



PROJEK JAWAB UNTUK JAYA (JUU) 2012



MODUL BIOLOGI

**PROJEK JAWAB UNTUK JAYA (JUU)
NEGERI PAHANG
TAHUN 2012**

BIOLOGI

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1.2 BIOLOGY SPM EXAM FORMAT (STARTING FROM 2003)

SUBJECT CODE : 4551

| Index | Criteria | Paper 1(4551/1) | Paper 2(4551/2) | Paper 3(4551/3) |
|-------|---------------------------------|--|---|--|
| 1 | Type of instrument | Objective Test | Subjective Test | Written Practical |
| 2 | Type of item | Objective Item <ul style="list-style-type: none"> Multiple choice Each item followed by four alternative answers A, B, C or D | Subjective Item <ul style="list-style-type: none"> Section A : structured Item Section B :Essay Item | Subjective Item : <ul style="list-style-type: none"> Structure Item Open ended Respond (Essay) |
| 3 | Total Question | 50 (Answer all the questions) | Section A : <ul style="list-style-type: none"> 5 items (Answer all the questions – Section B : <ul style="list-style-type: none"> 4 items (Answer any two questions) Refer to SPM 2008 format (latest) | Structure Item <ul style="list-style-type: none"> 1item (Answer all question) Open ended responds: <ul style="list-style-type: none"> 1 item (Essay written) |
| 4 | Total Marks | 50 | 100 | 50 |
| 5 | Responded | Blacken one space at OMR form | Write the answer in the space provided in the question paper | Write the answer in the space provided in the question paper |
| 6 | Duration | 1 hour 15 minutes | 2 hours 30 minutes | 1 hour 30 minutes |
| 7 | Construct scoring | section A : Knowlegment – 25 Section B : Understanding – 15 Section C : Application skill - 10 | Knowlegment – 10 Understanding – 20 Application skill – 30 Analysis skill – 15 Synthesis skill – 15 Evaluation - 10 | Science process skill : 16 aspect Max score :3 |
| 8 | Item example based on construct | Refer Example Instrument: Paper 4551 / 1 | Refer Example instrument: Paper 4551 / 2 | Refer Example instrument: Paper 4551 / 3 |

| | | | | |
|----------------------------------|--|--|---|---|
| 9 | Marking | Dichotomous Mark: 1 or 0 | Scoring is analytical based on scoring rubric | Scoring is analytical based on rubric at level 3. |
| 10 | Context | Construct from All learning Area are tested | Construct from All learning Area are tested | Construct are tested from suitable learning area. |
| 11 | Level of difficulties Easy : E Moderate : M Hard : H | R : S : T = 3 : 1 : 1 (25 easy item : 15 moderate item :10 hard item) | R : S : T = 4 : 4 : 2 (40marks easy Item: 40marks moderate item : 20marks hard item) | R : S : T = 3 : 1 : 1 (30 easy item : 10 moderate item : 10 hard item) |
| Overall R : S : T = 5 : 3 : 2 | | | | |
| 12 | Adding apparatus | Scientific calculator | Scientific calculator | Scientific calculator |

1.3 Analysis of the SPM Biology Exam Questions

Analysis of the SPM Biology Questions (2007-2011)

| CHAPTER | | 2007 | | | | | 2008 | | | | | 2009 | | | | | 2010 | | | | | 2011 | | | | |
|-----------|---|------|-----|----|---|----|------|-----|-----|---|----|------|-----|----|---|----|------|-----|----|---|----|------|-----|----|-----|----|
| | | P1 | | P2 | | P3 | P1 | | P2 | | P3 | P1 | | P2 | | P3 | P1 | | P2 | | P3 | P1 | | P2 | | P3 |
| | | OBJ | S | E | 1 | 2 | OB | S | E | 1 | 2 | OB | S | E | 1 | 2 | OB | S | E | 1 | 2 | OBJ | S | E | 1 | 2 |
| FORM FOUR | 1. Introduction of Biology | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2. Cell Structure and Cell Organisation | 4 | 1/2 | - | - | - | 2 | 1/2 | 1/5 | - | - | 2 | 1 | - | - | - | 3 | 1 | - | - | - | 4 | 3/5 | - | - | - |
| | 3. Movement of substance Across The Plasma Membrane | 2 | 1 | - | - | - | 3 | - | 4/5 | - | 1 | 5 | 1/5 | - | - | - | 2 | 1 | - | - | - | 4 | 1 | - | - | - |
| | 4. Chemical Composition Of The Cell | 1 | 1 | - | - | - | 3 | - | - | - | - | 3 | - | - | - | 1 | 4 | 1 | - | - | - | 3 | - | - | 1 | - |
| | 5. Cell Division | 2 | - | - | - | - | - | 1 | - | - | - | 2 | 2/3 | - | - | - | 2 | 1/2 | - | - | - | 3 | - | - | - | - |
| | 6. Nutrition | 9 | - | - | 1 | - | 8 | - | 1 | - | - | 6 | - | 1 | 1 | - | 5 | - | 1 | - | - | 4 | - | - | 1/2 | - |
| | 7. Respiration | 4 | 1/3 | - | - | 1 | - | - | - | - | - | 6 | 1 | - | - | - | 6 | - | - | - | - | 4 | 3/5 | - | - | - |
| | 8. Dynamic Ecosystem | 5 | - | 1 | - | - | 5 | - | - | 1 | - | 3 | - | 1 | - | - | 4 | - | - | - | - | 4 | - | - | 1/2 | - |
| | 9. Endangered Ecosystem | 3 | - | 1 | - | - | 3 | - | 1 | - | - | 4 | - | - | - | - | 3 | - | 1 | - | - | 3 | - | - | 1 | - |

| CHAPTER | | 2007 | | | | | 2008 | | | | | 2009 | | | | | 2010 | | | | | 2011 | | | | |
|-----------|------------------------------|------|-----|----|---|----|------|---|----|---|----|------|-----|----|---|----|------|-----|----|---|----|------|-----|---|----|---|
| | | P1 | | P2 | | P3 | P1 | | P2 | | P3 | P1 | | P2 | | P3 | P1 | | P2 | | P3 | P1 | P2 | | P3 | |
| | | OB | S | E | 1 | 2 | OB | S | E | 1 | 2 | OB | S | E | 1 | 2 | OB | S | E | 1 | 2 | | S | E | 1 | 2 |
| FORM FIVE | 1. Transport | 4 | - | - | - | - | 6 | ½ | 1 | - | - | 7 | 1 | 1 | - | - | 3 | - | 1 | | | 3 | 1/5 | | | 1 |
| | 2. Locomotion and Support | - | - | - | - | - | 3 | - | - | - | - | 1 | - | - | - | - | 1 | 1 | - | | | 5 | 1 | | | |
| | 3. Coordination and Response | 7 | 2/3 | 1 | - | - | 5 | 1 | - | - | - | 4 | - | - | - | - | 4 | - | 1 | | | 4 | 1 | | | |
| | 4. Reproduction and Growth | 6 | 2/3 | 1 | - | - | 5 | 1 | - | - | - | 4 | 1 | - | - | - | 7 | - | - | | | 3 | | 1 | | |
| | 5. Inheritance | 2 | - | 1 | - | - | 2 | 1 | - | - | - | 2 | 1/3 | - | - | - | 3 | - | - | | | 5 | | 1 | | |
| | 6. Variation | 3 | - | - | - | - | 2 | - | - | - | - | 1 | - | 1 | - | - | 3 | 1/2 | - | | | 1 | | | | |

EXPERIMENTS CHECKLISTS FORM 4 (SPM 2006-2011)

| No | Topic | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | 2011 | |
|----|--|------|----|------|----|------|----|------|----|------|----|------|----|
| | | Q1 | Q2 | Q1 | Q2 | Q1 | Q2 | Q1 | Q2 | Q1 | Q2 | Q1 | Q2 |
| 1 | CHAPTER 3: Akt:3.1 Size of molecule that can diffuse through a semipermeable membran | | | | | | X | | | | | | |
| 2 | CHAPTER 3: Movement of substances across the plasma membrane Activity 3.2 : Studying osmosis using an osmometer (page 24) | | | | | | | | | | | | |
| 3 | CHAPTER 3: Movement of substances across the plasma membrane Activity 3.4 and 3.4 : Studying the effects of hypotonic ,hypertonic and isotonic solutions on animal and plant cells. (27-28) | | | | | | | | | | | | |
| 4 | CHAPTER 3: Movement of substances across the plasma membrane Activity 3.6 : Determining the concentration of an external solution which is isotonic to the cell sap of a plant. (page 30) | | X | | | | | | | | | | |
| 5 | CHAPTER 4: Chemical composition of the cell Activity 4.3: Studying the effects of temperature on salivary amylase activity (page 36) | | | | | | | | X | | | | |
| 6 | CHAPTER 4: Chemical composition of the cell Activity 4.4: Studying the effects of pH on the activity of pepsin (page 39) | | | | | | | | | | | X | |
| 7 | CHAPTER 4: Chemical composition of the cell Activity 4.4: Investigate the effects of pH on the breakdown of starch by amylase. (page 41) | | | | | | | | | | | | |
| 8 | CHAPTER 4: Chemical composition of the cell | X | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|----|--|--|--|---|--|--|--|---|--|---|--|--|--|
| | Activity 4.5: Studying the effects of substrate concentration on salivary amylase activity (page 42) / (SPM : Concentration of albumen) | | | | | | | | | | | | |
| 9 | CHAPTER 4: Chemical composition of the cell Activity 4.6: Studying the effects of enzyme concentration on salivary amylase activity (page 43) | | | | | | | | | | | | |
| 10 | CHAPTER 6: Nutrition Activity 6.1: Determining the energy value in food samples. (page 61 – 62) | | | | | | | | | | | | |
| 11 | CHAPTER 6: Nutrition Activity 6.3: Determining the vitamin C contain in various fruit juices. (page 65 – 66) | | | | | | | | | | | | |
| 12 | CHAPTER 6: Nutrition Activity 6.8 : Studying the effects of macronutrient deficiency in plants (page 72) | | | | | | | | | | | | |
| 13 | CHAPTER 6: Nutrition Activity 6.11 Investigating the effects of light intensity on the rate of photosynthesis. (page 76) | | | X | | | | X | | | | | |
| 14 | CHAPTER 6: Nutrition Activity 6.11 Investigating the effects of carbon dioxide concentration on the rate of photosynthesis. | | | | | | | | | | | | |
| 15 | CHAPTER 7: Respiration Activity 7.6: Investigating the differences between inhaled and exhaled air in terms of oxygen and carbon dioxide contents. (page 93) (page 93 – 94) | | | | | | | | | X | | | |
| | | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|----|--|--|--|--|--|---|--|--|--|--|---|--|--|
| 16 | CHAPTER 7: Respiration Activity 7.2 : Investigating the process of anaerobic respiration in yeast (page 85) | | | | | | | | | | | | |
| 17 | CHAPTER 8 :Dynamic Ecosystem Activity 8.1 Investigating interspecific competition of plant | | | | | | | | | | X | | |
| 18 | CHAPTER 8: Dynamic Ecosystem Activity 8.5 Investigating the distribution of plants using the quadrat sampling technique (page 111- 112) Modified (using Grid) | | | | | X | | | | | | | |
| 19 | CHAPTER 8: Dynamic Ecosystem Activity 8.6 Estimating the population size of animals using capture, mark, release and recapture technique (page 113) | | | | | | | | | | | | |
| 20 | CHAPTER 8: Dynamic Ecosystem Activity 8.11 Studying the effects of temperature, pH, light intensity and nutrients on the activity of yeast (page 119) | | | | | X | | | | | | | |
| 21 | CHAPTER 9: Endangered Ecosystem Activity 9.2: Investigating the level of pollution in several different sources of water (page 128 – 129) | | | | | | | | | | | | |

EXPERIMENTS CHECKLISTS FORM 5 (SPM 2003-2011)

| No | Topic | 2003 | | 2004 | | 2005 | | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | 2011 | | |
|----|--|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|---|
| | | Q 1 | Q 2 | Q 1 | Q 2 | Q 1 | Q 2 | Q 1 | Q 2 | Q 1 | Q 2 | Q 1 | Q 2 | Q 1 | Q 2 | Q 1 | Q 2 | Q 1 | Q 2 | |
| 1 | CHAPTER 1:TRANSPORT To study one of the factor of affecting the rate of transpiration. | | | | | | | | | | | | | | | | | | | X |
| 2 | CHAPTER 3: COORDINATION AND RESPONSE. - To study the effect of different quantities of water intake of urine output. | | | | | | | | | | | | | | | | | | | |
| 3 | CHAPTER : VARIATION - To investigate continuous variation and discontinuous variation in human. | | | | | | | | | | | | | | | | | | | |
| 4. | CHAPTER 6: VARIATION - To investigate the importance of camouflage in the survival of a species | X | | | | | | | | | | | | | | | | | | |

1.4 TIPS FOR EXAM

1.4.1 Objective Question – Paper1

- i. Try to answer easy questions first, followed by moderate questions and students have enough time to answer difficult questions.
- ii. Don't take more than 1 1/2 minutes for each question to make sure enough time for all questions.
- iii. Read the question carefully for three times to you understand what are the questions ask.
- iv. More information for each question can get from graph, table, and diagram that given.
- v. Make (/) for true statement, reject all destructor and guess the best answer when you are not sure the best answer.
- vi. Make sure answer all the questions and remark all the answer and make sure:
 - * One question only one answer.
 - * Deleted wrong answer completely
 - * Used 2B pencil.
- Vii Examples of questions form for paper 1
 - * Remember the fact
 - * Making conclusion
 - * Application
 - * Observation
 - * Knowlegment
 - * Comparisons
 - * Identify the problem
 - * Calculation

1.4.2 Subjective Question

- ✚ Encourage the students to review the essay question first (Part B Paper2),before answer the structure question, this because students will have enough time to think some facts or explanation.
- ✚ Almost structure questions based on diagram, table, data, flow chart, graph that suitable with fact, experiment or investigation. Understand all the information given.
- ✚ Time suggestion to answer Paper 2: Part A (90 minutes), Part B (60 minutes), for Paper 3 : Question 1 (50 minutes) and Question 2 (40 minutes)
- ✚ Answer in one word, one number or one simple sentence
- ✚ Don't combine the right fact with the wrong fact
- ✚ Follow the instruction like : Give **two** examples of....., so students should give only two examples, the third example will not get the mark.
- ✚ No need write in long sentence or copy again part of the question.
- ✚ Answer can be in equations form, diagram, table or graph. Calculation must be show.
- ✚ Space for write the answers and mark at end of the essays or structure questions are given will show how long the answer must be write.
- ✚ Characteristics of alveolus :

| Accept | Reject |
|---|----------------------------|
| Thickness of alveolus is only one cell | Alveolus is thin |
| Surface of alveolus is wet | wet |
| A lot of network of blood capillaries covering the alveolus | A lot of blood capillaries |

- ✚ Instruction verb like justification, evaluation, give your opinion,
- ✚ Students must state like ‘ I agree / I accept / I’m not agree / I’m not accept that statement given (1 mark) and followed by opinion

- ✚ Draw a diagram
 - * No artistic
 - * Big (suitable size), clear,
 - * Label the diagram correctly and line for label can’t be cross together
 - * Neat and without broken lines

- ✚ Draw a enzyme structure: Size and shape of the enzyme must same with the original

- ✚ Comparison - Must have similarities and differences
 - One characteristic must compare between two subject in one sentence
 - Separate sentence between similarities and differences
 - If answer in table, must write in full sentence

- ✚ Write chemical equation :
 - * In word form
 - [/] Glucose + oxygen \longrightarrow Carbon dioxide + water + energy
 - [X] Glucose + oxygen \longrightarrow CO₂ + H₂O + energy
 - * In chemical form
 - [/] C₆H₁₂O₆ + 6O₂ \longrightarrow 6CO₂ + 6H₂O + energy

- ✚ Draw the hybrid cross (Inheritance)
 - * Has key
 - * Label the schema diagram
 - Parental Genotype
 - Parental Gamete
 - F1 Genotype
 - F1 Phenotype

- ✚ Male gamete and female gamete are fertilization
* **Reject combine / attach**
- ✚ Function of mitochondrion – Generate / provide energy
- **Reject : Supply / give energy**
- ✚ Don't copy again part of the question because this is not get any mark.

1.4.3 Paper 3

1.4.3.1 Question 1

i) Measuring using number

Measure / record the data using apparatus that given in the experiment / question with the correct unit

Example : Record scale / thermometer reading, stop watch, ruler, measuring cylinder, syringe, burette with the correct **units** (if not given)

ii) Observing

Making observation based on the experiment given not on the theory. What can observe / see only – from data, table, scale of apparatus

Example : State changes in color
State increase of thermometer reading
State changes in time
State changes in volume (end of experiment)

- State the **VALUE OF MV & RV**
- The observation that can be making inference

iii) Making Inferences

- Making initial conclusion / cause based on observation
- Inferences must be correspond with the observation (inference (i) correspond with observation (i) , inference (ii) correspond with observation (ii)
- Must infer MV & RV

If wrong / reject observation automatic inference will reject / wrong

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iv) **Controlling Variables**

- Able to state all the variables, controlled, responding and manipulated variables correctly and method to handle variable correctly.
- Must state **PARAMETER** like volume, temperature, mass, time, length
- State that apparatus using to get the result for responding and controlled variables.

| Variable | Method to handle variable correctly |
|--|---|
| <p>Manipulated variable: Variables that are changed in the experiment</p> <p>Examples: Temperature of water bath, Mass of food, Concentration of sucrose solution, Type of fruits</p> | <p>Change in mass/concentration / water Or used different mass/ concentration / type of food</p> <p>Example :</p> <ul style="list-style-type: none"> + Used different mass of food + Used 30% sucrose solution, 5% sucrose solution 10% sucrose solution + Replace papaya juice with orange juice + Change the concentration of albumen |
| <p>Responding variable: Variable that are measure after experiment / result</p> <p>Example</p> <ol style="list-style-type: none"> i) Final length of potato strip, ii) Final temperature of water, iii) Rate of transpiration iv) Rate of enzyme reaction | <p>Must state the apparatus or state the formula using</p> <p>Example :</p> <ol style="list-style-type: none"> i) Measure and record the final length of potato strip using ruler ii) Measure and record the final temperature of water using thermometer iii) Calculate the rate of transpiration using formula : distance divided by time iv) Calculate the rate of enzyme reaction using formula concentration of albumen dived by time |
| <p>Controlled variable: Variable that constant during experiment</p> <p>Example: Initial temperature of water, volume of water, concentration of starch, type of enzyme</p> | <p>Must state the PARAMETER and VALUE and APPERATUS</p> <p>Example :</p> <ul style="list-style-type: none"> Fix the temperature at 37°C using thermometer Fix volume of water at 20ml using measuring cylinder Fix concentration of starch at 10% Fix type of enzyme is pepsin |

v) **Making hypothesis**

Make a statement of hypothesis by relating **the manipulated** variable (MV) with the **responding** variable (RV) and showing the specific **relationship (H)**.

vi) **Communication**

Presenting the data in certain form like table, graph, chart or diagram.

Table - Column and row with correct title and units (manipulated and responding variable)

- Sufficient and systematic data (observational data)

Graph - Both axes labeled with correct units } (1m)

- Uniform scale
- All points plotted correctly (1m)
- Smooth curve and correct shape (1m)

Chart - Title of the chart

- Both axes labeled with correct units
- Uniform scale
- Bars plotted correctly
- Correct shape

Diagram - No artistic

- Big (suitable size), clear,
- Label the diagram correctly and line for label can't be cross together
- Neat and without broken lines

Calculation - Work out accurate calculation

- Wright formula
- Replacement with correct data
- Answer with correct unit

vii) **Interpreting Data**

- Based on the communicating data, able to state correctly the relationship between the variables
- Support with theory

viii) **Relationship between space and time**

- Quantity and time (concentration, volume)
- Relationship between manipulated / responding variable with time
- Support with theory

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- ix) **Predicting**
Give once value that may be true base on the trend / data before and support by Theory
- x) **Defining by operation**
- Base on experiment, refer observation
- Including data, color, or time
- Refer to RV , HP
- Can't base on theory
- xi) **Classifying**
Can group the answer base on the certain character

1.4.3.2 Question 2 (NEW FORMAT)

- i) **Problem statement (01) 3M**
- In question form.
- Relationship between manipulated and responding variable
- End of sentence has question mark (?)
- ii) **Hypothesis (02) 3M**
Make a statement of hypothesis by relating **the manipulated variable (MV)** with the **responding variable (RV)** and showing the specific **relationship**.
- ii) **Variables (03) 3M**
- **Manipulated variable - 1m**
- **Responding variable -1m**
- **Controlling variable - 1m**
- iii) **List of apparatus and materials (04) 3M**
Don't separate between apparatus and materials
- vi) **Experimental Procedure or method (05) 3M**
List down the complete and correct technique used based on the following criteria:
K1 : Technique of assembling the apparatus and materials to carry out the experiment
K2 : Technique of fixing the constant variable
K3 : Technique of changing the manipulated variable
K4 : Technique of measuring the responding variables
K5 : Technique of taking precautions to increase accuracy State precautionary in the experiment

Scoring :

| K's | Score |
|------------|--------------|
| 5K | 3M , |
| 3-4K | 2M |
| 2K | 1M |
| 1K | 0M |

viii) Presentation of data (06) 3M

- Title of column and row with correct unit
(**manipulated and responding variable**) **1m**
- **List Manipulated Variable correctly** **1m**

1.5 PAPER 2 – SPM 2011

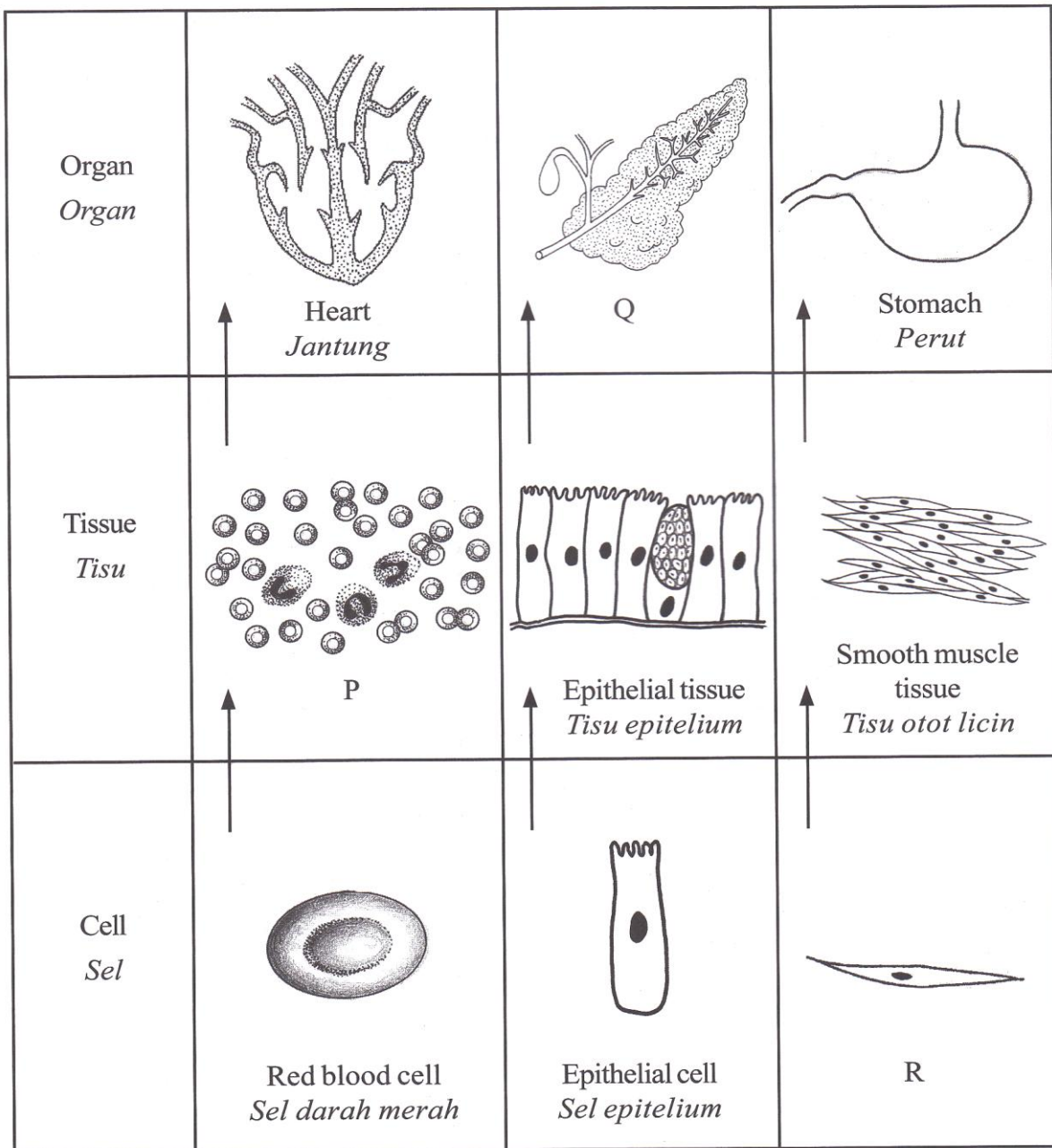
Section A

[60 marks]

Answer **all** questions in this section

Diagram 1.1 shows the different levels of cell organisation in human from cell to organ.

Rajah 1.1 menunjukkan aras yang berbeza dalam organisasi sel bagi manusia daripada sel ke organ.



(a) (i) Name P, Q and R.

P :

Q :

R :

[3 markah]

(ii) State one function of the red blood cell.

.....

[1 markah]

(b) Explain the function of Q in regulating the blood glucose level.

.....

.....

.....

.....

[2 markah]

Examiner's Use

Q1114

I(c)

| |
|---|
| 2 |
|---|

(c) Explain why the sperm cells contain more mitochondria.
 Terangkan mengapa sel sperma mempunyai lebih mitokondrion.

.....

.....

.....

[2 marks]
 [2 markah]

I(d)

| |
|---|
| 2 |
|---|

(d) Explain how lysosomes help in eliminating damaged organelles in the cells.
 Terangkan bagaimana lisosom membantu dalam penyingkiran organel-organel yang rosak di dalam sel.

.....

.....

.....

[2 marks]
 [2 markah]

Total
 A1

| |
|----|
| 12 |
|----|

| | <i>r ungsi</i> |
|--|----------------|
| Rennin <i>Renin</i> | |
| Pepsin <i>Pepsin</i> | |
| Hydrochloric acid <i>Asid hidroklorik</i> | |

[3 marks]
 [3 markah]

2. Diagram 2.1 shows a plant cell that has been immersed in 30% sucrose solution.
Rajah 2.1 menunjukkan sel tumbuhan yang telah direndam dalam larutan sukrosa 30%.

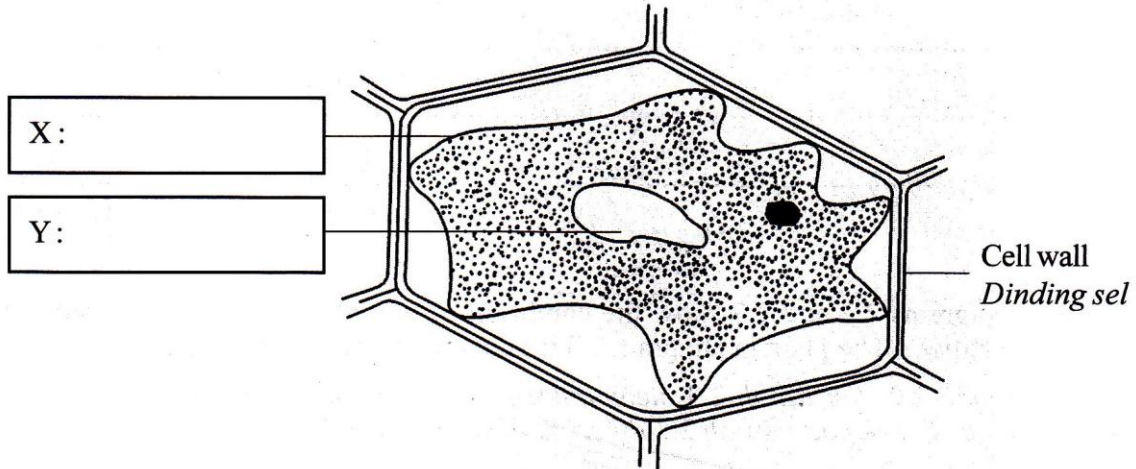


Diagram 2.1
Rajah 2.1

- (a) (i) On Diagram 2.1, label X and Y.
Pada Rajah 2.1, labelkan X dan Y.
- [2 marks]
 [2 markah]
- (ii) Name the solution which filled the space between the cell wall and X.
 Explain how the solution filled the space.
Namakan larutan yang mengisi ruang antara dinding sel dan X.
Terangkan bagaimana larutan itu mengisi ruang tersebut.
- Name of solution:
- Nama larutan*
- Explanation :
- Penerangan*
-
 [2 marks]
 [2 markah]

(b) The plant cell in Diagram 2.1 has undergone plasmolysis.

Explain how this happened.

Sel tumbuhan dalam Rajah 2.1 telah mengalami plasmolisis.

Terangkan bagaimana ini berlaku.

.....

.....

.....

[2 marks]
[2 markah]

(c) Diagrams 2.2 and 2.3 show the condition of two plants which are added with fertilizer. The plant in Diagram 2.3 is added with excess fertilizer.

Rajah 2.2 dan Rajah 2.3 menunjukkan keadaan dua pokok yang telah diberi baja. Pokok pada Rajah 2.3 diberi baja secara berlebihan.



Diagram 2.2
Rajah 2.2



Diagram 2.3
Rajah 2.3

Explain the condition of the plant in Diagram 2.3.

Terangkan keadaan pokok pada Rajah 2.3.

.....

.....

.....

.....

.....

[3 marks]
[3 markah]

(d) Diagram 2.4 shows a method of preserving vegetables.

Rajah 2.4 menunjukkan satu kaedah pengawetan sayur-sayuran.

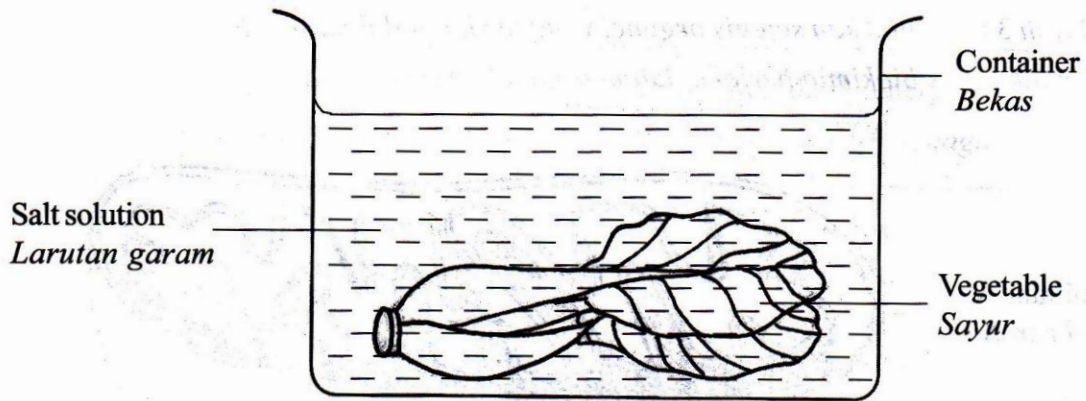


Diagram 2.4
Rajah 2.4

Explain the method used.

Terangkan kaedah yang digunakan.

.....

.....

.....

.....

.....

[3 marks]
[3 markah]

3.

Diagram 3 shows a type of organelle found in muscle cells.

A biochemical reaction occurs in the organelle.

Rajah 3 menunjukkan sejenis organel yang terdapat dalam sel otot.

Tindak balas biokimia berlaku dalam organel tersebut.

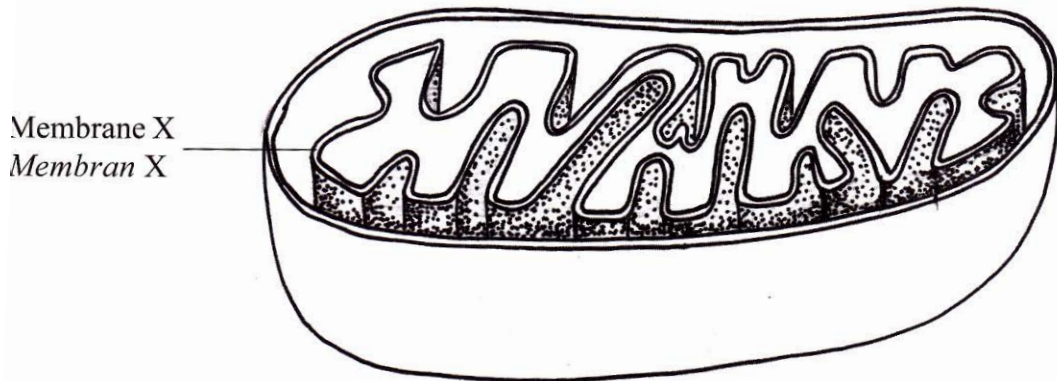


Diagram 3
Rajah 3

(a) (i) Name this organelle.

Namakan organel ini.

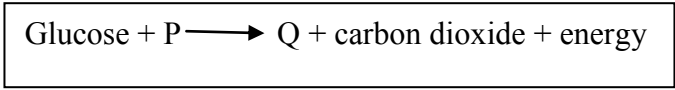
.....
[1 mark]
[1 markah]

(ii) Explain why membrane X is in the form of numerous folded layers.

Terangkan mengapa membran X adalah dalam bentuk lapisan yang berlipat-lipat.

.....
.....
.....
[2 marks]
[2 markah]

(b) The biochemical reaction that occurs in this organelle is summarized as follows:



(i) Name gas P

.....
[1 markah]

(ii) Name product Q.

.....
[1 markah]

(iii) Explain why the muscle cell has a large number of these organelles.

.....

[2 markah]

- (iv) If the blood sugar level is lower than the normal range, the biochemical reaction in this organelle can still occur.

Explain how.

.....

.....

.....

.....

.....

[3 markah]

- (c) State **two** differences on the biochemical reaction occurring between muscle cell and yeast cell in the absence of the gas P.

| Muscle cell | Yeast cell |
|------------------|----------------|
| 1. | |
| 2. | |

[2 markah]

4. Diagram 4 shows human muscles and bones involved in bending the leg.
Rajah 4 menunjukkan otot dan tulang manusia yang terlibat semasa pembengkokan kaki.

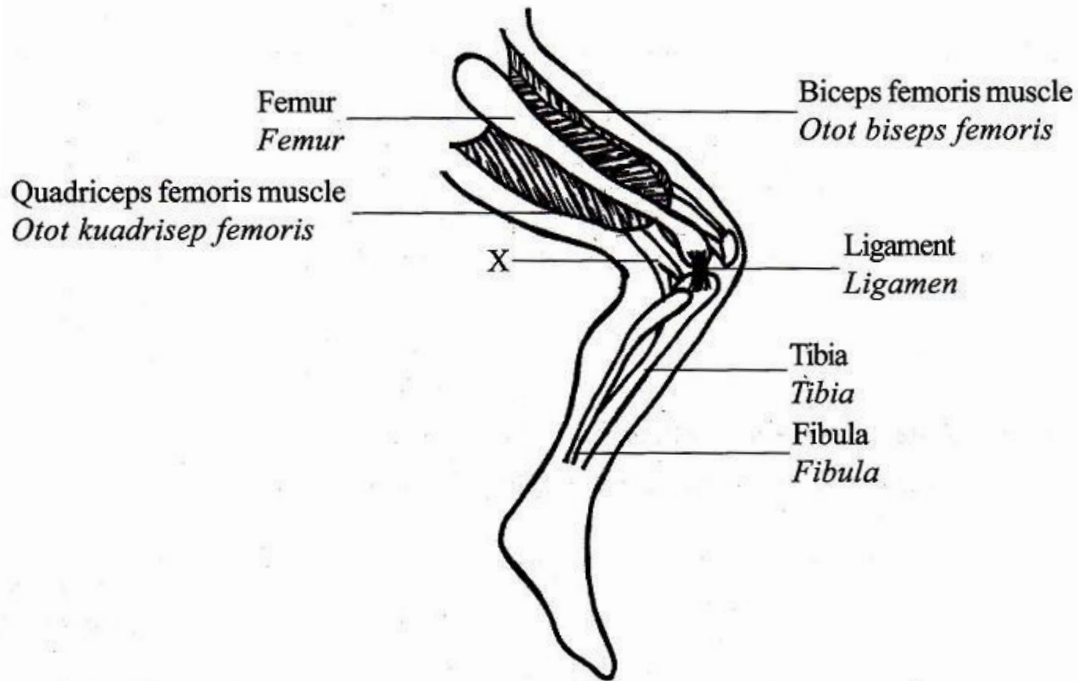


Diagram 4
Rajah 4

- (a) (i) Name X.

Namakan X.

X :

[1 mark]
 [1 markah]

- (ii) State **one** function of X.

*Nyatakan **satu** fungsi X.*

.....

[1 mark]
 [1 markah]

(b) Describe briefly how the characteristic of X is adapted for its function as stated in 4(a)(ii).

.....
.....
.....
.....
.....
.....

[2 markah]

(c) (i) State **one** function of ligament in Diagram 4.

.....

[3 markah]

(ii) Ligament of a gymnast are more flexible compared to ordinary people.

Explain the statement.

.....
.....
.....
.....
.....
.....

[2 markah]

(d) Some marathon runners experience muscle cramps at the end of a race.

(i) What is muscle otot?

.....

[1 markah]

(ii) State **one** cause of muscle cramps among alhlete.

.....

[1 markah]

(e) Suggest **three** ways in which a person can maintain a healthy musculoskeletal system.

1.

.....

2.....

.....

3.

.....

[3 markah]

- 5 Diagram 5 shows the structure of a nephron with the blood vessels in the kidney.
Rajah 5 menunjukkan struktur satu nefron dan salur darah dalam ginjal.

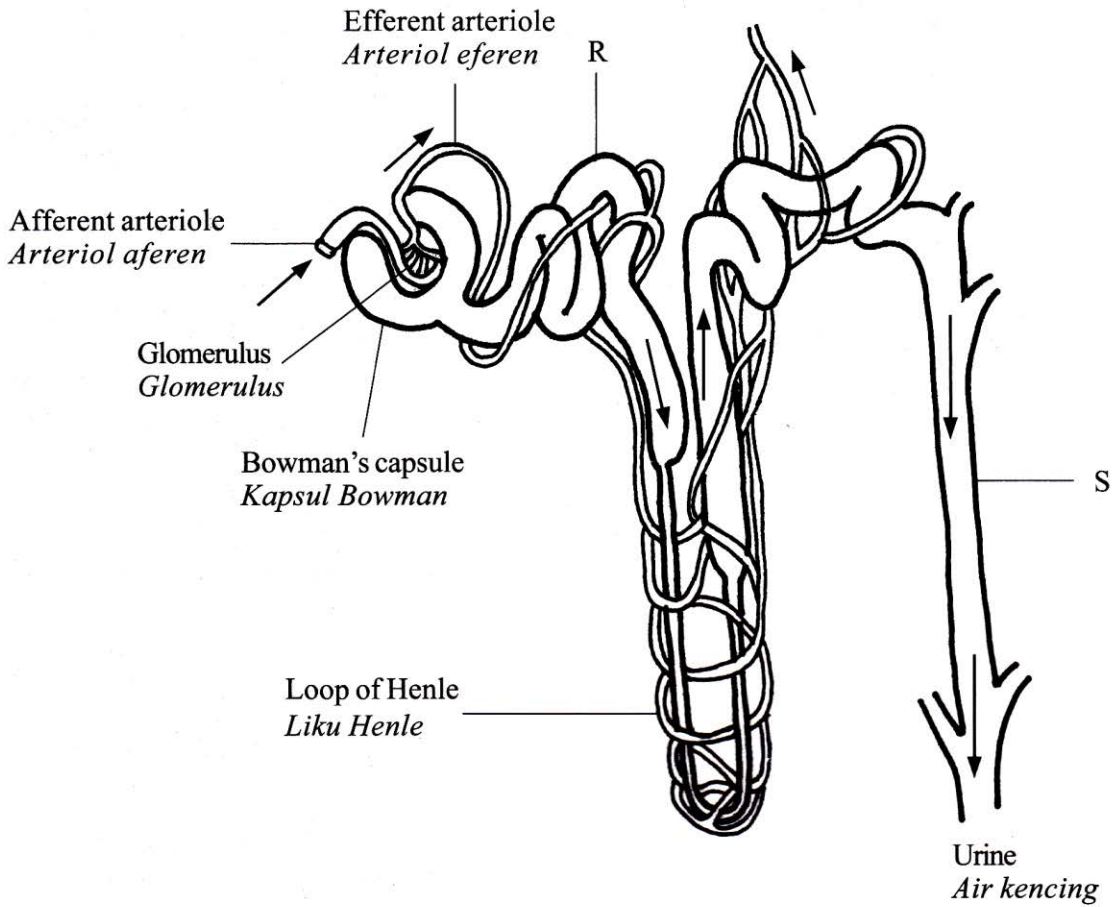


Diagram 5
Rajah 5

- (a) Explain the process that occurs between glomerulus and Bowman's capsule.
Terangkan proses yang berlaku antara glomerulus dengan kapsul Bowman.

Process / Proses:

.....

Explanation / Penerangan:

.....

.....

.....

[3 marks]
 [3 markah]

(b) Table 5 shows the filtrate in R and S.

| Filtrate content | Concentration of filtrate content (%) | |
|------------------|---------------------------------------|------|
| | R | S |
| Glucose | 0.1 | 0 |
| Amino acid | 8.0 | 0 |
| Water | 90.0 | 95.0 |
| Mineral salts | 1.87 | 2.65 |
| Urea | 0.03 | 2.0 |

Table 5

(i) State one difference in the concentration of amino acid between R and S.

.....

[1 marks]

(ii) Based on answer in 5(b)(i), explain why.

.....

[2 marks]

(c) The urine of a person contains glucose.

What is the disease he suffers from?

State why.

.....
.....
.....
.....

[2 marks]

(d) The nephrones of certain mammals living in desert have very long loops of Henle.

State the effect on the filtrate formed in S.

.....
.....

[1 marks]

(e) Explain the importance of kidney.

.....
.....
.....
.....
.....
.....

[3 marks]

Section B
[40 marks]

Answer any two questions from this section.

6.

Diagram 6.1 shows the growth curve of a grasshopper.

Rajah 6.1 menunjukkan lengkung pertumbuhan seekor belalang.

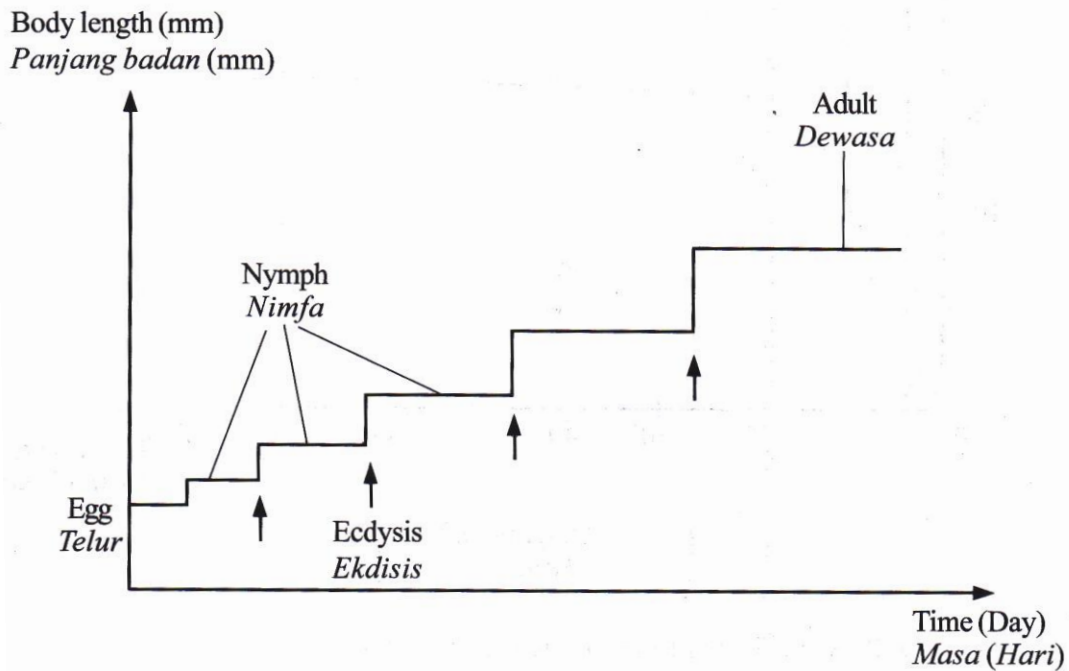


Diagram 6.1
Rajah 6.1

(a) Explain the growth curve of the grasshopper.

[4 marks]

Terangkan lengkung pertumbuhan belalang itu.

[4 markah]

(b) Diagram 6.2 shows the growth curve of human.
Rajah 6.2 menunjukkan lengkung pertumbuhan manusia.

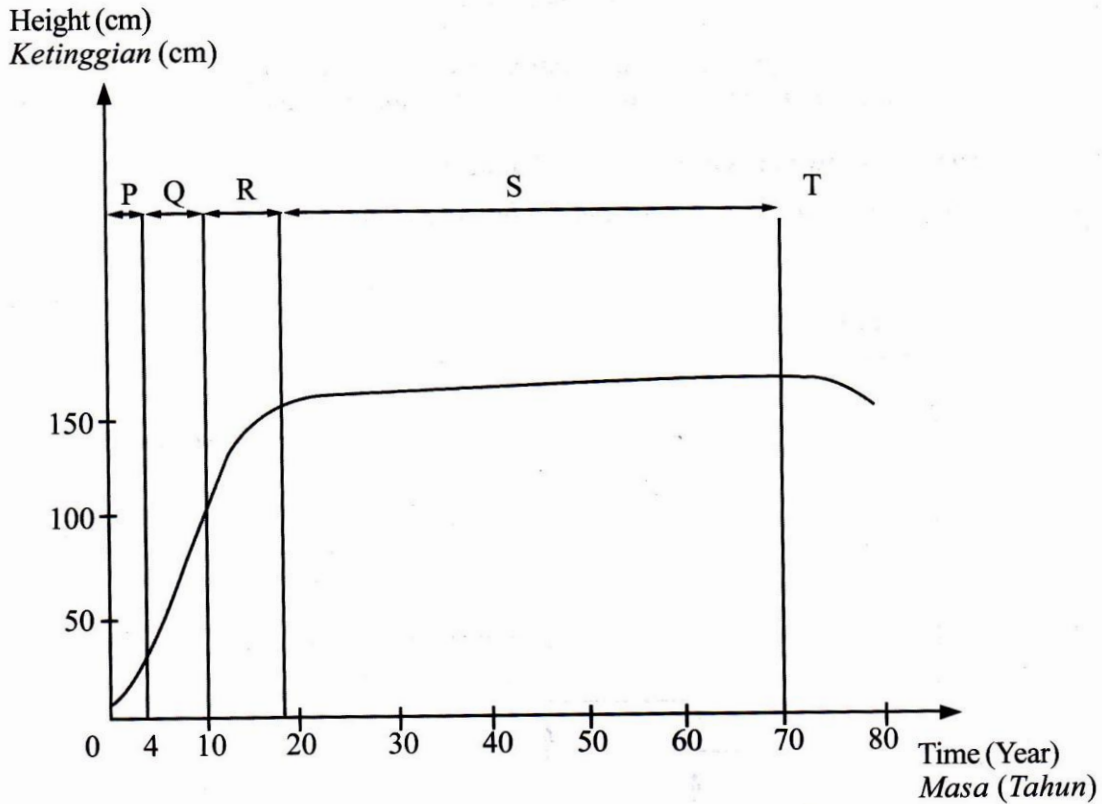


Diagram 6.2
Rajah 6.2

P, Q, R, S and T are phases of the growth curve.

Explain the changes occur in each phase.

[10 marks]

P, Q, R, S dan T adalah fasa-fasa pada lengkung pertumbuhan.

Terangkan perubahan yang berlaku pada setiap fasa.

[10 markah]

(c) Science and technology can help married couples to overcome their infertility problems.

State **two** infertility problems and explain the various methods to overcome the problems.

[6 marks]

Sains dan teknologi boleh membantu pasangan yang berkahwin untuk mengatasi masalah ketidaksuburan mereka.

*Nyatakan **dua** masalah ketidaksuburan dan terangkan pelbagai kaedah untuk mengatasi masalah itu.*

[6 markah]

7. (a) Diagram 7 shows a cross between a homozygous black male mouse and a homozygous white female mouse.

Rajah 7 menunjukkan kacukan di antara tikus jantan hitam homozigot dengan tikus betina putih homozigot.



Homozygous black male mouse
Tikus jantan hitam homozigot



Homozygous white female mouse
Tikus betina putih homozigot

Diagram 7
Rajah 7

Allele B for black fur is dominant and allele b for white fur is recessive.

Draw a genetic diagram to determine the phenotypic percentage of the offsprings in the cross. [6 marks]

Alel B untuk bulu hitam adalah dominan dan alel b untuk bulu putih adalah resesif.

Lukis rajah genetik untuk menentukan peratusan fenotip anak dalam kacukan itu. [6 markah]

- (b) Thalassaemia is a hereditary disease.

Explain the cause of this disease and how it affects a person's health. [4 marks]

Talasemia adalah penyakit pewarisan.

Terangkan penyebab kepada penyakit ini dan bagaimana penyakit ini memberi kesan terhadap kesihatan seseorang. [4 markah]

(c)

A man with Rhesus factor in his blood is Rh-positive. His wife who does not have Rhesus factor in her blood is Rh-negative. Their first child who is Rh-positive survives but their second child who is also Rh-positive does not survive

Explain the above passage.

[6 marks]

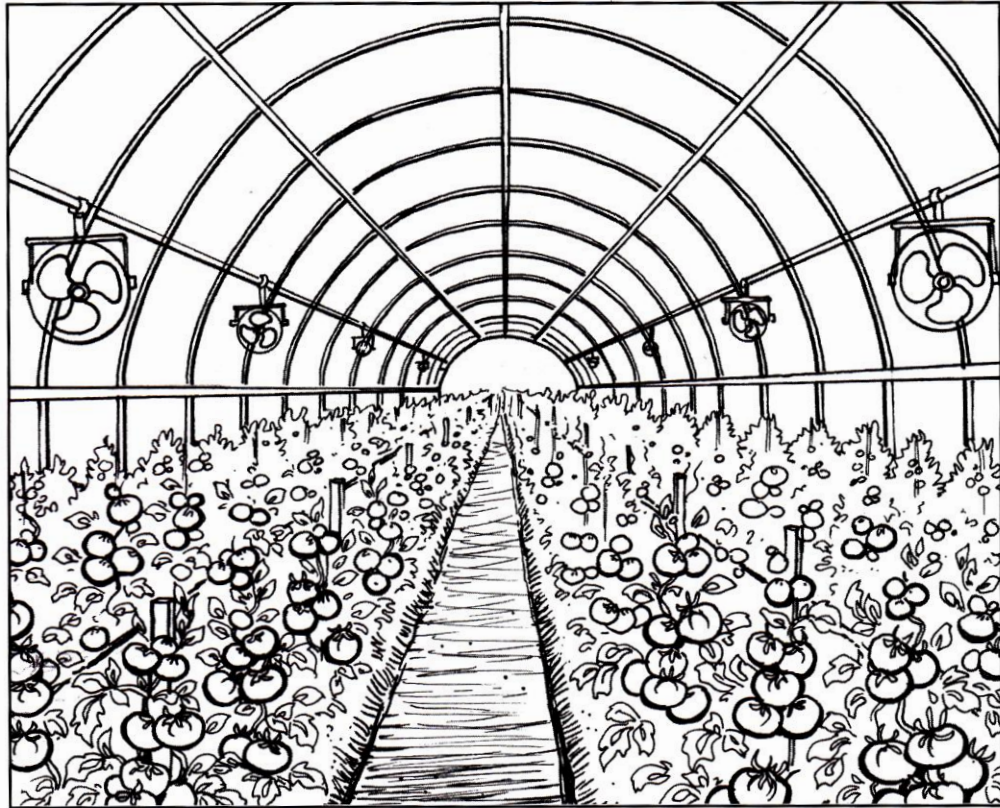
(d) State **four** differences between Down's Syndrome and colour blindness based on the causes and characteristics.

[6 marks]

8.

- (a) Greenhouse is used to control biotic and abiotic factors to increase the yield of crops. Diagram 8 shows tomato plants grown in a green house.

Rumah hijau digunakan untuk mengawal faktor biotik dan abiotik untuk meningkatkan hasil tanaman. Rajah 8 menunjukkan pokok tomato yang ditanam dalam rumah hijau.



Tomato plants grown in a greenhouse
Pokok tomato ditanam dalam rumah hijau

Diagram 8
Rajah 8

Explain how the greenhouse influences the productivity of the tomato plants.
[10 marks]

Terangkan bagaimana rumah hijau mempengaruhi produktiviti pokok tomato itu.
[10 markah]

- (b) There are various methods used in food processing.

Suggest **two** methods and discuss the advantages and disadvantages of each method.
[10 marks]

Terdapat pelbagai kaedah yang digunakan dalam pemprosesan makanan.

Cadangkan dua kaedah dan bincangkan kebaikan dan keburukan setiap kaedah itu. <http://edu.joshuatly.com/> [10 markah]

<http://fb.me/edu.joshuatly>

9. (a) Diagram 9.1 shows the effects of farming activities near a pond.

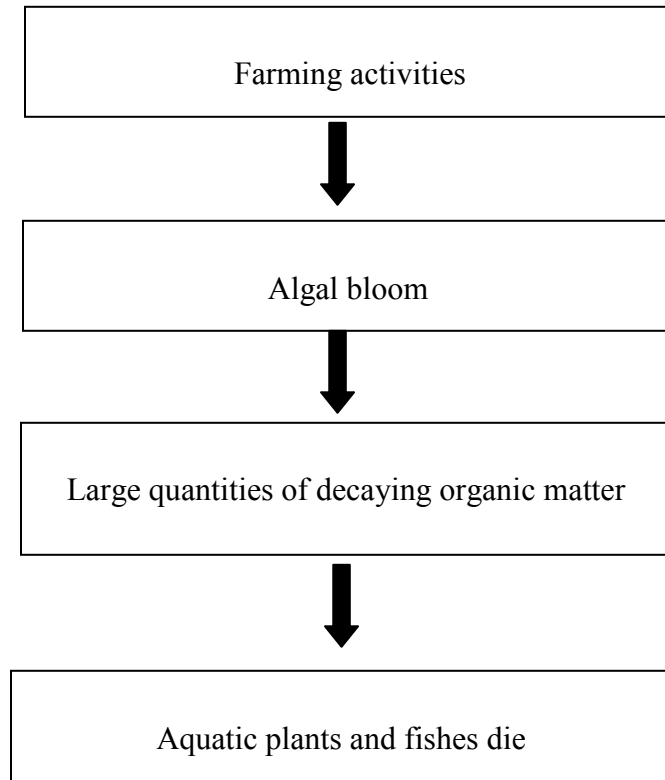


Diagram 9.1

Explain how the farming activities cause the death of the aquatic plant and fishes in the pond.

[6 marks]

(b) Diagram 9.2 shows a new industrial area situated near a residential area.

Rajah 9.2 menunjukkan satu kawasan perindustrian baru berdekatan dengan kawasan perumahan.

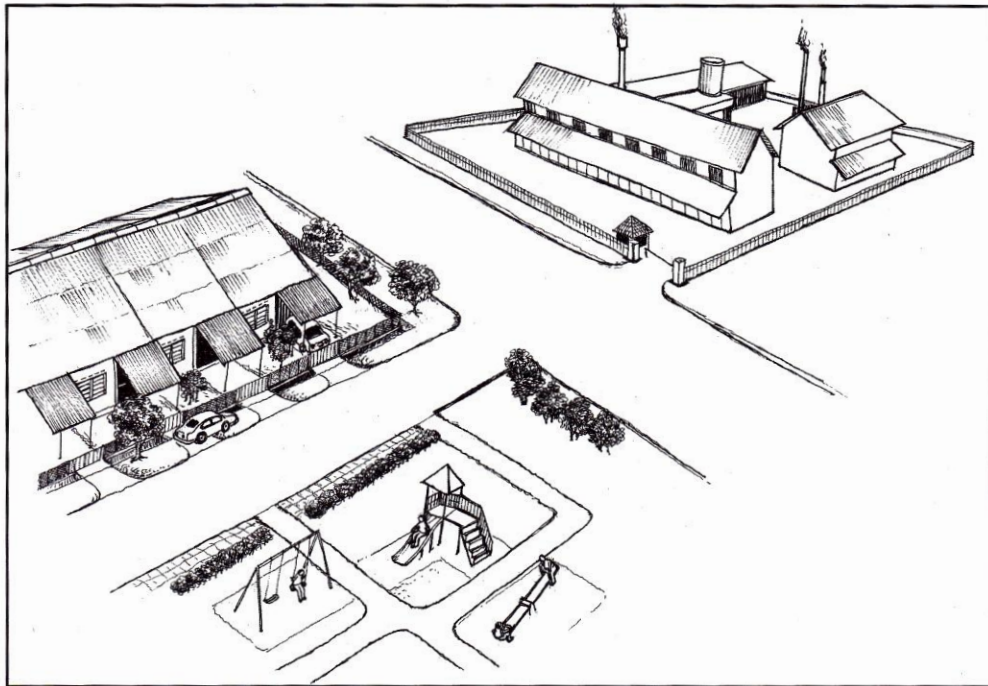


Diagram 9.2
Rajah 9.2

Discuss the good and the bad effects caused by the industrial activities on human and environment in years to come. [10 marks]

Bincangkan kesan baik dan kesan buruk yang disebabkan oleh aktiviti-aktiviti perindustrian terhadap manusia dan alam sekitar pada tahun-tahun akan datang. [10 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

1.5.2 PAPER 3

1. An experiment was carried out to investigate the effect of the values on the hydrolysis of starch by amylase enzyme. Several buffer solutions with different pH values were prepared.

The following steps were carried out.

Step 1.

2ml of 1% amylase solution was placed into a boiling tube containing 5ml of buffer solution at pH 6.

Step 2

2 drops of iodine solution was placed into each groove on white tile.

Step 3

3ml of 1% of starch solution was added into the boiling tube and the stopwatch is started immediately.

Step 4

Every 2 minutes, a drop of the mixture from the boiling tube was dropped into a new groove of iodine solution on the white tile by using a clean dropper.

Step 5

The time taken for iodine solution to remain yellow is recorded.

Step 6

Step 1-5 are repeated using buffer solution at pH 5, 6, 7, and 9.

Diagram 1 shows the materials and apparatus used in this experiment for different pH values of buffer solutions.

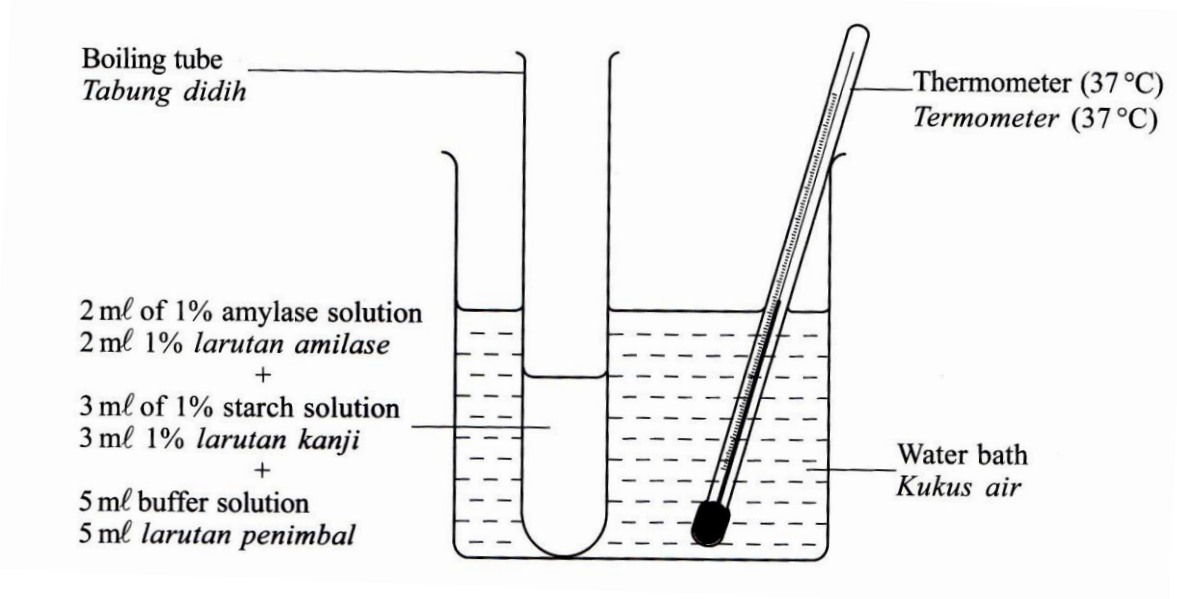


Diagram 1

Diagram 2 shows the observation for the experiment using buffer solution at pH 6 after 6 minutes.

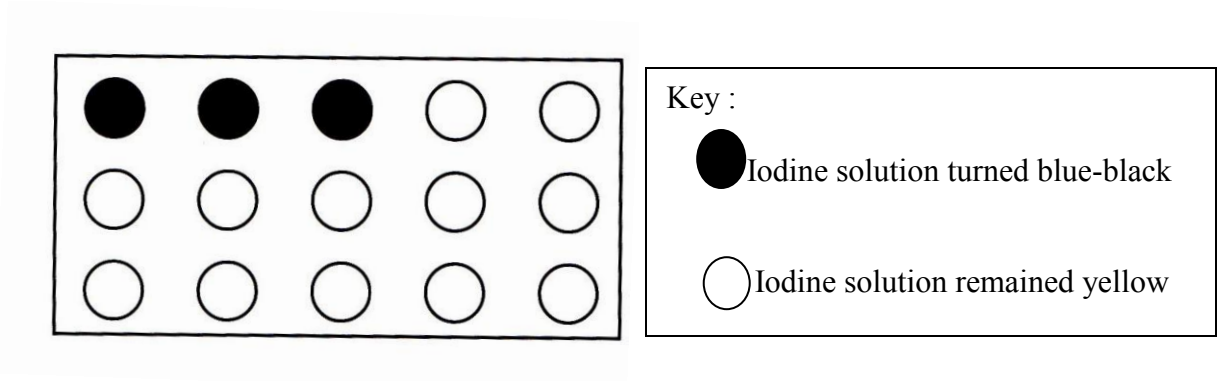


Diagram 2

(a) In table 1 ,list all the materials and apparatus labeled in Diagram 1.

*For
examiner's
use*

| Material | Apparatus |
|----------|-----------|
| | |

Table 1

1(a)

[3 marks]

Table 2 shows the results of this experiment.

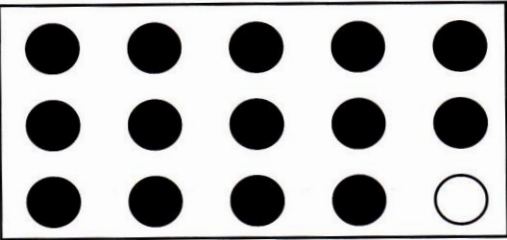
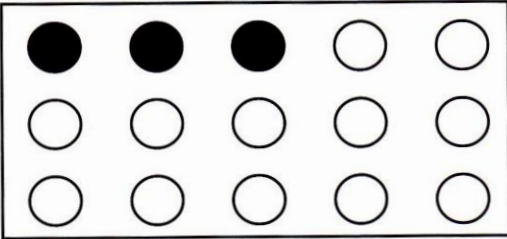
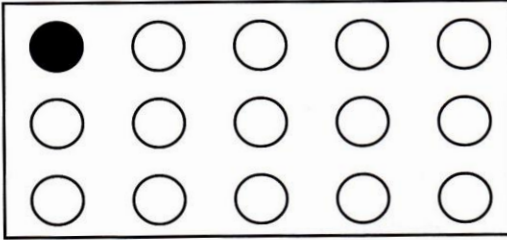
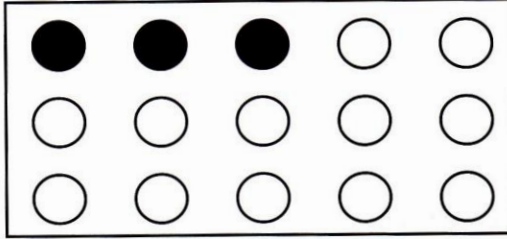
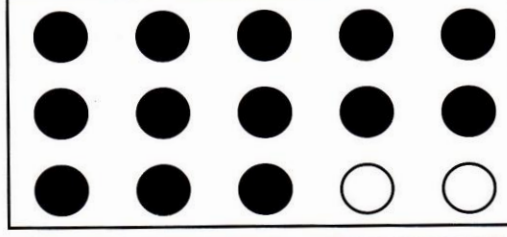
| pH of buffer solution <i>pH larutan penimbal</i> | OBSERVATION <i>PEMERHATIAN</i> | Time taken for iodine solution to remain yellow (min) <i>Masa diambil untuk larutan iodin kekal kuning (min)</i> |
|---|---|---|
| | End of experiment <i>Akhir eksperimen</i> | |
| 5 |  | <p>_____ minutes <i>_____ minit</i></p> |
| 6 |  | <p>6 minutes <i>6 minit</i></p> |
| 7 |  | <p>2 minutes <i>2 minit</i></p> |
| 8 |  | <p>_____ minutes <i>_____ minit</i></p> |
| 9 |  | <p>_____ minutes <i>_____ minit</i></p> |

Table 2

1(b)(i)

(b) Record the time taken for iodine solution to remain yellow in Table 2 on page 5.

[3 marks]

(c) (i) State **two** different observations made from Table 2.

Observation 1:

.....

.....

Observation 2:

.....

.....

[3 marks]

1(b)(i)

(ii) State the inferences from the observations in 1(c)(i).

Inference from observation 1:

.....

.....

Inference from observation 2 :

.....

.....

[3 marks]

*For
Examiner's
Use*

(d) Complete Table 3 based on this experiment.

| Variable | Method to handle the variable |
|---|-------------------------------|
| Manipulated variable | |
| Responding variable | |
| Controlled variable | |

Table 2

[3 marks]

1(d)

(e) State the hypothesis is for this experiment.

.....
.....
.....
.....

[3 marks]

1(e)

(f) (i) Construct a table and record all the data collected in this experiment. Your table should have the following titles:

- pH
- Time taken for iodine solution to remain yellow
- Rate of amylase activity on starch

$$\left[\text{Rate of amylase activity} = \frac{\text{1}}{\text{Time taken for iodine solution to remain yellow}} \right]$$

1(f)(i)

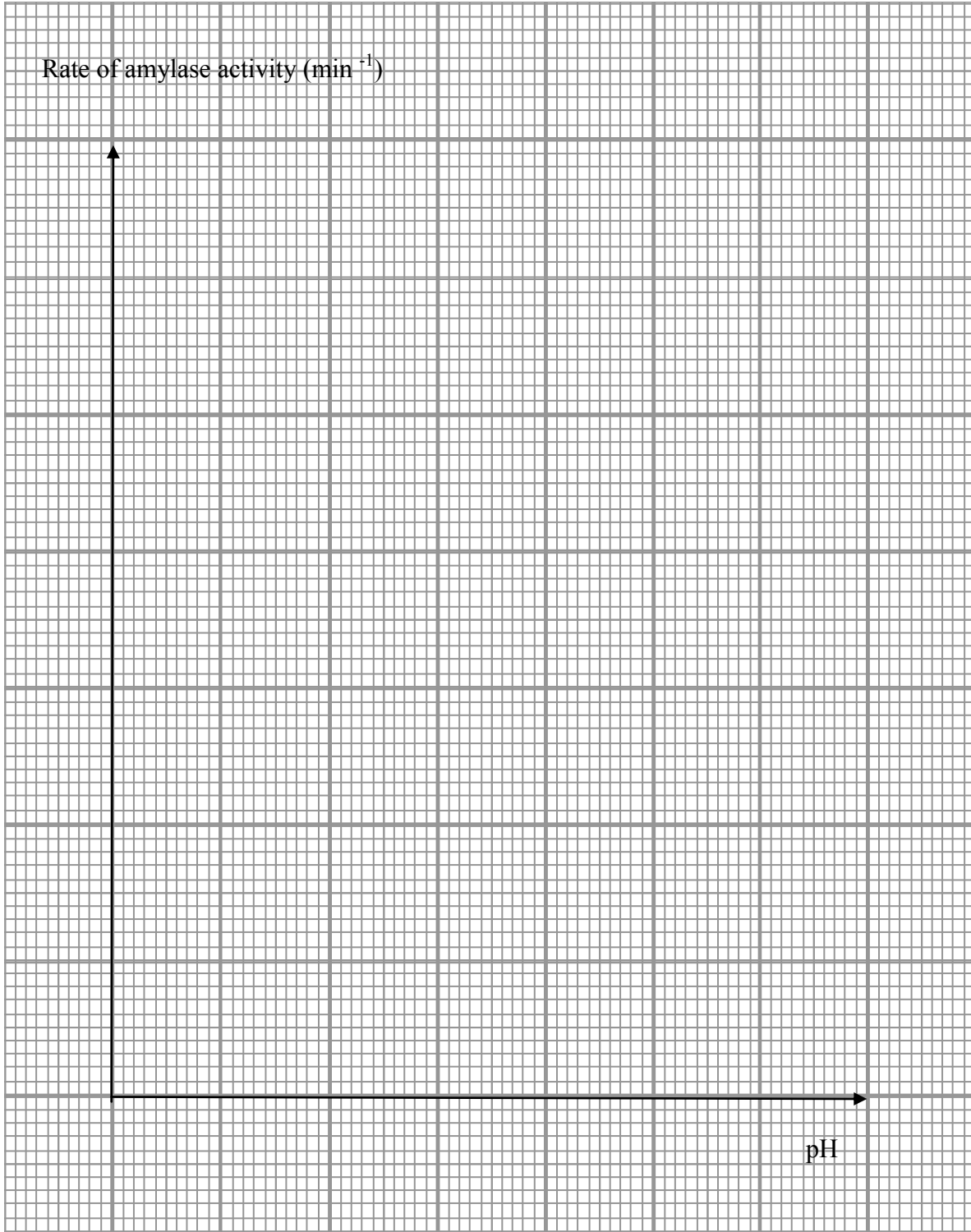
[3marks]

(f) (ii) Use the graph paper provided on the page 9 to answer this part of the question. Using the data in 1(f)(i) , draw the graph of the rate of amylase activity on starch against the mixture solution

1(f)(ii)

[3 marks]

Graph of the rate of amylase activity against the pH of the mixture solution



(g) Based on the graph in 1(f)(ii), explain the relationship between the rate of amylase activity on starch and the pH values of the mixture solution.

.....
.....
.....

[3 marks]

1(g)

(h) State the operational definition for hydrolysis of starch by amylase enzyme.

.....
.....
.....

[3 marks]

1(h)

(i) This experiment is repeated using buffer solution at pH in water bath at 20°C. Predict the outcome of this experiment.

Explain your prediction.

.....
.....
.....

[3 marks]

1(i)

TOTAL

2. Water is very important to plants. It can be lost by evaporation from the plants to the atmosphere. This is called transpiration. Light intensity is one of the factors that can affect the rate of transpiration.

Base on the above information, design a laboratory experiment to study the effect of light intensity on the rate of transpiration in *Hibiscus sp.*

The planning of your experiment must include the following aspects:

- Problem statement
- Hypothesis
- Variables
- List of apparatus and materials
- Experimental procedure or method
- Presentation of data

[17 marks]

END OF QUESTION PAPER

1.6.1 MARKING SCHEME BIOLOGY PAPER 2 SPM 2011

| No | Mark Scheme | Sub mark | Total mark |
|--------|---|--------------|------------|
| 1 | Able to name P,Q, and R | 1+1+1 | 3 |
| (a)(i) | Answer P : Connection tissue/blood tissue (reject red blood tissue) Q : Pancreas/Pancreas(BOD) R : Muscle/smooth muscle cell | | |
| (ii) | Able to state one function of the red blood cell Sample answer Transports/carry oxygen/carbon dioxide/respiratory gases Transport oxygenated/deoxygenated blood Note : reject transport blood | 1 | 1 |
| (b) | Able to explain the function of Q / pancreas in regulating the blood glucose level Sample answer F1 : The pancreas(Q) secretes/produces insulin when the blood glucose level/rises/increase E1 : By stimulate/converting excess glucose to glycogen E2 : Blood glucose level decrease/return back to normal OR F2 : The pancreas secretes produces glucagon when the blood glucose level is low E3 : by stimulate(converting)glycogena to glucose E4 : blood glucose level increase/back to normal (F1+E1 OR F2+E3) | 1+1 | 2 |

| No | Mark scheme | Sub mark | Total mark |
|---------|--|----------|------------|
| 2(a)(i) | <p>Able to label X and Y Answers</p> <p>X : plasma membrane//cell membrane</p> <p>Y : Vacuole//cell sap</p> | 1+1 | 2 |
| (ii) | <p>Able to name the solution which filled the space between the cell wall and X and explain the occurrence Sample answers</p> <p>Name of solution : (30%) sucrose solution</p> <p>Explanation : E1 : cell wall is permeable (to any substances)</p> <p style="padding-left: 40px;">E2 : allow sucrose solution can diffuse /move/ pass through the cellwall(and filled the space)</p> | 1+1 | 2 |
| (b) | <p>Able to explain how the plant cell in Diagram 2.1 has undergoes plasmolysis Sample answer</p> <p>E1 : The solution is hypertonic to cell sap E2 : Water diffuse out E3 : by osmosis E4 : Cytoplasm / vacuole shrinks E5 : The plasma membrane pulls/ moves/ detach away from the cell wall</p> | Max 2 | 2 |

| No | Mark Scheme | Sub mark | Total mark |
|------|--|--------------|---|
| 2(c) | <p>Able to explain the condition of the plant in D iagram 2.3 Sample answers</p> <p>F : The plant wilts.</p> <p>E1 : Present of (excess) fertilizer increase the (solute) concentration of soil water //decrease the water potential of soil water.</p> <p>E2 : (Solute) concentration of soil water is higher/hypertonic to the cell sap.</p> <p>E3 : Water (molecules) diffuse out of the cell/plant</p> <p>E4 : by osmosis</p> <p>E5 : Cause the cells to plasmolysed//cells flaccid</p> | Max 3 | 3 |
| 2(d) | <p>Able to explain the method of preserving vegetables Sample answers</p> <p>E1 : The concentration of salt solution is higher/hypertonic to cell sap (of the vegetable)</p> <p>E2 : water (molecules) diffuse out of the cell/vegetable.</p> <p>E3 : by osmosis</p> <p>E4 : The plant cells/bacteria becomes dehydrated/no water</p> <p>E5 : Bacteria cannot grow/survive(without water)//bacteria die because of lost of water(not because of salt solution)</p> | Max 3 | <p>3</p> <p>TOTAL 12</p> |

| | | | |
|-------------|--|-----|---|
| 3(a)(i) | Able to name the organelle Answer Mitochondrion | 1 | 1 |
| (ii) | Able to explain why membrane X is in the form of numerous folded layers. Sample answers F1 : increase total surface area E1 : for efficiency of (cellular) respiration // rate of respiration increase//more oxygen diffuse(into the organelle). | 1+1 | 2 |
| <i>b(i)</i> | Able to name gas P Answer Oxygen | 1 | 2 |
| (ii) | Able to name product Q Answer Water(vapour)/H ₂ O | 1 | 2 |
| (iii) | Able to explain why the muscle cell has a large number of these organelles Sample answers F1 : Muscles need a lot /more of energy/ATP(muscle need) | 1+1 | 2 |

E1 : for contraction /relaxation of muscle,

F2 : Site for cellular respiration

E2 : To supply /produce/generate/provide energy(ATP)
(Any two)

3(b) **Able to explain the biochemical reaction occurring in the organelle**
(iv) **if the blood sugar level is lower than the normal range**
Sample answers

Max 3 3

F1 : Pancreas secretes glucagon

E1 : to convert glycogen to glucose (to normal range).

E2 : Cellular respiration occurs // complete oxidation of glucose occurs.

E3 : Energy /ATP carbon dioxide and water (vapour) produced.
(any three)

(c) **Able to state two differences between the biochemical reaction**
occurring in muscle cell comparing to the yeast cell in the absence
of gas P.
Sample answers

Max 2 2

| Muscle cell | Yeast cell |
|--|---|
| D1 : Lactic acid produce/ equation | Ethanol produce/equation |
| D2 : Carbon dioxide is not produce | Carbon dioxide is produce |
| D3 : 150 kJ/ mol / less of energy is produce | 210 kJ/ mol / more of energy is produce |
| D4 : Oxygen dept occur | Oxygen dept does not occur |

**TOT
AL
12**

| | | | |
|---------|---|-------|---------------------------|
| 4(a)(i) | Able to name X Answer Tendon | 1 | 1 |
| (ii) | Able to state one function of X/ Tendon Answer Connects muscle to bone | 1 | 1 |
| (b) | Able to describe how characteristics of X/ tendon is adapted for its functions Sample answer E1 : It is inelastic E2 : so that it can transmit/ transfer the contracting force from the muscle to the bone | Max 2 | 2 |
| (c)(i) | Able to state one function of ligament in Diagram 4 Answer Connect bone to bone | 1 | 1 |
| (ii) | Able to explain the flexibility of the ligament of a gymnast Sample answer E1 : Ligament of a gymnast is more elastic / stronger/ easy to be stretch E2 : due to prolonged / continuous exercise/ training | Max 2 | 2 |
| (d)(i) | Able to explain what is muscle cramps Sample answer Continuous contraction in muscle | 1 | 1 |
| (ii) | Able to state one cause of muscle cramps among athlete Sample answer Does not warm up/ inadequate stretching // muscle fatigue// accumulation of lactic acid/ lack of salt | 1 | 1 |
| (e) | Able to suggest three ways in which a person can maintain a healthy musculoskeletal system Sample answer E1 : Diet rich in calcium / phosphate E2 : Good posture / keep back straight when lifting heavy object to avoid back problem E3 : Practice correct / safe technique E4 : Proper clothing/ attire | Max 3 | 3 |
| | | | TOTAL 12 |

| | | | |
|---------------|--|--------------|-----------------|
| <p>5(a)</p> | <p>Able to explain the process that occur between glomerulus and Bowman’s capsule Sample answers</p> <p>Process : ultrafiltration Explanation :</p> <p>E1 : Blood plasma filtered out E2 : due to the high hydrostatic pressure E3 : Smaller diameter of the hydrostatic pressure</p> <p style="text-align: right;">(Any two)</p> | <p>1+2</p> | <p>3</p> |
| <p>(b)(i)</p> | <p>Able to state one difference in the concentration of amino acid between R and S Sample answer</p> <p>The concentration of amino acid is higher in R compare to S // amino acid is absent in S but present in R</p> | <p>1</p> | <p>1</p> |
| <p>(ii)</p> | <p>Able to explain the difference in the concentration of amino acid between R and S Sample answer</p> <p>E1 : Reabsorption process occur in R E2 : Amino acid are reabsorped into the blood capillaries</p> | <p>Max 2</p> | <p>2</p> |
| <p>5(c)</p> | <p>Able to state the disease and reason why urine of a person contain glucose Sample answer</p> <p>Disease : the person is a diabetic person</p> <p>Reason</p> <p>E1 : High intake of glucose/ sugar/ carbohydrate E2 : Lack of insulin// malfunction of pancrease E3 : Glucose in R is not reabsorbed</p> | <p>1+1</p> | <p>2</p> |
| <p>(d)</p> | <p>Able to state on the effect on the filtrate formed in S Sample answer</p> <p>E1 : Volume of urine / filtrate less // very concentrated urine/ filtrate E2 : more water is reabsorbed</p> | <p>1</p> | <p>1</p> |

| No | Mark scheme | Sub mark | Total mark |
|-------------|--|---------------|------------|
| 6(a) | <p>Able to explain the growth curve of a grasshopper Sample answers</p> <p>F1 : A series of staircase growth //non linear curve.</p> <p>E1 : have a hard exoskeleton /outer skeleton is made of chitin</p> <p>E2 : This limit the increase in body length.</p> <p>E3 : New soft exoskeleton is formed beneath the old skeleton</p> <p>E4 : the insect sucking breath in a big/a lot/enough/ volume of air</p> <p>E5 : to force the old skeleton to spilt open/break.</p> <p>E6 : the new exoskeleton expand</p> <p>E7 : The growth stops when reach adult.</p> <p style="text-align: right;">(any four)</p> | Max 4 | 4 |
| 6(b) | <p>Able to explain each phase of the growth curve Sample answers</p> <p>F1 : P is lag phase //During infant phase /phase P,the gradient is small/low/the height growth increase slowly.</p> <p>E1 : The number of growing cells is low /small/growth rate is slow.</p> <p>F2 : during phase Q,the gradient is the highest /high//the body height Increase exponentially.</p> <p>E2 : Growth rate is the fastest/increase rapidly//number of cell increase exponentially /active cell division and elongation occur.</p> <p>F3 : During phase R , the gradient is small//the height growth increases Slowly.</p> <p>E3 : slow growth rate// Most cell have reach their maximum size.</p> <p>E4 : Growth is limited by external /internal factors// Any suitable examples of the factors.</p> | Max 10 | 10 |

| | | | |
|--------------------|---|-------------------------|----------------------------------|
| | <p>F4 : during phase S (stationary phase) the gradient is zero//constant Height Body height remains constant.//no changes in body height.</p> <p>E5 : Growth rate is zero //constant//number of new cells produced is equal to the number of cells eliminated.</p> <p>E6 : Organism achieves maturity/adult/adulthood.</p> <p>F5 : during phase T , the gradient is negative// The growth enter the ageing state /phase//body height decreasing.</p> <p>E7 : Low /decreased absorption/assimilation of nutrients by the cells./metabolism is slow.</p> <p>E8 : the muscles and cartilage of the body start to degenerate</p> <p>E9 : Decrease in number of cells/less cell replacement.</p> | | |
| <p>6(c)</p> | <p>Able to explain the various methods to overcome the infertility problems based on the following criteria : Sample answers</p> <p>Criteria P : problem F : method E : explanation</p> <p>P1: low count of sperm F1: artificial insemination E1: sperms collected and concentrated before insemination//increase Chance of fertilization</p> <p>P2: (Woman have) blocked or damaged fallopian tubes. F2: in vitro fertilization/(IVF) E2: ovum and sperm are mixed /fused/fertilized together in petri dish /embryo is transferred into uterus.</p> <p>P3: abnormalities of uterus. F3: surrogate mother E3: embryo from IVF is implanted in the uterus of another woman.</p> <p>P4: insufficient /imbalance of hormone/ovulation fail to occurs/ovum is not Release /ovary cannot produced ovum</p> <p>F4: injection hormone/FSH(any suitable answers) E4: to stimulate the development of follicles/to stimulate ovulation.</p> | <p>Max 6</p> | <p>6</p> <p>20</p> |

| No | Mark scheme | Sub mark | Total mark |
|------|--|----------|------------|
| 7(a) | <p>Able to determine the phenotypic percentage of the offsprings in the cross based on the following criteria</p> <p>C1 Genotype of the parent C2 meiosis process C3 gamete's genotype C4 fertilisation process C5 offspring's genotype C6 offspring's phenotype C7 conclusion</p> <p>Sample answers</p> <p>Parent's phenotype black fur x white fur</p> <p>Parent's genotype BB x bb</p> <p>Meiosis</p> <p>gametes B B b b</p> <p>Fertilization</p> <p>Offspring's genotype Bb Bb Bb Bb</p> <p>Offspring's phenotype black fur</p> <p>(all offspring)100% offspring have black fur</p> <p>Notes If any pair of the parent's genotype is incorrect ,marks are given / Rewarded for C2 C4 C5.</p> | Max 6 | 6 |

| | | | |
|-------|--|-------|---|
| 7 (b) | <p>Able to explain the cause of Thalassemia. Sample answers</p> <p>E1 : thalassemia is caused by defective gen//(homozygous) recessive Allele</p> <p>E2 : found on the autosome</p> <p>E3 : due to (gene) mutation</p> <p>E4 : affecting (one of) the base in the gene//affecting the production of Haemoglobin.</p> <p>E5 : Abnormal /lack /less haemaglobin produced</p> <p>E6 : size of erythrocytes smaller than normal//colour of erythrocytes paler.</p> <p>E7 : (thus) erythrocytes less efficient in transporting oxygen.</p> <p>E8 : (leads to) fatigue /anaemia//pale/weak/lack of energy/tiredness. (any four)</p> | Max 4 | 4 |
| 7(c) | <p>Able to explain why the first child who is Rh – positive survives but the second child who is also Rh – positive does not survive. Sample answers</p> <p>During the first pregnancy (first child with R-positive)</p> <p>E1 : small amount of the fetus blood (with antigen Rh) Diffuse into the mother 's blood (stream)</p> <p>E2 : stimulates the production of antibody(anti-Rhesus in the Mother's Blood).</p> <p>E3 : the antibody (anti-Rhesus)diffuse/enter into the foetal's blood.</p> <p>E4 : causing agglutination/haemolysis of the foetal red blood cell in Small Quantity(thus the first child survive)</p> <p>During the second pregnancy (second child with Rh-positive)</p> <p>E5 : the small amount of fetus blood diffuse into mothers blood</p> <p>E6 : stimulate/trigger more antibody(anti-rhesus)to be released from the mother's blood.</p> | Max 6 | 6 |

| | <p>E7 : the antibody diffuses/enter more into the foetus blood</p> <p>E8 : causing more haemolysis/agglunation/break down of foetal red blood Cell.</p> <p>E9 : this condition is known as erythroblastosis fetalis</p> <p>E10 : the foetus/new born baby suffer from jaundice /severe anaemia/damage heart/liver/brain.</p> | | | | | | | | | | | | | | | | |
|---|---|-----------------|------------------|--|--|---|---|--|--|---|---|---|--|---|--|--------------|--------------------|
| <p>7(d)</p> | <p>Able to state four differences between Down’s Syndrome and colour blindness Sample answers</p> <table border="1"> <thead> <tr> <th>Down’s Syndrome</th> <th>Colour blindness</th> </tr> </thead> <tbody> <tr> <td> P1 : abnormal number of Autosomes//has 47 Chromosomes//has one extra Autosome / chromosome </td> <td> P1 : normal number of autosomes //has 46 chromosomes. Has normal number of chromosomes </td> </tr> <tr> <td> P2 : the disease is not inherited from parent </td> <td> P2 : the disease is inherited from parent </td> </tr> <tr> <td> P3 : both male and female has the same probability of having the disease </td> <td> P3 : male has more probability of having the disease than female </td> </tr> <tr> <td> P4 : the disease is caused by non-disjunction of homologous chromosomes- 21 </td> <td> P4 : the disease is caused by Recessive allele located on the X chromosome. </td> </tr> <tr> <td> P5 : the disease involves autosome chromosome </td> <td> P5 : the disease involves sex/ X chromosome. </td> </tr> <tr> <td> P6 : characteristics : Flat/broad faces/slanted eyes/ Protruding tongue/short palms/mentally retarded </td> <td> P6 : characteristics : Unable to distinguish Between Red and green colour. </td> </tr> </tbody> </table> <p>Note:any one relevant characteristic</p> <p>Any four pairs (1</p> | Down’s Syndrome | Colour blindness | P1 : abnormal number of Autosomes//has 47 Chromosomes//has one extra Autosome / chromosome | P1 : normal number of autosomes //has 46 chromosomes. Has normal number of chromosomes | P2 : the disease is not inherited from parent | P2 : the disease is inherited from parent | P3 : both male and female has the same probability of having the disease | P3 : male has more probability of having the disease than female | P4 : the disease is caused by non-disjunction of homologous chromosomes- 21 | P4 : the disease is caused by Recessive allele located on the X chromosome. | P5 : the disease involves autosome chromosome | P5 : the disease involves sex/ X chromosome. | P6 : characteristics : Flat/broad faces/slanted eyes/ Protruding tongue/short palms/mentally retarded | P6 : characteristics : Unable to distinguish Between Red and green colour. | <p>Max 4</p> | <p>4</p> <p>20</p> |
| Down’s Syndrome | Colour blindness | | | | | | | | | | | | | | | | |
| P1 : abnormal number of Autosomes//has 47 Chromosomes//has one extra Autosome / chromosome | P1 : normal number of autosomes //has 46 chromosomes. Has normal number of chromosomes | | | | | | | | | | | | | | | | |
| P2 : the disease is not inherited from parent | P2 : the disease is inherited from parent | | | | | | | | | | | | | | | | |
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| P6 : characteristics : Flat/broad faces/slanted eyes/ Protruding tongue/short palms/mentally retarded | P6 : characteristics : Unable to distinguish Between Red and green colour. | | | | | | | | | | | | | | | | |

| No | Mark scheme | Sub mark | Total mark |
|-------|--|----------|------------|
| 8 (a) | <p>Able to explain how the greenhouse influences the productivity of the tomato plants</p> <p>Sample answers</p> <p>Factors that can be controlled in the greenhouse</p> <p>F1 : Concentration of carbon dioxide</p> <p>E1 : sufficient of carbon dioxide is supplied</p> <p>E2 : to increase the rate of photosynthesis</p> <p>F2 : Temperature</p> <p>E3 : is kept up at the optimum level all the time</p> <p>E4 : for maximum enzyme activities</p> <p>E5 : to increase the rate of photosynthesis</p> <p>E6 : reduce the rate of transpiration/ water loss</p> <p>F3 : Light intensity</p> <p>E7 : light is supplied all the time</p> <p>E8 : to increase the rate of photosynthesis</p> <p>E9 : photosynthesis can be carried out all the times</p> <p>F4 : Nutrient/ fertiliser</p> <p>E10: nutrients are supplied all the times</p> <p>F5 : Water</p> <p>E11: water is supplied all the times</p> <p>F6 : Pest control/ reduced the use of pesticide</p> <p>E12: prevent the attack of pest/ not contaminated with chemical substances</p> <p>E13: protect from bad weather</p> <p>F7 : Humidity</p> <p>E14: to avoid excessive water lost</p> <p style="text-align: right;">Any 10</p> | 10 | |

| <p>8(b)</p> | <p>Able to discuss two methods used in food processing and the advantages and disadvantages of each method</p> | <p>10</p> | | | | | | | | | | | | | | | | |
|--|---|--|--|--------|------------|---------------|--------------------|---|---|---------|---|--|-------------|---|--|------------------|---|---|
| <table border="1"> <thead> <tr> <th>Method</th> <th>Advantages</th> <th>Disadvantages</th> </tr> </thead> <tbody> <tr> <td> Pasteurisation (P) </td> <td> A1 – Kill/ destroys bacteria/ microorganisms A2 – Retains the natural flavour/ taste of the milk A3 – Retains nutrients A4 – Boost the food industry </td> <td> D1 – Do not destroy spores of microorganisms D2 – Only suitable for milk D3 – Not last longer after open// Must be refrigerated </td> </tr> <tr> <td> UHT (U) </td> <td> A1 – Kills bacteria and spores A2 – Last longer A3 – Boost the food industry </td> <td> D1 – Flavour/ taste changes D2 – Less nutrients </td> </tr> <tr> <td> Canning (T) </td> <td> A1 – Kill microorganisms and their spores A2 – Prevent growth of microorganism A3 – Last longer/ easier to carry A4 – More attractive/ increase the commercial value A5 – Food easier to digested A5 – Boost the food industry </td> <td> D1 – Can cause food poisoning if any damage at the tin D2 – Less nutrient D3 – Less original taste texture D4 – Food additives can cause cancer/ diseases </td> </tr> <tr> <td> Fermentation (F) </td> <td> A1 – Prevents the juice from becoming spoiled A2 – Improve the taste/ commercial value </td> <td> D1 – Intoxicating D2 – Change original taste </td> </tr> </tbody> </table> | | | | Method | Advantages | Disadvantages | Pasteurisation (P) | A1 – Kill/ destroys bacteria/ microorganisms A2 – Retains the natural flavour/ taste of the milk A3 – Retains nutrients A4 – Boost the food industry | D1 – Do not destroy spores of microorganisms D2 – Only suitable for milk D3 – Not last longer after open// Must be refrigerated | UHT (U) | A1 – Kills bacteria and spores A2 – Last longer A3 – Boost the food industry | D1 – Flavour/ taste changes D2 – Less nutrients | Canning (T) | A1 – Kill microorganisms and their spores A2 – Prevent growth of microorganism A3 – Last longer/ easier to carry A4 – More attractive/ increase the commercial value A5 – Food easier to digested A5 – Boost the food industry | D1 – Can cause food poisoning if any damage at the tin D2 – Less nutrient D3 – Less original taste texture D4 – Food additives can cause cancer/ diseases | Fermentation (F) | A1 – Prevents the juice from becoming spoiled A2 – Improve the taste/ commercial value | D1 – Intoxicating D2 – Change original taste |
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| | | | | | |
|---------------------------|------------|--|---|--|--|
| | | A3 – Increase vitamins content A4 – Boosting the food industry | | | |
| | Drying (K) | A1 – Microorganism/ bacteria cannot grows/ survives without water A2 – Easy to be carry out/ economical method A3 – Food last longer A4 – Boost food industry | D1 – Intoxicating D2 – Change original taste | | |
| Any 2 methods, any 4 A/ D | | | | | |

| No | Mark scheme | Sub mark | Total mark |
|------|--|----------|------------|
| 9(a) | <p>Able to explain how the farming activities cause the death of the aquatic plants and the fishes in the pond</p> <p>Sample answers</p> <p>E1 : Chemical fertiliser dissolved into the pond</p> <p>E2 : Increased the concentration of nitrates/ phosphates/ nutrients</p> <p>E3 : Algae cover the water surface</p> <p>E4 : caused eutrophication</p> <p>E5 : prevent/ block penetration of the sunlight</p> <p>E6 : reduced the rate of photosynthesis/ photosynthesis stop</p> <p>E7 : Less oxygen produced</p> <p>E8 : Dead organisms decomposed by bacteria/ microorganisms/ decomposer</p> <p>E9 : Bacteria/ decomposer population increase</p> <p>E10: and use the oxygen from the water</p> <p>E11: Lead to depletion of oxygen in the water</p> <p>E12: Less oxygen dissolved in the water for aquatic organisms</p> <p>E13: BOD level increase</p> <p>E14: water pollution increase</p> <p>Any 10</p> | 10 | |

| No | Mark scheme | Sub mark | Total mark | | | | | | | | | | | | | | | |
|----------|--|---|------------|-----|-------|-------|---------|----------|-----------|---|-----|----------------------------|--------------------------------------|-----|-----------------------------|---------------------|--|--|
| 9(b) | <p>Able to discuss the good and the bad effects caused by the industrial activities on human and environment</p> <p>Sample answers</p> <p>Good effects on human</p> <p>G1 : Provides job opportunity G2 : Increase county's economy G3 : Improve infrastructure/ transport G4 : More facilities/ hospitals/ schools are built G5 : Attract migration/ population increases</p> <p>Bad effect on human</p> <p>B1 : Social proble/ crime increases B2 : cause health problem/ respiratory diseases</p> <p>Bad effects on environment</p> <p>B3 : cause air pllution B4 : smoke/ dust/ soot B5 : cause formation of haze/ smog B6 : reduce light intensity B7 : decrease the rate of photosynthesis/ crops yeilds</p> <table border="1"> <thead> <tr> <th>B8</th> <th>B9</th> <th>B10</th> </tr> </thead> <tbody> <tr> <td>Gases</td> <td>Cause</td> <td>Effects</td> </tr> <tr> <td>NO2/ SO2</td> <td>Acid rain</td> <td>Damage building/ corrodes iron/ soil pH decreases</td> </tr> <tr> <td>CO2</td> <td>Increase in temperature</td> <td>Greenhouse effect/ global warming</td> </tr> <tr> <td>CFC</td> <td>Depletion of ozone layer</td> <td>More UV penetration</td> </tr> </tbody> </table> <p>B11: Water pollution B12: caused by industrial waste/ haevy metals B13: death of aquatic organisms</p> <p style="text-align: right;">Any 10</p> | B8 | B9 | B10 | Gases | Cause | Effects | NO2/ SO2 | Acid rain | Damage building/ corrodes iron/ soil pH decreases | CO2 | Increase in temperature | Greenhouse effect/ global warming | CFC | Depletion of ozone layer | More UV penetration | | |
| B8 | B9 | B10 | | | | | | | | | | | | | | | | |
| Gases | Cause | Effects | | | | | | | | | | | | | | | | |
| NO2/ SO2 | Acid rain | Damage building/ corrodes iron/ soil pH decreases | | | | | | | | | | | | | | | | |
| CO2 | Increase in temperature | Greenhouse effect/ global warming | | | | | | | | | | | | | | | | |
| CFC | Depletion of ozone layer | More UV penetration | | | | | | | | | | | | | | | | |

1.6.2 MARKING SCHEME BIOLOGY PAPER 3 SPM 2011

1(a) [KB0602 – Classifying]

| Score | Mark Scheme | | | | | | | | |
|--------------------------|---|----------|-----------|--------------------------|-----------------|-------------------------|----------------|--------------------|----------------------|
| 3 | <p>Able to list all material and apparatus labeled in Diagram 1 correctly</p> <p><u>Sample answers:</u></p> <table border="1"> <thead> <tr> <th>Material</th> <th>Apparatus</th> </tr> </thead> <tbody> <tr> <td>1. (1%) amylase solution</td> <td>1. Boiling tube</td> </tr> <tr> <td>2. (1%) starch solution</td> <td>2. Thermometer</td> </tr> <tr> <td>3. Buffer solution</td> <td>3. <u>Water bath</u></td> </tr> </tbody> </table> <p>6 ticks</p> | Material | Apparatus | 1. (1%) amylase solution | 1. Boiling tube | 2. (1%) starch solution | 2. Thermometer | 3. Buffer solution | 3. <u>Water bath</u> |
| Material | Apparatus | | | | | | | | |
| 1. (1%) amylase solution | 1. Boiling tube | | | | | | | | |
| 2. (1%) starch solution | 2. Thermometer | | | | | | | | |
| 3. Buffer solution | 3. <u>Water bath</u> | | | | | | | | |
| 2 | At least 4 – 5 ticks | | | | | | | | |
| 1 | At least 2-3 ticks | | | | | | | | |
| 0 | no response or incorrect response 0 – 1 tick | | | | | | | | |

(b) KB0603 – Measuring Using Numbers

| Score | Mark Scheme | | | | | | | | | | | | |
|--------------|--|---|---|---|----|---|---|---|---|---|---|---|----|
| 3 3 ticks | Able to record all the three reading accurately. | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th><i>pH of buffer solution</i></th> <th>Time taken for iodine solution to remain yellow (min)</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>28</td> </tr> <tr> <td>6</td> <td>6</td> </tr> <tr> <td>7</td> <td>2</td> </tr> <tr> <td>8</td> <td>6</td> </tr> <tr> <td>9</td> <td>26</td> </tr> </tbody> </table> | <i>pH of buffer solution</i> | Time taken for iodine solution to remain yellow (min) | 5 | 28 | 6 | 6 | 7 | 2 | 8 | 6 | 9 | 26 |
| | <i>pH of buffer solution</i> | Time taken for iodine solution to remain yellow (min) | | | | | | | | | | | |
| | 5 | 28 | | | | | | | | | | | |
| | 6 | 6 | | | | | | | | | | | |
| | 7 | 2 | | | | | | | | | | | |
| 8 | 6 | | | | | | | | | | | | |
| 9 | 26 | | | | | | | | | | | | |
| 2 2 ticks | Able to record two readings accurately | | | | | | | | | | | | |
| 1 1 tick | Able to record one reading accurately. | | | | | | | | | | | | |
| 0 | No response or incorrect response | | | | | | | | | | | | |

(c) (i) [KB0601 - Observation]

| Score | Mark Scheme |
|-------|---|
| 3 | <p>Able to state any two different observations correctly according to the criteria:</p> <p>C1 : MV / pH value C2 : RV / <u>time taken</u> (for iodine solution to remains yellow) / groove / color of iodine C3 : Reading / comparison for C2.</p> <p>Sample answers:</p> <ol style="list-style-type: none"> The time taken for iodine solution to remain yellow for pH solution 5/6/7/8/9 is 28min / 2min/ 6 min/26min. The time taken for iodine solution to remain yellow for pH solution 5/9 is longer than pH solution 6/7/8 For pH 5 the time taken is 8 minutes When pH change from pH 5 to pH 7 the time taken for iodine solution to remain yellow decrease. For pH 5, the number of groove blue black is <u>14</u> // the number of groove remain |

| | yellow is <u>l</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|------------|---------|------------|------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | <p>Able to state any one observation correctly <i>or</i> Able to state any two inaccurate observations</p> <p>Sample answers:</p> <ol style="list-style-type: none"> The time taken for iodine solution to remain yellow for pH solution 5 is long The time taken for iodine solution to remain yellow for pH solution 7 is short At pH 6 and pH 8, the time taken is the same. At pH 5, the time taken is 8. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | <p>Able to state observation at idea level .</p> <p>Sample answers:</p> <ol style="list-style-type: none"> The time taken for iodine solution to remain yellow is different. Time taken is different. For different pH, time taken is different | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | No response <i>or</i> wrong response. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Scoring</p> <table border="1"> <thead> <tr> <th>Score</th> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>2</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td rowspan="2">2</td> <td>1</td> <td>1</td> <td>-</td> <td>-</td> </tr> <tr> <td>-</td> <td>2</td> <td>-</td> <td>-</td> </tr> <tr> <td rowspan="4">1</td> <td>1</td> <td>-</td> <td>1</td> <td>-</td> </tr> <tr> <td>-</td> <td>-</td> <td>2</td> <td>-</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td>-</td> <td>1</td> </tr> <tr> <td rowspan="2">0</td> <td>-</td> <td>1</td> <td>-</td> <td>1</td> </tr> <tr> <td>-</td> <td>-</td> <td>1</td> <td>1</td> </tr> </tbody> </table> | | Score | Correct | Inaccurate | Idea | Wrong | 3 | 2 | - | - | - | 2 | 1 | 1 | - | - | - | 2 | - | - | 1 | 1 | - | 1 | - | - | - | 2 | - | - | 1 | 1 | - | 1 | - | - | 1 | 0 | - | 1 | - | 1 | - | - | 1 | 1 |
| Score | Correct | Inaccurate | Idea | Wrong | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 2 | - | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 1 | 1 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 2 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 1 | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | - | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | - | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

1 (c) (ii) [KB0604 - Making inferences]

| Score | Mark Scheme |
|------------------|--|
| 3 Any 2C's | <p>Able to make two inference correctly based on the criteria</p> <p>Note : Inference must match observation</p> <p>Criteria :</p> <p>C1 : pH and its condition / pH suitable or not suitable</p> <p>C2 : (Rate) for hydrolysis (of starch) / activity of amylase reaction. : (explain for C2 exp: fast / slow/max/work best/ effective / efficient/ worst at pH 5 /inactive / reactive)</p> <p>C3 : More collision / affinity / charge at active site // more product maltose form.</p> |

| | <p>Sample answers:</p> <ol style="list-style-type: none"> (pH 5 / pH 9) is acidic / alkaline / not suitable / not optimum Hydrolysis of starch takes a long time / is slow (pH 6 / pH 8) is slightly acidic / alkali not suitable / not optimum Hydrolysis of starch takes a short time / is fast (pH 7) is neutral / suitable / optimum / best Hydrolysis of starch take the shortest time / fast / faster / is fastest / high /higher/ highest (At pH 7) the hydrolysis is faster than at pH 5 / pH 6 / pH 8 / pH9 because it is neutral medium. <p>***Reject :</p> <ol style="list-style-type: none"> Time taken for iodine solution turns to yellow is longer No enzyme reaction / not able to react (obv at pH 8 / pH 9) To accept not optimum / not suitable one obv must be at pH 7. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|--|------------|---------|------------|------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <p>2 Any one C</p> | <p>Able to make one correct inference and one less accurate inference.</p> <p>Sample answers:</p> <ol style="list-style-type: none"> At pH 5 / pH9, hydrolysis of starch take longer time / slow (At pH), the hydrolysis of starch is fast / the fastest / maximum At pH 7, it is neutral / optimum At pH 7 maximum of reaction of enzyme / product form. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>1</p> | <p>Able to state one correct inference and two inference at idea level.</p> <p>Sample answer:</p> <ol style="list-style-type: none"> The starch is hydrolysed. The time for hydrolysis of starch is different Rate of enzyme reaction is different The pH of buffer solution is different | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>0</p> | <p>No response <i>or</i> wrong response.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>Scoring</p> <table border="1"> <thead> <tr> <th>Score</th> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>2</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td rowspan="2">2</td> <td>1</td> <td>1</td> <td>-</td> <td>-</td> </tr> <tr> <td>-</td> <td>2</td> <td>-</td> <td>-</td> </tr> <tr> <td rowspan="4">1</td> <td>1</td> <td>-</td> <td>1</td> <td>-</td> </tr> <tr> <td>-</td> <td>-</td> <td>2</td> <td>-</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td>-</td> <td>1</td> </tr> </tbody> </table> | Score | Correct | Inaccurate | Idea | Wrong | 3 | 2 | - | - | - | 2 | 1 | 1 | - | - | - | 2 | - | - | 1 | 1 | - | 1 | - | - | - | 2 | - | - | 1 | 1 | - | 1 | - | - | 1 |
| Score | Correct | Inaccurate | Idea | Wrong | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 2 | - | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 1 | 1 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 2 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 1 | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | - | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | | | | |
|--|--|---|---|---|---|---|
| | | 0 | - | 1 | - | 1 |
| | | | - | - | 1 | 1 |

1(d) [KB0610–Variables]

| | | |
|--|--|--|
| 3 | Able to state all 3 variables and the 3 methods to handle the variable correctly. | |
| | Sample Answer : | |
| | Variables | Method to handle the variable correctly |
| | <p style="text-align: center;"><u>Manipulated variable</u></p> <p>Buffer solution / pH solution</p> | Used different pH of buffer solution (pH 5, 6, 7 ,8 9) // Used pH 5/6/7/8/9 |
| <p style="text-align: center;"><u>Responding variable</u></p> <p>1. <u>The time taken for iodine solution to remain yellow</u> / number of groove that turn blue black.</p> <p>2. (Rate of) hydrolysis / activity of starch by amylase. / enzyme reaction</p> | <p>1. <u>Record</u> the time taken by using the <u>stopwatch</u>. / <u>Count and record</u> the numbers of groove that turn blue black multiply by 2 by using <u>stopwatch</u></p> <p>2. Calculate the rate of hydrolysis of starch using formula: $\frac{1}{\text{time}}$</p> | |
| <p style="text-align: center;"><u>Constant variable</u></p> <p>1. Concentration of the starch amylase</p> <p>2. Volume of starch solution / amylase / buffer solution.</p> <p>3. Temperature</p> <p>4. Amount / volume of iodine solution</p> <p>5. 5ml of buffer solution</p> | <p>1. <u>Fix / used</u> the concentration of starch / amylase at 1%</p> <p>2. <u>fix</u> / used the volume of starch at 3ml.</p> <p>3. Fix / used the temperature of water bath at 37°C</p> <p>4. Used / fix 2 drops of iodine</p> <p>5. <u>Used</u> 5ml of buffer solution for each experiment.</p> | |
| | 6 ticks correctly | |
| 2 | 4 - 5 ticks correctly. ▪ Reject way how to handle variable if variable is wrong. | |
| 1 | Able to state 2-3 ticks correctly | |
| 0 | Able to state 1 tick correctly or no response | |

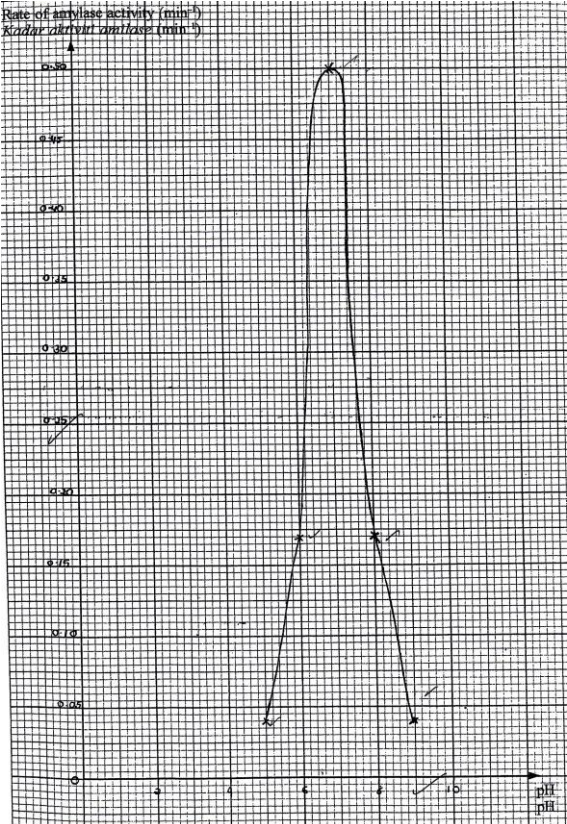
1(e) [KB0611- Making Hypothesis]

| Score | Mark Scheme |
|-------|---|
| 3 | <p>Able to state a hypothesis correctly following all criteria:</p> <p>C1 : Manipulated variable / pH value / pH5 /pH6/ pH7 / pH 8 / pH 9 C2 : Responding variable / time taken for iodine solution remain yellow H : Relationship</p> <p><u>Sample answer :</u></p> <ol style="list-style-type: none"> The higher the pH value, the longer time taken / the higher the rate to hydrolyse the starch. The optimum pH for (complete) hydrolysis of starch by amylase is pH 7. Amylase hydrolysed starch completely fastest at pH 7 compared to other pH vales. (Rate of) hydrolysis of starch by amylase is the fasters / fast / high at pH 7// slow / slower / slowest at pH 5 / 6/7/8/9 |
| 2 | <p>Able to make a hypothesis relating the manipulated variable and responding variable inaccurately</p> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> The hydrolysis of starch by amylase is influenced by the pH value. Amylase hydrolysis starch completely / fast / faster / fastest at neutral condition / acidic Different pH value has different rate of reaction. |
| 1 | <p>Able to make a hypothesis at idea level</p> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> The amylase hydrolyse the starch . |
| 0 | Not able to response <i>or</i> wrong response. |

1(f) (i)[KB0606 – Communicating]

| Score | Mark Scheme | | | | | | | | | | | | | | | | | | |
|-------|---|--|---|--|---|----|------------|---|---|------------|---|---|------------|---|---|------------|---|----|--------------|
| 3 | <p>Able to construct a table which contain following criteria:</p> <p>T : Titles with correct units – 1mark D : Record all the data correctly – 1 mark C : Calculate the rate of amylase activity correctly – 1 mark</p> <p><u>Sample answers</u></p> <table border="1"> <thead> <tr> <th>pH</th> <th>Time taken for iodine solution to remain yellow (min)</th> <th>Rate of amylase activity on starch (1/min)/min⁻¹</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>28</td> <td>0.04/0.036</td> </tr> <tr> <td>6</td> <td>6</td> <td>0.17/0.167</td> </tr> <tr> <td>7</td> <td>2</td> <td>0.50/0.500</td> </tr> <tr> <td>8</td> <td>6</td> <td>0.17/0.167</td> </tr> <tr> <td>9</td> <td>26</td> <td>0.04 / 0.038</td> </tr> </tbody> </table> | pH | Time taken for iodine solution to remain yellow (min) | Rate of amylase activity on starch (1/min)/min ⁻¹ | 5 | 28 | 0.04/0.036 | 6 | 6 | 0.17/0.167 | 7 | 2 | 0.50/0.500 | 8 | 6 | 0.17/0.167 | 9 | 26 | 0.04 / 0.038 |
| pH | Time taken for iodine solution to remain yellow (min) | Rate of amylase activity on starch (1/min)/min ⁻¹ | | | | | | | | | | | | | | | | | |
| 5 | 28 | 0.04/0.036 | | | | | | | | | | | | | | | | | |
| 6 | 6 | 0.17/0.167 | | | | | | | | | | | | | | | | | |
| 7 | 2 | 0.50/0.500 | | | | | | | | | | | | | | | | | |
| 8 | 6 | 0.17/0.167 | | | | | | | | | | | | | | | | | |
| 9 | 26 | 0.04 / 0.038 | | | | | | | | | | | | | | | | | |
| 2 | Able to record two criteria correctly | | | | | | | | | | | | | | | | | | |
| 1 | Able to record one criteria correctly | | | | | | | | | | | | | | | | | | |
| 0 | No response <i>or</i> wrong response. | | | | | | | | | | | | | | | | | | |

1 (f)(ii) [KB0612 – Relationship between space and time]

| Score | Mark Scheme |
|-------|---|
| 3 | <p>Able to draw the graph correctly</p> <p>P (paksi) : <u>Axes</u> : Uniform scales on both horizontal and vertical axes – 1 mark</p> <p>T (titik) : <u>Points</u> : All points plotted correctly - 1 mark</p> <p>B (bentuk) : <u>Curve</u> Able to join all the points to form a smooth curve - 1 mark</p>  |
| 2 | Any two criteria correct. |
| 1 | Any one criteria correct |
| 0 | No response or wrong response. |

1(g) [KB0608 – Interpreting Data]

| Score | Mark Scheme |
|-------------------------|--|
| 3 R + Any 2E's | <p>Able to explain the relationship between the rate of amylase activity and the pH value of the mixtures correctly base on the following criteria:</p> <p>R1 : State relationship between the rate of amylase activity on starch and the pH value. /correct conclusion from graph.</p> <p>R2 : Explain how pH affect the activity of enzyme on starch . / pH affect the active site of enzyme</p> <p>R3 : The result on hydrolysis of starch // enzyme mechanisms / product form / collision</p> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> At pH 7, the rate of amylase activity on starch is maximum / fastest // pH 7 is optimum pH for enzyme act / increases / high / higher / highest When the pH value is higher / lower than pH 7, the rate of amylase activity is low / slow / decreases / lower The rate of amylase activity on starch is maximum at pH 7 and less at pH lower than 7 and higher than pH 7. pH 7 is neutral, pH lower than 7 is acidic and pH higher than 7 is alkaline. Enzyme amylase is active at pH neutral, less active at other pH values The higher pH value the higher enzyme activity until pH 7. Rate of amylase activity increases linearly / directly proportional from pH 5 until pH 7. <p>** reject : Hypothesis not accepted for R1.</p> <p>R2: pH affect the active site of enzyme // pH changes in charges of the actives site of enzyme / attraction between substrate & enzyme / changes the affinity of active site.</p> <p>Higher affinity of the enzyme for the substrate</p> <p>***Reject : Change the active site of enzyme / enzyme</p> <p>R3: More / less starch is hydrolysed // More / less enzyme-substrate complex is formed // More / less products are formed // Maltose is formed //</p> |

| | |
|---|---|
| | Create more / less chances for enzyme to collide with starch ** Reject : Glucose is formed |
| 2 | Any two criteria stated |
| 1 | Any one criteria stated |
| 0 | Not able to response, inaccurate response |

1(h) [KB0609 –Defining by Operation]

| Score | Mark Scheme |
|-------|---|
| 3 | <p>Able to define operationally the hydrolysis of starch by amylase based on the following criteria.</p> <p>D1 : Action of amylase on breaking down of starch / amylase change / digested starch into a substances / maltose</p> <p>D2 : (Time taken) for iodine solution to remain yellow // can't be detected by iodine</p> <p>D3 : Hydrolysis of starch is influenced / affected by the pH value / the higher the pH the higher the rate of enzyme until pH 7 / after pH 7, the higher the pH the lower the rate enzyme reaction.</p> <p><u>Sample answer:</u></p> <p>Hydrolysis of starch is the action of enzyme amylase on breaking down of starch and it shows by the time taken for the iodine solution to remain yellow. The hydrolysis of starch is influenced by the pH value of the solution.</p> |
| 2 | Any two criteria stated |
| 1 | Any one criteria stated |
| 0 | No response or incorrect response. |

1(i) [KB0605 – Predicting]

| Score | Mark Scheme |
|-------------|--|
| 3 | <p>Able to predict the outcome of the experiment correctly.</p> <p>P1 : The time taken increases / given even values / more than 2 minutes (4 min / 6 min ,etc) / more than one groove black</p> <p>P2 : Temperature is low / cooler condition / not suitable / not optimum / decreases</p> <p>P3 : The activity of enzyme / amylase slow / inactive at lower temperature / the rate of amylase activity is low // Rate of enzyme decrease / given value less than 0.5min^{-1}</p> <p>Reject : Not body temperature</p> <p><u>Sample answer:</u></p> <p>1. The time taken will increase // Value more than 2 minutes because temperature is low the activity of amylase become slow / inactivate / the rate of amylase activity is low. Less starch is hydrolysed.</p> <p>*** If P1 wrong (X) , automatic no P2 & P3</p> |
| 2 | Any two criteria stated |
| 1 P only | Any one criteria stated |
| 0 | Not able to response <i>or</i> wrong response. |

QUESTION 2**PROBLEM STATEMENT (01)**

| No. | Mark Scheme | Score |
|--------------------------------|--|--|
| 2(i) KB061201 | <p>Able to state a problem statement relating the manipulated variable (MV) with the responding variable (RV) correctly</p> <p>P1 : MV- Light intensity/distance from light source/ different power of bulb</p> <p>P2 : RV –Rate of transpiration / time taken / distance for air bubble to move</p> <p>H : Relationship between the variables in a question form</p> <p><u>Sample answer</u></p> <ol style="list-style-type: none"> 1. Does the light intensity affect the rate of transpiration? 2. Can the light intensity affect the rate of transpiration? 3. What is the effect of light intensity on the rate of transpiration? | <p>3</p> <p>2P , H</p> |
| | <p>Able to state a problem statement inaccurately</p> <p><u>Sample answer</u></p> <ol style="list-style-type: none"> 1. Light intensity affect the rate of transpiration 2. What factors can affect the rate of transpiration? | <p>2</p> <p>P1, P2</p> <p>P1, H</p> <p>P2, H</p> |
| | <p>Able to state a problem statement at idea level</p> <p><u>Sample answer</u></p> <ol style="list-style-type: none"> 1. Light intensity influence transpiration. 2. Plant carries out transpiration. <p>** Reverse PB</p> <p>Does rate of transpiration affect the light intensity?</p> | <p>1</p> <p>P1 / P2</p> |
| | <p>No response or incorrect response</p> <p>** Only H – Reject</p> | <p>0</p> |

HYPOTHESIS (02)

| No. | Mark Scheme | Score |
|----------------------------------|--|----------|
| 2 (ii) KB061202 | Able to state a hypothesis relating the manipulated variable to the responding variable correctly P1 : MV P2 : RV H : Relationship between the variable accept wrong conclusion <u>Sample answer</u> 1. The higher light intensity, the higher the rate of transpiration of (<i>Hibiscus sp.</i>) 2. When the light intensity increases the rate of transpiration of (<i>Hibiscus sp.</i>) increases. | 3 |
| | Able to state a hypothesis inaccurately <u>Sample answer</u> 1. The light intensity influence the rate of transpiration of (<i>Hibiscus sp.</i>) 2. The rate of transpiration is affected by the light intensity 3. Different light intensity has different rate of transpiration | 2 |
| | Able to state a hypothesis at idea level <u>Sample answer</u> 1. Light intensity affect the rate transpiration 2. The higher the rate of transpiration, the higher light intensity (reverse HP) | 1 |
| | No response or incorrect response | 0 |

VARIABLES (03)

| No. | Mark Scheme | Score |
|--|--|----------|
| <p>2 (ii) KB061203</p> | <p>Able to state all three variables correctly</p> <p><u>Sample answer</u></p> <p>1. <u>Manipulated</u> :</p> <p><u>Light intensity</u> / (different) power of bulb / (different) distance of (<i>Hibiscus sp.</i>) from light (source).</p> <p>2. <u>Responding</u> :</p> <p>Rate of transpiration / time taken for air bubble to move a distance of (5cm) // Distance of the air bubble move in 5 minutes. // Mass of water lost // volume of water//mass of plant //height of air bubble.</p> <p>3. <u>Fixed</u> :</p> <p>Type of plant / <i>Hibiscus sp.</i> /(air) temperature / room temperature / air movement / surrounding temperature / relative humidity / the number of leaf (of the plant) / size of leaf (of plant) / height /length of plant</p> <p>** Reject : initial distance to move / fix distance / fix time</p> | 3 |
| | Able to state any two variables correctly | 2 |
| | Able to state any one variables correctly | 1 |
| | No response or incorrect response | 0 |

LIST OF APPARATUS AND MATERIALS (04)

2(iv)

KB061205

| Type of experiment | Apparatus | Materials | Marks | |
|--------------------|--|---|-----------------------|---|
| General | 1. Potometer 2. Ruler 3. Stopwatch 4. (dry) cloth 5. Knife 6. Marked / thread Cloth = 6A 5A | 1. Leafy / <i>Hibiscus sp.</i> shoot / terrestrial plant 2. (Colored) water / eosin //distilled water 3. Vaseline / grease / petroleum jelly. 4. // Tissue = 3M Tissue = 4M ** Reject : Aquatic plant, Wax, paraffin oil, plasticine | 6A + 3M // 5A + 4M | 3 |
| | | | Other 3A + 2M | 2 |
| | | | 2A + 1M | 1 |
| | | | 1A + 1M Or less | 0 |
| Light Bulb | All 1-6 and 7. Bulb // black plastic bag = 7A | All 3 above = 3M | 7A + 3M // 6A + 4M | 3 |
| | | | Other | 2 |
| | | | 2A + 1M | 1 |
| | | | 1A + 1M Or less | 0 |
| Weight potometer | All 1-5 + conical flask 6. (weighing) Balance | All 3 above Paraffin oil = 3M | 5A + 3M | 3 |
| | | | Other 3A + 2M | 2 |
| | | | 2A + 1M | 1 |
| | | | 1A + 1M Or less | 0 |

Note : Potometer = beaker + capillary tube + retort stand + rubber tubing

PROCEDURE (05)**2 (v) KB061204**

| No | Description | Keywords | K's |
|-----|--|---|-----|
| 1. | Cut a leafy / Hibiscus shoot under water | Cut...shoot | K1 |
| | | Under water | K5 |
| 2. | Used potometer | Potometer | K1 |
| 3.* | Fill photometer with water | Fill water | K1 |
| 4. | Attached leafy shoot to potometer | Leafy shoot into..potometer/rubber shoot / tubing | K1 |
| 5. | Wipe leaves dry using a (rdy) cloth / tissue | Wipe leaves ...cloth | K5 |
| 6. | Make all connections ...air-tight using vaseline | Air-tight ..vaseline / grease ** reject if put at stem /leaf | K5 |
| 7.* | Mark 2 points A and B...cm apart on capillary tube // mark initial point | Mark 2 points // mark initial point | K1 |
| 8* | Air bubble is introduced into the potometer | Air bubble ..introduces | K1 |
| 9. | Place potometer under the shade / (lighted) bulb • Reject carry out in high / low light intensity | Potometer ...shade / bulb | K1 |
| 10. | Using stopwatch // ruler // balance, record the time // distance ..weight .. | Stopwatch / ruler / balance record | K3 |
| 11. | Repeat the experiment..... Under sun light / at distance .../ bulb power | Repeat experiment ...different location / distance / bulb power | K4 |
| 12. | The experiment is carried out in same environment condition / temperature / humidity / plant | Same / constant condition / plant / hibiscus | K2 |
| 13. | Record all the data in a table // Tabulated data | Record...in a table / Tabulated data | K1 |
| 14. | Calculate the rate of transpiration using formula | CalculateCorrect Formula given | K3 |
| 15. | Repeat experiment to get average reading / result | Repeat experiment...average | K5 |
| 16. | Diagram with labels | At least 5 labels | K1 |

- K1 : Preparation of materials and apparatus (any 4)
- K2 : Operating the constant variable (any 1)
- K3 : Operating the responding variable (any 1)
- K4 : Operating the manipulated variable (any 1)
- K5 : Steps to increase reliability of results accurately / precaution (any 1)

| No. | Mark Scheme | Score |
|-------|--|-------|
| 2 (v) | Able to describe all the K's | |
| | 5 K | 3 |
| | Any 3-4 K | 2 |
| | Any 2K | 1 |
| | No response or incorrect response / 1K | 0 |

PRESENTATION OF DATA (06)

2 (vi)

KB061203

| No. | Mark Scheme | Score | | | | | | | | | |
|---|---|-------|--|--|--|-------------------------------|--|--|---------------------------------------|--|--|
| 2 (vi) KB061203 | Able to construct a table to record data based on the following criteria: C1 : MV with parameter and unit C2 : Operating RV and RV with unit <u>Sample answer:</u> | 2 | | | | | | | | | |
| | <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Light intensity</th> <th>Time taken for air bubble to move from point A to point B / 5 cm (min)</th> <th>Rate of transpiration (cm min⁻¹) // g min⁻¹</th> </tr> </thead> <tbody> <tr> <td>Shady (lower light intensity)</td> <td></td> <td></td> </tr> <tr> <td>Strong light (higher light intensity)</td> <td></td> <td></td> </tr> </tbody> </table> | | Light intensity | Time taken for air bubble to move from point A to point B / 5 cm (min) | Rate of transpiration (cm min ⁻¹) // g min ⁻¹ | Shady (lower light intensity) | | | Strong light (higher light intensity) | | |
| | Light intensity | | Time taken for air bubble to move from point A to point B / 5 cm (min) | Rate of transpiration (cm min ⁻¹) // g min ⁻¹ | | | | | | | |
| | Shady (lower light intensity) | | | | | | | | | | |
| Strong light (higher light intensity) | | | | | | | | | | | |
| Able to construct a table to record data based on one aspect only | 1 | | | | | | | | | | |
| No response or incorrect response | 0 | | | | | | | | | | |

1.7 **MARKING SKILL**

Paper 3 Question 2

Problem statement :

How does the light intensity affects the rate of transpiration in Hibiscus sp? H ✓ 01=3

Hypothesis :

As the light intensity increases, the rate of transpiration in Hibiscus sp. Increases. 02=3

Variables :

Manipulated variable : Light intensity ✓ 03=3

Responding variable : Rate of transpiration in Hibiscus sp. ✓

Fix variable : Surrounding temperature ✓

Materials and apparatus:

Potometer, beaker, razor blade, water, Hibiscus sp. Shoot, light source, ruler, stopwatch, rubber tube 04=2

Procedure :

1. A leafy Hibiscus sp. Shoot is choosen SK 05=3
2. The bottom of Hibiscus sp. shoot is cut obliquely 1cm under water in basin using a razor blade. K5 ✓
3. The potometer is moved around in the basin of water to remove all the air bubbles. The reservoir is filled with water.
4. The Hibiscus sp. in inserted to the potometer under water with a rubber tube. K1 ✓
5. The potometer is lifted from the basin, and the of potometer is immersed to a beaker of water.
6. The end of photometer is lifted from the water surface for a while, to introduce an air bubble. K1 ✓
7. The apparatus is placed in a room with no air movement. The apparatus is left for a while until the bubble moves along the potometer at the constant rate. K2 ✓
8. Point X and Y are marked on the potometer such that distance of X and Y is 5 cm. K1 ✓
9. A light source is placed at a distance of 50cm from the Hibiscus sp. shoot and K2 ✓

switched on.

10. The time taken for the air bubble to move from Y to X, which is 5cm distance, is measured and recorded with a stopwatch. (K2) ✓
11. The rate of transpiration of Hibiscus sp. is calculated with the formula,

$$\text{Rate of transpiration} = \frac{1}{\text{Time taken to move over 5cm}}$$
 (K3) ✓
12. The tap of reservoir is opened to allow the air bubble to flow to Y.
13. The experiment is repeated by placing the light source at a distance of 40cm, 30cm, 20cm and 10cm. (K4) ✓

Presentation of data

| Distance of light from the Hibiscus sp(cm) | The time taken for the air bubble to move over 50cm (s) | Rate of transpiration in Hibiscus sp. |
|--|---|---|
| | | $\frac{1}{\text{Time taken for air bubble to move 5 cm (s}^{-1}\text{)}}$ |
| 10 | | |
| 20 | | |
| 30 | | |
| 40 | | |
| 50 | | |

C2 ✓

06 = 2

C1 ✓

16

FORM 4

CHAPTER 2: CELL ORGANISATION

JUJ 2006

1. Diagram 1 shows a schematic reaction which occurs in mechanism of photosynthesis.

Rajah 1 menunjukkan rajah skema tindakbalas yang berlaku dalam mekanisme proses fotosintesis.

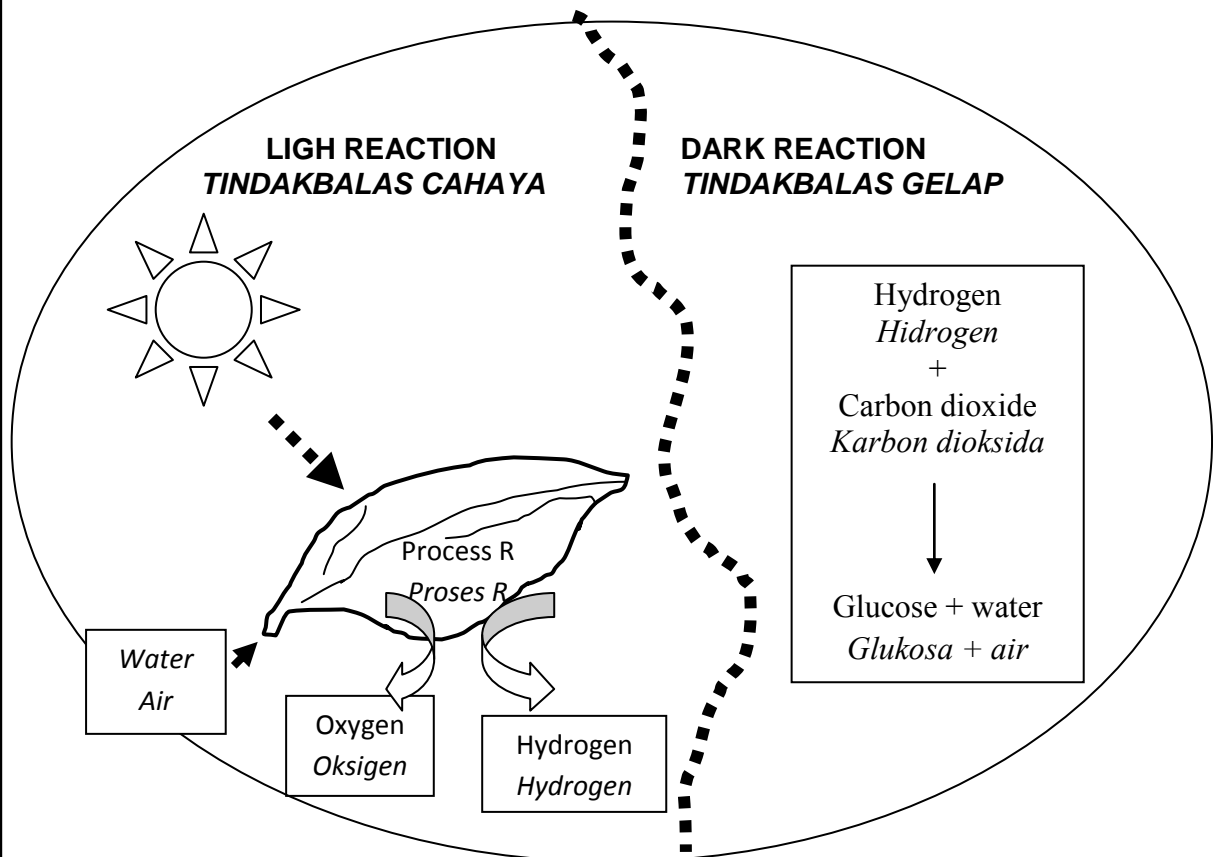


Diagram 1

Rajah 1

a) (i) Name the process involved during
Namakan proses yang terlibat semasa
Light reaction/ Tindakbalas cahaya :

Dark reaction/ Tindakbalas gelap :

[2 marks]

(ii) Explain process R which occurs during light reaction.

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Terangkan proses R yang berlaku semasa tindakbalas cahaya

.....
.....
.....
.....

[2 marks]

b) (i) Name the organelle which involves in process R.


Namakan organel yang terlibat dalam proses R?

.....

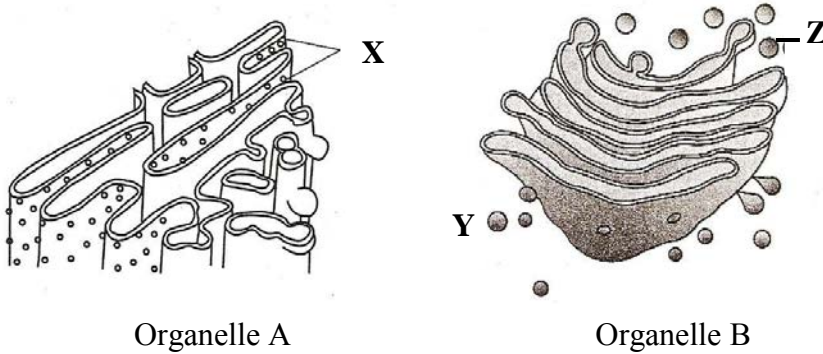
[1mark]

(ii) Draw and label the organelle in b (i) in the space given

Lukis dan labelkan organel di b(i) dalam ruang kosong disediakan.



[2 marks]



Organelle A

Organelle B

Diagram 1

Rajah 1

2. (a) Diagram 1 shows two organelles in a human cell.

Rajah 1 menunjukkan dua organel di dalam sel manusia

Name structure X, Y and Z.

Namakan struktur X, Y dan Z.

X:
 Y:
 Z:

[3 marks]

- (b) Name and state the functions of

Nama dan nyatakan fungsi

Organelle A:

Function/ *Fungsi* :

Organelle B:

Function/ *Fungsi* :

[4 marks]

(c) Organelles on Diagram 1 involve in synthesise of enzyme.

Organel dalam Rajah 1 terlibat dalam sintesis enzim

(i) On Organelle B, draw an arrow to show the direction of the products produced.

Pada Organel B, lukis anak panah untuk menunjukkan arah pergerakan produk yang dihasilkan.

[1 marks]

(ii) Explain how an enzyme is produced by organelles in Diagram 1.

Terangkan bagaimana enzim dihasilkan oleh organel dalam Rajah 1.

.....
.....
.....
.....
.....
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[3 marks]

(d) Explain why organelle B presents in a large numbers in the pancreas.

Terangkan mengapa organel B wujud dalam kuantiti yang banyak di dalam pankreas.

.....
.....
.....
.....

[2 marks]

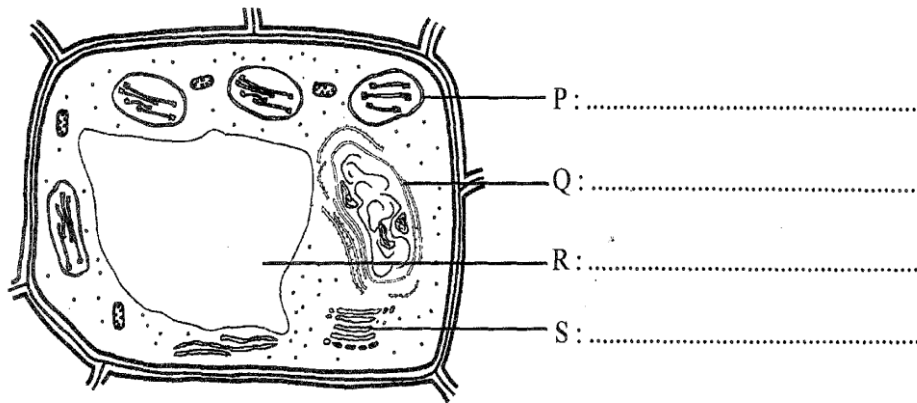


Diagram 1

Rajah 1

3. Diagram 1 shows a plant cell as seen under an electron microscope

Rajah 1 menunjukkan sel tumbuhan di bawah mikroskop electron.

(a)(i) On Diagram 1, label the structures P, Q, R and S.

Di atas rajah 1, labelkan struktur P, Q, R dan S

[4 marks]

(ii) State the function of structure:

Nyatakan fungsi struktur :

P :

S :

[2 marks]

(b) Diagram 1.1 shows the pathway of water movement from the soil to the upper part of the plant.

Rajah 1.1 menunjukkan laluan pergerakan air dari tanah ke bahagian atas tumbuhan.

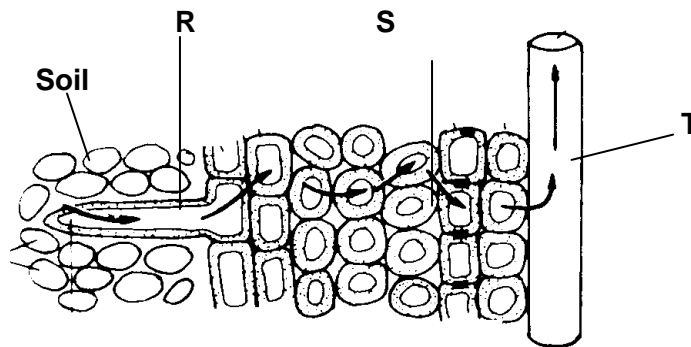


Diagram 1.1

Rajah 1.1

- (a)(i) State **one** characteristic of R and its importance.

*Nyatakan **satu** ciri R dan kepentingannya.*

.....
.....
.....

[2 marks]

- (ii) Based on Diagram 1.1, explain how water from soil move to structure T.

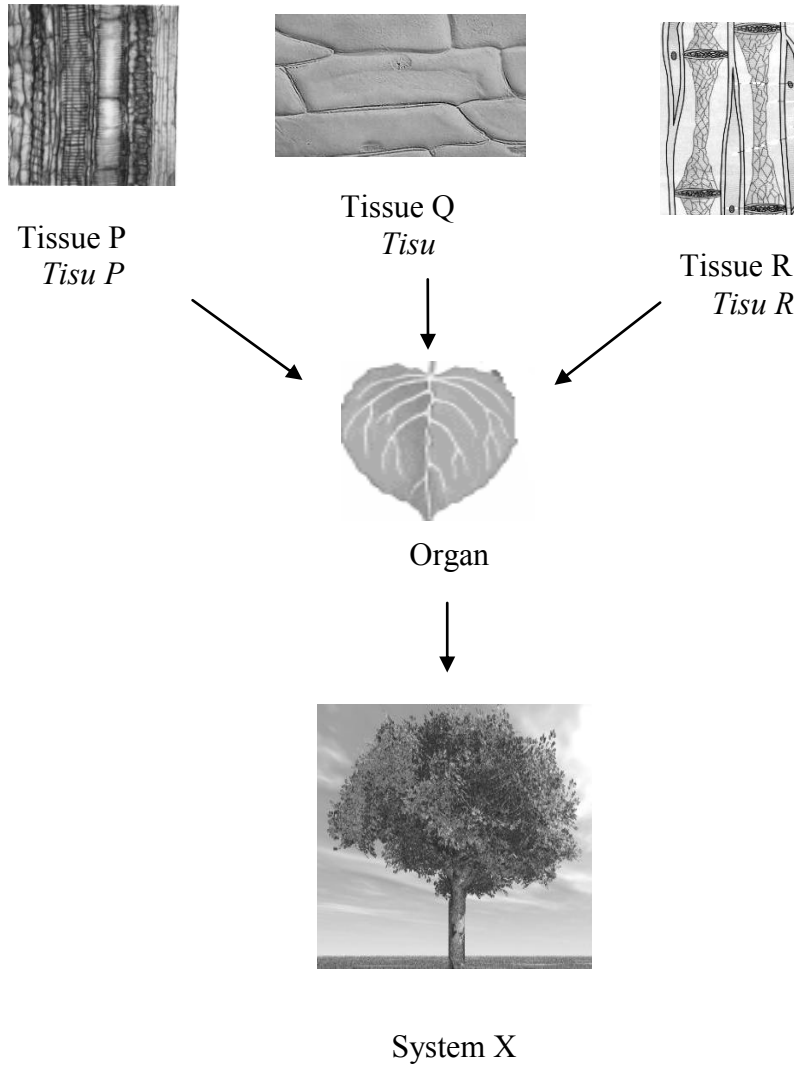
Berdasarkan Rajah 1.1, terangkan bagaimana air dari tanah bergerak ke struktur T.

.....
.....
.....
.....

[4 marks]

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4. (e) Diagram 4.3 shows a cell organization of a plant.
Rajah 4.3 menunjukkan organisasi sel satu tumbuhan



System X
Diagram 4.3
Rajah 4.3

- (i) Name tissues P, and R
Namakan tisu P, dan R

P :
R :

[2 marks]

(ii) State **one** function of tissues P and R

*Nyatakan **satu** fungsi tisu P dan R.*

P :

Q :

[2 marks]

JUJ 2011

5. Diagram 1 shows the cross section of plant cell.

Rajah 1 menunjukkan keratan rentas struktur sel tumbuhan.

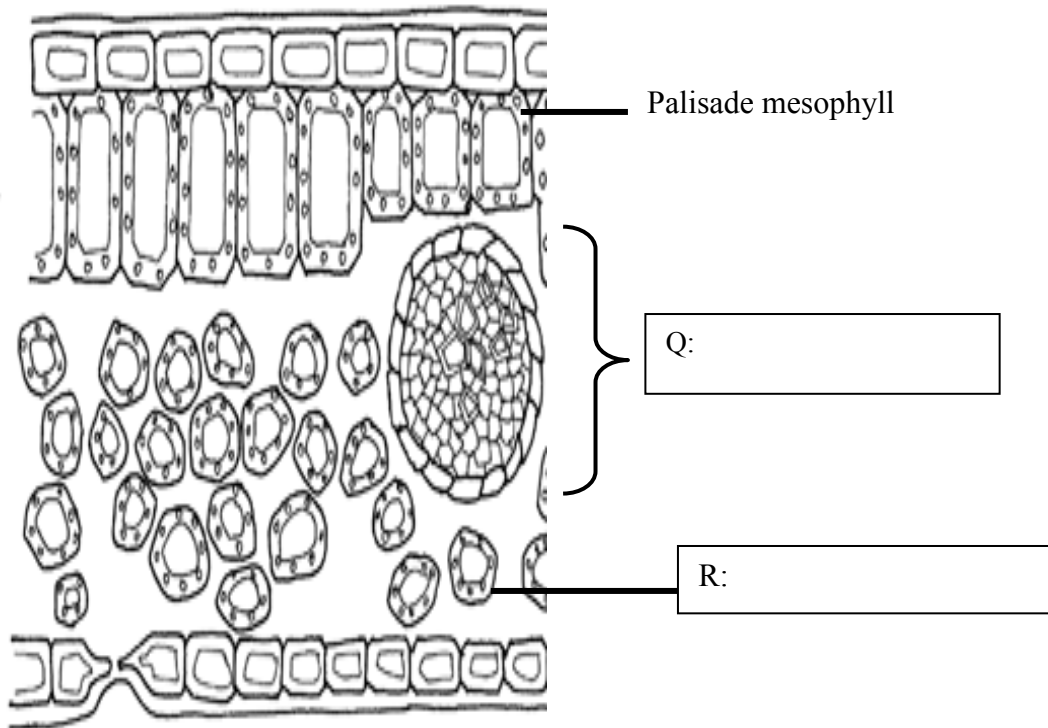


Diagram 1
Rajah 1

(a) (i) In Diagram 1, label Q and R.

Pada Rajah 1, label Q dan R

[2 marks]

(ii) Structure Q consists of two types of cells. State the function of each cell.

Struktur Q mengandungi dua jenis sel. Nyatakan fungsi sel-sel tersebut.

.....
.....
.....

[2 marks]

(b) (i) Explain **two** leaf adaptations to optimise photosynthesis.

*Terangkan **dua** penyesuaian daun untuk mengoptimumkan fotosintesis.*

.....
.....
.....
.....

[4 marks]

CHAPTER 3: MOVEMENT OF SUBSTANCES ACROSS PLAMA MEMBRANE

JUJ 2007

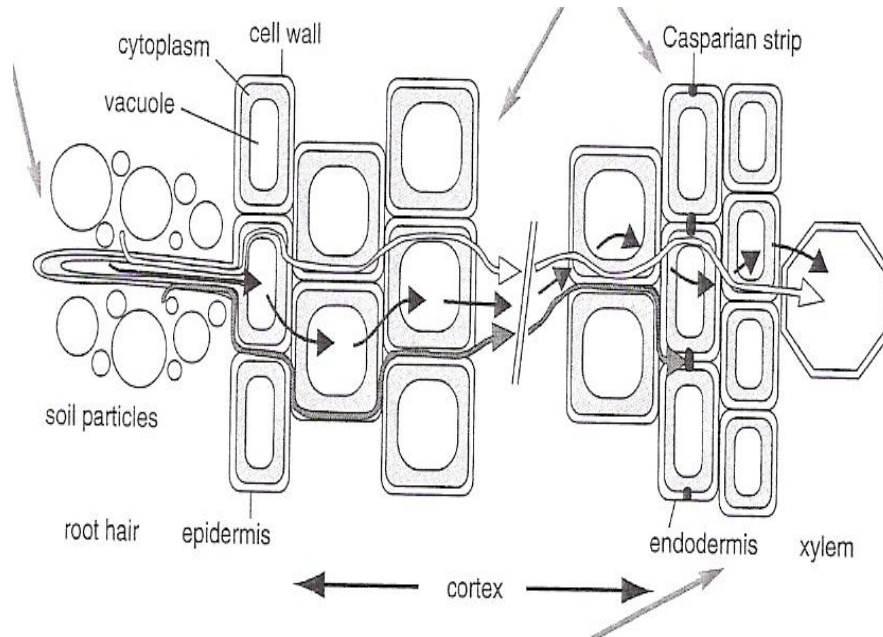


DIAGRAM 1

1. Diagram 1.1 shows the movement of water from the root hair to the xylem.

Rajah 1.2 menunjukkan pergerakan air dari rambut akar ke xilem

a) (i) Name the process that is occur in the diagram.

Namakan proses yang berlaku di dalam rajah

.....

[1 mark]

(ii) What is the factor that affects the direction of the process in (a)(i)?

Apakah faktor yang mempengaruhi arah proses tersebut dalam (a)(i)?

.....

[1 mark]

(iii) Give an explanation what will happen to the plant if there is no water in its surrounding soils.

Berikan satu penjelasan apa yang akan berlaku kepada tumbuhan jika tiada air di sekelilingnya.

.....

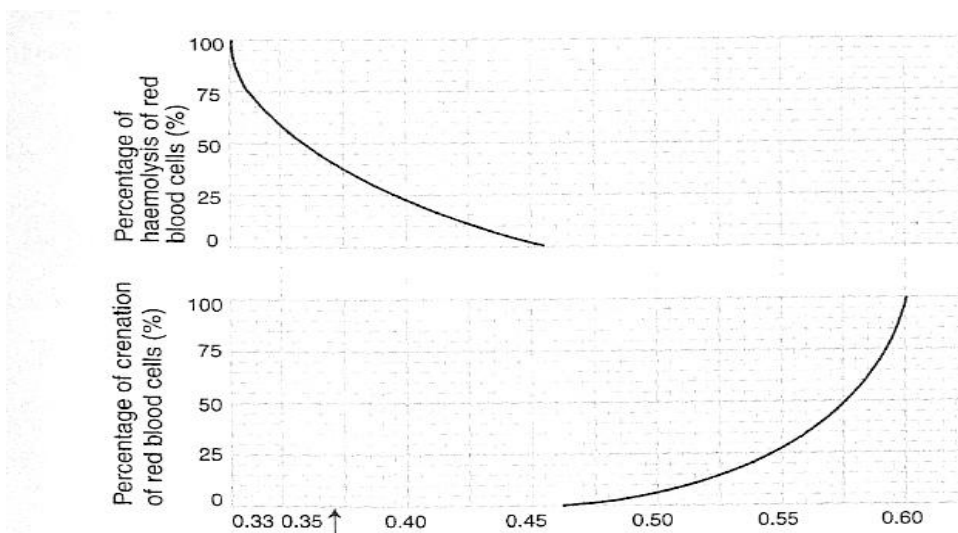
.....

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[3 marks]



GRAPH 1

b) Graph 1 shows the percentage of red blood cells that are burst or shrink when placed in salt solution of different concentration.

Graf 1 menunjukkan peratus sel darah merah yang pecah atau mengecut apabila dimasukkan ke dalam larutan garam yang berbeza kepekatan.

(i) State the concentration of salt solution that causes haemolysis of 25% of red blood cells.

Nyatakan kepekatan garam yang menyebabkan 25% daripada sel darah merah mengalami hemolisis.

.....

[1 mark]

(ii) Based on the graph given, state the concentration which is isotonic to blood plasma.

Berdasarkan graf yang diberi, nyatakan kepekatan larutan yang isotonik terhadap plasma darah.

.....

[1 mark]

(iii) Explain your answer in (b)(ii)

Jelaskan jawapan anda dalam (b)(ii)

.....
.....
.....
.....
.....

[2 marks]

c) The concentration of ions inside root cells is up to 100 times greater than in the soil. Anyway, the ions are still transported into the cells by active transport.

Kepekatan ion di dalam sel akar adalah 100 kali lebih tinggi berbanding di dalam tanah. Walau bagaimanapun, ion-ion tersebut masih diangkut ke dalam sel secara pengangkutan aktif.

(i) Define active transport

Takrifkan pengangkutan aktif.

.....
.....
.....

[1 mark]

- (ii) Explain what will happen to the uptake of the ions by root cells if the roots are immersed in a solution containing metabolic poisons such as cyanide.

Terangkan apa akan berlaku terhadap pengangkutan ion oleh sel akar jika akar tersebut direndam di dalam larutan yang mengandungi racun metabolik seperti sianida.

.....

.....

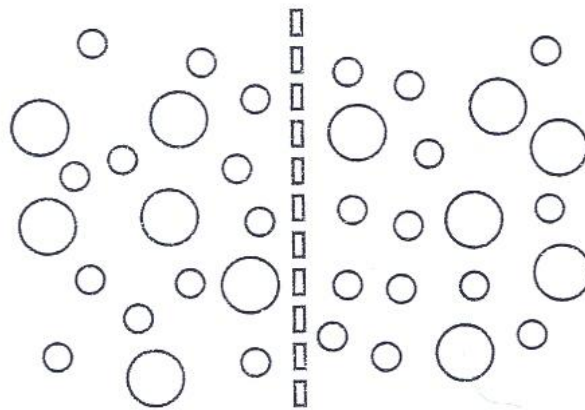
.....

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[3 marks]

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30% Sucrose solution
Larutan sukrosa 30%

10% Sucrose solution
Larutan sukrosa 10%

Diagram 1

Rajah 1

- 2. Diagram 1 shows two sucrose solutions with a different concentration that are separated with a semi-permeable membrane.

Rajah 1 menunjukkan dua larutan sukrosa yang berlainan kepekatan yang dipisahkan oleh membrane separa telap.

- (a)(i) Name the process that is involved in Diagram 1.

Namakan process yang terlibat dalam Rajah 1.

.....

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[1 mark]

(ii) State the molecule that is involved in the process that you name in (a)(i).

Namakan molekul yang terlibat dalam proses yang dinamakan dalam (a)(i).

.....

[1 mark]

(iii) In Diagram 1, draw arrows to show the direction of the movement of molecules.

Dalam Rajah 1, lukis anak panah untuk menunjukkan arah pergerakan molekul.

[1 mark]

(b)(i) Name the term used to describe the 30% sucrose solution compared to the 10% sucrose solution as shown in Diagram 1.

Namakan istilah yang digunakan untuk menggambarkan larutan sukrosa 30% berbanding larutan sukrosa 10% seperti yang digambarkan dalam Rajah 1.

.....

[1 mark]

(ii) If a plant cell is immersed into 30% sucrose solution for 30 minutes, explain what will happen to the cell.

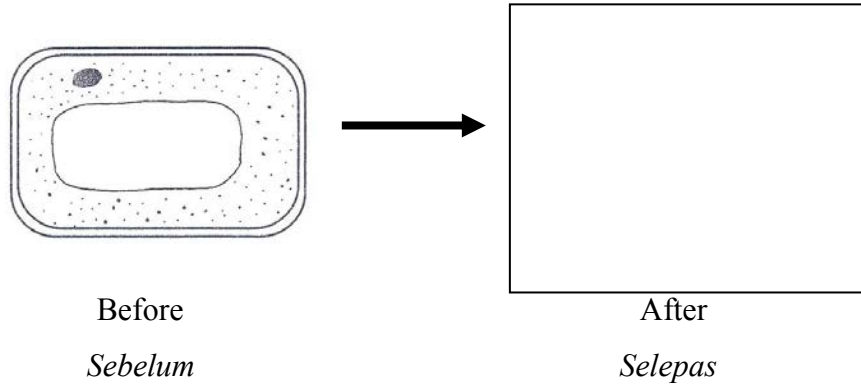
Sekiranya satu sel tumbuhan direndam ke dalam larutan sukrosa 30% selama 30 minit, terangkan apa yang akan berlaku kepada sel tersebut.

.....
.....
.....
.....

[3 marks]

- (iii) Draw the condition of the cell after it is immersed into the 30% sucrose solution.

Lukis keadaan sel tersebut selepas ia direndam ke dalam larutan sukrosa 30% tersebut.



[1 mark]

- (c)(i) State the process that is involved in the uptake of mineral ions by root hairs.
Nyatakan proses yang terlibat dalam pengambilan ion mineral oleh akar rambut.

.....

[1 mark]

- (ii) Explain what will happen to the uptake of mineral ions by roots hair if the roots are immersed into a solution containing metabolic poisons such as cyanide.

Terangkan apakah yang akan berlaku terhadap pengambilan ion mineral oleh akar rambut sekiranya ia direndam di dalam larutan yang mengandungi racun metabolik seperti sianida.

.....

[3 marks]

JUJ 2011

3. (c) Diagram 1.1 shows the condition of plant after being spread with excess fertilizers.

Rajah 1.1 menunjukkan keadaan sel selepas ditabur dengan baja berlebihan.



Before
Sebelum



After
Selepas

Diagram 1.1
Rajah 1.1

Explain the condition of the plants after being spread with excess fertilizers.

Terangkan keadaan tumbuhan selepas ditabur dengan baja berlebihan.

.....

.....

.....

.....

.....

[4 marks]

CHAPTER 4: CHEMICAL COMPOSITION IN THE CELL

JUJ 2009

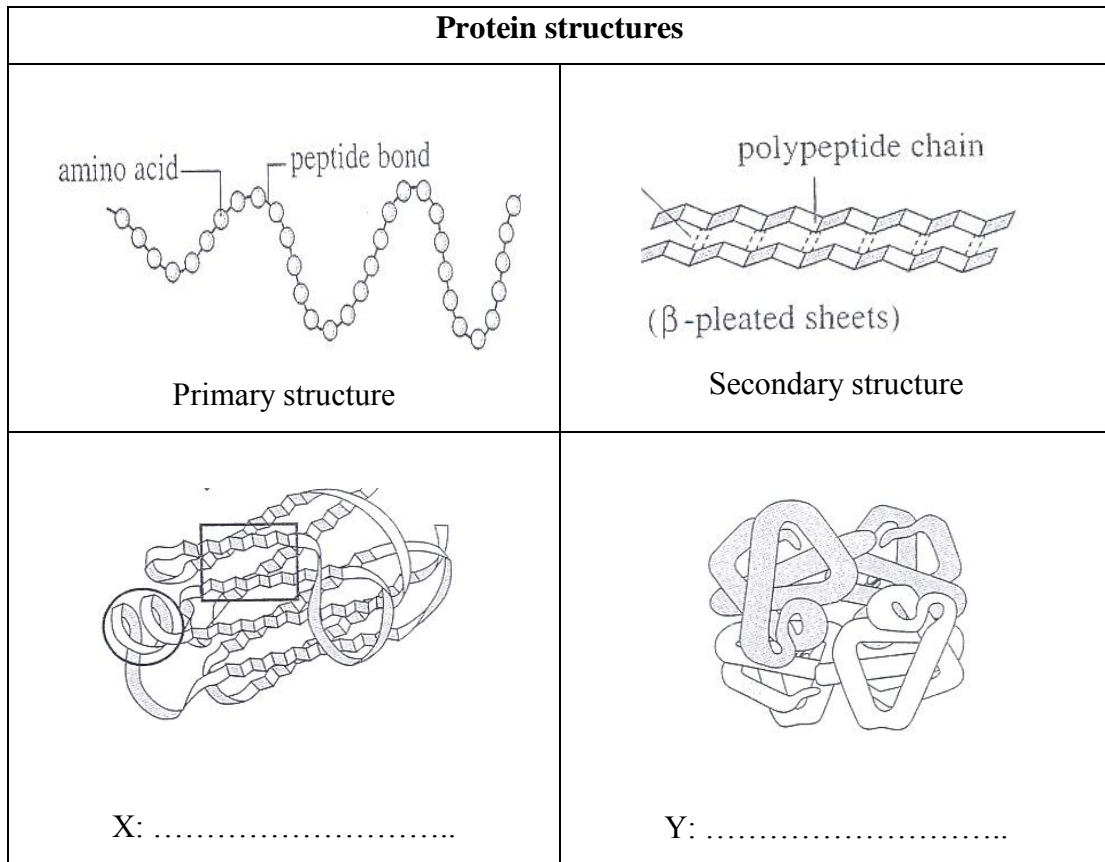


Diagram 2.1

Rajah 2.1

1. Proteins are large complex organic molecules which play diverse roles in living organisms. Diagram 2.1 shows four levels of organization in protein structures.

Protein adalah molekul organik kompleks besar yang memainkan pelbagai fungsi dalam kehidupan organisma. Rajah 2.1 menunjukkan empat peringkat organisasi dalam struktur protein.

(a)(i) Name structure X and Y in Diagram 2.1.

Namakan struktur X dan Y dalam Rajah 2.1

[2 marks]

(ii) Give **one** example of protein with structure X.

*Berikan **satu** contoh protein yang berstruktur X.*

.....

[1 mark]

(b) Amino acid is the monomer of protein. There are two types of amino acids which are essential amino acid and non-essential amino acid.

Explain about essential amino acid.

Asid amino adalah monomer bagi protein. Terdapat dua jenis asid amino iaitu asid amino perlu dan asid amino tidak perlu.

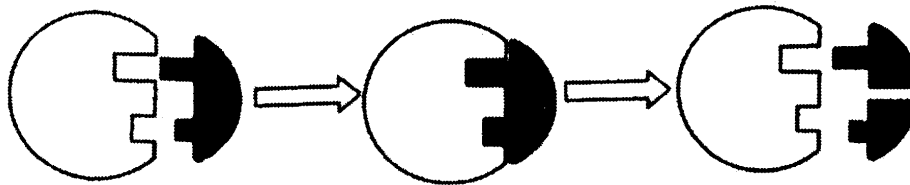
Terangkan tentang asid amino perlu.

.....

.....

.....

[2 marks]



(c)(i) Diagram 2.2 shows an enzyme reaction which is very specific. Based on the diagram, state other characteristic of enzyme that can be observed.

Diagram 2.2 menunjukkan satu tindak balas enzim di mana tindak balasnya adalah spesifik. Berdasar rajah tersebut, berikan ciri enzim yang lain yang dapat diperhatikan.

.....

.....

[1 mark]

- (ii) The enzyme reaction is referred as the 'lock and key' hypothesis. Explain about the hypothesis.

Tindak balas enzim dirujuk sebagai hipotesis 'mangga dan kunci'. Jelaskan tentang hipotesis tersebut.

.....
.....
.....
.....

[3 marks]

- (d)(i) The enzyme reaction can be slowed down or completely stopped by inhibitors.

Give **one** example of inhibitor.

Tindak balas enzim dapat diperlahankan atau dihentikan sepenuhnya oleh perencat.

*Beri **satu** contoh perencat.*

.....

[1 mark]

- (ii) Explain how inhibitor inhibits the enzyme reaction.

Terangkan bagaimana perencat merencat tindak balas enzim.

.....
.....
.....

[2 marks]

JUJ 2011

2. Diagram 2 shows the processes involved in lipids.

Rajah 2 menunjukkan proses-proses yang terlibat dalam lipid.

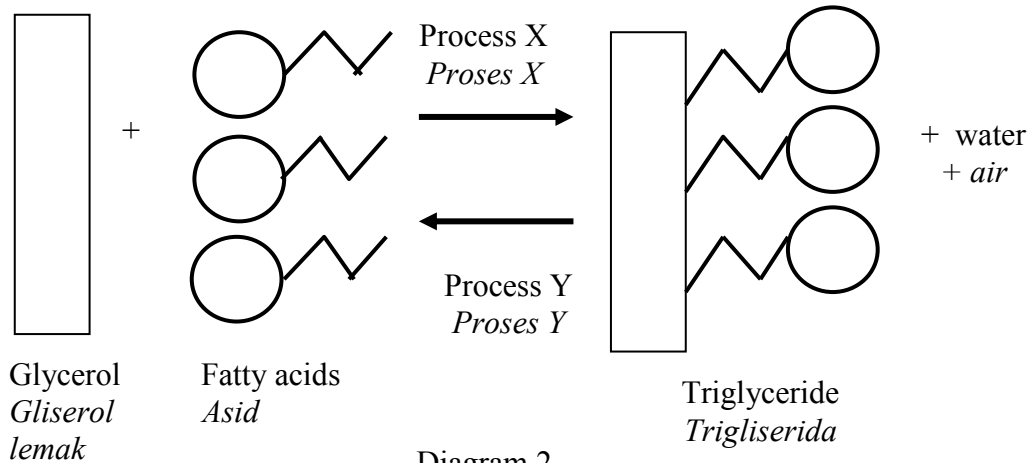


Diagram 2

Rajah 2

(a) State the processes X and Y.

Nyatakan proses-proses X dan Y.

Process / Proses X :

Process / Proses Y :

[2 marks]

(b) Waxes are type of lipid. It is found on the cuticles of the epidermis of leaves, fruits and seeds of some plant. Explain another type of lipid in human.

Lilin merupakan sejenis lipid. Ia dijumpai pada kutikel epidermis daun, buah dan biji pada tumbuhan tertentu. Terangkan jenis lain lipid yang terdapat pada manusia.

.....
.....
.....

[2 marks]

- (c) (i) Butter is saturated fat but corn oil is unsaturated fat. Explain briefly the differences between saturated fat and unsaturated fat.

Mentega merupakan lemak tepu tetapi minyak jagung ialah lemak tak tepu. Terangkan dengan ringkas perbezaan-perbezaan di antara lemak tersebut.

.....
.....
.....
.....

[2 marks]

- (ii) The gradual deposition of cholesterol and fats in the inner lining of artery wall leads to the narrowing of lumen. State this condition and its consequence.

Pengenapan kolesterol dan lemak pada lapisan dalam dinding arteri menyebabkan lumen menjadi sempit. Nyatakan keadaan tersebut dan akibatnya.

.....
.....

[2 marks]

- (d) Organic compounds are chemical compound that contain the element of carbon. One of the organic compounds in the cell is nucleic acid. Diagram 2.1 shows a type of nucleic acid and Diagram 2.2 shows the building blocks of nucleic acid.

Sebatian organik merupakan sebatian kimia yang mengandungi unsur karbon. Satu daripada sebatian organik di dalam sel ialah asid nukleik. Rajah 2.1 menunjukkan sejenis asid nukleik dan Rajah 2.2 menunjukkan blok binaan asid nukleik.

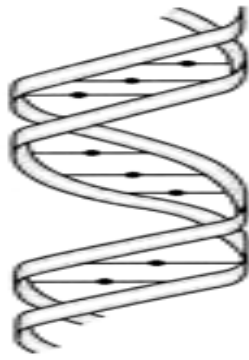


Diagram 2.1

Rajah 2.1

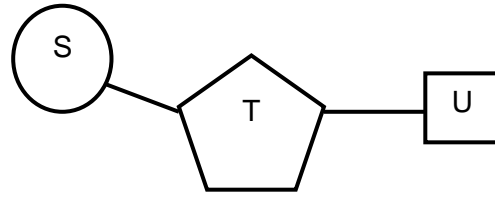


Diagram 2.2

Rajah 2.2

- (i) Based on Diagram 2.2, state structure T and U.

Berdasarkan Rajah 2.2, nyatakan struktur T and U.

T :

U :

[2 marks]

- (ii) Segments of structure in Diagram 2.1 carry characteristics for each individual. Describe the application of genetics that be used for identification purposes in solving criminal cases.

Segmen pada struktur dalam Rajah 2.1 membawa ciri-ciri individu.

Terangkan aplikasi bidang genetik yang digunakan bagi tujuan pengecaman dalam penyelesaian kes-kes jenayah.

.....

[2 marks]

CHAPTER 5: CELL DIVISION

JUJ 2007

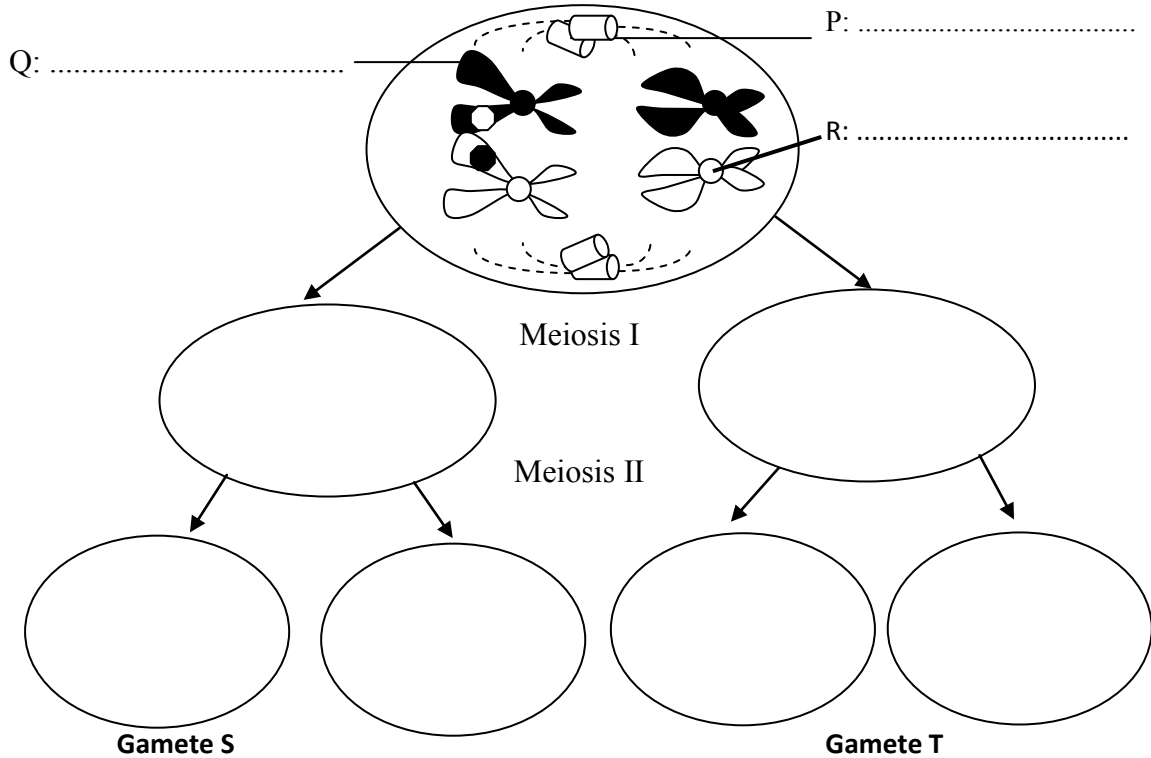


DIAGRAM 2

1. Diagram 2 shows the stages of meiosis during the formation of gametes which involve a pair of chromosome P and a pair of chromosome Q.

Rajah 2 menunjukkan peringkat-peringkat meiosis semasa pembentukan gamet yang melibatkan pasangan kromosom P dan pasangan kromosom Q.

(a) (i) On the Diagram 2, label the structures P, Q and R.

Pada Rajah 2, label struktur P, Q dan R

[3 marks]

(ii) Names the stage of the dividing cell that is shown in Diagram 2.

Namakan peringkat pembahagian sel seperti ditunjukkan dalam Rajah 2

.....

[1 mark]

(iii) Give your reason for the answer in (b)(i)

Berikan alasan bagi jawapan anda dalam b(i)

.....
.....

[1 mark]

b) State one of organs where this type of cell division occurs.

Nyatakan satu organ di mana pembahagian sel ini berlaku

.....

[1 mark]

c) Complete the formation of Gamete S **or** Gamete T in the Diagram 2.

*Lengkapkan pembentukan Gamet S **atau** Gamet T dalam Rajah 2.*

[3 marks]

d) Meiosis consists of two separate divisions; Meiosis I and Meiosis II. There are a lot of differences between both divisions. Give **two** differences between Prophase I and Prophase II.

Meiosis terdiri daripada dua bahagian yang berlainan; Meiosis I dan Meiosis II. Terdapat banyak perbezaan antara kedua-dua pembahagian. Berikan dua perbezaan antara Profasa I dan Profasa II.

.....
.....
.....
.....
.....

[2 marks]

e) Explain the significant of maintaining the diploid number of chromosomes for organism?

Terangkan kepentingan mengekalkan bilangan kromosom yang diploid kepada organisma.

.....
.....
.....

[1 marks]

JUJ 2010

2. Diagram 2 shows the different stages which take place during cell division.
Rajah 2 menunjukkan peringkat berlainan yang berlaku semasa pembahagian sel.

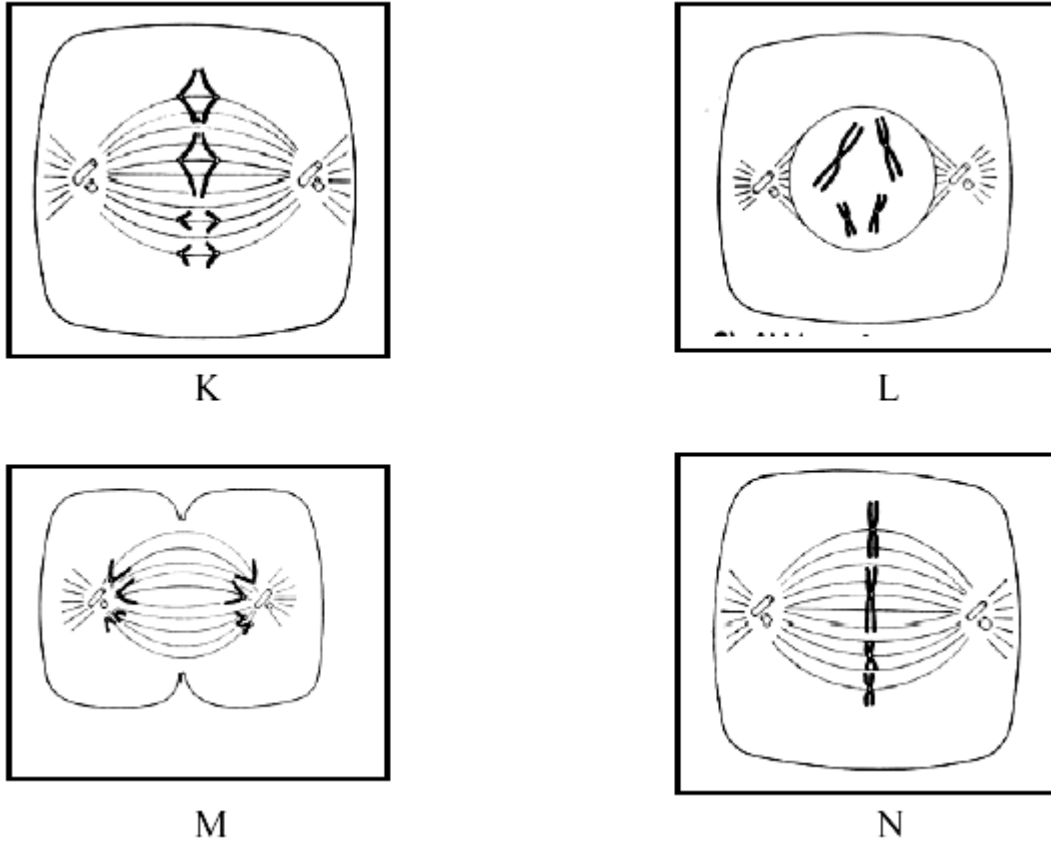


Diagram 2

Rajah 2

- (a) Name the cell division shown in Diagram 2

Namakan pembahagian sel yang ditunjukkan dalam Rajah 2 .

.....

[1 mark]

- (b)(i) Arrange the stages in Diagram 2 according to the correct sequence of events during cell division.

Susunkan peringkat-peringkat dalam Rajah 2 mengikut tertib yang betul semasa pembahagian sel.

[2 marks]

(ii) Based on the diagram, describe the behaviour for each stages

- K :
- L :
- M :
- N :

[4 marks]

(c) Diagram 2.1 shows an experiment carried out on animal cloning by using two different species of frogs.

Rajah 2.1 menunjukkan satu eksperimen pengklonan haiwan dengan menggunakan dua spesis katak yang berbeza.

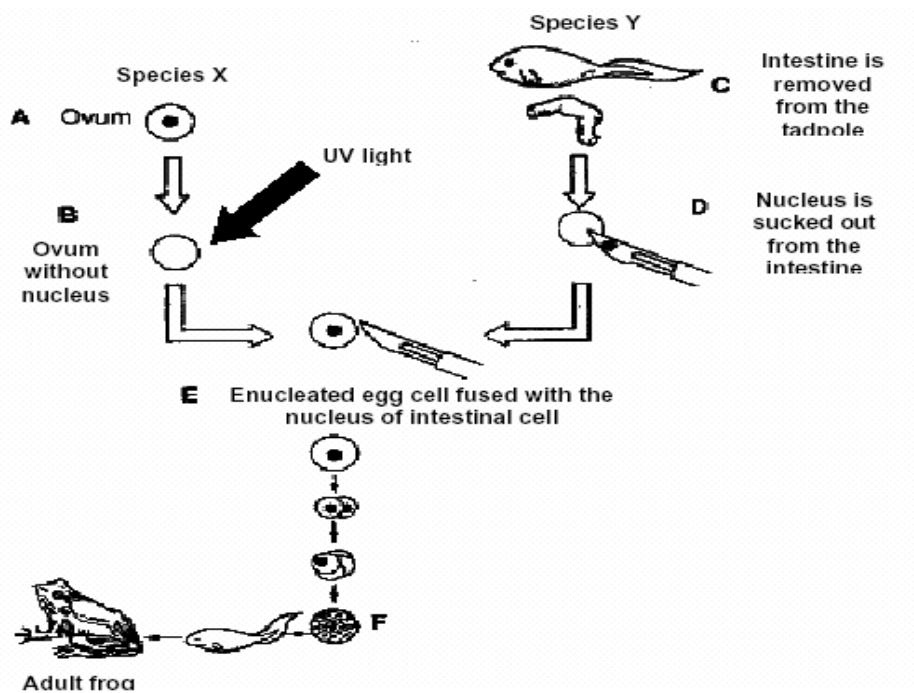


Diagram 2.1

Rajah 2.1

(c) Based on Diagram 2.1, state the meaning of cloning.

Berdasarkan Rajah 2.1, nyatakan maksud pengklonan

-
-

[1 mark]

(d) Name the type of reproduction shown in Diagram 2.1.

Give a reason for your answer.

Namakan jenis pembiakan yang ditunjukkan dalam Rajah 2.1.

Berikan satu sebab untuk jawapan anda.

.....
.....
.....

[2 marks]

(e)(i) Based on Diagram 2.1, name the species of frog that will be produced at the end of the experiment.

Berdasarkan Rajah 2.1, namakan spesies katak yang akan dihasilkan di akhir eksperimen.

.....

[1 mark]

(ii) Explain your answer in (e) (i).

Terangkan jawapan anda di (e)(i).

.....
.....

[1 mark]

JUJ 2011

3. Diagram 3 shows cytokinesis occurs in cell division.
Rajah 3 menunjukkan sitokinesis yang berlaku dalam pembahagian sel.

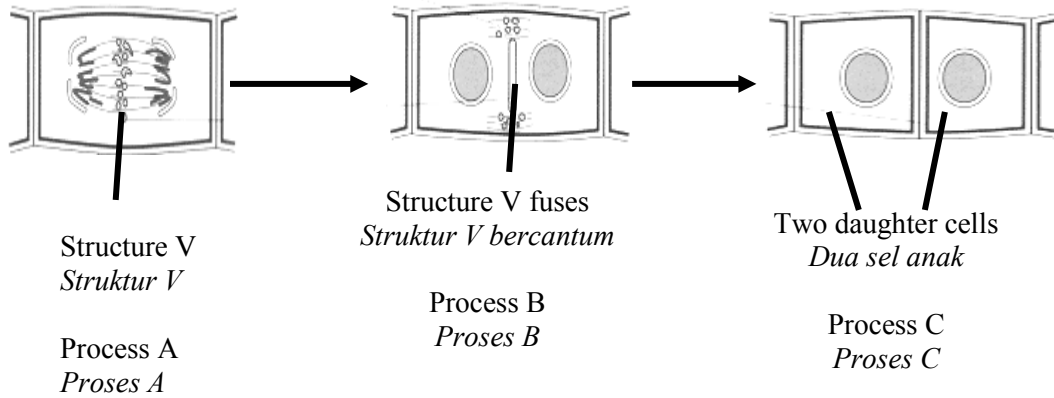


Diagram 3

Rajah 3

- (a) State whether above cell division occurs in animal cell or plant cell and name structure V.

Nyatakan sama ada pembahagian sel di atas berlaku dalam sel haiwan atau sel tumbuhan dan namakan struktur V.

.....
 Structure / Struktur V:

[2 marks]

- (b) Structure V is formed during cytokinesis but in animal cell, actin filaments in the cytoplasm contracts to pull a ring of the plasma membrane inwards forming a groove. Name the groove.

Struktur V terbentuk semasa sitokinesis tapi dalam sel haiwan, filamen aktin dalam sitoplasma mengecut untuk menarik membran plasma ke dalam lalu membentuk satu alur. Namakan alur tersebut.

.....
 [1 mark]

- (c) State an important of mitosis in human.

Nyatakan satu kepentingan mitosis dalam manusia.

.....

[1 mark]

- (d) If one of the daughter cell in process C undergoes as process below,

Jika salah satu dari sel anak dalam proses C mengalami proses seperti di bawah,

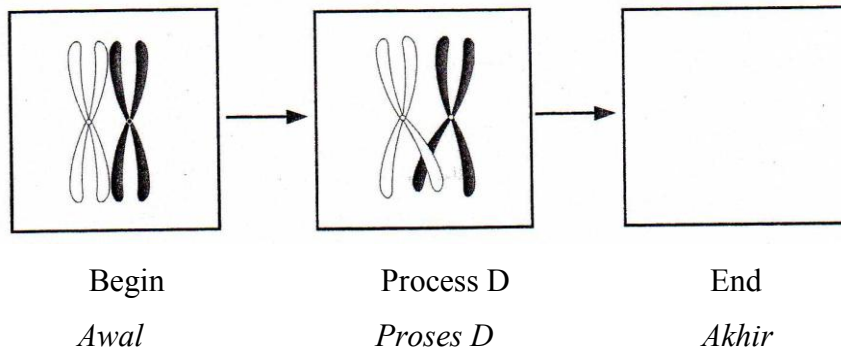


Diagram 3.1

Rajah 3.1

- (i) Complete the draw in Diagram 3.1 below to show the appearance of the chromosome at the end.

Lengkapkan Rajah 3.1 di atas untuk menunjukkan rupa kromosom di akhir proses.

[1 mark]

- (ii) State one importance of process D to an organism.

.....

[1 mark]

- (e) Diagram 3.2 shows chromosomal mutation which change in chromosome structure.

Rajah 3.2 menunjukkan mutasi kromosom di mana perubahan dalam struktur kromosom .

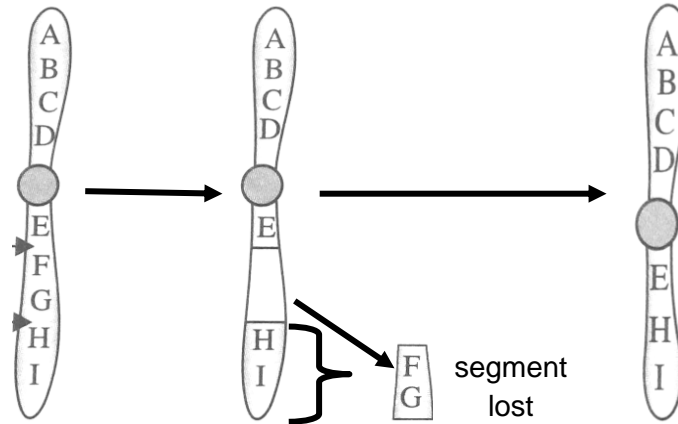


Diagram 3.2

Rajah 3.2

- (i) Explain the meaning of mutation.

Terangkan maksud mutasi.

.....

[2 marks]

- (ii) Based on diagram 3.2, name the process occurred and state a factor that causes it.

Berdasarkan rajah 3.2, namakan proses yang berlaku dan nyatakan faktor penyebabnya.

.....

[2 marks]

- (iii) State two ways to prevent from being exposed to factor you have named in

(e) (ii) above.

Nyatakan dua cara untuk mengelakkan dari terdedah kepada faktor yang telah anda namakan dalam (e) (ii) di atas.

1.
2.

[2 marks]

CHAPTER 6: NUTRITION

JUJ 2008

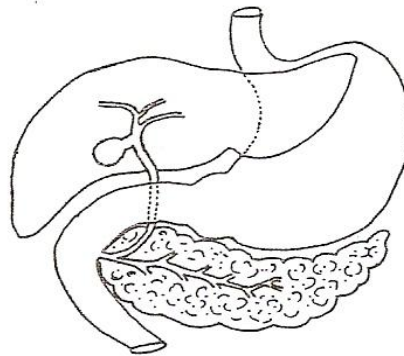


Diagram 5

Rajah 5

1. Diagram 5 shows organs that involve in digestive system. Some of the organs also involve in endocrine system.

Rajah 5 menunjukkan organ-organ yang terlibat dalam sistem pencernaan. Sebahagian dari organ ini turut terlibat dalam sistem endokrin.

- (a) (i) In the diagram, label T for the organ that involves in both systems.

Dalam rajah tersebut, label T untuk organ yang terlibat dalam kedua-dua sistem.

[1 mark]

- (iii) State the function of the organ labeled:

Nyatakan fungsi organ yang telah dilabel:

In digestive system

Dalam sistem pencernaan:

.....
.....

In endocrine system:

Dalam sistem endokrin:

.....
.....

[2 marks]

- (b) Predict what will happen to a person if organ T fails to function?

Jangkakan apakah yang akan terjadi kepada seseorang itu jika organ T gagal berfungsi?

.....
.....
.....
.....
.....

[3 marks]

- (c) Our body gains and loses water everyday. However, we still can maintain our water contents of the blood at a constant level through a process called osmoregulation.

Badan kita mendapat dan kehilangan air setiap hari. Walau bagaimanapun, kita masih dapat mengekalkan kandungan air dalam darah pada tahap yang malar melalui satu proses yang dipanggil osmokawalaturan.

- (i) Name the hormone that involves in the osmoregulation.

Namakan hormon yang terlibat dalam osmokawalaturan.

.....

[1 mark]

- (ii) State the function of the hormone mentioned in 5(c)(i).

Nyatakan fungsi hormon yang dinyatakan dalam 5(c)(i).

.....
.....

[1 marks]

- (d) If a person has kidney problems and both kidneys stop functioning, he can be treated by haemodialysis using haemodialysis machine. Explain briefly, how the machine works.

Jika seseorang mempunyai masalah ginjal dan kedua-dua ginjalnya tidak berfungsi, dia boleh dirawat dengan kaedah hemodialisis melalui penggunaan mesin hemodialisis. Terangkan secara ringkas, bagaimana mesin ini berfungsi.

.....

.....

.....

.....

.....

.....

[4 marks]

JUJ 2010

2. Diagram 3.1 shows a food pyramid.
Rajah 3.1 menunjukkan piramid makanan.

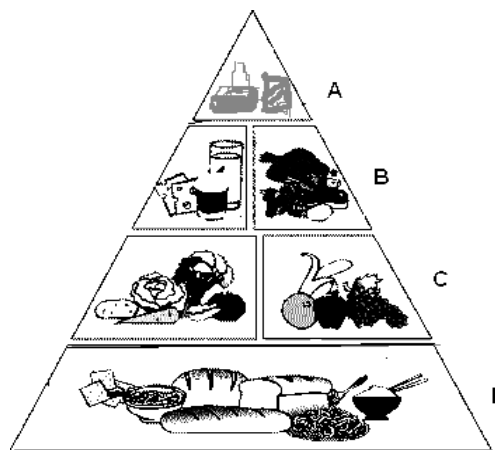


Diagram 3.1

Label A, B, C and D are the different classes of food that make up the balanced diet.

Label A, B, C and D adalah kelas-kelas makanan yang berbeza dalam gizi seimbang.

Name the classes of food that build the muscle tissue and give two examples.

Namakan kelas makanan yang membina tisu otot dan berikan dua contoh.

.....
.....

[3 marks]

JUJ 2008

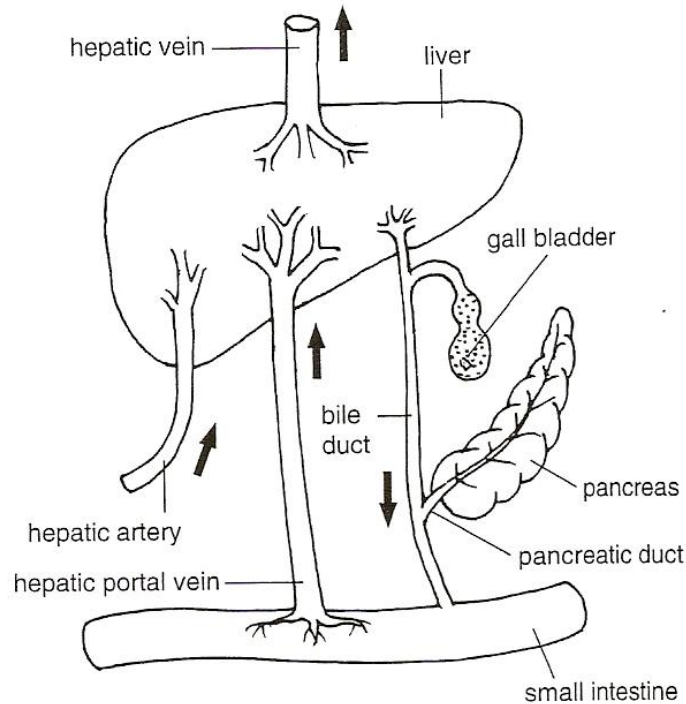


Diagram 8.1

Rajah 8.1

3. (a) Digested nutrients will be absorbed by ileum and some of it will be transported to liver. In the liver, the nutrients are used to form complex compounds or structural components. By using examples, describe the processes that take place in the liver.

Makanan tercerna akan diserap oleh ileum dan sebahagiannya akan diangkut ke hati. Di hati, nutrien digunakan dalam pembentukan sebatian kompleks atau komponen struktur sel. Dengan menggunakan contoh yang sesuai, huraikan proses yang berlaku di hati.

[10 marks]

| Meals | Types of food |
|-------------------------------|--|
| Breakfast <i>Sarapan</i> | Coffee , Nasi Lemak <i>Kopi, Nasi Lemak</i> |
| Lunch <i>Makan t/ hari</i> | Rice, Beef Curry , Chicken Soup, Fresh Orange Juice <i>Nasi, Kari Daging, Sup Ayam, Jus Oren</i> |
| Dinner <i>Makan malam</i> | Rice , Grilled Fish , Spinach Soup, Tea <i>Nasi, Ikan Bakar, Sup Bayam, Tea</i> |

Table 8.2

Jadual 8.2

- (b) Based on the table 8.2, analyse the food content and justify the preparation food methods toward Ahmad's health.

Berdasarkan jadual 8.2 di atas, analisis kandungan makanan dan beri justifikasi kaedah penyediaan makanan terhadap kesihatan Ahmad .

[10 marks]

JUJ 2009

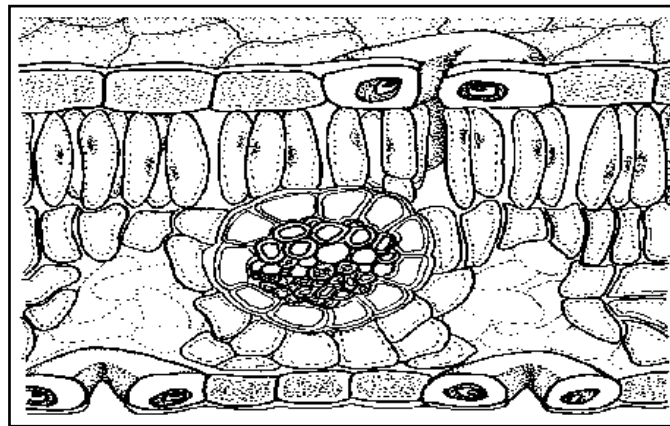


Diagram 6.1

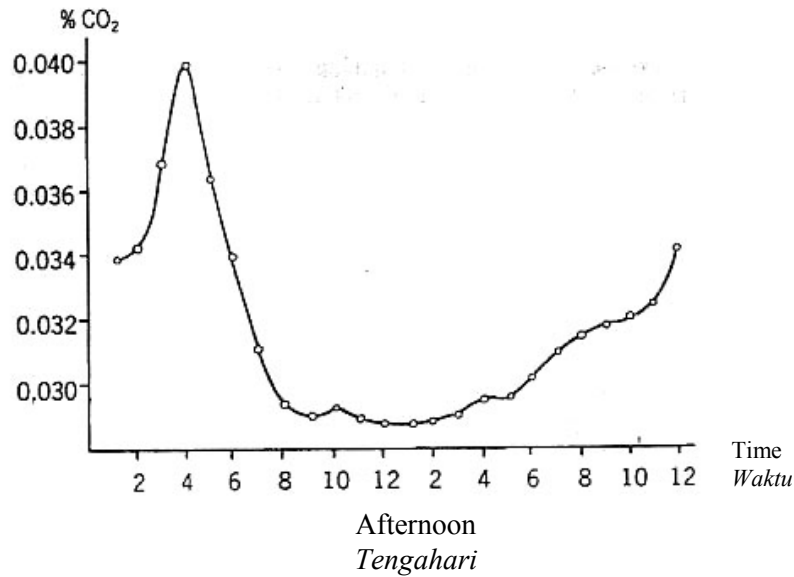
4. Diagram 6.1 shows a cross section of a dicotyledonous leaf. Explain how the structure of a leaf being adapted to maximize the rate of photosynthesis towards certain plants.

Rajah 6.1 menunjukkan keratan rentas daun dikotiledon. Terangkan bagaimana struktur daun diadaptasikan untuk memaksimumkan kadar fotosintesis yang terhadap tumbuhan tertentu.

[6 marks]

<http://edu.joshuatly.com/>
<http://fb.me/edu.joshuatly>

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SULIT



Graph 6.3

5. Based on the graph 6.3, explain the changes of concentration of carbon dioxide occur at the places where the density of plants is high such as at the tropical rainforest.

Berdasarkan graf 6.3, terangkan perubahan kepekatan karbon dioksida di kawasan kepadatan tumbuhan yang tinggi seperti di hutan hujan tropika. .

[8 marks]

JUJ 2011

6. (a) (i) Diagram 6 shows a human digestive system.

Rajah 6 menunjukkan sistem pencernaan manusia.

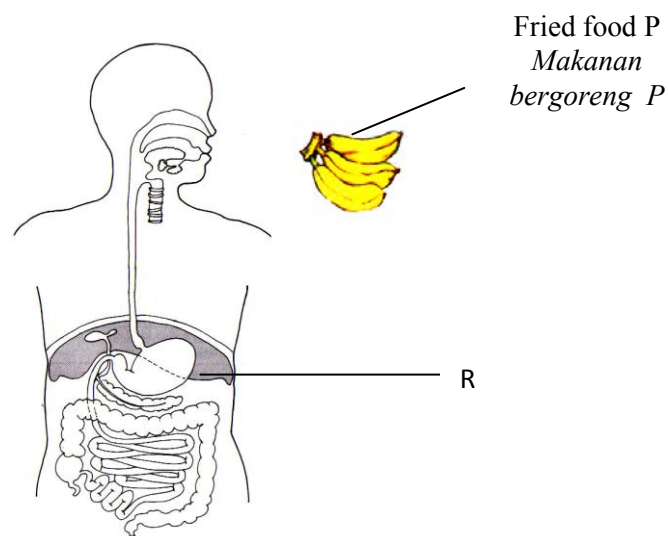


Figure 6

<http://edu.joshuatly.com/>
<http://fb.me/edu.joshuatly>

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SULIT

Explain how fried food P is digested in the digestive system.

Terangkan bagaimana makanan bergoreng P dicernakan di dalam sistem pencernaan itu.

[6 marks]

(ii) Explain how organ R helps in the assimilation of glucose and amino acid.

Terangkan bagaimana organ R membantu dalam asimilasi glukosa dan asid amino.

[4 marks]

(b) You are asked to prepare a talk on "Good Eating Habits" for a group of parents.

Discuss the good eating habits that you may want to educate them.

Anda dikehendaki menyediakan suatu ceramah yang bertajuk " Amalan tabiat pemakanan yang baik" untuk sekumpulan ibu bapa. Bincangkan amalan pemakanan yang baik untuk disampaikan kepada mereka

[10 marks]

JUJ 2011

7. *Hibiscus* plants synthesize its own organic substances through the process of photosynthesis. This process involve two reaction in the diagram 7.2 below.

Hibiscus merupakan tumbuhan yang mensintesis bahan organiknya sendiri melalui proses fotosintesis. Proses ini melibatkan dua tindakbalas seperti dalam rajah 7.2 di bawah.

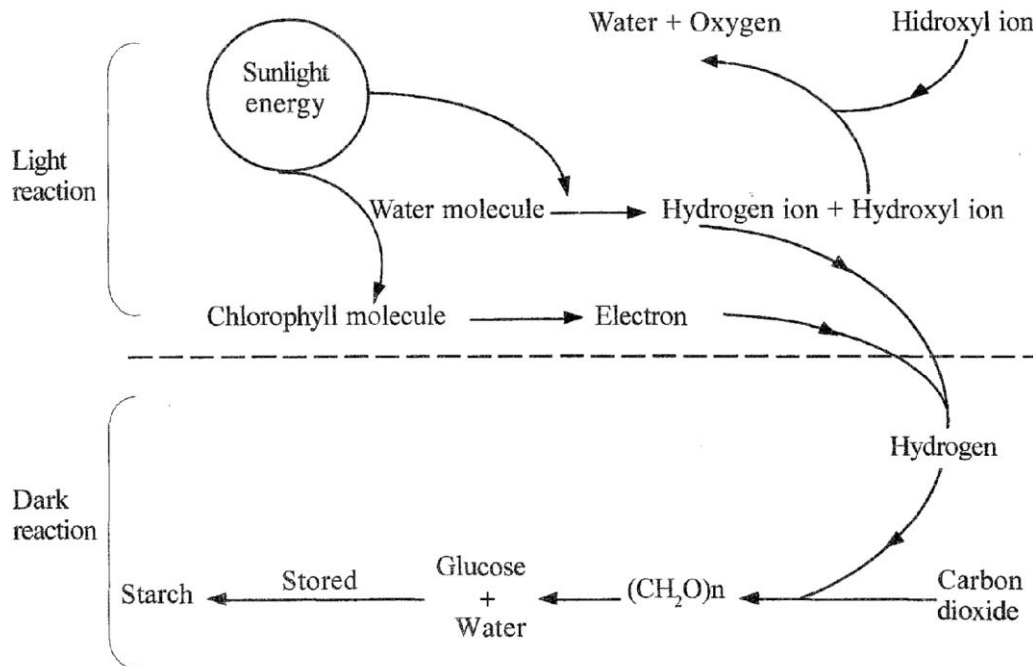


Diagram 7.2
Rajah 7.2

- (i) State the meaning of photosynthesis based on the schematic diagram in diagram 7.2.

Nyatakan pengertian fotosintesis berdasarkan rajah skema 7.

[2 marks]

- (ii) Starting with water and carbon dioxide as the raw materials, describe how a green plant produces starch molecules.

Bermula dengan air dan karbon dioksida sebagai bahan mentah, huraikan bagaimana tumbuhan hijau menghasilkan molekul kanji.

[8 marks]

CHAPTER 7: RESPIRATION

JUJ 2007

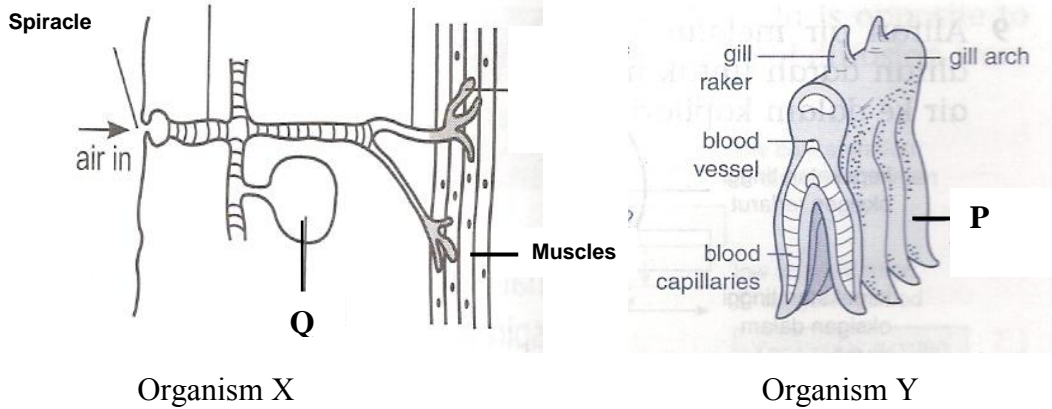


DIAGRAM 3

1. Diagram 3 shows the respiratory organ for two different organisms.
Rajah 2 menunjukkan organ respirasi untuk dua organism yang berbeza.

a) (i) Name the respiratory organ for each organism.
Namakan organ respirasi untuk setiap organism.

Organism X/ *Oragnisma X* :

.....

Organism Y/ *Organisma Y* :

.....

[2 marks]

(ii) State the function of structure

Nyatakan fungsi struktur

P :

.....

Q :

.....

[2 marks]

(iii) What is the main difference between the transportation of respiratory gaseous in organism X and organism Y?

Apakah perbezaan utama pengangkutan gas respirasi dalam organism X dan

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organism Y?

.....
.....

[1 mark]

b) The efficiency of gaseous exchange in organism Y is further enhanced by a mechanism. Name the mechanism.

Kecekapan pertukaran gas dalam organisma Y dipertingkatkan oleh satu mekanisma. Namakan mekanisma tersebut.

.....

[1 marks]

c) State two common characteristics shown by the respiratory surfaces of animals.

Nyatakan dua ciri umum yang ditunjukkan oleh permukaan respirasi haiwan.

i.

.....

ii.

.....

[2 marks]

d) If both fish and humans are of the same size, give two reasons why the rate of oxygen supply to the body cells in human is faster than the rate of oxygen supply to the body cells in fish?

Jika ikan dan manusia mempunyai saiz yang sama, berikan dua alasan mengapa kadar penghantaran oksigen ke tisu badan dalam manusia adalah lebih cepat berbanding kadar penghantaran oksigen ke tisu badan ikan?

.....

.....

.....

.....

.....

.....

[3 marks]

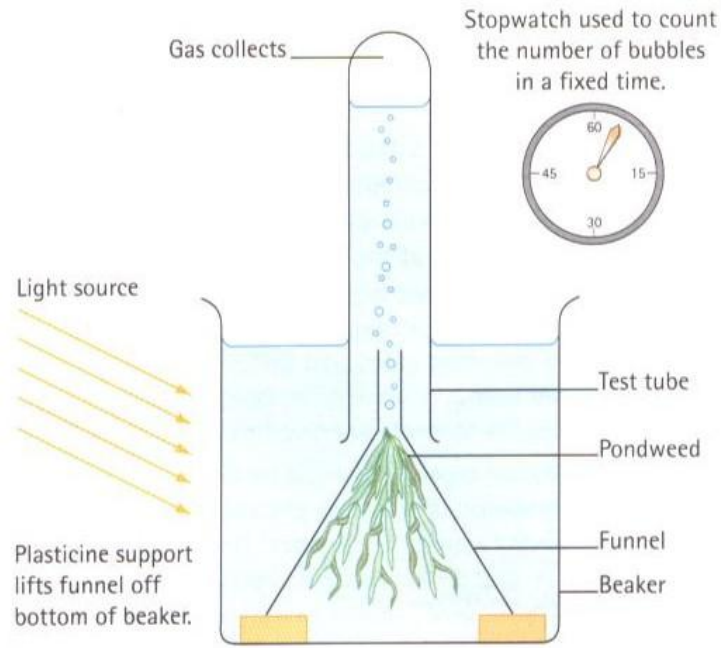


FIGURE 6.2 (i)

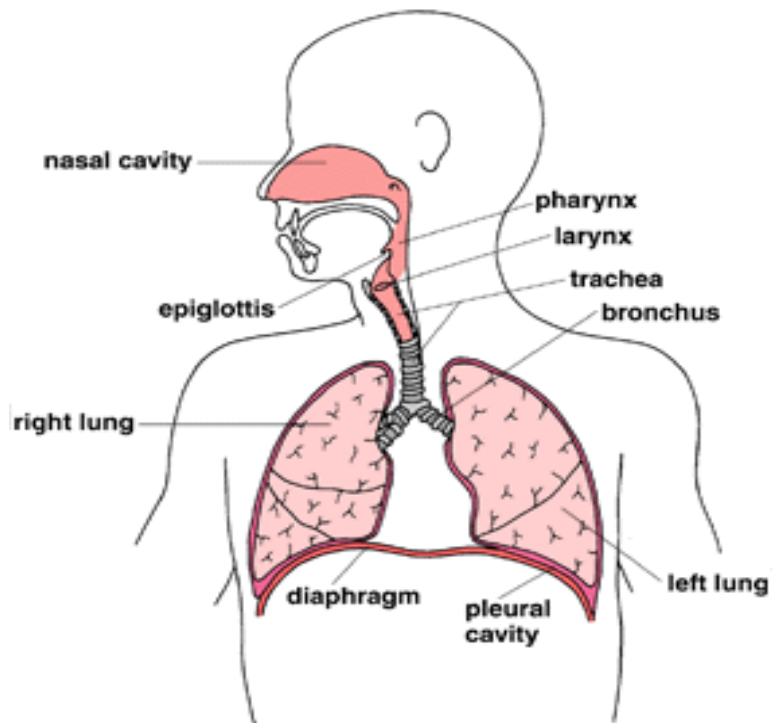


FIGURE 6.2 (ii)

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<http://fb.me/edu.joshuatly>

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JUJ 2007

2. Figure 6.2(i) and 6.2(ii), show two physiology systems in organisms. Figure 6.2(i) shows the consumes of carbon dioxide and releases of oxygen. Whereas, Figure 6(ii) shows the consumes of oxygen and releases of carbon dioxide
- a) Explain the regulatory mechanism of oxygen and carbon dioxide contents:
- During vigorous activity
 - At high altitude

Rajah 6.2 (i) dan 6.2 (ii) menunjukkan dua sistem fisiologi dalam organisma hidup. Rajah 6.2 (i) menunjukkan penggunaan karbon dioksida dan penghasilan oksigen. Manakala Rajah 6.2(ii) menunjukkan penggunaan oksigen dan penghasilan karbon dioksida.

- a) *Terangkan mekanisme kawalatur kandungan oksigen dan karbon dioksida:*
- semasa aktiviti cergas*
 - pada altitud tinggi*

[10 marks]

- b) Identify and describe the differences between Figure 6.2(i) and Figure 6.2(ii).
Kenalpasti dan terangkan perbezaan di antara Rajah 6.2(i) dan Rajah 6.2(ii).

[10 marks]

JUJ 2009

3. (a)(i) Each organism has certain respiratory structure to allow gaseous exchange.

Name **one** respiratory structure in fish and amphibian.

*Setiap organisma mempunyai struktur respirasi yang tertentu untuk pertukaran gas. Namakan **satu** struktur respirasi dalam ikan dan amfibia.*

[2 marks]

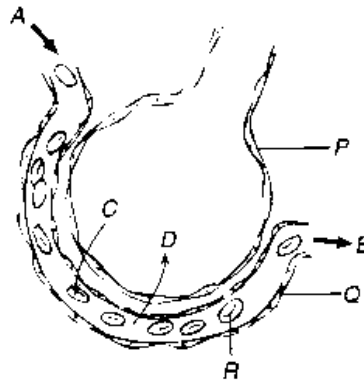


Diagram 7.1

Rajah 7.1

(ii) Describe the characteristics of the respiratory structure of a human that enable gaseous exchange to be carried out efficiently in the respiratory organs.

Jelaskan ciri-ciri struktur respirasi manusia yang membolehkan pertukaran gas berlaku secara efisien dalam organ respirasi.

[4 marks]

(iii) Respiratory gases such as carbon dioxide and oxygen can diffuse through the plasma membrane easily. Explain how gaseous exchange occurs in the diagram 7.1?

Gas-gas respirasi seperti karbon dioksida dan oksigen boleh meresap melalui membran plasma dengan mudah. Terangkan bagaimana proses pertukaran gas dalam rajah 7.1 berlaku?

[8 marks]

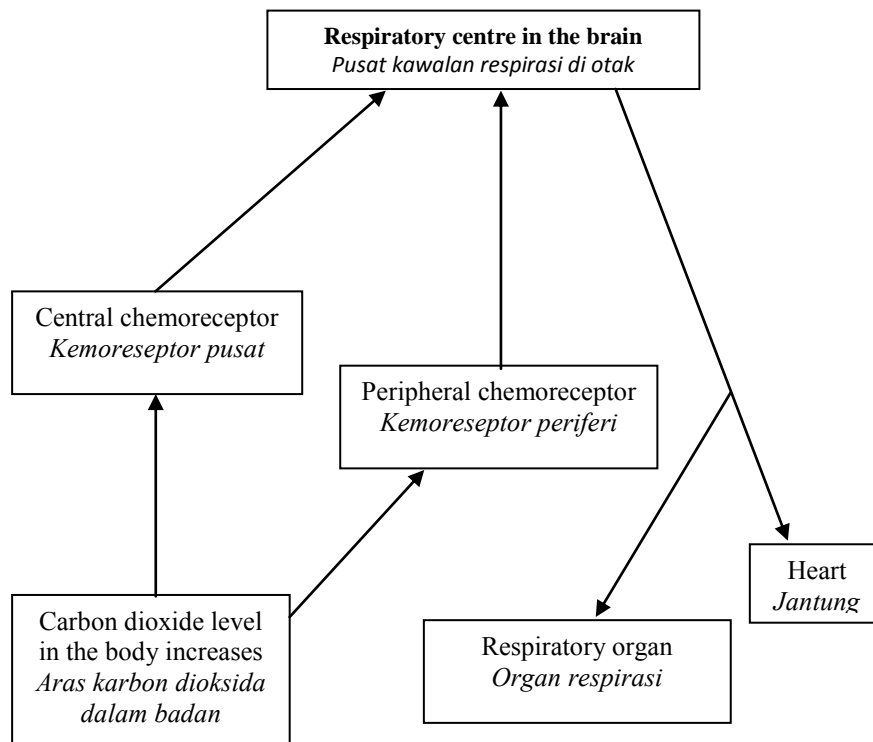


Diagram 7.2

Rajah 7.2

- (b) Diagram 7.2 shows a part of the regulatory mechanism of carbon dioxide content in the body. How the increasing in the concentration of carbon dioxide is regulated by central chemoreceptor to maintain the internal environment factor in the body?

Rajah 7.2 menunjukkan sebahagian daripada mekanisme kawal atur kandungan karbon dioksida di dalam badan. Bagaimanakah peningkatan kepekatan karbon dioksida dikawalatur oleh kemoreseptor pusat untuk mengekalkan faktor persekitaran dalaman dalam badan?

[6 marks]

JUJ 2010

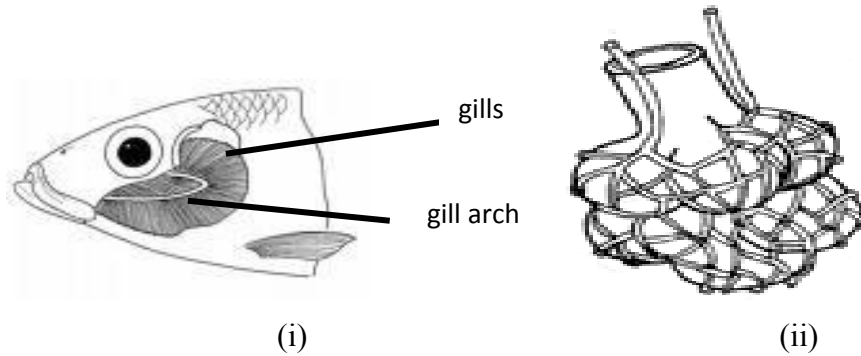


Diagram 7

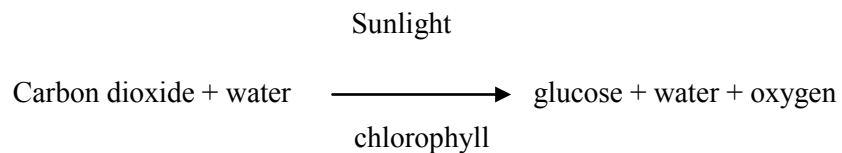
Rajah 7

4. (a) Diagram 7 (i) and (ii) show the respiratory organs of fish and human. Describe the respiratory structures and inhalation mechanism of fish and human.

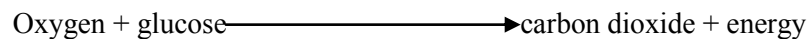
Rajah 7 (i) dan (ii) menunjukkan organ respirasi ikan dan manusia. Huraikan struktur respirasi dan mekanisme pengambilan oksigen dari persekitaran.

[10 marks]

Process A



Process B



- (b) Based on the equations in the table above, compare the processes A and B.
Berdasarkan persamaan di atas, bandingkan proses A dan B

[6 marks]

- (c) The air we inhale contains millions of particles which cannot be seen by the naked eye. These include dirt, dust, soot, other irritants and harmful pollutants. If a person smokes, he or she inhales gases like carbon monoxide, tar and nicotine directly into the lungs. Describe briefly the effect of smoking to the efficiency of respiration.

Udara yang disedut masuk mengandungi jutaan partikel yang tidak boleh dilihat dengan mata kasar. Partikel tersebut termasuklah kotoran, debu, jelaga dan bahan pencemar lain yang memudaratkan. Jika seseorang itu merokok maka ia seolah-olah menyedut gas seperti karbon monoksida, tar dan nikotin secara terus ke paru-paru. Terangkan secara ringkas kesan merokok ke atas kecekapan respirasi.

[4 marks]

CHAPTER 8: DYNAMIC ECOSYSTEM

JUJ 2007

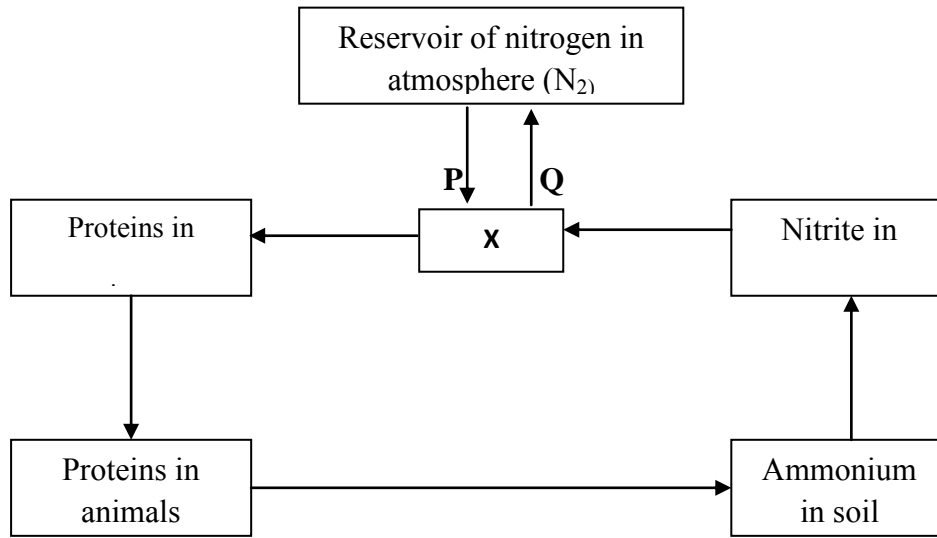


DIAGRAM 4

1. Diagram 4 shows a Nitrogen Cycle.

Rajah 4 menunjukkan satu kitar nitrogen.

(b) (i) Name the process P

Namakan proses P

.....

[1 mark]

(ii) Name the compound X

Namakan kompoun X

.....

[1 mark]

(iii) State two ways how reservoir of nitrogen ion in atmosphere are changed into X.

Nyatakan dua cara bagaimana nitrogen bebas dalam atmosfer bertukar kepada X

.....
.....
.....
.....

[2 marks]

- b) Explain what will happen to compound X when it was absorbed by plants roots.
Terangkan apa yang akan berlaku kepada sebatian X setelah diserap oleh akar tumbuhan.

.....
.....
.....
.....

[2 marks]

- c) (i) Name the microorganism which is involves in process Q.
Namakan mikroorganisma yang terlibat dalam proses Q.

.....

[1 marks]

- (ii) Explain how proteins in animals can be changed into compound X.
Terangkan bagaimana protein dalam haiwan ditukarkan kepada sebatian X

.....
.....
.....
.....
.....

[3 marks]

- d) Decomposers play an important role in nitrogen cycle. Give an example of decomposer and its role in maintaining the ecosystem.

Pengurai mempunyai peranan yang penting dalam kitar nitrogen. Berikan satu contoh pengurai dan terangkan peranannya dalam mengekalkan ekosistem.

.....
.....
.....
.....
.....

[3 marks]

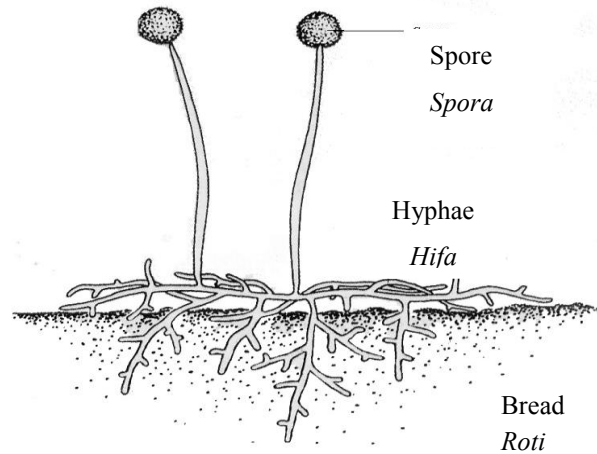


Diagram 3.1

Rajah 3.1

2. Diagram 3.1 shows one of organisms that are existing in our environment.

Rajah 3.1 menunjukkan salah satu organisma yang wujud di persekitaran kita.

(a)(i) Name the kingdom of the organism.

Namakan alam bagi organisma tersebut.

.....

[1 mark]

(ii) State the type of interaction represented in Diagram 3.1?

Nyatakan jenis interaksi yang ditunjukkan dalam Rajah 3.1?

.....

[1 mark]

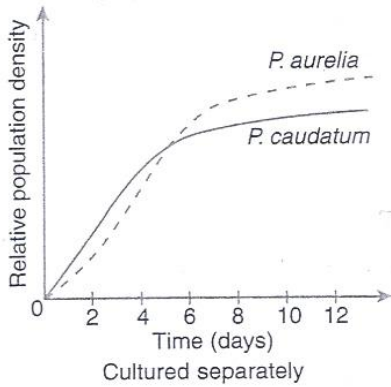
(iii) Give the definition of the interaction given in 2(a) (ii).

Beri definisi interaksi yang dinyatakan dalam 3(a) (ii).

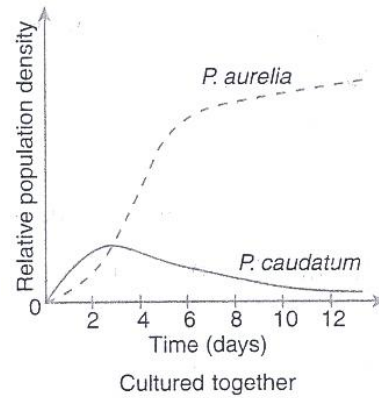
.....

.....

[1 mark]



Graph (a)



Graph (b)

Diagram 3.2

Rajah 3.2

(b)(i) Diagram 3.2 shows a graph of competition between *Paramecium caudatum* and *Paramecium aurelia*.

Name the type competition that is involved.

Diagram 3.2 menunjukkan satu graf persaingan di antara Paramecium caudatum dan Paramecium aurelia.

Namakan jenis persaingan yang terlibat.

.....

[1 mark]

(ii) State one of resources that are competed between the *paramecium*.

Nyatakan satu daripada sumber yang menjadi rebutan paramecium tersebut.

.....

[1 mark]

(iii) Based on the Diagram 3.2, describe graph (b).

Berdasarkan Rajah 3.2, jelaskan graf (b).

.....
.....
.....
.....

[3 marks]

- (c) Microorganisms can be very useful for human but at the same time are harmful. Pathogen is microorganisms that can cause diseases and can be spread out through several ways.

Microorganisma sangat berguna kepada manusia tetapi pada masa yang sama juga memberi kemudaran kepada kita. Patogen adalah mikroorganisma penyebab penyakit dan dapat disebarkan melalui beberapa cara.

- (i) State **two** ways how diseases can be transmitted.

*Nyatakan **dua** cara bagaimana penyakit disebarkan.*

1.
2.

[2 marks]

- (ii) Explain one method of controlling pathogens.

*Jelaskan **satu** cara kawalan patogen.*

.....
.....
.....

[2 marks]

JUJ 2008

5. (a)(i) Diagram 6.1 shows one of organism from Fungi kingdom. Explain how this organism gains the energy to survive in life.

Rajah 6.1 menunjukkan sejenis organisma dari alam Fungi. Terangkan bagaimana organisma tersebut memperolehi tenaga untuk terus hidup.

[4 marks]

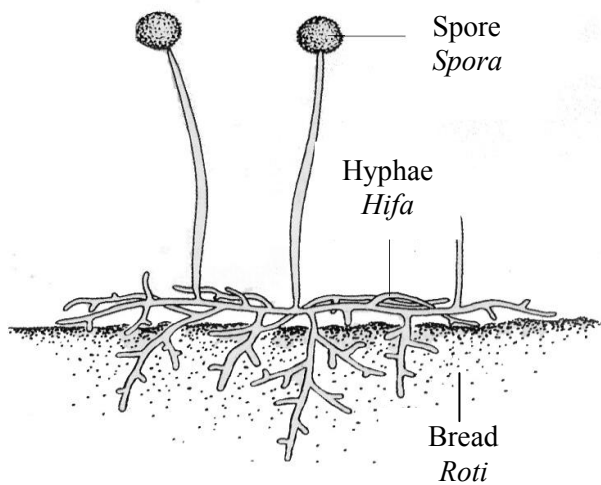


Diagram 6.1

Rajah 6.1

We could not survive without microorganisms

Kita tidak boleh hidup tanpa mikroorganisma

- (ii) Based on examples, explain the statement above.

Berdasarkan contoh-contoh yang sesuai, terangkan pernyataan di atas

[6 marks]

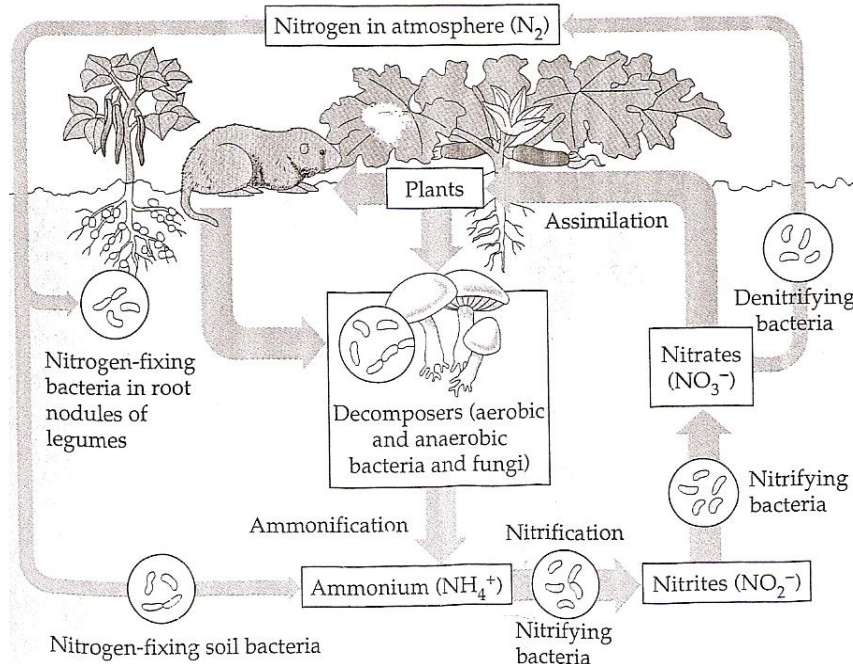


Diagram 6.2

Rajah 6.2

- (b) Nitrogen is an important element to produce protein. Diagram 6.2 shows bacteria, animals and plants interactions in Nitrogen Cycle. Based on Diagram 6.2, explain the role of bacteria and plants in order to supply protein to the animals.

Nitrogen merupakan unsur penting untuk membentuk protein. Rajah 6.2 menunjukkan interaksi bakteria, haiwan dan tumbuh-tumbuhan dalam kitar nitrogen. Berdasarkan Rajah 6.2, terangkan peranan bakteria dan tumbuhan dalam membekalkan protein kepada haiwan .

[10 marks]

JUJ 2007

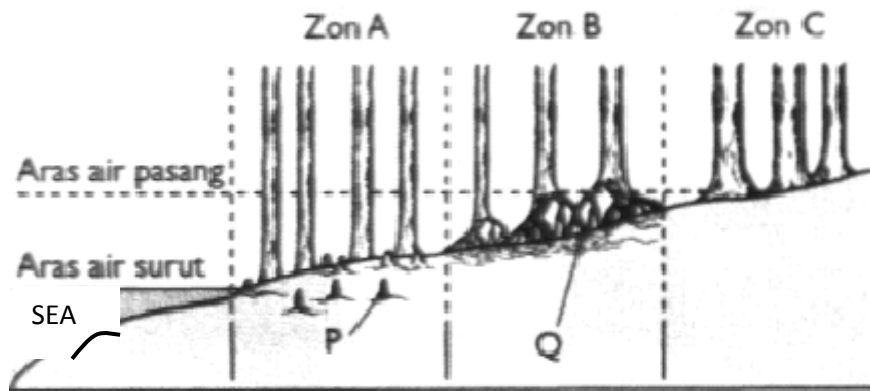


FIGURE 6.1

Mangroves act as a natural barrier that absorbs the energy of waves and winds, thus reducing the damage caused by tsunamis. Mangrove swamps are found in tropical and sub tropical region where freshwater meets salt water. They have unique characteristic due to the abiotic factors.

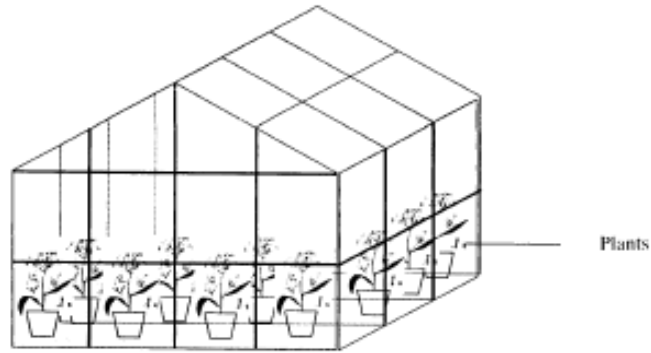
Pokok bakau merupakan 'tembok' semulajadi yang dapat menyerap tenaga ombak dan tiupan angin bagi mengurangkan kesan kemusnahan akibat tsunami. Paya bakau boleh didapati di pantai tropika dan sub tropika di mana berlaku pertemuan air tawar dan air masin. Faktor abiotik menyebabkan paya bakau mempunyai ciri-ciri yang unik berdasarkan faktor abiotik.

- f) a) Referring to statement above, analyze the problem faced by pioneer and successor species. Explain how the species can grow well adapted to these harsh conditions.

Berdasarkan pernyataan di atas, analisis masalah yang dihadapi oleh tumbuhan perintis dan penyesar. Terangkan bagaimana spesies tersebut boleh beradaptasi dengan baik dalam persekitaran tersebut.

[10 marks]

JUJ 2009



Vegetables
Sayur-sayuran

- g) (a) A greenhouse is used to grow vegetables in countries with four seasons, especially during winter. This method can ensure crop production throughout the year. Explain this statement based on the factors that affected the rate of photosynthesis.

Rumah hijau digunakan untuk menanam sayur-sayuran di negara yang mengalami 4 musim terutamanya semasa musim sejuk. Ia dapat memastikan penghasilan hasil pertanian sepanjang tahun. Terangkan pernyataan tersebut berdasarkan faktor-faktor yang mempengaruhi kadar fotosintesis.

[6 marks]

JUJ 2011

- h) (a)(i) Diagram 8.1 shows types of interaction between two organisms in an ecosystem.

Rajah 8.1 menunjukkan jenis interaksi antara dua organisma di dalam suatu ekosistem.

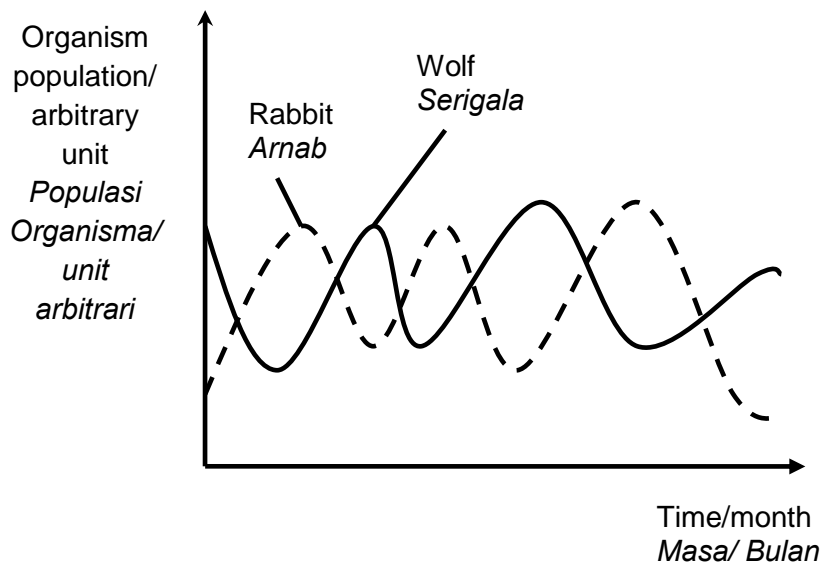


Diagram 8.1
Rajah 8.1

Explain how the interaction between the two organisms controls each other population.

Terangkan bagaimana interaksi di antara dua organisma tersebut mengawal populasi mereka.

[6 marks]

- (ii) A farmer is having a problem of pest such as rats in the palm oil estate. Instead of using pesticides, how can the population of rats be controlled. Explain these two methods.

Seorang petani menghadapi masalah perosak tanaman contohnya tikus di dalam ladang kelapa sawitnya. Terangkan kedua-dua kaedah tersebut.

[4 marks]

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CHAPTER 9: ENDAGERED ECOSYSTEM

JUJ 2008

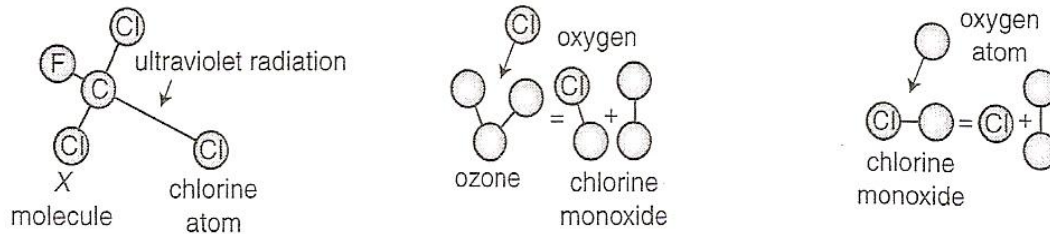


Diagram 3

Rajah 3

1. (a) Diagram 3 shows a series of reaction that occurs because of pollutions.
Rajah 3 menunjukkan satu siri tindak balas yang berlaku disebabkan oleh pencemaran.

(i) Name the phenomenon that occurs as the result of the reaction in Diagram 3.

Namakan fenomena yang berlaku akibat daripada tindak balas dalam Rajah 3.

.....
[1 mark]

(ii) State main chemical substances that can cause the phenomenon mention in 3 (a)(i).

Nyatakan bahan kimia utama yang menyebabkan fenomena yang telah dinyatakan dalam 3(a)(i)

.....
[1 mark]

- (f) The phenomenon that caused by reaction in Diagram 3 allows ultraviolet radiation to reach the Earth. Give two harmful effects of the phenomenon on humans.

Fenomena yang disebabkan oleh tindak balas dalam Rajah 3 membolehkan sinaran ultra ungu untuk sampai ke bumi. Berikan dua kesan buruk fenomena ini ke atas manusia.

- i.
.....
- ii.
.....

[2 marks]

- (g) Based on the Diagram shown, explain how the phenomenon occurs?

Berdasarkan rajah yang ditunjukkan, jelaskan bagaimana fenomena ini berlaku?

.....
.....
.....
.....
.....
.....

[3 marks]

- (h) Ultra radiation that reaches the Earth also reduces the number of stomata and amount of chlorophyll in the leaves. How this situation can effect the ecosystem?

Sinaran ultra yang sampai ke bumi juga mengurangkan bilangan stoma dan jumlah klorofil dalam daun. Bagaimana situasi ini boleh memberi kesan kepada ekosistem?

.....
.....

.....
.....

[3 marks]

- (i) Based on your knowledge, give two suggestions how this phenomenon can be reduced.

Berdasarkan pengetahuan anda, beri dua cadangan bagaimana fenomena ini boleh dikurangkan.

- i.
.....
ii.
.....

[2 marks]

JUJ 2007

Observation of ecological fieldwork:

- The waste disposal flows little by little, increase the number of aquatic organisms.
- When a large amount of disposal is released into the pond, at one level, all aquatics will die.
-

Dalam satu kajian ekologi sebuah kolam, pemerhatian berikut telah dibuat :

- *Apabila kumbahan dilepaskan ke dalam kolam sedikit demi, bilangan dan saiz haiwan akuatik bertambah*
- *Apabila semakin banyak kumbahan dilepaskan ke dalam kolam, satu peringkat tercapai di mana semua haiwan akuatik itu mati.*

2. Based on your biological knowledge, write a report to explain the observation in this field work.

Dengan menggunakan pengetahuan biologi anda, tulis satu laporan untuk menerangkan pemerhatian ini.

[10 marks]

JUJ 2010

3. Diagram 9 shows the impact of human activities to the ecosystem.
Rajah 9 menunjukkan kesan aktiviti manusia ke atas ekosistem.

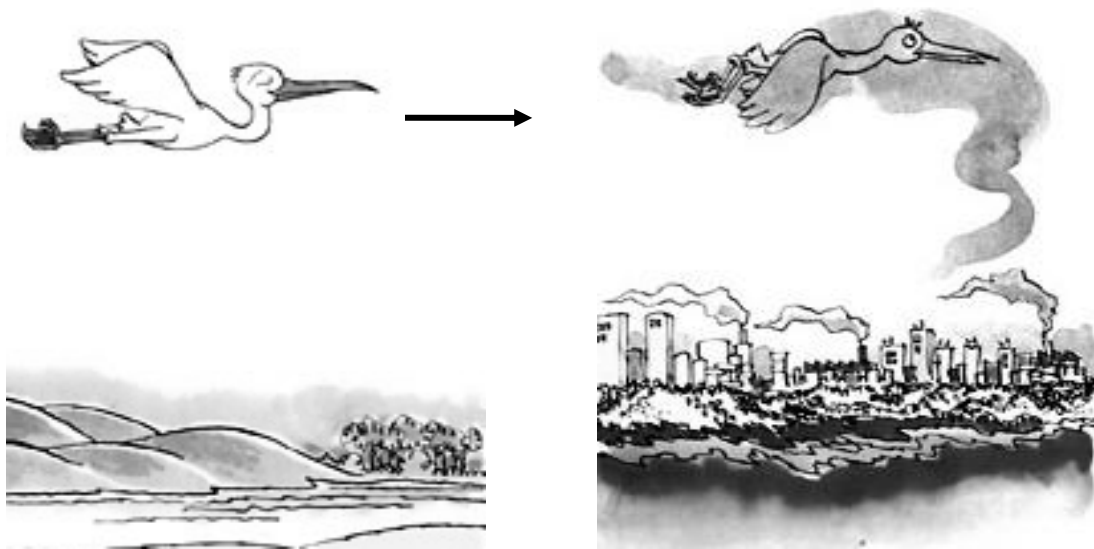


Diagram 9.1

Rajah 9.1

- (a) Discuss the conditions and effect of human activities to the ecosystem.
Bincangkan keadaan dan kesan aktiviti manusia ke atas ekosistem.

[10 marks]

- (b) Diagram 9.2 shows the ozone layer that prevent our earth from the harmful ultraviolet radiation from the sun.

Rajah 9.2 menunjukkan lapisan ozon yang melindungi bumi daripada sinaran ultraungu dari matahari.

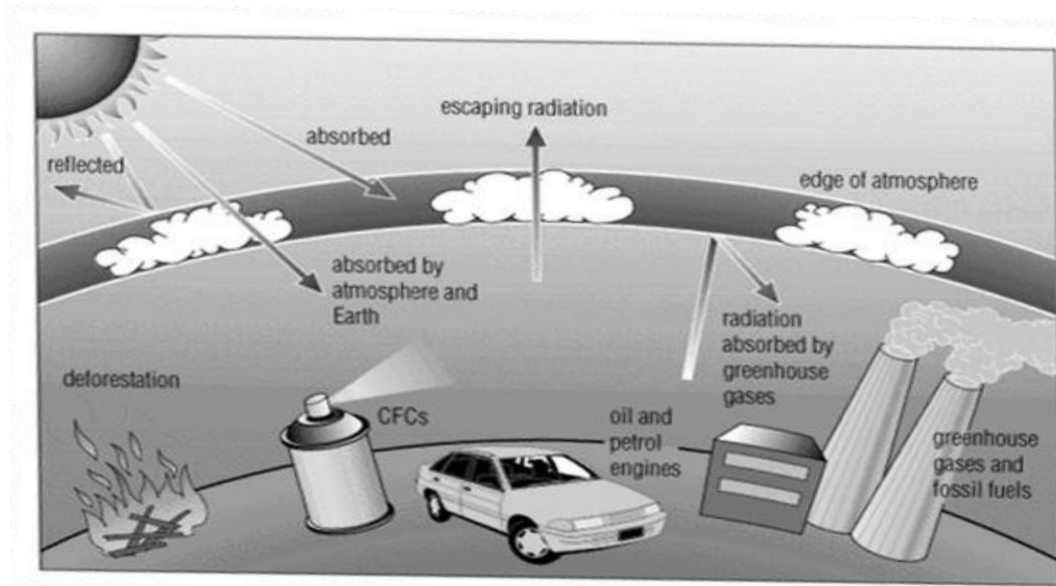


Diagram 9.2

Rajah 9.2

- (i) Explain how the ozone layer becomes thinner and discuss the effect of its depletion to living things.

Terangkan bagaimana lapisan ozon semakin nipis dan bincangkan kesan penipisannya ke atas benda hidup.

[8 marks]

- (ii) What is your suggestion to overcome the depletion of ozone layer?

Apakah cadangan anda untuk mengatasi masalah penipisan lapisan ozon?

[2 marks]

JUJ 2011

4. Diagram 8.2 shows a river in one area.

Rajah 8.2 menunjukkan sebatang sungai di satu kawasan.

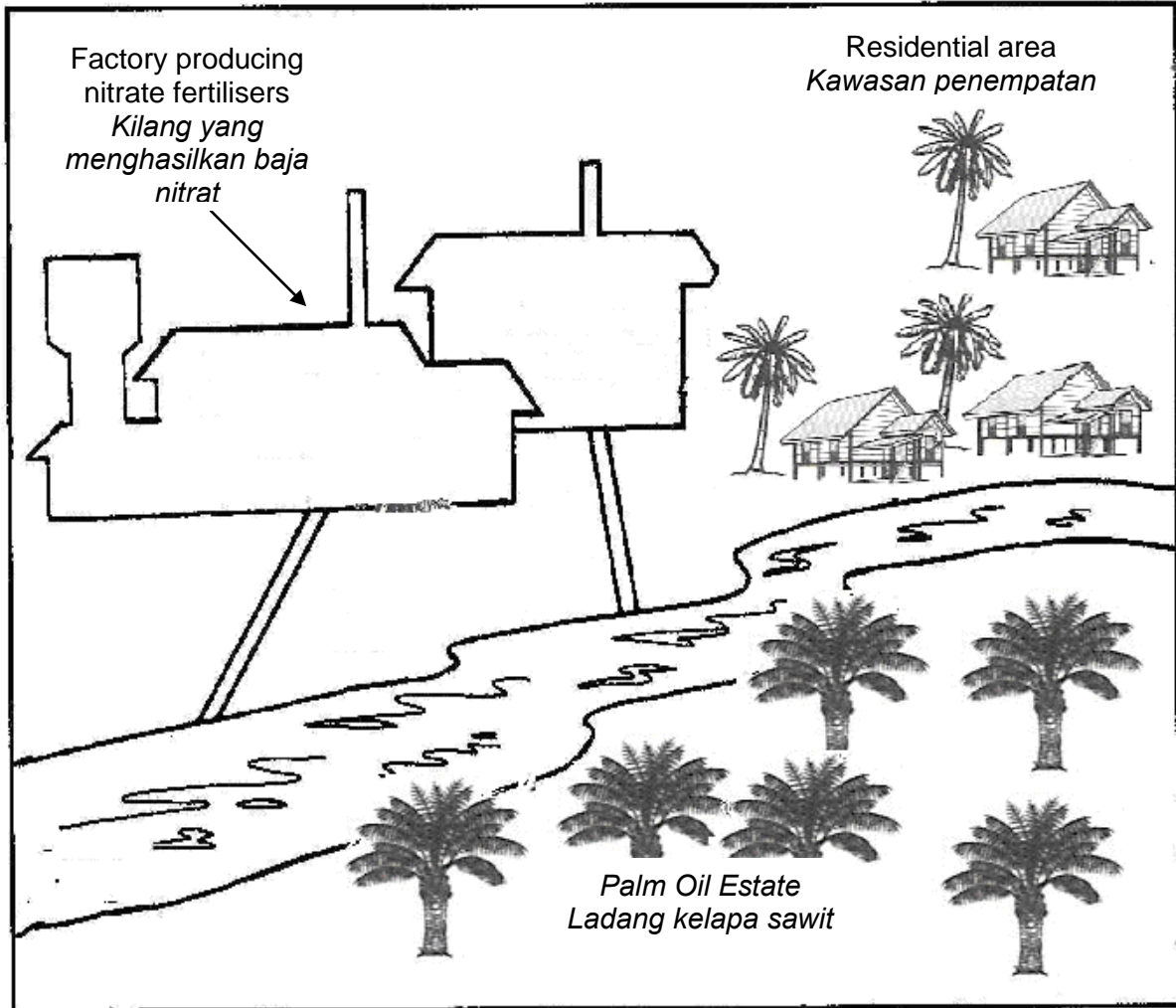


Diagram 8.2
Rajah 8.2

Based on Diagram 8.2 describe the effect of activities on the aquatic organisms in the river.

Berdasarkan Diagram 8.2 huraikan kesan aktiviti tersebut ke atas organisma akuatik di dalam sungai tersebut.

[10 marks]

FORM 5

CHAPTER 1: TRANSPORT

JUJ 2008

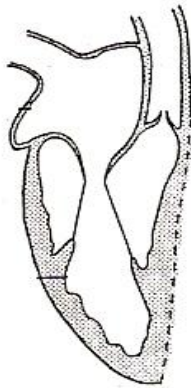


Diagram 2.1

Rajah 2.1

1. Diagram 2.1 shows a right side of a human heart.

Rajah 2.1 menunjukkan bahagian kanan jantung manusia.

- a. Complete the heart structure in Diagram 2.1.

Lengkapkan struktur jantung pada Rajah 2.1

- b. Heart is an effective pump that made up mostly by strong muscle.

Jantung merupakan pam efektif yang sebahagian besarnya dibina oleh otot yang kuat.

- (i) Name the type of muscles that build this organ.

Namakan jenis otot yang membina organ ini.

.....

[1 mark]

- (ii) The muscle that builds the heart is myogenic. What is the meaning of myogenic?

Otot yang membina jantung adalah miogenik. Apakah yang dimaksudkan dengan miogenik?

.....

.....

[1 mark]

- (c) Cardiovascular disease is a disease that related to heart and blood vessel. More people die from this disease than cancer over the past 30 years. Based on your biological knowledge, how this disease can be prevented?
Penyakit kardiovaskular adalah satu penyakit berkaitan jantung dan salur darah. Lebih ramai yang meninggal dunia disebabkan oleh penyakit ini berbanding kanser dalam tempoh 30 tahun kebelakangan ini. Berdasarkan pengetahuan biologi anda, bagaimana penyakit ini dapat dicegah?

.....
.....
.....
.....
.....
.....

[2 marks]

JUJ 2010

2. (c) Diagram 3.2 shows the formation of P due to unhealthy eating habit.
Rajah 3.2 menunjukkan pembentukan P akibat tabiat pemakanan yang tidak sihat.

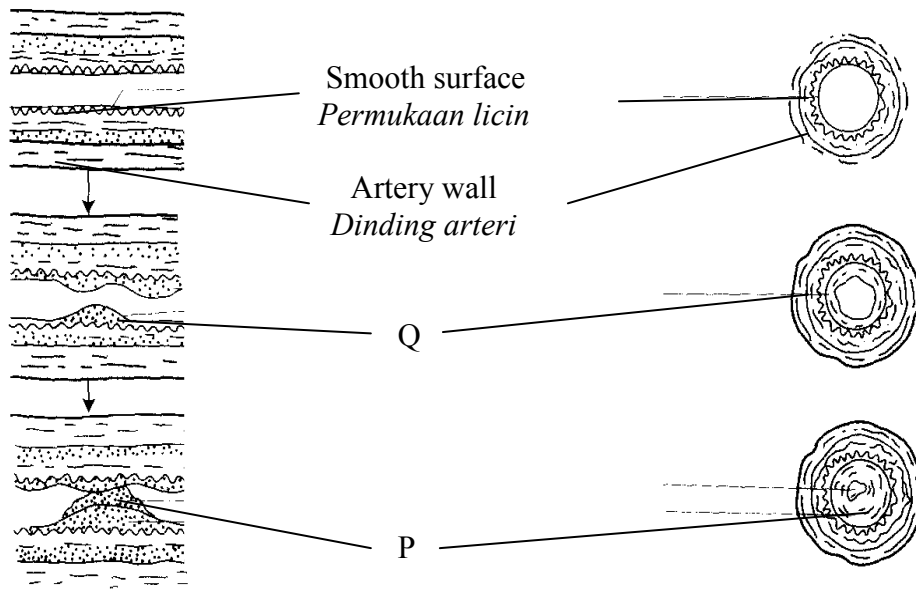


Diagram 3.2
Rajah 3.2

- (i) Name the part labelled P.

Namakan bahagian berlabel P

.....

[1 mark]

- (ii) Explain how P is formed which can cause a blockage in blood vessel.

Terangkan bagaimana P terbentuk yang menyebabkan penyumbatan salur darah .

.....

.....

.....

.....

[4 marks]

JUJ 2008

3. (a)(i) Give definition of antigen and antibody. Explain briefly the mechanism used by antibody to protect our body against diseases.

Berikan definisi antigen dan antibodi. Terangkan secara ringkas bagaimana antibodi dapat melindungi diri dari serangan penyakit.

[4 marks]

- (ii) Aminah was shocked when a doctor told that her baby has been diagnosed with Hepatitis B. She explained to the doctor that her baby already got her first immunisation for Hepatitis B last month. Based on your biological knowledge, explain why this incident occurs.

Aminah terkejut apabila dimaklumkan oleh doktor bahawa bayinya disahkan mengidap Hepatitis B. Dia menjelaskan bahawa bayinya telah diberi imunisasi untuk Hepatitis B yang pertama pada bulan lepas. Berdasarkan pengetahuan biologi anda, jelaskan mengapa keadaan ini boleh berlaku.

[6 marks]

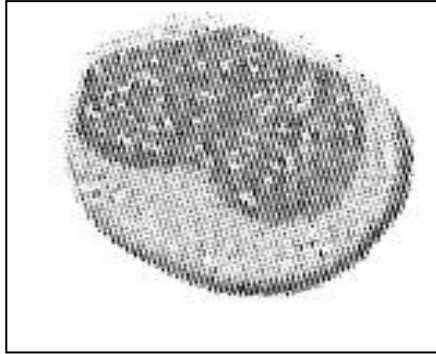


Diagram 7.1

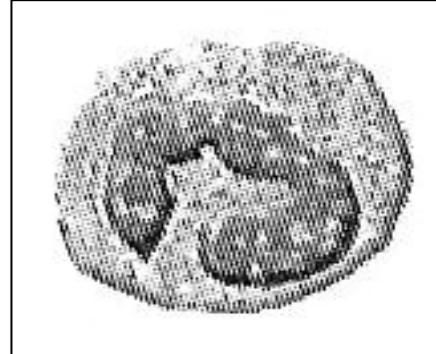


Diagram 7.2

- (b) Based on the diagrams 7.1 and 7.2, name and explain how the structures play its role in defence mechanism.

Berdasarkan rajah 7.1 dan 7.2, namakan dan terangkan bagaimana struktur tersebut memainkan peranannya dalam mekanisme pertahanan badan.

[6 marks]

JUJ 2009

4. (a) Body immune system is important to every individual. Explain the differences between the immune systems of an infant with an adult who has been suffered *Chikungunya*.

Sistem keimunan badan adalah penting kepada setiap individu. Terangkan perbezaan sistem keimunan bayi dengan orang dewasa yang menghidapi Chikungunya.

[3 marks]

CHAPTER 2: LOCOMOTION AND SUPPORT

JUJ 2009

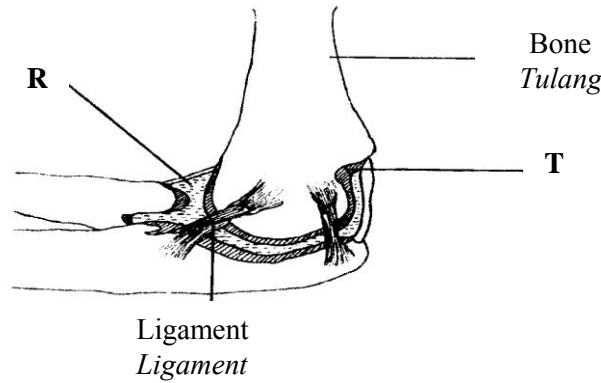


Diagram 4.1

Rajah 4.1

1. Diagram 4 show an elbow joint from a skeletal system of a human.

Rajah 4 menunjukkan sendi pada siku dari sistem rangka manusia.

(a)(i) Name the type of joint showed in Diagram 4.

Namakan jenis sendi yang ditunjukkan dalam Rajah 4.

.....

[1 mark]

(ii) What is the different between the joint mentioned in (a)(i) and the joint on the shoulder ?

Apakah perbezaan di antara sendi yang dinyatakan dalam 5(a)(i) dan sendi terdapat di bahu ?

.....
.....

[2 marks]

(b)(i) Name and state the function of R.

Nama dan nyatakan fungsi R.

Structure R/ *Struktur R* :

Function/ *Fungsi* :

.....

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[2 marks]

- (ii) When structure T wear and tear at certain joints, it may cause a person suffer from a painful and stiff knee which restricts daily activities like walking.
Name the disease described in above statement.

Apabila struktur T haus dan terkoyak, ia mungkin menyebabkan seseorang itu menderita sakit dan sukar menggerakkan lutut yang mana menghadkan aktiviti seharian seperti berjalan.

Namakan penyakit yang diterangkan dalam pernyataan di atas.

.....

[1 mark]

- (c) Joints and the contraction of muscles are very important to allow the movement of organisms occurs. Explain why the contraction of muscles needs sufficient blood.

Sendi dan pengecutan otot sangat penting bagi membolehkan pergerakan bagi organisma berlaku. Terangkan mengapa pengecutan otot memerlukan bekalan darah yang mencukupi.

.....

.....

.....

[2 marks]

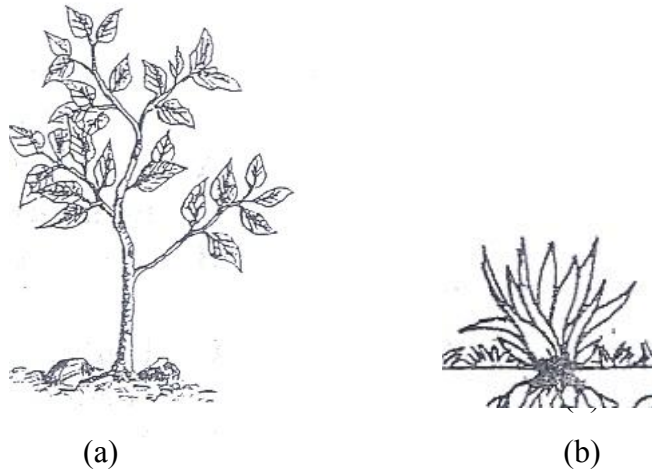


Diagram 4.2

Rajah 4.2

- (d)(i) Like humans and animals, plants also need support. Give one necessity for support in plants.

Seperti manusia dan haiwan, tumbuhan juga memerlukan sokongan. Berikan satu keperluan sokongan kepada tumbuhan.

.....
.....

[1 mark]

- (ii) Name one tissue that provided support to plant in Diagram 4.2 (a).

Namakan satu tisu yang memberi sokongan kepada pokok dalam Rajah 4.2(a).

.....

[1 mark]

- (iii) Explain how turgidity provides supports to plant in Diagram 4.2 (b).

Terangkan bagaimana kesegahan membekalkan sokongan kepada tumbuhan dalam Diagram 4.2(b)

.....
.....
.....

[2 marks]

JUJ 2010

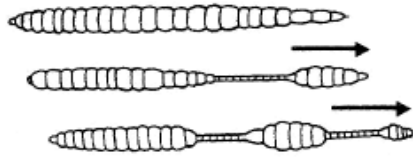


Diagram 4.1

Rajah 4.1

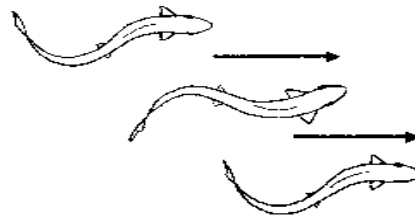


Diagram 4.2

Rajah 4.2

2. Diagram 4.1 and 4.2 show the movement of an earthworm and a fish.

Rajah 4.1 dan 4.2 menunjukkan pergerakan seekor cacing tanah dan seekor ikan

(a) State the type of earthworm's skeleton system.

Nyatakan jenis system rangka cacing tanah.

.....

[1 mark]

(b) State the antagonistic muscles found in the body wall of the earthworm.

Nyatakan otot antagonistik yang ditemui pada dinding badan cacing tanah.

.....

[2 marks]

(c) Explain how the earthworm moves based on the skeletal system.

Terangkan bagaimana system rangka cacing tanah membolehkannya bergerak.

.....

[2 marks]

- (d)(i) Name the type of muscle found in the fish.
Namakan jenis otot yang terdapat pada ikan.

.....

[1 mark]

- (ii) Besides muscles, what other structures help the fish to swim?
Selain otot, apakah struktur lain yang membantu ikan untuk berenang.

.....
.....
.....

[2 marks]

JUJ 2011

3. Diagram 5 shows the position of leg during a movement.
Rajah 5 menunjukkan kedudukan kaki semasa pergerakan.

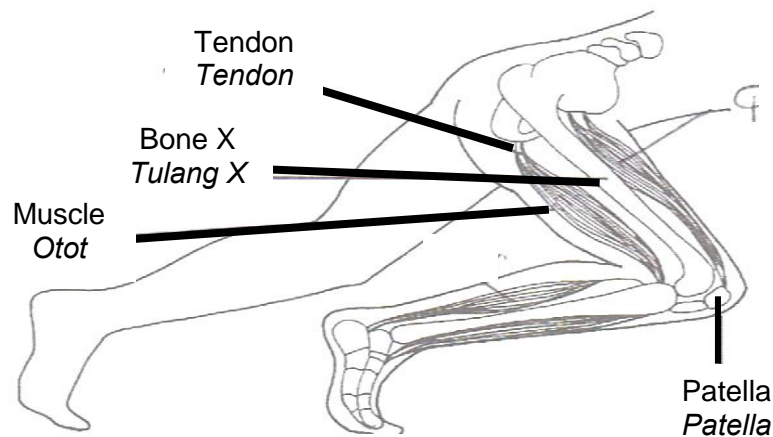


Diagram 5
Rajah 5

- (a) Diagram 5 shows a part of skeleton of human. The skeleton of human has two main parts. State the part for bone X and patella.

Rajah 5 menunjukkan sebahagian rangka pada manusia.

Tulang manusia mempunyai dua bahagian. Nyatakan bahagian tulang X dan patella.

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<http://fb.me/edu.joshuatly>

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[1 mark]

- (b) Name bone X and state its function.

Namakan tulang X dan nyatakan fungsinya.

Bone / Tulang X :

Function / Fungsi :

[2 marks]

- (c) Tendon is tough and inelastic strands of connective tissue but there is another tissue that hold the bones together. State that tissue and the function of tendon respectively.

Tendon merupakan tisu penghubung yang kuat dan tidak kenyal tetapi terdapat satu tisu lain yang menghubungkan antara tulang dengan tulang.

Nyatakan tisu tersebut dan fungsi tendon masing-masing,

.....
.....

[2 marks]

- (d) Diagram 5.1 shows water *Hyacinth* sp. in its habitat.

Rajah 5.1 menunjukkan keladi bunting yang hidup dalam habitatnya.

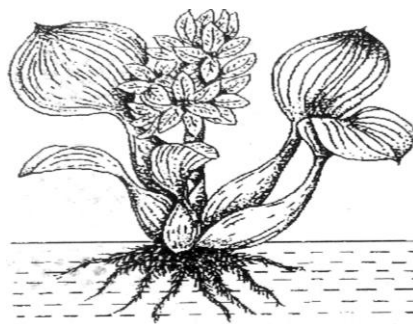


Diagram 5.1

Rajah 5.2

Explain briefly how support is achieved in aquatic plants above.

Terangkan secara ringkas bagaimana tumbuhan akuatik di atas memperoleh sokongan.

.....
.....

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.....
[2 marks]

- (e) The condition where bone tissue becomes porous is called osteoporosis. Explain why Sherry suffering from osteoporosis is advised to drink plenty of milk.

Keadaan di mana tisu tulang menjadi rapuh dikenali sebagai osteoporosis. Terangkan mengapa Sherry yang mengidap osteoporosis disarankan minum banyak susu.

.....
.....
.....

[2 marks]

- (f) Azmi is an athlete. His coach advises him to carry out a warming exercise before starting an event. Explain why Azmi do it.

Azmi merupakan seorang atlit. Jurulatih beliau menasihatinya supaya melakukan senaman memanaskan badan sebelum memulakan acara. Terangkan mengapa Azmi mesti melakukannya.

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[3 marks]

CHAPTER 3: COORDINATION AND REPOSE

JUJ 2009

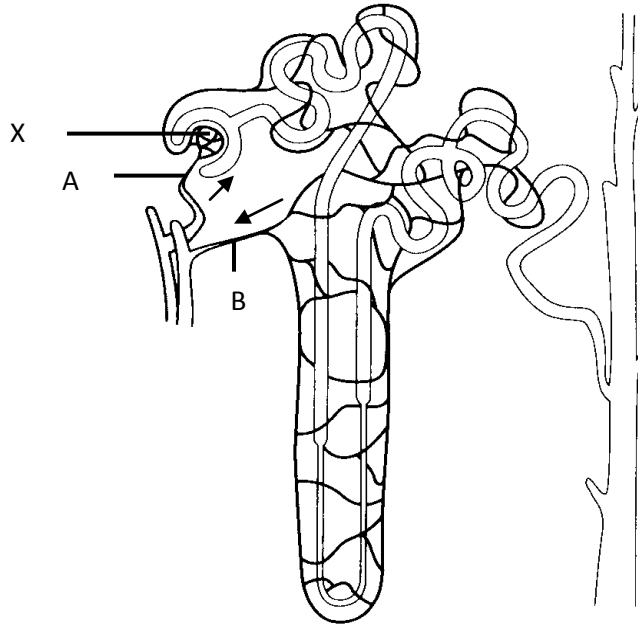


Diagram 5

Rajah 5

1. Kidneys are the primary organs of the excretory system. Diagram 5 shows a part of structure in kidneys which is nephron.

Ginjal merupakan organ utama bagi sistem perkumuhan. Rajah 5 menunjukkan sebahagian struktur dalam ginjal iaitu nefron.

- (a)(i) Name the process that take place in X.

Namakan proses yang berlaku di X.

.....

[1 mark]

- (ii) Explain how the process mention in 5(a)(i) occurs.

Terangkan bagaimana proses yang dinyatakan dalam 5(a)(i) berlaku.

.....

.....

.....
[2 marks]

(iii) Give one difference between the content in A and B.

Beri satu perbezaan di antara kandungan dalam A dan B.

.....
.....
[1 mark]

(b) Explain why glucose and amino acid can be found in glomerular filtrate but absent in urine.

Terangkan mengapa glukosa dan asid amino ditemui dalam hasil turasan glomerulus tetapi tiada di dalam air kencing.

.....
.....
.....
[2 marks]

(c)(i) Give one consequences if both kidneys failure to function.

Beri satu kesan jika kedua-dua ginjal gagal untuk berfungsi.

.....
.....
[1 mark]

(ii) If the kidney is severe enough and the patient does not want to use dialysis machine, give suggestion of treatment and explain briefly about the treatment.

Jika ginjal tersebut rosak teruk dan pesakit tersebut tidak mahu menggunakan mesin dialysis, beri cadangan rawatan dan terangkan secara ringkas tentang rawatan tersebut.

.....
.....
.....
[2 marks]

- (d) There are molecules that will not be reabsorbed, for example, drugs. Alcohol is an example of a strong depressant drug that interferes with coordination and judgment. Explain why alcohol abuse is dangerous to a driver.

Terdapat molekul yang tidak akan diserap semula seperti dadah. Alkohol merupakan dadah penenang yang mampu mempengaruhi koordinasi dan pertimbangan. Terangkan bagaimana pengambilan alcohol berlebihan membahayakan pemandu .

.....

[3 marks]

JUJ 2010

2. (a) Diagram 3 shows the arch reflex involved when we accidentally touch a hot kettle.

Rajah 3 menunjukkan laluan arka refleks apabila kita menyentuh cerek panas secara tidak sengaja.

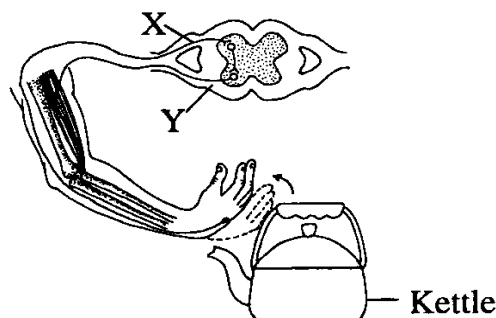


Diagram 3

Rajah 3

- (i) State the stimulated receptor in this event.

Nyatakan reseptor rangsangan dalam kejadian ini.

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[1 mark]

(ii) Explain how the arm will react in that situation.

Terangkan bagaimana lengan bertindak balas terhadap situasi tersebut.

.....
.....
.....
.....

[3 marks]

JUJ 2011

3. Diagram 4 shows the structure involved in osmoregulation in human.

Rajah 4 menunjukkan struktur yang terlibat dalam pengawalaturan pada manusia.

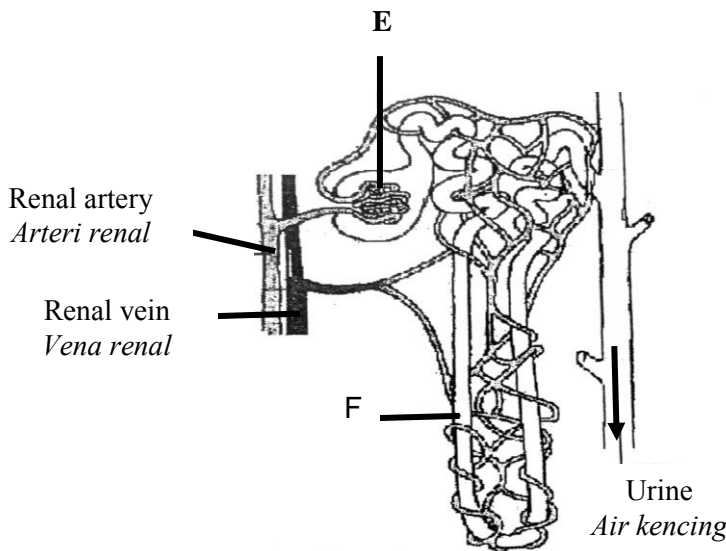


Diagram 4
Rajah 4

(a)(i) Name the structure in Diagram 4.

Namakan struktur dalam Rajah 4

.....

[1 mark]

(ii) Explain the formation of fluid E.

Terangkan pembentukan cecair dalam E.

.....
.....

.....

[2 marks]

(iii) Explain **one** difference between the content in E and F.

*Terangkan **satu** perbezaan kandungan dalam E dan F.*

.....
.....
.....

[2 marks]

(b) Khairi suffers from diabetes insipidus produces a large amount of urine. Explain how this problem is related to the imbalance of hormone in his body.

Khairi menghidapi diabetes insipidus menghasilkan air kencing yang banyak. Terangkan bagaimana masalah ini berkaitan dengan ketidakseimbangan hormon dalam badannya.

.....
.....
.....

[2 marks]

- (c) Diagram 4.1 shows a treatment undergone by a patient.
Rajah 4.1 menunjukkan satu rawatan yang dilalui oleh seorang pesakit.

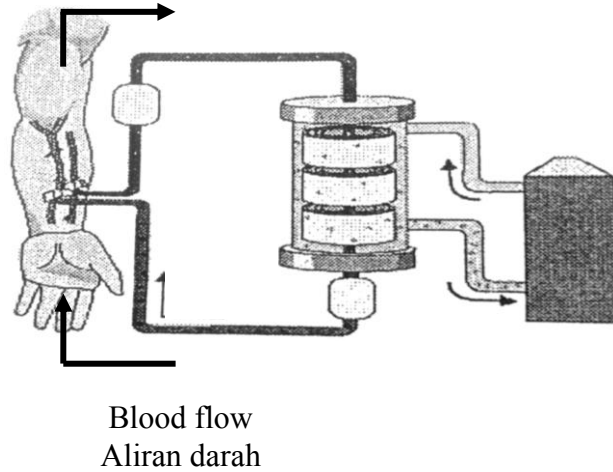


Diagram 4.1
Rajah 4.1

Explain the condition of the patient before undergoing this treatment.
Terangkan keadaan pesakit itu sebelum menjalani rawatan tersebut.

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.....

[3 marks]

- (d) Explain the importance of kidney in maintaining human health.
Terangkan kepentingan ginjal dalam mengekalkan kesihatan manusia.

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.....

[3 marks]

JUJ 2007

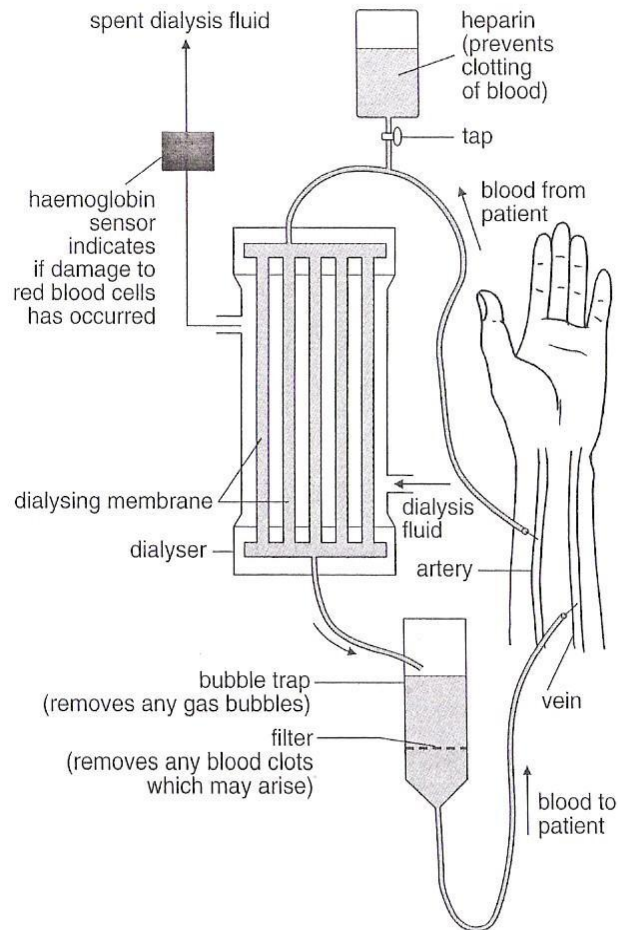


FIGURE 8

4. (a) Figure 8 shows a kidney machine . People with the damaged kidneys may be treated using haemodialysis, which perform some of the functions of a normal kidney.

Dialysis is the net movement (diffusion) of a solute through a selectively permeable membrane.

- i. State the definition of haemodialysis
- ii. Explain briefly how the machine functions.

Ginjal seseorang individu yang rosak boleh dirawat menggunakan kaedah haemodialisis, yang berfungsi seperti ginjal yang normal. Dialisis melibatkan pergerakan (resapan) melalui membran separa telap.

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- i) Nyatakan definisi haemodialisis
- ii) Terangkan dengan ringkas bagaimana ia berfungsi

[10 marks]

Drugs and alcohol are being widely used in our everyday life.
Dadah digunakan secara meluas dalam kehidupan seharian

- (b) Write an evaluation report concerning the above statement.
Tuliskan laporan penilaian berdasarkan pernyataan di atas.

[10 marks]

JUJ 2010

4. (a)



Diagram 6.1

Rajah 6.1

Diagram 6.1 shows a longitudinal section through the mammalian kidney showing the position of nephrons relative to the whole kidney. Describe the formation of urine in order to regulate water content in human body.

Rajah 6.1 menunjukkan keratan memanjang melalui ginjal mamalia yang menunjukkan kedudukan nefron yang berkaitan dengan keseluruhan ginjal. Huraikan pembentukan air kencing (urin) dalam mengawalatur kandungan air dalam badan manusia.

[10 marks]

(b)(i)

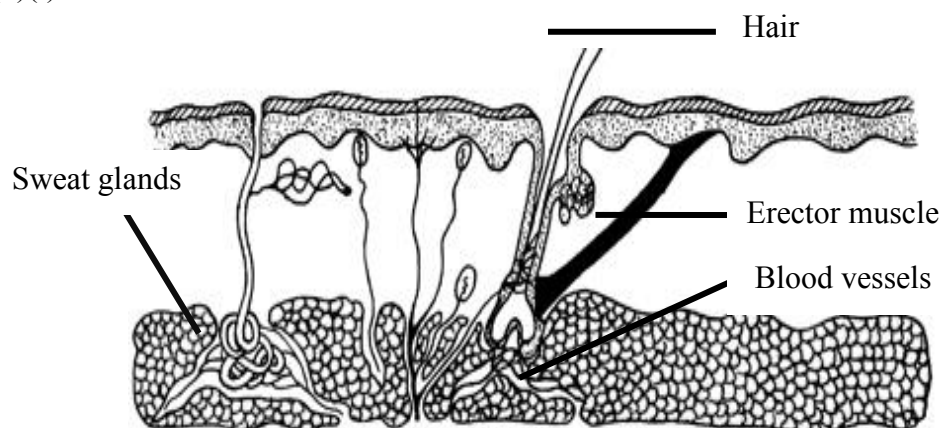


Diagram 6.2

Rajah 6.2

Diagram 6.2 shows a cross section of the human skin. Based on the diagram above describe briefly the role of sweat glands, hair, erector muscle and blood vessels to maintain the body temperature during the cool day.

Rajah 6.2 menunjukkan keratan rentas kulit manusia. Berdasarkan rajah di atas, terangkan secara ringkas peranan kelenjar peluh, bulu roma, otot erektor dan salur darah untuk mengekalkan suhu badan semasa hari sejuk.

[6 marks]

(ii)

Drugs can alter brain functions and the rates at which neurons release neurotransmitters. There are different types of drugs which are stimulants, depressants, hallucinogens and narcotics.

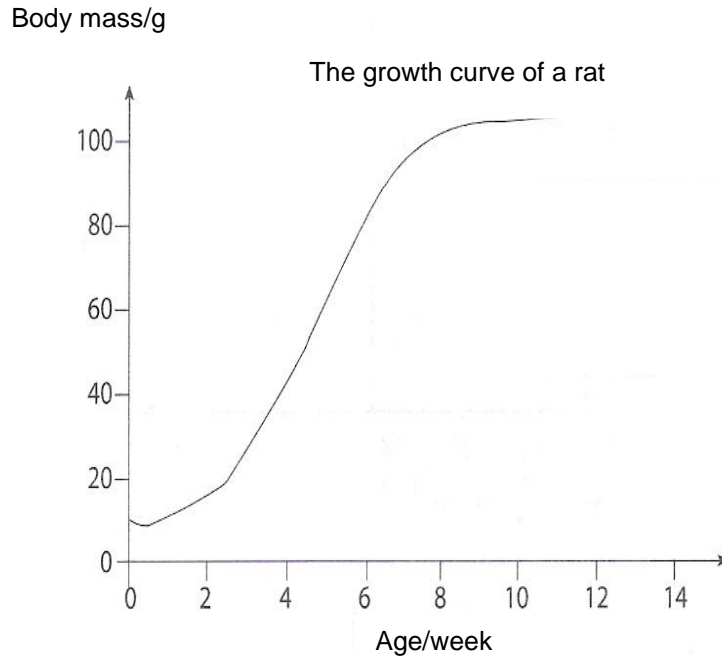
Dadah boleh mengubah fungsi otak dan kadar pelepasan neurotransmitter oleh neuron. Terdapat pelbagai jenis dadah yang berbeza yang dikenali sebagai perangsang, depressi, menyebabkan hallusinasi dan narkotik.

Based on the statement, state and explain briefly the effects of any two drugs. *Berdasarkan pernyataan di atas, nyatakan dan terangkan secara ringkas kesan mana-mana dua dadah.*

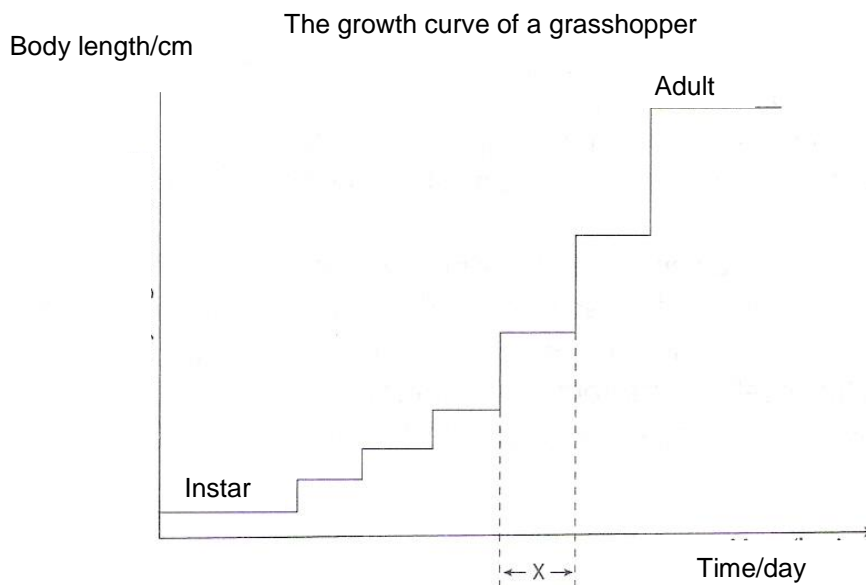
[4 marks]

CHAPTER 4: REPRODUCTION AND GROWTH

JUJ 2007



GRAPH 5.1



GRAPH 5.2

1. A student carried out an experiment to study the growth and life cycle of a rat and a grasshopper. The growth curves for both organisms are shown in Graph 5.1 and Graph 5.2.

Seorang pelajar menjalankan satu eksperimen untuk mengkaji pertumbuhan dan kitar hidup seekor tikus dan seekor belalang. Lengkung pertumbuhan untuk kedua-dua organisma itu ditunjukkan seperti dalam Graf 5.1 dan Graf 5.2.

a) Give two differences of the growth curve between both organisms.

Berikan dua perbezaan lengkung pertumbuhan di antara kedua-dua organism tersebut.

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[4 marks]

b) (i) On Diagram 5.1, label and state all the phases that should be in the growth curve.

Pada Rajah 5.1, label dan nyatakan semua peringkat yang sepatutnya dalam pertumbuhan.

[2 marks]

(ii) Using any of the phases in (b)(i), explain briefly what happen during each phases.

Dengan memilih salah satu fasa dalam (b)(i), jelaskan secara ringkas apa yang berlaku semasa fasa tersebut.

.....
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[1 mark]

- c) (i) On Graph 5.2, draw an arrow and label it as Q to show where the ecdysis begins.

Pada Graf 5.2, lukis satu anak panah dan labelkan ia sebagai Q untuk menunjukkan di mana ekdisis bermula.

[1 mark]

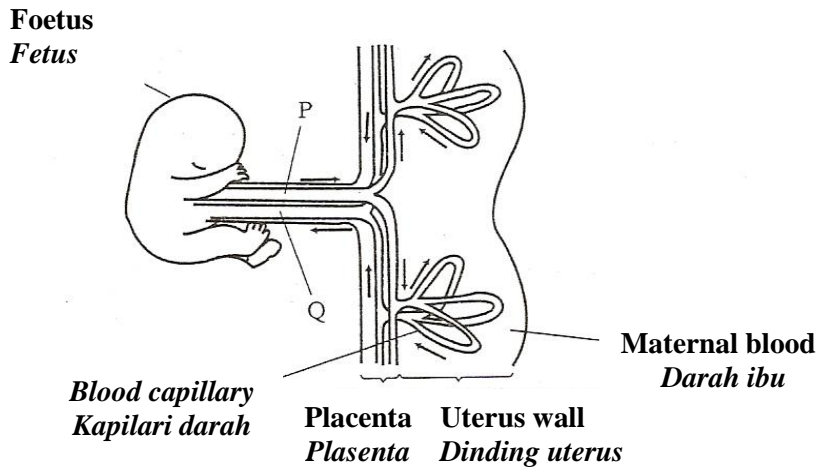
- (ii) Base on Diagram 5.2, explain the process that occur during X.

Berdasarkan Graf 5.2, jelaskan proses yang berlaku semasa X.

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[3 marks]

JUJ 2008



2. (d) Diagram 2.2 shows a relationship between foetus and its mother through placenta and umbilical cord.

Rajah 2.2 menunjukkan hubungan di antara fetus dan ibunya melalui plasenta dan tali pusat.

(i) Label structure P and Q.

Label struktur P dan Q

P:

Q:

[2 marks]

(ii) Give the difference between P and Q

Nyatakan perbezaan di antara P dan Q.

.....

.....

[1 mark]

(iii) Explain the advantages of foetus having a separate circulatory system from maternal circulatory systems.

Jelaskan kelebihan fetus mempunyai sistem peredaran yang berasingan dengan sistem peredaran ibunya.

.....
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[2 marks]

(e) Placenta also involves in endocrine system. Discuss how placenta acts as an endocrine gland?

Plasenta juga terlibat dalam sistem endokrin. Bincang bagaimana plasenta berperanan sebagai satu kelenjar endokrin?

.....
.....
.....
.....

[2 marks]

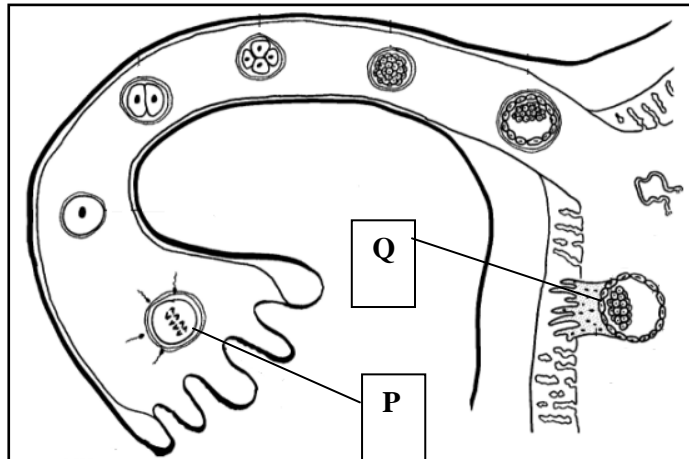


Diagram 8.1

Rajah 8.1

3. (a)(i) Diagram 8.1 shows a cross section of a uterine wall. Describe the development of P to Q.

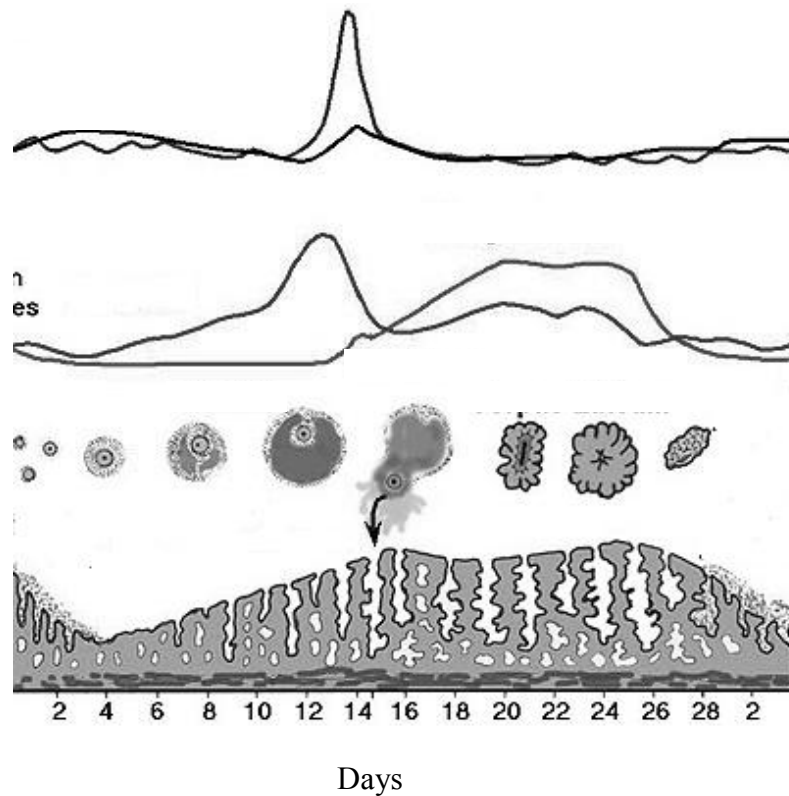
Rajah 8.1 menunjukkan satu keratan rentas dinding uterus. Jelaskan perkembangan P ke Q.

[4 marks]

- (ii) A married woman has her uterus removed, making it impossible for her to conceive through the natural process. If she still wants to have a baby with her husband, suggest what she can do. Justify the technique that can be used by the couple to conceive.

Uterus seorang wanita telah dibuang menjadikannya mustahil untuk mendapatkan anak secara semulajadi. Jika beliau masih menginginkan anak bersama suaminya, cadangkan teknik yang boleh dilakukan. Justifikasikan teknik yang boleh dilakukan oleh pasangan tersebut untuk mendapatkan anak.

[6 marks]



Days
Hari
Diagram 8.2
Rajah 8.2

(b)(i) Based on Diagram 8.2, state the meaning of menstruation.

Berdasarkan Rajah 8.2, nyatakan maksud haid .

[2 marks]

(ii) Explain the relationship between development of the follicles, hormonal levels in the blood and changes in thickness of the endometrium wall.

Terangkan hubungan antara perkembangan folikel, aras hormon di dalam darah dan perubahan ketebalan dinding endometrium.

[8 marks]

4. Diagram 8.1 shows a physiological process in a human.
Rajah 8.1 menunjukkan proses fisiologi di dalam manusia

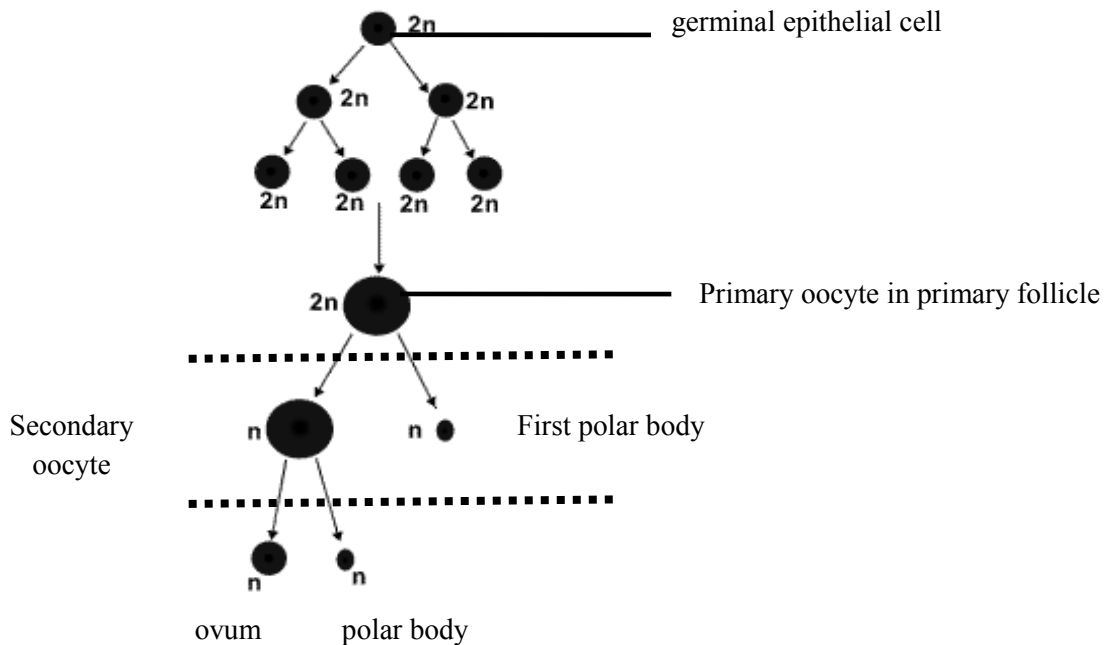


Diagram 8.1

Rajah 8.1

- (a) Based on the diagram above, describe the physiological process.
Berdasarkan rajah di atas, terangkan proses fisiologi tersebut.

[4 marks]

- (b) Diagram 8.2 shows fertilization and development of a zygote in humans
Rajah 8.2 menunjukkan proses persenyawaan dan perkembangan zigot manusia

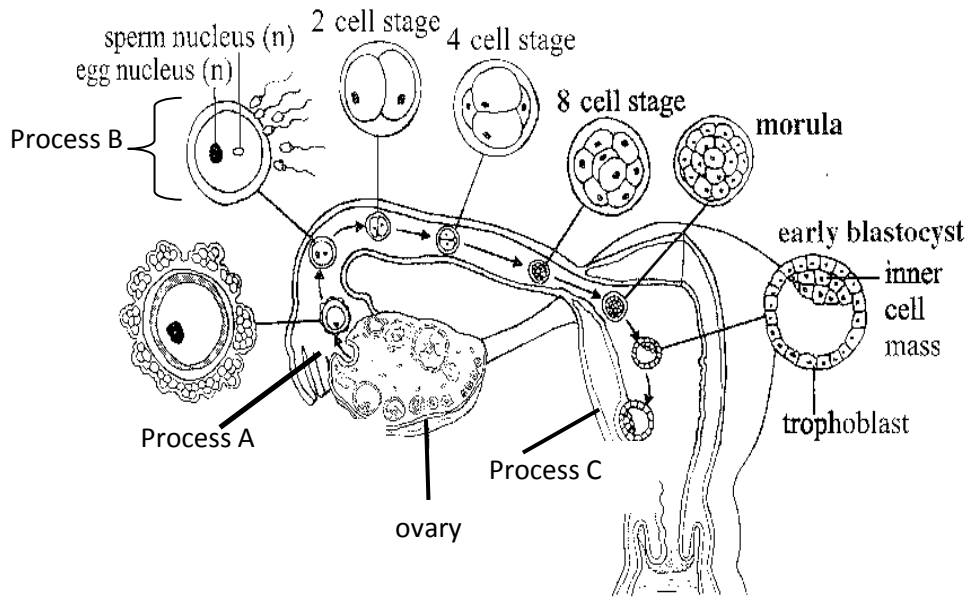


Diagram 8.2

Rajah 8.2

Based on the above diagram

Berdasarkan rajah di atas

- (i) explain briefly process A

terangkan dengan ringkas proses A

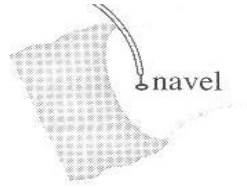
[2 marks]

- (ii) Describe the early development of a zygote from process B until process C.

terangkan perkembangan awal zigot bermula dari proses B sehingga proses C

[6 marks]

- (c) Diagram 8.3 (i) and (ii) show the methods related to human reproduction.
Rajah 8.3 (i) dan (ii) menunjukkan kaedah yang berkaitan dengan pembiakan manusia



1. A laparoscope is inserted at the navel to collect immature ova from the ovaries

1. Laparoskop dimasukkan di pusat untuk mengambil ovum pramatang dari ovari



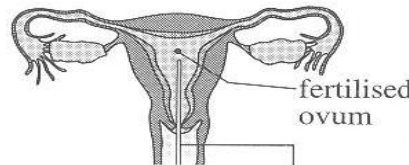
2. An immature ovum is placed in culture solution to mature.

2. Ovum pramatang diletakkan dalam larutan kultur untuk mematangkannya



3. Sperms are collected and placed in the culture solution. Fertilisation occurs after 5-6 hours.

3. Sperma diambil dan diletakkan di dalam larutan kultur. Persenyawaan berlaku selepas 5-6 jam



4. A catheter is used to transfer a fertilised ovum into the uterus

4. Kateter digunakan untuk memindahkan ovum yang telah disenyawakan ke dalam uterus

Diagram 8.3(i)



Diagram 8.3(ii)

Rajah 8.3

Based on the above diagram, describe the methods.

Berdasarkan rajah di atas, terangkan kaedah tersebut

[8 marks]

JUJ 2011

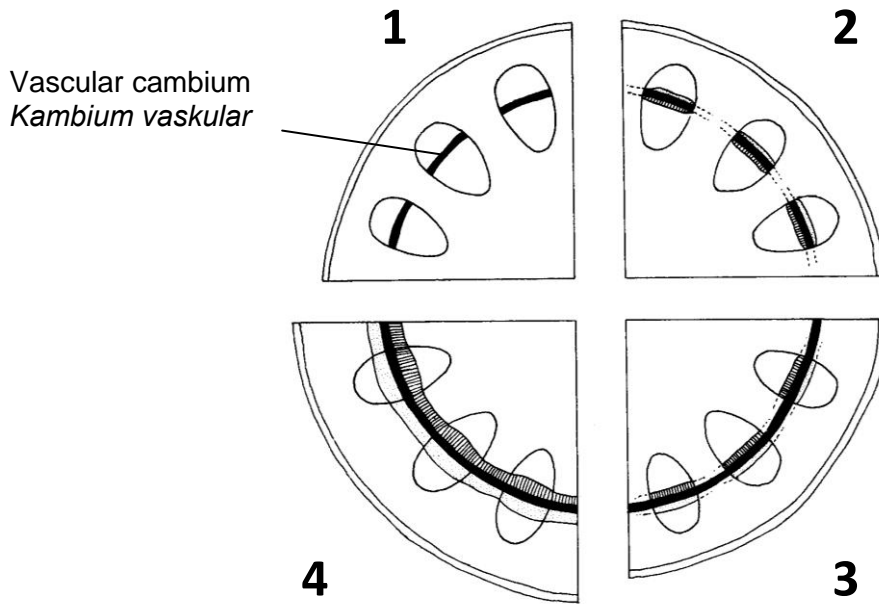


Diagram 7.1

Rajah 7.1

5. (a) (i) Diagram 7.1 show the stages of secondary growth in the stem of dicotyledonous plants. Explain the stages of growth (1 to 4).

Rajah 7.1 menunjukkan peringkat pertumbuhan sekunder di dalam batang tumbuhan dikotiledon. Terangkan peringkat pertumbuhan(1 ke 4).

[6 marks]

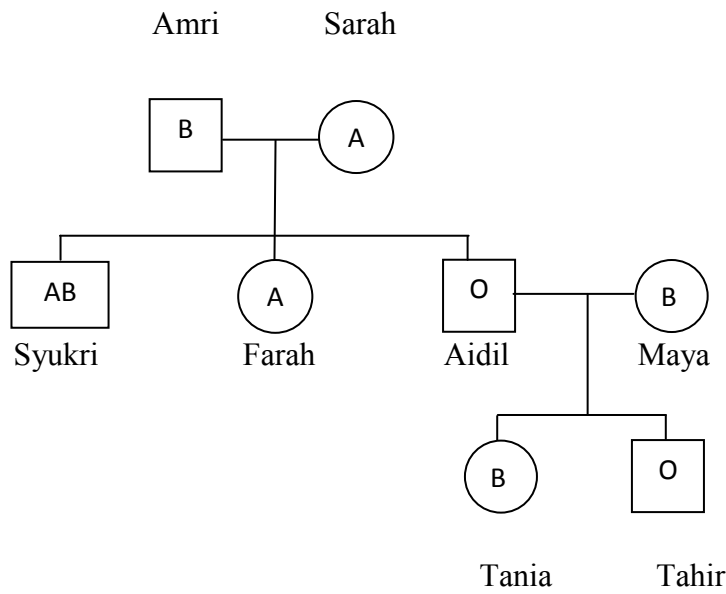
- (ii) Describe the importance of secondary growth.

Huraikan kepentingan pertumbuhan sekunder.

[4 marks]

CHAPTER 5: INHERITION

JUJ 2008



Keys:

Kekunci

A - Blood group A

Kumpulan darah A

B - Blood group B

Kumpulan darah B

AB - Blood group AB

Kumpulan darah AB

O - Blood group O

Kumpulan darah O

Diagram 4

Rajah 4

1. Diagram 4 shows a schematic diagram of ABO blood groups in a family.

Rajah 4 menunjukkan satu gambarajah skema kumpulan darah ABO dalam satu keluarga.

(a) (i) What is the genotype of blood group for Maya?

Apakah genotip kumpulan darah Maya?

.....

[1 mark]

- (ii) Explain your answer in 4 (a)(i).
Jelaskan jawapan anda di 4 (a)(i)

.....
.....
.....

[2 marks]

- (iii) Draw a schematic diagram if Tania marries with a man which is a heterozygote blood group B.
Lukis satu gambarajah skema jika Tania berkahwin dengan lelaki yang kumpulan darah B yang heterozigot.

- (b) Syukri was involved in a serious accident. Aidil volunteer to donate his blood to save Syukri's life.

Explain why is it safe to transfuse blood of group O to an accident victim during an emergency?

Syukri terlibat dalam satu kemalangan yang serius. Aidil menderma darahnya kepada Syukri secara sukarela untuk menyelamatkan nyawa Syukri.

Terangkan mengapa selamat untuk memindahkan darah kumpulan O kepada mangsa semasa kecemasan?

.....
.....
.....
.....

[2 marks]

- (c) There are other blood systems in humans that affect blood compatibility. One such system is the Rhesus factor.

Discuss why there is a problem if a Rh-negative mother has more than one Rh-positive babies.

Terdapat system darah yang lain di dalam manusia yang mempengaruhi keserasian. Salah satu daripadanya ialah factor Rhesus.

Bincangkan mengapa akan wujud masalah jika seorang ibu yang Rh-negatif mempunyai lebih dari seorang anak yang Rh-positif.

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[3 marks]

JUJ 2007

Case A: In human, the allele for albinism is recessive to the the allele for normal skin pigmentation.

Kes A: Dalam manusia, alel untuk albino adalah resesif kepada alel untuk pigmentasi kulit normal.

2. a)(i) Using a schematic diagram, shows the probability that a child of a mother and father who are heterozygous will be albino?

Dengan menggunakan rajah skema, tunjukkan kebarangkalian anak yang dihasilkan mengidap albino jika kedua ibu dan bapanya adalah heterozigot.

[5 marks]

Case B: In a family, father has curly hair and mother has straight hair, whereas, their daughter has a curly hair.

Kes B: Dalam satu keluarga, bapa berambut kerinting dan ibu berambut lurus. Manakala anak perempuannya berambut kerinting

- (ii) The production of gametes occurs through the process of meiosis.

Offspring produced by sexual reproduction differ genetically from one another and from the parents. Describe briefly how meiosis makes genetic variation possible, with aid of your biological knowledge.

Penghasilan gamet berlaku melalui proses meiosis. Anak-anak yang terhasil adalah berbeza antara satu sama lain. Berdasarkan pengetahuan biologi anda, terangkan dengan ringkas bagaimana meiosis boleh menghasilkan variasi genetik tersebut.

[5 marks]

- b) Nuclear radiation has been applied in food industrial, medical and plantation. However, it is dangerous for those who exposed to radiation in period of time directly or indirectly.

Give an evaluation of the usage of nuclear radiation whether this technique should be developed further. Your explanations must include examples of the advantages and disadvantages of nuclear radiation.

Radiasi nuklear telah digunakan dalam industri makanan, perubatan dan pertanian. Walau bagaimanapun, ia amat berbahaya kepada individu yang terdedah kepada radiasi untuk jangka masa yang panjang sama ada secara langsung atau tidak langsung.

Nilaiakan penggunaan radiasi nuklear ini sama ada boleh digunakan dengan lebih meluas. Penerangan anda hendaklah merangkumi contoh-contoh kebaikan dan keburukan radiasi nuklear.

[10 marks]

JUJ 2008

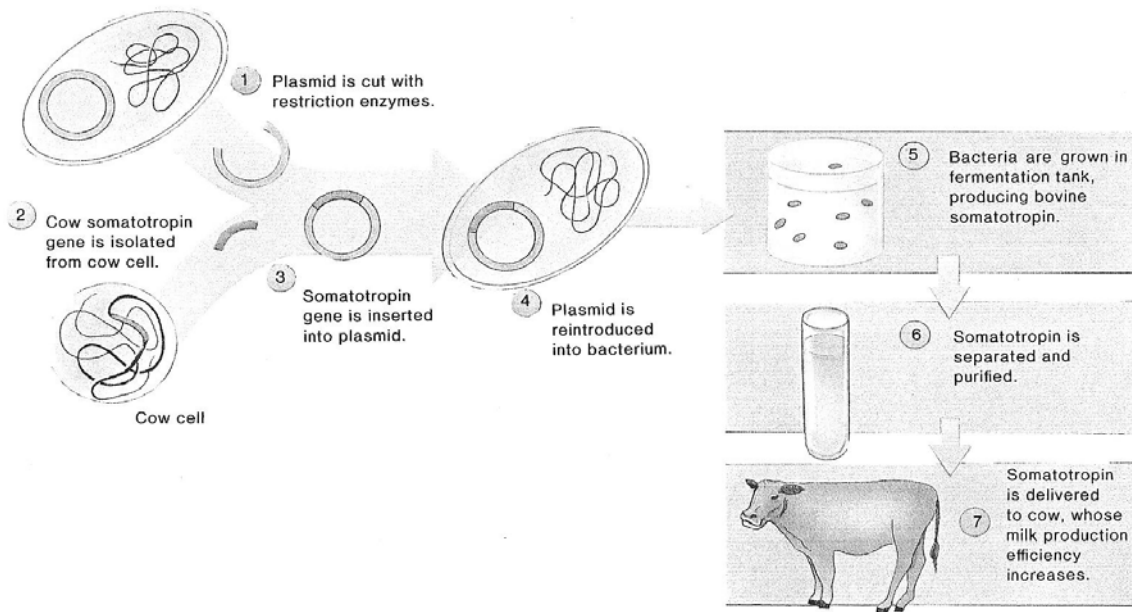


Diagram 9

Rajah 9

3. (a) Genetic engineering can be used to produce large quantities of substances, which are importance for humans and animals. For example, the production of insulin. Bovine somatotrophin (BST) is used commercially to increase milk production in cows and mass of beef cattle. BST production has a similar process of insulin production. Based on the above statement, explain how the BST can be produced by genetic engineering.

Kejuruteraan genetik boleh digunakan untuk menghasilkan suatu bahan dalam kuantiti yang banyak yang mana memberi manfaat kepada manusia dan haiwan. Sebagai contoh, penghasilan insulin. Bovine somatotrophin (BST) yang digunakan secara komersil dapat meningkatkan penghasilan susu dan daging lembu. Penghasilan BST hampir sama dengan penghasilan insulin. Berdasarkan kepada pernyataan di atas, terangkan bagaimana BST boleh dihasilkan melalui kejuruteraan genetik.

[10 marks]

- (b) Genetic engineering is a technique whereby the genetic content of an organism is manipulated. Evaluate the contributions of genetic engineering by stating its advantages and disadvantages.

Kejuruteraan genetik adalah satu teknik yang mana kandungan genetik sesuatu organisma dimanipulasikan. Beri penilaian terhadap kejuruteraan genetik dengan memberikan kebaikan dan keburukan.

[10 marks]

JUJ 2009

4. (a)(i) Mr. and Mrs. Lim are healthy normal couple. Their first child is a thalassaemia girl and the second child is a thalassaemia son. Their youngest is a pair of normal identical female twins. Thalassaemia is a disease passed on genetically by a recessive allele. The allele for the normal condition is T. The allele for thalassaemia is t. Explain how the inheritance of heredity disease to the next generation of Mr. Lim's family can be controlled.

En. Lim dan isteri adalah sepasang suami-isteri yang sihat dan normal. Anak pertama mereka adalah seorang perempuan thalassaemia dan yang kedua pula anak lelaki thalassaemia. Anak bongsu mereka adalah sepasang kembar seiras perempuan yang normal. Thalassaemia ialah sejenis penyakit yang diturunkan secara genetik oleh alel resesif. Alel untuk keadaan normal ialah T. Alel untuk thalassaemia ialah t. Terangkan bagaimana pewarisan penyakit keturunan bagi keluarga En. Lim dapat dikawal pada generasi akan datang.

[7 marks]

- (ii) Based on your biology knowledge, justify the importance of DNA fingerprinting and Human Genome Project to mankind.

Berdasarkan pengetahuan biologi anda, berikan justifikasi kepentingan cap jari DNA dan Projek Genom Manusia terhadap manusia.

[10 marks]

JUJ 2011

5. (a) Ismail has brown hair and blue eyes. He was married to the woman who have black hair and brown eyes. By using schematic diagram explain how their daughter will get black hair and blue eyes. (The trait of brown eyes and black hair is dominant over blue eyes and brown hair).

[10 marks]

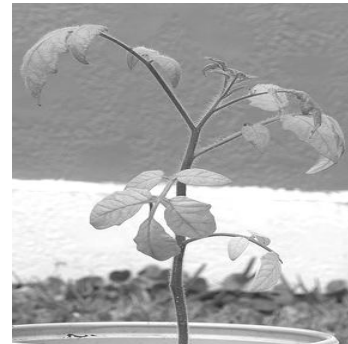
Ismail mempunyai rambut perang dan bermata biru. Beliau telah berkahwin dengan seorang perempuan yang mempunyai rambut hitam dan bermata perang. Dengan menggunakan rajah skema terangkan bagaimana anak mereka akan memperolehi rambut hitam dan bermata biru. (Trait mata perang dan rambut hitam adalah dominan kepada mata biru dan rambut perang).

- (b) Diagram 9 shows two tomato plants which have been exposed to caterpillars. The normal plant has been completely eaten while the genetically engineered plant shows practically no signs of damage.
[10 marks]

Rajah 9 menunjukkan dua pokok tomato yang telah didedahkan kepada beluncas. Pokok biasa telah dimakan habis oleh beluncas manakala pokok yang telah mengalami pengubahsuaian kandungan genetikanya tidak dimakan oleh beluncas.



Genetically engineered plant
*Tumbuhan yang telah dirawat melalui
kejuruteraan genetik*



Normal plant
Tumbuhan normal

Diagram 9

Rajah 9

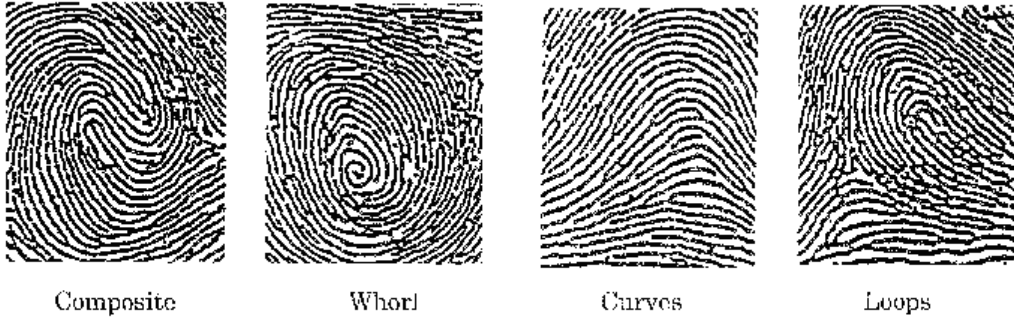
Discuss the advantages and disadvantages of using the genetic engineering technology in agriculture.

Bincangkan kebaikan dan keburukan menggunakan teknologi kejuruteraan genetik dalam pertanian.

[10 marks]

CHAPTER 6: VARIATION

JUJ 2010



1. Diagram 5 shows various types of fingerprints.
Rajah 5 menunjukkan pelbagai jenis cap jari.
- (a)(i) Based on Diagram 5, name the types of fingerprints of students X and Y as shown below.
Berdasarkan rajah 5, namakan jenis cap jari pelajar X dan Y.



[2 marks]

- (ii) State one factor that causes variation between the fingerprints of students X and Y.
Nyatakan satu faktor yang menyebabkan perbezaan variasi cap jari bagi pelajar X dan Y.
-

[1 mark]

(iii) What is the type of variation shown in Figure 8?

Apakah jenis variasi yang ditunjukkan dalam rajah 8?

.....

[1 mark]

(b) An identity card bears both the fingerprint and the photograph of the individual. Explain why the use of such identity card is a more effective method of identification than a card with only the fingerprint or the photograph.

Kad pengenalan terdiri daripada cap jari dan gambar seseorang individu.

Terangkan mengapa penggunaan kad pengenalan sebegini merupakan kaedah yang lebih efektif daripada kad pengenalan yang hanya menggunakan cap jari atau gambar sahaja.

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[3 marks]

Figure 5.1(a) shows a cross-section of the seminiferous tubule of a human male.

Figure 5.1(b) shows a cross-section of the ovary of a human female.

Figure 5.1(c) represents the human male karyotype in a spermatogonium from the seminiferous tubule.

Figure 5.1(d) represents the human female karyotype in a primary oocyte from the ovary.

Rajah 5.1(a) menunjukkan keratan rentas tubul seminiferus seorang lelaki.

Rajah 5.1(b) menunjukkan keratan rentas ovari seorang perempuan.

Rajah 5.1(c) menggambarkan kariotip seorang lelaki di dalam spermatogonium daripada tubul seminiferus.

Rajah 5.1(d) menggambarkan kariotip seorang perempuan di dalam oosit primer daripada ovari.

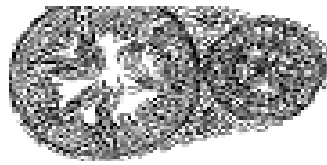


Figure 5.1(a)

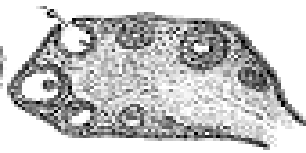


Figure 5.1(b)

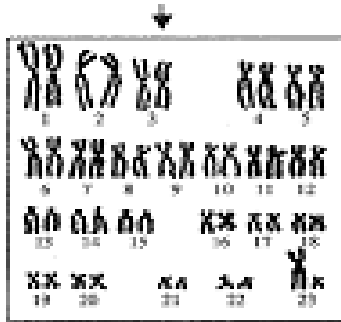


Figure 5.1(c)

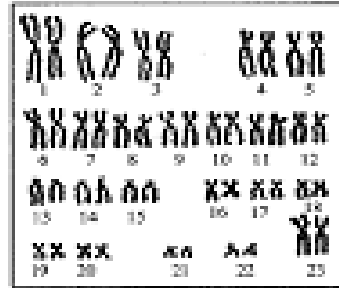


Figure 5.1(d)



Figure 5.1

Rajah 5.1

(c) Based on the human karyotype in Figure 5.1(c) and Figure 5.1(d),
Berdasarkan kariotip manusia di dalam rajah 5.1(c) dan rajah 5.1(d),

(i) State the total chromosome number in a human somatic cell.
Nyatakan jumlah nombor kromosom dalam sel soma manusia.

.....

[1 mark]

(ii) State one difference between the male karyotype and female karyotype.
Terangkan satu perbezaan di antara kariotip lelaki dan kariotip perempuan

| Male karyotype <i>Kariotip lelaki</i> | Female karyotype <i>Kariotip perempuan</i> |
|--|---|
| | |

[1 mark]

(d) Q, R, S and T represent the gametes produced during process P. Complete Figure 5.1 to show the number and type of chromosomes inherited by gametes Q, R and T.


Q, R, S and T menggambarkan penghasilan gamet semasa proses P. Lengkapkan rajah 51 untuk menunjukkan bilangan dan jenis kromosom yang diwarisi oleh gamet Q, R, dan T.

.....
.....
.....

[3 marks]

JAWAPAN

CHAPTER 2: CELL ORGANISATION

| NO. | MARK SCHEME | MARK |
|----------|---|-----------------------|
| 1.(a)(i) | Photolysis of water Reduction of carbon dioxide (into glucose) | 1 1 |
| (a)(ii) | F1 : sunlight trapped by chloroplast/ chlorophyll P1 : light energy/ sunlight break down water molecule into oxygen gas and hydrogen atom. | 1 1 |
| (b)(i) | Kloroplas | 1 |
| (b)(ii) | Drawing Label | 1 1 |
| 2(a)(i) | Able to name the structures X, Y and Z correctly. X – Ribosome Y – Transport vesicle Z – Secretory vesicle | 1 1 1 |
| (b) | Able to name and state the function or organel A and organel B correctly. <u>Sample answer</u> Organel A: Rough endoplasmic reticulum Function : transport proteins made by structure X/ ribosome Organel B: Golgi apparatus Function : Process, package and transport center of carbohydrates/ proteins/ phospholipids/ glycerole | 1 1 1 1 |
| (c)(i) | Able to draw an arrow to show the direction of the products correctly.  | 1 |
| (c)(ii) | Able to explain how enzyme is produced by organelles in Diagram 1 correctly. <u>Sample answer</u> P1 – protein is synthesised by X/ ribosome at organelle A P2 – transport through (spaces between) rough endoplasmic reticulum P3 – transport to organelle B by Y/ transport vesicle P4 – (proteins are) modified in organelle B P5 – secretory vesicle transport the products and release it outside the cells | 1 1 1 1 1 |
| | (any 3 P) | |

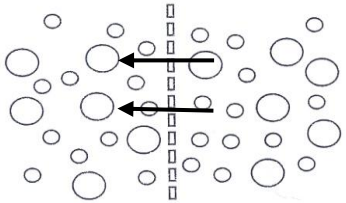
| | | |
|---------|--|----------------------------------|
| (d) | <p>Able to explain why organelle B presents in a large numbers in pancreas correctly.</p> <p><u>Sample answer</u> P1 – Function of pancreas to secretes hormones and enzymes P2 – more Golgi apparatus to synthesised more hormones and enzymes</p> | <p>1 1</p> |
| 1(a)(i) | <p>Able to label the structures P, Q , R and S</p> <p>P – Chloroplast Q – Nucleus R – Vacuole S – Golgi Apparatus</p> | <p>1 1 1 1</p> |
| (ii) | <p>Able to state the function of the structures P and R</p> <p><u>Sample answer</u></p> <p>P- Absorb light energy (to carry out photosynthesis) R – Separate / converts protein / enzyme from (rough) endoplasmic reticulum - Encloses the content in vesicles - Sends vesicles to other parts of the cell</p> <p style="text-align: right;">(Any one)</p> | <p>1 1</p> |
| (b)(i) | <p>Able to state one characteristic of R and its importance.</p> <p><u>Sample answer</u></p> <p>F1 : Characteristics of R : small in size // have a large total surface area to volume (TSA/V) P1 : Important of R : // Increases the surface area // for water (and mineral) absorption F2 : Characteristics of R : Have thin cell wall // have no cuticle P2 : Important of R: for water (and mineral) ions absorption // F3 : Charateristics of R : The cell sap in R is usually hypertonic to the surrounding soil water. P3 : Important of R: for water absorption.</p> <p style="text-align: right;">(any 2)</p> | <p>1 1 1 1 1</p> |
| (ii) | <p>Able to explain how water from soil move to structure T.</p> <p>P1 : The cell sap of R is hypertonic to the soil water. P2 : So, water diffuses into R by osmosis P3 : The entry of water dilutes cell sap of R// cell sap of R becomes hypotonic compared to cell sap of S/ the next cells. P4 : Terefore water diffuses into S/to these adjacent cells which become more diluted themselves, so osmosis continues across the S</p> | <p>1 1 1 1</p> |

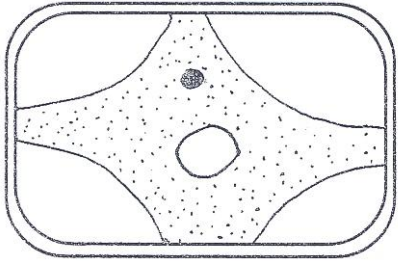
| | | |
|----------|---|--|
| | P5 : The continuous flow of water in S creates a force known as root pressure to push water into xylem. <p style="text-align: right;">(any 4)</p> | 1 |
| 4 (e)(i) | Able to name tissues P,Q and R <u>correctly</u> <u>Sample answer</u> P: Xylem tissue R: Phloem tissue | 1 1 |
| (ii) | Able to state the function of P and R <u>correctly</u> <u>Sample answer</u> P : To transport water and dissolved minerals from the roots to other parts of a plant /the leaf // To provide mechanical support R : To transport organic compounds from the leaf to other parts of the plant. | 1 1 |
| 1(a) (i) | Able to label structure Q and R <u>Sample answers</u> Q: vascular bundle / tissue R: spongy mesophyll | 1 1 |
| (ii) | Able to name and explain the function of the cells in structure Q <u>Sample answers</u> F1: Xylem transport water F2: Phloem transport organic substances | 1 1 |
| (b) | Able to explain two leaf adaptations to optimize photosynthesis <u>Sample answers</u> F1: palisade mesophyll are closely packed with more chlorophyll P1: to absorb maximum light F2: spongy mesophyll are loosely arranged P2: provide air spaces to allow easy diffusion of water / carbon dioxide F3: mosaic arrangement of leaf P3: to absorb much light F4: thin lamina of leaf P4: allows diffusion of gases involved in photosynthesis F5: flattened shape of lamina P5: for large surface area to trap sunlight F6: veins contain vascular tissue / xylem and phloem P6: for transportation of water and organic substances | 1 1 1 1 1 1 1 1 1 1 |

| | | |
|--|--|--------|
| | F7: abundant of stomata on the lower surface (of leaf) P7: allows exchange of gases between (internal part) leaf and the environment. | 1 1 |
| | Any 2 sets F with P correspondingly Example F1P1 = 2m F2P2 = 2m Total = 4 | |

CHAPTER 2: MOVEMENT OF SUBSTANCES ACROSS THE PLASMA MEMBRANE

| NO. | MARKING SCHEME | MARK |
|---------|--|------|
| 1(a)(i) | Able to name the process <u>Sample answer</u> Osmosis | 1 |
| (ii) | Able to state the factor that affects the direction of the process <u>Sample answer</u> Relative concentration (of solutes) inside and outside the cell. | 1 |
| (iii) | Able to give explanation what will happen to the plant if there is no water in its surrounding soils. <u>Sample answer</u> P1 – soils become hypertonic P2 – water molecules move out/ diffuse out of the root cell by <u>osmosis</u> P3 – The plant cells become flaccid P4 – the plant become wilt <i>(Any 2 of P1-P3 and P4)</i> | 1x3 |
| (b)(i) | Able to state the concentration of salt solution that cause haemolysis of 25% of red blood cells <u>Sample answer</u> 0.40g/cm ³ (0.39 g/cm ³ accepted) | 1 |
| (ii) | Able to state the osmotic concentration of blood plasma <u>Sample answer</u> 0.46 g/cm ³ | 1 |
| (iii) | Able to give an explanation <u>Sample answer</u> P1 – No blood cell that is shrink or burst// the red blood cells are | 1x2 |

| | | |
|---|--|-------------------------------------|
| <p>(c)(i)</p> | <p>not haemolysed or crenated P2 – the net movement of water in and out of cell are equal</p> <p>Able to define active transport</p> <p><u>Sample answer</u> Movement of molecules or ions, against the concentration gradient across plasma membrane with the help of carrier protein and energy/ ATP</p> <p>(ii)</p> <p>Able to explain what will happen to the uptake of the ions by root cells.</p> <p><u>Sample answer</u> P1 – there is no uptake of ions by root cells P2 – metabolic poisons kill/ damaged the (root) cells P3 – no energy/ ATP is produced P4 – active transport do not occur (Any three)</p> | <p>1</p> <p>1x3</p> |
| <p>2(a)(i)</p> <p>(ii)</p> <p>(iii)</p> | <p>Able to name the process involved</p> <p><u>Answer</u> Osmosis</p> <p>Able to state the molecule that is involve in the process</p> <p><u>Answer</u> Water</p> <p>Able to draw an arrow to show the direction of the movement of molecules.</p> <p><u>Sample answer</u></p>  | <p>1</p> <p>1</p> <p>1</p> |
| <p>(b)(i)</p> <p>(ii)</p> | <p>Able to name the term used to describe the 30% sucrose solution compare to the 10% sucrose solution.</p> <p><u>Sample answer</u> Hypertonic solution</p> <p>Able to explain what will happen to the cell if a plant cell is immersed into 30% sucrose solution for 30 minutes.</p> <p><u>Sample answer</u> P1 – 30% sucrose solution is a hypertonic solution compare to the plant cell sap P2 – water will diffuse/ move out of the cell/ vacuole by osmosis. P3 – plasma membrane will move away from the cell wall P4 – cell becomes flaccid/ plasmolysed</p> <p style="text-align: right;">(Any 3 P)</p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> |

| | | |
|---------------|--|----------------------------|
| <p>(iii)</p> | <p>Able to draw the condition of the cell after it is immersed into the 30% sucrose solution. <u>Sample answer</u></p>  | <p>1</p> |
| <p>(c)(i)</p> | <p>Able to state the process that is involved in the uptake of mineral ions by root hairs <u>Answer.</u> Active transport</p> | <p>1</p> |
| <p>(ii)</p> | <p>Able to explain what will happen to the uptake of mineral ions by roots hair if the roots are immersed into a solution containing metabolic poisons such as cyanide. <u>Sample answer</u> P1 – metabolic poison stopped the cell respiration P2 – no energy/ ATP is produced P3 – active transport cannot occurs P4 – no uptake of mineral ions by roots hair. (Any 3 P)</p> | <p>1 1 1 1</p> |
| <p>3. (c)</p> | <p>Able to explain the condition of the plants after being spread with excess fertilizers <u>Sample answers</u> P1: excess fertilizers cause the soil becomes hypertonic / more concentrated P2: water diffuses out from root (cell) via osmosis P3: plant loses water and cells are plasmolysed P4: hence, the plant wilt</p> | <p>1 1 1 1</p> |

CHAPTER 4: CHEMICAL COMPOSITION IN THE CELL

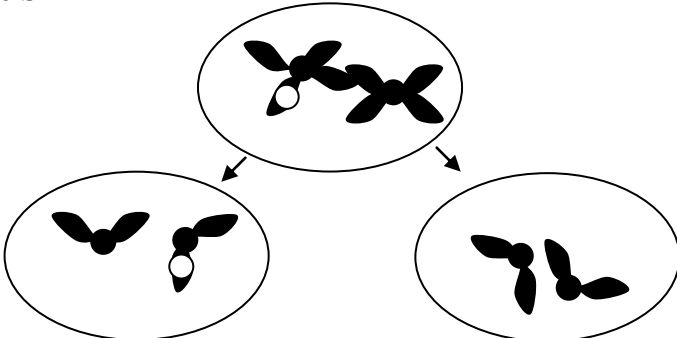
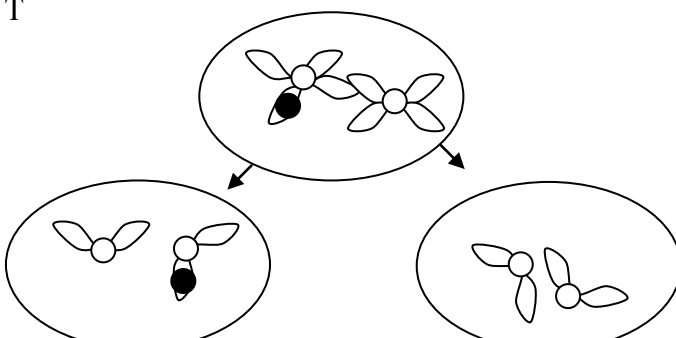
| NO. | MARKING SCHEME | MARK |
|----------------|---|----------------|
| <p>2(a)(i)</p> | <p>Able to name structure X and Y <u>Answer</u> X: Tertiary structure Y: Quaternary structure</p> | <p>1 1</p> |

| | | |
|--------|--|----------------------|
| (ii) | Able to give one example of protein with structure X. <u>Sample answer</u> Hormones/ enzyme/ antibody/ plasma protein | 1 |
| (b) | Able to explain about essential amino acid. <u>Sample answer</u> P1 – cannot be synthesis by the body P2 – obtain from diet | 1 1 |
| (c)(i) | Able to state other characteristic of enzyme that can be observed <u>Sample answer</u> Do not destroyed at the end of the reaction// enzyme reaction is reversible | 1 |
| (ii) | Able to explain about the ‘lock and key’ hypothesis <u>Sample answer</u> P1 – enzyme has active site where only certain molecules can fit in. P2 – substrate represent the ‘key’ and enzyme represent the ‘lock’ P3 – when substrate fit into (active site of) enzyme forming enzyme -substrate complex P4 – enzyme catalyst the substrate to form products <i>(Any 3 P)</i> | 1 1 1 1 |
| (d)(i) | Able to give one example of inhibitor. <u>Sample answer</u> Heavy metal/ leads/ mercury | 1 |
| (ii) | Able to explain how inhibitor inhibits the enzyme reaction. <u>Sample answer</u> P1 – inhibitor change the active site of enzyme P2 – substrate cannot fit in the active site P3 – cannot form enzyme-substrate complex <i>(Any 2 P)</i> | 1 1 1 |
| 2 (a) | Able to state processes X and Y <u>Sample answer</u> Process X : Condensation Process Y : Hydrolysis | 1 1 |
| (b) | Able to state and explain the other type of lipid in human <u>Sample answer</u> F1: Phospholipids P1: components in the formation of plasma membrane F2: Steroids P2: organic compounds such as cholesterol / hormone /testosterone / oestrogen / progesterone Any one set of F and P correspondingly | 1 1 1 1 |

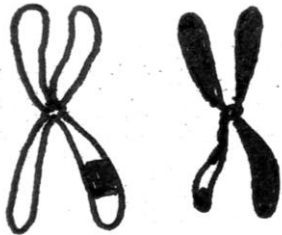
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|---------------|--|----------------------------|
| <p>(c)(i)</p> | <p>Able to explain briefly the differences between saturated fat and unsaturated fat</p> <p><u>Sample answer</u> P1: Saturated fat is solid at room temperature but unsaturated fat is liquid (at room temperature) P2: Saturated fat without double bonds between carbon atoms whereas unsaturated fat have at least one double bond (between the carbon atoms) P3: Saturated fat cannot react with additional hydrogen atoms but unsaturated fat are able to react (with additional hydrogen atoms) P4: saturated fat has higher LDL / cholesterol in the blood whereas unsaturated fat has lower LDL / cholesterol</p> <p style="text-align: right;">[Any 2 P]</p> | <p>1 1 1 1</p> |
| <p>(ii)</p> | <p>Able to state the condition when the lumen is narrowing and consequences</p> <p><u>Sample answer</u> F1: arteriosclerosis P1: causes heart attack / myocardial infarction / angina / chest pain</p> | <p>1 1</p> |
| <p>(d)(i)</p> | <p>Able to state structure T and U</p> <p><u>Sample answer</u> T: pentose / sugar / deoxyribose sugar U: nitrogenous base</p> | <p>1 1</p> |
| <p>(ii)</p> | <p>Able to name and describe the application of genetics that be used for identification purposes in solving criminal cases.</p> <p><u>Sample answer</u> F1: DNA fingerprinting P1: (it is used) to examine DNA from tissue samples of hair / saliva / blood / semen found at the scene of the crime then compare it to suspect's DNA</p> | <p>1 1</p> |

CHAPTER 5: CELL DIVISION

| NO. | MARKING SCHEME | MARK |
|----------------|---|------------|
| <p>1(a)(i)</p> | <p>Able to name the structures P, Q and R</p> <p><u>Sample answer</u> P – Centriole Q – Chromosome/ chromatid R – Centromer</p> | <p>1x3</p> |

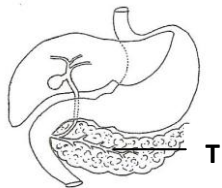
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| <p>(ii)</p> | <p>Able to name the stage of the dividing cell</p> <p><u>Sample answer</u> Metaphase I</p> | <p>1</p> |
| <p>(iii)</p> | <p>Able to give a reason</p> <p><u>Sample answer</u> Homologous chromosomes line up/ align at metaphase plate</p> | <p>1</p> |
| <p>(b)</p> | <p>Able to state one organ</p> <p><u>Sample answer</u> Ovary// testis</p> | <p>1</p> |
| <p>(c)</p> | <p>Able to complete the formation of Gamete S or Gamete T</p> <p>P1 – Number of chromosomes/ chromatid P2 – Chromosomes pair P3 – Structure (chromosome/ chromatid)</p> <p><u>Sample answer</u></p> <p>Gamete S</p>  <p style="text-align: center;">Or</p> <p>Gamete T</p>  | <p>1x3</p> |

| <p>(d)</p> | <p>Able to give differences between Prophase I and Prophase II</p> <p>Sample answer</p> <table border="1"> <thead> <tr> <th></th> <th>Prophase I</th> <th>Prophase II</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>There is no synapsis occurs</td> <td>Synapsis occurs between homologous chromosomes</td> </tr> <tr> <td>P2</td> <td>The chromosomes do not crossing over</td> <td>Crossing over occurs between homologous chromosomes</td> </tr> </tbody> </table> | | Prophase I | Prophase II | P1 | There is no synapsis occurs | Synapsis occurs between homologous chromosomes | P2 | The chromosomes do not crossing over | Crossing over occurs between homologous chromosomes | <p>1x2</p> |
|---------------|---|---|------------|-------------|----|-----------------------------|--|----|--------------------------------------|---|------------|
| | Prophase I | Prophase II | | | | | | | | | |
| P1 | There is no synapsis occurs | Synapsis occurs between homologous chromosomes | | | | | | | | | |
| P2 | The chromosomes do not crossing over | Crossing over occurs between homologous chromosomes | | | | | | | | | |
| <p>(e)</p> | <p>Able to explain the significant of maintaining the diploid number of chromosomes.</p> <p><u>Sample answer</u></p> <p>In order for the offspring to have the same chromosomal number of their parent</p> | <p>1</p> | | | | | | | | | |
| <p>2(a)</p> | <p>Able to name the cell division</p> <p><u>Sample answer</u></p> <p>Mitosis</p> | <p>1</p> | | | | | | | | | |
| <p>(b)(i)</p> | <p>Able to arrange the phase K, L, M and N correctly</p> <p><u>Sample answer</u></p> <p>L, N, K, M</p> <p><i>Note : L, N (1 mark)</i></p> <p><i>K, M (1 Mark)</i></p> | <p>1</p> <p>1</p> | | | | | | | | | |
| <p>(ii)</p> | <p>Able to describe the behavior for each stages</p> <p><u>Sample answer</u></p> <p>L : (early) anaphase</p> <p>N : Metaphase</p> <p>K : Sister chromatids separate and move towards the opposite poles</p> <p>M : Chromosome align at metaphase plate</p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> | | | | | | | | | |
| <p>(c)</p> | <p>Able to state the meaning of cloning</p> <p><u>Sample answer</u></p> <p>Cloning is the process to produce a new frog identical to its parent by mitosis</p> | <p>1</p> | | | | | | | | | |
| <p>(d)</p> | <p>Able to state the type of reproduction and give reason why</p> <p><u>Sample answer</u></p> <p>F : Asexual reproduction</p> <p>P : The production of offspring is not involving the process of fertilization</p> | <p>1</p> <p>1</p> | | | | | | | | | |
| <p>(e)(i)</p> | <p>Able to name the species of frog</p> <p><u>Sample answer</u></p> <p>Species Y</p> | <p>1</p> | | | | | | | | | |

| | | |
|--------|--|--------|
| (ii) | <p>Able to explain answer in (e)(i) <u>Sample answer</u> The nucleus of frog is obtained from species Y</p> | 1 |
| 3(a) | <p>Able to state the cell division occurred in plant cell and structure V <u>Sample answer</u> Plant cell Structure V: cell plate</p> | 1 1 |
| (b) | <p>Able to state the groove <u>Sample answer</u> Cleavage furrow</p> | 1 |
| (c) | <p>Able to state the important of mitosis in human <u>Sample answer</u> F1: to replace dead / damaged cells F2: for growth by increasing the number of cells F3: maintain the chromosomal number in offspring is identical to parents // genetic contents of offspring is identical to parents</p> | 1 |
| (d)(i) | <p>Able to draw the appearance of the chromosome after undergoes crossing over <u>Sample answer</u></p>  | 1 |
| (ii) | <p>Able to state one importance of process crossing over to an organism <u>Sample answer</u> Variation // Variety of organism // Organism with <u>different physical characteristics</u></p> | 1 |
| (e)(i) | <p>Able to explain the meaning of mutation <u>Sample answer</u> P1: (Permanent) change in the nucleotide sequence of DNA / in the amount of DNA P2: (occurs) spontaneously</p> | 2 |
| (ii) | <p>Able to name the process and state a factor that causes it <u>Sample answer</u> Process : Deletion Factor F1: Rays: X-rays / gamma rays / UV rays / nuclear radiation / radioactive rays</p> | 2 |

| | | |
|-------|---|---|
| | F2: Chemical: benzene / formaldehyde / carbon tetrachloride / asbestos / mustard gas / tar / pesticides Process and any one F | |
| (iii) | Able to state two ways to prevent from being exposed to factor stated in (e) (ii) <u>Sample answer</u> 1. Prevent from exposure to radioactive rays // use sunblock 2. Prevent from taking in food containing flavor/coloring / additive / preservative | 2 |

CHAPTER 6: NUTRITION

| NO. | MARKING SCHEME | MARK |
|---------|--|-------------|
| 1(a)(i) | Able to label the organ that involve in digestive system and endocrine system correctly.  | 1 |
| (a)(ii) | Able to state the function of the organ correctly. <u>Sample answer</u> In digestive system: secretes enzyme lipase, amylase and trypsin In endocrine system: secretes insulin and glucagons | 1 1 |
| (b) | Able to predict what will happen to a person if organ T fails to function correctly. <u>Sample answer</u> P1 – digestion of lipid/ starch/ protein is disturbed P2 - risk to have diabetes mellitus P3 – (because) excess glucose cannot be converted into glycogen | 1 1 1 |
| (c)(i) | Able to name the hormone that involves in osmoregulation correctly Antidiuretic hormone (ADH) | 1 |
| (c)(ii) | Able to state the function of the hormone in 5(c)(i) correctly. <u>Sample answer</u> Increase the permeability of uriniferus tubule to water | 1 |

| | | |
|------|--|---|
| | <p>P1 – Excess of lipids P2 – Excess of proteins P3 - Excess of carbohydrates P4 – Fibers P5 – Vitamins</p> <p style="text-align: right;">(any 4P)</p> <p>Able to justify the preparation food methods toward Ali’s health correctly.</p> <p><u>Sample answer:</u> F2: Good / not good preparation food methods</p> <p>P6 – Fruits and vegetables should not be cooked because vitamins B, C soluble in water // vitamins A, D , E and K soluble in oil P7 – Grill prevent from more oil added into the food P8 – Fry the food is not good because more oil added into the food</p> <p>(any 2P)</p> <p>Evaluation skill: Able to state F1 and F2 correctly Able to state any one of P1 – P4 and any one of P5 – P7 correctly</p> | <p style="text-align: center;">4</p> <p style="text-align: center;">4</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> |
| 4(a) | <p>Able to explain how the structure of a leaf being adapted to maximize the rate of photosynthesis</p> <p><u>Sample answer:</u> A 1 : Lamina of the leaf flat and thin P1 : Large surface area for maximum absorption of sunlight // Thin leaf allow light to penetrate and reach the cell A2 : Position of the leaf is positioned at a right angle to rays of sunlight A3 : Arrangement of the leaf mosaic pattern A4 : Palisade mesophyll cell closely packed/ Contain the greatest number of chloroplasts P2 / P3 / P4 : To absorb maximum sunlight</p> <p>A5 : Upper epidermis no nucleus / translucent P5 : Allow sunlight to pass through easily A6 : Spongy mesophyll cell loosely arranged with large air spaces between the cell P6 : provides large air pockets to facilitate the diffusion of carbon dioxide and oxygen A7 : Many stoma P7 : Allow the exchange of gases between the cell in the leaf and the atmosphere</p> <p>(any 6 corresponding A + P)</p> | <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> |

| | | |
|---------|---|--|
| 5 | <p>Able to explain the changes of concentration of carbon dioxide occurs <u>Sample answer:</u> F1 : At night , percentage CO₂ is high / increases P1 : Low / decreases of light intensity leads to photosynthesis does not occur P2 : CO₂ does not absorb from environment P3 : CO₂ releases to environment as the product of plants' respiration (F1 and any 1 P) F2 : At morning , percentage CO₂ is reducing P4 : Photosynthesis happen at the low rate early in the morning because of the extremity low light P5 : Some CO₂ produced from the respiration process which was being used in the photosynthesis process / carbon dioxide was less released to the environment P6 : When the extremity light increase, the photosynthesis rate increased until the photosynthesis was more that the respiration rate P7 : CO₂ will be absorbed from environment caused the reducing of percentage (F2 and any 3 P) F3 : At noon, percentage CO₂ is very low P8 : The extremity of light raise higher and photosynthesis rate at maximum level P9 : The absorption of CO₂ from environment is very high which caused very low percent (F3 and any 1 P)</p> | <p>1 1 1 1 1 1 1 1 1 1 1 1 1 1</p> |
| 6(a)(i) | <p>Able to explain how fried food P / banana is digested in digestive system. <u>Sample answer</u> P1 : Fried banana / food P is rich in carbohydrates / starch and fats P2: In the mouth salivary amylase hydrolysed the (pieces of) carbohydrates / starch into maltose P3 : The food is pushed down the esophagus through peristalsis (In stomach , food P is not hydrolysed) P4: (In duodenum) fats is hydrolysed / break down / digest to fatty acids and glycerol by lipase P5 : Fats +water $\xrightarrow{\text{Lipase}}$ Fatty acids + Glycerol P6 : in alkaline medium</p> | |

| | | |
|--|--|---|
| | <p>P7 : (In ileum) fats is hydrolyzed / break down by lipase into fatty acids and glycerol</p> <p>P8 : Maltose is hydrolysed into glucose // Sucrose is hydrolysed by sucrase to glucose and fructose // Lactose is hydrolysed by lactase to glucose and galactose</p> <p>P9 : Banana contain a lot of fiber that stimulate peristalsis.</p> <p>P10 : Fibre can prevent constipation.</p> | 6 |
| | <p style="text-align: right;">Any 6</p> <p>(ii) Able to explain how organ R / liver helps in the assimilation of glucose and amino acids.</p> <p><u>Sample answer</u></p> <p><u>Glucose</u></p> <p>P1 : Glucose is used (by cells) to produced energy / carry out (cellular) respiration.</p> <p>P2 : Excess of glucose in the blood is converted to glycogen and stored // excess glucose is stored as glycogen.</p> <p>P3 : When glucose level in the blood is low the glycogen is converted into glucose.</p> <p>P4 : Excess of glycogen is converted into lipids.</p> <p><u>Amino acid</u></p> <p>P5 : Synthesis of plasma protein / enzymes / any suitable protein molecule from amino acids.</p> <p>P6 : Excess amino acids are converted / deaminated into urea (to be excreted)</p> | 4 |
| | <p>(b) Able to discuss the good eating habits.</p> <p><u>Sample answer</u></p> <p>P1 : Good eating habits mean taking food in the correct quantity / proportion at the correct time.</p> <p>P2 : Improper eating habits can lead health problems such as obesity / diabetes mellitus / anorexia nervosa / and bulimia</p> <p>P3 : Always eat a balanced diet that include all / seven / the different classes of food / protein, carbohydrate, fat, vitamins, minerals, water and fibre (follow food pyramid).</p> <p>P4 : Take proper meals a regular times of the day // take in three meals a day(breakfast, lunch and dinner).</p> <p>P5 : Check the food labels for information regarding the nutrient Contents / the total calories of the food.</p> <p>P6 : Avoid consuming unhealthy food / junk foods, salty snack foods, because junk food includes food that is high in</p> | |

| | | |
|------|---|---|
| | <p>salt / sugar / fat but low in nutritional value.</p> <p>P7 : Avoid taking excessive fatty food and food rich in sugar.</p> <p>P8 : Avoid under eating, it cause tiredness, malnourishment.</p> <p>P9 : Sufficient amount of fiber from fruits and vegetables.</p> <p>P10 : Take time to chew the food to avoid indigestion</p> <p>P11 : Avoid smoking, drinking too much alcohol and coffee.</p> <p>P12 : We should refrain from overeating or eating too little during a meal.</p> <p>P13 : Drinking at least 2 to 3 liters of water a day.</p> | 10 |
| 7(i) | <p>Able to state the meaning of photosynthesis based on the schematic diagram in diagram 7.2.</p> <p><u>Sample answer</u></p> <p>F1 : (Photosynthesis is the) process whereby a green plant synthesizes glucose from carbon dioxide and water</p> <p>F2: in the presence of chlorophyll and sunlight.</p> | 1 1 |
| (ii) | <p>Able to describe how a green plant produces starch molecules.</p> <p><u>Sample answer</u></p> <p>P1 : Chlorophyll absorbs light energy to produce ATP/ electrons.</p> <p>P2 : Photolysis of water releases hydrogen ions and hydroxyl ions.</p> <p>P3 : The hydrogen ion combine with electrons to form hydrogen.</p> <p>P4 : The hydrogen / ATP will be used in the dark reaction.</p> <p>P5 : It occurs in the grana.</p> <p>P6 : Carbon dioxide combines with hydrogen to form glucose and water.</p> <p>P7 : Glucose undergoes condensation and is converted to starch for storage.</p> <p>P8 : It occur in a series of chemical reactions which require ATP.</p> <p>P9 : The reaction occurs in the stroma.</p> <p style="text-align: right;">(Any eight)</p> | 1 1 1 1 1 1 1 1 1 |

CHAPTER 7: RESPIRATION

| NO. | MARKING SCHEME | MARK |
|-----------|---|------|
| 1 (a) (i) | <p>Able to name the respiratory organs of organism X and organism Y</p> <p><u>Sample answer</u></p> <p>Organism X: Trachea</p> <p>Organism Y: Gill</p> | 1x2 |

| | | |
|---|--|--|
| <p>(ii)</p> <p>(iii)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p> | <p>Able to state the function of structure P and Q</p> <p><u>Sample answer</u> P – Speed up the movement of gases to and from the insect’s Tissue Q – Maximize the surface area for gaseous exchange</p> <p>Able to state the main difference between the transportation of respiratory gaseous in organism X and organism Y</p> <p><u>Sample answer</u> The transportation of respiratory gaseous in organism X do not involve circulatory system while in organism Y involve circulatory system</p> <p>Able to name the mechanism</p> <p><u>Sample answer</u> Countercurrent exchange mechanism</p> <p>Able to state two characteristics shown by the respiratory surfaces of animals</p> <p><u>Sample answer</u> P1 – the respiratory surface is moist P2 – cells lining the respiratory structure are thin P3 – the respiratory structure has a large surface area</p> <p>Able to give two reasons</p> <p><u>Sample answer</u></p> <p>P1 – human have structure such as diaphragm and intercostals muscles to help in breathing mechanism while fish do not have. P2 – Human heart more muscular and efficient in pumping blood throughout the body compare to fish P3 – The total surface area of lungs is much larger than the total surface area of the lamellae</p> <p style="text-align: right;"><i>(Any two)</i></p> | <p>1x2</p> <p>1</p> <p>1</p> <p>1 X 2</p> <p>1 X 3</p> |
| <p>2. (a)</p> | <p>Able to explain the regulatory mechanism of oxygen and carbon dioxide contents :</p> <p>i. During vigorous activity :</p> <ul style="list-style-type: none"> • The partial pressure of carbon dioxide increase as a result of active cellular respiration • Because carbon dioxide reacts with water to form carbonic acid // equation • Higher carbon dioxide concentration level in blood results in a drop in pH value of blood and cerebrospinal fluid • The drop in pH is detected by central chemoreceptor | <p>1 X 8</p> |

| | <p>(in medulla oblongata)</p> <ul style="list-style-type: none"> • Send impulse to respiratory centre • The respiratory muscles contract and relax more / faster • Breathing and ventilation rate increase • As excess carbon dioxide is eliminated , concentration and pH value of blood return to normal level <p>ii. At high altitude :</p> <ul style="list-style-type: none"> • Decrease concentration of oxygen • Peripheral chemoreceptor / aortic bodies and carotid bodies stimulated • Send impulse to respiratory centre • Heartbeat rate increase • Breathing rate and ventilation increase • More oxygen is inhaled and the oxygen concentration return to normal level <p>(b) Able to name the two process shown in figures :</p> <ul style="list-style-type: none"> • Respiration • Photosynthesis <p>Able to state the comparison between respiration and photosynthesis :</p> <table border="1"> <thead> <tr> <th>Respiration</th> <th>Item</th> <th>Photosynthesis</th> </tr> </thead> <tbody> <tr> <td>All living organisms</td> <td>Organisms involve</td> <td>Only in green plants //photosynthetic bacteria</td> </tr> <tr> <td>Occurs during day and night</td> <td>When it occurs</td> <td>Occurs only on day time // at certain light intensity</td> </tr> <tr> <td>As a catabolism process // metabolism process that break down of molecules to smaller ones.</td> <td>Process</td> <td>As an anabolism process // synthesis of complex molecules from simpler molecules.</td> </tr> <tr> <td>Glucose and oxygen are used while the carbon dioxide and water are released</td> <td>Reaction</td> <td>Carbon dioxide and water are used while oxygen and glucose are released</td> </tr> <tr> <td>Chemical energy is converted to chemical energy/ ATP and heat energy</td> <td>Exchange of energy</td> <td>Light energy is converted to chemical energy</td> </tr> <tr> <td>Energy, water and carbon dioxide</td> <td>Products</td> <td>Glucose and oxygen</td> </tr> <tr> <td>Mitochondrion</td> <td>Organelle Involved</td> <td>Chloroplast</td> </tr> </tbody> </table> | Respiration | Item | Photosynthesis | All living organisms | Organisms involve | Only in green plants //photosynthetic bacteria | Occurs during day and night | When it occurs | Occurs only on day time // at certain light intensity | As a catabolism process // metabolism process that break down of molecules to smaller ones. | Process | As an anabolism process // synthesis of complex molecules from simpler molecules. | Glucose and oxygen are used while the carbon dioxide and water are released | Reaction | Carbon dioxide and water are used while oxygen and glucose are released | Chemical energy is converted to chemical energy/ ATP and heat energy | Exchange of energy | Light energy is converted to chemical energy | Energy, water and carbon dioxide | Products | Glucose and oxygen | Mitochondrion | Organelle Involved | Chloroplast | <p>1 X 6</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> |
|---|---|---|------|----------------|----------------------|-------------------|--|-----------------------------|----------------|---|---|---------|---|---|----------|---|--|--------------------|--|----------------------------------|----------|--------------------|---------------|--------------------|-------------|--|
| Respiration | Item | Photosynthesis | | | | | | | | | | | | | | | | | | | | | | | | |
| All living organisms | Organisms involve | Only in green plants //photosynthetic bacteria | | | | | | | | | | | | | | | | | | | | | | | | |
| Occurs during day and night | When it occurs | Occurs only on day time // at certain light intensity | | | | | | | | | | | | | | | | | | | | | | | | |
| As a catabolism process // metabolism process that break down of molecules to smaller ones. | Process | As an anabolism process // synthesis of complex molecules from simpler molecules. | | | | | | | | | | | | | | | | | | | | | | | | |
| Glucose and oxygen are used while the carbon dioxide and water are released | Reaction | Carbon dioxide and water are used while oxygen and glucose are released | | | | | | | | | | | | | | | | | | | | | | | | |
| Chemical energy is converted to chemical energy/ ATP and heat energy | Exchange of energy | Light energy is converted to chemical energy | | | | | | | | | | | | | | | | | | | | | | | | |
| Energy, water and carbon dioxide | Products | Glucose and oxygen | | | | | | | | | | | | | | | | | | | | | | | | |
| Mitochondrion | Organelle Involved | Chloroplast | | | | | | | | | | | | | | | | | | | | | | | | |

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| | $\begin{array}{c} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow \\ 6\text{CO}_2 + 6\text{H}_2\text{O} + \\ \text{energy} \end{array}$ | Chemical equation | $\begin{array}{c} 6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \\ \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \end{array}$ | 1 |
| | <p>*[R and P are dependent]</p> <p>Analyse Skill : Able to state 5 the differences between respiration and photosynthesis correctly.</p> | | | 1 |
| 3(a)(i) | <p>Able to name one respiratory structure in fish and amphibian.</p> <p><u>Sample answer</u></p> <p>P1 : Filaments</p> <p>P2 : Skin</p> <p>P3 : Alveolus</p> <p>(P1 and P2/P3)</p> | | | 1 1 1 |
| (ii) | <p>Able to describe the characteristics of the respiratory structure of human that enable gaseous exchange to be carried out efficiently</p> <p><u>Sample answer:</u></p> <p>P1: The ratio total surface area per volume (TSA/V) is high for the exchange of gases</p> <p>P2: The cells lining the respiratory surface is a single layer of cell which is very thin to allow gases to diffuse easily</p> <p>P3 : The respiratory surface is constantly moist to allow gases to dissolve in water before diffusing in and out of the respiratory surface</p> <p>P4 : The respiratory surface is covered with a dense network of blood capillaries to allow rapid diffusion and transport of gases</p> | | | 1 1 1 1 |
| (iii) | <p>Able to explain how gaseous exchange occurs in the alveoli and blood capillaries</p> <p><u>Sample answer:</u></p> <p>P1: Gas exchange is driven by diffusion // Diffusion of a gas depends on differences in partial pressure between the two regions</p> <p>P2: The molecules move down a concentration gradient.</p> <p>P3: Oxygen moves from the alveoli which is high oxygen concentration</p> <p>P4: to the blood which has lower oxygen concentration</p> <p>P5: due to the continuous consumption of oxygen in the body.</p> <p>P6: Conversely, carbon dioxide is produced by metabolism</p> <p>P7: has a higher concentration in the blood than in the air of alveoli</p> <p>P8: carbon dioxide diffuses out of the blood capillaries into the alveoli</p> <p>P9: Oxygen in the lungs first diffuses through the alveolar wall and dissolves in the blood plasma.</p> <p>P10: then diffuse into red blood cells</p> <p style="text-align: right;">(any 8 P)</p> | | | 1 1 1 1 1 1 1 1 1 1 |

CHAPTER 8: DYNAMIC ECOSYSTEM

| NO. | MARKING SCHEME | MARK |
|-----------|--|------|
| 1 (a) (i) | <p>Able to name the process P</p> <p><u>Sample answer</u> Nitrogen fixation</p> | 1 |
| (ii) | <p>Able to name the compound X</p> <p><u>Sample answer</u> Nitrates</p> | 1 |
| (iii) | <p>Able to state two ways how reservoir of nitrogen ion in atmosphere are changed into X</p> <p><u>Sample answer</u> P1 – Nitrogen fixing bacteria will assimilate the nitrogen ion into X // through nitrogen fixation by nitrogen fixing bacteria P2 – During lighting</p> | 1x2 |
| (b) | <p>Able what will happen to compound X when it was absorbed by plants roots</p> <p><u>Sample answer</u> P1 – it will used to synthesis protein in the tissues P2 – to form (organic) nitrogen compound in plants</p> | 1x2 |
| (c) (i) | <p>Able to name the microorganism</p> <p><u>Sample answer</u> Denitrifying bacteria</p> | 1 |
| (ii) | <p>Able to explain how proteins in animals can be change into compound X</p> <p><u>Sample answer</u> P1 – during decomposition, decomposers break down the proteins compound (in dead animals/ animals waste) P2 – to form ammonium/ ammonia P3 – ammonium/ ammonia will be converted into nitrites by nitrifying bacteria/ <i>Nitrosomonas sp.</i> P4 – Nitrites are converted into compound X/ nitrates by nitrifying bacteria/ <i>Nitrobacter sp.</i></p> <p style="text-align: right;"><i>(Any three)</i></p> | 1x3 |

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| (d) | <p>Able to state a decomposer.</p> <p>Able to give its function in maintaining the ecosystem</p> <p><u>Sample answer</u> F1 – Saprophytic bacteria// saprophytic fungi P1 – Break down organic matter/ dead animals/ animals waste into simple molecules. P2 – return the nutrients (contained within the remain of organic matter) to the atmosphere/ soil/ water</p> | 1x3 |
| 2(a)(i) | <p>Able to name the kingdom of the organism</p> <p><u>Sample answer</u> Fungi</p> | 1 |
| (ii) | <p>Able to state the type of interaction represented in Diagram 3.1</p> <p><u>Sample answer</u> Saprophytism</p> | 1 |
| (iii) | <p>Able to give the definition of the interaction given in 3(a) (ii)</p> <p><u>Sample answer</u> Interaction which organisms that obtain food from dead and decaying matter.</p> | 1 |
| (b)(i) | <p>Able to name the type competition that is involved.</p> <p><u>Sample answer</u> Interspecific competition</p> | 1 |
| (ii) | <p>Able to state one of resources that are competed between the paramecium.</p> <p><u>Sample answer</u> Food/ mates/ shelter</p> | 1 |
| (iii) | <p>Able to describe graph (b).</p> <p><u>Sample answer</u> P1 – Both Paramecium share same sources/ food supply P2 – <i>Paramecium aurelia</i> reproduced faster// <i>Paramecium caudatum</i> enable to compete with <i>Paramecium aurelia</i> P3 – the population of <i>Paramecium caudatum</i> decrease</p> <p style="text-align: right;">(Any 2 P)</p> | 1 1 1 |
| (c)(i) | <p>Able to state <u>two</u> ways how diseases can be transmitted.</p> <p><u>Sample answer</u> 1. vectors 2. air 3. water 4. contact with infected person</p> <p style="text-align: right;">(Any 2)</p> | 1 1 1 1 |

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| (ii) | <p>Able to explain one method of controlling pathogens.</p> <p><u>Sample answer</u></p> <p>F1 – antibiotic P1 – inhibit the growth or kill other microorganism</p> <p>F2 – vaccines (injection) P2 – induce the production of antibodies</p> <p>F3 – antiseptics P3 – inhibit the growth of microorganisms</p> <p>F4 – disinfectants P4 – to kill microorganisms on floor, building or furniture// sterilize surgical equipment.</p> <p style="text-align: right;"><i>(Any equivalent F and P)</i></p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> |
| 3(a)(i) | <p>F: Able to state the type of interaction between organism correctly</p> <p>P: Able to explain how fungi obtain nutrient and convert it into energy form correctly.</p> <p><u>Sample answer:</u></p> <p>F - Saprophytism</p> <p>P1 - Mycelium secrete enzyme P2 - Enzyme digest carbohydrate in the bread P3 – Hyphae absorb nutrient P4 – Oxidation of glucose to produce energy// Glucose is oxidation to produce energy</p> <p style="text-align: right;"><i>(any 3P)</i></p> | <p>1</p> <p>3</p> |
| (ii) | <p>Able to state the importance of microorganisms</p> <p>Explanation</p> <p><u>Sample answer:</u></p> <p>F1 – A group of bacteria involved in Nitrogen Cycle P1 - Allows atmospheric nitrogen to be utilized and returned to the environment</p> <p>F2 – Saprophytic bacteria and fungi as decomposers P2 - Reduces pollution by preventing accumulation of the remains of decaying organisms</p> <p>F3 – Symbiotic bacteria in the colon of human digestive system P3 – To synthesise B12 / Vitamin K // Important in blood clotting / production of red blood cell</p> <p>F4 – Fermentation of yeast P4 – Wine / bread / cake production</p> <p>F5 – Culture certain species of bacteria P5 – Bioplastic</p> <p>F6 – Anaerobic fermentation of yeast on organic waste</p> | |

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| | <p>P2 – Waterlogged conditions of the soil decrease the amount of oxygen</p> <p>P3 – Direct exposure to the sun // high rate of transpiration</p> <p>P4 – The surrounding water in the soil hypertonic as compared to the cell sap of the root cells.</p> <p>P5 – Seeds which fall onto the ground die because they are submerged in the soft and waterlogged soil</p> | <p>A3 – Avicennia sp has breathing root // pneumatophores A4 – Pores called lenticels [any one]</p> <p>A5 – A thick layer of cuticle covers the leaves A6 – The leaves are thick and succulent [any one]</p> <p>A7 – The cell sap of the roots cells has a higher osmotic pressure than the soil water that surrounds them A8 – Have pores on the leaves // hydathodes [any one]</p> <p>A9 – Seeds have vivipary characteristic</p> | <p>F3 – Allow gaseous exchange to take place.</p> <p>F4 – Reduce transpiration F5 – To store water [any one]</p> <p>F6 – To ensure that the roots do not lose water by osmosis F7 – Excrete the excess salt [any one]</p> <p>F8 – Able to germinate while still attached to the mother plants F9 – Can float horizontally on the water [any one]</p> | | |
| | | Max : 4 | Max : 4 | | |
| | Analyze Skill | : Able to state at least 3 problems correctly | | | 1 |
| | Synthesis Skill | : Able to state at least 3 adaptations and 3 functions | | | 1 |
| 5(a) | <p>Able to explain the factors which affected the rate of photosynthesis in the green house</p> <p><u>Sample answer:</u></p> <p>F1 : Temperature is maintained at optimum temperature // 25°C – 30 °C</p> <p>P1 : Dark reaction is catalyzed by enzyme that sensitive to temperature // Optimum temperature leads to maximum photosynthesis rate</p> <p>F2 : If the light from sun is low, the light intensity is controlled optimally with the alternative light sources</p> <p>P2 : The rate photosynthesis increasing when the light intensity increasing if the concentration of CO₂ increasing</p> <p>F3 : CO₂ is not a limiting factor because it is supplied accordingly to other</p> | | | | 1 1 1 1 1 |

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| | <p>factors</p> <p>P3 : Leads to the increases of rate of photosynthesis to maximum, if the light intensity increases</p> <p>F4 : Has automatic sprinker system to supply enough water</p> <p>P4 : Water needed in light reaction/ water photolysis</p> <p style="text-align: right;"><i>(any 3 corresponding F + P)</i></p> | <p>1</p> <p>1</p> <p>1</p> |
| 6(a)(i) | <p>Able to explain how the interaction between the two organisms control each other population.</p> <p><u>Sample answer</u></p> <p>F1 : Prey-predator interaction.</p> <p>F2 : When the population of a predator (wolf) is high, the population of its prey (rabbit) decreases.</p> <p>E1 : because the prey is eaten by the predator.</p> <p>F3 : When the population of the prey falls, there is insufficient food for the predator.</p> <p>E2 : results in a decline / decrease of the predator population.</p> <p>F4 : When the population of predator is low, the prey recovers and its population increases</p> <p>E3 : result in an increase in the population of the predator (have enough food)</p> <p style="text-align: right;"><i>(Any 6)</i></p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> |
| (ii) | <p>Able to explain how the population of rats can be controlled. Able to explain the differences between the two methods.</p> <p><u>Sample answer</u></p> <p>F : (The method is) Biological control method.</p> <p>P1 : The use of pesticides will kill the pests.</p> <p>P2 : The pesticide will accumulate in other organism in the food Chain.</p> <p>P3 : Will cause mutation.</p> <p>P4 : The mutant organisms / pest develop resistance to the pesticides.</p> <p>P5 : The biological control method uses predators to kill only their specific preys / pests.</p> <p>P6 : It will cause imbalance population of other organisms in the food chain.</p> <p style="text-align: right;"><i>(Any 4)</i></p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> |

CHAPTER 9: ENDANGER ECOSYSTEM

| NO. | MARKING SCHEME | MARK |
|---------|---|------------------|
| 1(a)(i) | <p>Able to name the phenomenon that occurs as a result of the reaction in Diagram 3 correctly.</p> <p><u>Sample answer</u> Ozone depletion</p> | 1 |
| (a)(ii) | <p>Able to state main chemical substances that can cause the phenomenon correctly.</p> <p><u>Sample answer</u> Chlorofluorocarbon (CFC)</p> | 1 |
| (b) | <p>Able to give two harmful effects of the phenomenon on humans correctly.</p> <p><u>Sample answer</u> P1 – skin cancer/ melanoma P2 – eye damage/ cataract P3 – lowering of body’s immunity system</p> <p style="text-align: right;">(any 2P)</p> | 1 1 1 |
| (c) | <p>Able to explain how the phenomenon occurs.</p> <p><u>Sample answer</u> P1 – UV radiations break off a chlorine atom from a molecule of CFC P2 – chlorine atom attacks/ attach to an ozone molecule/ O₃ and breaks it apart P3 – chlorine monoxide molecule reacts with an oxygen atom to form a chlorine molecule and oxygen molecule P4 - chlorine atom released is free to attacks and destroy more ozone molecules</p> <p style="text-align: right;">(any 3P)</p> | 1 1 1 1 |
| (d) | <p>Able to state the affects of the phenomenon to ecosystem correctly.</p> <p><u>Sample answer</u> P1 – cause plants/ producers die/ reduce P2 – food chains will be disturbed P3 – less oxygen is produced, more carbon dioxide is released/ carbon cycle disturbed P4 – imbalanced ecosystem</p> <p style="text-align: right;">(any 3P)</p> | 1 1 1 1 |

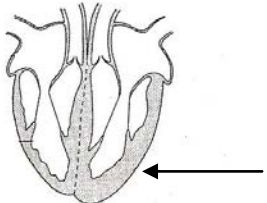
| | | |
|------|---|--|
| (e) | <p>Able to give two suggestions how the phenomenon can be reduced correctly.</p> <p><u>Sample answer</u> P1 – replace the use of chlorofluorocarbon (CFC) with hydrochloroflourocarbon (HCFC) P2 – reduce/ stop using the CFC base products</p> | <p>1 1</p> |
| 2 | <p>Able to explain the observation :</p> <p>F1 – Sewage disposal contains of nitrate and phosphate F2 - Enhance the growth and reproduction of algae F3 - Algae are producers F4 - Aquatic organisms get enough food F5 - Enrich reproduction and growth of aquatic organisms as consumers F6 - The more untreated sewage increase, the more growth of algae rapidly F7 - Algal bloom F8 - Algae will cover the surface of pond F9 - The density of the algae may be so high that light intensity in the water is greatly reduced. F10 - The death of plants and algae and the subsequent decomposition of these organisms by bacteria lead to F11 - A severe Depletion of oxygen in the water F12 - Causing the death of aerobic organisms.</p> <p style="text-align: right;"><i>Any 10</i></p> | <p>1 1 1 1 1 1 1 1 1 1 1 1 1</p> |
| 3(a) | <p>Able to state two conditions and describe the effect of human activities to the ecosystem</p> <p>C1 – air pollution F1 – carbon monoxide (gas) from incomplete combustion of fossil fuels / exhausts of vehicles/factories F2 – sulphur dioxide from volcanic gases/large industries boilers F3 – oxides of nitrogen //nitrogen monoxide//nitrogen dioxide from the action of bacteria on fertilizers F4 – fine particle matter/smoke/haze from open burning/burning/quarries/sawmills/asbestos from factories F5 – carbon dioxide from open burning / combustion of fossil fuels F6 – lead from vehicle exhaust fumes</p> <p>P1 – causes fatigue and headache // can be fatal P2 – cause irritates the eyes /bronchitis/shortness of breath & coughing/asmatic attacks// damages respiratory passages//form acid rain P3 – causes irritate lungs, nose and throat/respiratory infections/form acid rain P4 – haze causes conjunctivitis/sore throats/influenza/asthma and lead to bronchitis P5 – dust can cause lung diseases // haze and smoke reduce visibility/light intensity</p> | <p>1 1 1 1 1 1 1 1 1 1 1 1 1</p> |

| | | |
|--------|---|---|
| | P6 – dust/soot from smoke deposit on leaves will prevent gaseous exchange | 1 |
| | P7- lower the rate of photosynthesis so lacking of oxygen in atmosphere // reduce the crop yields | 1 |
| | P8 – leads to greenhouse effect / global warming | 1 |
| | P9 – increase the atmospheric temperature | 1 |
| | P10 – climatic change | 1 |
| | P11 – causes retard mental development / damages the liver /coma/death | 1 |
| | C2 – water pollution | 1 |
| | F7 – agricultural runoffs/waste/nitrates/phosphates | 1 |
| | F8 – herbicide/pesticide residues | 1 |
| | F9 – domestic waste/faeces/detergent and food waste/animal waste | 1 |
| | F10 – effluent from industries // heavy metals // leads | 1 |
| | P12 – lead to eutrophication | 1 |
| | P13 – alga bloom //excessive growth of alga//increase BOD | 1 |
| | P14 – toxic to aquatic organisms // death to aquatic organism | 1 |
| | P15 – reduced light penetration/intensity | 1 |
| | P16 – cause water-borne diseases/cholera | 1 |
| | P17 – disturb food chains/food webs | 1 |
| | P18 – mercury cause nervous disorders in humans | 1 |
| | P19 – impair the mental ability of children | 1 |
| | C1 with any 2F and 2P = 1+2+2 | |
| | C2 with any 2F and 2P=1+2+2 | |
| (b)(i) | Able to explain the thinning of ozone layer the its effect on living things | |
| | F1 – increasing levels of CFC | 1 |
| | P1 - CFC is used as coolants/in refrigerator of air conditioner// as propellant in aerosol// as foaming agents/in making of Styrofoam packaging | 1 |
| | P2 – UV strikes the CFC molecule and causes a chlorine to break away | 1 |
| | P3 – chlorine atom collides with ozone molecule and combine with an oxygen (atom) | 1 |
| | P4 - form chlorine monoxide and leaves oxygen molecule | 1 |
| | P5 – free atom oxygen collides with chlorine monoxide to form oxygen molecule | 1 |
| | P6 - so chlorine atom is released and can destroy more ozone molecule | 1 |
| | E1- Skin cancer/ melanoma/cataracts/sunburns/weakened immune system to humans | 1 |
| | E2 – reduces nutrient content in plants/ crop yields of plants | 1 |
| | E3 – leaf cells/chlorophyll are damaged reduced the rate of photosynthesis | 1 |
| | E4 – kill phytoplankton so decrease the protein source in marine | 1 |
| | E5 – leads to increase in temperature on earth | 1 |
| | F1 with any 4P = 5 marks | |
| | Any 3E = 3marks | |

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|------|--|--|
| (ii) | <p>Able to state and describe two suggestions to overcome the depletion of ozone layer</p> <p>F1 – reduce/ stop the use of CFC F2 – replace CFC with HCFC and HFC F3 – strict law / any relevant answer</p> <p style="text-align: right;">Any 2F</p> | <p>1 1 1</p> |
| 4 | <p>Able to describe the effect of activities to the aquatic organisms in the river.</p> <p><u>Sample answer</u></p> <p>P1 : Condition of the river is the result of eutrophication. P2 : Caused by nitrates from the factories leach into the river. P3 : (Caused by) leaching of nitrates / phosphates from palm oil estate. P4 : Excess nutrients encourages the rapid growth of algae / algae bloom. P5 : Algae covered the surface of the river. P6 : Prevent the penetration of light into water P7 : causes the rate of photosynthesis in aquatic plants reduced P8 : Water pollution caused by sewage / domestic waste / human faeces / gabbage from rubbish dumps from residential area P9 : River contains a lot of organic matter P10 : The decaying organic matter is broken down by decomposing microorganism / aerobic bacteria P11 : Increasing in the BOD results in a depletion of oxygen // reduction in the amount of dissolve oxygen in the river P12 : Imbalance to the aquatic food web P13 : (The low level of oxygen dissolve) kills aquatic organism like freshwater shrimps / mayfly nymphs</p> <p style="text-align: right;">Any 10</p> | <p>1 1 1 1 1 1 1 1 1 1 1 1 1</p> |

FORM 5

CHAPTER 1: TRANSPORT

| NO. | MARKING SCHEME | MARK |
|--------|--|------|
| 1(a) | <p>Able to complete the heart structure correctly.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">Left ventricle wall MUST thicker than the right one</p> </div> | 1 |
| (b)(i) | <p>Able to name the type of muscle that build heart correctly.</p> <p><u>Sample answer</u></p> | |

| | | |
|----------|--|-------------|
| | Cardiac muscle | 1 |
| (b)(ii) | Able to give the meaning of myogenic correctly. <u>Sample answer</u> Muscles that contracts and relaxes without the need to receive impulses from the nervous system | 1 |
| (c) | Able to state how cardiovascular disease can be prevented correctly. <u>Sample answer</u> P1 – do regular exercises P2 – eat food that lack of lipids/ cholesterols P3 – do not smoking | 1 1 1 |
| | (any 2P) | |
| (d)(i) | Able to label structure P and Q correctly. P – umbilical arteries Q – umbilical veins | 1 1 |
| (d)(ii) | Able to state the difference between P and Q correctly. <u>Sample answer</u> P carries deoxygenate blood while Q carries oxygenated blood | 1 |
| (d)(iii) | Able to explain the advantages of foetus having a separate circulatory from maternal circulatory system correctly. <u>Sample answer</u> P1 – permits exchange of gases, food and waste products (between foetus and the mother) without mixing blood P2 – prevents the action of maternal and other chemicals which could harm the foetal development | 1 1 |
| (e) | Able to discuss how placenta acts as endocrine gland correctly. <u>Sample answer</u> P1 – placenta secretes oestrogen and progesterone P2 – helps maintain a thickened, blood enriched endometrium during pregnancy | 1 1 |
| 2(c)(i) | Able to name the part labeled P <u>Sample answer</u> Fat deposited / plaque | 1 |
| (ii) | Able to explain how P is formed <u>Sample answer</u> P1 : Deposition of cholesterol / fats / clumping blood platelet | 1 |

| | | |
|---------|--|------------------------|
| | <p>P2 : Formation of thrombus P3 : Beneath the artery P4 : Causing the narrowing of lumen</p> | <p>1 1 1</p> |
| 3(a)(i) | <p>Able to state the meaning of antigen and antibody correctly</p> <p><u>Sample answer :</u> Antigen is molecules that produced by microorganisms that initiate antibody production.</p> <p>Antibody is proteins that produced by immune system cells that bind to foreign molecules/microorganism</p> <p>Able to explain the mechanism used by antibody to protect our body against disease correctly</p> <p>P1 – Antibody binds to the specific antigen binding site P2 – Hence, inactivates antigen by several ways P3 – Neutralisation / Lysis / Agglutination / Opsonisation</p> <p>(any 2P)</p> | <p>1 1 2</p> |
| (a)(ii) | <p>F: Able to state the immunity correctly P: Able to explain why the baby has been diagnosed with Hepatitis B.</p> <p><u>Sample answer :</u> F1 – Artificially acquired active immunity</p> <p>P1 – Vaccination/ vaccine injection P2 – it will activate the body to produce antibodies P3 – Result in the production of a low level of antibodies concentration P4 – (but) the dose does not sufficient to protect against the disease P5 – second booster dose is necessary P6 – to increase antibody production over a level of immunity</p> <p>(any 5P)</p> | <p>1 5</p> |
| (b) | <p>F: Able to state the structures in diagrams 7.1 and 7.2 correctly P: Able to explain how the structures plays its role defence mechanism</p> <p><u>Sample answer:</u> F1 : Diagram 7.1 - Neutrophil Diagram 7.2 - Monocytes / Macrophage</p> <p>P1 – Phagocytosis P2 – The phagocyte is attracted by the chemicals produced by the bacterium</p> | <p>2</p> |

| | | |
|------|--|---|
| | <p>P3 – The phagocyte extends its pseudopodium towards the bacterium to engulf it</p> <p>P4 – Ingestion of the bacterium forms the phagosome</p> <p>P5 – The phagosome combines with a lysosome</p> <p>P6 - Lysosome releases lysozyme into the phagosome</p> <p>P7 – The bacterium inside the phagosome is destroyed by the lysozyme</p> <p>P8 – The phagocytes releases the digested products from the cell.</p> <p>(any 8P)</p> | 8 |
| 4(a) | <p>Able to explain the differences the immune system of an infant with an adult who has been suffered <i>Chikungunya</i>.</p> <p><u>Sample answer:</u></p> <p>P1 : Immune system for the adult is Natural Active Immunity. While, immune system for infant is Natural Passive Immunity.</p> <p>P2 : Adult’s lymphocytes activated to produce antibodies. Meanwhile , infant get the antibodies when it pass naturally from mother to the foetus across the placenta / when babies breastfeed</p> <p>P3 : Adult long lasting immunity while, infant temporary immunity.</p> | 3 |

CHAPTER 2: LOCOMOTION AND SUPPORT

| NO. | MARKING SCHEME | MARK |
|---------|---|--------|
| 1(a)(i) | <p>Able to name the type of joint showed in Diagram 4.</p> <p><u>Sample answer</u></p> <p>Hinge joint</p> | 1 |
| (ii) | <p>Able to give is the different between the joint mentioned in (a)(i) and the joint on the shoulder.</p> <p><u>Sample answer</u></p> <p>P1 – Joint in 4(a)(i) allow movement in one plane</p> <p>P2 – joint on the shoulder allow rotational movement in all directions.</p> | 1 1 |
| (b)(i) | <p>Able to name and state the function of R.</p> <p><u>Sample answer</u></p> <p>R: synovial fluid</p> <p>F: acts as a lubricant (which reduces friction between the ends of bones)</p> | 1 1 |
| (ii) | <p>Able to name the disease described in above statement.</p> <p><u>Sample answer</u></p> <p>Arthritis // osteoarthritis</p> | 1 |

| | | |
|---|--|--|
| <p>(c)</p> <p>(d)(i)</p> <p>(ii)</p> <p>(iii)</p> | <p>Able to explain why the contraction of muscles needs sufficient blood. <u>Sample answer</u> P1 – contraction of muscle need more energy from cell respiration P2 – need more oxygen and glucose that transported through blood. <i>(any 2P)</i></p> <p>Able to give one necessity for support in plants. <u>Sample answer</u> To be in an upright position so their leaves can absorb maximum sunlight for photosynthesis // flower need to be lifted for pollination</p> <p>Able to name one tissue that provided support to plant in Diagram 4.2 (a). <u>Sample answer</u> schelrenchyma tissue/ xylem tissue</p> <p>Able to explain how turgidity provides supports to plant in Diagram 4.2(b). <u>Sample answer</u> P1 – turgor pressure of liquid content in the vacuole P2 – pushes the cell membrane against the cell wall P3 – creating support for the stem, leaves and roots. <i>(Any 2 P)</i></p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> |
| <p>2(a)</p> <p>(b)</p> <p>(c)</p> <p>(d)(i)</p> | <p>Able to state type of earthworm and fish skeletal system</p> <p><u>Sample answer :</u> Earthworm : Hydrostatic skeleton</p> <p>Able to state the antagonistic muscles found in the body wall of the earthworm</p> <p><u>Sample answer :</u></p> <ol style="list-style-type: none"> 1. circular muscle 2. longitudinal muscle <p>Able to explain how the organism moves based on the skeletal system</p> <p><u>Sample answer :</u></p> <p>P1- Earthworm moves by changing the pressure of hydrostatic fluid in its body</p> <p>P2- When the circular muscles contract and longitudinal muscles relaxes// Circular muscles relaxes and longitudinal muscles contract</p> <p>P3- earthworm becomes thinner and longer// shorter and thicker</p> <p>P4- This pair of muscles act antagonistically/ in antagonistic manner MAXIMUM: 2 marks</p> <p>Able to state the type muscles found in the fish</p> <p><u>Sample answer :</u></p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> |

| | | |
|--|--|--|
| <p>(ii)</p> | <p>Myotome muscles</p> <p>Able to what other structures help the fish to swim</p> <p><u>Sample answer :</u></p> <p>1. Fins / tail</p> <p>2 .Air sac / swim bladder</p> | <p>1</p> <p>1</p> <p>1</p> |
| <p>3(a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p> <p>(e)</p> <p>(f)</p> | <p>Able to state part for bone X and patella</p> <p><u>Sample answer</u> Appendicular skeleton</p> <p>Able to name bone X and state its function</p> <p><u>Sample answer</u> Bone X : Femur</p> <p>Function</p> <p>F1: support body / soft body tissues</p> <p>F2: provide body shape</p> <p>F3: bone marrow produce new red blood cells</p> <p>F4: protect internal organ</p> <p>F5: involved in movement</p> <p>Any one F</p> <p>Able to state tissue that hold the bones together and function of tendon</p> <p><u>Sample answer</u> Tissue: Ligament Function of tendon : attach the muscles to bones</p> <p>Able to explain how support is achieved in aquatic plants</p> <p><u>Sample answer</u> F1: Aerenchyma tissues (in stems and leaves) P1: provide large air spaces P2: provide buoyancy // can float on the surface of the water</p> <p>Able to explain the reason Sherry suffering from osteoporosis is advised to drink plenty of milk.</p> <p><u>Sample answer</u> F1: Milk contains calcium P1: calcium for build / strengthening bones</p> <p>Able to explain why Azmi carry out a warming up exercise before starting an event</p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> |

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| | <p><u>Sample answer</u> F1: to prevent muscle cramp // muscles can contract more efficiently F2: to increase body / muscles temperature F3: more efficient glucose oxidation // increase metabolism process F4: increase heartbeat // heart pump faster // supply of oxygen / glucose faster</p> <p>Any 3 F</p> | <p>1 1 1 1</p> |
|--|--|----------------------------|

CHAPTER 3: COORDINATION AND RESPONSE

| NO. | MARKING SCHEME | MARK |
|---------|---|----------------------------|
| 5(a)(i) | <p>Able to name the process that takes place in X. <u>Sample answer</u> Ultrafiltration</p> | 1 |
| (ii) | <p>Able to explain how the process mention in 5(a)(i) occurs. <u>Sample answer</u> P1 – blood under high hydrostatic pressure / P2 – because diameter of afferent arteriole is larger than efferent arteriole P3 – force fluid filtrate into capsule Bowman P4 - form glomerular filtrate (Any 2 P)</p> | <p>1 1 1 1</p> |
| (iii) | <p>Able to give one difference between the content in A and B. <u>Sample answer</u> P1 – urea in A is more compare in B P2 – oxygen in A is more in A compare in B P3 – water in A is less compare in B (Any 1 P)</p> | <p>1 1 1</p> |
| (b) | <p>Able to explain why glucose and amino acid can be found in glomerular filtrate but absent in urine. <u>Sample answer</u> P1 – all glucose and amino acid will be reabsorb (in proximal convulated tubule) P2 – through active transport</p> | <p>1 1</p> |
| (c)(i) | <p>Able to give one consequences if both kidneys failure to function. <u>Sample answer</u> P1 - toxin waste products/ urea accumulate in blood P2 – ionic levels in blood will become increasing (Any 1 P)</p> | <p>1 1</p> |

| | | |
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| <p>(ii)</p> | <p>Able to give suggestion of treatment and explain briefly about the treatment. <u>Sample answer</u> F1 – kidney transplant P1 – failed kidneys replaced with working kidneys from donor P2 – donor’s kidney has to match with recipient’s body (F and any 1 P)</p> | <p>1 1 1</p> |
| <p>(d)</p> | <p>Able to explain how alcohols abuse disturbs the nervous system. <u>Sample answer</u> P1 - block the release of neurotransmitters P2 – it will slow down the transmitted of impulses through synapse P3 – slow down the coordination between nerves, eyes and muscle</p> | <p>1 1 1</p> |
| <p>2(a)(i)</p> | <p>Able to state the stimulated receptor <u>Sample answer :</u> Pain receptors</p> | <p>1</p> |
| <p>(ii)</p> | <p>Able to explain the arm react <u>Sample answer:</u> 1. The receptor receives nerve impluse 2. The nerve travels along the afferent 3. And is transfreed to the efferent neurone 4. At the axon terminal of the efferent neurone, the nerve impulse is transferred to muscle cell causing them to contract. 5. The arm bends and moves away from the hot object. (Any 3)</p> | <p>1 1 1 1 1</p> |
| <p>3(a)(i)</p> | <p>Able to name the structure <u>Sample answer</u> Nephro</p> | <p>1</p> |
| <p>(ii)</p> | <p>Able to explain the formation of fluid E in Bowman’s capsule <u>Sample answer</u> P1: (By) ultrafiltration P2: (due to) higher hydrostatic pressure / P3: (some) blood components except red blood cells, platelets and plasma proteins enter E / Bowman’s capsule Any two P</p> | <p>1 1 1</p> |
| <p>(iii)</p> | <p>Able to explain one difference between the content in Bowmans’s capsule and in loop of Henle <u>Sample answer</u> P1: In E / Bowman’s capsule has higher glucose / amino acid / vitamins / minerals / water // In F has lower glucose / amino acid / vitamins / minerals P2: because reabsorption occurs at the proximal convoluted tubule</p> | <p>1 1</p> |

| | | |
|----------------------------------|---|-----------------------|
| <p>(b)</p> <p>(c)</p> <p>(d)</p> | <p>Able to explain how diabetes insipidus is related to the imbalance of hormone in the body</p> <p>Sample answer P1: Lacking in ADH / antidiuretic hormone P2: less absorption of water in the distal convoluted tubule / collecting duct // Distal convoluted tubule / collecting duct less permeable to water</p> <p>Able to explain why a patient needs to undergo haemodialysis regularly</p> <p>Sample answer F1: the kidneys are malfunction / stop functioning / kidney failure P1: blood contains high amount of waste materials / urea / toxic waste / salts P2: blood constituents / osmotic pressure higher than normal</p> <p>Able to explain the importance of kidney in maintaining human health</p> <p>Sample answer P1: To eliminate waste materials / urea / toxic waste / excess water/salts from blood P2: To maintain normal osmotic pressure in blood / constant internal environment P3: To maintain an optimal physical / chemical condition (in the internal environment)</p> | |
| <p>4(a)</p> | <p>Able to state the meaning of haemodialysis :</p> <p>A process of F1 - filtering blood using artificial kidney/kidney machine means that replace a failed kidney.</p> <p>Able to explain the haemodialysis process :</p> <p>E1 – A patient’s blood is passed / diverted through (several) narrow / series of tubes E2 - Made of a partially-permeable/ semi-permeable dialysing membrane E3- The pores in the dialysing membrane allow small particles such as glucose / ions / urea to pass through E4 - but not big particles such as blood cells / plasma proteins. E5 - The (narrow) tubes are immersed in a dialysis fluid E6 - Dialysis fluid, which has the same composition as tissue fluid. E7 - The dialysis fluid contains glucose and ions but not waste products such as urea. E8 - As useful substances are present in equal concentrations occurs. E9 - However any excess of tissue fluid constituents, such as potassium ions and phosphate ions, will be lost from the</p> | <p>1</p> <p>1 X 8</p> |

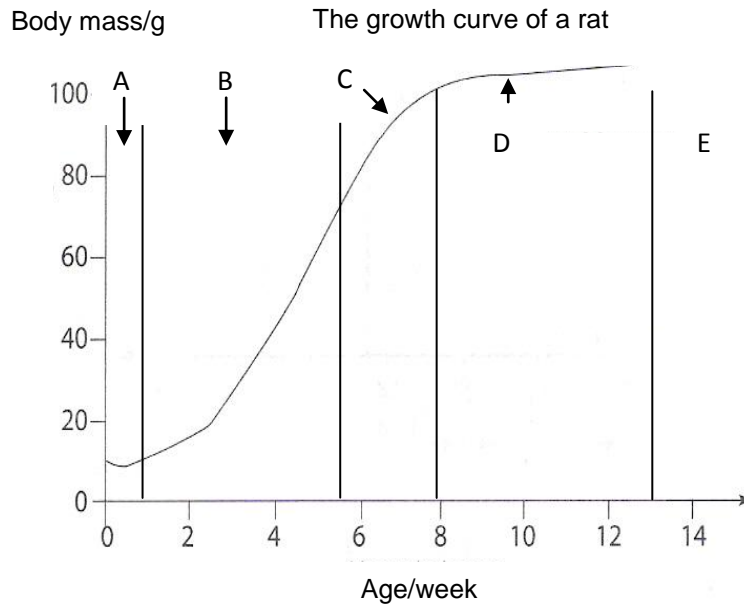
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| | <p>blood.</p> <p>E10 - There is a net loss from the blood of waste products, such as urea, as these are not found in the dialysis fluid.</p> <p>E11 – The cleansed blood is returned to the patient.</p> <p>Analysis skill : Able to list explanation by sequence and systematic</p> <p>(b) Able to state advantages of drugs in medical :</p> <p>F1. produce medicine / pill</p> <p>F2. Steroid drug used by sport athlete</p> <p>Reject:</p> <ol style="list-style-type: none"> 1. used in producing cheese/yogurt/ 2. Beer / wine 3. Produce vinegar <p>Able to state advantages for drugs on human physiology :</p> <p>Sample answer :</p> <p>F3: Depressant –psychiatry</p> <p>F4: depressant to relief pain</p> <p>Able to state advantages for alcohol used in life :</p> <p>Sample answer :</p> <p>F5: Production of perfume</p> <p>F6: Used in medical as antiseptic</p> <p>Able to state disadvantages used of drugs in human life:</p> <p>Sample answer :</p> <p>F7: Interfere nervous system leads to lengthen reflex time</p> <p>F8: Liver failure / cirrhosis</p> <p>Able to state disadvantages of alcohol on human physiology :</p> <p>Sample answer :</p> <p>F9: Alter brain functions</p> <p>F10: impair vision, coordination</p> <p>Analyze skill : Able to state at least two points of advantages and disadvantages.</p> <p>Evaluate skill : Able to rationalize / justify whether drugs and alcohol give good impact or not to human.</p> | <p>1</p> <p>Max 8</p> <p>1</p> <p>1</p> |
| 5(a) | <p>Able to state three basic processes in the formation of urine</p> <p>Answers</p> <p>F1 – ultrafiltration</p> <p>F2 – reabsorption</p> <p>F3 – secretion</p> | <p>1</p> <p>1</p> <p>1</p> |

| | | |
|--------|--|---|
| | Able to explain the respective processes | |
| | F1 - Ultrafiltration | 1 |
| | P1 – (blood enters the glomerulus), ultrafiltration takes place whereby the high pressure forces fluid through the filtration membrane/glomerulus into capsular space/Bowman’s capsule | |
| | P2 – the fluid is called glomerular filtrate | 1 |
| | P3 – glomerular filtrate contains water/glucose/amino acids/urea/mineral salts/other small molecules but does not contain red blood cells and plasma protein | 1 |
| | P4 – useful substances are reabsorbed (from the filtrate into the blood) while toxic compounds/water/any solutes in excess are removed (as urine) | 1 |
| | F2 - Reabsorption | 1 |
| | P5 – in proximal convoluted tubule, sodium ions and chloride ions are pumped into capillary network | 1 |
| | P6 – reabsorption of glucose and amino acids by active transport | 1 |
| | P7 – in the loop of Henle, water, sodium, chloride ions are reabsorbed | 1 |
| | P8 – at distal convoluted tubule and <u>more</u> water, sodiums and chloride ions are reabsorbed | 1 |
| | P9 – at collecting duct, 99% of water has been reabsorbed(into blood stream) and 1% of water leaves the body as urine | |
| | F3 – Secretion | 1 |
| | P10 – occurs at distal convoluted tubule | 1 |
| | P11 - waste/excess substances/hydrogen ions/ potassium ions/ ammonia/ urea/ creatinine/ toxin/ drugs are eliminated | 1 |
| | P12 – by adjusting the amount of ions the kidney regulate the chemical composition/water content | |
| | <i>Any 10</i> | |
| (b)(i) | Able to describe the role of sweat glands, hair, erector muscle and blood vessels to maintain the body temperature during the cool day. | |
| | Sweat gland | 1 |
| | P1 – sweating does not occur body heat is conserved | 1 |
| | Erector muscle | 1 |
| | P2 – contracts | |
| | Hair | 1 |
| | P3 – hair is raised to trap an insulating layer/heat | |
| | Blood vessel | 1 |
| | P5 – vasoconstriction/contraction of arterioles occurs | 1 |
| | P6 – amount of blood flowing through skin decreases | 1 |
| | P7 – reduce the amount heat to be lost | |
| | <i>Any 6</i> | |
| (ii) | Able to state the example of drugs and its effects | |

| | |
|---|--------------------|
| Drug - 1 Effect – 1 | |
| Stimulants D1- cocaine E1 - block the removal of pleasure-inducing neurotransmitters | 1 1 |
| Depressants D2 - Tranquiliser E2 - slow down the transmission of impulses | 1 1 |
| Hallucinogens D3 - LCD E3 - cause user to see, hear and perceive things that do not exist | 1 1 |
| Narcotic D4 - heroin // morphine E4 - induce feeling of euphoria/block pain signals/slow down | 1 1 |
| | Any 2D+2E Any 4 |

CHAPTER 4: REPRODUCTION AND GROWTH

| NO. | MARKING SCHEME | MARK | | | | | | | | | |
|---------|--|----------------------------------|------------------------|--------------------------------|----|--------------------|-------------------|----|---------------------------|----------------------------------|-----------------------|
| 1(a) | <p>Able to give two differences of the growth curve between both organisms</p> <p>P1 P2</p> <p><u>Sample answer</u></p> <table border="1"> <thead> <tr> <th></th> <th>Growth curve for a rat</th> <th>Growth curve for a grasshopper</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>Shaped: sigmoid/ S</td> <td>Shaped: staircase</td> </tr> <tr> <td>P2</td> <td>Has five different phases</td> <td>Has five instars and imago phase</td> </tr> </tbody> </table> | | Growth curve for a rat | Growth curve for a grasshopper | P1 | Shaped: sigmoid/ S | Shaped: staircase | P2 | Has five different phases | Has five instars and imago phase | <p>1x2</p> <p>1x2</p> |
| | Growth curve for a rat | Growth curve for a grasshopper | | | | | | | | | |
| P1 | Shaped: sigmoid/ S | Shaped: staircase | | | | | | | | | |
| P2 | Has five different phases | Has five instars and imago phase | | | | | | | | | |
| (b) (i) | <p>Able to label and state the all the phases</p> <p>Label State (at least 4 corrects)</p> | | | | | | | | | | |



- A – Lag phase
- B – Rapid growth phase
- C – Slow growth phase
- D – Stationary phase
- E – Senescence and death phase

(ii)

Able to explain briefly every phase

Sample answer

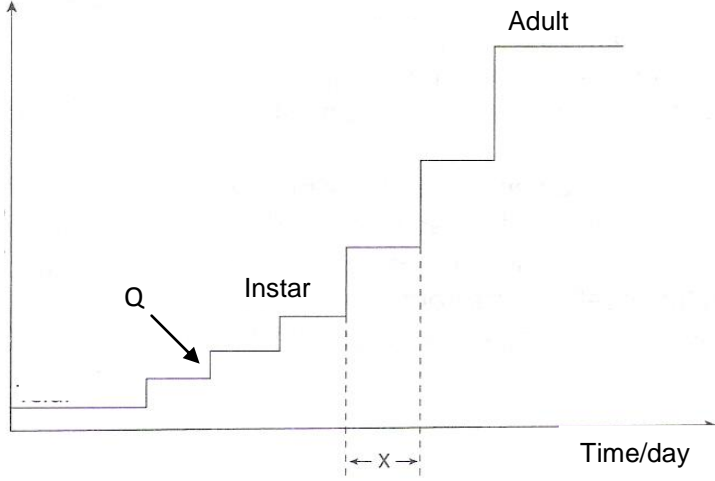
- P1 – lag phase: growth rate is slow
 - P2 – rapid growth phase: growth rate is the fastest
 - P3 – slow growth phase: slow growth phase
 - P4 – Stationary phase: growth rate is zero
 - P5 – Senescence and death phase: old age stage
- (Any one)

(c)(i)

1
1

1

1

| | | |
|----------------|--|-------------------------------------|
| <p>(ii)</p> | <p>Able to draw an arrow to show where the ecdysis begins</p> <p>Sample answer</p> <p>Body length/cm</p> <p>The growth curve of a grasshopper</p>  <p>Adult</p> <p>Instar</p> <p>Q</p> <p>Time/day</p> <p>X</p> <p>Able to explain the process occur during X</p> <p>Sample answer</p> <p>P1 – a new exoskeleton forms below the old exoskeleton</p> <p>P2 – The exoskeleton soften and its essential resources are digested and reabsorbed into new exoskeleton</p> <p>P3 – The old exoskeleton then splits and is discarded</p> <p>P4 – (Before the new exoskeleton hardens), the insect enlarges its body volume by swallowing air or liquid until new cuticles harden</p> <p>(Any three)</p> | <p>3</p> |
| <p>2(d)(i)</p> | <p>Able to label structure P and Q correctly.</p> <p>P – umbilical arteries</p> <p>Q – umbilical veins</p> <p>(ii)</p> <p>Able to state the difference between P and Q correctly.</p> <p><u>Sample answer</u></p> <p>P carries deoxygenate blood while Q carries oxygenated blood</p> <p>(iii)</p> <p>Able to explain the advantages of foetus having a separate circulatory from maternal circulatory system correctly.</p> <p><u>Sample answer</u></p> <p>P1 – permits exchange of gases, food and waste products (between foetus and the mother) without mixing blood</p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> |

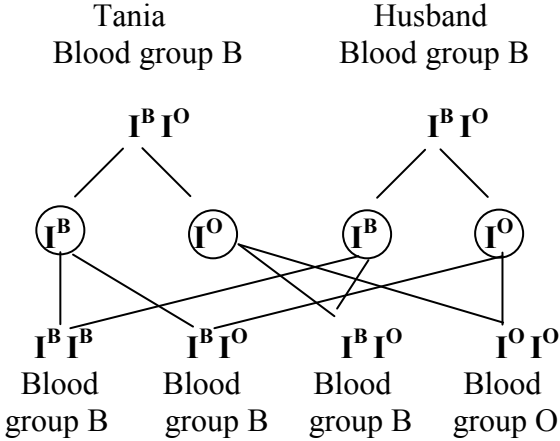
| | | |
|--------|---|---|
| (ii) | <p>Able to describe the role of hormones FSH, LH, oestrogen and progesterone which have a different level in the menstrual cycle</p> <p><u>Sample answer:</u></p> <p><i>F1: FSH/hormone P</i> P1 : It stimulates the development of the follicles in the ovaries. P2 : It also stimulates the follicles in the ovary to secrete oestrogen.</p> <p><i>F2: Oestrogen/ hormone X</i> P3 : After menstruation, it causes the repair and growth of the uterine lining (endometrium). P4 : The uterine lining becomes thick and spongy with blood vessels. P5 : A high concentration of oestrogen in the blood inhibits FSH production, preventing the ripening and growth of more follicles. P6 : It stimulates the pituitary gland to secrete luteinising hormone (LH).</p> <p style="text-align: right;"><i>(any 3 Ps)</i></p> <p><i>F3: LH/ hormone R</i> P7 : It causes ovulation. P8 : It also causes the promote the development of corpus luteum.</p> <p style="text-align: right;"><i>(any 1P)</i></p> <p><i>F4: Functions of progesterone/ hormone Y</i> P9 : It keeps the uterine lining thick and well supplied with blood P10 : Preparing it for the implantation of the embryo. P11 : It inhibits both FSH and LH production.</p> <p><i>(any 2P)</i></p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> |
| 4(a) | <p>Able to describe the oogenesis process</p> <p>Sample answers</p> <p>P1 – the process is oogenesis P2 – germinal epithelial cells undergo mitosis to form diploid oogonia P3 – oogonia grow to form diploid primary oocytes P4 – the primary oocytes undergo meiosis I to form haploid secondary oocyte and first polar body P5 – secondary oocyte undergo meiosis II and form ovum and (second) polar body</p> <p style="text-align: right;"><i>Any 4P</i></p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> |
| (b)(i) | <p>Able to state and explain the process of ovulation</p> <p>Sample answer</p> <p>F1 – ovulation P1 – the release of secondary oocyte from the ovary</p> | <p>1</p> <p>1</p> |

| | | |
|---------|--|--|
| (ii) | <p>Able to describe the early development of zygote until process C</p> <p>Sample answer</p> <p>P1 – after <u>fertilization</u>, the zygote divide repeatedly/undergoes mitosis</p> <p>P2 – as its travel along the (Fallopian) tube towards uterus</p> <p>P3 – first division forms two-celled embryo</p> <p>P4 – further division forms a solid mass of cells called morula</p> <p>P5 – then morula is a ball of about 100 cells called blastocyst/blastula</p> <p>P6 – blastocyst/blastula is a fluid-filled sphere with outer layer of cells and inner cell mass</p> <p>P7 – the cilia in the (Fallopian) tube helps developing embryo to reach the uterus</p> <p>P8 – blastocyst / blastula undergoes <u>implantation</u> to attach itself to the endometrium</p> <p>P9 – the inner cell mass becomes firmly embedded in the endometrium</p> <p style="text-align: right;"><i>Any 6</i></p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> |
| (c) | <p>Able to state the methods with explanation</p> <p>Sample answer</p> <p>M1 - IVF / <i>in vitro fertilization</i></p> <p>P1 – a laparoscope is inserted at the navel to collect immature ovum from ovary</p> <p>P2 – the ovum is placed in culture solution to mature</p> <p>P3 – sperms are collected and added to the the culture</p> <p>P4 – fertilization occurs // sperms and ovum fused and develop into embryo</p> <p>P5 – (after 2-4 days) the embryo is transferred/inserted into uterus (through servix)</p> <p>M2 – diaphragm</p> <p>P6 – for female contraceptive method</p> <p>P7 – inserted into vagina to cover the servix</p> <p>P8 – to stop sperms entering the uterus</p> <p style="text-align: right;">M1+4P= 5 M2+2P=3</p> | |
| 7(a)(i) | <p>Able to explain the stages of growth (1 to 4).</p> <p><u>Sample Answer</u></p> <p>P1 : (Secondary growth start) at vascular cambium at the vascular bundle / separated primary xylem and primary phloem // involves the lateral meristem.</p> <p>P2 : The cambium cell divide radially and merge with vascular cambium to form intervacular cambium.</p> <p>P3 :(The cambium cell divide) tangentially to produced two layer of cell, (one inner layer and one outer layer.)</p> <p>P4 : The inner layer will form secondary xylem while the outer</p> | |

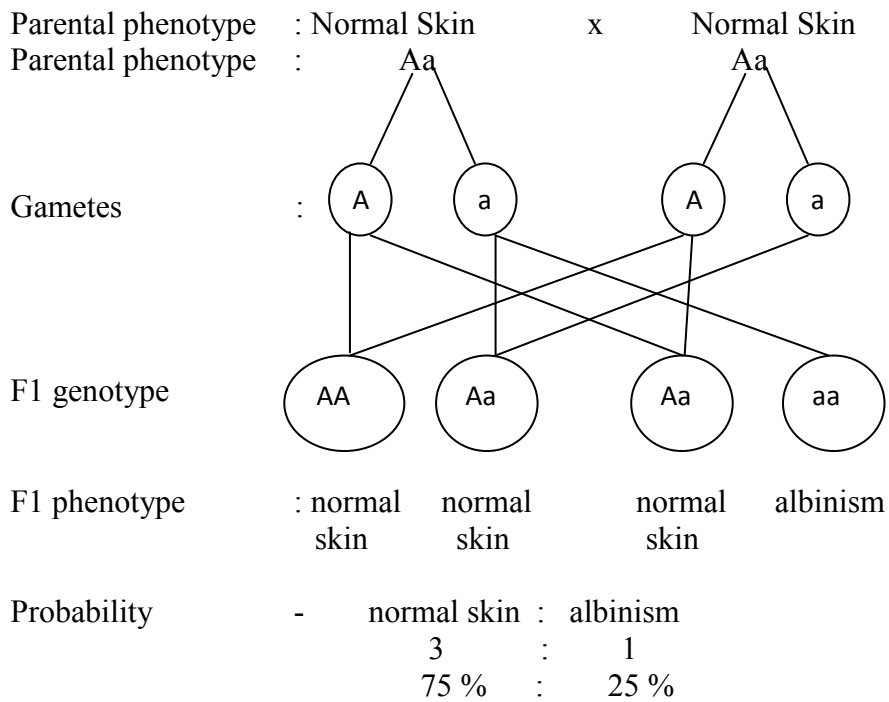
| | | |
|------|--|---|
| | <p>layer will form secondary phloem.</p> <p>P5 : The primary xylem will pushed towards the pith while the primary phloem will pushed toward to epidermis.</p> <p>P6 : The walls of the secondary xylem become thickened with lignin to give the tissue mechanical strength (which have to support the plant).</p> <p>P7 : Cambium cell between the vascular bundle divided to form secondary parenchyma tissue.</p> <p>P8 : (Increasing the secondary tissue will) increase the diameter of the stem.</p> <p style="text-align: right;">(Any 6)</p> | 6 |
| (ii) | <p>Able to describe the importance of secondary growth.</p> <p><u>Sample Answer</u></p> <p>E1: secondary growth increase the perimeter / diameter of the Stem.</p> <p>E2: To increase the mechanical support (and stability)</p> <p>E3: Secondary growth produced <u>more</u> secondary phloem and secondary xylem.</p> <p>E4: to support water and mineral salt transportation</p> <p>E5: to transport the product of photosynthesis.</p> <p>E6: (More secondary xylem tissue produced) to increase support when the plants become increase the stem and diameter.</p> <p>E7: To increase the life of the plant / life longer.</p> <p style="text-align: right;">(Any 4)</p> | 4 |

CHAPTER 5: INHERITENCE

| NO. | MARKING SCHEME | MARK |
|---------|--|-------------|
| 1(a)(i) | <p>Able to state the genotype of blood group for Maya correctly.</p> <p><u>Sample answer</u> $I^B I^O / BO$</p> | 1 |
| (a)(ii) | <p>Able to give a reason for answer in 4(a)(i) correctly.</p> <p><u>Sample answer</u> P1 – she has a son who has O blood group. P2 – she has a B blood group P3 – Tahir receives one allele I^O from his father and one allele I^O from his mother</p> <p style="text-align: right;">(any 2P)</p> | 1 1 1 |

| | | |
|-----------------|--|-------------------------------------|
| <p>(a)(iii)</p> | <p>Able to state P1 – Parents genotype P2 – gametes produced P3 – F1 generation</p> <div style="text-align: center;">  </div> <p>Parents genotype</p> <p>Gametes</p> <p>F1 generation</p> | <p>1</p> <p>1</p> <p>1</p> |
| <p>(b)</p> | <p>Able to explain why is it safe to transfuse blood of group O to an accident victim during an emergency correctly.</p> <p><u>Sample answer</u> P1 – people who has blood group O is a universal donor P2 – blood group O do not have antigen A and antigen B P3 – agglutination will not occurs</p> <p style="text-align: right;">(any 2P)</p> | <p>1</p> <p>1</p> <p>1</p> |
| <p>(c)</p> | <p>Able to discuss why there is a problem if a Rh-negative mother has more than one Rh-positive babies correctly.</p> <p><u>Sample answer</u> P1 – (during) first pregnancy, some of the Rh blood antigen from Rh-positive foetus enter the blood streams (Rh-negative) of mother P2 – cause antibodies are produced by mother P3 – antibodies (from mother) enter the foetus’s blood (in the subsequent pregnancy) P4 – may cause excessive break down of red blood cells in the foetus/ lead to brain damage</p> <p style="text-align: right;">(any 3P)</p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> |
| <p>2(a)(i)</p> | <p>Able to draw the schematic diagram shows Mendel’s Law I : <u>Sample answer</u></p> | |

Key: A represents the dominant allele normal skin
 a represents the recessive allele albinism



Scoring :

- Keys - 1 mark
 - Parental phenotype and genotype - 1 mark
 - Gametes - 1 mark
 - F1 genotype and phenotype - 1 mark
 - Probability - 1 mark
- 5 marks
 =====

(ii) **Able to explain how meiosis makes genetic variation :**

Sample answer

P1 - Crossing over

P2 - The arrangement and separation of homologous chromosomes

During Metaphase I / Anaphase I //

Mendel's Law of Independent Assortment

P3 - Independent arrangement of chromosomes at the equator of spindle occurs during Metaphase II //

Subsequent separation of chromatids occurs during Anaphase II

P4 - The haploid chromosomes number leads to various of probability of assortment

P5- Random fertilization

P6- Produce gametes with different combinations of chromosomes.

P7- Phenotype / trait will be expressed by the dominant alleles

Synthesis Skill : [P1/P2/P3] + [P4/P5/P6] + [P7]

5

1 X 7

(b) **Able to state the advantages and disadvantages of the usage of nuclear**

| | | |
|-------|--|--|
| | <p>radiation :</p> <p>Advantages :</p> <p>A1 – food sterile in canning process to prevent bacteria growth A2 – sterile the medical appliances to reduce pathogen infection A3 – Produce vast of energy for industrial used A4 - Scanning the tissue/ bone tissue to identify any abnormality</p> <p>[Any 3A]</p> <p>Disadvantages :</p> <p>D1 – Act as mutagen to cause mutation D2 – Gene mutation and chromosome mutation permanently D3 – Mutation chromosome – change of chromosome number D4 – Cause immobilize / disability D5 – Down Syndrome // Turner Syndrome D6 – Mutation gene occur D7 – Sickle cell anaemia D8 – Uncontrolled mitosis cause cancer</p> <p>[Any 5D]</p> <p>Application skill : Able to state at least two points of advantages and disadvantages.</p> <p>Evaluate skill : Able to give an evaluation of the usage of nuclear radiation whether this technique should be developed further or not</p> | <p>1</p> <p>1 X 4</p> <p>1 X 8</p> <p>1</p> <p>1</p> |
| 3(a) | <p>Able to explain how the BST can be produced by genetic engineering correctly.</p> <p><u>Sample answer :</u></p> <p>P1 – Small ring of DNA in bacteria called plasmid P2 – Plasmid is cut with restriction enzymes P3 – Cow somatotrophin gene is isolated from cow cell P4 – Somatotrophin gene is inserted into plasmid P5 – Somatotrophin plus bacterial plasmid called as recombinant DNA P6 – Plasmid is reintroduced into bacteria P7 – Bacteria are grown in fermentation tank, producing bovine somatotrophin P8 – Somatotrophin is separated and purified P9 – Somatotrophin is delivered to cow, whose milk production efficiency increases</p> <p>Synthesis skill : Able to list P1 / P2 + P3 / P4 + P6 / P6 + P7 correctly</p> | <p>9</p> <p>1</p> |
| (b) | <p>F: Be able to decide whether contributions of genetic engineering</p> | |

| | | |
|---------|--|-------------------------------------|
| | <p>are good or not P: Able to explain the advantages and disadvantages of genetic engineering</p> <p><u>Sample answer :</u> F1 – Good // Not good</p> <p>P1 – A gene can be inserted into crop plants which make it resistant to herbicides P2 – Enable the production of medical / pharmaceutical / examples P3 – Help to solve environmental problems/oil spills P4 – Using genetically engineered bacteria carry the desired human genes P5 - Bacteria multiply rapidly to reproduce rapidly and form a huge pollution P6 – Gene which causes a genetic disorder is replaced with a healthy gene / gene therapy P7 – New varieties of crops and farm animals have been produced P8 - Enables good selected genes to be transferred within a cross species P9 – Increases productivity and efficiency in the breeding organism P10 - Transgenic food may cause allergic reaction in some consumer ** (Any acceptable answers)</p> <p style="text-align: right;">(any 6P)</p> <p>P11- Misused of knowledge create new combination of gene which may be used in biological P12 – Could alter the natural evolution process P13 – Mutation ** (Any acceptable answers)</p> <p style="text-align: right;">(any 2P)</p> <p>Evaluating skill : Able to state F1 + any one of P1 – P10 + any one of P11 – P10 correctly</p> | <p>1</p> <p>6</p> <p>2</p> <p>1</p> |
| 4(a)(i) | <p>Able to explain how to control the inheritance of thalassaemia to the next generation of Mr. Lim’s family, based on the following criteria.</p> <p>C1 – The inheritance of thalassaemia if the thalassaemia daughter / son marry thalassaemia person. C2 – The inheritance of thalassaemia if the thalassaemia daughter / son marry thalassaemia carrier person.</p> <p><u>Sample answer:</u></p> | |

| | | |
|-------------|---|----------------------------|
| | <p>particular patient</p> <p>P5 : to examine the relationship among human populations</p> <p>P6 : to detect human genetic diseases / cancer</p> <p>P7 : to confirm the genotypes of animals and plants in agriculture</p> <p style="text-align: right;">(Any 5 P)</p> | <p>1</p> <p>1</p> <p>1</p> |
| <p>5(a)</p> | <p>Able to explain how their daughter will get black hair and blue eyes.</p> <p><u>Sample answer</u></p> <p>P1 : This situation involved dihybrid inheritance.</p> <p>P2 : Ismail is homozygous recessive for both hair (hh) and eye (bb) traits.</p> <p>P3 : His wife is homozygous dominant for hair trait (HH) and heterozygous for the eye trait (Bb). (Assume H is the gene that controls the black hair and B is the gene that controls the brown eye).</p> <p>P4 : Ismail and his wife undergo meiosis I and II.</p> <p>P5 : All the gametes (sperms and ovum) are haploid.</p> <p>P6 : Ismail will produce only one type of gamete example brown hair and blue eye (hhbb).</p> <p>P7 : His wife will produce two type of gametes example black hair and black eye (HHBb).</p> <p>P8 : The gametes (haploid) from Ismail and his wife will fertilise to produce zygote (diploid).</p> <p>P9 : This zygote will receive dominant gene for hair trait from his / her mother and recessive gene for eye trait from either his / her mother.</p> <p>P10 :So Ismail sons/ daughters will have black hair and brown eye.</p> <p>P11 :Their son/ daughter will have heterozygous gene for hair trait and homozygous recessive for eye trait.</p> <p style="text-align: right;">(Any ten)</p> <p style="text-align: center;">OR</p> | |

| | Parents | Ismail | Wife |
|----|--------------------------------|----------------------------|---------------------------|
| P1 | Genotype | (hhbb) | (HhBb) |
| P2 | Meiosis | | |
| P3 | Gamete | | |
| P4 | Fertilisation | | |
| P5 | Phenotype Son ∨ daughter | | |
| P6 | Genotype Son / daughter | Black hair, Brown eyes. | Black hair, Blue eyes. |

P7 : This situation involved dihybrid inheritance.

P8 : The son/ daughter(HhBb) inherit the allele hb from father and allele HB from mother.

P9 : The son/ daughter(Hhbb) inherit the allele hb from father and allele Hb from mother.

P10 : Key

| | |
|---|------------------------------|
| H | allele dominant black hair. |
| h | allele recessive brown hair. |
| B | allele dominant brown eye. |
| b | allele recessive blue eye. |

(b) **Able to discuss the advantages and disadvantages of using genetic**

| | | |
|---|--|---|
| engineering technology in agriculture. | | |
| <u>Sample Answer</u> | | |
| <u>The advantages</u> | | |
| F1: Genetic engineering used to produce disease resistant / pest resistant plant example : legumes, peas , maize and beans. | | 1 |
| P1 : Less pesticides are used. | | 1 |
| P2 : less pollution to the environment // better health for consumers. | | 1 |
| F2: Increase yield of crops / profitability. | | 1 |
| P3: better livelihood for farmers. | | 1 |
| P4: help to solve problems of insufficient food. | | 1 |
| F3: Increase resistance to herbicide example soya bean. | | 1 |
| P5: which allows weeds to be killed without affecting the crop plant. | | 1 |
| F4: Able to survive on poorer quality grassland. | | 1 |
| P6: can resist drought // climatic changes. | | 1 |
| F5 : Create crops with better nutrition value example tomatoes | | 1 |
| P7 : with higher vitamin A content. | | 1 |
| P8 : help to solve problems of malnutrition. | | 1 |
| F6 : Create crops with longer shelf lives example tomato. | | 1 |
| P9 : less food wastage | | 1 |
| F7 : Genetically modified livestock example cows. | | 1 |
| P10 : produce meat with less fat / more milk. | | 1 |
| <u>Disadvantages</u> | | |
| F8 : Pest resistant genes may be transferred to weeds. | | 1 |
| P11 : may be difficult to control growth of weeds. | | 1 |
| F9 : Some transgenic crops may have animal genes. | | 1 |
| P12 : this may not be acceptable to certain groups for religious reasons. | | 1 |
| F10 : Genetically modified foods may be harmful to health. | | 1 |
| P13 : may activate human genes to cause cancer. | | 1 |
| F11: Transgenic organisms may affect the survival of other organisms in the ecosystem. | | 1 |
| P14: may cause the imbalance of nature / ecosystem. | | 1 |
| (Any ten) | | |

| NO. | MARKING SCHEME | MARK |
|---------|--|-------------|
| 5(a)(i) | <p>Able to name the types of finger prints <u>Answer</u> Whorl : composite</p> | 2 |
| (ii) | <p>Able to state one factor that causes variation. <u>Answer</u> Genetic factor</p> | 1 |
| (iii) | <p>Able to state the type of variation. <u>Sample answer</u> Discontinuos variation</p> | 1 |
| (b) | <p>Able to explain why the use of identity card is more effective method than photograph only <u>Sample answer</u> P1 – Thumbprint is discontinuos variation P2 – Photograph is continuous variation P3 – We can differentiate for example identical twin that have same face.</p> | 1 1 1 |
| (c)(i) | <p>Able to state the total chromosome number. <u>Answer</u> 46</p> | 1 |
| (ii) | <p>Able to state one difference between male karyotype and female karyotype <u>Sample answer</u> P1 : The male karyotype will have apir of homologous chromosome that have different size example XY. P2 : The female karyotype will consist of all chromosome pairs with the same size and homologous. (<i>Note : pair for one mark</i>)</p> | 1 |
| (d) | <p>Able to complete figure 5.1 <u>Sample answer</u> Gamete Q : 22 + X Gamete R : 22 + Y Gamete J : 22 + X</p> | 1 1 1 |



MODUL TOPIKAL

PROGRAM JAWAB UNTUK JAYA (JUJ) 2006-2011

BIOLOGI

Kertas 3

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Kertas soalan ini mengandungi dua soalan. Jawab **semua** soalan.
2. Tulis jawapan anda dalam ruangan yang disediakan.
3. Anda hendaklah menyerahkan kertas tulis dan kertas graf tambahan, jika digunakan bersama-sama dengan kertas soalan.
4. Penggunaan kalkulator saintifik yang tidak boleh diprogramkan adalah dibenarkan.
5. Calon dikehendaki membaca arahan di halaman 2

| Soalan | Markah penuh | Markah diperolehi |
|--------|--------------|-------------------|
| 1 | 33 | |
| 2 | 17 | |
| Jumlah | | |

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of two questions. Answer **all** questions.
Kertas soalan ini mengandungi dua soalan. Jawab SEMUA soalan.
2. Write your answer for **Question 1** in the spaces provided in the question paper.
Jawapan anda bagi Soalan 1 hendaklah ditulis pada ruangan yang disediakan.
3. Write your answers for **Question 2** on the 'helaian tambahan'. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.
Jawapan anda bagi Soalan 2 hendaklah ditulis dalam helaian tambahan yang dibekalkan. Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.
4. Show your working, it may help you to get marks.
Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.
5. The diagrams in the questions are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
6. The marks allocated for each question or sub-part of a question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.
7. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
Jika anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.
8. You may use a non-programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.
9. You are advised to spend 45 minutes to answer **Question 1** and 45 minutes for **Question 2**.
Anda dinasihatkan supaya mengambil masa 45 minit untuk menjawab Soalan 1 dan 45 minit untuk Soalan 2
10. Hand in this question paper at the end of examination.
Serahkan soalan dan jawapan di akhir peperiksaan.
Marks awarded :

| Score | Description |
|-------|---|
| 3 | Excellent : The best response |
| 2 | Satisfactory : An average response |
| 1 | Weak : An inaccurate response |
| 0 | No response or wrong response |

Soalan 1

(Chapter 3: Movement of Substances Across Plasma Membrane)**Praktis Bestari JUJ2011**

1 An experiment was carried out to investigate the effect of concentration of sucrose solution on the movement of water molecules across a semi-permeable membrane. In this experiment, a student fill the Visking tubing with 20ml different concentration of sucrose solution.

The Visking tubing is immersed into a beaker filled with 250ml of distilled water.

Diagram 1 shows the method used by the student. The height of the sucrose solution in the capillary tube is measured after 20 minutes.

Satu eksperimen telah dijalankan untuk menyoiasat kesan kepekatan larutan sukrosa ke atas pergerakan molekul air merentasi membran separa telap.

Dalam eksperimen ini, seorang murid telah mengisi tiub Visking dengan 20 ml larutan sukrosa yang berlainan kepekatan.

Tiub Visking direndam di dalam bikar yang berisi 250ml air suling.

Rajah 1 menunjukkan kaedah yang telah digunakan oleh pelajar itu. Ketinggian larutan sukrosa dalam tiub kapilari diukur selepas 20 minit.

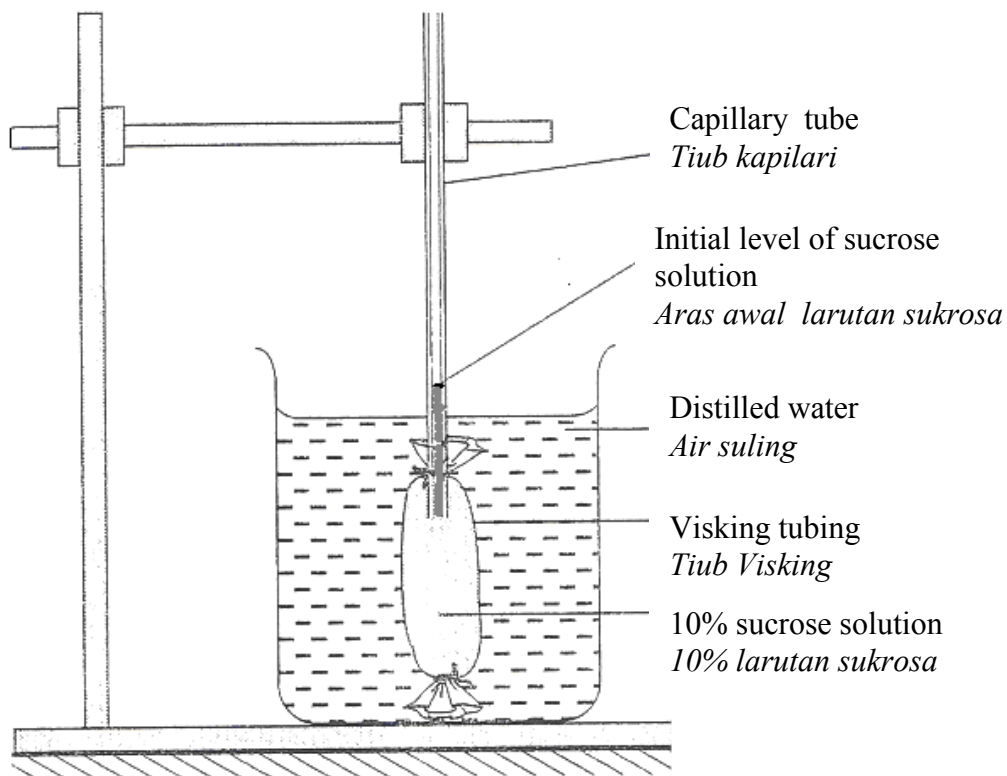


Diagram 1
Rajah 1

Table 1 shows the results of measuring the height of the sucrose solution in the capillary tube.
Jadual 1 menunjukkan keputusan pengukuran ketinggian larutan sukrosa dalam kapilari tiub.

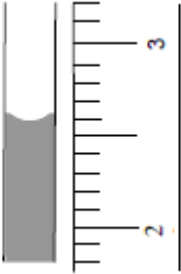
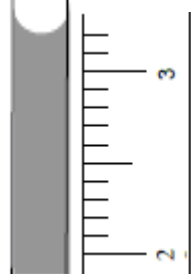
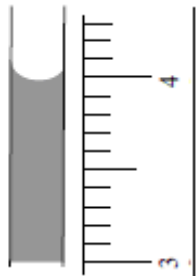
| Concentration of sucrose solution, % <i>Kepekatan larutan sukrosa, %</i> | Height of the sucrose solution in the capillary tube after 20 minutes <i>Ketinggian larutan sukrosa dalam kapilari tiub selepas 20 minit</i> |
|---|---|
| 10 |  <div style="display: inline-block; border: 1px solid black; width: 100px; height: 30px; text-align: center; vertical-align: middle;">cm</div> |
| 20 |  <div style="display: inline-block; border: 1px solid black; width: 100px; height: 30px; text-align: center; vertical-align: middle;">cm</div> |
| 30 |  <div style="display: inline-block; border: 1px solid black; width: 100px; height: 30px; text-align: center; vertical-align: middle;">cm</div> |

Table 1
Jadual 1

- (a) Record the height of the sucrose solution in the capillary tube in the boxes provided in Table 1.

Rekod ketinggian larutan sukrosa dalam kapilari tiub dalam petak yang disediakan dalam Jadual 1.

[3 marks]
[3 markah]

*For
Examiner's
Use*

1(a)

- (b) (i) State **two** different observations made from Table 1.

*Nyatakan **dua** pemerhatian berbeza yang dibuat daripada Jadual 1.*

Observation 1 :

Pemerhatian 1 :

.....
.....

Observation 2 :

Pemerhatian 2 :

.....
.....

[3 marks]
[3 markah]

1(b)(i)

- (ii) State the inferences which corresponds to the observations in 1(b)(i).

Nyatakan inferens yang sepadan dengan pemerhatian di 1(b)(i)

Inference from observation 1 :

Inferens daripada pemerhatian 1 :

.....
.....

Inference from observation 2 :

Inferens daripada pemerhatian 2 :

.....
.....

[3 marks]
[3 markah]

1(b)(ii)

(c) Complete Table 2 based on this experiment.

Lengkapkan Jadual 2 berdasarkan eksperimen ini.

*For
Examiner
's use*

| Variable <i>Pembolehubah</i> | Method to handle the variable <i>Cara mengendali pembolehubah</i> |
|--|--|
| Manipulated variable <i>Pembolehubah dimanipulasi</i> | |
| Responding variable <i>Pembolehubah bergerak balas</i> | |
| Constant variable <i>Pembolehubah dimalarkan</i> | |

Table 2
Jadual 2

[3 marks]
[3 markah]

1(c)

(d) State the hypothesis for this experiment.

Nyatakan hipotesis bagi eksperimen ini.

.....

.....

.....

[3 marks]
[3 markah]

1 (d)

- (e) (i) Construct a table and record all the data collected in this experiment.
Bina satu jadual dan rekodkan semua data yang dikumpulkan dalam eksperimen ini.

Your table should have the following aspects:
Jadual anda hendaklah mengandungi aspek-aspek berikut:

- Concentration of sucrose solution
Kepekatan laruta sukrosa
- Height of sucrose solution in the capillary tube after 20 minute
Ketinggian larutan sukrosa dalam kapilari tiub
- Rate of water diffusion
Kadar resapan air

Use the formula :

$$\text{Rate of water diffusion} = \frac{\text{Height of sucrose solution}}{\text{Time taken}}$$

Gunakan formula:

$$\text{Kadar resapan air} = \frac{\text{Ketinggian larutan sukrosa}}{\text{Masa}}$$

*For
Examiner
's use*

[3 marks]
[3 markah]

1(e)(i)

*For
Examiner
's use*

- (e) (ii) Use the graph paper provided to answer this question.
Using the data in 1(e)(i), draw a line graph of the rate of water diffusion against the concentration of sucrose solution.

Guna kertas graf yang disediakan untuk menjawab soalan ini.

Menggunakan data di 1 (e)(i), lukis graf garis bagi kadar resapan air melawan kepekatan larutan sukrosa.

[3 marks]
[3 markah]

1(e)(ii)

- (f) Based on the line graph in 1(e)(ii), explain the relationship between the concentration of sucrose solution and the rate of water diffusion.

Berdasarkan graf di 1(e)(ii), terangkan hubungan antara kepekatan larutan sukrosa dengan kadar resapan air.

.....
.....
.....

[3 marks]
[3 markah]

1(f)

- (g) Based on the result of this experiment, state the operational definition for osmosis.

Berdasarkan keputusan eksperimen ini, nyatakan definisi secara operasi bagi osmosis.

.....
.....
.....
.....

[3 marks]
[3 markah]

1(g)

- (h) The experiment is repeated by using distilled water in the Visking tubing and is immersed in 30% of sucrose solution. Predict the outcome of this experiment.
Explain your prediction.

*Eksperimen diulang dengan menggunakan air suling di dalam tiub Visking dan direndam dalam 30% larutan sukrosa. Ramalkan hasil eksperimen ini.
Terangkan ramalan anda.*

.....

.....

.....

.....

[3 marks]
[3 markah]

*For
Examiner
's use*

1 (h)

- (i) The following substances can move across the plasma membrane.
Senarai bahan berikut boleh bergerak merentasi membran plasma.

| | | |
|------------------------------------|---------------------------------|--------------------------|
| Potassium ion <i>Ion kalium</i> | Glucose <i>Glukosa</i> | Oxygen <i>Oksigen</i> |
| Sodium ion <i>Ion natrium</i> | Amino acid <i>Asid amino</i> | |

Complete Table 3 based on the list given above
Lengkapkan Jadual 3 berdasarkan senarai yang diberikan di atas.

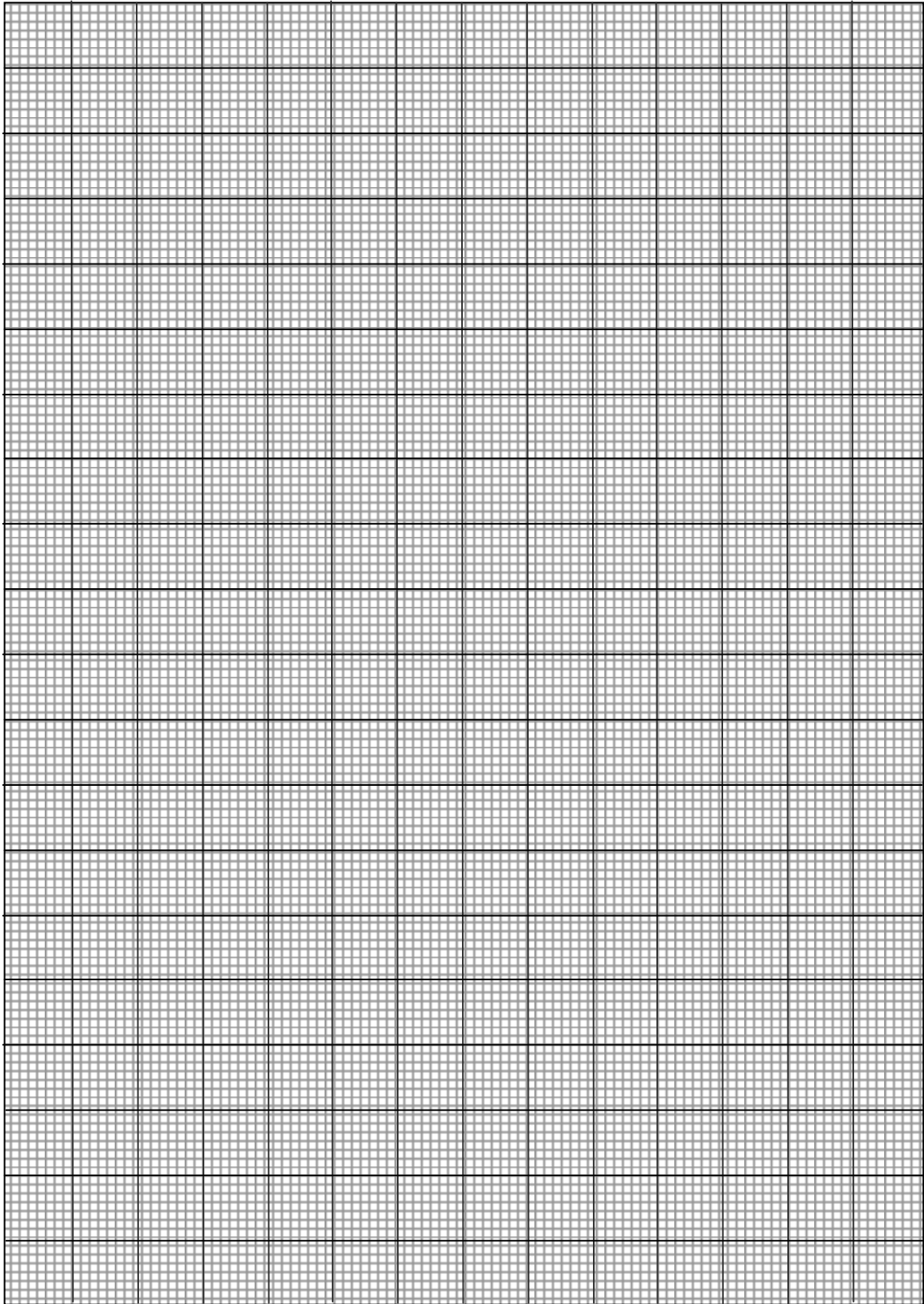
| Passive Transport <i>Pengangkutan pasif</i> | Active Transport <i>Pengangkutan Aktif</i> |
|--|---|
| | |

Table 3
Jadual 3

[3 marks]
[3 markah]

1(i)

TOTAL



2

(Chapter 4 : Chemical Composition of the Cell)
Modul JUJ 2007: SPM 2006

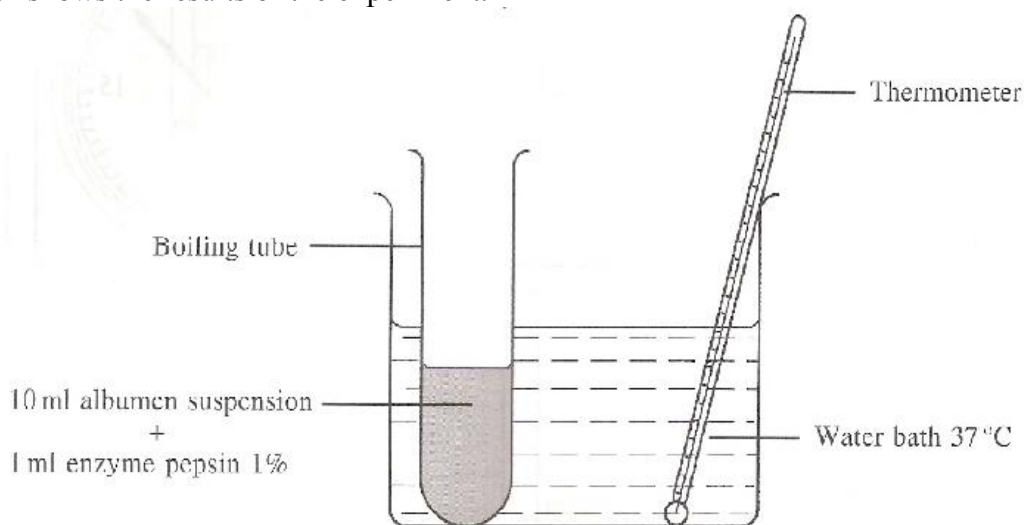
A group of students carried out an experiment to study the effect of the concentration of albumen suspension on the rate of reaction of pepsin enzyme.

Diagram 1.1 shows the method used by the students.

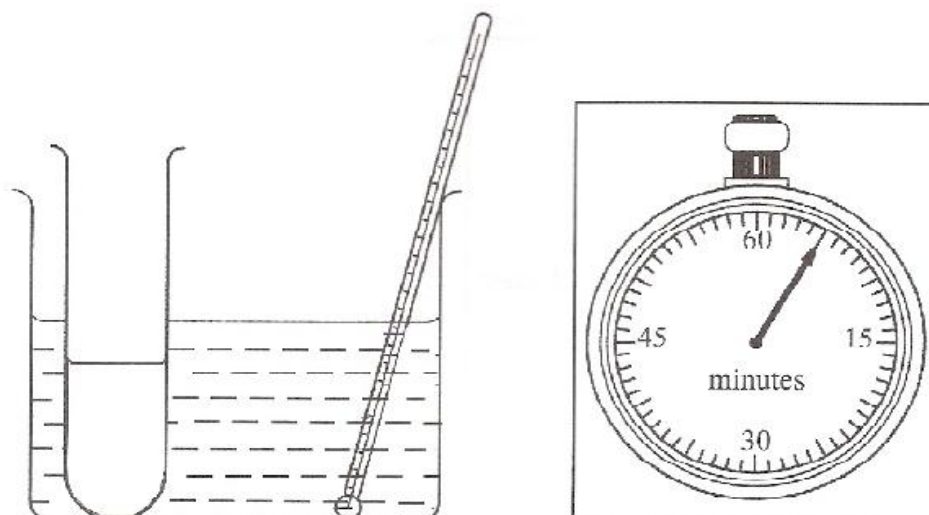
The time taken for the change in the cloudiness of the albumen suspension is shown in diagram 1.2.

The whole experiment in Diagram 1.1 was repeated using different concentrations of albumen suspension.

Table 1.1 shows the results of the experiment.



OBSERVATION AT THE BEGINNING OF EXPERIMENT
DIAGRAM 1.1



OBSERVATION AT THE END OF EXPERIMENT
DIAGRAM 1.2


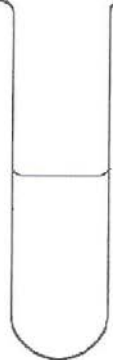


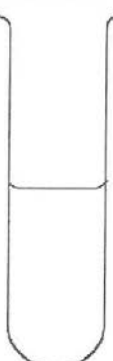



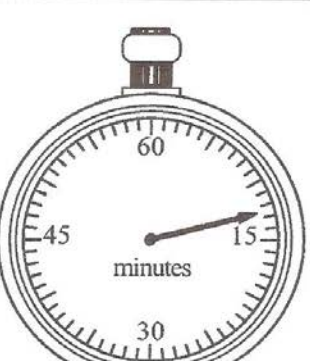
| Percentage concentration of albumen suspension | OBSERVATION | | Time taken /minutes |
|--|--|---|--|
| | Beginning of experiment | End of experiment | |
| 10% |  <p>10 ml albumen suspension + 1 ml pepsin 1%</p> |  |  |
| 15% |  <p>10 ml albumen suspension + 1 ml pepsin 1%</p> |  |  |
| 20% |  <p>10 ml albumen suspension + 1 ml pepsin 1%</p> |  |  |

TABLE 1.1

(a) (i) Based on Table 1.1, state **two** observations on the relationship between the quantity of albumen and time.

1

.....

2

.....

[3 marks]

*For
Examiner's
Use*

1(a) (i)

(ii) State the inference which corresponds to the observation in 1 (a) (i).

1.....

.....

2

.....

[3 marks]

1(a) (ii)

(b) Using the information provided in Table 1.1, complete Table 1.2 by recording the time taken for the albumen suspension to turn clear.

| Percentage concentration of albumen suspension | Time taken / minutes |
|--|----------------------|
| 10% | |
| 15% | |
| 20% | |

TABLE 1.2

[3 marks]

1(b)

*For
Examiner's
Use*

(c) (i) Complete Table 1.3 based on this experiment.

| Variable | Method to handle the variable |
|--|-------------------------------|
| Manipulated variable | |
| Responding variable | |
| Controlled variable | |

TABLE 1.3

[3 marks]

1(c) (i)

(ii) The following list is part of the apparatus and material used in this experiment.

Thermometer, Stop watch, Albumen suspension, Water bath, Pepsin, Syringe

Complete table 1.4 by matching each variable with the apparatus and material used in this experiment.

| Variables | Apparatus | Material |
|-------------|-----------|----------|
| Manipulated | | |
| Responding | | |
| Controlled | | |

TABLE 1.4

[3 marks]

1(c)(ii)

(d) State the hypothesis is for this experiment.

.....

[3 marks]

*For
Examiner's
Use*

1(d)

(e) (i) Based on table 1.1 construct a table and record the results of the experiment which includes the following aspects:

- Percentage concentration of albumen suspension
- Time/min
- Rate of enzyme reaction as percentage of albumen converted per minute

[3 marks]

1(e) (i)

(ii) On the graph paper provided, draw the graph of rate of reaction of pepsin against the concentration of albumen suspension.

[3 marks]

1(e) (ii)

(iii) Explain the relationship between the rate of reaction of pepsin and the concentration of albumen suspension based on the graph in 1(e)(ii).

.....

[3marks]

1(e) (iii)

For
Examiner's
Use

(f) Based on experiment, what can you deduce about this enzyme?.

.....

.....

.....

[3 marks]

1 (f)

(g) The experiment is repeated using the apparatus set up as in Diagram 1.3. The quantities of albumen suspension and pepsin enzyme used are as shown. The experiment is left for one hour.

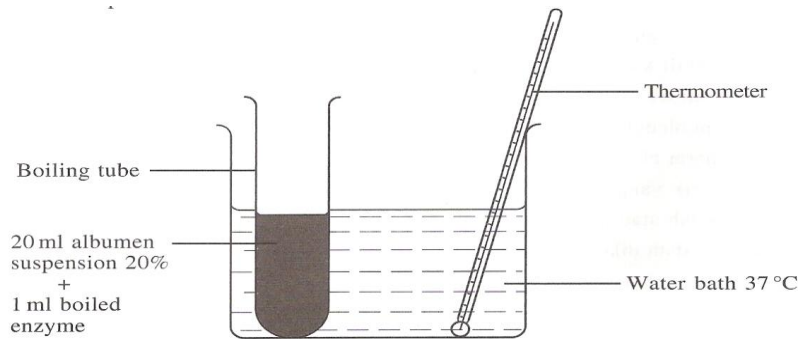
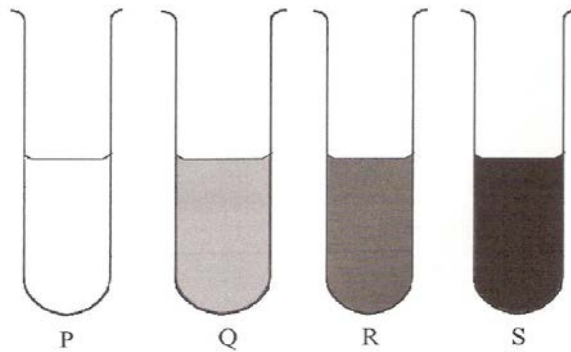


DIAGRAM 1.3

P, Q, R and S are four possible observations after one hour. Choose **one** correct observation and explain your choice.



.....

.....

.....

[3 marks]

1 (g)

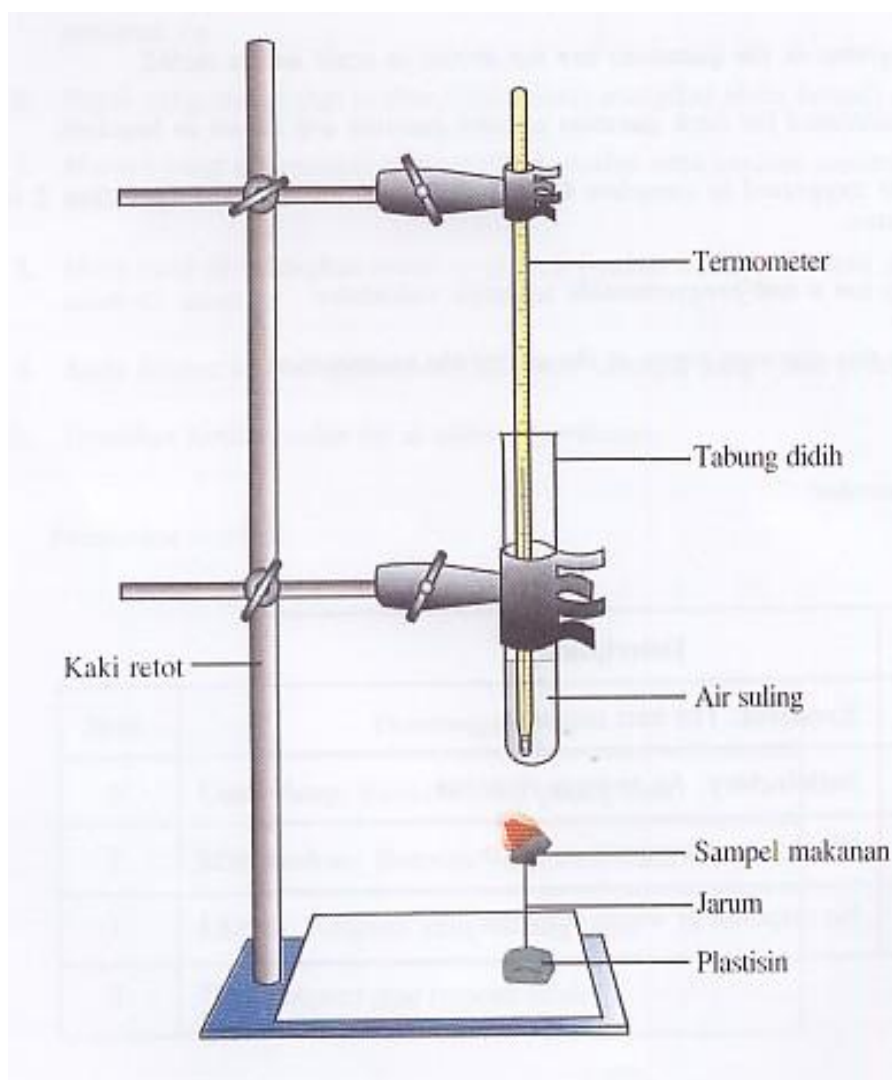
3

(Chapter 6 : Nutrition)
Modul JUJ 2006

Satu eksperimen telah dijalankan untuk menentukan dan membandingkan kandungan tenaga bagi roti putih dan kacang tanah.

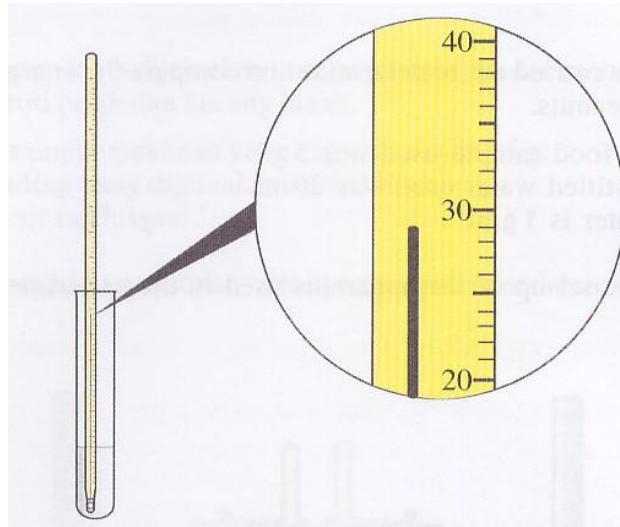
Jisim setiap sample makanan yang digunakan ialah 5g
Isipadu air suling yang digunakan ialah 20ml
Ketumpatan air ialah 1gml^{-1}

Rajah 1 menunjukkan susunan radas yang digunakan dalam eksperimen itu.



RAJAH 1

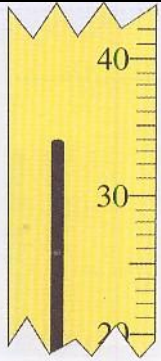

Rajah 2 menunjukkan suhu awal air bagi setiap sample makanan.



Suhu awal air :^oC

RAJAH 2

Jadual 1 menunjukkan suhu tertinggi air selepas setiap sample makanan terbakar dengan lengkap.

| Sampel makanan | Suhu air / ^o C |
|----------------|--|
| Roti putih |  <input type="text"/> |
| Kacang tanah |  <input type="text"/> |

JADUAL 1

- (a) (i) Rekodkan suhu awal air dalam ruangan yang disediakan pada Rajah 2.
 (ii) Rekodkan suhu akhir air dalam kotak yang disediakan dalam jadual 1.
 (3 markah)

(b) (i) Nyatakan **dua** pemerhatian yang berlainan yang dibuat daripada Jadual 1.

1.

.....

2.

.....

(ii) Nyatakan dua inferens daripada pemerhatian di (b) (i).

1.

.....

2.

.....

(3 markah)

(c) Lengkapkan Jadual 2 berdasarkan eksperimen yang dijalankan.

| Pembolehubah | Perkara-perkara yang dikendalikan |
|--|--|
| 1. Pembolehubah dimanipulasikan | Bagaimana mengubah pembolehubah dimanipulasikan |
| 2. Pembolehubah bergerak balas | Bagaimana menentukan pembolehubah bergerak balas. |
| 3. Pembolehubah dimalarkan | Bagaimana menetapkan pembolehubah dimalarkan |

(6 markah)

(d) Nyatakan hipotesis bagi eksperimen ini.

.....

(3 markah)

(e)(i) Bina satu jadual untuk merekod keputusan eksperimen ini.
 Jadual anda hendaklah mengandungi tajuk-tajuk berikut:

- Sampel makanan
- Kenaikan suhu air
- Nilai tenaga

Muatan haba tentu air ialah $4.2 \text{ Jg}^{-1}\text{C}^{-1}$
 Gunakan formula:

$$\text{Nilai tenaga} = \frac{\begin{array}{ccc} \text{Jisim} & \text{muatan haba} & \text{kenaikan} \\ \text{Air} & \times \text{ tentu air} & \times \text{ suhu} \end{array}}{\text{Jisim makanan}}$$

(3 markah)

(ii) Berdasarkan jadual di (e)(i), nyatakan hubungan antara kelas makanan dengan nilai tenaganya bagi setiap sample makanan.

.....

.....

.....

.....

.....

(3 markah)

(f) Berdasarkan keputusan eksperimen, apakah yang dapat anda rumuskan tentang nilai tenaga?

.....

.....

.....

.....

(3 markah)

(g) Eksperimen ini diulang dengan menggunakan biji gajus.
Ramalkan pemerhatian dan nilai tenaga yang mungkin diperolehi.

.....

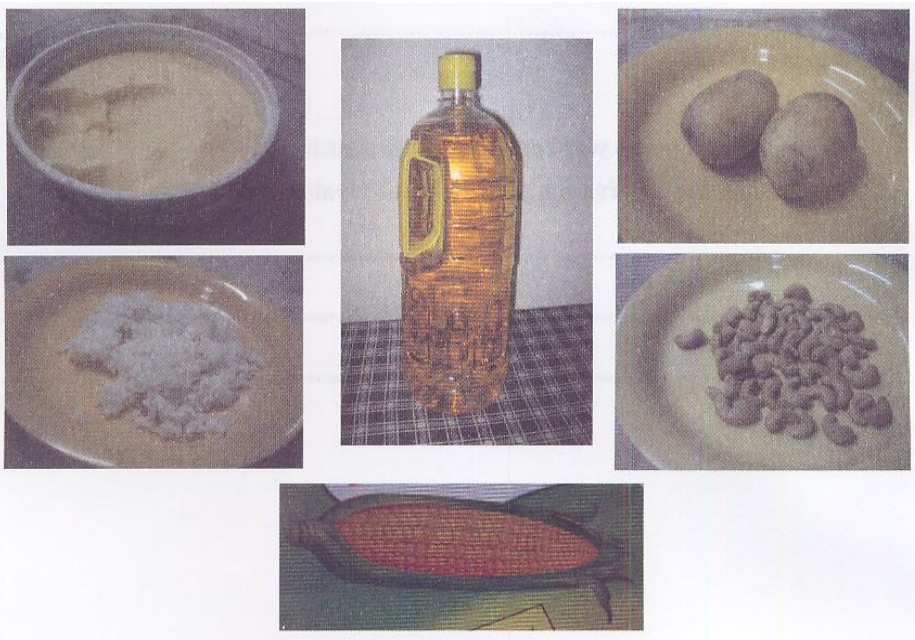
.....

.....

(3 markah)

(h) Gambar menunjukkan beberapa jenis sampel makanan:
Marjerin, nasi, minyak sawit, kentang rebus, gajus dan jagung.

Kelaskan sampel makanan itu kepada dua kumpulan makanan dalam Jadual 3, berdasarkan nilai tenaga yang setara dengan nilai tenaga roti putih atau nilai tenaga kacang tanah.



| Sampel makanan yang nilai tenaganya setara dengan nilai tenaga | |
|---|---------------------|
| Roti putih | Kacang tanah |
| | |

JADUAL 3

(3 markah)

4

(Chapter 6 : Nutrition)
Modul JUJ 2008 : SPM 2007

*For
Examiner
's use*

An experiment was carried out to investigate the effect of light intensity on the rate of photosynthesis of a *Hydrilla sp.* sprig.

The following steps were carried out.

Step 1 : 50 ml of 2% sodium hydrogen carbonate solution was placed in a boiling tube.

Step 2 : A *Hydrilla sp* sprig was immersed in the sodium hydrogen carbonate Solution.

Step 3 : A light source from a 60W bulb was placed at a distance of 60cm from the boiling tube.

Diagram 1 shows the apparatus set up used in this experiment.

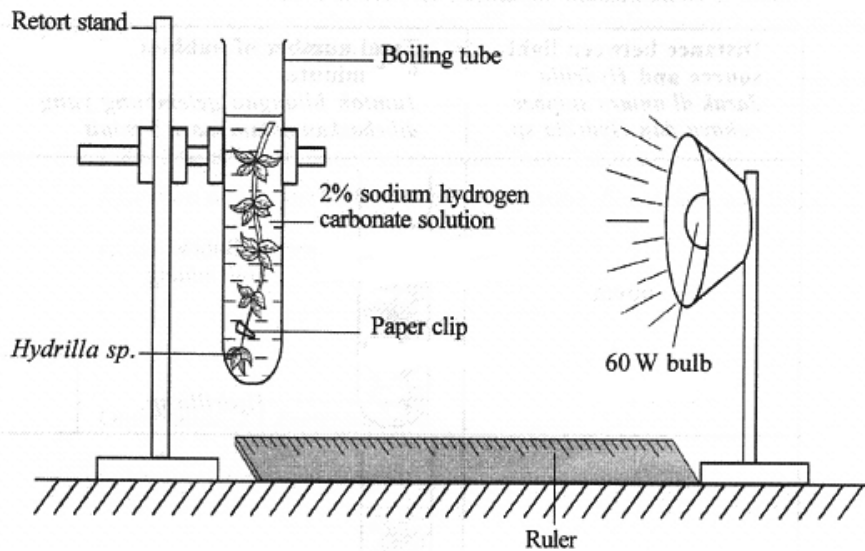


Table 1

(a) In Table 1, list all the materials and apparatus labeled in Diagram 1.

| Material | Apparatus |
|----------|-----------|
| | |

Table 1

[3 marks]

1(a)

Table 2 shows the results of the experiment.

For
Examiner's
Use

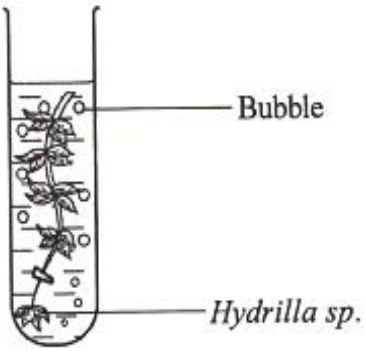



| Distance between light source and <i>Hydrilla sp.</i> | Total number of bubbles released in 5 minutes |
|---|--|
| 60cm |  <input type="text"/> |
| 50cm |  <input type="text"/> |
| 40cm |  <input type="text"/> |
| 30cm |  <input type="text"/> |

Table 2

- (b) Record the total number of bubble released in 5 minutes in the boxes provided in Table 2.

[3 marks]

1(b)

*For
Examiners
Use*

(c) (i) State **two** different observations made from Table 2.

Observation 1:

.....
.....

Observation 2:

.....
.....

[3 marks]

1(c)(i)

(ii) State the inference which corresponds to the observations in 1 (c) (i).

Inference from observation 1:

.....
.....

Inference from observation 2 :

.....
.....

[3 marks]

1(c)(ii)

For Examiner's Use

(d) Complete Table 3 based on this experiment.

| Variable | Method to handle the variable |
|--|-------------------------------|
| Manipulated variable | |
| Responding variable | |
| Controlled variable | |

TABLE 3

[3 marks]

1(d)

1(d)

(e) State the hypothesis is for this experiment.

.....

[3 marks]

1(e)

- (f) (i) Construct a table and record all the data collected in this experiment. Your table should have the following title:

- Distance between light source and *Hydrilla sp.*
- Total number of bubbles released in 5 minutes.
- Light intensity

Used the formula:

$$\text{Light intensity} = \frac{1}{\text{Distance between light source and } \textit{Hydrilla sp.}}$$

*For
Examiner's
Use*

[3marks]

1(f)(i)

- (f) (ii) Use the graph paper provided on the page 9 to answer this part of the question. Using the data in 1(f)(i) , draw the graph of the total number of bubbles against the light intensity.

[3 marks]

1(f)(ii)

- (g) Based on the graph in 1(f)(ii), explain the relationship between the total number of bubbles and the light intensity.

.....
.....
.....

[3 marks]

For
Examiner's
Use

1(g)

- (h) This experiment is repeated using two springs of *Hydrilla sp.*
Predict the total number of bubbles released in 5 minutes by these two sprigs of *Hydrilla sp.* Explain your prediction.

.....
.....
.....

[3 marks]

1(h)

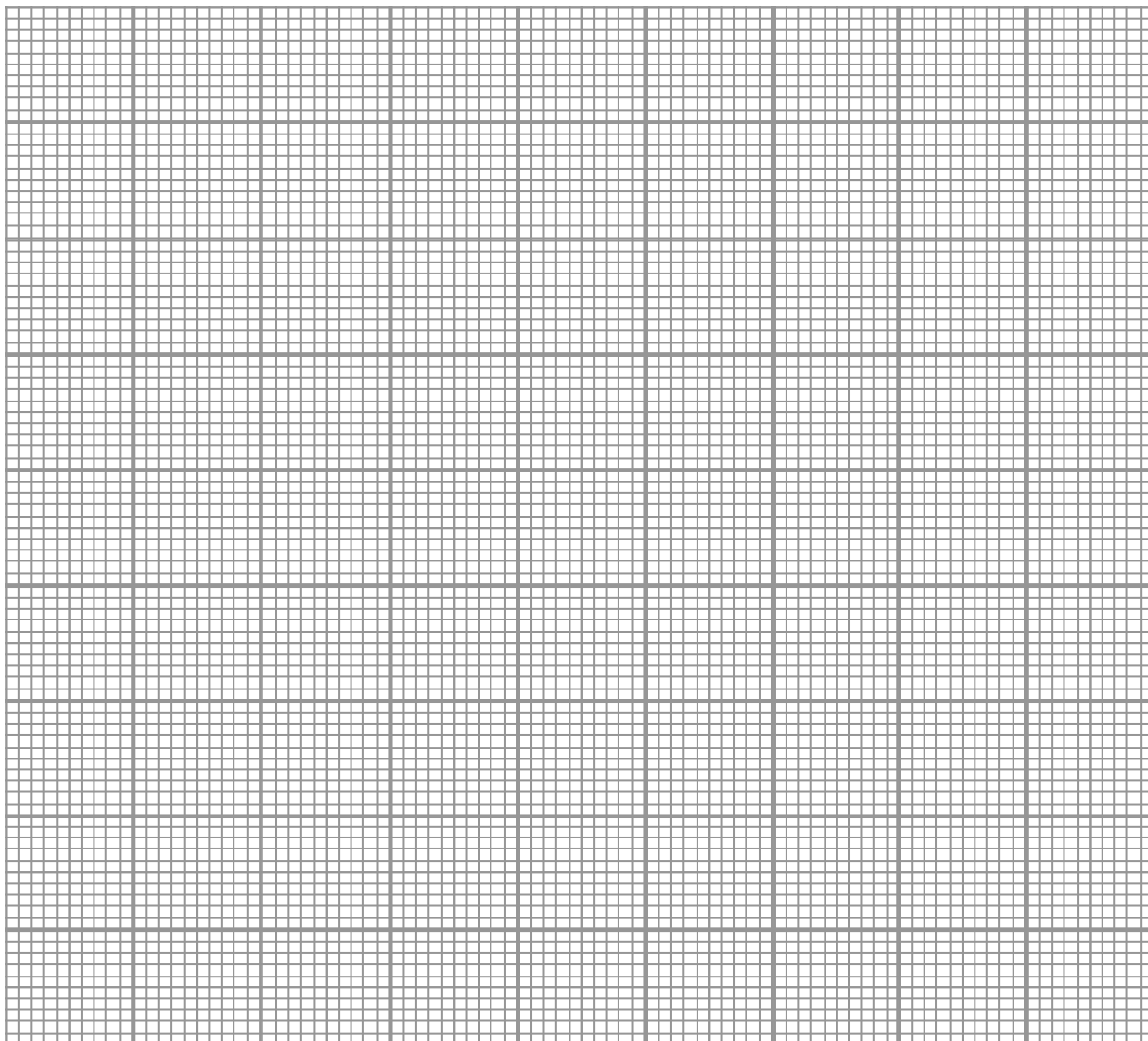
- (i) Based on the result from this experiment, what can be deduced about photosynthesis ?

.....
.....
.....

[3 marks]

1(i)

Graph of the total number of bubbles against the light intensity



(Chapter 7: Respiration)
Praktis Bestari JUU 2009

A group of students carried out an experiment to study the effect of the concentration of nutrients on the activity of yeast. Diagram 1.1 shows the method used by the students.

Sekumpulan pelajar menjalankan eksperimen untuk mengkaji kesan kepekatan nutrien ke atas aktiviti yis. Rajah 1.1 menunjukkan kaedah yang dilakukan oleh pelajar-pelajar tersebut.

The initial height of the coloured liquid in the manometer is shown in Diagram 1.2. The experiment was repeated using different concentrations of glucose. Table 1.1 shows the results of the experiment after 10 minutes.

Bacaan awal cecair berwarna dalam tiub manometer ditunjukkan seperti Rajah 1.2. Eksperimen ini diulang dengan menggunakan kepekatan glukosa yang berbeza. Jadual 1.1 menunjukkan keputusan eksperimen selepas 10 minit.

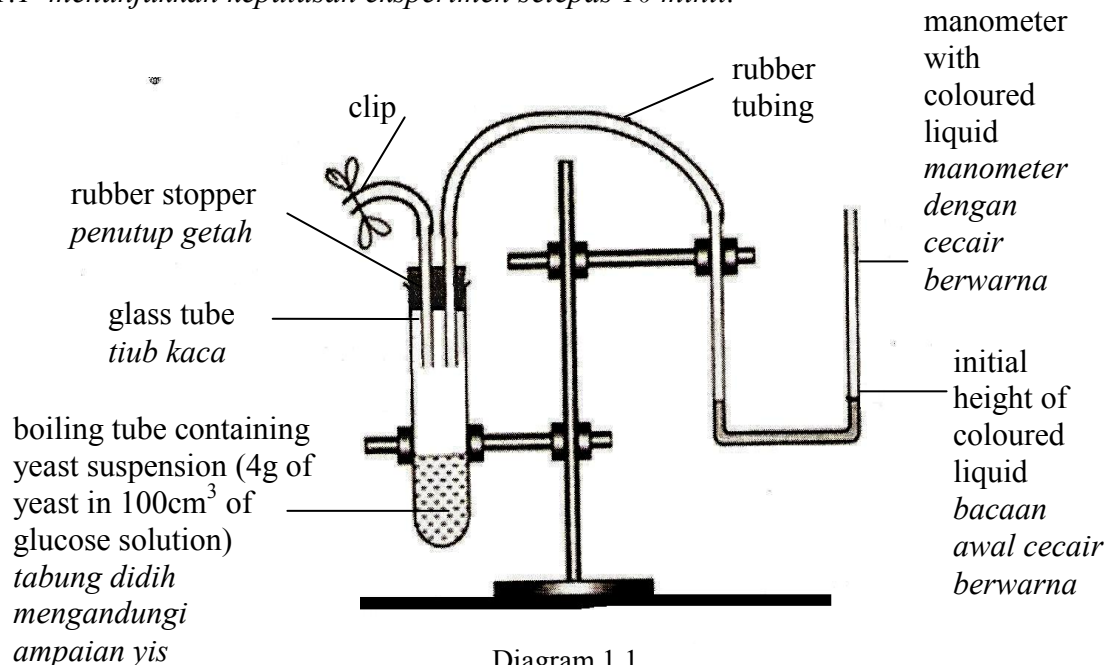


Diagram 1.1
Rajah 1.1

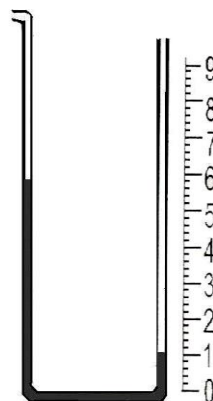


Diagram 1.2
Rajah 1.2

*For
Examiner's
Use*

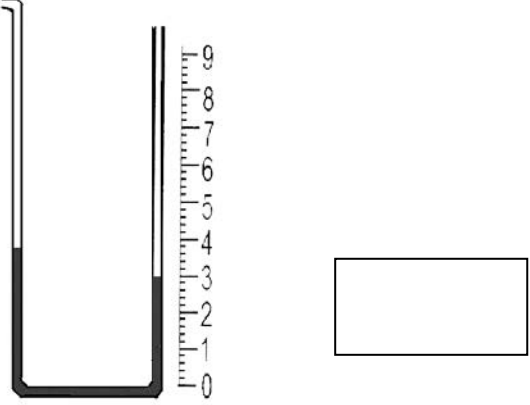
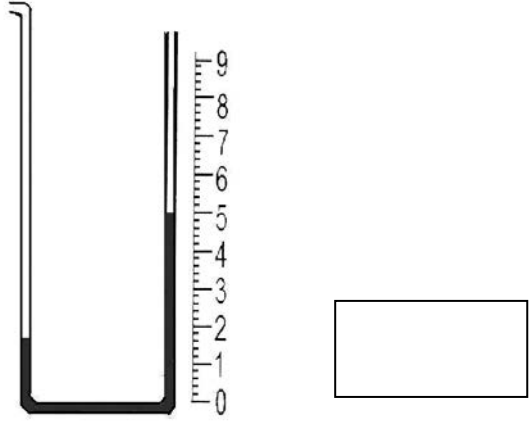
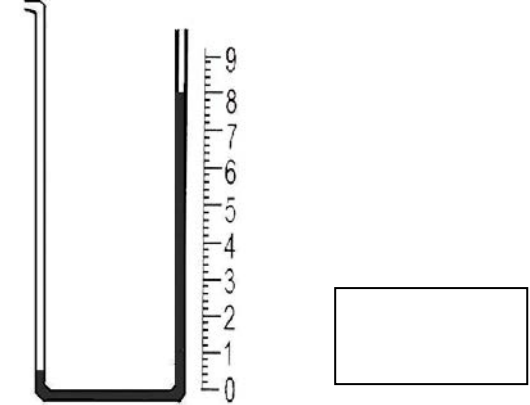
| <p>Percentage concentration of glucose / % <i>Peratus kepekatan glukosa / %</i></p> | <p>Final height of coloured liquid in the manometer / cm <i>Bacaan akhir cecair berwarna dalam manometer /cm</i></p> |
|--|---|
| <p>10</p> |  |
| <p>15</p> |  |
| <p>20</p> |  |

Table 1.1
Jadual 1.1

- (a) Record the height of coloured liquid in the manometer after 10 minutes in the boxes provided in Table 1.1.
Rekod aras kenaikan cecair berwarna selepas 10 minit dalam kotak yang disediakan dalam Jadual 1.1.

For
Examiner's
use

1(a)

[3 marks]

- (b) (i) State **two** different observations made from Table 1.1 .
*Nyatakan **dua** pemerhatian yang berbeza yang dibuat daripada Rajah 1.1.*

Observation 1 :

Pemerhatian 1 :

.....

.....

Observation 2 :

Pemerhatian 2 :

.....

.....

[3 marks]

- (ii) State the inferences from the observations in **1(b)(i)**.
*Nyatakan inferens daripada pemerhatian di **1(b)(i)***

Inference from observation 1 :

Inferens daripada pemerhatian 1 :

.....

.....

Inference from observation 2 :

Inferens daripada pemerhatian 2 :

.....

.....

[3 marks]

1(b)(i)

1(b)(ii)

(c) (i) Complete Table 1.2 based on this experiment.

Lengkapkan Jadual 1.2 berdasarkan eksperimen ini.

*For
Examiner's
use*

| Variable <i>Pembolehubah</i> | Method to handle the variable <i>Cara mengendali pembolehubah</i> |
|--|---|
| Manipulated variable <i>Pembolehubah dimanipulasi</i> | |
| Responding variable <i>Pembolehubah bergerak balas</i> | |
| Constant variable <i>Pembolehubah dimalarkan</i> | |

Table 1.2
Jadual 1.2

[3 marks]

1(c)(i)

- (c) (ii) The following list is part of the apparatus and material used in this experiment.
Senarai berikut adalah sebahagian daripada radas dan bahan yang digunakan dalam eksperimen ini.

yeast , metre rule, coloured liquid, electronic balance, glucose solution, measuring cylinder
yis , pembaris, cecair berwarna , penimbang elektronik , larutan glukosa, silinder penyukat

Complete Table 1.3 by matching each variable with the apparatus and material used in the experiment.

Lengkapkan Jadual 1.3 dengan memadankan setiap pembolehubah dengan radas dan bahan yang digunakan dalam eksperimen ini.

| Variables <i>Pembolehubah</i> | Apparatus <i>Radas</i> | Material <i>Bahan</i> |
|---|----------------------------------|---------------------------------|
| Manipulated <i>Dimanipulasikan</i> | | |
| Responding <i>Bergerak balas</i> | | |
| Controlled <i>Dimalarkan</i> | | |

Table 1.3
Jadual 1.3

[3 marks]

1 (c) (ii)

- (d) State the hypothesis for this experiment.
Nyatakan hipotesis bagi eksperimen ini.

.....

[3 marks]

1 (d)

- (e) (i) Construct a table and record all the data collected in this experiment.
Bina satu jadual dan rekodkan semua data yang dikumpulkan dalam eksperimen ini.

Your table should have the following aspects:

Jadual anda hendaklah mengandungi aspek-aspek berikut:

- Title with correct unit
Tajuk dengan unit yang betul
- Percentage concentration of glucose
Peratusan kepekatan larutan glukosa
- Changes in the height of coloured liquid
Perubahan aras kenaikan cecair berwarna
- The rate of the activity of yeast
Kadar tindak balas aktiviti yis

*For
Examiner's
use*

[3 marks]

1(e)(i)

- (e) (ii) Use the graph paper provided, draw a graph of the rate of the activity of yeast against the concentration of glucose.
Dengan menggunakan kertas graf yang disediakan, lukis graf kadar tindak balas aktiviti yis melawan kepekatan glukosa.

*For
Examiner's
use*

1(e)(ii)

[3 marks]

- (f) Explain the relationship between the rate of the activity of yeast and the concentration of glucose based on the graph in 1(e)(ii).
Berdasarkan graf di 1(e)(ii), terangkan hubungan antara kadar tindak balas aktiviti yis dan kepekatan glukosa.

.....

1(f)

[3 marks]

- (g) State the operational definition for anaerobic respiration in yeast.
Nyatakan definisi secara operasi bagi respirasi anaerob oleh yis.

.....

1(g)

[3 marks]

- (h) The experiment is repeated by using the apparatus set up in Diagram 1.3 . 1 ml of 0.1 mol dm^{-3} of sodium hydroxide solution is added into the boiling tube. The experiment is left for 10 minutes.

Eksperimen ini diulang dengan menggunakan radas seperti Rajah 1.3. Sebanyak 1 ml larutan natrium hidroksida 0.1 mol dm^{-3} ditambahkan ke dalam tabung didih. Eksperimen ini dibiarkan selama 10 minit.

For Examiner's use

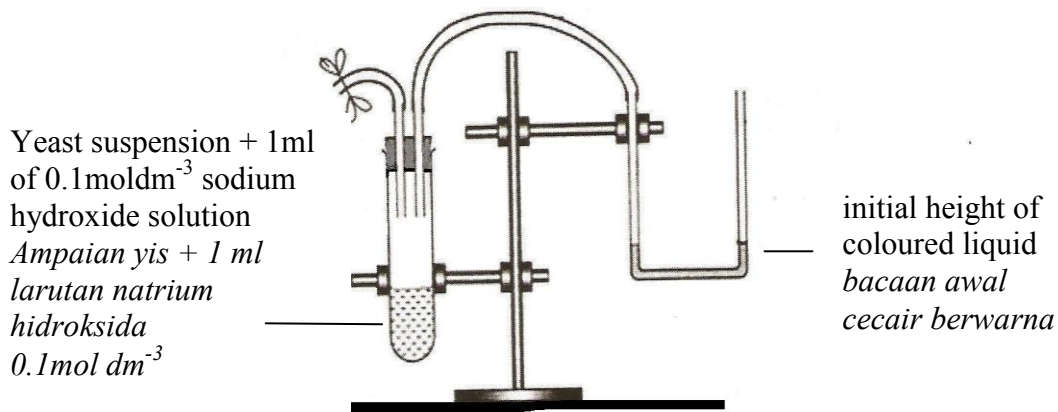
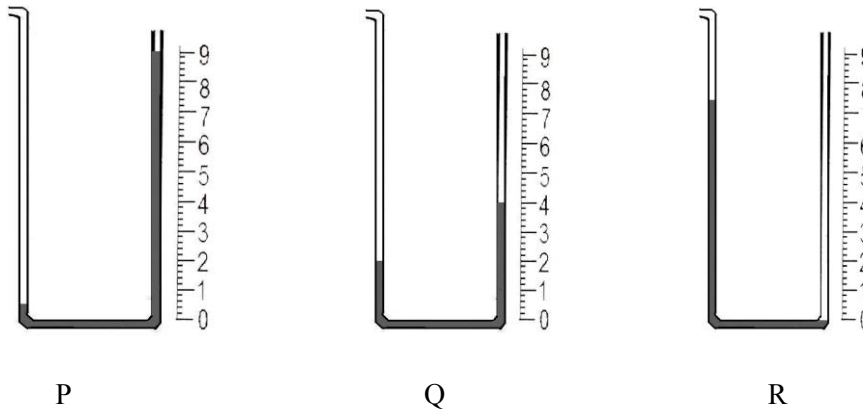


Diagram 1.3
Rajah 1.3

P, Q and R are three possible observations . Choose **one** correct observation and explain your choice.

P, Q dan R adalah tiga kemungkinan pemerhatian. Pilih **satu** pemerhatian yang betul dan terangkan pilihan anda.



.....

.....

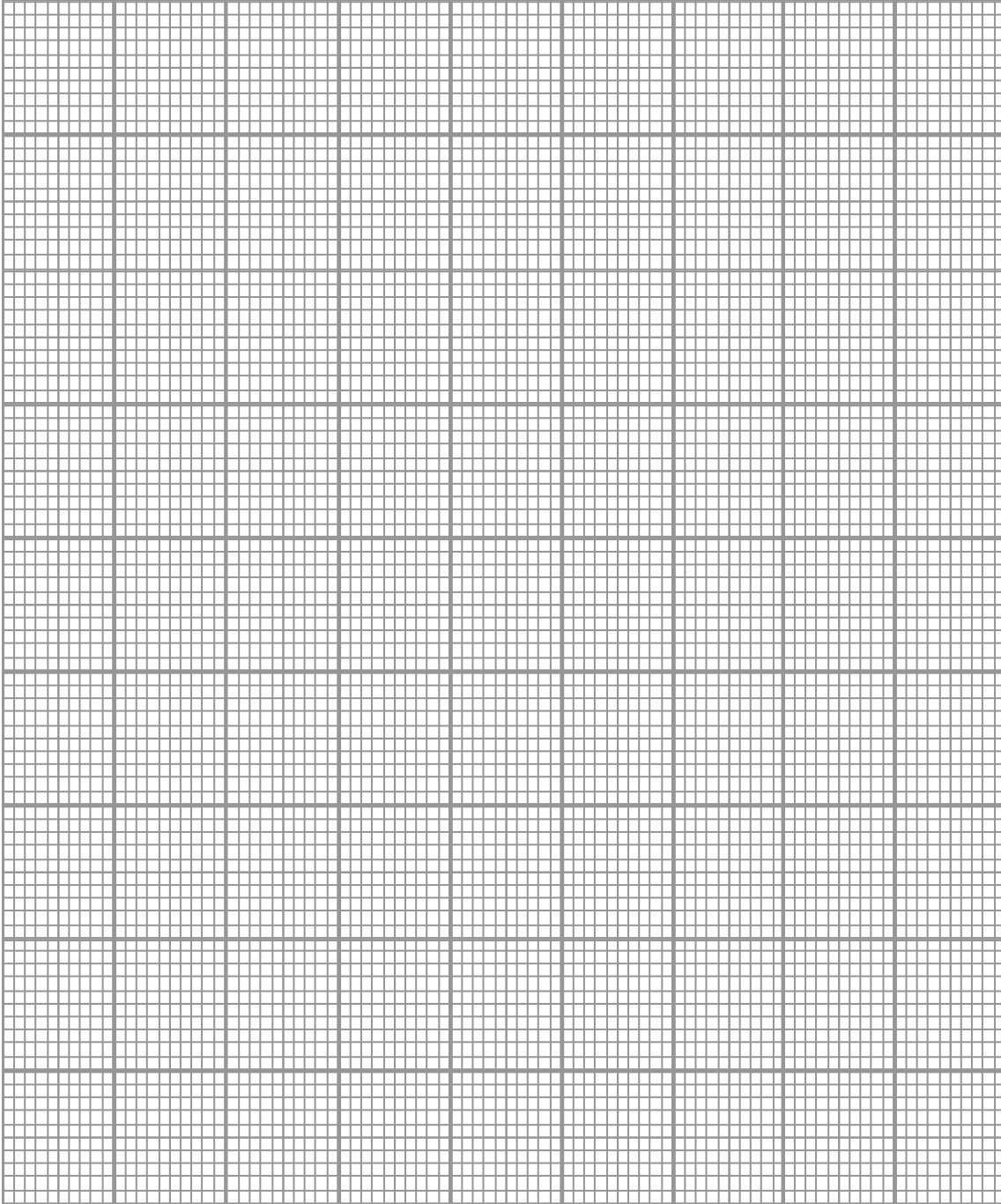
.....

[3 marks]

1(h)

TOTAL

Graph of the rate of the activity of yeast against the concentration of glucose.
Graf kadar tindak balas aktiviti yis melawan kepekatan glukosa.



6

(Chapter 8: Dynamic Ecosystem)
Modul JUJ 2009: SPM 2008

Pleurococcus. Sp is a unicellular green alga found on the bark of trees. The population distribution of *Pleurococcus. Sp* is affected by abiotic factors such as light intensity. A group of students carried out an experiment to investigate the effect of light intensity on the population distribution of *Pleurococcus. Sp*.

Diagram 1 shows a tree plant trunk on which *Pleurococcus. Sp* was growing.

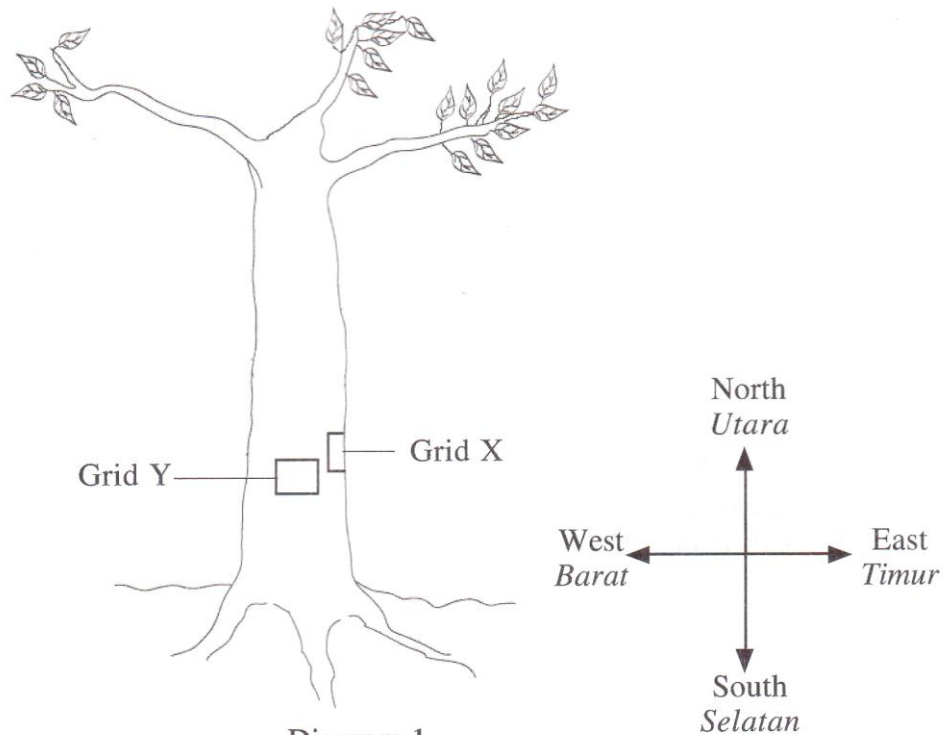


Diagram 1
Rajah 1

Two samples of the distribution of *Pleurococcus. Sp.*, Grid X and Grid Y, were taken. Grid X was placed on the trunk facing east which received more sunlight. Grid Y was placed on the tree trunk facing south which received less sunlight.

Table 1 (a) and Table 1 (b) show the total surface area covered by *Pleurococcus* sp. on Grid X and Grid Y.

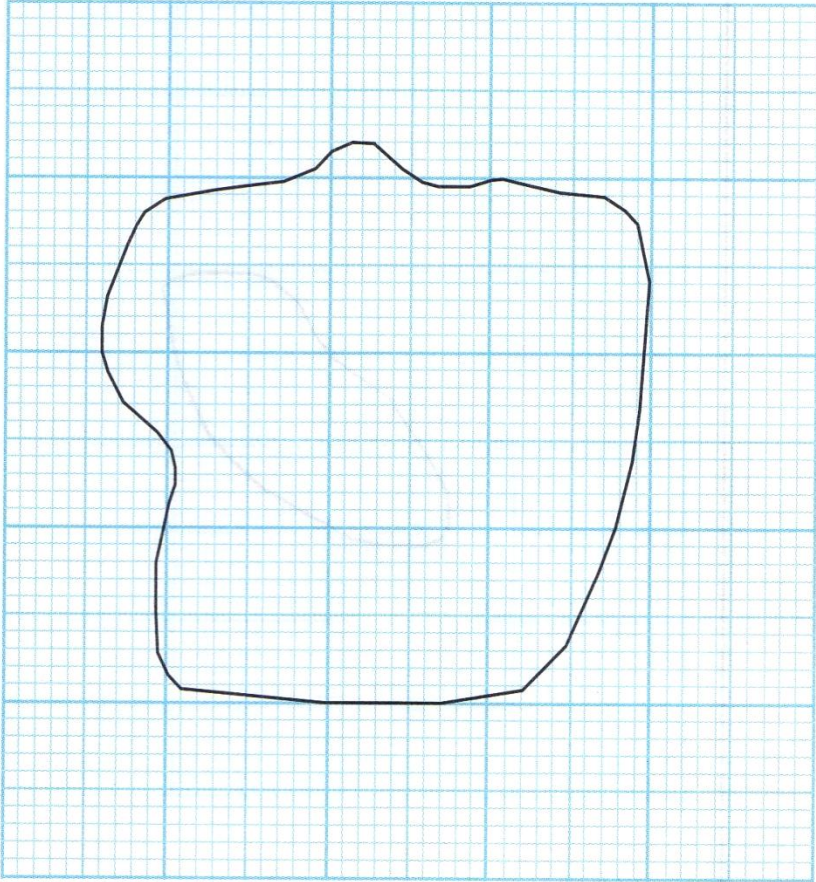
| Grid | Total surface area covered by <i>Pleurococcus</i> sp. |
|------|--|
| X | <div style="text-align: center;">  </div> <div style="text-align: right; margin-top: 20px;"> <p>..... cm²</p> </div> |

Table 1 (a)

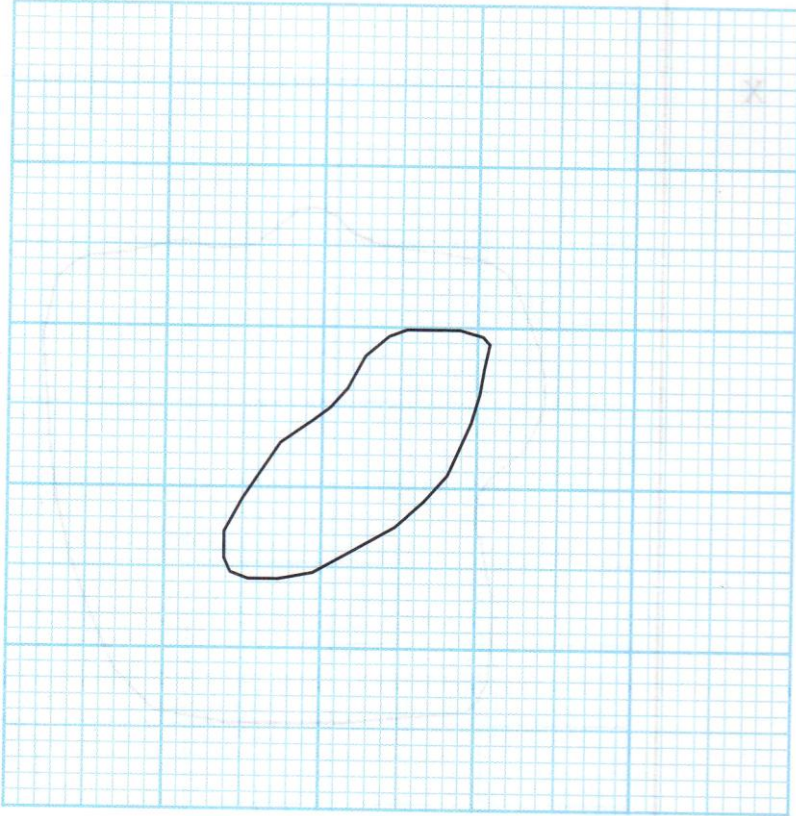
| Grid | Total surface area covered by <i>Pleurococcus</i> sp. |
|------|--|
| Y |  <p style="text-align: right;">..... cm²</p> |

Table 1 (b)

(a) Record the total surface area covered by *Pleurococcus* sp.in the spaces provided in Table 1(a) and Table 1 (b). [3 marks]

For
Examiner's
Use

1(a)

(b) (i) State two different observations made from the diagrams in Table 1 (a) and Table 1 (b)

Observation 1:

.....
.....

Observation 2:

.....
.....

[3 marks]

1(b)(i)

(ii) State the inferences from the observations in 1(b) (i).

Inference from observation 1:

.....
.....

Inference from observation 2 :

.....
.....

[3 marks]

1(b)

(c) Complete Table 2 based on this experiment.

*For
Examiner's
Use*

| Variable | Method to handle the variable |
|---|-------------------------------|
| Manipulated variable | |
| Responding variable | |
| Controlled variable | |

Table 3

[3marks]

1(c)

(d) State the hypothesis is for this experiment.

.....
.....
.....
.....

[3 marks]

1(d)

(e) (i) Construct a table and record all the data collected in this experiment. Your table should have the following aspects:

- Title with the correct unit
- Position of the grid
- Total surface area covered by *Pleucococcus* sp.

*For
Examiner's
Use*

[3marks]

1(e)(i)

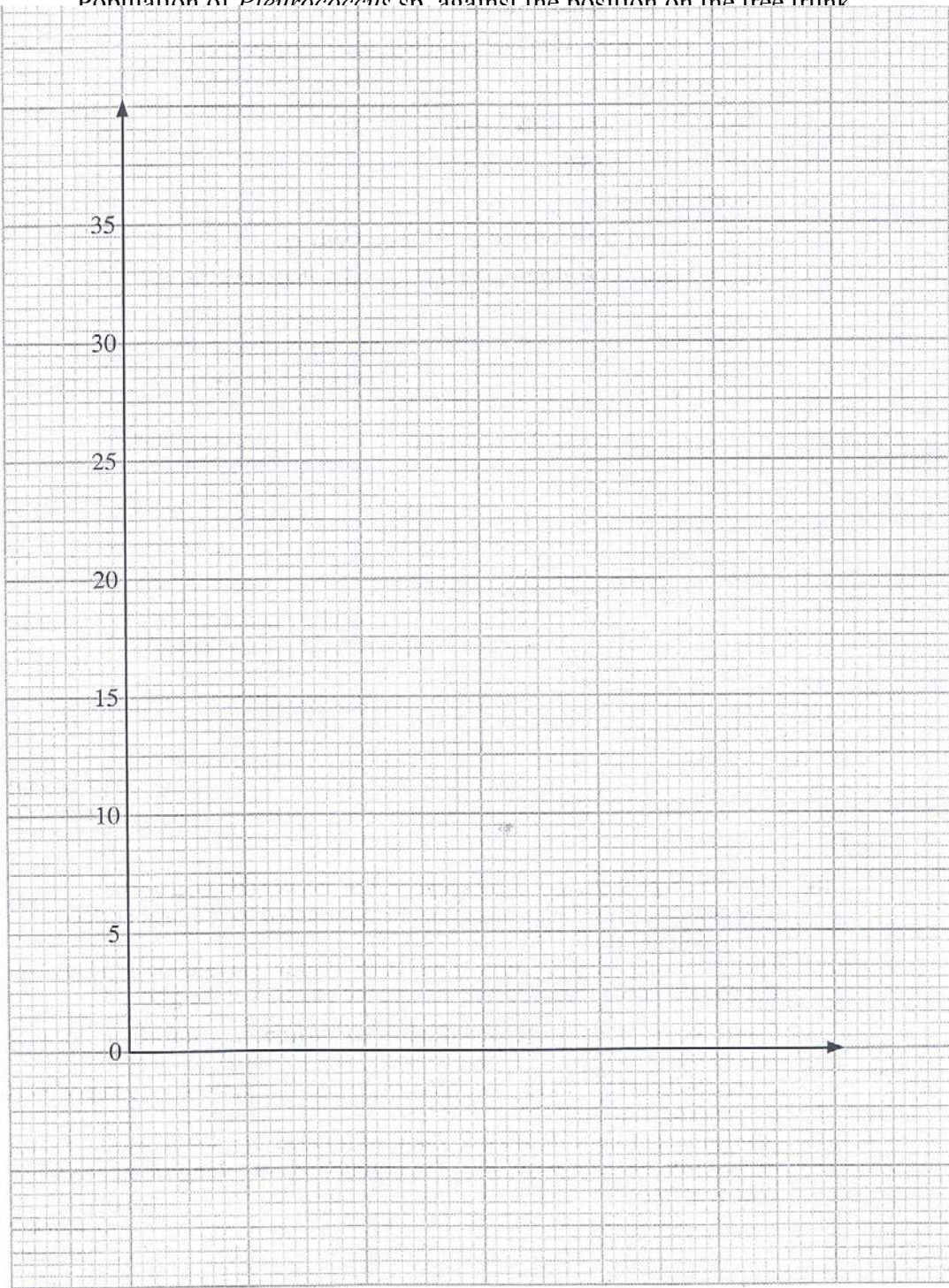
(e) (ii) Use the graph paper provided on the page 8 to answer this question. The population of *Pleucococcus* sp is represented by the total surface area covered in the grid.

Using the data in 1(e)(i) , draw a bar chart to show the relationship between the population of *Pleucococcus* sp. and the position of the grids.

[3 marks]

1(e)(ii)

Population of *Pleurococcus* sp. against the position on the tree trunk



For
Examiner's
Use

- (f) Based on the bar chart in 1(e)(ii), explain the relationship between the population distribution of *pleurococcus* sp and the light intensity.

.....

.....

.....

[3 marks]

For
Examiner's
Use

1(f)

- (g) State the operational definition for population distribution of *Pleurococcus* sp. *Hydrilla* sp. Explain your prediction.

.....

.....

.....

[3 marks]

1(g)

- (h) Lightning strikes the tree and causes the tree to fall. The *Pleurococcus* sp. under study is than exposed to direct sunlight from 7.00am. till 6.00p.m daily.

Based on the results of this experiment, predicts what will happen to the total surface area covered by the *Pleurococcus* sp. after one week.
Explain your prediction.

.....

.....

.....

[3 marks]

1(h)

(i) The following is a list of biotic and abiotic factors.

pH paper, fish, water-lily, humidity, snail, temperature, soil

Classify these factors in Table 3.

| Biotic factor | Abiotic factors |
|---------------|-----------------|
| | |

Table 3

[3 marks]

*For
Examiner's
Use*

1(i)

TOTAL

7

(Chapter 9: Endangered Ecosystem)
Praktis bestari JUJ 2007

A group of students carried out an experiment to study the water pollution level in four water samples, P, Q, R and S.

Diagram 1 shows the method used by the students.

Each water samples is added with 1 ml of methylene blue 0.1% and kept in a cupboard.

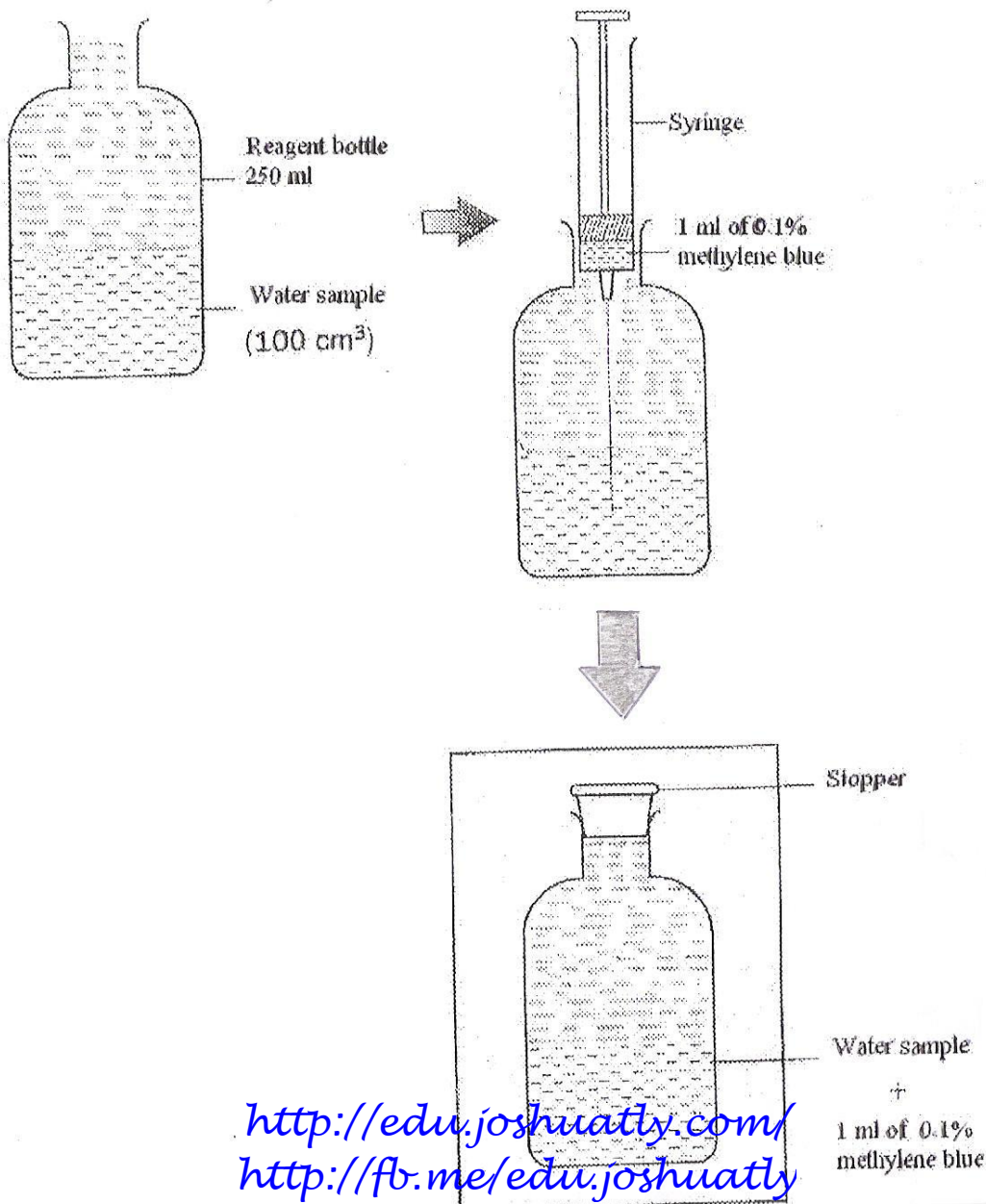
The time taken for the methylene blue solution to decolourise is shown in Table 1.

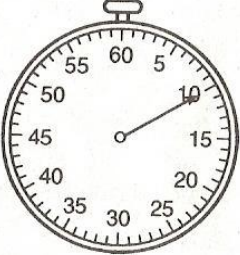
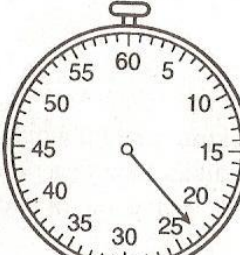
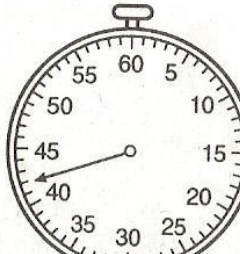
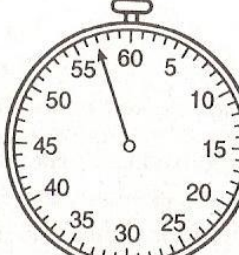
Sekumpulan pelajar telah menjalankan satu eksperimen untuk mengkaji tahap pencemaran air bagi empat sampel air yang diambil dari empat sumber berlainan iaitu P, Q, R dan S.

Rajah 1 menunjukkan kaedah yang telah digunakan oleh kumpulan pelajar itu.

Setiap sampel air dicampurkan dengan 1 ml larutan metilena biru 0.1% dan dimasukkan ke dalam almari gelap.

Masa pelunturan warna metilena biru ditunjukkan dalam Jadual 1.



| Water samples | Time taken for methylene blue solution to decolourise / minutes | |
|---------------|--|--|
| P |  <div style="float: right; border: 1px solid black; width: 100px; height: 30px; margin-top: 20px;"></div> | |
| Q |  <div style="float: right; border: 1px solid black; width: 100px; height: 30px; margin-top: 20px;"></div> | |
| R |  <div style="float: right; border: 1px solid black; width: 100px; height: 30px; margin-top: 20px;"></div> | |
| S |  <div style="float: right; border: 1px solid black; width: 100px; height: 30px; margin-top: 20px;"></div> | |

- a) Record the time taken for methylene blue solution to decolourise in the boxes provided in Table 1. [3 marks]

*For
Examiner's
Use*

- b) (i) State **two** different observations made from Table 1.

1(a)

- 1
.....
2
.....

[3 marks]

1(b)(i)

- (ii) State the inference which corresponds to the observation in (b)(i).

- 1 :
.....
2 :
.....

[3 marks]

1(b)(ii)

(c) Complete Table 2 based on the experiment that was carried out.

| Variables | Particulars to be implemented |
|--|---|
| Manipulated variable | How to alter the manipulated variable |
| Responding variable | How to determine the responding variable |
| Controlled variable | How to maintain the controlled variable |

Table 2

[3marks]

1(c)

(d) State the hypothesis for this experiment.

.....

[3 marks]

1(d)

(e) (i) Base on Table 1, construct a table and record the results of the experiments.

*For
Examiner's
Use*

[3 marks]

1(e)(i)

(ii) Base on the table in (e) (i), state the relationship between the time taken for methylene blue solution to decolourise and the amount of dissolved oxygen in water samples.

.....
.....
.....

[3 marks]

1(e)(ii)

- (f) A student shakes the reagent bottle containing water sample S vigorously and left it on the table without covering.
Predict the observation and explain your answer.

.....

[3 marks]

1(f)

- (g) Based on this experiment, what can you deduce about biochemical oxygen Demand (BOD).

.....

[3 marks]

1(g)

- (h) If the time taken for the methylene blue solution to decolourise is seen as an indicator of the level of pollution in a sample of water, classify the water samples P, Q, R and S according to the levels of pollution based on Table 2, assuming they represent samples of water collected from different sources.

| Class | Status | Time taken for methylene blue solution to decolourise |
|-------|-------------------|---|
| 1 | Clean | More than 50 minutes |
| 2 | Slightly polluted | 30 – 50 minutes |
| 3 | Very polluted | 10 – 30 minutes |
| 4 | Severely polluted | 5 to 10 minutes |

.....

[3 marks]

1(h)

- (i) Explain the relationship between the amount of dissolved oxygen in water samples and the level of water pollution based on your answer in (h).

.....
.....
.....

[3 marks]

*For
Examiner's
Use*

1(i)

(Chapter 12: Coordination & Response)
Praktis Bestari JUJ 2008

Osmoregulation is an example of homeostasis that regulated the blood osmotic pressure by regulating the water content and the concentration of salts in the body.

Pengosmokawalaturan adalah satu contoh homeostasis yang mengawal tekanan osmosis darah dengan mengawal atur kandungan air dan garam di dalam badan.

A group of students carried out an experiment to study the effect of drinking different quantities of water on urine output.

Sekumpulan pelajar menjalankan satu eksperimen untuk mengkaji kesan pengambilan air yang berbezakuantiti ke atas isipadu air kencing yang terhasil.

The following steps were carried out.
Langkah-langkah-berikut telah dijalankan.

- Step 1 : A student should empty their urinary bladder before start the experiment.
Langkah 1 : Pelajar haruslah mengosongkan pundi kencing sebelum memulakan eksperimen.
- Step 2 : After an hour, the same student who has not been given any food or drink, is made to drink different volume of plain water for four days.
*Langkah 2 : Selepas satu jam, pelajar yang tidak diberi makan dan minum dikehendaki meminum air kosong yang **berlainan isipadu** setiap hari selama empat hari.*
- Step 3 : The volume of urine output of the student is measured using measuring cylinder after an hour everyday.
Langkah 3 : Isipadu air kencing yang terhasil diukur menggunakan silinder penyukat selepas satu jam setiap hari.

Diagram 1 shows the results of the experiment.

Rajah 1 menunjukkan keputusan eksperimen tersebut.

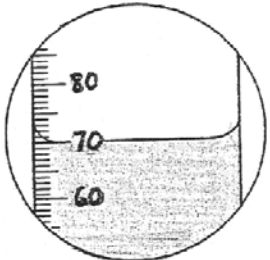
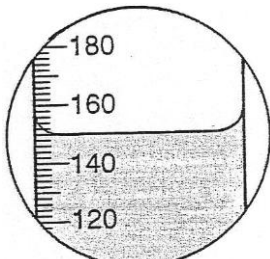
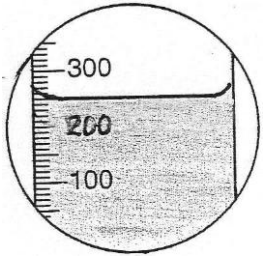
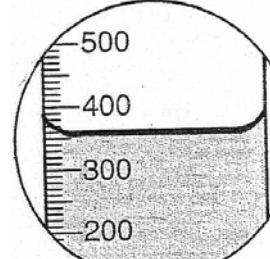
| Day Hari | Volume of plain water taken (ml) Isipadu air kosong yang diminum (ml) | Volume of urine excreted by the student after an hour Isipadu air kencing yang dikumuhkan oleh pelajar selepas satu jam |
|-------------|--|--|
| 1 | 100 |  <input type="text"/> |
| 2 | 200 |  <input type="text"/> |
| 3 | 300 |  <input type="text"/> |
| 4 | 400 |  <input type="text"/> |

Diagram 1
Rajah 1

- a) Record the volume of urine excreted by the student after an hour in the boxes provided in Table 1.

Rekod isipadu air kencing yang dikumuhkan oleh pelajar tersebut selepas satu jam dalam petak yang disediakan dalam Jadual 1.

[3 marks]

*For
Examiner's
Use*

1(a)

- b) (i) State two different observations made from Table 1.

Nyatakan dua pemerhatian yang berbeza yang dibuat daripada Jadual 1.

Observation 1 / *Pemerhatian 1 :*

.....

.....

Observation 2 / *Pemerhatian 2 :*

.....

.....

[3 marks]

1(b)(i)

- (ii) State the inference which corresponds to the observations in 1(b)(i).

Nyatakan inferens yang sepadan dengan pemerhatian di 1(c)(i).

Inference from observation 1 / *Inferens daripada pemerhatian 1 :*

.....

.....

Inference from observation 2 / *Inferens daripada pemerhatian 2 :*

.....

.....

[3 marks]

1(b)(ii)

c) Complete Table 1 based on this experiment.

Lengkapkan Jadual 1 berdasarkan eksperimen ini.

*For
Examiner's
Use*

| Variable <i>Pembolehubah</i> | Method to handle the variable <i>Cara mengendali pembolehubah</i> |
|--|---|
| Manipulated variable <i>Pembolehubah dimanipulasi</i> | |
| Responding variable <i>Pembolehubah bergerak balas</i> | |
| Constant variable <i>Pembolehubah dimalarkan</i> | |

Table 1
Jadual 1

[3 marks]

1(c)

d) State the hypothesis for this experiment.

Nyatakan hipotesis bagi eksperimen ini.

.....

[3 marks]

1(d)

- e) (ii) Use the graph paper provided to answer this part of the question.
Using the data in 1 (e)(i), draw the bar chart showing the percentage of water taken in which was excreted as urine by the student.

Guna kertas graf yang disediakan untuk menjawab ceraiian soalan ini. Menggunakan data di 1 (e)(i), lukis carta bar untuk menunjukkan peratus air diminum yang dikumuhkan sebagai air kencing.

[3 marks]

*For
Examiner's
Use*

1(e)(ii)

- f) Explain the relationship between the volume of water intake and the volume of urine excreted by the student.

Terangkan hubungan antara isipadu air yang diminum dengan isipadu air kencing yang dikumuhkan oleh pelajar tersebut.

.....

.....

.....

[3 marks]

1(f)

- h) Based on the result from this experiment, what can be deduced about osmoregulation?

Berdasarkan keputusan daripada eksperimen ini, apakah yang dapat dirumuskan tentang homeostasis?

.....

.....

.....

[3 marks]

*For
Examiner's
Use*

1(h)

- i) Another group of students carried out the experiment to study the effect of the following materials on the volume of urine output.

Sekumpulan pelajar yang lain menjalankan eksperimen untuk menyiasat kesan pengambilan bahan yang berbeza seperti di bawah ke atas isipadu air kencing.

| | | |
|---|--|--|
| Salted plums <i>Jeruk plum asin</i> | Watermelon <i>Tembikai</i> | Prawn crackers <i>Keropok udang</i> |
| Isotonic drink <i>Minuman isotonik</i> | Potato chips <i>Kerepek kentang</i> | Orange juice <i>Jus oren</i> |

Classify all the materials based on their effect on the volume of urine output in Table 3.

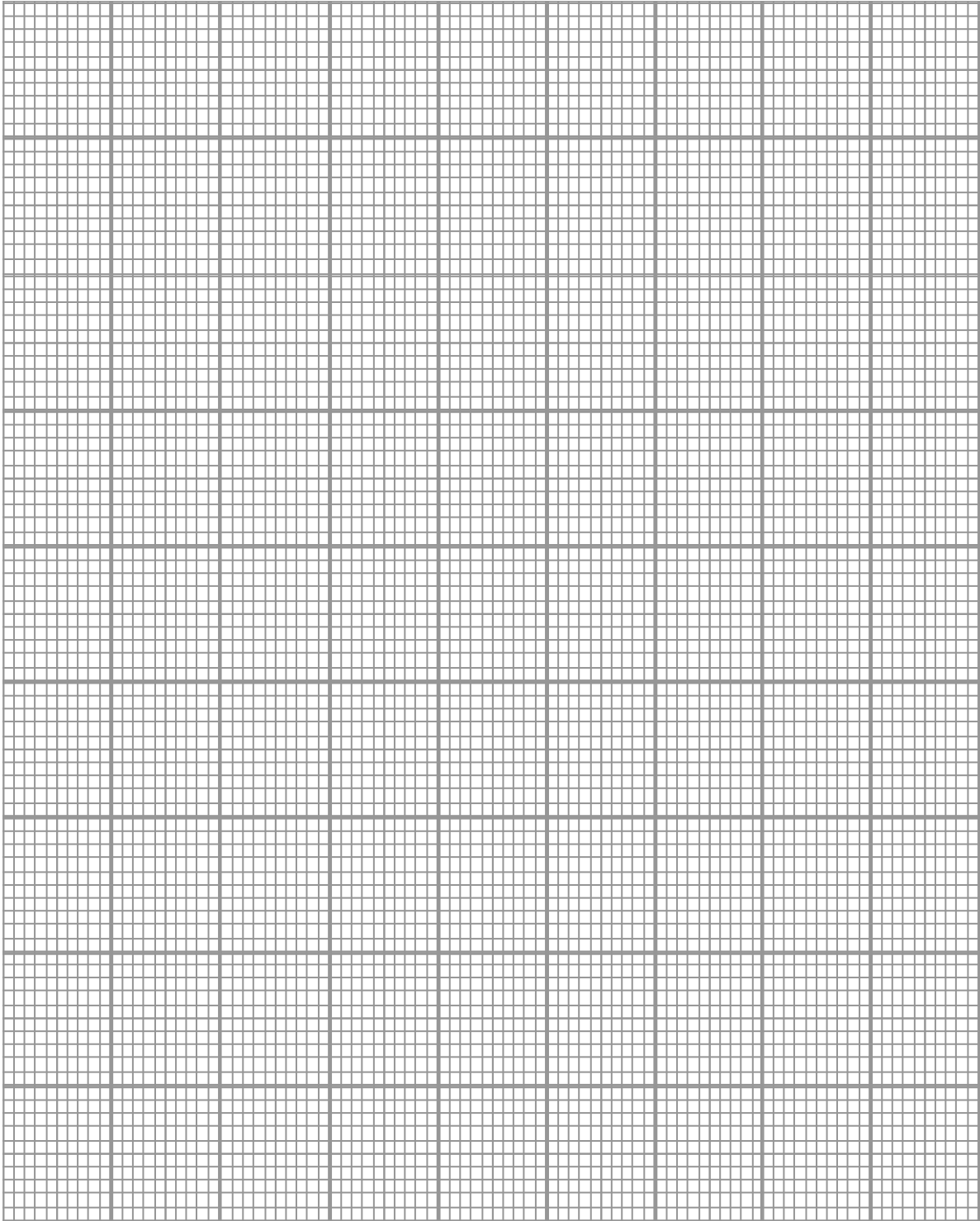
Kelaskan semua bahan tersebut berdasarkan kesannya ke atas isipadu air kencing yang terhasil dalam Jadual 3.

| Increase the volume of urine output <i>Meningkatkan isipadu penghasilan air kencing</i> | Decrease the volume of urine output <i>Mengurangkan isipadu penghasilan air kencing</i> |
|--|--|
| | |

[3 marks]

1(i)

Bar chart of the percentage of water taken in which was excreted as urine by the student against the volume of water intake
Carta bar peratusan air yang diminum yang dihasilkan sebagai air kencing melawan isipadu air yang diminum



(Chapter 13: Reproduction & Growth)
Praktis Bestari JUJ 2010

A group of students carried out an experiment to study the growth of grasshopper. The following steps were carried out :

- Step 1 : Grasshopper was reared in a cage with fine netting and sufficient food supply for 32 days.
- Step 2 : Using a ruler, the body length of grasshopper was measured at intervals of eight days, beginning from the day of hatching. Grasshopper underwent moulting at eight day time intervals. No growth occurred between moulting periods.

Sekumpulan murid menjalankan eksperimen untuk mengkaji pertumbuhan belalang. Langkah-langkah berikut telah dijalankan.

- Langkah 1 : Belalang dikurung dalam sebuah sangkar jaring yang halus dan dibekalkan dengan makanan yang mencukupi selama 32 hari.*
- Langkah 2 : Dengan menggunakan pembaris, panjang badan belalang telah diukur pada sela masa lapan hari, bermula pada hari ia ditangkap. Belalang menjalani proses ekdisis pada sela masa lapan hari. Tiada pertumbuhan berlaku pada masa di antara ekdisis berlaku.*

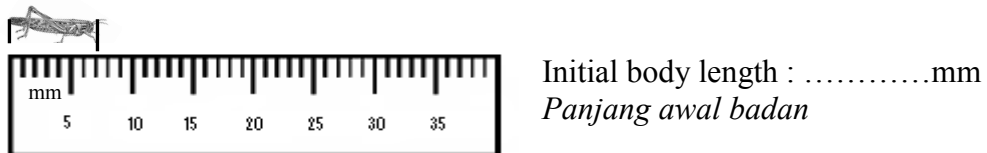


Figure 1 The method of measuring the length of grasshopper on the first day after hatching.

Rajah 1 Kaedah pengukuran panjang belalang pada hari pertama selepas ditangkap.

Table 1 shows the results of measuring the length of grasshopper at eight day time intervals.
Jadual 1 menunjukkan keputusan pengukuran panjang belalang pada sela masa 8 hari.

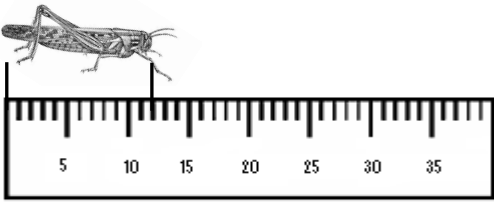
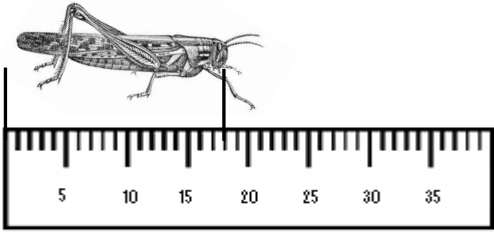
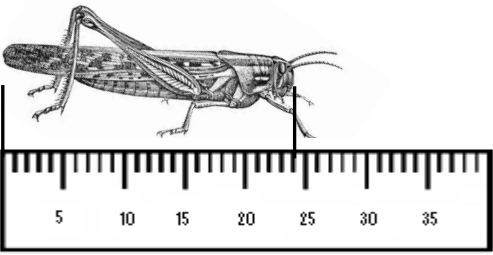
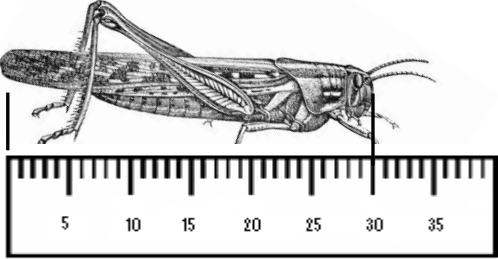
| Observation | Day | Growth stages of grasshopper | Body length (mm) |
|-------------|-----|--|------------------|
| 1 | 8 |  | |
| 2 | 16 |  | |
| 3 | 24 |  | |
| 4 | 32 |  | |

Table 1

Jadual 1

- a) (i) Record the initial body length of grasshopper in the spaces provided in Figure 1.
Rekod panjang badan belalang dalam ruang yang disediakan dalam Rajah 1.
- (ii) Record the body length of grasshopper at eight day time intervals in the spaces provided in Table 1.
Rekod panjang badan belalang pada sela masa lapan hari dalam ruang yang disediakan dalam Jadual 1.

[3 marks]

For
Examiner's
Use

1(a)

- b) (i) Base on Table 1, state **two** different observations.
*Berdasarkan Jadual 1, nyatakan **dua** pemerhatian yang berbeza.*

Observation 1 :
Pemerhatian 1 :

.....

.....

Observation 2 :
Pemerhatian 2 :

.....

.....

[3 marks]

1(b)(i)

- (ii) State the inferences which corresponds to the observations in 1(b)(i).
Nyatakan inferens yang sepadan dengan pemerhatian di 1(b)(i)

Inference from observation 1 :
Inferens daripada pemerhatian 1 :

.....

.....

Inference from observation 2 :
Inferens daripada pemerhatian 2 :

.....

.....

[3 marks]

1(b)(ii)

c) Complete Table 2 based on this experiment.

Lengkapkan Jadual 2 berdasarkan eksperimen ini.

| Variable <i>Pembolehubah</i> | Method to handle the variable <i>Cara mengendali pembolehubah</i> |
|---|--|
| Manipulated variable <i>Pembolehubah dimanipulasi</i> | |
| | |
| | |
| | |
| Responding variable <i>Pembolehubah bergerak balas</i> | |
| | |
| | |
| | |
| Constant variable <i>Pembolehubah dimalarkan</i> | |
| | |
| | |
| | |

Table 2
Jadual 2

[3 marks]

1(c)

d) State the hypothesis for this experiment.

Nyatakan hipotesis bagi eksperimen ini.

.....

.....

.....

[3 marks]

1(d)

- e) (i) Construct a table and record all the data collected in this experiment.
Bina satu jadual dan rekodkan semua data yang dikumpulkan dalam eksperimen ini.

Your table should have the following aspects:
Jadual anda hendaklah mengandungi aspek-aspek berikut:

- Title with correct unit
Tajuk dengan unit yang betul
- Time / Day
Masa / Hari
- Body length
Panjang badan
- Changes in the body length
Perubahan panjang badan
- Growth rate
Kadar pertumbuhan

*For
Examiner's
Use*

[3 marks]

1(e)(i)

- e) (ii) Use the graph paper provided, draw a graph of the length of grasshopper against the time to show the growth curve of an insect.
Dengan menggunakan kertas graf yang disediakan, lukis graf panjang badan belalang melawan masa untuk menunjukkan lengkung pertumbuhan serangga .

[3 marks]

For
Examiner's
Use

1(e)(ii)

- f) Based on the graph in 1(e)(ii), explain the growth curve of grasshopper.
Berdasarkan graf di 1(e)(ii), terangkan lengkung pertumbuhan belalang.

.....

[3 marks]

1(f)

- g) Based on the result of this experiment, state the operational definition for growth of grasshopper.
Berdasarkan keputusan eksperimen ini, nyatakan definisi secara operasi bagi pertumbuhan belalang.

.....

[3 marks]

1(g)

- h) Another group of students carried out the same experiment. The grasshopper is supplied with excess food on day 27.
 Predict the outcome of this experiment. Explain your prediction.
*Sekumpulan murid yang lain menjalankan eksperimen yang sama. Belalang itu telah diberi makanan yang berlebihan pada hari ke 27.
 Ramalkan hasil eksperimen ini. Terangkan ramalan anda.*

.....

[3 marks]

1(h)

- i) Using the list provided below, in Table 3, classify the animal based on their shape of growth curve.

Cricket , Frog , Dragon fly , Elephant , Bird , Ant

Menggunakan senarai yang disediakan di bawah, dalam Jadual 3, klasifikasikan haiwan tersebut berdasarkan jenis lengkung pertumbuhan.

Cengkerik , Katak , Pepatan , Gajah , Burung , Semut

| Sigmoid Growth Curve <i>Lengkung Pertumbuhan Sigmoid</i> | Staircase Shape <i>Bentuk tangga</i> |
|---|---|
| | |

TABLE 3

[3 marks]

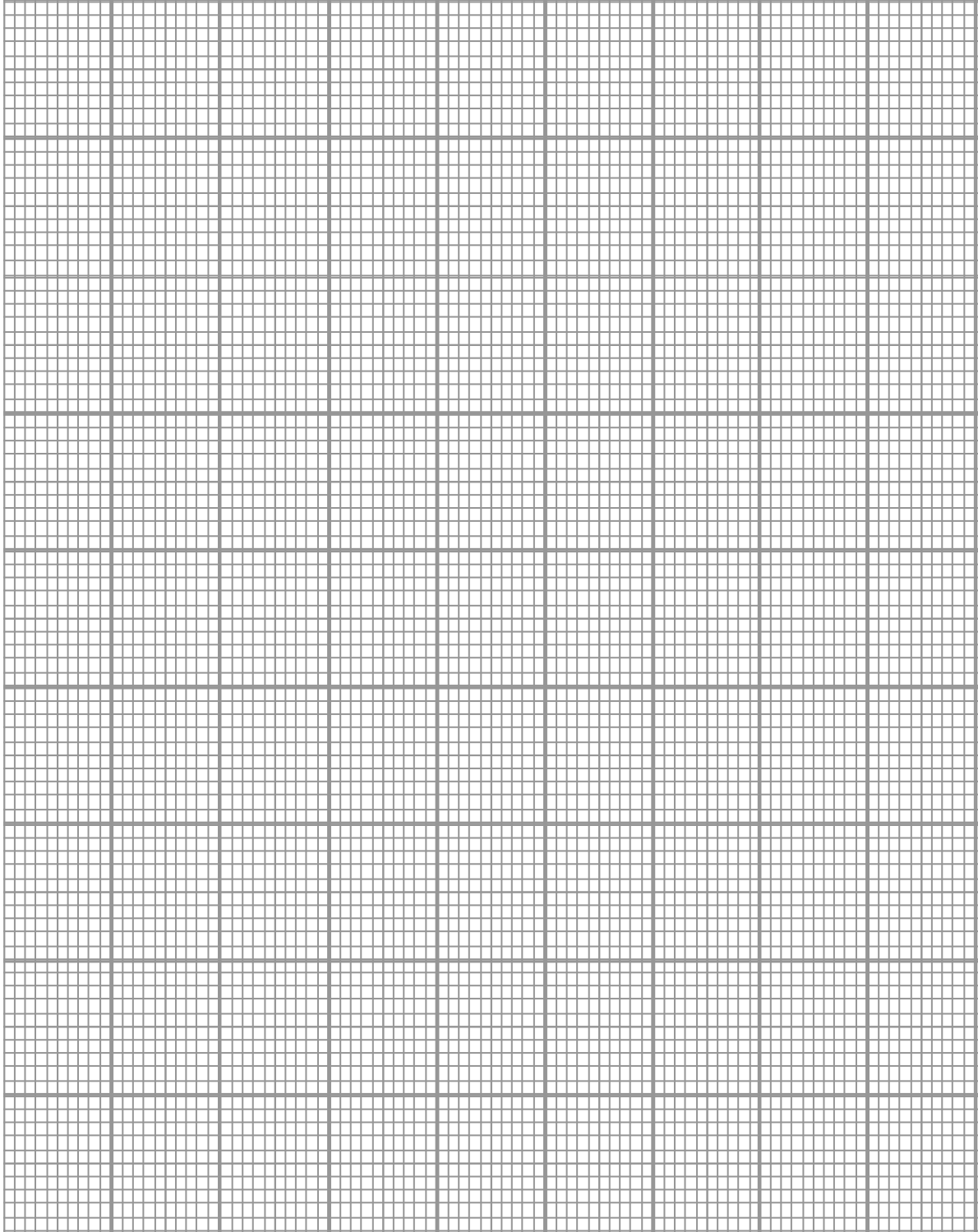
*For
Examiner's
Use*

1(i)

TOTAL

Graph of graph of the length of grasshopper against the time to show the growth curve of an insect.

Graf panjang badan belalang melawan masa untuk menunjukkan lengkung pertumbuhan serangga.



10

(Chapter 15: Variation)
Modul JUJ 2011

*For
Examiner's
Use*

A group of biology students carried out an experiment to determine the variation of leaf by measuring the leaves surface area for three different plant P,Q and R but same spesies.

Sekumpulan pelajar biologi menjalankan satu eksperimen untuk mengkaji variasi daun dengan mengukur luas permukaan daun bagi tiga tumbuhan P, Q dan R yang berlainan persekitaran yang berbeza tapi daripada sepseis yang sama.

Diagram 1 shows the surface area of 48 leaves from P,Q and R.

Rajah 1 menunjukkan luas permukaan 48 helai daun dari tumbuhan P,Q dan R.

| Leaves Surface area Luas permukaan daun (mm ²) | | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|----|----|
| 50 | 61 | 66 | 70 | 55 | 61 | 58 | 64 | 63 | 63 | 74 | 73 |
| 70 | 54 | 66 | 70 | 57 | 68 | 58 | 61 | 63 | 62 | 75 | 71 |
| 73 | 52 | 54 | 66 | 81 | 66 | 59 | 58 | 63 | 67 | 67 | 63 |
| 77 | 60 | 55 | 69 | 72 | 62 | 62 | 65 | 77 | 65 | 68 | 64 |

DIAGRAM 1 / RAJAH 1

- a) Based on the table 1, record the number of leaves based on range of leaves surface area below..

Berdasarkan Rajah 1 rekodkan bilangan daun berdasarkan sela kelas luas permukaan daun di bawah.

| | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|
| Leaves Surface Area/Luas permukaan daun (mm ²) | 50-53 | 54-57 | 58-61 | 62-65 | 66-69 | 70-73 | 74-77 | 78-81 |
| Number of leaf Bilangan daun | | | | | | | | |

[3 marks]

1(a)

- b) (i) Based on table 1, state two observations from this experiment.
Berdasarkan jadual 1, nyatakan dua pemerhatian daripada eksperimen ini.

*For
Examiner's
Use*

Observation1/ Pemerhatian 1

.....
.....
.....

Observation 2/ Pemerhatian 2

.....
.....
.....

1(b)(i)

[3marks]

- (ii) State the inferences which corresponds to the observations in (b)(i)
Nyatakan inference yang berkaitan dengan pemerhatian dalam (b)(i).

Inference 1/ Inferens 1

.....
.....
.....

Inference2/ Inferens 2

.....
.....
.....

1(b)(ii)

[3 marks]

- c) Complete Table 1 based on this experiment.
 Lengkapkan jadual 1 berdasarkan eksperimen

For
 Examiner's
 Use

| Variable <i>Pembolehubah</i> | Method to handle the variable <i>Kaedah mengendalikan pembolehubah</i> |
|---|---|
| Manipulated variable <i>Pembolehubah dimanipulasi</i> | |
| Responding variable <i>Pembolehubah bergerakbalas</i> | |
| Controlled variable <i>Pembolehubah dimalarkan</i> | |

[3 marks]

1(c)

- d) State the hypothesis for this experiment.
 Nyatakan hipotesis eksperimen ini.

.....

[3 marks]

1(d)

4551/3

- e) (i) Based on table 1, construct a table and record the result of the experiment which includes the following aspects:
Berdasarkan jadual 2, bina satu jadual dan rekod keputusan eksperimen di mana mengandungi aspek berikut :-

- Title with correct unit
Tajuk dengan unit yang betul
- Leaves surface area
Luas permukaan daun
- Number of leaves
Bilangan daun

*For
Examiner's
Use*

[3 marks]

1(e)(i)

- e) ii) Use the graph paper provided to answer this question. The variation of leaves is represented by the leaves surface area. Using the the data in 1(e)(i) , draw a bar chart to show the relationship between variation of leaves against number of leaves on the graph paper provided.

Gunakan graf yang di sediakan untuk menjawab soalan ini. Variasi daun diwakili oleh luas permukaan daun.

Menggunakan data di 1 (e)(i), lukis graf bar untuk menunjukkan hubungan antara variasi daun dengan bilangan daun

[3 marks]

1(e)(ii)

For Examiner's Use

- f) Based on a bar chart, explain the relationship between variation of leaves and the number of leaves.
Berdasarkan graf bar , terangkan perhubungan antara variasi daun dan bilangan daun.

.....

[3 marks]

1(f)

- g) The experiment is repeated using same plant but planted in sand area. Predict the number leaves in range surface area 74 – 81 mm² .

Eksperimen di ulang menggunakan pokok yang sama tetapi di tanam di kawasan berpasir .Ramalkan bilangan daun dalam sela luas permukaan daun antara 74-81mm² .

.....

[3 marks]

1(g)

- h) Based on the result of this experiment, state the operational definition of continuous variation.

Berdasarkan keputusan eksperimen ini, nyatakan definasi secara operasi bagi variasi selanjur.

.....

[3 marks]

1(h)

- i) The following is a list of genetic and environmental factors for variation classify these factors causing variation in table 3.

For Examiner's Use

Berikut adalah senarai faktor-faktor genetic dan sekitaran yang mempengaruhi variasi klasifikasikan faktor penyebab variasi dalam jadual 3

mutation, nutrient ,sunlight, temperature, sexual reproduction,
mutasi, nutrient, cahaya matahari, suhu pembiakan seksual.

| Genetic Factor <i>Faktor Genetik</i> | Environment Factor <i>Faktor Persekitaran</i> |
|--|---|
| | |

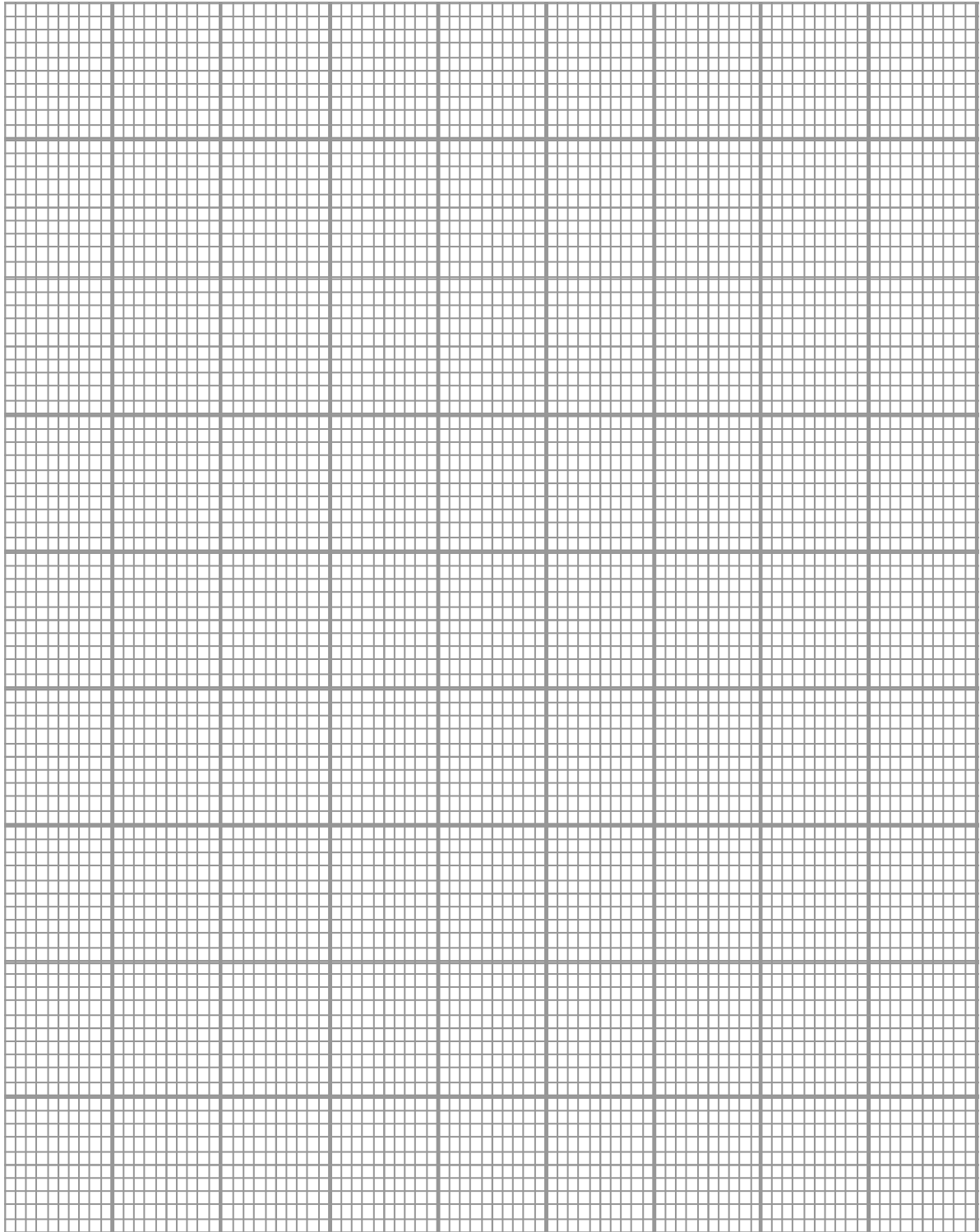
Table 3
Jadual 3

1(i)

[3 marks]

TOTAL

Number of leaves against variation of leaves



Soalan 2

1. (Chapter 3 : Movement Of Substances Across Plasma Membrane) Modul JUJ 2006 : SPM 2005

Maklumat :

Jisim dan kesegaran tisu tumbuhan dipengaruhi oleh proses osmosis.

Osmosis dipengaruhi oleh kepekatan bahan larut di dalam sel dan di luar sel

Situasi:

Seorang pekebun mempunyai dusun rambutan. Oleh itu hasil dusunnya terlalu banyak, dia bercadang untuk menghasilkan jem rambutan. Sebelum buah rambutan itu diproseskan menjadi jem, jisimnya perlu dikekalkan untuk sementara waktu. Oleh itu pekebun tersebut perlu menentukan larutan dan kepekatan yang harus digunakan.



Berdasarkan maklumat dan situasi di atas, rekabentuk satu eksperimen makmal untuk menentukan kepekatan larutan yang mengekalkan jisim tisu tumbuhan.

Gunakan tisu tumbuhan yang sesuai semasa merekabentuk eksperimen anda.

Perancangan eksperimen anda hendaklah meliputi aspek-aspek berikut:

- Pernyataan masalah yang dikaji
- Objektif kajian
- Pembolehubah
- Pernyataan hipotesis
- Senarai bahan dan alat radas
- Teknik yang digunakan
- Prosedur eksperimen
- Cara data dipersembahkan
- Kesimpulan

(17 markah)

2. *(Chapter 4 : Chemical Composition In The Cell)*
Praktis Bestari JUJ 2007

Yis digunakan untuk membuat roti. Untuk menghasilkan roti yang lembut, doh yang telah diuli tidak boleh dengan serta merta dimasukkan ke dalam pembakar. Doh tidak naik kerana yis termusnah akibat suhu yang tinggi.

Suhu adalah salah satu komponen abiotik yang mempengaruhi aktiviti mikroorganisma seperti yis.

Rancang satu eksperimen di dalam makmal untuk menyiasat kesan suhu ke atas aktiviti mikroorganisma.

Perancangan kerja eksperimen anda perlu meliputi aspek-aspek berikut

- Pernyataan masalah
- Objektif kajian
- Pernyataan hipotesis
- Pembolehubah
- Senarai bahan dan alat radas
- Teknik yang digunakan
- Kaedah atau prosedur eksperimen
- Data yang dikumpul
- Cara data dikomunikasikan
- Kesimpulan

(17 markah)

3.

*(Chapter 6 : Nutrition)**Praktis Bestari JUJ 2008*

Vitamin C is a require substances to human body for maintaining the gum health. A scurvy patient want to choose either he better takes a lime juice or a mango juice to get enough supplement of Vitamin C.

Vitamin C merupakan suatu bahan yang diperlukan oleh badan untuk mengekalkan kesihatan gusi. Seorang pesakit skurvi ingin memilih sama ada lebih baik dia mengambil jus limau atau jus mangga bagi mendapatkan Vitamin C yang mencukupi



Design an experiment to help him to choose between of that juices. The planning of the experiment should cover the following aspects :

Rancangkan satu eksperimen untuk membantu beliau memilih di antara dua jenis jus tersebut. Perancangan eksperimen hendaklah meliputi aspek-aspek berikut :

- Problem statement
Penyataan Masalah
- Aim of investigation
Objektif kajian
- Hypothesis
Hipotesis
- Variables
Pembolehubah
- List of apparatus and materials
Senarai radas dan bahan
- Technique used
Teknik yang digunakan
- Experimental procedure or method
Kaedah eksperimen
- Presentation of data
Cara data dipersembahkan
- Conclusion
Kesimpulan

4. (Chapter 7 : Respiration)
Praktis Bestari JUJ 2011

Cigarette smoke contains harmful chemicals which damage the respiratory system and increase the temperature of the respiratory tract.

Asap rokok mengandungi bahan kimia yang merbahaya dan boleh merosakkan sistem respirasi dan meningkatkan suhu dalam salur respirasi.



Based on the above information, plan a laboratory experiment to study the effect of different number of cigarette on the temperature of respiratory tract.

The planning of your experiment must include the following aspects:

Berdasarkan maklumat di atas, rancang satu eksperimen dalam makmal untuk mengkaji kesan bilangan rokok yang berbeza ke atas suhu salur respirasi. Perancangan eksperimen anda hendaklah mengandungi aspek-aspek berikut:

- Problem statement
Pernyataan Masalah
- Hypothesis
Hipotesis
- Variables
Pembolehubah
- List of apparatus and materials
Senarai radas dan bahan
- Experimental procedure
Prosedur eksperimen
- Presentation of data
Persembahan data

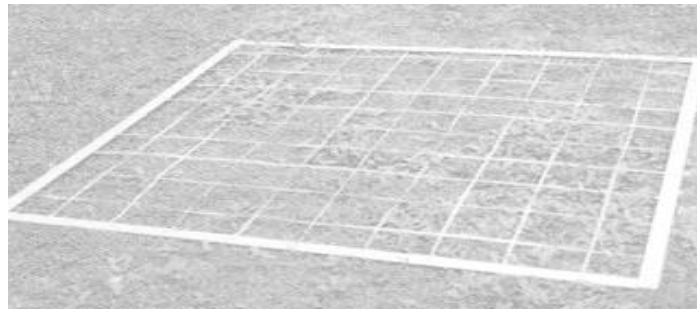
[17 marks]

5.

*(Chapter 8 : Dynamic Ecosystem)**Praktis Bestari JUJ 2010*

Students of 5Sc1 carried out a field work study to determine the population size of plants species X and Y by using the quadrat sampling technique. Figure below shows how the technique was used using a quadrat of 1m x 1m.

Pelajar tingkatan 5Sc1 telah menjalankan suatu projek kajian luar untuk menentukan saiz populasi spesies tumbuhan X dan Y menggunakan teknik persampelan kuadrat. Rajah di bawah menunjukkan bagaimana teknik tersebut digunakan dengan kuadrat beukuran 1m x 1m .



Based on the above diagram, design an experiment to study how the percentage coverage of certain plant species can be determined. Your experimental planning should include the following aspects:
Berdasarkan rajah di atas, reka bentuk suatu eksperimen untuk mengkaji bagaimana peratus taburan sesuatu spesies tumbuhan dapat ditentukan. Perancangan eksperimen anda hendaklah mengandungi aspek-aspek berikut:

- Statement of the identified problem
Pernyataan Masalah dinyatakan
- Objective of the study.
Objektif kajian atau tujuan
- Variables.
Pembolehubah.
- Statement of the Hypothesis.
Pernyataan Hypothesis
- List of materials and apparatus.
Senarai Radas dan bahan
- Technique used.
Teknik digunakan
- Experimental procedure.
Prosedur eksperimen.
- Presentation of data.
Data dikomunikasikan
- Conclusion
Kesimpulan.

[17 marks]

6. *(Chapter 10 :Transport)*
Modul JUJ 2011

Transpiration is the loss of water to surroundings in the form of water vapour from the surface of plant through evaporation

There are several environment factors that affect the rate of transpiration. Humidity is one of the factors that affect the rate of transpiration

Transpirasi ialah proses kehilangan air ke persekitaran melalui permukaan daun melalui proses penyejatan

Design a laboratory experiment to study the effect of humidity on rate of transpiration

The planning of your experiment must include the following aspects:

- ❖ Problem statement
Penyataan masalah
- ❖ Hypothesis
Hipotesis
- ❖ Variables
Pembolehubah
- ❖ List of apparatus and materials
Senarai radas dan bahan
- ❖ Experimental procedures or methods
Prosedur eksperimen
- ❖ Presentation of data
Persembahan data

[17 marks]

7. *(Chapter 4 :Chemical Composition of The Cell)*
Modul JUJ 2010 : SPM 2009

Situation 1A

Housewife A uses warm water to wash her clothes using washing liquid which contains added enzyme. The cleaning is more effective.

Situation 2

Using the same washing liquid as in situation 1, housewife B uses cold water to wash her clothes. The cleaning is less effective.

Base on both situation, design a laboratory experiment to study the effect of temperature on the rate of enzyme reaction.

The planning of your experiment must include the following aspects:

- Problem statement
- Aim of investigation
- Hypothesis
- Variables
- List of apparatus and materials
- Technique used
- Experimental procedure or method
- Presentation of data
- Conclusion

[17 marks]

END OF QUESTION

Skema Pemarkahan Soalan 1

1. Praktis Bestari JUJ2011(Chapter 3: Movement of Susbtances Across Plasma Membrane)

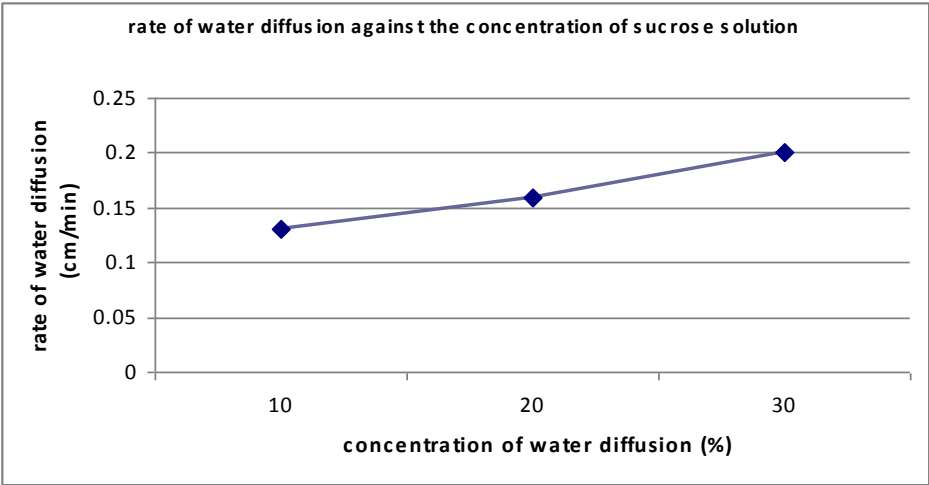
| No | Mark Scheme | Score | | | | | | | | |
|--|---|-------|--|--|----|-----|----|-----|----|-----|
| KB0603 – Measuring Using Number | | | | | | | | | | |
| 1(a) | Able to record all 3 readings for the height of sucrose solution correctly <i>Sample answer</i> | 3 | | | | | | | | |
| | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="padding: 5px;">Concentration of sucrose solution, %</th> <th style="padding: 5px;">Height of the sucrose solution in the capillary tube after 20 minutes,cm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">10</td> <td style="text-align: center; padding: 5px;">2.6</td> </tr> <tr> <td style="text-align: center; padding: 5px;">20</td> <td style="text-align: center; padding: 5px;">3.2</td> </tr> <tr> <td style="text-align: center; padding: 5px;">30</td> <td style="text-align: center; padding: 5px;">4.0</td> </tr> </tbody> </table> | | Concentration of sucrose solution, % | Height of the sucrose solution in the capillary tube after 20 minutes,cm | 10 | 2.6 | 20 | 3.2 | 30 | 4.0 |
| | Concentration of sucrose solution, % | | Height of the sucrose solution in the capillary tube after 20 minutes,cm | | | | | | | |
| | 10 | | 2.6 | | | | | | | |
| 20 | 3.2 | | | | | | | | | |
| 30 | 4.0 | | | | | | | | | |
| Able to record any two readings correctly | 2 | | | | | | | | | |
| Able to record any one reading correctly | 1 | | | | | | | | | |
| No response or incorrect response | 0 | | | | | | | | | |
| KB0601 - Observation | | | | | | | | | | |
| (b) (i) | Able to state two different observations correctly : P1 – Concentration of sucrose solution P2 - The height/level of sucrose solution Sample Answers Horizontal observation: 1. The height/level of sucrose solution (in capillary tube) is 2.6cm/3.2cm/4.0cm in 10%/20%/30% of sucrose solution. Vertical observation : 1. The height/level of sucrose solution (in capillary tube) in 30% of sucrose solution is the highest compared to the 10% / 20% of sucrose solution. 2. When the concentration of sucrose solution used is increases the height/level of sucrose solution is increases. | 3 | | | | | | | | |
| | Able to state one observation correctly and two inaccurate observations. Sample answers 1. The height/level of sucrose solution (in capillary tube) is higher when 30% of sucrose solution is used. | 2 | | | | | | | | |

| | <p>2. The height/level of sucrose solution (in capillary tube) is lowest when 10% of sucrose solution is used.</p> <p>Able to state the observations at idea level</p> <p>Sample answer</p> <ol style="list-style-type: none"> The height/level of sucrose solution (in capillary tube) is increase / 2.6cm / 3.2cm / 4.0cm. The height/level of sucrose solution depends on the concentration of sucrose solution. | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|------|---------|------------|------|-------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No response or incorrect response | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Scoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>-</td> <td>-</td> <td>-</td> <td>3</td> </tr> <tr> <td>1</td> <td>1</td> <td>-</td> <td>-</td> <td rowspan="2">2</td> </tr> <tr> <td>-</td> <td>2</td> <td>-</td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td>1</td> <td>-</td> <td rowspan="4">1</td> </tr> <tr> <td>-</td> <td>-</td> <td>2</td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td>-</td> <td>1</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> </tr> <tr> <td>-</td> <td>1</td> <td>-</td> <td>1</td> <td rowspan="2">0</td> </tr> <tr> <td>-</td> <td>-</td> <td>1</td> <td>1</td> </tr> </tbody> </table> | | | Correct | Inaccurate | Idea | Wrong | Score | 2 | - | - | - | 3 | 1 | 1 | - | - | 2 | - | 2 | - | - | 1 | - | 1 | - | 1 | - | - | 2 | - | 1 | - | - | 1 | - | 1 | 1 | - | - | 1 | - | 1 | 0 | - | - | 1 | 1 |
| Correct | Inaccurate | Idea | Wrong | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | - | - | - | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | - | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 2 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | - | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| KB0604 - Making inference | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (b) (ii) | <p>Able to make two inferences correctly</p> <p><u>Criteria:</u> P1 : Infer on concentration of sucrose solution - The concentration gradient <u>low/high</u> P2 : Infer on height - Water diffuse/move into the Visking tubing <u>less/more</u></p> <p>Sample answers</p> <ol style="list-style-type: none"> 10% of sucrose solution has <u>low</u> concentration gradient (compare to distilled water) so <u>less</u> water diffuse/move into the Visking tubing 30% of sucrose solution has high concentration gradient (compare to distilled water) so more water diffuse/move into the Visking tubing | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| <p>Able to make one correct inference and one inaccurate or two inaccurate inferences</p> <p>Sample answers</p> <ol style="list-style-type: none"> 10% of sucrose solution has <u>low</u> concentration gradient (compare to distilled water) Water diffuse/move into the Visking tubing <u>more/less</u> | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|------------|---------|------------|-------|-------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <p>Able to state only one correct inference or two inferences at idea level</p> <p>Sample answers</p> <ol style="list-style-type: none"> Water diffuse/move into the Visking tubing | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>No response or incorrect response</p> | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p><u>Scoring</u></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>-</td> <td>-</td> <td>-</td> <td>3</td> </tr> <tr> <td>1</td> <td>1</td> <td>-</td> <td>-</td> <td rowspan="2">2</td> </tr> <tr> <td>-</td> <td>2</td> <td>-</td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td>1</td> <td>-</td> <td rowspan="4">1</td> </tr> <tr> <td>-</td> <td>-</td> <td>2</td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td>-</td> <td>1</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> </tr> <tr> <td>-</td> <td>1</td> <td>-</td> <td>1</td> <td rowspan="2">0</td> </tr> <tr> <td>-</td> <td>-</td> <td>1</td> <td>1</td> </tr> </tbody> </table> | | Correct | Inaccurate | Idea | Wrong | Score | 2 | - | - | - | 3 | 1 | 1 | - | - | 2 | - | 2 | - | - | 1 | - | 1 | - | 1 | - | - | 2 | - | 1 | - | - | 1 | - | 1 | 1 | - | - | 1 | - | 1 | 0 | - | - | 1 | 1 |
| Correct | Inaccurate | Idea | Wrong | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | - | - | - | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | - | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 2 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | - | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| KB0610-Controlling variables | | | | | | | | | | |
|--|--|----------|-------------------------------|---|--|---|---|--|--|---|
| (c) | <p>Able to state all 3 variables and 3 methods to handle the variable. Sample answers</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Variable</th> <th style="width: 50%; text-align: center;">Method to handle the variable</th> </tr> </thead> <tbody> <tr> <td> <p style="text-align: center;"><u>Manipulated variable</u></p> <p>Concentration of sucrose (solution)</p> </td> <td> <p>Use different concentration of sucrose (solution) Change 10% sucrose solution with 20% and 30% of sucrose solution Use various concentration of sucrose solution</p> </td> </tr> <tr> <td> <p style="text-align: center;"><u>Responding variable</u></p> <p>Height of the sucrose solution (in the capillary tube after 20 minutes)</p> <p>Rate of water diffusion</p> </td> <td> <p>Record the height of the sucrose solution using a ruler Measure and record the height of the sucrose solution using a ruler</p> <p>Calculate the rate of water diffusion by using the formula = $\frac{\text{Height of sucrose solution}}{\text{Time taken}}$</p> </td> </tr> <tr> <td> <p style="text-align: center;"><u>Controlled variable</u></p> <p>1. Volume of sucrose solution 2. Volume of distilled water 3. Time taken (to immersed the Visking tubing)</p> </td> <td> <p>1. Use the same / Fix volume of sucrose solution, 20 ml. 2. Use the same / Fix volume of distilled water, 250 ml 3. Fix the time 20 minutes.</p> </td> </tr> </tbody> </table> | Variable | Method to handle the variable | <p style="text-align: center;"><u>Manipulated variable</u></p> <p>Concentration of sucrose (solution)</p> | <p>Use different concentration of sucrose (solution) Change 10% sucrose solution with 20% and 30% of sucrose solution Use various concentration of sucrose solution</p> | <p style="text-align: center;"><u>Responding variable</u></p> <p>Height of the sucrose solution (in the capillary tube after 20 minutes)</p> <p>Rate of water diffusion</p> | <p>Record the height of the sucrose solution using a ruler Measure and record the height of the sucrose solution using a ruler</p> <p>Calculate the rate of water diffusion by using the formula = $\frac{\text{Height of sucrose solution}}{\text{Time taken}}$</p> | <p style="text-align: center;"><u>Controlled variable</u></p> <p>1. Volume of sucrose solution 2. Volume of distilled water 3. Time taken (to immersed the Visking tubing)</p> | <p>1. Use the same / Fix volume of sucrose solution, 20 ml. 2. Use the same / Fix volume of distilled water, 250 ml 3. Fix the time 20 minutes.</p> | 3 |
| Variable | Method to handle the variable | | | | | | | | | |
| <p style="text-align: center;"><u>Manipulated variable</u></p> <p>Concentration of sucrose (solution)</p> | <p>Use different concentration of sucrose (solution) Change 10% sucrose solution with 20% and 30% of sucrose solution Use various concentration of sucrose solution</p> | | | | | | | | | |
| <p style="text-align: center;"><u>Responding variable</u></p> <p>Height of the sucrose solution (in the capillary tube after 20 minutes)</p> <p>Rate of water diffusion</p> | <p>Record the height of the sucrose solution using a ruler Measure and record the height of the sucrose solution using a ruler</p> <p>Calculate the rate of water diffusion by using the formula = $\frac{\text{Height of sucrose solution}}{\text{Time taken}}$</p> | | | | | | | | | |
| <p style="text-align: center;"><u>Controlled variable</u></p> <p>1. Volume of sucrose solution 2. Volume of distilled water 3. Time taken (to immersed the Visking tubing)</p> | <p>1. Use the same / Fix volume of sucrose solution, 20 ml. 2. Use the same / Fix volume of distilled water, 250 ml 3. Fix the time 20 minutes.</p> | | | | | | | | | |
| | All 6 ticks | | | | | | | | | |
| | Able to state 4 to 5 ticks | 2 | | | | | | | | |
| | Able to state 2-3 ticks | 1 | | | | | | | | |
| | No response or incorrect response or one tick only | 0 | | | | | | | | |

| KB0611-State hypothesis | | | | | | | | | | | |
|--|--|--|-----|---------|--|-----|----------|---|-----|----------|---|
| (d) | <p>Able to state a hypothesis relating manipulated variable and responding variable correctly with the following aspect :</p> <p>P1 – Manipulated variable – Concentration of sucrose solution P2 – Responding variable – Height of sucrose solution in capillary tube H - relationship – increase</p> <p>Sample answer</p> <ol style="list-style-type: none"> As the concentration of sucrose solution increases, the height/level of sucrose solution in capillary tube increases //vice-versa | 3 | | | | | | | | | |
| | <p>Able to state a hypothesis relating the manipulated variable and the responding variable inaccurately.</p> <p>Sample answer</p> <ol style="list-style-type: none"> When the concentration of sucrose solution different, the height/level of sucrose solution in capillary tube different. The height/level of sucrose solution in capillary tube depends on the concentration of sucrose solution. The height/level of sucrose solution in capillary tube directly / linearly proportional on the concentration of sucrose solution. | 2 | | | | | | | | | |
| | <p>Able to state one idea of a hypothesis</p> <p>Sample answer</p> <ol style="list-style-type: none"> The height/level of sucrose solution (in capillary tube) increases. The height/level of sucrose solution (in capillary tube) changes. The height/level of sucrose solution in capillary tube is 2.6cm for 10% sucrose solution. | 1 | | | | | | | | | |
| | <p>No response or incorrect response</p> <ul style="list-style-type: none"> If no P1 and P2, no mark for H | 0 | | | | | | | | | |
| KB0606 – Communicating data | | | | | | | | | | | |
| (e) (i) | <p>Able to construct a table correctly and record all the data correctly</p> <p><u>Note</u></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 60%;">1. Able to state the 3 titles with units correctly</td> <td style="width: 10%;">- T</td> <td style="width: 30%;">1- mark</td> </tr> <tr> <td>2. Able to record all data for height of the sucrose solution correctly.</td> <td>- D</td> <td>1 - mark</td> </tr> <tr> <td>3. Able to calculate and record rate of water diffusion</td> <td>- C</td> <td>1 - mark</td> </tr> </table> | 1. Able to state the 3 titles with units correctly | - T | 1- mark | 2. Able to record all data for height of the sucrose solution correctly . | - D | 1 - mark | 3. Able to calculate and record rate of water diffusion | - C | 1 - mark | 3 |
| 1. Able to state the 3 titles with units correctly | - T | 1- mark | | | | | | | | | |
| 2. Able to record all data for height of the sucrose solution correctly . | - D | 1 - mark | | | | | | | | | |
| 3. Able to calculate and record rate of water diffusion | - C | 1 - mark | | | | | | | | | |

| | <p>Sample answer</p> <table border="1"> <thead> <tr> <th>Concentration of sucrose solution, %</th> <th>Height of the sucrose solution in the capillary tube after 20 minutes,cm</th> <th>Rate of water diffusion, cm/minute</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>2.6</td> <td>0.13</td> </tr> <tr> <td>20</td> <td>3.2</td> <td>0.16</td> </tr> <tr> <td>30</td> <td>4.0</td> <td>0.20</td> </tr> </tbody> </table> | Concentration of sucrose solution, % | Height of the sucrose solution in the capillary tube after 20 minutes,cm | Rate of water diffusion, cm/minute | 10 | 2.6 | 0.13 | 20 | 3.2 | 0.16 | 30 | 4.0 | 0.20 | |
|--------------------------------------|--|--------------------------------------|--|------------------------------------|----|-----|------|----|-----|------|----|-----|------|--|
| Concentration of sucrose solution, % | Height of the sucrose solution in the capillary tube after 20 minutes,cm | Rate of water diffusion, cm/minute | | | | | | | | | | | | |
| 10 | 2.6 | 0.13 | | | | | | | | | | | | |
| 20 | 3.2 | 0.16 | | | | | | | | | | | | |
| 30 | 4.0 | 0.20 | | | | | | | | | | | | |
| | <p>Any two aspects correctly</p> | <p>2</p> | | | | | | | | | | | | |
| | <p>Any one aspect correctly</p> | <p>1</p> | | | | | | | | | | | | |
| | <p>No response or incorrect response</p> | <p>0</p> | | | | | | | | | | | | |
| <p>(e) (ii)</p> | <p>Able to draw a graph correctly</p> <p>Axes (P) – both axes are label with correct units and uniform scales - 1 mark</p> <p>Points(T)- Able to plot 3 points correctly - 1 mark</p> <p>Shape(B)- Able to joint all 3 points - 1 mark</p> <p>Sample answer Refer graph</p>  | <p>3</p> | | | | | | | | | | | | |

| | | |
|---------------------------------------|--|---|
| | Any two criteria correctly | 2 |
| | Any one criteria correctly | 1 |
| | No response or incorrect response | 0 |
| KB 0608 – Interpreting data | | |
| (f) | Able to explain the relationship between the concentration of sucrose solution and the rate of water diffusion correctly R1- Able to state the relationship R2- Concentration of water molecule is low in Visking tubing R3- Water move into Visking tubing through <u>osmosis</u> Sample answer 1. The rate of water diffusion is higher when the concentration of sucrose solution is high because the concentration of water molecule in Visking tubing is low. Water diffuse into Visking tubing through osmosis. | 3 |
| | Able to explain the relationship incompletely | 2 |
| | Able to explain the relationship at idea level or only state the relationship. | 1 |
| | No response or incorrect response | 0 |
| KB0609 – Defining by operation | | |
| (g) | Able to state the definition of osmosis based on the following criteria: P- Movement of water molecule into the Visking tubing E1- The level/height of sucrose solution capillary tube increases E2- As the concentration of sucrose solution increases, the height/level of sucrose solution/rate of water diffusion increases. Sample answer 1. Osmosis is the movement of water molecule into the Visking tubing that caused the level/height of sucrose solution capillary tube increases. As the concentration of sucrose solution increases, the height/level of sucrose solution/rate of water diffusion increases. | 3 |

| | | |
|----------------------------|---|---|
| | Any two correct / 2 P's | 2 |
| | Any one correct / 1 P | 1 |
| | None of the above or no response or incorrect response | 0 |
| KB0605 - Predicting | | |
| (h) | <p>Able to predict correctly and explain the prediction based on the following criteria:</p> <p>P – Height of distilled water decrease / less than 4.0cm</p> <p>E1 – concentration of water molecule is high in Visking tubing / hypotonic to sucrose solution</p> <p>E2 – Water molecule diffuse out from Visking tubing through <u>osmosis</u></p> <p><i>Sample answer</i></p> <p>1. The height / level of sucrose solution decrease because concentration of water molecule is high in Visking tubing. Water molecule diffuse out from Visking tubing through <u>osmosis</u></p> | 3 |
| | Any two correct | 2 |
| | Any one correct | 1 |
| | No response or incorrect response | 0 |

| | | | | | | |
|--|---|--|---|----------------------------------|-----------------------------|---|
| KB0602 - Classifying | | | | | | |
| (c) (ii) | <p>Able to list all substances in Table 3 correctly</p> <p>Sample Answers</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"> Passive Transport <i>Pengangkutan pasif</i> </td> <td style="text-align: center;"> Active Transport <i>Pengangkutan Aktif</i> </td> </tr> <tr> <td style="text-align: center;"> Glucose Oxygen, Amino acid </td> <td style="text-align: center;"> Sodium ion Potassium ion </td> </tr> </table> | Passive Transport <i>Pengangkutan pasif</i> | Active Transport <i>Pengangkutan Aktif</i> | Glucose Oxygen, Amino acid | Sodium ion Potassium ion | 3 |
| Passive Transport <i>Pengangkutan pasif</i> | Active Transport <i>Pengangkutan Aktif</i> | | | | | |
| Glucose Oxygen, Amino acid | Sodium ion Potassium ion | | | | | |

| | | |
|--|---|---|
| | Able to list 4 substances correctly | 2 |
| | Able to list 2-3 substances correctly | 1 |
| | No response or wrong response or <i>only one correct</i> | 0 |

2. Modul JIJ 2007(Chapter 4 : Chemical Composition of the Cell)

1 (a) (i) [KB0601 - Observing]

| Skor | Kriteria |
|------|--|
| 3 | <p>Able to state two the correct observations based on the following criteria :</p> <p>K1 - Quantity / concentration / albumen in the boiling tube K2 – The time taken for the albumen to turn clear in any concentration</p> <p>Sample Answer:</p> <ol style="list-style-type: none"> 1. Albumen suspension which is cloudy at concentration 10% / 15% / 20% turns clear after 7/10/12.5 minutes respectively. 2. The 10% Albumen suspension took the shorter than time for the cloudiness to change compare to 20% albumen suspension. |
| 2 | <p>Able to state any one observation correctly and any one observation less accurate or state any two observation less accurate.</p> <p>Sample Answer:</p> <ol style="list-style-type: none"> 1. The 10% albumen suspension take short / less time. 2. The 10% / 20% albumen suspension, time taken for cloudiness is 7 / 12.5 min 3. The less albumen take shorter than time compare more albumen. |
| 1 | <p>Able to state any one observation correctly or less accurate with any one criteria or two ideas only.</p> <p>Example Answer:</p> <ol style="list-style-type: none"> 1. High concentration / concentrated of albumen take long time. 2. The 10% / 20% albumen suspension for turns cloudy is 7 / 12.5 min. |
| 0 | <p>No response or wrong response. ** Reject hypothesis statement or rate of reaction</p> <p>Example Answer :</p> <ol style="list-style-type: none"> 1. The higher the concentration of albumen suspension, the longer the time. |

| | | |
|---------------|---------------|-------------------------------|
| Score summary | | |
| Score | Observation 1 | Observation 2 |
| 3 | √ | √ |
| 2 | √ √ | Idea / reverse X / reverse |
| 1 | Idea L.A | Idea X |
| 0 | Idea | X |

1 (a) (ii) [KB0604 – Making inference]

| Score | Criteria |
|-------|---|
| 3 | <p>Able to state two inferences for each observation made correctly and accurately for each observation and equivalent in 1(a)(i). Sample Answer:</p> <p>Inference 1: 1. Albumen / Substrate is hydrolysed / digested by enzyme / pepsin // Enzyme / pepsin react with albumen to form peptone / polypeptide</p> <p>Inference 2: 1. More number of albumen / substrate molecules // 10% albumen hydrolysed faster.</p> <p>***</p> <ul style="list-style-type: none"> ▪ Inference must equivalent with observation. ▪ If observation wrong, inference can't get mark (reject) ▪ If observation only idea, inference may be can get mark if correct. |
| 2 | <p>Able to state any one inference made correctly and one less accurately or two inferences less accurately based on the observation.</p> <p>Sample answer: 1. Albumen / substrate are digested / hydrolysed 2. Less albumen / less concentration // 10% albumen are hydrolysed faster. 3. Rate of reaction for 10% albumen / 7 min is lower than compare to 20% albumen / 12.5 min</p> |
| 1 | <p>Able to state any one inference correctly or two inferences on idea only.</p> <p>Sample Answer: 1. Albumen turns into clear (fast / slow) 2. Rate of reaction for 10% albumen suspension is low</p> |
| 0 | <p>No response or wrong response. ** Reject hypothesis statement The higher the concentration of albumen the longer time taken turns clear.</p> |

| | | | |
|---|----------|-------------|----------------------------|
| | Scoring: | | |
| | Score | Inference 1 | Inference 2 |
| | 3 | √ | √ |
| | 2 | √ L.A | Less Accurate (L.A) L.A |
| | 1 | Idea | Idea |
| 0 | Idea | X | |

(b) KB0603 – Measuring Using Numbers

| Score | Criteria | | | | | | | | |
|-------|--|------------------|------------------|------|---|------|----|------|------|
| 3 | Able to record all the three times correctly . Sample Answer: | | | | | | | | |
| | <table border="1"> <tr> <th>Percentage</th> <th>Time taken / min</th> </tr> <tr> <td>10 %</td> <td>7</td> </tr> <tr> <td>15 %</td> <td>10</td> </tr> <tr> <td>20 %</td> <td>12.5</td> </tr> </table> | Percentage | Time taken / min | 10 % | 7 | 15 % | 10 | 20 % | 12.5 |
| | Percentage | Time taken / min | | | | | | | |
| | 10 % | 7 | | | | | | | |
| | 15 % | 10 | | | | | | | |
| 20 % | 12.5 | | | | | | | | |
| 2 | Able to record any two times correctly . | | | | | | | | |
| 1 | Able to record any one times correctly. | | | | | | | | |
| 0 | No response or wrong respons | | | | | | | | |

1 (c) (i) [KB0610 – Controlling Variables]

| Score | Criteria | | | | | | | | |
|--|--|--|---|---|--|---|--|--|---|
| 3 | Able to state the three variables (all P) in this experiment and state three (all K) ways of controlling the variables correctly. Sample Answer : | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Variables</th> <th>Able to state method to handle variable correctly</th> </tr> </thead> <tbody> <tr> <td> Manipulated variable(P1): Concentration of albumen / substrate </td> <td> K1: Used different concentration of / Change the concentration albumen </td> </tr> <tr> <td> Responding variable (P2): Time (taken for albumen to turn clear) // Rate of reaction of enzyme / pepsin. </td> <td> K2 Record the time using stop watch / Measure time using stop watch / Calculate The rate reaction of enzyme using formula concentration of albumen divided by time. </td> </tr> <tr> <td> Constant variable (P3): Temperature (water bath / enzyme/pepsin) // Volume of enzyme // Concentration of enzyme // Volume of albumen // pH value </td> <td> K3 Fix the temperature of water bath / enzyme at 37°C // Fix the volume of enzyme / pepsin 1ml // Fix the concentration of enzyme at 1% Fix the pH value at 2 </td> </tr> </tbody> </table> | Variables | Able to state method to handle variable correctly | Manipulated variable(P1): Concentration of albumen / substrate | K1: Used different concentration of / Change the concentration albumen | Responding variable (P2): Time (taken for albumen to turn clear) // Rate of reaction of enzyme / pepsin. | K2 Record the time using stop watch / Measure time using stop watch / Calculate The rate reaction of enzyme using formula concentration of albumen divided by time. | Constant variable (P3): Temperature (water bath / enzyme/pepsin) // Volume of enzyme // Concentration of enzyme // Volume of albumen // pH value | K3 Fix the temperature of water bath / enzyme at 37°C // Fix the volume of enzyme / pepsin 1ml // Fix the concentration of enzyme at 1% Fix the pH value at 2 |
| | Variables | Able to state method to handle variable correctly | | | | | | | |
| | Manipulated variable(P1): Concentration of albumen / substrate | K1: Used different concentration of / Change the concentration albumen | | | | | | | |
| Responding variable (P2): Time (taken for albumen to turn clear) // Rate of reaction of enzyme / pepsin. | K2 Record the time using stop watch / Measure time using stop watch / Calculate The rate reaction of enzyme using formula concentration of albumen divided by time. | | | | | | | | |
| Constant variable (P3): Temperature (water bath / enzyme/pepsin) // Volume of enzyme // Concentration of enzyme // Volume of albumen // pH value | K3 Fix the temperature of water bath / enzyme at 37°C // Fix the volume of enzyme / pepsin 1ml // Fix the concentration of enzyme at 1% Fix the pH value at 2 | | | | | | | | |
| 2 | Able to state 4-5 P and K correctly. <ul style="list-style-type: none"> ▪ Reject way how to control variable if variable is wrong. | | | | | | | | |
| 1 | Able to state 2-3 P and K correctly | | | | | | | | |
| 0 | No response or only one criteria correct. | | | | | | | | |

1(c) (ii) [KB0602 – Clyssifying]

| | | | | |
|---|--|-------------|-----------------------|-------------------------------|
| 3 | Able to match the apparatus and materials used to obtain data for the three variables correctly. Sample Answer: | | | |
| | | Variable | Apparatus | Material |
| | K1 | Manipulated | Syringe | Albumen suspension |
| | K2 | Responding | Stop watch | Albumen suspension |
| | K3 | Controlled | Thermometer / syringe | Water bath / pepsin Pepsin |
| 2 | Able to match the apparatus and material for any two variables correctly | | | |
| 1 | Able to match the apparatus and material for any one variable correctly | | | |
| 0 | No response or wrong response | | | |

1 (d) [KB0611 – Making Hypothesis]

| Score | Criteria |
|-------|---|
| 3 | <p>Able to make a statement of hypothesis by relating the manipulated variable with the responding variable correctly and accurately. Criteria set: K1 : Stating manipulated variable. K2 : Stating responding variable H : Showing a specific relationship/ showing direction of relationship</p> <p>Sample Answer :</p> <ol style="list-style-type: none"> 1. The higher / lower concentration of albumen suspension, the longer / shorter time taken for reaction of enzyme. 2. The higher the concentration of albumen suspension, the longer the time taken pepsin / enzyme to hydrolyze the albumen 3. The higher the concentration of albumen, the longer time taken albumen turns to clear |
| 2 | <p>Able to make the hypothesis but less accurate</p> <p>Sample Answer:</p> <ol style="list-style-type: none"> 1. Different concentration of albumen suspension causes different time for the albumen suspension to turn clear. |

| | |
|---|--|
| 1 | <p>Able to state the idea of the hypothesis.</p> <p>Sample Answer :</p> <p>1. Concentration affects the time taken for the albumen suspension to turn clear.</p> |
| 0 | No response or wrong response |

1 (e) (i) [KB0606 – Communication]

| Score | Criteria | | | | | | | | | | | | |
|--|--|---|------------|---|-----|---|------|-----|----|-----|-----|------|-----|
| 3 | <p>Able to construct a table and record the result of the experiment with the following criteria:</p> <p>T : State all the three aspect with units correctly D : Transfer all data for concentration of albumen suspension and time K : Calculate all values for rate of reaction correctly</p> <p>Sample answer :</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Percentage concentration of albumen suspension</th> <th style="text-align: center;">Time / min</th> <th style="text-align: center;">Rate of reaction / %/min // Percentage concentration of albumen per minutes</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">10%</td> <td style="text-align: center;">7</td> <td style="text-align: center;">1.43</td> </tr> <tr> <td style="text-align: center;">15%</td> <td style="text-align: center;">10</td> <td style="text-align: center;">1.5</td> </tr> <tr> <td style="text-align: center;">20%</td> <td style="text-align: center;">12.5</td> <td style="text-align: center;">1.6</td> </tr> </tbody> </table> | Percentage concentration of albumen suspension | Time / min | Rate of reaction / %/min // Percentage concentration of albumen per minutes | 10% | 7 | 1.43 | 15% | 10 | 1.5 | 20% | 12.5 | 1.6 |
| Percentage concentration of albumen suspension | Time / min | Rate of reaction / %/min // Percentage concentration of albumen per minutes | | | | | | | | | | | |
| 10% | 7 | 1.43 | | | | | | | | | | | |
| 15% | 10 | 1.5 | | | | | | | | | | | |
| 20% | 12.5 | 1.6 | | | | | | | | | | | |
| 2 | Able to construct a table and record any two criteria: | | | | | | | | | | | | |
| 1 | Able to construct the idea of a table and record any one criteria: | | | | | | | | | | | | |
| 0 | No response or wrong response. | | | | | | | | | | | | |

1 (e) (ii) [KB0608 – Interpreting Data]

| Score | Criteria |
|-------|---|
| 3 | <p>Able to draw a graph of rate of reaction of pepsin against the concentration of albumen suspension which satisfies the following criteria:</p> <p>Axes (P) : Both axes are labeled and uniform scales, manipulated variable on horizontal axis and with unit correctly</p> <p>Points (T) : All points correctly plotted</p> <p>Shape (B) : All points are connected smoothly</p> |
| 2 | Graph which satisfies any two criteria. |
| 1 | Graph which satisfies any one criteria. |
| 0 | No response or wrong response. |

1 (e)(iii) [KB0612 – Relationship between space and time]

| Skor | Kriteria |
|------|---|
| 3 | <p>Able to explain the relationship between the rate of reaction and the concentration of albumen suspension following criteria:</p> <p>C1 : State relationship between the rate of reaction of pepsin and concentration of albumen.</p> <p>C2 : State the number of substrate / albumen molecules increase</p> <p>C3 : State more / increase collisions between enzyme molecules and substrate molecules.</p> <p>Sample Answer:</p> <ol style="list-style-type: none"> 1. When the concentration of albumen suspension increases, the rate of reaction of pepsin / enzyme increases. 2. Because increases in number of substrate / albumen 3. Cause more / increases collisions enzyme molecules with albumen / substrate molecules |
| 2 | Able to state any two criteria. |
| 1 | Able to state any one criteria |
| 0 | No response or wrong response. |

1 (f) [KB0609 –Defining by Operation]

| Score | Criteria |
|-------|---|
| 3 | <p>Able to state the definition of enzyme operationally, complete and (correct), based on the following criteria:</p> <p>K1 : The function of enzyme / pepsin hydrolyses / digest on albumen / protein K2 : The effect on albumen / protein turns to clear K3 : The factor that effects the rate of enzyme reaction // statement that shows relationship between concentration of albumen / protein and rate of reaction on enzyme</p> <p>Sample Answer:</p> <p>Albumen suspension digested / hydrolyzed by pepsin (K1) that turns from cloudy to clear (K2) and the rate of reaction of enzyme is affected by the concentration of the albumen (K3).</p> |
| 2 | Able to state any two criteria |
| 1 | Able to state any one criteria |
| 0 | No response or wrong response |

1 (g) [KB0605 – Predicting]

| Score | Criteria |
|-------|--|
| 3 | <p>Able to predict correctly and explain the prediction based on the following criteria:</p> <p>K1 : Boiling tube S/R K2 : State the substrate / albumen remains cloudy K3 : Enzyme / pepsin is denatured / destroyed // change in active base</p> <p>Sample answer: Boiling tube S / R (K1) , albumen suspension remains cloudy / same (K2) because enzyme/ pepsin is denatured (K3)</p> |
| 2 | Able to state any two criteria. |
| 1 | Able to state any one criteria. |
| 0 | No response or wrong response. |

SCORE TOTAL - 11 X 3 = 33 marks

3. Modul JUU 2006(Chapter 6 : Nutrition)

1 a) (i) (ii) KB0603 – Mengukur Menggunakan Nombor

| Skor | Kriteria / penerangan |
|------|---|
| 3 | Dapat mencatatkan ketiga-tiga suhu dengan betul betul Contoh jawapan: Jawapan: Suhu awal air = 29 °C Suhu akhir roti putih = 34 °C Suhu akhir kacang tanah = 40 °C |
| 2 | Dapat mencatat mana-mana dua suhu dengan betul |
| 1 | Dapat mencatat mana-mana satu suhu dengan betul |
| 0 | Tidak dapat memberi respons <u>atau</u> respons salah. |

b) (i) [KB0601 - Memerhati]

| Skor | Kriteria / penerangan |
|------|--|
| 3 | Dapat menyatakan dua pemerhatian daripada Jadual 1 dengan betul dan tepat. 1. Nyatakan suhu akhir air bagi setiap sampel makanan ATAU 2. Membandingkan suhu akhir bagi kedua-dua sampel makanan. Contoh jawapan: 1. Suhu akhir bagi roti putih yang habis dibakar ialah 34 °C 2. Suhu akhir bagi kacang tanah habis dibakar ialah 40 °C 3. Suhu air bagi kacang tanah lebih tinggi daripada suhu air bagi roti putih ATAU sebaliknya. 4 Suhu akhir air bagi roti putih dan kacang tanah adalah berbeza. |
| 2 | Dapat menyatakan mana-mana satu pemerhatian dengan betul dan tepat atau pernyataan pentafsiran data. Contoh jawapan: 1. Suhu akhir air yang dipanaskan oleh kacang tanah adalah lebih tinggi daripada suhu akhir air yang dipanaskan oleh roti putih. |
| 1 | Dapat menyatakan idea bagi pemerhatian. Contoh Jawatan: 1. Suhu akhir air berbeza 2. Beza suhu air antara roti putih dan kacang tanah ialah 6 °C |
| 0 | Tidak dapat memberi respons atau respons salah. |

1 (b)(ii) [KB0604 – Membuat inferens]

| Skor | Kriteria/penerangan |
|------|---|
| 3 | <p>Dapat menyatakan inferens bagi setiap pemerhatian dengan betul dan tepat berdasarkan kriteria berikut.</p> <p>Kriteria:</p> <ol style="list-style-type: none"> 1. Kenaikan suhu air yang disebabkan oleh tenaga/haba diserap daripada pembakaran sampel makanan 2. Kacang tanah membebaskan lebih banyak tenaga/haba berbanding roti putih ATAU sebaliknya <p>Contoh jawapan:</p> <ol style="list-style-type: none"> 1. Air menyerap tenaga/haba daripada kacang tanah yang terbakar 2. (Roti putih /kacang tanah terbakar membebaskan sedikit/banyak tenaga/haba |
| 2 | <p>Dapat menyatakan mana-mana satu inferens dengan betul berdasarkan kriteria yang ditetapkan.</p> <p>ATAU</p> <p>Dapat menyatakan kedua-dua inferens diperingkat idea berdasarkan kriteria yang ditetapkan.</p> |
| 1 | <p>Dapat menyatakan mana-mana satu inferens di peringkat idea sahaja.</p> <p>Contoh jawapan:</p> <ol style="list-style-type: none"> 1. Makanan mengandungi tenaga. 2. Kacang tanah /roti putih mengandungi tenagayang banyak/kurang 3. Kacang tanah/roti putih menyebabkan kenaikan suhu air. |
| 0 | <p>Tidak dapat memberi respons atau respons salah.</p> |

CATATAN:

Inferens mestilah menerangkan pemerhatian yang telah dinyatakan.

(c) [KB0610 - Mengawal pembolehubah]

| Pembolehubah | Perkara-perkara yang dikendalikan (mesti bergantung kepada PU yang dinyatakan oleh calon) |
|--|---|
| 1. Pembolehubah dimanipulasikan: Jenis makanan/ Roti putih DAN kacang tanah | Cara mengubah pembolehubah dimanipulasikan: Menggantikan roti putih dengan kacang tanah, Mengubah Menggunakan makanan yang bebeza |
| 2. Pembolehubah bergerak balas: Kandungan tenaga / (kenaikan) suhu | Bagaimana pembolehubah bergerak balas ditentukan: Menyukat / merekod suhu Mengira kandungan tenaga * Tolak : membaca/memerhati |
| 3. Pembolehubah dimalarkan: Jisim makanan/isipadu air suling/Suhu awal air * Tolak berat | Cara menetapkan pembolehubah dimalarkan: Menetapkan keadaan bilik iaitu gelap sepanjang eksperimen / menetapkan suhu menggunakan termometer / membuat pemerhatian dalam sela masa yang sama iaitu 3 hari |

Rumusan Penskoran

Skor 6 : 6 betul

Skor 5 : 5 betul

Skor 4: 4 betul

Skor 3 : 3 betul

Skor 2 : 2 betul

Skor 1: 1 betul

- Perkara yang dikendalikan mesti bergantung kepada PU yang dinyatakan
- jika PU salah maka perkara yang dikendalikan ditolak.

(d) [KB0611 – Membuat hipotesis]

| Skor | Kriteria/penerangan |
|------|---|
| 3 | Dapat menyatakan hipotesis yang menunjukkan perkaitan antara pembolehubah dimanipulasi dengan pembolehubah bergerakbalas dengan betul dan tepat Set kriteria: P1: Nyatakan Pu manipulasi P2: Nyatakan Pu bergerakbalas H: Menunjukkan perbandingan/hubungan yang khusus Contoh jawapan: Kacang tanah menghasilkan kenaikan suhu yang lebih tinggi daripada roti putih ATAU sebaliknya |

| | |
|---|---|
| 2 | Dapat mencatatkan mana-mana dua kriteria dengan betul. P1: Nyatakan PUM P2: Nyatakan PUB H : Menunjukkan perhubungan tidak khusus Contoh jawapan: Makanan berbeza mempengaruhi kenaikan suhu air. |
| 1 | Dapat mencatatkan mana-mana satu kriteria dengan betul. Contoh jawapan: 1. Kacang tanah/roti putih mempunyai kandungan tenaga yang tinggi/rendah. 2. Kacang tanah dan roti putih menyebabkan perubahan suhu. |
| 0 | Tidak dapat memberi respons atau respons salah. |

(e) (i) [KB0606 – Berkomunikasi]

| Skor | Kriteria/penerangan | | | | | | | | | |
|----------------|--|--------------------------------|------------------|--------------------------------|------------|---|------|--------------|----|-------|
| 3 | Dapat membina satu jadual yang mengandungi kriteria berikut: 1. Tajuk dengan unit yang betul 2. Semua nama sampel makanan ada dan betul 3. Semua data yang betul dan tepat Contoh jawapan: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Sampel makanan</th> <th>Kenaikan suhu/°C</th> <th>Nilai tenaga/ Jg⁻¹</th> </tr> </thead> <tbody> <tr> <td>Roti putih</td> <td>5</td> <td>84.0</td> </tr> <tr> <td>Kacang tanah</td> <td>11</td> <td>184.8</td> </tr> </tbody> </table> | Sampel makanan | Kenaikan suhu/°C | Nilai tenaga/ Jg ⁻¹ | Roti putih | 5 | 84.0 | Kacang tanah | 11 | 184.8 |
| Sampel makanan | Kenaikan suhu/°C | Nilai tenaga/ Jg ⁻¹ | | | | | | | | |
| Roti putih | 5 | 84.0 | | | | | | | | |
| Kacang tanah | 11 | 184.8 | | | | | | | | |
| 2 | Dapat membina satu jadual yang mengandungi kurang lengkap salah satu kriteria yang ditentukan. | | | | | | | | | |
| 1 | Dapat membina satu jadual yang mengandungi kurang lengkap dua daripada kriteria yang ditentukan. | | | | | | | | | |
| 0 | Tidak dapat memberi respons atau respons salah. | | | | | | | | | |

(e)(ii) [KB0608 – Mentafsir Data]

| Skor | Kriteria/penerangan |
|------|---|
| 3 | <p>Dapat menyatakan hubungan antara ketiga-tiga kriteria dengan betul.</p> <p>C1: Sampel makanan (Roti putih / kacang tanah) C2: Kelas makanan (Karbohidrat / lipid/lemak) C3: Tenaga dibebaskan (Rendah / tinggi)</p> <p>Contoh jawapan: Roti putih adalah kelas makanan karbohidrat dan mempunyai nilai tenaga yang rendah/sedikit manakala kacang tanah adalah kelas makanan lemak/lipid dan mempunyai nilai tenaga yang tinggi/banyak.</p> |
| 2 | <p>Dapat menyatakan mana-mana dua kriteria dengan betul.</p> <p>Contoh jawapan. Roti putih adalah kelas makanan karbohidrat manakala kacang tanah adalah kelas makanan lemak</p> |
| 1 | <p>Dapat menyatakan mana-mana satu kriteria.</p> <p>Contoh jawapan: Roti putih/ kacang tanah menghasilkan tenaga</p> |
| 0 | <p>Tidak dapat memberi respons atau respons salah.</p> |

(f) [KB0609 – Mendefinisi Secara Operasi]

| Skor | Kriteria/penerangan |
|------|---|
| 3 | <p>Dapat menyatakan definisi nilai tenaga berdasarkan keputusan eksperimen dengan betul dan tepat merangkumi kriteria berikut:</p> <p>C1 : Kuantiti haba / tenaga yang dibebaskan oleh sampel makanan (terima jika nilai dinyatakan)</p> <p>C2 : Jisim sampel makanan (roti putih / kacang tanah) C3 : Jisim / isipadu air yang digunakan dan kenaikan suhu</p> <p>Contoh jawapan:</p> <ol style="list-style-type: none"> 1. Nilai tenaga ialah kuantiti haba /tenaga yang dibebaskan oleh 1g roti putih apabila terbakar dengan lengkap untuk menaikkan suhu 20 ml air sebanyak 5 °C. 2. Nilai tenaga ialah kuantiti haba yang dibebaskan oleh 1g kacang tanah apabila terbakar dengan lengkap untuk menaikkan suhu 20ml air sebanyak 11 °C <ul style="list-style-type: none"> • Tolak haba/tenaga dibekalkan |
| 2 | <p>Dapat menyatakan definisi nilai tenaga dengan mempamerkan dua kriteria dengan betul dan tepat. C1 + C2</p> <p>Contoh jawapan:</p> <p>Nilai tenaga ialah kuantiti haba/tenaga yang dibebaskanoleh 1g roti putih / kacang tanah yang terbakar dengan lengkap.</p> |

| | |
|---|---|
| 1 | Dapat menyatakan definisi nilai tenaga tetapi pada peringkat idea sahaja atau definisi secara teori. Contoh jawapan: 1. Nilai tenaga ialah kuantiti haba yang dibebaskan oleh makanan yang terbakar. 2. Nilai tenaga ialah tenaga yang tersimpan/terkandung dalam makanan. 3. Nilai tenaga ialah roti putih /kacang tanah yang terbakar menyebabkan kenaikan suhu air/memanaskan air. |
| 0 | Tidak dapat memberi respons atau respons salah. |

(g) [KB0605 – Meramal]

| Skor | Kriteria |
|------|--|
| 3 | Dapat meramalkan pemerhatian dan nilai tenaga yang diperoleh sekiranya biji gajus digunakan berdasarkan kriteria berikut: C1 : Menyatakan pemerhatian terhadap kenaikan suhu C2 : Menyatakan perubahan nilai tenaga C3 : Membandingkan makanan yang digunakan Contoh jawapan: 1. Kenaikan suhu dan nilai tenaga yang diperolehi adalah sama dengan kenaikan suhu dan nilai tenaga kacang tanah (bagi jisim yang sama). 2. Kenaikan suhu dan nilai tenaga yang diperolehi adalah dua kali ganda kenaikan suhu dan nilai tenaga roti putih (bagi jisim yang sama). • Jika dibandingkan dengan roti putih nilai tenaga yang boleh diterima ialah mesti lebih tinggi daripada roti putih. |
| 2 | Dapat meramalkan pemerhatian dan nilai tenaga yang diperoleh sekiranya biji gajus digunakan tetapi kurang lengkap mana-mana dua kriteria. Contoh jawapan: 1. Kenaikan suhu diperoleh adalah sama dengan kenaikan suhu kacang tanah. 2. Nilai tenaga yang diperoleh adalah kurang dari kacang tanah. |
| 1 | Dapat meramalkan pemerhatian dan nilai tenaga yang diperoleh sekiranya biji gajus digunakan pada peringkat idea sahaja atau mana-mana satu kriteria sahaja. Contoh jawapan: 1. Biji gajus mengandungi tenaga 2. Biji gajus menyebabkan kenaikan suhu. |
| 0 | Tidak dapat memberi respons atau respons salah. |

(h) [KB0602 – Mengelas]

| Skor | Kriteria/penerangan | | | | | | | | |
|---------------|---|------------|--------------|--------|----------|---------------|-------|------|--------------|
| 3 | <p>Dapat melengkapkan Jadual 2 dengan betul semua jenis makanan yang diberikan dan mengelaskan makanan itu berdasarkan nilai tenaga yang setara dengan roti putih dan kacang tanah.</p> <p>Contoh jawapan:</p> <table border="1"> <thead> <tr> <th>Roti putih</th> <th>Kacang tanah</th> </tr> </thead> <tbody> <tr> <td>Jagung</td> <td>Marjerin</td> </tr> <tr> <td>Kentang rebus</td> <td>Gajus</td> </tr> <tr> <td>Nasi</td> <td>Minyak sawit</td> </tr> </tbody> </table> <p>Skor diberi kepada pasangan yang betul (tiga pasangan betul)</p> | Roti putih | Kacang tanah | Jagung | Marjerin | Kentang rebus | Gajus | Nasi | Minyak sawit |
| Roti putih | Kacang tanah | | | | | | | | |
| Jagung | Marjerin | | | | | | | | |
| Kentang rebus | Gajus | | | | | | | | |
| Nasi | Minyak sawit | | | | | | | | |
| 2 | Dapat melengkapkan jadual dengan dua pasangan jenis makanan yang betul berdasarkan nilai tenaga yang setara dengan roti putih dan kacang tanah | | | | | | | | |
| 1 | Dapat melengkapkan jadual dengan satu pasangan jenis makanan yang betul berdasarkan nilai tenaga yang setara dengan roti putih dan kacang tanah | | | | | | | | |
| 0 | Tidak dapat memberi respons atau respons salah. | | | | | | | | |

JUMLAH SKOR - 11 X 3 = 33 markah

4. Modul JUJ 2008 (Chapter 6 : Nutrition)

1(a) [KB0602 – Classifying]

| 3 | Able to list all materials and apparatus labeled in Diagram 1 correctly: | | | | | | | | | | | |
|---|---|---------------|---------------|--|-------------|-------------------------------------|--|----|---|----|---------------|--|
| | <table border="1"> <thead> <tr> <th>Material (M)</th> <th>Apparatus (A)</th> </tr> </thead> <tbody> <tr> <td>1. 2% Sodium Hydrogen Carbonate solution</td> <td>1. 60W bulb</td> </tr> <tr> <td>2. <i>Hydrilla sp</i></td> <td>2. Ruler</td> </tr> <tr> <td></td> <td>3. Boiling tube</td> </tr> <tr> <td></td> <td>4. Paper clip</td> </tr> <tr> <td></td> <td>5. Retort stand</td> </tr> </tbody> </table> | Material (M) | Apparatus (A) | 1. 2% Sodium Hydrogen Carbonate solution | 1. 60W bulb | 2. <i>Hydrilla sp</i> | 2. Ruler | | 3. Boiling tube | | 4. Paper clip | |
| Material (M) | Apparatus (A) | | | | | | | | | | | |
| 1. 2% Sodium Hydrogen Carbonate solution | 1. 60W bulb | | | | | | | | | | | |
| 2. <i>Hydrilla sp</i> | 2. Ruler | | | | | | | | | | | |
| | 3. Boiling tube | | | | | | | | | | | |
| | 4. Paper clip | | | | | | | | | | | |
| | 5. Retort stand | | | | | | | | | | | |
| All two materials and five apparatus are correct. | | | | | | | | | | | | |
| 2 | Able to list 2 materials and any 3 / 4 apparatus correctly | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Materials (M)</th> <th>Apparatus (A)</th> </tr> </thead> <tbody> <tr> <td>2M + 1A</td> <td>4A</td> </tr> <tr> <td>2M</td> <td>3 / 4 A</td> </tr> <tr> <td>1M</td> <td>5A</td> </tr> </tbody> </table> | Materials (M) | Apparatus (A) | 2M + 1A | 4A | 2M | 3 / 4 A | 1M | 5A | | | |
| Materials (M) | Apparatus (A) | | | | | | | | | | | |
| 2M + 1A | 4A | | | | | | | | | | | |
| 2M | 3 / 4 A | | | | | | | | | | | |
| 1M | 5A | | | | | | | | | | | |
| 1 | Able to list 1 material and any 1 / 2 apparatus correctly | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Materials (M)</th> <th>Apparatus (A)</th> </tr> </thead> <tbody> <tr> <td>2M + 2A</td> <td>3A</td> </tr> <tr> <td>2M + 1A</td> <td>3A</td> </tr> <tr> <td>2M</td> <td>2 / 3 A + X (unlisted apparatus)</td> </tr> <tr> <td>1M</td> <td>3 / 4 A</td> </tr> </tbody> </table> | Materials (M) | Apparatus (A) | 2M + 2A | 3A | 2M + 1A | 3A | 2M | 2 / 3 A + X (unlisted apparatus) | 1M | 3 / 4 A | |
| Materials (M) | Apparatus (A) | | | | | | | | | | | |
| 2M + 2A | 3A | | | | | | | | | | | |
| 2M + 1A | 3A | | | | | | | | | | | |
| 2M | 2 / 3 A + X (unlisted apparatus) | | | | | | | | | | | |
| 1M | 3 / 4 A | | | | | | | | | | | |
| 0 | No response or wrong response | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Materials (M)</th> <th>Apparatus (A)</th> </tr> </thead> <tbody> <tr> <td>5A</td> <td>2M</td> </tr> <tr> <td>1 / 2 M + any X (unlisted material)</td> <td>3 / 4 A + any X(unlisted apparatus)</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table> | Materials (M) | Apparatus (A) | 5A | 2M | 1 / 2 M + any X (unlisted material) | 3 / 4 A + any X(unlisted apparatus) | | | | | |
| Materials (M) | Apparatus (A) | | | | | | | | | | | |
| 5A | 2M | | | | | | | | | | | |
| 1 / 2 M + any X (unlisted material) | 3 / 4 A + any X(unlisted apparatus) | | | | | | | | | | | |
| | | | | | | | | | | | | |

1 (b) KB0603 – Measuring Using Numbers

| Score | Criteria | | | | | | | | | | |
|--|---|--|--|----|----|----|----|----|----|----|----|
| 3 | <p>Able to record all 4 readings for the total number of bubbles released in 5 minutes correctly .</p> <p>Sample Answer:</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Distance between light source and Hydrilla sp / cm</th> <th>Total number of bubbles released in 5 minutes.</th> </tr> </thead> <tbody> <tr> <td>60</td> <td>10</td> </tr> <tr> <td>50</td> <td>12</td> </tr> <tr> <td>40</td> <td>15</td> </tr> <tr> <td>30</td> <td>20</td> </tr> </tbody> </table> | Distance between light source and Hydrilla sp / cm | Total number of bubbles released in 5 minutes. | 60 | 10 | 50 | 12 | 40 | 15 | 30 | 20 |
| Distance between light source and Hydrilla sp / cm | Total number of bubbles released in 5 minutes. | | | | | | | | | | |
| 60 | 10 | | | | | | | | | | |
| 50 | 12 | | | | | | | | | | |
| 40 | 15 | | | | | | | | | | |
| 30 | 20 | | | | | | | | | | |
| 2 | Able to record any 3 readings correctly . | | | | | | | | | | |
| 1 | Able to record any 2 readings correctly. | | | | | | | | | | |
| 0 | No response or one reading | | | | | | | | | | |

1 (c) (i) [KB0601 - Observation]

| Score | Criteria |
|-------|---|
| 3 | <p>Able to state two the correct observations based on the following criteria : Can observe distance and bubbles. [Observation must have values for MV and RV in a Table 2 or comparison between two reading. MV : Distance RV : Number of bubble Sample answer:</p> <ol style="list-style-type: none"> 1. At distance of 60am, the total number of bubble released is 10. 2. At a distance of 30cm, the total number of bubbles released is 20 3. The total number of bubbles released at 60cm is less than the total number of bubbles released at 30cm // inversely OR other distance and number of bubbles released |
| 2 | <p>Able to state two different observation inaccurately OR without values. Sample Answer:</p> <ol style="list-style-type: none"> 4. At distance of 60cm, (less) bubbles are released// inversely. 5. The distance between light source and <i>Hydrilla sp.</i> influences the number of bubbles released / rate of photosynthesis. 6. The least distance from the light source produces 20 bubbles // inversely. |

| 1 | <p>Able to state two different observations at idea level. Example Answer: 1. (The light source influences <i>Hydrilla sp.</i>) to release bubbles. // Bubbles are released/produced) 2. The distance of light source changes / increases / decreases. 3. The number of bubbles changes/increases/decreases.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|---|------------|---------|------------|------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | No response or wrong response. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Scoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Score</th> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">2</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> <tr> <td rowspan="2" style="text-align: center;">2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">-</td> <td style="text-align: center;">2</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> <tr> <td rowspan="3" style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">2</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">-</td> </tr> <tr> <td rowspan="2" style="text-align: center;">0</td> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> </tbody> </table> | Score | Correct | Inaccurate | Idea | Wrong | 3 | 2 | - | - | - | 2 | 1 | 1 | - | - | - | 2 | - | - | 1 | 1 | - | 1 | - | - | - | 2 | - | - | 1 | 1 | - | 0 | - | 1 | - | 1 | - | - | 1 | 1 |
| Score | Correct | Inaccurate | Idea | Wrong | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 2 | - | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 1 | 1 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 2 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 1 | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | - | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

1 (c) (ii) [KB0604 – Making inference]

| Score | Criteria |
|-------|--|
| 3 | <p>Able to state two inferences for each observation made correctly and accurately for each observation and equivalent in 1(c)(i). Infer on light intensity and rate of photosynthesis. Sample Answers: 2. At distance of 60 cm, the <u>light intensity</u> / (rate of) <u>photosynthesis</u> is <u>low</u> / <u>less</u>. 3. At a distance of 30cm, the light intensity / (rate of) photosynthesis is high/more. 4. Light intensity/(rate of) photosynthesis at 60 cm is less than light intensity / (rate of) photosynthesis at 30 cm.</p> |
| 2 | <p>Able to state any two inferences inaccurately Sample answers: 4. (At 60 cm), Photosynthesis occurs in Hydrilla // Hydrilla produces gas / oxygen. 5. The rate of photosynthesis is affected / influenced by the distance of light source / light intensity.</p> |
| 1 | <p>Able to state two inferences at idea level. Sample Answer: 3. Photosynthesis occurs. / Gas is produced. 4. Light intensity changes / decreases / increases. 5. The rate of photosynthesis is changes / decreases / increases.</p> |

| | | | | | |
|----------|--------------------------------|------------|------|-------|--|
| 0 | No response OR wrong response. | | | | |
| Scoring: | | | | | |
| Score | Correct | Inaccurate | Idea | Wrong | |
| 3 | 2 | - | - | - | |
| 2 | 1 | 1 | - | - | |
| | - | 2 | - | - | |
| 1 | 1 | - | 1 | - | |
| | - | - | 2 | - | |
| | - | 1 | 1 | - | |
| 0 | - | 1 | - | 1 | |
| | - | - | 1 | 1 | |

1 (d) [KB0610 – Controlling Variables]

| Score | Criteria | | | | | | | | |
|--|---|-----------|---|--|---|--|--|--|---|
| 3 | <p>Able to state all 3 variables and the methods to handle the variable. Sample Answer :</p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Variables</th> <th style="text-align: center;">Method to handle the variable correctly</th> </tr> </thead> <tbody> <tr> <td> <u>Manipulated variable:</u> Distance between light source and Hydrilla sp/ light intensity </td> <td>Carry out the experiment at various/different distance of 60 cm,50 cm, 40cm, and 30 cm. / at different light intensities.</td> </tr> <tr> <td> <u>Responding variable :</u> Total number of bubbles released in <u>5 minutes</u> // Rate of photosynthesis. </td> <td>Using a <u>stopwatch</u> , to count / record the total number of bubbles released in 5 minutes. Calculate the rate of photosynthesis using formula <u>number of bubbles</u> . <div style="text-align: center;">Time taken</div> </td> </tr> <tr> <td> <u>Constant variable:</u> 1) Time taken to count the total number of bubbles / 2) Size / type of plant 3) Concentration / volume of sodium hydrogen carbonate solution ./ 4) Power of bulb 5) (water) temperature </td> <td> 1. Fix the time of 5 minutes 2. Used the same plant. 3. Fix / used the concentration at 2% // Volume at 50ml 4. Fix / Used the power at 60W 5. Fix the temperature at room temperature </td> </tr> </tbody> </table> | Variables | Method to handle the variable correctly | <u>Manipulated variable:</u> Distance between light source and Hydrilla sp/ light intensity | Carry out the experiment at various/different distance of 60 cm,50 cm, 40cm, and 30 cm. / at different light intensities. | <u>Responding variable :</u> Total number of bubbles released in <u>5 minutes</u> // Rate of photosynthesis. | Using a <u>stopwatch</u> , to count / record the total number of bubbles released in 5 minutes. Calculate the rate of photosynthesis using formula <u>number of bubbles</u> . <div style="text-align: center;">Time taken</div> | <u>Constant variable:</u> 1) Time taken to count the total number of bubbles / 2) Size / type of plant 3) Concentration / volume of sodium hydrogen carbonate solution ./ 4) Power of bulb 5) (water) temperature | 1. Fix the time of 5 minutes 2. Used the same plant. 3. Fix / used the concentration at 2% // Volume at 50ml 4. Fix / Used the power at 60W 5. Fix the temperature at room temperature |
| Variables | Method to handle the variable correctly | | | | | | | | |
| <u>Manipulated variable:</u> Distance between light source and Hydrilla sp/ light intensity | Carry out the experiment at various/different distance of 60 cm,50 cm, 40cm, and 30 cm. / at different light intensities. | | | | | | | | |
| <u>Responding variable :</u> Total number of bubbles released in <u>5 minutes</u> // Rate of photosynthesis. | Using a <u>stopwatch</u> , to count / record the total number of bubbles released in 5 minutes. Calculate the rate of photosynthesis using formula <u>number of bubbles</u> . <div style="text-align: center;">Time taken</div> | | | | | | | | |
| <u>Constant variable:</u> 1) Time taken to count the total number of bubbles / 2) Size / type of plant 3) Concentration / volume of sodium hydrogen carbonate solution ./ 4) Power of bulb 5) (water) temperature | 1. Fix the time of 5 minutes 2. Used the same plant. 3. Fix / used the concentration at 2% // Volume at 50ml 4. Fix / Used the power at 60W 5. Fix the temperature at room temperature | | | | | | | | |

| | |
|---|--|
| 2 | Able to state correctly. <ul style="list-style-type: none"> ▪ Reject way how to handle variable if variable is wrong. |
| 1 | Able to state 2-3 correctly |
| 0 | No response or only one criteria correct. |

1 (e) [KB0611 – Making Hypothesis]

| Score | Criteria |
|-------|---|
| 3 | Able to state a hypothesis by relating the manipulated variable and responding variable correctly with following aspects: P1 : Stating manipulated variable. P2: Stating responding variable H : Showing a specific relationship/ showing direction of relationship Sample Answer : 4. As the light intensity increases, the rate of photosynthesis increases / the total number of bubbles released increased. 5. As the distance between the light source and <i>Hydrilla sp.</i> Decreases, the rate of photosynthesis increases / total number of bubbles released increases. |
| 2 | Able to state a hypothesis relating the manipulated variable inaccurately. Sample Answer: 2. The increase of the light intensity influences / affects the total number of bubbles released (by <i>Hydrilla sp.</i>). 3. The total number of bubbles released (by <i>hydrilla sp.</i>) is affected by light intensity. |
| 1 | Able to state a hypothesis relating the manipulated variable at idea level. Sample Answer : 1. <i>Hydrill sp</i> released / produces bubbles. |
| 0 | No response or wrong response if no P1 or P2 no mark for each. |

1 (f) (i) [KB0606 – Communication]

| Score | Criteria | | | | | | | | | | | | | | | |
|--|--|--|-------|-------|----|----|---|----|----|----|----|--|-------|-------|-------|-------|
| 3 | <p>Able to construct a table correctly with the following aspects:</p> <p>1 : Able to state the 3 titles with units correctly. 2 : Able to record all the correctly. 3 : Able to calculate and record light intensity correctly</p> <p>Sample answer :</p> <table border="1"> <tr> <td>Distance between light source and <i>Hydrilla sp.</i> / cm</td> <td>60</td> <td>50</td> <td>40</td> <td>30</td> </tr> <tr> <td>Number of bubbles released in 5 minutes</td> <td>10</td> <td>12</td> <td>15</td> <td>20</td> </tr> <tr> <td>Light intensity / cm^{-1} // 1/cm</td> <td>0.017</td> <td>0.020</td> <td>0.025</td> <td>0.033</td> </tr> </table> | Distance between light source and <i>Hydrilla sp.</i> / cm | 60 | 50 | 40 | 30 | Number of bubbles released in 5 minutes | 10 | 12 | 15 | 20 | Light intensity / cm^{-1} // 1/cm | 0.017 | 0.020 | 0.025 | 0.033 |
| Distance between light source and <i>Hydrilla sp.</i> / cm | 60 | 50 | 40 | 30 | | | | | | | | | | | | |
| Number of bubbles released in 5 minutes | 10 | 12 | 15 | 20 | | | | | | | | | | | | |
| Light intensity / cm^{-1} // 1/cm | 0.017 | 0.020 | 0.025 | 0.033 | | | | | | | | | | | | |
| 2 | Any two aspects correct | | | | | | | | | | | | | | | |
| 1 | Any one aspect correct | | | | | | | | | | | | | | | |
| 0 | No response or wrong response. | | | | | | | | | | | | | | | |

1 (e)(iii) [KB0612 – Relationship between space and time]

| Score | Criteria |
|-------|---|
| 3 | <p>Able to draw the graph correctly with the following aspects:</p> <p>P(paksi) : Corrected title with unit on both horizontal, vertical axis and uniform scale on the axis.</p> <p>T(titik) : All points plotted / transferred correctly.</p> <p>B(bentuk) : Able to join any two point to form a smooth graph / line and positive gradient.</p> |
| 2 | Able to state any two correct. |
| 1 | Able to state any one correct |
| 0 | No response or wrong response. |

1 (g) [KB0608 – Interpreting Data]

| Score | Criteria |
|-------|---|
| 3 | <p>Able to interpret data correctly and explain with the following aspects :</p> <p>Relationship : P1 = Able to state the <u>relationship between the manipulated variable and responding variable</u></p> <p>Explanation P2 = Able to state <u>rate of photosynthesis increases</u></p> <p>P3 = Able to state <u>more gas / oxygen is produced</u></p> <p>Sample answer : 1. When the light intensity increases, the total number of bubble increases (P1) because the rate of photosynthesis increases (P2). More gas/oxygen is Produced (P3).</p> <p>** Reject more bubbles released.</p> |
| 2 | Able to interpret data correctly with aspects correctly with two aspects correctly. |
| 1 | Able to interpret data correctly with the only one aspect correctly. |
| 0 | No response or wrong response. |

1 (h) [KB0605 – Predicting]

| Score | Criteria |
|-------|---|
| 3 | <p>Able to predict and explain the outcome of the experiment correctly with the following aspects:</p> <p>Prediction :</p> <p>P1 : Able to <u>predict the total number</u> of bubbles released in 5 minutes correctly. Increases // remain the same</p> <p>Explanation :</p> <p>P2 : Able to state two sprigs have <u>more leaves / more chloroplast / chlorophyll</u> // concentration of sodium hydrogen carbonate solution is the same.</p> <p>P3 : Able to state rate of photosynthesis increases // same</p> <p>Sample answer:</p> <ol style="list-style-type: none"> The total number of bubbles released is higher / increases because two spring have more leaves and the rate of photosynthesis increased The total number of bubbles released is the same because two sprigs share concentration of carbon dioxide <p>** P1 must be correct to get P2 & P3, if P1 wrong automatically reject P2 & P3 - for score 3, 2, 1</p> |
| 2 | Able to predict and explain the outcome of the experiment correctly with the two aspects |
| 1 | Able to predict and explain the outcome of the experiment correctly with one aspect correctly. |
| 0 | No response or wrong response. |

1 (i) [KB0609 –Defining by Operation]

| Score | Criteria |
|-------|--|
| 3 | <p>Able to define operationally based on the result of the experiment with the following aspects:</p> <p>P1 : <i>Hydrilla</i> sp in sodium hydrogen carbonate solution P2 : Produces bubbles / gas P3 : The rate of photosynthesis / (total) number of bubbles released is influenced by light intensity / distance from light source.</p> <p>Sample answer:</p> <p>1. Photosynthesis is a process occurring in <i>Hydrilla</i> sp in sodium hydrogen carbonate solution (P1) and produces bubbles / gas (P2). The number of bubbles produces / rate of photosynthesis is influenced by the light intensity / distance from light source (P3)</p> |
| 2 | Able to define operationally based on the result of the experiment with two aspects correctly. |
| 1 | Able to define operationally based on the result of the experiment with only one aspects correctly. |
| 0 | No response or wrong response |

SCORE TOTAL - 11 X 3 = 33 marks

5. *Praktis Bestari JUJ 2009 (Chapter 7: Respiration)*

| No | Mark Scheme | Score | | | | | | | | |
|---|---|---|--------------------------------------|----|---|----|---|----|---|---|
| KB0603 – Measuring Using Number | | | | | | | | | | |
| 1(a) | <p>Able to record all the three final heights correctly <i>Sample answer</i></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Percentage concentration of glucose / %</th> <th>Final height of coloured liquid / cm</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>3</td> </tr> <tr> <td>15</td> <td>5</td> </tr> <tr> <td>20</td> <td>8</td> </tr> </tbody> </table> | Percentage concentration of glucose / % | Final height of coloured liquid / cm | 10 | 3 | 15 | 5 | 20 | 8 | 3 |
| Percentage concentration of glucose / % | Final height of coloured liquid / cm | | | | | | | | | |
| 10 | 3 | | | | | | | | | |
| 15 | 5 | | | | | | | | | |
| 20 | 8 | | | | | | | | | |
| | Able to record any two heights correctly | 2 | | | | | | | | |
| | Able to record any one height correctly | 1 | | | | | | | | |
| | No response or incorrect response. | 0 | | | | | | | | |
| KB0601 - Observation | | | | | | | | | | |
| (b) (i) | <p>Able to state any two correct observations based on the following criteria : K1 – The concentration of glucose K2 - The final height of coloured liquid</p> <p><i>Sample Answer</i> Horizontal observation:</p> <ol style="list-style-type: none"> 2. The final height of coloured liquid is 3 cm for 10% of glucose solution. 3. At 15% of glucose solution , the final height of coloured liquid is 5 cm 4. At 20% of glucose solution , the final height of coloured liquid is 8 cm <p>Vertical observation :</p> <ol style="list-style-type: none"> 5. At 5% of glucose solution the final height of coloured liquid is higher/greater compared to 20% of glucose solution. | 3 | | | | | | | | |
| | <p>Able to state one correct observation and any one inaccurate observation or able to state two inaccurate observations</p> <p><i>Sample answers of incomplete observation : (Has the concentration of glucose, but no value of height but in qualitative)</i> Horizontal</p> <ol style="list-style-type: none"> 3. At 10% concentration of glucose ,the final height of coloured liquid is low. 4. At 20% concentration of glucose ,the final height of coloured liquid is high. | 2 | | | | | | | | |

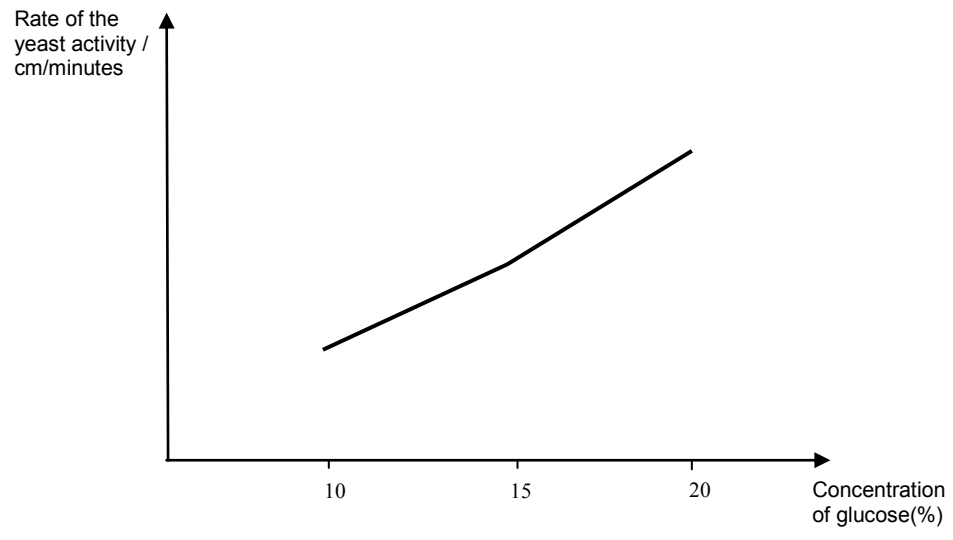
| | <p>Vertical</p> <p>5. Lower concentration of glucose, has lower final height of coloured liquid compared to higher concentration of glucose (<i>comparing</i>)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------------|---|---------|------------|-------|-------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
| | <p>Able to state only one correct observation or Able to state two observations at idea level.</p> <p>Sample answer</p> <p>3. In lower / higher concentration of glucose , has lower/higher final height of coloured liquid.</p> <p>4. Final height of coloured liquid is increase.</p> | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>No response <u>or</u> incorrect response <u>or</u> one idea only</p> | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p style="text-align: center;">Scoring</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>-</td> <td>-</td> <td>-</td> <td>3</td> </tr> <tr> <td>1</td> <td>1</td> <td>-</td> <td>-</td> <td rowspan="2">2</td> </tr> <tr> <td>-</td> <td>2</td> <td>-</td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td>1</td> <td>-</td> <td rowspan="3">1</td> </tr> <tr> <td>-</td> <td>-</td> <td>2</td> <td>-</td> </tr> <tr> <td>1</td> <td></td> <td></td> <td>1</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> <td rowspan="3">0</td> </tr> <tr> <td>-</td> <td>1</td> <td>-</td> <td>1</td> </tr> <tr> <td>-</td> <td>-</td> <td>1</td> <td>1</td> </tr> </tbody> </table> | Correct | Inaccurate | Idea | Wrong | Score | 2 | - | - | - | 3 | 1 | 1 | - | - | 2 | - | 2 | - | - | 1 | - | 1 | - | 1 | - | - | 2 | - | 1 | | | 1 | - | 1 | 1 | - | 0 | - | 1 | - | 1 | - | - | 1 | 1 | |
| Correct | Inaccurate | Idea | Wrong | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | - | - | - | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | - | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 2 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | 1 | - | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| KB0604 - Making inference | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (b) (ii) | <p>Able to make two correct inferences</p> <p>Sample answers</p> <p>Horizontal observation</p> <ol style="list-style-type: none"> At 10% (low) concentration of glucose, <u>less carbon dioxide</u> is released means <u>low activity of yeast</u>. At 20% (high) concentration of glucose, <u>more carbon dioxide</u> is released means <u>high activity of yeast</u>. <p>Vertical observation</p> <ol style="list-style-type: none"> In lower concentration of glucose, less carbon dioxide is released means low activity of yeast compared to higher concentration of glucose //vice-versa | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| <p>Notes :</p> <p>The inferences should be correspond to the observations.</p> <p style="text-align: center;"> – inference 1 → observation 1 } - inference 2 → observation 2 } 0 mark if not correspond </p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|------------|------------|-------|-------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|---|
| <p>Able to make one correct inference and one inaccurate inference or Able to state two inaccurate inferences</p> <p>Sample answers Inference (horizontal observation)</p> <ol style="list-style-type: none"> 1. In 10%/low concentration of glucose, low activity of yeast // less carbon dioxide released 2. In 20%/high concentration of glucose, high activity of yeast // high carbon dioxide released. <p>Inference (vertical observation)</p> <ol style="list-style-type: none"> 3. In lower concentration of glucose, low activity of yeast compared to higher concentration of glucose//vice-versa 4. In lower concentration of glucose, less carbon dioxide is released compared to higher concentration of glucose//vice-versa | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Able to state only one correct inference or Able to state two inferences at idea level</p> <p>Sample answers</p> <ol style="list-style-type: none"> 2. The activity of yeast is occurred. 3. The activity of yeast depends on the concentration of glucose. 4. Gas is released. | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>No response or incorrect response</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>-</td> <td>-</td> <td>-</td> <td>3</td> </tr> <tr> <td>1</td> <td>1</td> <td>-</td> <td>-</td> <td>2</td> </tr> <tr> <td>-</td> <td>2</td> <td>-</td> <td>-</td> <td rowspan="3">1</td> </tr> <tr> <td>1</td> <td>-</td> <td>1</td> <td>-</td> </tr> <tr> <td>-</td> <td>-</td> <td>2</td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td>-</td> <td>1</td> <td rowspan="3">0</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> </tr> <tr> <td>-</td> <td>1</td> <td>-</td> <td>1</td> </tr> <tr> <td>-</td> <td>-</td> <td>1</td> <td>1</td> <td></td> </tr> </tbody> </table> | Correct | Inaccurate | Idea | Wrong | Score | 2 | - | - | - | 3 | 1 | 1 | - | - | 2 | - | 2 | - | - | 1 | 1 | - | 1 | - | - | - | 2 | - | 1 | - | - | 1 | 0 | - | 1 | 1 | - | - | 1 | - | 1 | - | - | 1 | 1 | | 0 |
| Correct | Inaccurate | Idea | Wrong | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | - | - | - | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | - | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 2 | - | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | - | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| KB0602 - Classifying | | | | | | | | | | | | | | |
|---|--|-----------------|--------------------|------------------|----------|-------------|--------------------|------------------|------------|------------|-----------------|------------|--------------------|-------|
| (c) (ii) | Able to match the apparatus and material used to obtain data for the three variables correctly | 3 | | | | | | | | | | | | |
| | <i>Sample Answer</i> | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Variables</th> <th>Apparatus</th> <th>Material</th> </tr> </thead> <tbody> <tr> <td>Manipulated</td> <td>measuring cylinder</td> <td>glucose solution</td> </tr> <tr> <td>Responding</td> <td>metre rule</td> <td>coloured liquid</td> </tr> <tr> <td>Controlled</td> <td>electronic balance</td> <td>yeast</td> </tr> </tbody> </table> | | Variables | Apparatus | Material | Manipulated | measuring cylinder | glucose solution | Responding | metre rule | coloured liquid | Controlled | electronic balance | yeast |
| | Variables | | Apparatus | Material | | | | | | | | | | |
| | Manipulated | | measuring cylinder | glucose solution | | | | | | | | | | |
| Responding | metre rule | coloured liquid | | | | | | | | | | | | |
| Controlled | electronic balance | yeast | | | | | | | | | | | | |
| Able to match the apparatus and material for any two variables correctly | 2 | | | | | | | | | | | | | |
| Able to match the apparatus or material for any one variable correctly | 1 | | | | | | | | | | | | | |
| No response or wrong response | 0 | | | | | | | | | | | | | |

| KB0611-State hypothesis | | |
|--|---|---|
| (d) | Able to state a hypothesis relating manipulated variable and responding variable correctly with the following aspect : P1 – Manipulated variable – concentration of glucose P2 – Responding variable – (Final) Height of coloured liquid / the rate of yeast activity H - relationship – higher // inversely | 3 |
| | <p>Sample answer</p> <p>2. The higher/ lower the concentration of glucose(nutrient), the higher / greater / lower / the height of coloured liquid / the rate of yeast activity.</p> | |
| | Able to state a hypothesis relating the manipulated variable and the responding variable but less accurately. | |
| <p>Sample answer</p> <p>1. The concentration of glucose (nutrient) affects the rate of yeast activity/height of coloured liquid.</p> | | |
| (d) | Able to state one idea of a hypothesis | 1 |
| | <p>Sample answer</p> <p>1. Glucose(nutrient) affects the rate of yeast activity (no P1 and relationship)</p> | |

| | No response or incorrect response <ul style="list-style-type: none"> If no P1 and P2, no mark for H | 0 | | | | | | | | | | | | |
|---|---|--|--|--|----|---|-----|----|---|-----|----|---|-----|---|
| KB0606 – Communicating data | | | | | | | | | | | | | | |
| (e) (i) | <p>Able to construct a table correctly with the following aspects :</p> <p>1. Able to state the 3 titles with units correctly - T 1- mark</p> <p>2. Able to record all data for concentration of glucose and changes in height of coloured liquid correctly. - D 1 - mark</p> <p>3. Able to calculate and record the values for rate of yeast activity - C 1 - mark</p> <p>Sample answer</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Percentage concentration of glucose / %</th> <th>Changes in height of coloured liquid /cm</th> <th>Rate of the yeast activity / cmminutes⁻¹</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>2</td> <td>0.2</td> </tr> <tr> <td>15</td> <td>4</td> <td>0.4</td> </tr> <tr> <td>20</td> <td>7</td> <td>0.7</td> </tr> </tbody> </table> | Percentage concentration of glucose / % | Changes in height of coloured liquid /cm | Rate of the yeast activity / cmminutes ⁻¹ | 10 | 2 | 0.2 | 15 | 4 | 0.4 | 20 | 7 | 0.7 | 3 |
| Percentage concentration of glucose / % | Changes in height of coloured liquid /cm | Rate of the yeast activity / cmminutes ⁻¹ | | | | | | | | | | | | |
| 10 | 2 | 0.2 | | | | | | | | | | | | |
| 15 | 4 | 0.4 | | | | | | | | | | | | |
| 20 | 7 | 0.7 | | | | | | | | | | | | |
| | Any two aspects correctly | 2 | | | | | | | | | | | | |
| | Any one aspect correctly | 1 | | | | | | | | | | | | |
| | No response or incorrect response | 0 | | | | | | | | | | | | |
| (e) (ii) | <p>Able to draw a graph of the rate of yeast activity against the concentration of glucose which satisfies the following criteria:</p> <p>Axes (P) – both axes are labelled and uniform scales, manipulated variable on horizontal axis, correct units.</p> <p>Points(T)- all points correctly plotted</p> <p>Shape(B)- all points are connected smoothly</p> <p><i>Sample Answer</i> Refer graph</p> | 3 | | | | | | | | | | | | |

| | | |
|------------------------------------|---|---|
| |  | |
| | Any two aspects correctly | 2 |
| | Any one aspects correctly | 1 |
| | No response or incorrect response | 0 |
| KB 0608 – Interpreting data | | |
| (f) | <p>Able to explain the relationship between the rate of yeast activity and the concentration of glucose correctly based on the following criteria:</p> <p>R1- state the relationship between the rate of yeast activity and the concentration of glucose R2- state the activity of anaerobic respiration is increase/decrease R3- state the carbon dioxide released is increase/decrease</p> <p>Sample Answer</p> <ol style="list-style-type: none"> 2. When the concentration of glucose increases/decreases, the rate of yeast activity increases/decreases 3. Because of the activity of anaerobic respiration increase /decreases 4. So the released of carbon dioxide is increased/ decreased | 3 |
| | Able to explain the relationship using any two criteria | 2 |

| | | |
|---------------------------------------|---|---|
| | Able to explain the relationship using one criteria | 1 |
| | No response or incorrect response | 0 |
| KB0609 – Defining by operation | | |
| (g) | <p>Able to state the definition of anaerobic respiration operationally, complete and correct based on the following criteria:</p> <p>D1- yeast respire using glucose</p> <p>D2- the released of gas causes the pressure in the manometer to rise / increase the height of coloured liquid in manometer</p> <p>D3- concentration of nutrien affects the activity of yeast</p> <p>Sample answer</p> <p>Anaerobic respiration is yeast respire using glucose(K1) and release gas (carbon dioxide) that causes the pressure in the manometer tube to rise/ increase the height of coloured liquid in manometer (K2) and the rate of yeast activity is affected by the concentration of glucose (K3)</p> | 3 |
| | <p>Any two criteria stated</p> <p>Sample answer</p> <p>An anaerobic respiration is when yeast using glucose(K1) and the rate of yeast activity is affected by the concentration of glucose (K3)</p> | 2 |
| | <p>Any one criteria stated</p> <p>1.The rate of yeast activity is affected by the concentration of glucose (K3)</p> <p>2. Yeast using glucose to respire anaerobically to release ethanol and carbon dioxide.</p> | 1 |
| | None of the above or no response | 0 |
| KB0605 - Predicting | | |
| (h) | <p>Able to predict correctly and explain the prediction based on the following criteria:</p> <p>K1 – manometer R</p> <p>K2 – the height of coloured liquid is declined/ nil / 0 / below the initial height</p> <p>K3- the activity of yeast is declined / lowered in an alkaline medium //optimum / higher in an acidic medium</p> | 3 |

| | | |
|--|---|---|
| | <p><i>Sample answer</i> <i>Contoh jawapan</i> The height of coloured liquid in manometer R is declined / nil / 0 / below the initial height . This is because the activity of yeast is declined in an alkaline medium // optimum / higher in an acidic medium</p> | |
| | Any two criteria stated | 2 |
| | Any one criteria stated | 1 |
| | No response or incorrect response | 0 |

6. Modul JUU 2009 (Chapter 8: Dynamic Ecosystem)

1(a) [KB0602 – Measuring Using Number]

| | | | |
|----------|--|--------------------------------------|-------|
| 3 | Able to record the total surface area covered by the <i>Pleurococcus sp.</i> correctly Sample answer: | | |
| | Grid | Total surface area / cm ² | |
| | X | Any 32-36 | |
| | Y | Any 4-8 | |
| 2 | Able to record 1 correct and 1 inaccurate Sample answer: | | |
| | Grid | Total surface area / cm ² | |
| | X | 32 -36 | |
| | Y | 4.5 // 5.5 | |
| | Grid | Total surface area / cm ² | |
| | X | 32.5 // 33.5 | |
| Y | 5 | | |
| 1 | Able to record 2 inaccurate or 1 correct and 1 wrong answer. Sample answer: | | |
| | Grid | Total surface area / cm ² | |
| | X | 32.5 | |
| | Y | 4.5 | |
| | Grid | Total surface area / cm ² | |
| | X | 32 | |
| Y | 1 | | |
| 0 | No response or wrong response | | |
| Scoring: | | | |
| | Grid X | Grid Y | Score |
| | correct | correct | 3 |
| | correct | inaccurate | 2 |
| | inaccurate | correct | |
| | inaccurate | inaccurate | 1 |
| | correct | wrong | |
| | Wrong | correct | |
| | inaccurate | wrong | 0 |
| | wrong | inaccurate | |

1 (b) (i) [KB0601 - Observation]

| Score | Criteria | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|------------|---------|------------|------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | <p>Able to state two different correct observations.</p> <p>[Values must be same with in table 1(a) and 1(b).] Sample answer:</p> <ol style="list-style-type: none"> The total surface area covered by <i>Pleurococcus sp.</i> in Grid X / facing east is 33cm². The total surface area covered by <i>Pleurococcus sp.</i> in Grid Y / facing south is 5cm². The <u>total surface area</u> covered by <i>Pleurococcus sp.</i> in Grid X / facing east is more than in Grid Y / facing south. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | <p>Able to state one correct observation and one inaccurate oobservations</p> <p>Sample Answer:</p> <ol style="list-style-type: none"> The total surface area covered by <i>Pleurococcus sp.</i> in Grid X / facing east is big / large / more. The total surface area covered by <i>Pleurococcus sp.</i> in Grid Y / facing south is small / little . Surface area covered by <i>Pleurococcus sp.</i> in Grid X / facing east is more than in Grid Y / facing south. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | <p>Able to state only one correct observation or two different observations at idea level (id).</p> <p>Example Answer (idea level):</p> <ol style="list-style-type: none"> <i>Pleurococcus sp</i> is found in Grid X <i>Pleurococcus sp</i> is found in Grid Y <i>Pleurococcus sp</i> is found in both Grid X and Grid Y | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | No response or wrong response. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Scoring</p> <table border="1"> <thead> <tr> <th>Score</th> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>2</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td rowspan="2">2</td> <td>1</td> <td>1</td> <td>-</td> <td>-</td> </tr> <tr> <td>-</td> <td>2</td> <td>-</td> <td>-</td> </tr> <tr> <td rowspan="3">1</td> <td>1</td> <td>-</td> <td>1</td> <td>-</td> </tr> <tr> <td>-</td> <td>-</td> <td>2</td> <td>-</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> </tr> <tr> <td rowspan="2">0</td> <td>1</td> <td>-</td> <td>-</td> <td>1</td> </tr> <tr> <td>-</td> <td>1</td> <td>-</td> <td>1</td> </tr> </tbody> </table> | | Score | Correct | Inaccurate | Idea | Wrong | 3 | 2 | - | - | - | 2 | 1 | 1 | - | - | - | 2 | - | - | 1 | 1 | - | 1 | - | - | - | 2 | - | - | 1 | 1 | - | 0 | 1 | - | - | 1 | - | 1 | - | 1 |
| Score | Correct | Inaccurate | Idea | Wrong | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 2 | - | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 1 | 1 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 2 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 1 | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | - | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

1 (b) (ii) [KB0604 – Making inference]

| Score | Criteria | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|--|------------|---------|------------|------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | <p>Able to state two inferences Note : Inference must match observation Sample Answers:</p> <ol style="list-style-type: none"> 5. In Grid X, there is a more <u>growth</u> of <i>Pleurococcus sp.</i> / photosynthesis because it receive more sunlight / light intensity. 6. In Grid Y, there is a less <u>growth</u> of <i>Pleurococcus sp.</i> / photosynthesis because it receive less sunlight / light intensity. 7. In Grid X, <i>Pleurococcus sp</i> <u>growth more</u> compare to Grid Y because it receives <u>more sunlight</u>. // Vice versa | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | <p>Able to state one correct inference and one inaccurate inference. Or able to state two inferences inaccurately Sample answers:</p> <ol style="list-style-type: none"> 1. In Grid X, there is a more growth / photosynthesis of <i>Pleurococcus sp.</i> // there is more sunlight / light intensity. 2. In Grid Y, there is a less growth / photosynthesis of <i>Pleurococcus sp.</i> //there is less sunlight / light intensity. 3. There is more growth / photosynthesis of <i>Pleurococcus sp</i>/ more sunlight / light intensity in Grid X than in Grid Y 4. Grid X has more sunlight and growth. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | <p>Able to state only one correct inference or able to state two inferences at idea level. Sample Answer:</p> <ol style="list-style-type: none"> 6. In Grid X, <i>Pleurococcus sp.</i> influenced by humidity / temperature. 7. In Grid Y, <i>Pleurococcus sp</i> influenced by humidity. 8. Grid X is more humid than Grid Y | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | No response OR wrong response. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Score | Correct | Inaccurate | Idea | Wrong | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 2 | - | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 1 | 1 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 2 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 1 | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | - | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - | - | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

1 (e) [KB0610 – Controlling Variables]

| Score | Criteria | | | | | | | | |
|--|---|--|---|--|--|---|---|--|---|
| 3 | Able to state all 3 variables and the methods to handle the variable. Sample Answer : | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Variables</th> <th>Method to handle the variable correctly</th> </tr> </thead> <tbody> <tr> <td><u>Manipulated variable:</u> Position / direction / location of the grids (X,Y), // <u>amount</u> of sunlight, // Grid X and Grid Y</td> <td><u>Place /change/put</u> the grid on the tree trunk that are facing east or south // placed at different direction/location / different light intensities.</td> </tr> <tr> <td><u>Responding variable :</u> <u>Total surface area</u> covered by <i>Pleurococcus sp.</i> // <u>population distribution</u> of <i>Pleurococcus sp.</i></td> <td><u>Count/calculate/recorded</u> the number squares covered with the pleurococcus sp. in a <u>Grid X/Grid Y/</u> by <u>using a graph paper.</u> ** Accept : <u>measured and recorded</u> Reject : Quadrat sampling</td> </tr> <tr> <td><u>Constant variable:</u> 1) Type of tree trunk/ 2) Sampling time 3) Size of grid used 4) Height of grid 5) Type of alga / plant / organism ** Reject : water / nutrient</td> <td>1. Use the <u>same tree</u> to place Grid X and Grid Y 2. Sampling experiment is carried out at the <u>same time.</u> 3. Using the size for Grid X and Grid Y 4. Fix the same height from ground of the grid 5. Fix the type of algae/plant</td> </tr> </tbody> </table> | Variables | Method to handle the variable correctly | <u>Manipulated variable:</u> Position / direction / location of the grids (X,Y), // <u>amount</u> of sunlight, // Grid X and Grid Y | <u>Place /change/put</u> the grid on the tree trunk that are facing east or south // placed at different direction/location / different light intensities. | <u>Responding variable :</u> <u>Total surface area</u> covered by <i>Pleurococcus sp.</i> // <u>population distribution</u> of <i>Pleurococcus sp.</i> | <u>Count/calculate/recorded</u> the number squares covered with the pleurococcus sp. in a <u>Grid X/Grid Y/</u> by <u>using a graph paper.</u> ** Accept : <u>measured and recorded</u> Reject : Quadrat sampling | <u>Constant variable:</u> 1) Type of tree trunk/ 2) Sampling time 3) Size of grid used 4) Height of grid 5) Type of alga / plant / organism ** Reject : water / nutrient | 1. Use the <u>same tree</u> to place Grid X and Grid Y 2. Sampling experiment is carried out at the <u>same time.</u> 3. Using the size for Grid X and Grid Y 4. Fix the same height from ground of the grid 5. Fix the type of algae/plant |
| | Variables | Method to handle the variable correctly | | | | | | | |
| | <u>Manipulated variable:</u> Position / direction / location of the grids (X,Y), // <u>amount</u> of sunlight, // Grid X and Grid Y | <u>Place /change/put</u> the grid on the tree trunk that are facing east or south // placed at different direction/location / different light intensities. | | | | | | | |
| <u>Responding variable :</u> <u>Total surface area</u> covered by <i>Pleurococcus sp.</i> // <u>population distribution</u> of <i>Pleurococcus sp.</i> | <u>Count/calculate/recorded</u> the number squares covered with the pleurococcus sp. in a <u>Grid X/Grid Y/</u> by <u>using a graph paper.</u> ** Accept : <u>measured and recorded</u> Reject : Quadrat sampling | | | | | | | | |
| <u>Constant variable:</u> 1) Type of tree trunk/ 2) Sampling time 3) Size of grid used 4) Height of grid 5) Type of alga / plant / organism ** Reject : water / nutrient | 1. Use the <u>same tree</u> to place Grid X and Grid Y 2. Sampling experiment is carried out at the <u>same time.</u> 3. Using the size for Grid X and Grid Y 4. Fix the same height from ground of the grid 5. Fix the type of algae/plant | | | | | | | | |
| 2 | Able to state correctly. ▪ Reject way how to handle variable if variable is wrong. | | | | | | | | |
| 1 | Able to state 2-3 correctly | | | | | | | | |
| 0 | No response or only one criteria correct. | | | | | | | | |

1 (d) [KB0611 – Making Hypothesis]

| Score | Criteria |
|-------|---|
| 3 | <p>Able to state a hypothesis by relating the manipulated variable and responding variable correctly with following aspects:</p> <p>P1 : Stating manipulated variable.(Grid X and Grid Y, direction of grid, light intensity)</p> <p>P2: Stating responding variable (Total surface area,/ growth/population distribution)</p> <p>H : Relationship (more, higher ,Inversely, increases)</p> <p>Sample Answer :</p> <ol style="list-style-type: none"> 6. When the <i>Pleurococcus sp.</i> is facing east / in Grid X /it receives <u>more</u> sunlight , the total surface area covered <u>increases</u>. 7. When the <i>Pleurococcus sp.</i> is facing south /in Grid Y / it receives <u>less</u> sunlight, total surface area covered decreases. 8. The higher the light intensity, the higher the total population distribution / the total surface area covered by <i>Pleurococcus sp.</i> |
| 2 | <p>Able to state a hypothesis relating the manipulated variable inaccurately.</p> <p>Sample Answer:</p> <ol style="list-style-type: none"> 4. When <i>Pleurococcus sp.</i> receives sunlight, total surface area covered increased. 5. When <i>Pleurococcus sp.</i> receives sunlight, total surface area covered decreased. 6. Sunlight / light intensity influence the total surface area covered by <i>Pleurococcus sp.</i> |
| 1 | <p>Able to state a hypothesis relating the manipulated variable at idea level.</p> <p>Sample Answer :</p> <ol style="list-style-type: none"> 1. The <i>Pleurococcus sp</i> needs sunlight / can grow. |
| 0 | <p>No response or wrong response if no P1 or P2 no mark for each.</p> |

1 (e) (i) [KB0606 – Communication]

| Score | Criteria | | | | | | |
|------------------|---|------------------|---|----------|--------|-----------|-------|
| 3 | <p>Able to construct a table correctly with the following aspects:</p> <p>1 : Titles with correct units 2 : Position of grids. 3 : Total surface area</p> <p>Sample answer :</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Position of grid</th> <th>Total surface area covered by <i>Pleurococcus sp.</i> / cm²</th> </tr> </thead> <tbody> <tr> <td>X / East</td> <td>32 -36</td> </tr> <tr> <td>Y / South</td> <td>4 – 8</td> </tr> </tbody> </table> | Position of grid | Total surface area covered by <i>Pleurococcus sp.</i> / cm ² | X / East | 32 -36 | Y / South | 4 – 8 |
| Position of grid | Total surface area covered by <i>Pleurococcus sp.</i> / cm ² | | | | | | |
| X / East | 32 -36 | | | | | | |
| Y / South | 4 – 8 | | | | | | |
| 2 | Any two aspects correct | | | | | | |
| 1 | Any one aspect correct | | | | | | |
| 0 | No response or wrong response. | | | | | | |

1 (e)(iii) [KB0612 – Relationship between space and time]

| Score | Criteria |
|-------|--|
| 3 | <p>Able to draw the graph correctly with the following aspects:</p> <p>P(paksi) : Title of x-axis and y-axis T(titik) : Two bars drawn and label correctly (height correctly) B(bentuk) : Two bars labelled</p> |
| 2 | Able to state any two correct. |
| 1 | Able to state any one correct |
| 0 | No response or wrong response. |

1 (f) [KB0608 – Interpreting Data]

| Score | Criteria |
|-------|--|
| 3 | <p>Able to explain the relationship between the population of <i>Pleurococcus sp</i> and the light intensity correctly based on the following criteria:</p> <p>R1- The population / total surface area covered by <i>Pleurococcus sp.</i> / growth increased / greater // decrease / lower R2 – Compare compass (direction of grid) / compare between Grid X <u>and</u> Grid Y // more / less photosynthesis R3 - (Degree) / more / less light intensity.</p> <p>Sample answer :</p> <p>1. The population distribution / growth / total surface covered by <i>Pleurococcus sp.</i> at Grid X / facing east is greater / higher / more than Grid Y / facing south because Grid X receive higher / more light intensity. More photosynthesis in Grid X // inversely.</p> <p>** Reject more sunlight</p> |
| 2 | <p>Sample answer:</p> <p>1. The population of <i>Pleurococcus sp.</i> is greater for Grid X which receives high light intensity. 2. The population of <i>Pleurococcus sp.</i> is less for Grid Y which receives low light intensity.</p> |
| 1 | <p>Able to interpret data correctly with the only one aspect correctly.</p> <p>1. Grid X has more sunlight</p> |
| 0 | <p>No response or wrong response.</p> |

1 (g) [KB0609 –Defining by Operation]

| Score | Criteria |
|-------|--|
| 3 | <p>Able to define operationally the population distribution for the <i>Pleurococcus sp.</i> :</p> <p>D1 : Definition <u>Total Surface area</u> covered by <i>Pleurococcus sp.</i> / value from table 1 D2 : How the total surface area is measured // graph paper is used / used a grid D3 : The light intensity influences the population distribution // grid is different direction // different light intensity.</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. Population distribution is defined as the total surface area covered by <i>Pleurococcus sp.</i> within a 10cm x 10 cm grid using graph paper at different direction is influences by light intensity. 2. Population distribution is defined as 33cm² and 5cm² area covered by <i>Pleurococcus sp.</i> within 10cm x 10cm / grid / using graph paper at east and south position of the tree trunk. |
| 2 | <p>Any two criteria stated</p> <p>Area covered by <i>Pleurococcus sp.</i> in facing east is 35cm² and facing south is 5 cm² .</p> |
| 1 | <p>Any one criteria stated.</p> <ol style="list-style-type: none"> 1. Total surface area covered by <i>Pleurococcus sp</i> 2. Grid X facing east and Grid Y facing south |
| 0 | No response or wrong response |

1 (h) [KB0605 – Predicting]

| Score | Criteria |
|-------|---|
| 3 | <p>Able to predict the outcome of the experiment correctly based on the following criteria:</p> <p>Prediction :</p> <p>C1 : Prediction of total surface area of <i>Pleurococcus sp.</i> C2 : Effects of direct sunlight. C3 : Effect of light intensity of <i>Pleurococcus sp.</i></p> <p>Sample answer: Set 1 C1 : (Size of) the total surface area covered by Pleurococcus sp in Grid X and Grid Y increase / more C2 : Pleurococcus sp. exposed to more sunlight / light intensity. C3 : (More) photosynthesis / (more) growth / <u>more</u> population / reproduction</p> <p>** Reject : Direct sunlight. ** C1 wrong automatically reject C2 and C3</p> <p>Sample answer : Set 2 C1 : Total surface area decrease / less C2 : Pleurococcus sp. exposed to <u>high /more</u> sunlight / light intensity C3 : High temperature/ low humidity / bark become dry / wilt / lost water / less Growth</p> |
| 2 | <p>Able to predict and explain the outcome of the experiment correctly with the two aspects</p> |
| 1 | <p>Able to predict and explain the outcome of the experiment correctly with one aspect correctly.</p> |
| 0 | <p>No response or wrong response.</p> |

1 (i) [KB0602 –Classifying]

| Score | Criteria | | | | |
|-----------------------------|--|---------------|----------------|-----------------------------|---------------------------------------|
| 3 | <p>Able to classify the biotic and abiotic factors correctly:</p> <p>Sample answers</p> <table border="1"> <thead> <tr> <th>Biotic factor</th> <th>Abiotic factor</th> </tr> </thead> <tbody> <tr> <td>Fish Water Lily Snail</td> <td>pH Humidity Temperature Soil</td> </tr> </tbody> </table> <p>7 ticks</p> | Biotic factor | Abiotic factor | Fish Water Lily Snail | pH Humidity Temperature Soil |
| Biotic factor | Abiotic factor | | | | |
| Fish Water Lily Snail | pH Humidity Temperature Soil | | | | |
| 2 | 5-6 ticks | | | | |
| 1 | 3-4 ticks | | | | |
| 0 | No response or wrong response | | | | |

SCORE TOTAL - 11 X 3 = 33 marks

7. Praktis bestari JUJ 2007(Chapter 9:Endangered Ecosystem)

1 a) (i) KB0603 – Measuring using number

| Score | Explanation | | | | | | | | | | |
|--------------|--|--------------|---|---|----|---|----|---|----|---|----|
| 3 | <p>Able to record all the four times correctly. Sample answer</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Water sample</th> <th>Time taken for methylene blue solution to decolourise / minutes</th> </tr> </thead> <tbody> <tr> <td>P</td> <td>10</td> </tr> <tr> <td>Q</td> <td>23</td> </tr> <tr> <td>R</td> <td>42</td> </tr> <tr> <td>S</td> <td>57</td> </tr> </tbody> </table> | Water sample | Time taken for methylene blue solution to decolourise / minutes | P | 10 | Q | 23 | R | 42 | S | 57 |
| Water sample | Time taken for methylene blue solution to decolourise / minutes | | | | | | | | | | |
| P | 10 | | | | | | | | | | |
| Q | 23 | | | | | | | | | | |
| R | 42 | | | | | | | | | | |
| S | 57 | | | | | | | | | | |
| 2 | Able to record any three times correctly | | | | | | | | | | |
| 1 | Able to record any two times correctly. | | | | | | | | | | |
| 0 | No response or wrong response | | | | | | | | | | |

1 (b) (i) [KB0601 - Observation]

| Score | Explanation |
|-------|--|
| 3 | <p>Able to state the correct observations based on the following criteria</p> <ol style="list-style-type: none"> 1. State the time taken for methylene blue solution to decolourise for <i>any two</i> of water samples. 2. Compare the time taken for methylene blue solution to decolourise for all the water samples. <p>Sample answer</p> <ol style="list-style-type: none"> 3. The time taken for methylene blue solution to decolourise for water sample P is 10 minutes. 4. The time taken for methylene blue solution to decolourise for water sample Q / R / S is 23 / 42 / 52 minutes. 5. The time taken for methylene blue solution to decolourise is the shortest for sample P and the longest for sample S.//otherwise |
| 2 | Able to state any one of the observation correctly |

| 1 | <p>Able to give an idea for the observation.</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. Time taken for methylene blue solution to decolourise is 10 minutes. 2. Time taken for methylene blue solution to decolourise is increase. | | | | | | | | | | | | | | | |
|---|---|-----------------------------------|---------------|---------------|---|---|---|---|---|-----------------------------------|---|------|------|---|------|---------------|
| 0 | No response or wrong response | | | | | | | | | | | | | | | |
| <p>Scoring</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Score</th> <th>Observation 1</th> <th>Observation 2</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">√</td> <td style="text-align: center;">√</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">√</td> <td style="text-align: center;">Idea / otherwise X / otherwise</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">Idea</td> <td style="text-align: center;">Idea</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">Idea</td> <td style="text-align: center;">X / otherwise</td> </tr> </tbody> </table> | | Score | Observation 1 | Observation 2 | 3 | √ | √ | 2 | √ | Idea / otherwise X / otherwise | 1 | Idea | Idea | 0 | Idea | X / otherwise |
| Score | Observation 1 | Observation 2 | | | | | | | | | | | | | | |
| 3 | √ | √ | | | | | | | | | | | | | | |
| 2 | √ | Idea / otherwise X / otherwise | | | | | | | | | | | | | | |
| 1 | Idea | Idea | | | | | | | | | | | | | | |
| 0 | Idea | X / otherwise | | | | | | | | | | | | | | |

1 (b) (ii) [KB0604 – Making Inferences]

| Score | Explanation |
|-------|--|
| 3 | <p>Able to state the inference for each observation made corectly and accurately.</p> <p>Sample answer</p> <ol style="list-style-type: none"> 8. The amount of dissolved oxygen in the sample P is low. 9. The amount of dissolved oxygen in the sample P is lower than sample S. <p>Notes:</p> <ul style="list-style-type: none"> ▪ Inference must equivalent with observation. ▪ If observation wrong ,inference reject ▪ If observatian is an idea, inference can get mark. |
| 2 | <ol style="list-style-type: none"> 1. Able to state any one inference made corectly. or 2. Able to state two inferences but incomplete or 3. Able to state an idea of inference for both two observations |
| 1 | <p>Able to state an idea of inference for any one observation made.</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. Water contains oxygen 2. P contains low oxygen. |
| 0 | No response or wrong response |

| | | |
|---------|--------------|----------------------------|
| Scoring | | |
| Score | Inference 1 | Inference 2 |
| 3 | √ | √ |
| 2 | idea √ | Idea X / otherwise |
| 1 | Idea Idea | No answer X / otherwise |

1 (c) [KB0610 – Controlling variables]

| Score | Explanation | | | | | | | | |
|--|---|-----------|-------------------------------|---|---|---|--|---|---|
| 3 | <p>Able to state all the variables and all method to handle variables correctly. Sample answer</p> <table border="1"> <thead> <tr> <th>Variables</th> <th>Particulars to be implemented</th> </tr> </thead> <tbody> <tr> <td> <p>Manipulated variable</p> <p>Water samples/ Source/ type of water samples</p> </td> <td> <p>How to alter the manipulated variable</p> <p>Repeat experiment using different water samples / Change the water samples / Collect water samples from different sources</p> </td> </tr> <tr> <td> <p>Responding variable</p> <p>Time taken for methylene blue solution to decolourise</p> </td> <td> <p>How to determine the responding variable</p> <p>Record/ measure the time taken for methylene blue solution to decolourise using stopwatch</p> </td> </tr> <tr> <td> <p>Controlled variable</p> <p>Volume of water sample</p> <p>Concentration of methylene blue</p> </td> <td> <p>How to maintain the controlled variable</p> <p>Measure 250 ml of water sample using measuring cylinder for each experiment</p> <p>Fix 0.1% methylene blue solution</p> </td> </tr> </tbody> </table> | Variables | Particulars to be implemented | <p>Manipulated variable</p> <p>Water samples/ Source/ type of water samples</p> | <p>How to alter the manipulated variable</p> <p>Repeat experiment using different water samples / Change the water samples / Collect water samples from different sources</p> | <p>Responding variable</p> <p>Time taken for methylene blue solution to decolourise</p> | <p>How to determine the responding variable</p> <p>Record/ measure the time taken for methylene blue solution to decolourise using stopwatch</p> | <p>Controlled variable</p> <p>Volume of water sample</p> <p>Concentration of methylene blue</p> | <p>How to maintain the controlled variable</p> <p>Measure 250 ml of water sample using measuring cylinder for each experiment</p> <p>Fix 0.1% methylene blue solution</p> |
| Variables | Particulars to be implemented | | | | | | | | |
| <p>Manipulated variable</p> <p>Water samples/ Source/ type of water samples</p> | <p>How to alter the manipulated variable</p> <p>Repeat experiment using different water samples / Change the water samples / Collect water samples from different sources</p> | | | | | | | | |
| <p>Responding variable</p> <p>Time taken for methylene blue solution to decolourise</p> | <p>How to determine the responding variable</p> <p>Record/ measure the time taken for methylene blue solution to decolourise using stopwatch</p> | | | | | | | | |
| <p>Controlled variable</p> <p>Volume of water sample</p> <p>Concentration of methylene blue</p> | <p>How to maintain the controlled variable</p> <p>Measure 250 ml of water sample using measuring cylinder for each experiment</p> <p>Fix 0.1% methylene blue solution</p> | | | | | | | | |
| 2 | <p>Able to state 4-5 correct answer. Remark :</p> <ul style="list-style-type: none"> Reject particulars to be implemented if variables is wrong. | | | | | | | | |
| 1 | Able to state 2-3 correct answer | | | | | | | | |
| 0 | No response or wrong response or only one correct | | | | | | | | |
| <p>Scoring</p> <p>Score 3 : 6 correct Score 2 : 4 - 5 correct</p> <p>Score 1 : 2 - 3 correct Skor 0 : 1 correct</p> | | | | | | | | | |

1 (d) [KB0611 – Making hypothesis]

| Score | Explanation |
|-------|---|
| 3 | <p>Able to state the hypothesis correctly based on the following criteria: P1 : State the manipulated variable P2 : State the responding variables H : State the relationship between P1 and P2</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. Different samples of water, different time taken for methylene blue solution to decolourise. 2. The time taken for methylene blue solution to decolourise for sample P is shorter than sample S / otherwise |
| 2 | <p>Able to state any two of the criteria (the hypothesis less accurate) P1 : State the manipulated variable P2 : State the responding variables H : State the relationship between P1 and P2</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. Sample water affect the time taken for methylene blue solution to decolourise |
| 1 | <p>Able to state any one of the criteria or idea of hypothesis.</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. Water affects the time taken for methylene blue solution to decolourise. |
| 0 | <p>No response or wrong response</p> |

1 (e) (i) [KB0606 – Communication]

| Score | Explanation | | | | | | | | | | |
|---------------|--|---------------|---|---|----|---|----|---|----|---|----|
| 3 | <p>Able to construct a table and record the results of the experiment with the following criteria: T – Title with correct units. D – All correct and accurate data S - Names of all water samples.</p> <p>Sample answer</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Water Samples</th> <th>Time taken for methylene blue solution to decolourise / minutes</th> </tr> </thead> <tbody> <tr> <td>P</td> <td>10</td> </tr> <tr> <td>Q</td> <td>23</td> </tr> <tr> <td>R</td> <td>42</td> </tr> <tr> <td>S</td> <td>57</td> </tr> </tbody> </table> | Water Samples | Time taken for methylene blue solution to decolourise / minutes | P | 10 | Q | 23 | R | 42 | S | 57 |
| Water Samples | Time taken for methylene blue solution to decolourise / minutes | | | | | | | | | | |
| P | 10 | | | | | | | | | | |
| Q | 23 | | | | | | | | | | |
| R | 42 | | | | | | | | | | |
| S | 57 | | | | | | | | | | |
| 2 | Able to construct a table with one of the given criteria being incomplete | | | | | | | | | | |
| 1 | Able to construct a table with two of the given criteria being incomplete | | | | | | | | | | |
| 0 | No response or wrong response | | | | | | | | | | |

1 (e) (ii) [KB0607– Using space and time relationship]

| Score | Explanation |
|-------|--|
| 3 | <p>Able to state the relationship between the time taken for methylene blue solution to decolourise and the amount of dissolved oxygen in water samples accurately.</p> <p>P1 - the time taken for methylene blue solution to decolourise P2 - the amount of dissolved oxygen in water samples H – correct relationship</p> <p>Sample answer</p> <ol style="list-style-type: none"> The time taken for methylene blue solution to decolourise will be short if the water sample has a low content of dissolved oxygen / otherwise |
| 2 | <p>Able to state the relationship between the time taken for methylene blue solution to decolourise and the amount of dissolved oxygen in water samples but less accurate.</p> <p>Sample answer</p> <ol style="list-style-type: none"> The time taken to decolourise will be short if the water sample has a low content of dissolved oxygen. The time taken for methylene blue solution to decolourise is short with the amount of dissolved oxygen in water samples |
| 1 | <p>Able to state an idea of the relationship between the time taken for methylene blue solution to decolourise and the amount of dissolved oxygen in water samples.</p> <p>Sample answer</p> <ol style="list-style-type: none"> The time taken to decolourise is short with dissolved oxygen in water samples. |
| 0 | <p>No response or wrong response.</p> |

1 (f) [KB0605 – Predicting]

| Score | Explanation |
|-------|--|
| 3 | <p>Able to predict correctly and explain prediction based on the following criteria K1 – Time taken longer K2 – compare sample S K3 - amount of dissolved oxygen higher</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. The time taken for methylene blue solution to decolourise is longer than sample S because the amount of dissolved oxygen in water sample is higher. 2. The time taken for methylene blue solution to decolourise is more than 57 minutes because the amount of dissolved oxygen in water sample is higher. 3. The time taken for methylene blue solution to decolourise is 60 minutes because the amount of dissolved oxygen in water sample is higher. |
| 2 | <p>Able to predict based on <i>any two</i> criterias</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. The time taken for methylene blue solution to decolourise is longer than sample S because the amount of dissolved oxygen in water sample is higher. |
| 1 | <p>Able to give an idea of a prediction on the observation or predict based on any one criteria.</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. The time taken for methylene blue solution to decolourise is longer. |
| 0 | <p>No response or wrong response</p> |

1 (g) [KB0609 – Defining by operation]

| Score | Explanation |
|-------|--|
| 3 | <p>Able to state correctly and accurately the definition of biochemical oxygen demand based on the results of the experiment using the following criteria :</p> <p>C1 : decolourise C2 : 1ml of 0.1% methylene blue C3 : dissolved oxygen</p> <p>Sample answer</p> <ol style="list-style-type: none"> Biochemical oxygen demand (BOD) in water sample is the content of dissolved oxygen needed to decolourise 1 ml of 0.1% methylene blue soluton in each water samples. |
| 2 | <p>Able to state the definition of BOD based on any two criteria</p> <p>Sample answer</p> <ol style="list-style-type: none"> Biochemical oxygen demand (BOD) in water sample is the content of dissolved oxygen needed to decolourise methylene blue soluton in each water samples. |
| 1 | <p>Able to state the idea of the definition of BOD or state the definition based on any one criteria.</p> <p>Sample water</p> <ol style="list-style-type: none"> Biochemical oxygen demand (BOD) in water sample is the time taken for methylene blue solution to decolourise in each water sample. |
| 0 | No response or wrong response |

1 (h) [KB0602 – Classifying]

| Score | Explanation | | | | | | | | | | |
|---------------|--|---------------|--------|---|-------|---|-------------------|---|---------------|---|-------------------|
| 3 | <p>Able to classify all the water samples according to the levels of pollution correctly.</p> <p>Sample answer</p> <table border="1"> <thead> <tr> <th>Water samples</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>S</td> <td>Clean</td> </tr> <tr> <td>R</td> <td>Slightly polluted</td> </tr> <tr> <td>Q</td> <td>Very polluted</td> </tr> <tr> <td>P</td> <td>Severely polluted</td> </tr> </tbody> </table> | Water samples | Status | S | Clean | R | Slightly polluted | Q | Very polluted | P | Severely polluted |
| Water samples | Status | | | | | | | | | | |
| S | Clean | | | | | | | | | | |
| R | Slightly polluted | | | | | | | | | | |
| Q | Very polluted | | | | | | | | | | |
| P | Severely polluted | | | | | | | | | | |
| 2 | Able to classify any 3 water samples according to the levels of pollution correctly. | | | | | | | | | | |
| 1 | Able to classify any 2 water samples according to the levels of pollution correctly | | | | | | | | | | |
| 0 | No response or wrong answer or only one correct | | | | | | | | | | |

1 (i) [KB0608 – Interpreting data]

| Skor | Kriteria |
|------|--|
| 3 | <p>Able to state the relationship between the amount of dissolved oxygen in water samples and the level of water pollution correctly based on the following criteria: C1 - amount of dissolved oxygen in sample water C2 - level of water pollution C3 – correct relationship</p> <p>Sample answer</p> <p>1. The amount of dissolved oxygen in P water sample is the lowest so P is the most polluted water sample.</p> |

| | |
|---|---|
| 2 | <p>Able to state the relationship based on any two criteria :</p> <p>Sample answer</p> <ol style="list-style-type: none"> The amount of dissolved oxygen in P water sample is the lowest so it's polluted. |
| 1 | <p>Able to state an <i>idea</i> of relationship or state the relationship based on any one criteria.</p> <p>Sample answer</p> <ol style="list-style-type: none"> P is the most polluted water sample. The amount of dissolved oxygen in P water sample is low. |
| 0 | No response or wrong answer |

TOTAL SCORE = 11 X 3 = 33 marks

8. Praktis Bestari JUJ 2008(Chapter 12: Coordination & Response)

| No | Mark Scheme | Score | | | | | | | | | | |
|--|---|----------------------------------|---|-----|-------|-----|--------|-----|--------|-----|--------|---|
| KB0603 – Measuring Using Number | | | | | | | | | | | | |
| 1(a) | <p>Able to record all 4 readings with unit for the volume of urine excreted in an hour correctly.</p> <p>Sample answer</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Volume of plain water taken (ml)</th> <th style="text-align: center;">Volume of urine excreted by the student after an hour</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100</td> <td style="text-align: center;">70 ml</td> </tr> <tr> <td style="text-align: center;">200</td> <td style="text-align: center;">150 ml</td> </tr> <tr> <td style="text-align: center;">300</td> <td style="text-align: center;">250 ml</td> </tr> <tr> <td style="text-align: center;">400</td> <td style="text-align: center;">350 ml</td> </tr> </tbody> </table> | Volume of plain water taken (ml) | Volume of urine excreted by the student after an hour | 100 | 70 ml | 200 | 150 ml | 300 | 250 ml | 400 | 350 ml | 3 |
| Volume of plain water taken (ml) | Volume of urine excreted by the student after an hour | | | | | | | | | | | |
| 100 | 70 ml | | | | | | | | | | | |
| 200 | 150 ml | | | | | | | | | | | |
| 300 | 250 ml | | | | | | | | | | | |
| 400 | 350 ml | | | | | | | | | | | |
| | <p>Able to record any 3 readings with unit for the volume of urine excreted in an hour correctly or all 4 readings without unit.</p> | 2 | | | | | | | | | | |
| | <p>Able to record any 2 readings with unit for the volume of urine excreted in an hour correctly</p> | 1 | | | | | | | | | | |
| | <p>No response or incorrect response or only one reading is correct.</p> | 0 | | | | | | | | | | |

| KB0601 - Observation | | |
|-----------------------------|---|---|
| (b (i) | <p>Able to state two different observations correctly.</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. 70 ml of urine is excreted (by the student after an hour) when 100 ml of plain water is taken (by her/him). 2. 350 ml of urine is excreted (by the student after an hour) when 400 ml of plain water is taken (by her/him). 3. The volume of urine output is less when 100ml of water is taken than the volume of urine output when 400ml of water is taken. 4. The volume of urine output is more when 400ml of water is taken than the volume of urine output when 100ml of water is taken. | 3 |
| | <p>Able to state one observation correctly and one-two inaccurate observations</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. 70 ml of urine is excreted (by the student after an hour) when less water is taken. 2. More urine is excreted (by the student after an hour) when 400 ml of plain water is taken. 3. The volume of urine excreted is less than the volume of water intake by the students. | 2 |
| | <p>Able to state one correct observation and one – two observations at idea level.</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. The volume of urine output changes / increase. 2. The volume of water intake changes / increase 3. The least volume of urine output is 70ml. | |
| | <p>No response or incorrect response or one inaccurate/idea level of observation and another one is wrong.</p> | 0 |

| KB0604 - Making inference | | |
|----------------------------------|---|---|
| (b) (ii) | <p>Able to make inferences correctly</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. Drinks less water cause more water is reabsorbed from the tubules into the blood capillaries (hence less urine output). 2. Drinks more water cause less water is reabsorbed from the tubules into the blood capillaries (hence more urine output) . 3. More water is reabsorbed from the tubules into the blood capillaries when the volume of water intake is lower compare higher volume of water intake. 4. Less water is reabsorbed from the tubules into the blood capillaries when the volume of water intake is higher compare to lower volume of water intake. | 3 |
| | <p>Able to make one correct inference and one-two inaccurate inferences.</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. Water is reabsorbed. 2. The volume of urine output is influenced by osmoregulation. | 2 |
| | <p>Able to state one correct inference and one-two inferences at idea level</p> <p>Sample answer</p> <ol style="list-style-type: none"> 1. Reabsorption occurs. | 1 |
| | <p>No response or incorrect response or one inaccurate/idea level of inference and another one is wrong.</p> | 0 |
| | | |

| KB0610-Controlling variables | | | |
|---|--|---|---|
| (c) | Able to state all 3 variables and 3 methods to handle the variable. Sample answer | | 3 |
| | Variable | Method to handle the variable | |
| | <u>Manipulated variable</u> Volume of water intake | Change/Use /carry out experiment with various/different volume of water intake (100ml,200ml,300ml and 400ml). | |
| | <u>Responding variable</u> Volume of urine output / excreted | Measure/record the volume of urine output using measuring cylinder . | |
| | <u>Constant variable</u> Student Time to collect urine. | Same students carried out the experiment. Use an hour to collect urine | |
| All 6 ticks | | | |
| 4 to 5 ticks | | 2 | |
| 2-3 ticks | | 1 | |
| No response or incorrect response or only 1 tick | | 0 | |

| KB0611-State hypothesis | | |
|--------------------------------|---|---|
| (d) | <p>Able to state hypothesis relating manipulated variable and responding variable correctly with the following aspect :</p> <p>P1 – Manipulated variable P2 – Responding variable H - relationship</p> <p>Sample answer</p> <ol style="list-style-type: none"> As the volume of water intake increase the volume of urine output / excreted increase // inversely. The greater the volume of water intake the greater the volume of urine output. | 3 |
| | <p>Able to state a hypothesis relating the manipulated variable and the responding variable inaccurately.</p> <p>Sample answer</p> <ol style="list-style-type: none"> (The increase) of the volume of water intake influences/affects the volume of urine output. | 2 |
| | <p>Able to state a hypothesis relating the manipulated variable and responding variable at idea level</p> <p>Sample answer</p> <ol style="list-style-type: none"> Water increase urine output. | 1 |
| | <p>No response or incorrect response</p> <ul style="list-style-type: none"> <i>If no P1 and P2, no mark for H</i> | 0 |

| KB0606 – Communicating data | | | | | | | | | | | | | | | | | |
|------------------------------------|--|---|--|---|-----|----|------|-----|-----|------|-----|-----|------|-----|-----|------|---|
| (e) (i) | <p>Able to construct a table correctly with the following aspects :</p> <p>1. Able to state the 3 titles with units correctly. 1- mark</p> <p>2. Able to record all data correctly. 1 - mark</p> <p>3. Able to calculate and record percentage of water taken in that has been excreted as urine. 1 - mark</p> <p>Sample answer</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Volume of water intake (ml)</th> <th style="text-align: center;">Volume of water output/excreted after an hour (ml)</th> <th style="text-align: center;">Percentage of water taken in that has been excreted as urine, %</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100</td> <td style="text-align: center;">70</td> <td style="text-align: center;">70.0</td> </tr> <tr> <td style="text-align: center;">200</td> <td style="text-align: center;">150</td> <td style="text-align: center;">75.0</td> </tr> <tr> <td style="text-align: center;">300</td> <td style="text-align: center;">250</td> <td style="text-align: center;">83.0</td> </tr> <tr> <td style="text-align: center;">400</td> <td style="text-align: center;">350</td> <td style="text-align: center;">87.5</td> </tr> </tbody> </table> | Volume of water intake (ml) | Volume of water output/excreted after an hour (ml) | Percentage of water taken in that has been excreted as urine, % | 100 | 70 | 70.0 | 200 | 150 | 75.0 | 300 | 250 | 83.0 | 400 | 350 | 87.5 | 3 |
| Volume of water intake (ml) | Volume of water output/excreted after an hour (ml) | Percentage of water taken in that has been excreted as urine, % | | | | | | | | | | | | | | | |
| 100 | 70 | 70.0 | | | | | | | | | | | | | | | |
| 200 | 150 | 75.0 | | | | | | | | | | | | | | | |
| 300 | 250 | 83.0 | | | | | | | | | | | | | | | |
| 400 | 350 | 87.5 | | | | | | | | | | | | | | | |
| | Any two aspects correctly | 2 | | | | | | | | | | | | | | | |
| | Any one aspect correctly | 1 | | | | | | | | | | | | | | | |
| | No response or incorrect response | 0 | | | | | | | | | | | | | | | |
| (e) (ii) | <p>Able to draw the bar chart correctly with the following aspects:</p> <p>P : Correct title with unit on both horizontal and vertical axis and uniform scale. 1 - mark</p> <p>T : All points plotted correctly accordingly to the table. 1 – mark</p> <p>B : Uniform size of bar chart 1 - mark</p> | 3 | | | | | | | | | | | | | | | |
| | Any two aspects correctly | 2 | | | | | | | | | | | | | | | |
| | Any one aspects correctly | 1 | | | | | | | | | | | | | | | |
| | No response or incorrect response | 0 | | | | | | | | | | | | | | | |

| KB 0607 – Correlating time and space | | |
|---|--|---|
| (f) | <p>Able to interpret data correctly and explain with the following aspects :</p> <p>P1 : Able to state relationship between manipulated variable and responding variable.</p> <p>P2 : Able to state less water is reabsorbed from the tubules into the blood capillaries</p> <p>P3 : Able to state more urine is excreted.</p> <p>Sample answer When the volume of water intake increase the volume of urine output / excreted increase because less water is reabsorbed from the tubules into the blood capillaries therefore more urine is excreted.</p> | 3 |
| | Able to interpret the data with 2 aspects correctly | 2 |
| | Able to interpret data correctly with only one aspect correct. | 1 |
| | No response or incorrect response | 0 |
| KB0605 - Predicting | | |
| (g) | <p>Able to predict and explain the outcome of the experiment correctly with the following aspects :</p> <p>P1 : Correct prediction – Able to state the volume of urine output is decrease/less than 70 ml</p> <p>P2 : Explanation : Able to state salts increase / raised the blood osmotic pressure</p> <p>P3 : Explanation : Able to state the volume of urine output/excreted decrease</p> <p>Sample answer P1 : The volume of urine output is decrease / less than 70 ml P2 : because salts increase / raised the blood osmotic pressure P3 : therefore the volume of urine output/excreted decrease</p> | 3 |
| | Able to predict and explain the outcome of the experiment with the two aspects correctly. | 2 |
| | Able to predict and explain the outcome of the experiment with the one aspects correctly. | 1 |
| | None of the above or no response | 0 |

| KB0609 – Defining by operation | | | | | | | | | | |
|---------------------------------------|--|-------------------------------------|-------------------------------------|------------|--------------|----------------|----------------|--------------|--------------|---|
| (h) | <p>Able to define operationally based on the result of the experiment with the following aspects :</p> <p>P1 : The process of regulating the blood osmotic pressure P2 : The volume of urine output is effected by the volume of water taken P3 : The higher the volume of water intake, the higher the volume of urine output.</p> <p>Sample answer 1. Osmoregulation is the process of regulating the blood osmotic pressure where the volume of urine output is effected by the volume of water taken. The higher the volume of water intake, the higher the volume of urine output.</p> | 3 | | | | | | | | |
| | Able to define operationally based on the result of the experiment with two aspects correctly. | 2 | | | | | | | | |
| | Able to define operationally based on the result of the experiment with only one aspect correctly | 1 | | | | | | | | |
| | None of the above or no response | 0 | | | | | | | | |
| KB0602 - Classifying | | | | | | | | | | |
| (i) | <p>Able to classify all the materials based on their effect on the volume of urine output in Table 3.</p> <p>Sample answer</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Increase the volume of urine output</th> <th style="width: 50%;">Decrease the volume of urine output</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Watermelon</td> <td style="text-align: center;">Salted plums</td> </tr> <tr> <td style="text-align: center;">Isotonic drink</td> <td style="text-align: center;">Prawn crackers</td> </tr> <tr> <td style="text-align: center;">Orange juice</td> <td style="text-align: center;">Potato chips</td> </tr> </tbody> </table> | Increase the volume of urine output | Decrease the volume of urine output | Watermelon | Salted plums | Isotonic drink | Prawn crackers | Orange juice | Potato chips | 3 |
| Increase the volume of urine output | Decrease the volume of urine output | | | | | | | | | |
| Watermelon | Salted plums | | | | | | | | | |
| Isotonic drink | Prawn crackers | | | | | | | | | |
| Orange juice | Potato chips | | | | | | | | | |

| | <p>Able to classify two materials based on their effect on the volume of urine output.</p> <table border="1"> <thead> <tr> <th>Increase the volume of urine output</th> <th>Decrease the volume of urine output</th> </tr> </thead> <tbody> <tr> <td> √ √ X </td> <td> √ √ X </td> </tr> </tbody> </table> | Increase the volume of urine output | Decrease the volume of urine output | √ √ X | √ √ X | |
|-------------------------------------|---|-------------------------------------|-------------------------------------|-------------|-------------|--|
| Increase the volume of urine output | Decrease the volume of urine output | | | | | |
| √ √ X | √ √ X | | | | | |
| | <p>Able to classify any one material based on their effect on the volume of urine output</p> <table border="1"> <thead> <tr> <th>Increase the volume of urine output</th> <th>Decrease the volume of urine output</th> </tr> </thead> <tbody> <tr> <td> √ X X </td> <td> √ X X </td> </tr> </tbody> </table> | Increase the volume of urine output | Decrease the volume of urine output | √ X X | √ X X | |
| Increase the volume of urine output | Decrease the volume of urine output | | | | | |
| √ X X | √ X X | | | | | |

9. Praktis Bestari JUJ 2010(Chapter 13: Reproduction & Growth)

| No | Mark Scheme | Score | | | | | | | | | | | | |
|--|--|-------|------------------|-----------------------|---|---|----|----|----|----|----|----|----|---|
| KB0603 – Measuring Using Number | | | | | | | | | | | | | | |
| 1(a) | <p>Able to record the initial body length and all four body length correctly <i>Sample answer</i></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Day</th> <th>Body length (mm)</th> </tr> </thead> <tbody> <tr> <td>0 (initial length)</td> <td>7</td> </tr> <tr> <td>8</td> <td>11</td> </tr> <tr> <td>16</td> <td>17</td> </tr> <tr> <td>24</td> <td>24</td> </tr> <tr> <td>32</td> <td>30</td> </tr> </tbody> </table> | Day | Body length (mm) | 0 (initial length) | 7 | 8 | 11 | 16 | 17 | 24 | 24 | 32 | 30 | 3 |
| Day | Body length (mm) | | | | | | | | | | | | | |
| 0 (initial length) | 7 | | | | | | | | | | | | | |
| 8 | 11 | | | | | | | | | | | | | |
| 16 | 17 | | | | | | | | | | | | | |
| 24 | 24 | | | | | | | | | | | | | |
| 32 | 30 | | | | | | | | | | | | | |
| | Able to record any four lengths correctly | 2 | | | | | | | | | | | | |
| | Able to record any three lengths correctly | 1 | | | | | | | | | | | | |
| | No response or incorrect response or <i>only two data correctly</i> | 0 | | | | | | | | | | | | |
| KB0601 - Observation | | | | | | | | | | | | | | |
| (b) (i) | <p>Able to state any two correct observations based on the following criteria : K1 – Time/Day K2 - The body length of grasshopper and unit</p> <p>Sample Answer Horizontal observation:</p> <ol style="list-style-type: none"> 6. The body length of grasshopper at day 8 is 11 mm. 7. The body length of grasshopper at day a16 is 17 mm. 8. The body length of grasshopper at day 24 is 24 mm. 9. The body length of grasshopper at day 32 is 29 mm. <p>Vertical observation :</p> <ol style="list-style-type: none"> 3. The body length of grasshopper at day 32 is greater than the body length at day 8. 4. The body length of grasshopper at day 8 is lower than the body length at day 32. | 3 | | | | | | | | | | | | |
| | <p>Able to state one correct observation and any one inaccurate observation or able to state two inaccurate observations Sample answers of incomplete observation : (<i>Has the time/day, but no value of length but in qualitative</i>) Horizontal</p> <ol style="list-style-type: none"> 6. At day 8, the body length of grasshopper is low. 7. At day 32, the body length of grasshopper is high. 8. The body length of grasshopper is 11mm/17mm/24mm/29mm. | 2 | | | | | | | | | | | | |

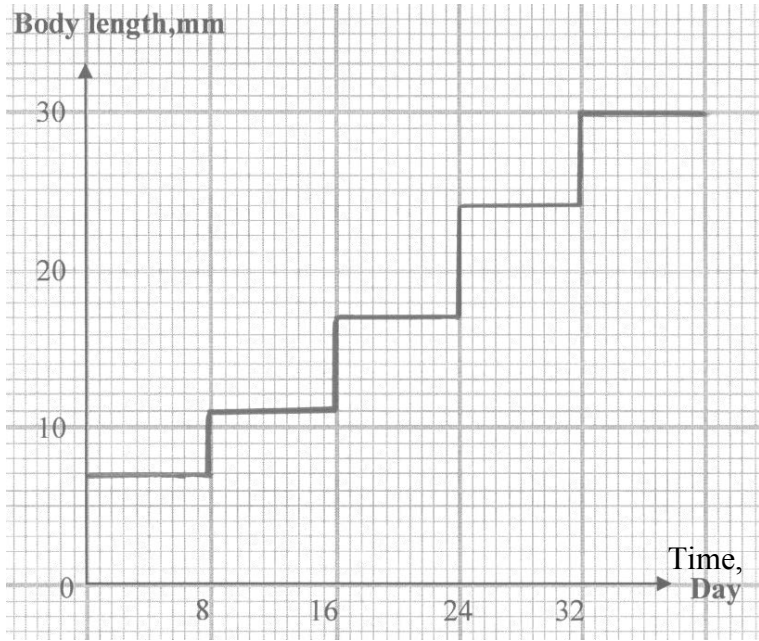
| | <p>Vertical</p> <p>9. The length of grasshopper body increase when time / day increase. (<i>comparing</i>)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|------|---------|------------|------|-------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | <p>Able to state only one correct observation or Able to state two observations at idea level.</p> <p>Sample answer</p> <p>5. Body length of grasshopper is increase.</p> | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>No response <u>or</u> incorrect response <u>or</u> one idea only</p> | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Scoring</p> <table border="1" style="margin: auto;"> <thead> <tr> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>-</td> <td>-</td> <td>-</td> <td>3</td> </tr> <tr> <td>1</td> <td>1</td> <td>-</td> <td>-</td> <td rowspan="2">2</td> </tr> <tr> <td>-</td> <td>2</td> <td>-</td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td>1</td> <td>-</td> <td rowspan="3">1</td> </tr> <tr> <td>-</td> <td>-</td> <td>2</td> <td>-</td> </tr> <tr> <td>1</td> <td></td> <td></td> <td>1</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> <td rowspan="3">0</td> </tr> <tr> <td>-</td> <td>1</td> <td>-</td> <td>1</td> </tr> <tr> <td>-</td> <td>-</td> <td>1</td> <td>1</td> </tr> </tbody> </table> | | | Correct | Inaccurate | Idea | Wrong | Score | 2 | - | - | - | 3 | 1 | 1 | - | - | 2 | - | 2 | - | - | 1 | - | 1 | - | 1 | - | - | 2 | - | 1 | | | 1 | - | 1 | 1 | - | 0 | - | 1 | - | 1 | - | - | 1 | 1 |
| Correct | Inaccurate | Idea | Wrong | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | - | - | - | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | - | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 2 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | 1 | - | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>KB0604 - Making inference</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>(b) (ii)</p> | <p>Able to make two correct inferences</p> <p>Sample answers</p> <p>Horizontal observation</p> <ol style="list-style-type: none"> 1. Growth rate low 2. Growth rate high <p>Vertical observation</p> <ol style="list-style-type: none"> 1. At day 3, the growth rate is than day 8 //vice-versa <p>Notes :</p> <p>The inferences should be correspond to the observations.</p> <p style="margin-left: 40px;"> – inference 1 → observation 1 } - inference 2 → observation 2 } 0 mark if not correspond </p> | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| <p>Able to make one correct inference and one inaccurate inference or Able to state two inaccurate inferences</p> <p>Sample answers Inference (horizontal observation) 1. Growth low 2. Growth high</p> <p>Inference (vertical observation) 1. At day 3, the growth is higher than day 8 //vice-versa</p> | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|------------|------------|-------|-------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|---|
| <p>Able to state only one correct inference or Able to state two inferences at idea level</p> <p>Sample answers 5. Growth occurred.</p> | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>No response or incorrect response</p> <table border="1"> <thead> <tr> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>-</td> <td>-</td> <td>-</td> <td>3</td> </tr> <tr> <td>1</td> <td>1</td> <td>-</td> <td>-</td> <td>2</td> </tr> <tr> <td>-</td> <td>2</td> <td>-</td> <td>-</td> <td rowspan="3">1</td> </tr> <tr> <td>1</td> <td>-</td> <td>1</td> <td>-</td> </tr> <tr> <td>-</td> <td>-</td> <td>2</td> <td>-</td> </tr> <tr> <td>1</td> <td></td> <td></td> <td>1</td> <td rowspan="3">0</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> </tr> <tr> <td>-</td> <td>1</td> <td>-</td> <td>1</td> </tr> <tr> <td>-</td> <td>-</td> <td>1</td> <td>1</td> <td></td> </tr> </tbody> </table> | Correct | Inaccurate | Idea | Wrong | Score | 2 | - | - | - | 3 | 1 | 1 | - | - | 2 | - | 2 | - | - | 1 | 1 | - | 1 | - | - | - | 2 | - | 1 | | | 1 | 0 | - | 1 | 1 | - | - | 1 | - | 1 | - | - | 1 | 1 | | 0 |
| Correct | Inaccurate | Idea | Wrong | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | - | - | - | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | - | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 2 | - | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| KB0610-Controlling variables | | | | | | | | | | |
|---|--|---|---|-------------------------------|---|---|---|---|---|--|
| (c) | Able to state all 3 variables and 3 methods to handle each variable. Sample answer | 3 | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Variable</th> <th>Method to handle the variable</th> </tr> </thead> <tbody> <tr> <td><u>Manipulated variable</u> Time / Day</td> <td>Use intervals of eight days beginning from the day of hatching.</td> </tr> <tr> <td><u>Responding variable</u> Body length of grasshopper Growth rate</td> <td>Record the body length of grasshopper using ruler Measure and record the body length of grasshopper using a ruler Calculate the growth rate by using the formulae = $\frac{\text{Change in body length}}{\text{time taken}}$</td> </tr> <tr> <td><u>Controlled variable</u> 1.Type of animal/insect</td> <td>8. Use the same grasshopper 9. Fix the amount of food supplied.</td> </tr> </tbody> </table> | | Variable | Method to handle the variable | <u>Manipulated variable</u> Time / Day | Use intervals of eight days beginning from the day of hatching. | <u>Responding variable</u> Body length of grasshopper Growth rate | Record the body length of grasshopper using ruler Measure and record the body length of grasshopper using a ruler Calculate the growth rate by using the formulae = $\frac{\text{Change in body length}}{\text{time taken}}$ | <u>Controlled variable</u> 1.Type of animal/insect | 8. Use the same grasshopper 9. Fix the amount of food supplied. |
| | Variable | | Method to handle the variable | | | | | | | |
| | <u>Manipulated variable</u> Time / Day | | Use intervals of eight days beginning from the day of hatching. | | | | | | | |
| | <u>Responding variable</u> Body length of grasshopper Growth rate | | Record the body length of grasshopper using ruler Measure and record the body length of grasshopper using a ruler Calculate the growth rate by using the formulae = $\frac{\text{Change in body length}}{\text{time taken}}$ | | | | | | | |
| <u>Controlled variable</u> 1.Type of animal/insect | 8. Use the same grasshopper 9. Fix the amount of food supplied. | | | | | | | | | |
| All 6 ticks | | | | | | | | | | |
| Able to state 4 to 5 ticks | 2 | | | | | | | | | |
| Able to state 2-3 ticks | 1 | | | | | | | | | |
| No response or incorrect response or one tick only | 0 | | | | | | | | | |

| KB0611-State hypothesis | | |
|--------------------------------|---|---|
| (d) | <p>Able to state a hypothesis relating manipulated variable and responding variable correctly with the following aspect :</p> <p>P1 – Manipulated variable – time / Day P2 – Responding variable – Body length / Growth rate of grasshopper H - relationship – increase // inversely</p> <p>Sample answer</p> <p>3. As the time/day increase, the (body) length/growth rate of grasshopper also increase //vice-versa</p> | 3 |

| | Able to state a hypothesis relating the manipulated variable and the responding variable but less accurately. Sample answer 4. When the time/day different, the (body) length of grasshopper also different. | 2 | | | | | | | | | | | | | | | | | | | | |
|------------------------------------|--|----|-----------------------|--------------------|-----------------------|--------------------|---|----|---|-----|----|----|----|-------|----|----|----|-------|----|----|----|-------|
| | Able to state one idea of a hypothesis Sample answer 1. Body length increase | 1 | | | | | | | | | | | | | | | | | | | | |
| | No response or incorrect response • <i>If no P1 and P2, no mark for H</i> | 0 | | | | | | | | | | | | | | | | | | | | |
| KB0606 – Communicating data | | | | | | | | | | | | | | | | | | | | | | |
| (e) (i) | Able to construct a table correctly with the following aspects : 1. Able to state the 4 titles with units correctly - T 1- mark 2. Able to record all data for body length and changes in body length correctly . - D 1 - mark 3. Able to calculate and record the values for growth rate of grasshopper - R 1 - mark Sample answer | 3 | | | | | | | | | | | | | | | | | | | | |
| | <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Day</th> <th>Body Length (mm)</th> <th>Changes in length, mm</th> <th>Growth rate mm/day</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>11</td> <td>4</td> <td>0.5</td> </tr> <tr> <td>16</td> <td>17</td> <td>10</td> <td>0.625</td> </tr> <tr> <td>24</td> <td>24</td> <td>17</td> <td>0.708</td> </tr> <tr> <td>32</td> <td>30</td> <td>23</td> <td>0.719</td> </tr> </tbody> </table> | | Day | Body Length (mm) | Changes in length, mm | Growth rate mm/day | 8 | 11 | 4 | 0.5 | 16 | 17 | 10 | 0.625 | 24 | 24 | 17 | 0.708 | 32 | 30 | 23 | 0.719 |
| Day | Body Length (mm) | | Changes in length, mm | Growth rate mm/day | | | | | | | | | | | | | | | | | | |
| 8 | 11 | | 4 | 0.5 | | | | | | | | | | | | | | | | | | |
| 16 | 17 | | 10 | 0.625 | | | | | | | | | | | | | | | | | | |
| 24 | 24 | 17 | 0.708 | | | | | | | | | | | | | | | | | | | |
| 32 | 30 | 23 | 0.719 | | | | | | | | | | | | | | | | | | | |
| | Any two aspects correctly | 2 | | | | | | | | | | | | | | | | | | | | |
| | Any one aspect correctly | 1 | | | | | | | | | | | | | | | | | | | | |
| | No response or incorrect response | 0 | | | | | | | | | | | | | | | | | | | | |
| (e) (ii) | Able to draw a graph of the change in length of grasshopper against the time to show the growth curve of an insect which satisfies the following criteria: Axes (P) – both axes are labelled and uniform scales, manipulated variable on horizontal axis, correct units. Points(T)- all points correctly plotted Shape(B)- staircase shape | 3 | | | | | | | | | | | | | | | | | | | | |

| | | |
|------------------------------------|---|---|
| | <p><i>Sample Answer</i> Refer graph</p>  | |
| | Any two aspects correctly | 2 |
| | Any one aspects correctly | 1 |
| | No response or incorrect response | 0 |
| KB 0608 – Interpreting data | | |
| (f) | <p>Able to explain the growth curve of insect correctly based on the following criteria:</p> <p>R1- state the shape of the growth curve of insect – staircase shape R2- state that horizontal parts indicate zero growth –the time when the insect stop growing. R3- state that vertical lines indicate the nymphs undergo ecdysis and increases rapidly in size during ecdysis.</p> <p>Sample Answer</p> <ol style="list-style-type: none"> 5. The shape of the growth curve of insect is staircase shape 2. Horizontal parts indicate zero growth that is the time when the insect stop growing. 3. and vertical lines indicate the nymphs undergo ecdysis and increases rapidly in size during ecdysis. | 3 |

| | | |
|---------------------------------------|--|---|
| | | |
| | Able to explain the relationship using any two criteria | 2 |
| | Able to explain the relationship using one criteria | 1 |
| | No response or incorrect response | 0 |
| KB0609 – Defining by operation | | |
| (g) | <p>Able to state the definition of growth, complete and correct based on the following criteria:</p> <p>D1- Irreversible increase</p> <p>D2- in body length of grasshopper</p> <p>D3- As the time increases, the body length of grasshopper increases.</p> <p>Sample answer</p> <p>1. Growth is irreversible increases (D1) in body length of grasshopper (D2). As the time increases, the body length of grasshopper increases(D3).</p> | 3 |
| | <p>Any two criteria stated</p> <p>Sample answer</p> <p>1. Growth is change in body length of grasshopper (D2). As the time increases, the body length of grasshopper increases (D3).</p> | 2 |
| | <p>Any one criteria stated</p> <p>Sample answer</p> <p>1. Growth is change in body length of grasshopper (D2).</p> <p>2. As the time increases, the body length of grasshopper increases (D3).</p> | 1 |
| | None of the above or no response | 0 |
| KB0605 - Predicting | | |
| (h) | <p>Able to predict correctly and explain the prediction based on the following criteria:</p> <p>P1 – body length is 24mm</p> <p>P2 – doest not change</p> | 3 |

| | | |
|--|--|---|
| | P3 – because the growth of an insect occurs only during ecdysis. <i>Sample answer</i> 1. The body length of grasshopper is 24mm. The body length does not change because the growth of an insect occurs only during ecdysis. | |
| | Any two criteria stated | 2 |
| | Any one criteria stated | 1 |
| | No response or incorrect response | 0 |

| KB0602 - Classifying | | | | | | | | | | |
|---|--|---|---|------|---------|----------|------------|------|-----|---|
| (c) (ii) | Able to classify all animals based on their shape of growth curve correctly <i>Sample Answer</i> | | | | | | | | | |
| | <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Sigmoid Growth Curve <i>Lengkung Pertumbuhan Sigmoid</i></th> <th>Staircase Shape <i>Bentuk tangga</i></th> </tr> </thead> <tbody> <tr> <td>Frog</td> <td>Cricket</td> </tr> <tr> <td>Elephant</td> <td>Dragon fly</td> </tr> <tr> <td>Bird</td> <td>Ant</td> </tr> </tbody> </table> | Sigmoid Growth Curve <i>Lengkung Pertumbuhan Sigmoid</i> | Staircase Shape <i>Bentuk tangga</i> | Frog | Cricket | Elephant | Dragon fly | Bird | Ant | 3 |
| Sigmoid Growth Curve <i>Lengkung Pertumbuhan Sigmoid</i> | Staircase Shape <i>Bentuk tangga</i> | | | | | | | | | |
| Frog | Cricket | | | | | | | | | |
| Elephant | Dragon fly | | | | | | | | | |
| Bird | Ant | | | | | | | | | |
| | Able to classify 5 animals based on their shape of growth curve correctly | 2 | | | | | | | | |
| | Able to classify 3-4 animals based on their shape of growth curve correctly | 1 | | | | | | | | |
| | No response or wrong response or <i>only two correct</i> | 0 | | | | | | | | |

10. Modul JUJ 2011(Chapter 15:Variation)

| No | Mark Scheme | Score | | | | | | | | | | | | | | | | | | |
|---|---|-------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|------------------|---|---|---|----|---|---|---|---|
| KB0603 – Measuring Using Number | | | | | | | | | | | | | | | | | | | | |
| 1(a) | Able to record all the number of leave at their range of surface area correctly <i>Sample answer</i> | 3 | | | | | | | | | | | | | | | | | | |
| | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Leaves Surface area</td> <td style="width: 10%;">50-53</td> <td style="width: 10%;">54-57</td> <td style="width: 10%;">58-61</td> <td style="width: 10%;">62-65</td> <td style="width: 10%;">66-69</td> <td style="width: 10%;">70-73</td> <td style="width: 10%;">74-77</td> <td style="width: 10%;">78-81</td> </tr> <tr> <td>Number of leaves</td> <td>2</td> <td>5</td> <td>8</td> <td>12</td> <td>9</td> <td>7</td> <td>4</td> <td>1</td> </tr> </table> | | Leaves Surface area | 50-53 | 54-57 | 58-61 | 62-65 | 66-69 | 70-73 | 74-77 | 78-81 | Number of leaves | 2 | 5 | 8 | 12 | 9 | 7 | 4 | 1 |
| | Leaves Surface area | | 50-53 | 54-57 | 58-61 | 62-65 | 66-69 | 70-73 | 74-77 | 78-81 | | | | | | | | | | |
| | Number of leaves | | 2 | 5 | 8 | 12 | 9 | 7 | 4 | 1 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| Able to record any two heights correctly | 2 | | | | | | | | | | | | | | | | | | | |
| Able to record any one height correctly | 1 | | | | | | | | | | | | | | | | | | | |
| No response or incorrect response. | 0 | | | | | | | | | | | | | | | | | | | |
| KB0601 - Observation | | | | | | | | | | | | | | | | | | | | |
| (b) (i) | Able to state any two correct observations based on the following criteria : K1 – range of leaves surface area K2 - The number of leaves Sample Answer Horizontal observation: 10. The range of leaves surface area for 62-65 is 12 11. The range of leaves surface area for 78-81 is 1 Vertical observation : 12. The range of leaves surface area for 62-65 is higher number of leaves surface area compared to other the range of leaves surface area | 3 | | | | | | | | | | | | | | | | | | |
| | Able to state one correct observation and any one inaccurate observation or able to state two inaccurate observations Sample answers of incomplete observation : (<i>Has the range surface area, but no value of number but in qualitative</i>) Horizontal 10. The range of leaves surface area for 62-65 is the higher number 11. The range of leaves surface area for 78-81 is the lower number | 2 | | | | | | | | | | | | | | | | | | |

| | <p>Able to state only one correct observation or Able to state two observations at idea level.</p> <p>Sample answer</p> <p>6. Number of leaves lower in the range of surface area. 7. Number of leaves lower at the lower range of surface area.</p> | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|------|---------|------------|------|-------|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No response <u>or</u> incorrect response <u>or</u> one idea only | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Scoring</p> <table border="1" style="margin: auto;"> <thead> <tr> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>-</td> <td>-</td> <td>-</td> <td>3</td> </tr> <tr> <td>1</td> <td>1</td> <td>-</td> <td>-</td> <td rowspan="2">2</td> </tr> <tr> <td>-</td> <td>2</td> <td>-</td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td>1</td> <td>-</td> <td rowspan="3">1</td> </tr> <tr> <td>-</td> <td>-</td> <td>2</td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td>-</td> <td>1</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> <td rowspan="3">0</td> </tr> <tr> <td>-</td> <td>1</td> <td>-</td> <td>1</td> </tr> <tr> <td>-</td> <td>-</td> <td>1</td> <td>1</td> </tr> </tbody> </table> | | | Correct | Inaccurate | Idea | Wrong | Score | 2 | - | - | - | 3 | 1 | 1 | - | - | 2 | - | 2 | - | - | 1 | - | 1 | - | 1 | - | - | 2 | - | 1 | - | - | 1 | - | 1 | 1 | - | 0 | - | 1 | - | 1 | - | - | 1 | 1 |
| Correct | Inaccurate | Idea | Wrong | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | - | - | - | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | - | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 2 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | 1 | - | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| KB0604 - Making inference | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (b) (ii) | <p>Able to make two correct inferences</p> <p>Sample answers</p> <p>Horizontal observation</p> <p>3. Range of surface area 50-53 has low number of leaves distribution 4. Range of surface area 62-65 has higher leaves distribution</p> <p>Notes :</p> <p>The inferences should be correspond to the observations.</p> <p>- inference 1 → observation 1 } - inference 2 → observation 2 } 0 mark if not correspond</p> | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>Able to make one correct inference and one inaccurate inference or Able to state two inaccurate inferences</p> <p>Sample answers</p> <p>Inference (horizontal observation)</p> | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| <p>5. Number of leaves for range of low surface area is lesser 6. Number of leaves for range of higher surface area is the most</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|-------------------------------|--|--|--|--|---|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|---|
| <p>Able to state only one correct inference or Able to state two inferences at idea level</p> <p>Sample answers 6. The range of surface area affect the number of leaves</p> | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>No response or incorrect response</p> <table border="1"> <thead> <tr> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>-</td> <td>-</td> <td>-</td> <td>3</td> </tr> <tr> <td>1</td> <td>1</td> <td>-</td> <td>-</td> <td>2</td> </tr> <tr> <td>-</td> <td>2</td> <td>-</td> <td>-</td> <td rowspan="3">1</td> </tr> <tr> <td>1</td> <td>-</td> <td>1</td> <td>-</td> </tr> <tr> <td>-</td> <td>-</td> <td>2</td> <td>-</td> </tr> <tr> <td>1</td> <td></td> <td></td> <td>1</td> <td rowspan="3">0</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> </tr> <tr> <td>-</td> <td>1</td> <td>-</td> <td>1</td> </tr> <tr> <td>-</td> <td>-</td> <td>1</td> <td>1</td> <td></td> </tr> </tbody> </table> | Correct | Inaccurate | Idea | Wrong | Score | 2 | - | - | - | 3 | 1 | 1 | - | - | 2 | - | 2 | - | - | 1 | 1 | - | 1 | - | - | - | 2 | - | 1 | | | 1 | 0 | - | 1 | 1 | - | - | 1 | - | 1 | - | - | 1 | 1 | | 0 |
| Correct | Inaccurate | Idea | Wrong | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | - | - | - | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | - | - | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 2 | - | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | - | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 2 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | 1 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | 1 | - | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | - | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>KB0610-Controlling variables</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>(c) Able to state all 3 variables and 3 methods to handle each variable. Sample answer</p> <table border="1"> <thead> <tr> <th>Variable</th> <th>Method to handle the variable</th> </tr> </thead> <tbody> <tr> <td> <u>Manipulated variable</u> Range of surface area </td> <td> Change the range of surface area 50-53,54-57,58-61,62-65,66-69,70-73,74-77,77-81 Use different range of surface area </td> </tr> <tr> <td> <u>Responding variable</u> The number of leaves </td> <td> Count and record the number of leaves </td> </tr> <tr> <td> <u>Controlled variable</u> 1.Species of plant 2. Area planted </td> <td> 10. Use the same/ fix species of plant 11. Use the same/ fix location planted </td> </tr> </tbody> </table> <p>All 6 ticks</p> | Variable | Method to handle the variable | <u>Manipulated variable</u> Range of surface area | Change the range of surface area 50-53,54-57,58-61,62-65,66-69,70-73,74-77,77-81 Use different range of surface area | <u>Responding variable</u> The number of leaves | Count and record the number of leaves | <u>Controlled variable</u> 1.Species of plant 2. Area planted | 10. Use the same/ fix species of plant 11. Use the same/ fix location planted | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Variable | Method to handle the variable | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <u>Manipulated variable</u> Range of surface area | Change the range of surface area 50-53,54-57,58-61,62-65,66-69,70-73,74-77,77-81 Use different range of surface area | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <u>Responding variable</u> The number of leaves | Count and record the number of leaves | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <u>Controlled variable</u> 1.Species of plant 2. Area planted | 10. Use the same/ fix species of plant 11. Use the same/ fix location planted | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | |
|--------------------------------|--|---|
| | Able to state 4 to 5 ticks | 2 |
| | Able to state 2-3 ticks | 1 |
| | No response or incorrect response or one tick only | 0 |
| KB0611-State hypothesis | | |
| (d) | <p>Able to state a hypothesis relating manipulated variable and responding variable correctly with the following aspect :</p> <p>P1 – Manipulated variable – range of surface area P2 – Responding variable – The number of leaves H - relationship – higher // lower</p> <p>Sample answer</p> <p>4. The number of leaves at range of surface area 62-65 is 12</p> | 3 |
| | <p>Able to state a hypothesis relating the manipulated variable and the responding variable but less accurately.</p> <p>Sample answer</p> <p>1.</p> | 2 |
| | <p>Able to state one idea of a hypothesis</p> <p>Sample answer</p> <p>1. The range of surface area affects the number of leaves (no P1 and relationship)</p> | 1 |
| | No response or incorrect response | 0 |

| KB0606 – Communicating data | | | | | | | | | | | | | | | | | | | | |
|------------------------------------|--|-------------------------|------------------|-------|---|-------|---|-------|---|-------|----|-------|---|-------|---|-------|---|-------|---|---|
| (e) (i) | <p>Able to construct a table correctly with the following aspects :</p> <p>1. Able to state the 3 titles with units - T 1- mark</p> <p>2. Able to record all data for leaves surface area correctly. - D 1 mark</p> <p>3. Able to count the number of leaves - C 1 - mark</p> <p>Sample answer</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>The leaves surface area</th> <th>Number of leaves</th> </tr> </thead> <tbody> <tr> <td>50-53</td> <td>2</td> </tr> <tr> <td>54-57</td> <td>5</td> </tr> <tr> <td>58-61</td> <td>8</td> </tr> <tr> <td>62-62</td> <td>12</td> </tr> <tr> <td>66-69</td> <td>9</td> </tr> <tr> <td>70-73</td> <td>7</td> </tr> <tr> <td>74-77</td> <td>4</td> </tr> <tr> <td>78-81</td> <td>1</td> </tr> </tbody> </table> | The leaves surface area | Number of leaves | 50-53 | 2 | 54-57 | 5 | 58-61 | 8 | 62-62 | 12 | 66-69 | 9 | 70-73 | 7 | 74-77 | 4 | 78-81 | 1 | 3 |
| The leaves surface area | Number of leaves | | | | | | | | | | | | | | | | | | | |
| 50-53 | 2 | | | | | | | | | | | | | | | | | | | |
| 54-57 | 5 | | | | | | | | | | | | | | | | | | | |
| 58-61 | 8 | | | | | | | | | | | | | | | | | | | |
| 62-62 | 12 | | | | | | | | | | | | | | | | | | | |
| 66-69 | 9 | | | | | | | | | | | | | | | | | | | |
| 70-73 | 7 | | | | | | | | | | | | | | | | | | | |
| 74-77 | 4 | | | | | | | | | | | | | | | | | | | |
| 78-81 | 1 | | | | | | | | | | | | | | | | | | | |
| | Any two aspects correctly | 2 | | | | | | | | | | | | | | | | | | |
| | Any one aspect correctly | 1 | | | | | | | | | | | | | | | | | | |
| | No response or incorrect response | 0 | | | | | | | | | | | | | | | | | | |
| (e) (ii) | <p>Able to draw a graph of the variation of leaves against the number of leaves which satisfies the following criteria:</p> <p>Axes (P) – both axes are labelled and uniform scales, manipulated variable on horizontal axis, correct units.</p> <p>Points(T)- all points correctly plotted</p> <p>Shape(B)- all points are connected smoothly</p> <p><i>Sample Answer Refer grap</i></p> | 3 | | | | | | | | | | | | | | | | | | |

| | <table border="1"> <caption>Data from Bar Chart</caption> <thead> <tr> <th>range of surface area</th> <th>number of leaves</th> </tr> </thead> <tbody> <tr><td>10-15</td><td>2</td></tr> <tr><td>15-20</td><td>5</td></tr> <tr><td>20-25</td><td>8</td></tr> <tr><td>25-30</td><td>12</td></tr> <tr><td>30-35</td><td>9</td></tr> <tr><td>35-40</td><td>7</td></tr> <tr><td>40-45</td><td>4</td></tr> <tr><td>45-50</td><td>1</td></tr> </tbody> </table> | range of surface area | number of leaves | 10-15 | 2 | 15-20 | 5 | 20-25 | 8 | 25-30 | 12 | 30-35 | 9 | 35-40 | 7 | 40-45 | 4 | 45-50 | 1 | |
|------------------------------------|--|-----------------------|------------------|-------|---|-------|---|-------|---|-------|----|-------|---|-------|---|-------|---|-------|---|--|
| range of surface area | number of leaves | | | | | | | | | | | | | | | | | | | |
| 10-15 | 2 | | | | | | | | | | | | | | | | | | | |
| 15-20 | 5 | | | | | | | | | | | | | | | | | | | |
| 20-25 | 8 | | | | | | | | | | | | | | | | | | | |
| 25-30 | 12 | | | | | | | | | | | | | | | | | | | |
| 30-35 | 9 | | | | | | | | | | | | | | | | | | | |
| 35-40 | 7 | | | | | | | | | | | | | | | | | | | |
| 40-45 | 4 | | | | | | | | | | | | | | | | | | | |
| 45-50 | 1 | | | | | | | | | | | | | | | | | | | |
| | Any two aspects correctly | 2 | | | | | | | | | | | | | | | | | | |
| | Any one aspects correctly | 1 | | | | | | | | | | | | | | | | | | |
| | No response or incorrect response | 0 | | | | | | | | | | | | | | | | | | |
| KB 0608 – Interpreting data | | | | | | | | | | | | | | | | | | | | |
| (f) | <p>Able to explain the relationship between the range of surface area and the number of leaves correctly based on the following criteria:</p> <p>R1- number of leaves is higher at range of surface area 62-65 E1- show slight different in characteristic of individual E3- continuous variation</p> <p>Sample Answer</p> <ol style="list-style-type: none"> 6. The number of leaves is higher at range of surface area 62 -65, 7. Show slight different in characteristic of individual 8. To show continuous variation | 3 | | | | | | | | | | | | | | | | | | |
| | Able to explain the relationship using any two criteria | 2 | | | | | | | | | | | | | | | | | | |

| | | |
|---------------------------------------|--|---|
| | | |
| | Able to explain the relationship using one criteria | 1 |
| | No response or incorrect response | 0 |
| KB0605 - Predicting | | |
| | <p>Able to predict correctly and explain the prediction based on the following criteria:</p> <p>P – number of leaves lesser</p> <p>E1 – at range of surface area at 78-81</p> <p>E2- due to continuous variation</p> <p><i>Sample answer</i></p> <p><i>Contoh jawapan</i></p> <p>Number of leaves lesser at range of surface area at 78-81 due to continuous variation.</p> | 3 |
| | Any two criteria stated | 2 |
| | Any one criteria stated | 1 |
| | No response or incorrect response | 0 |
| KB0609 – Defining by operation | | |
| (g) | <p>Able to state the definition of exhaled air operationally, complete and correct based on the following criteria:</p> <p>D1- Continuous variation is slight differences in characteristics (Fact)</p> <p>D2- that cause the change in the number of leaves(RV)</p> <p>D3- affected by area planted/range of surface area (MV)</p> <p><i>Sample answer</i></p> <p>Continuous variation is differences in characteristics that cause the changes in the number of leaves affected by area planted/ range of surface area.</p> | 3 |

| | Any two criteria stated Sample answer Continuous variation is differences in characteristics that cause the changes in the number of leaves | 2 | | | | | | | | |
|-----------------------------|---|----------------|---------------------|---------------------|----------|----------|-------------|--|----------|---|
| | Any one criteria stated 1. Continuous variation is differences in characteristics 2. Continuous variation is the changes in number of leaves | 1 | | | | | | | | |
| | None of the above or no response | 0 | | | | | | | | |
| KB0602 - Classifying | | | | | | | | | | |
| (c) (ii) | Able to classify the genetic and environmental cause variation in this experiment correctly <i>Sample Answer</i> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Genetic factor</th> <th>Enviromental factor</th> </tr> </thead> <tbody> <tr> <td>Sexual reproduction</td> <td>nutrient</td> </tr> <tr> <td>mutation</td> <td>temperature</td> </tr> <tr> <td></td> <td>sunlight</td> </tr> </tbody> </table> 5 Ticks | Genetic factor | Enviromental factor | Sexual reproduction | nutrient | mutation | temperature | | sunlight | 3 |
| Genetic factor | Enviromental factor | | | | | | | | | |
| Sexual reproduction | nutrient | | | | | | | | | |
| mutation | temperature | | | | | | | | | |
| | sunlight | | | | | | | | | |
| | 4 Ticks | 2 | | | | | | | | |
| | 2- 3 Ticks | 1 | | | | | | | | |
| | No response or wrong response | 0 | | | | | | | | |

Skema Pemarkahan Soalan 2

1. Modul JIJ 2006 (Chapter 3 : Movement Of Substances Across Plasma Membrane)

KB061201 – Membuat Pernyataan masalah

| Skor | Penerangan |
|------|--|
| 3 | Dapat menyatakan pernyataan masalah dengan lengkap dan betul berdasarkan criteria yang berikut: P1: PUM (kepekatan larutan sukrosa) P2: PUB (Jisim tisu tumbuhan) H : Bentuk soalan dan ada hubungan antara PUM dan PUB Contoh jawapan 1. Apakah kepekatan larutan sukrosa yang dapat mengekalkan jisim tumbuhan/ubi kentang/batang sawi/batang bayam? 2. Apakah kesan kepekatan sukrosa yang berlainan ke atas jisim tisu tumbuhan? |
| 2 | Dapat menyatakan pernyataan masalah tetapi kurang lengkap. Contoh jawapan 1. Apakah kepekatan larutan yang akan dapat mengekalkan jisim tisu tumbuhan? 2. Adakah larutan sukrosa dapat mengekalkan jisim tisu tumbuhan? |
| 1 | Dapat menyatakan idea pernyataan masalah sahaja. Contoh jawapan Larutan yang berbeza mengekalkan jisim tisu tumbuhan |
| 0 | Respon salah atau tiada memberi respons. |

KB061202 – Membuat hipotesis

| | |
|---|---|
| 3 | Dapat membuat pernyataan hipotesis yang menghubungkan PUM dengan PUB. Set criteria: P1: Menyatakan PUM (Kepekatan larutan sukrosa) P2: Menyatakan PUB(Jisim tisu tumbuhan) H : Menunjukkan arah perkaitan khusus antara PUM dan PUB. Jawapan mesti ada P1, P2 dan H Contoh jawapan 1. Semakin tinggi kepekatan larutan sukrosa semakin kurang jisim tisu tumbuhan 2. Jisim tisu tumbuhan tidak berubah bila diletakkan dalam larutan sukrosa isotonic terhadap tisu tumbuhan. |
| 2 | Dapat membuat pernyataan hipotesis yang menghubungkan PUM dengan PUB. Hanya dua criteria yang tepat. |

| | |
|---|---|
| | <p>Contoh jawapan:</p> <ol style="list-style-type: none"> 1. Kepekatan larutan sukrosa yang berbeza mempengaruhi jisim tisu tumbuhan. 2. Tisu tumbuhan tidak berubah bila diletakkan dalam larutan sukrosa isotonic terhadap tisu tumbuhan. |
| 1 | <p>Dapat menyatakan idea pernyataan hipotesis Ada P1 dan P2</p> <p>Contoh jawapan 1. Tisu tumbuhan berubah dalam larutan sukrosa</p> |
| 0 | <p>Respon salah atau tiada memberi respon</p> <p>Contoh jawapan Berkadar terus / songsang</p> |

KB061203 – Merancang untuk menjalankan penyiasatan

| | |
|---|---|
| 3 | <p>Dapat menyatakan 7-9 perkara dalam perancangan eksperimen seperti berikut</p> <p>Contoh jawapan</p> <ol style="list-style-type: none"> 1. Pernyataan masalah (PM) – Hubungan PUM & PUB dlm bentuk penyoalan 2. Objektif atau tujuan kajian (TJ) – P1 & P2 3. Pembolehubah (PU)-mesti semua betul 4. Hipotesis (HP) 5. Radas dan bahan (RB) 6. Teknik (TK) – mesti betul (B1) = 1 markah 7. Kaedah (KD) – Sekurang-kurangnya satu 8. Cara data dikomunikasikan (RD) –mesti betul = (B2)=1markah 9. Kesimpulan (KS) – rujuk hipotesis yang telah dinyatakan |
| 2 | Dapat menyatakan 4-6 perkara dalam perancangan eksperimen di atas |
| 1 | Dapat menyatakan 1-3 perkara dalam perancangan eksperimen seperti di atas |
| 0 | Respon salah atau tidak memberi respon |

KB06124 – Prosedur atau kaedah

| | |
|---|--|
| 3 | <p>Dapat menyatakan kelima-lima prosedur kerja dengan betul</p> <p>K1 : Cara mengendalikan radas atau bahan L1. <u>Potong/tebuk dan timbang</u> L3. <u>Rendam</u> (masukkan) ubi kentang dalam larutan sukrosa L5. <u>Keluarkan</u> ubi kentang dari larutan sukrosa L6. <u>Timbangkan</u> (semula) ubi kentang –jisim akhir L8. <u>Plot graf</u></p> <p>* K1 : mesti ada mana-mana 3L</p> <p>K2 : Langkah menetapkan pembolehubah dimalarkan (PUL) L1. Samakan saiz/jisim sama L4. Selama satu jam / masa rendaman yang sesuai</p> <p>* K2 : Mana mana 1L</p> <p>K3 : Langkah mengesan PU bergerakbalas (PUB) Catatkan dalam jadual</p> <p>K4 : Langkah mengubah / menukar PU dimanipulasikan (PUM) Larutan sukrosa yang berlainan (3 kepekatan yang berbeza) dengan unit kepekatan yang betul.</p> <p>K5 : Langkah berjaga- jaga Keringkan dengan kertas turas</p> |
| 2 | Dapat menyatakan mana-mana 4 prosedur kerja di atas dengan betul |
| 1 | Dapat menyatakan mana-mana 2-3 prosedur kerja di atas dengan betul |
| 0 | Respon salah atau tiada memberi respon / satu criteria sahaja |
| | <p>Contoh jawapan:</p> <p>L1: <u>Tebuk kentang/potong</u> untuk mendapatkan jalur-jalur ubi kentang yang sama saiz dan timbang jalur-jalur ubi kentang yang mempunyai jisim yang sama.</p> <p>K4: Isikan larutan sukrosa <u>0.5%, 5.0%, 10.0%, 15.0%, 20.0% dan 25%</u> ke dalam enam bikar yang berasingan.</p> <p>L3: Masukkan 4 / bilangan yang sesuai jalur ubi kentang ke dalam setiap bikar.</p> <p>K2/K4 : Biarkan jalur-jalur ubi kentang terendam dalam larutan sukrosa <u>selama 1 jam</u>.</p> <p>L5: Keluarkan jalur ubi kentang dari setiap bikar, <u>keringkan dengan kertas turas</u>. (K5)</p> |

| | |
|--|---|
| | <p>L6: Timbang jalur ubi kentang daripada setiap bikar</p> <p>K3: <u>Catat</u> (jisim) jalur ubi kentang tersebut dalam <u>jadual keputusan</u>.</p> <p>L8: <u>Plot graf</u> (kepekatan larutan sukrosa melawan jisim jalur ubi kentang).</p> |
|--|---|

KB061205 – Menyenaraikan Bahan dan Alat Radas

| | |
|---|--|
| 3 | <p>Dapat menyenaraikan semua bahan dan alat radas.</p> <p>Contoh jawapan Bahan : Ubi kentang / rambutan / bayam / sawi Larutan sukrosa (0.1%, 10.0%, 15%, 20%, dan 25.0%) Kertas turas / tisu</p> <p>Radas : Penebuk gabus / pisau Tabung uji / bikar Jam randik Neraca / penimbang</p> <p>* Mesti ada 3B dan 3R</p> |
| 2 | <p>Dapat menyatakan bahan dan alat radas yang disebarikan seperti berikut:</p> <p>Contoh jawapan: Bahan : Ubi kentang Larutan sukrosa</p> <p>Radas: Penebuk gabus / pisau Tabung uji/bikar Neraca</p> <ul style="list-style-type: none"> • Mana-mana dua bahan dan radas (2B+2R / 2B+3R / 3B+2R) |
| 1 | <p>Dapat menyatakan satu daripada bahan dan satu daripada alat radas yang disenaraikan:</p> <p>Contoh jawapan: Bahan: Ubi kentang / larutan sukrosa</p> <p>Radas : Penebuk gabus/ tabung uji</p> <ul style="list-style-type: none"> • (1B+1R / 2B+1R / 1B+2R) |
| 0 | <p>Respon salah atai tidak memberi respon</p> <ul style="list-style-type: none"> • (1B+0R / 0B+1R) |

Contoh Jawapan keseluruhan / perancangan penuh eksperimen

| Kriteria Penskoran | Penerangan |
|--------------------|--|
| TJ | <p>Tujuan kajian: Menentukan kesan kepekatan larutan sukrosa yang berbeza ke atas jisim tisu tumbuhan ubi kentang.</p> |
| PM | <p>Pernyataan masalah: Adakah kepekatan larutan sukrosa yang berbeza mempengaruhi jisim tisu ubi kentang?</p> |
| HP | <p>Pernyataan hipotesis: Semakin tinggi kepekatan sukrosa, semakin kurang jisim tisu ubi kentang</p> |
| PU | <p>Pembolehubah: i) Dimanipulasikan : Kepekatan larutan sukrosa ii) Bergerak balas : Perubahan jisim tisu ubi kentang iii) Dimalarkan : Jenis ubi kentang, isipadu larutan sukrosa, masa rendaman, saiz ubi kentang</p> |
| RB | <p>Senarai bahan dan radas: Bahan : Ubi kentang Larutan sukrosa (0.1%, 10.0%, 15%, 20%, dan 25.0%) Kertas turas / tisu Radas : Penebuk gabus / pisau Tabung uji / bikar Jam randik Neraca / penimbang</p> |
| TK | <p>Teknik yang digunakan: Mengukur perubahan jisim tisu tumbuhan / menimbang jisim tisu tumbuhan dengan menggunakan neraca/penimbang</p> <ul style="list-style-type: none"> • B1= 1 markah |
| KD | <p>Kaedah / prosedur penyiasatan: 1. Tebuk kentang/potong untuk mendapatkan jalur-jalur ubi kentang yang sama saiz dan timbang jalur-jalur ubi kentang yang mempunyai jisim yang sama. 2. Isikan larutan sukrosa 0.5%, 5.0%, 10.0%, 15.0%, 20.0% dan 25% ke dalam enam bikar yang berasingan. 3. Masukkan 4 / bilangan yang sesuai jalur ubi kentang ke dalam setiap bikar. 4. Biarkan jalur-jalur ubi kentang terendam dalam larutan sukrosa selama 1 jam. 5. Keluarkan jalur ubi kentang dari setiap bikar, keringkan dengan kertas</p> |

| | | | | | | | | | | | |
|---------------------------------|--|-------------------------------|-----|----|----|----|---------------------------------|--|--|--|--|
| | turas. (K5) 6. Timbang jalur ubi kentang daripada setiap bikar 7. Catat (jisim) jalur ubi kentang tersebut dalam jadual keputusan. 8. Plot graf (kepekatan larutan sukrosa melawan jisim jalur ubi kentang. | | | | | | | | | | |
| Kriteria Penskoran | Penerangan | | | | | | | | | | |
| RD | Cara data dikomunikasikan / persembahan keputusan: Mesti ada PUM, PUB dengan unit yang betul <table border="1" style="width: 100%; text-align: center;"> <tr> <td>Kepekatan larutan sukrosa / %</td> <td>0.5</td> <td>5</td> <td>10</td> <td>15</td> </tr> <tr> <td>Perubahan jisim ubi kentang / g</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> B2 = 1 markah | Kepekatan larutan sukrosa / % | 0.5 | 5 | 10 | 15 | Perubahan jisim ubi kentang / g | | | | |
| Kepekatan larutan sukrosa / % | 0.5 | 5 | 10 | 15 | | | | | | | |
| Perubahan jisim ubi kentang / g | | | | | | | | | | | |
| KS | Kesimpulan: Semakin tinggi kepekatan larutan sukrosa, semakin berkurangan jisim tisu ubi kentang. Hipotesis diterima. | | | | | | | | | | |

2. Praktis Bestari JUJ 2007 (Chapter 4 : Chemical Composition In The Cell)

KB061201 – (Problem statement)

| Score | Criteria |
|-------|---|
| 3 | Able to state the problem statement correctly : C1 : Manipulated Variable C2 : Responding variable R : Question form and have relationship Sample Answer : 1. What is the effect of temperature on the height of the coloured liquid in the manometer/activity of yeast? # Without question mark (?) – score 2 |
| 2 | Able to give a statement of identified problem but incomplete. Sample Answer: 1. What is the effect of temperature on yeast? 2. How does temperature affect yeast activity? |
| 1 | Able to give idea of a statement of identified problem. Sample Answer: What is the effect of temperature? |
| 0 | No response or wrong response |

KB061202 (KB061203 – Making Hypothesis)

| Score | Criteria |
|-------|--|
| 3 | <p>Able to state the hypothesis correctly by relating two variables.</p> <p>Criteria set: C1 : States the manipulated variable C2 : States the responding variable R : Show the specific relationship and direction between the manipulated variable and the responding variable. Answer must have C1, C2 and R</p> <p>Sample Answer : 1. As the temperature increases, the height of colour liquid in the manometer / activity of yeast also increase.</p> |
| 2 | <p>Able to make a statement of hypothesis which relates the manipulated variable to the responding variable. Answer must have C1 and C2 but without correct relationship</p> <p>Sample Answer : 1. The temperature increases the height of colour liquid in the manometer. 2. The temperature affect the height of colour liquid in the manometer.</p> |
| 1 | <p>Able to state an idea of a statement of hypothesis.</p> <p>Sample Answer: 1. The height of colour liquid in the manometer increase.</p> |
| 0 | No response or wrong response |

KB061203 - Planning (Planning for investigation)

| Score | Criteria | | | | | | | | | | | | | | | | | | |
|-----------|--|---|------------------|---|---|---|--|---|----|--|---|----|--|---|----|--|---|----|--|
| 3 | <p>Scoring Criteria: Able to state 7-9 planning investigation of experiment following:</p> <ul style="list-style-type: none"> • Problem statement (PS) – idea • Aim of investigation / Objective (Ob) – Relation between C1 and C2 Sample answer 1. To investigate the effect of temperature on the height of colour liquid in the manometer/activity of yeast. • Statement of hypothesis (HP) – idea • States variables – (Vb) All <i>three</i> variables must be correct : Manipulated variable : Temperature Responding Variable : The height of colour liquid in the manometer / activity of yeast Constant Variable : Volume of yeast suspension/ pH / light intensity / time taken • List of materials and apparatus (AP) • Technique (Tq) – Correctly and accurately (Bonus 1) = 1 mark Sample Answer: Measuring the difference in the heights of coloured liquid in the manometer using ruler • Procedure / Method of investigation (PD)– must have at least one criteria either P1 @ P2 @ P3 @ P4 @ P5 • Data presentation // presentation of result (DP) – Have table with title and unit Sample Answer : <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Test tube</th> <th>Temperature (°C)</th> <th>Height of coloured liquid in the manometer (cm)</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>0</td> <td></td> </tr> <tr> <td>B</td> <td>20</td> <td></td> </tr> <tr> <td>C</td> <td>30</td> <td></td> </tr> <tr> <td>D</td> <td>40</td> <td></td> </tr> <tr> <td>E</td> <td>50</td> <td></td> </tr> </tbody> </table> <p>Second Bonus : 1 mark</p> <ul style="list-style-type: none"> • Conclusion (CS) – Must same with hypothesis, If hypothesis is wrong, <i>reject</i> conclusion. | Test tube | Temperature (°C) | Height of coloured liquid in the manometer (cm) | A | 0 | | B | 20 | | C | 30 | | D | 40 | | E | 50 | |
| Test tube | Temperature (°C) | Height of coloured liquid in the manometer (cm) | | | | | | | | | | | | | | | | | |
| A | 0 | | | | | | | | | | | | | | | | | | |
| B | 20 | | | | | | | | | | | | | | | | | | |
| C | 30 | | | | | | | | | | | | | | | | | | |
| D | 40 | | | | | | | | | | | | | | | | | | |
| E | 50 | | | | | | | | | | | | | | | | | | |

| | |
|---|--|
| | <p>Sample answer :</p> <p>As the temperature increases, the height of colour liquid in the manometer / activity of yeast also increase.(Hypothesis is accepted)</p> <p>***</p> <p>If students only write Hypothesis accepted in conclusion , reject conclusion.</p> |
| 2 | <p>Scoring Criteria :</p> <p>State 4 - 6 items</p> |
| 1 | <p>Scoring Criteria:</p> <p>State 1 - 3 items</p> |
| 0 | <p>No response or wrong response</p> |

KB061204 (Method / procedure of investigation)

| Score | Criteria |
|-------|---|
| 3 | <p>Able to state all five criteria P1, P2, P3, P4 and P5 :</p> <p>Criteria :</p> <p>P1 : <i>Ways to conduct apparatus and materials:</i></p> <p>K1 : Label boiling tubes</p> <p>K2 : Fill yeast suspension</p> <p>K3 : Fill the manometer tube with coloured liquid</p> <p>K4 : Connect the stoppers with rubber tubing to manometer tubes</p> <p>K5 : Clamp to retort stand</p> <p>K6 : Place boiling tube A in a beaker of ice</p> <p>K7 : Start the stop watch</p> <p>K8 : Notes the level of coloured liquid in manometer after 10 minutes and record the height of coloured liquid.</p> <p>K9 : Repeat experiment using different experiment.</p> <p>K10 : Plot a graph of the heights of the coloured liquid in manometer against the temperatures.</p> <p>Remark :</p> <p>Able to state any five (K) step to get P1.</p> <p>P2 : <i>Ways to control controlling variable</i></p> <p>i) Fill the boiling tube with 15 cm³ of yeast suspension. //</p> <p>ii) Time taken</p> <p>P3 : <i>Ways to determine responding variable</i></p> <p>i) Record the height of coloured liquid in the manometer.</p> |

| | |
|---|--|
| | <p>P4 : <i>Ways to change manipulated variables.</i> i) Repeat the experiment using different temperatures.</p> <p>P5 : <i>Precautionary:</i> State one precautionary in the experiment. Sample Answer: i) Make sure the set up apparatus is air tied.</p> <p>Sample Answer: Method / Procedure :</p> <ol style="list-style-type: none"> 1. Label five boiling tubes, A,B,C,D and E. 2. Fill all the boiling tubes with 15 cm³ of yeast suspension. 3. Fill the manometer tube with coloured liquid and mark the level of coloured liquid at the beginning of experiment. 4. Connect the stoppers with rubber tubing to manometer tubes. 5. Clamp the boiling tube and manometer tube vertically to a retort stand. 6. Place boiling tube A in a beaker of ice. Record the temperature after five minutes. 7. Start the stop watch and note the level of coloured liquid in manometer after 10 minutes. 8. Record the height of coloured liquid in the manometer. 9. Repeat step 4 by placing the boiling tubes B, C, D and E in water baths at the temperatures of 20°,30°,40°, and 50°. 10. Record the results in the table below. 11. Plot a graph of the heights of the coloured liquid in manometer against the temperatures. |
| 2 | Able to state 4 criteria |
| 1 | Able to state two to three criteria |
| 0 | No response or wrong response |

KB061205 (Listing of Materials and Apparatus)

| Skor | Perkara | | | | | | | | | | | | | | |
|-------------------------|---|----------------------|------------|-----------------------|-------|-------------------------|-----------------|----------------------|----------------|---------------|----------|--|----------------------|--|-------------|
| 3 | <p>Able to state all the materials and apparatus:</p> <p>Sample Answer: Materials : Yeast suspension*, coloured liquid*, ice cubes</p> <p>Apparatus :</p> <table border="0"> <tr> <td>Boling tubes*</td> <td>Glass tube</td> </tr> <tr> <td>Rubber tubing*</td> <td>Clips</td> </tr> <tr> <td>Manometer tubes*</td> <td>Rubber stoppers</td> </tr> <tr> <td>Thermometers*</td> <td>Retort stands,</td> </tr> <tr> <td>Ruler*</td> <td>Strings,</td> </tr> <tr> <td></td> <td>Measuring cylinders,</td> </tr> <tr> <td></td> <td>Stopwatches</td> </tr> </table> <p>Remark Must list 2 * materials and 5 * apparatus.</p> | Boling tubes* | Glass tube | Rubber tubing* | Clips | Manometer tubes* | Rubber stoppers | Thermometers* | Retort stands, | Ruler* | Strings, | | Measuring cylinders, | | Stopwatches |
| Boling tubes* | Glass tube | | | | | | | | | | | | | | |
| Rubber tubing* | Clips | | | | | | | | | | | | | | |
| Manometer tubes* | Rubber stoppers | | | | | | | | | | | | | | |
| Thermometers* | Retort stands, | | | | | | | | | | | | | | |
| Ruler* | Strings, | | | | | | | | | | | | | | |
| | Measuring cylinders, | | | | | | | | | | | | | | |
| | Stopwatches | | | | | | | | | | | | | | |
| 2 | <p>Able to state two of the * materials and 3 * apparatus including manometer tubes.</p> | | | | | | | | | | | | | | |
| 1 | <p>Able to state two of the * materials and 2 *apparatus including manometer.</p> | | | | | | | | | | | | | | |
| 0 | <p>No response or wrong response</p> | | | | | | | | | | | | | | |

Mark:

3 X 5 = 15 marks

B1 = 1 mark(technique)

B2 = 1 mark(Data presentation)

TOTAL = 17 marks

3. Praktis Bestari JUJ 2008 (Chapter 6 : Nutrition)

PROBLEM STATEMENT

| No. | Mark Scheme | Score |
|-----------------|--|----------|
| KB061201 | Able to state a problem statement relating the manipulated variable with the responding variable correctly P1 : type of fruit juices P2 : concentration of Vitamin C/ volume of juices needed to decolourise DCPIP H : relationship and question mark(?) <u>Sample answer</u> 1. How does the type of fruit juices affecting the concentration of Vitamin C? 2. Do different types of fruit juices contain similar concentration of Vitamin C? | 3 |
| | Able to state a problem statement inaccurately <u>Sample answer</u> 1. What is the volume of Vitamin C to decolourise DCPIP solution? 2. What is the affect of different juices on concentration of Vitamin C? | 2 |
| | Able to state a problem statement at idea level <u>Sample answer</u> Vitamin C was affected by type of juices | 1 |
| | No response or incorrect response | 0 |

AIM OF INVESTIGATION

| No. | Mark Scheme | Score |
|-----------------|---|-------|
| KB061203 | Able to state the aim of the investigation correctly <u>Sample answer</u> To determine the concentration of Vitamin C in the fruit juices. | |

HYPOTHESIS

| No. | Mark Scheme | Score |
|----------|---|----------|
| KB061202 | <p>Able to state a hypothesis relating the manipulated variable to the responding variable correctly</p> <p>P1 : type of fruit juices P2 : concentration of Vitamin C/ volume of juices needed to decolourise DCPIP H : relationship</p> <p><u>Sample answer</u></p> <p>1. The lime juice contain more Vitamin C than the mango juice. 2. Different type of fruit juices contain different concentration of Vitamin C. 3. Volume of lime juices needed to decolourise DCPIP solution is lower compare to orange juice.</p> | 3 |
| | <p>Able to state a hypothesis inaccurately</p> <p>*Have P1 and P2 or P1/P2 and H</p> <p><u>Sample answer</u></p> <p>Type of fruit juices influences the concentration of Vitamin C</p> | 2 |
| | <p>Able to state a hypothesis at idea level</p> <p><u>Sample answer</u></p> <p>Lime juice contain Vitamin C</p> | 1 |
| | <p>No response or incorrect response</p> <p>* H only</p> | 0 |

VARIABLES

| No. | Mark Scheme | Score |
|----------|---|-------|
| KB061203 | <p>Able to state all three variables correctly</p> <p><u>Sample answer</u></p> <p>Manipulated : Type of fruit juices</p> <p>Responding : Vitamin C concentration in fruit juices</p> <p>Fixed : Volume of DCPIP solution/ Concentration of ascorbic acid</p> | |

LIST OF APPARATUS AND MATERIALS

| No. | Mark Scheme | Score |
|-----------------|---|----------|
| KB061205 | Able to list all the important apparatus and materials correctly *compulsory apparatus and materials - bolded <u>Sample answer</u> Apparatus : Specimen tubes, syringes , beaker, measuring cylinder Materials : DCPIP solution (dichlorophenolindophenol solution), 0.1% ascorbic acid solution , lime juice, mango juice | 3 |
| | Able to list any 2 apparatus and 3 materials | 2 |
| | Able to list any 1 apparatus and 2 materials | 1 |
| | No response or incorrect response | 0 |

TECHNIQUE USED

| No. | Mark Scheme | Score |
|-----------------|---|---------------|
| KB061203 | Able to state the operating responding variable correctly using suitable apparatus <u>Sample answer</u> To record/measure the volume of fruit juices required to decolourise DCPIP solution using syringe | B1 = 1 |

PROCEDURE

| No. | Mark Scheme | Score |
|------------------------|---|-------|
| <p>KB061204</p> | <p>Able to describe the steps of experiment correctly</p> <p><u>Sample answer</u></p> <ol style="list-style-type: none"> 1. 1 cm³ of DCPIP solution is placed in a specimen tube using 1cm³ syringe 2. A 5 cm³ syringe is filled with 0.1% ascorbic acid solution 3. The needle of the syringe containing ascorbic acid is placed into the DCPIP solution. 4. The ascorbic acid solution is added drop by drop to the DCPIP solution while stirring gently with the syringe needle. 5. Continue this procedure until the DCPIP solution is decolourised, the volume of ascorbic acid solution used is recorded using syringe 6. Steps 1 to 4 are repeated using freshly prepared lime juice and mango juice 7. The volume of each fruit juices required to decolourise DCPIP solution is recorded in the table 8. The percentage and concentration of vitamin C in the juices can be calculated using the following formula: <p>Percentage of vitamin C = $\frac{\text{volume of 0.1\% ascorbic acid used}}{\text{volume of fruit juice}} \times 0.1\%$</p> <p>Concentration of vitamin C = $\frac{\text{volume of 0.1\% ascorbic acid used}}{\text{volume of fruit juice}}$</p> | |

| | | |
|--|--|----------|
| | <p>Note : K1 : Preparation of materials and apparatus 1. Put DCPIP solution in a specimen tube 2. Fill ascorbic acid solution in syringe. 3. The ascorbic acid solution is added drop by drop to the DCPIP solution (All 3 steps) K2 : Operating fixed variable (volume of DCPIP / concentration of ascorbic acid) K3 : Operating responding variable (volume of fruit juices needed to decolourise DCPIP solution) K4 : Operating manipulated variable (fruit juices) K5 : Precaution/ To improve data collected (needle of syringe placed in DCPIP solution)</p> | |
| | All the 'K' | 3 |
| | Any 3 - 4 K | 2 |
| | Any 2 K | 1 |
| | No response or incorrect response | 0 |

| No. | Mark Scheme | Score | | | | | | | | | | | | | | | | |
|---------------------|--|--|--|--|--|---------------------|--|--|--|------|--|--|--|-------|--|--|--|--------|
| KB061203 | <p>Able to present all data with units correctly</p> <p><u>Sample answer</u></p> <table border="1"> <thead> <tr> <th>Juice</th> <th>Volume required to decolourise 1 cm³ DCPIP solution (cm³)</th> <th>Percentage of vitamin C in fruit juice (%)</th> <th>Concentration of vitamin C in fruit juice (mg cm⁻³)</th> </tr> </thead> <tbody> <tr> <td>0.1 % ascorbic acid</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Lime</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Mango</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | Juice | Volume required to decolourise 1 cm ³ DCPIP solution (cm ³) | Percentage of vitamin C in fruit juice (%) | Concentration of vitamin C in fruit juice (mg cm ⁻³) | 0.1 % ascorbic acid | | | | Lime | | | | Mango | | | | B2 = 1 |
| Juice | Volume required to decolourise 1 cm ³ DCPIP solution (cm ³) | Percentage of vitamin C in fruit juice (%) | Concentration of vitamin C in fruit juice (mg cm ⁻³) | | | | | | | | | | | | | | | |
| 0.1 % ascorbic acid | | | | | | | | | | | | | | | | | | |
| Lime | | | | | | | | | | | | | | | | | | |
| Mango | | | | | | | | | | | | | | | | | | |

CONCLUSION

| No. | Mark Scheme | Score |
|----------|--|-------|
| KB061203 | <p>Able to make the right conclusion correctly</p> <p><u>Sample answer</u> The lime juice contain more Vitamin C then the mango juice. Hypothesis accepted</p> <p>Reject : (only) Hypothesis accepted</p> | |

PLANNING OF EXPERIMENT

| No. | Mark Scheme | Score |
|-----------------|---|--------------|
| KB061203 | <p>Able to write the experimental planning</p> <ol style="list-style-type: none"> 1. Problem Statement 2. Aim 3. Hypothesis 4. Variables 5. Materials and Apparatus 6. Technique 7. Procedure 8. Result 9. Conclusion | |
| | 7 - 9 plans | 3 |
| | 4 - 6 plans | 2 |
| | 1 - 3 plans | 1 |
| | No response or incorrect response | 0 |

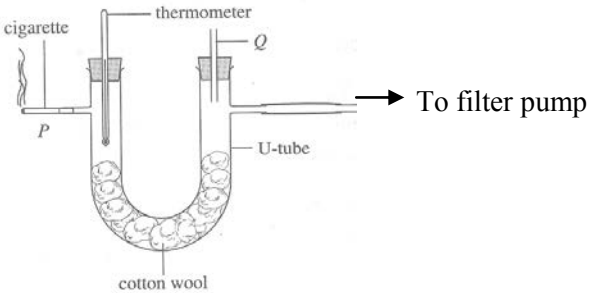
4. Praktis Bestari JUU 2011 (Chapter 7 : Respiration)

| No | Mark scheme | Score |
|-------|---|-------|
| 2 (i) | <p>01 – Problem statement Able to state a problem statement relating the manipulated variable with the responding variable correctly P1 : Manipulated variable - number of cigarette P2 : Responding variable - (changes) in temperature of U-tube H : Question form</p> <p>Sample answer :</p> <ol style="list-style-type: none"> 1. What is the effect of (different) number of cigarette on the temperature (of respiratory tract)? / U-tube 2. How does (different) number of cigarette affect the temperature (of respiratory tract)? / U-tube <p># Without question mark (?) – score 2</p> | 3 |
| | <p>Able to state a problem statement inaccurately .</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. What is the effect of cigarette on the temperature (of respiratory tract)? / U-tube 2. Does temperature increase after a cigarette is lighted? | 2 |
| | <p>Able to state a problem statement at idea level</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. Cigarette increases the temperature. | 1 |
| | <p>No response or incorrect response or H only</p> | 0 |

| No | Mark scheme | Score |
|--------|---|-------|
| 2 (ii) | <p>02 – Hypothesis Able to state hypothesis relating the manipulated variable to the responding variable correctly P1 : States the manipulated variable P2 : States the responding variable H : Specific relationship between the manipulated variable and the responding variable.</p> <p>Sample answer : 1. When the number of cigarette increase, the temperature (of respiratory tract) is increase.</p> | 3 |
| | <p>Able to state a problem hypothesis inaccurately .</p> <p>Sample answers: 1. The temperature (of respiratory tract) is directly proportional with the number of cigarette. 2. The temperature (of respiratory tract) / U-tube is different when the number of cigarette is different.</p> | 2 |
| | <p>Able to state a hypothesis at idea level</p> <p>Sample answer: 1. The temperature increases.</p> | 1 |
| | No response or incorrect response | 0 |

| No | Mark scheme | Score |
|---------|---|-------|
| 2 (iii) | <p>03 – Variables Able to state all three variables correctly</p> <p>Sample answers: Manipulated variable: Number of cigarette Responding variable : (change) in temperature of (U-tube) Controlled variable: Type of cigarette</p> | 3 |
| | Able to state any two variables correctly | 2 |
| | Able to state any one variable correctly | 1 |
| | No response or incorrect response | 0 |
| 2(iv) | 04 – Apparatus and materials | |

| | | |
|-------|--|-------|
| | <p>Able to list all important apparatus and materials correctly</p> <p>Sample answers: Apparatus : U-tube, thermometer, rubber tubing, filter pump Materials : Cotton wool, cigarette</p> | 3 |
| | <p>Able to list at least 3 apparatus including measuring tools (thermometer) and two materials correctly</p> | 2 |
| | <p>Able to list at least two apparatus (including thermometer) and two materials</p> | 1 |
| | <p>No response or incorrect response</p> | 0 |
| No | Mark scheme | Score |
| 2 (v) | <p>Able to state five criteria K1, K2, K3, K4 and K5 : Criteria : K1 : Technique of assembling the apparatus and materials to carry out the experiment: M1 : Set up apparatus (must have/draw functional diagram and labeled) M2 : The cigarette is lighted M3 : Filter pump is switched on M4 : Finger is placed over tube Q to drawn air to cotton wool</p> <p>Remark : Able to state three step to get K1</p> <p>K2 : Technique of fixing the constant variable: i) Use same types of cigarette</p> <p>K3 : Technique of measuring the responding variables. i) Measure / record initial temperature ii) Measure / record the temperature of the U-tube after 1/2/3 cigarette completely burned using thermometer iii) Record results in the table</p> <p>Remark : Should state three steps</p> <p>K4 : Technique of changing the manipulated variable i) State at least three different number of cigarette used in the experiment</p> | 3 |

| | | |
|--|--|----------|
| | <p>K5 : Technique of taking precautions to increase accuracy: State precautionary in the experiment.</p> <p>i) Repeat experiment to get average readings</p> <p>Sample answers:</p> <p>Method / Procedure :</p>  <ol style="list-style-type: none"> 1. Set up the apparatus as shown in figure above.(K1) 2. Place a cigarette at P/one end of U-tube.(K1) 3. Record the initial temperature of air in the U-tube.(K3) 4. Light the cigarette (K1)and switch on the filter pump.(K1) 5. Place the finger over tube Q (place in U-tube).This cause the air to be drawn through the cotton wool, just like what happens in smoking.(K1) 6. Record the temperature of the tube using thermometer.(K3) 7. Repeat steps 2-6 using 2 and 3 number of cigarette with same type. (K4,K2) 8. Repeat experiment to get average readings.(K5) 9. Record the results in the table.(K3) | |
| | <p>Able to state <u>three</u> to <u>four</u> criteria</p> | <p>2</p> |
| | <p>Able to state <u>two</u> criteria</p> | <p>1</p> |
| | <p>Able to state <u>only</u> one criteria</p> | <p>0</p> |

| No | Mark scheme | Score | | | | | | | | | | | | | | | |
|---------------------|---|-----------------------|---------------------------|-----------------------|---------------------------|---|--|--|--|---|---------------|--|--|---|--|--|---|
| 2 (vi) | <p>06 – Presentation of data Able to present data with units correctly</p> <p style="text-align: center;">1 mark</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Number of cigarette</th> <th>Initial temperature, °C</th> <th>Final temperature, °C</th> <th>Change in temperature, °C</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td rowspan="2" style="text-align: center;">1 mark</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> </tr> </tbody> </table> <p>Note: <i>Title for MV and RV with the correct unit – 1 mark</i> <i>Sample for MV at least 3– 1 mark</i></p> | Number of cigarette | Initial temperature, °C | Final temperature, °C | Change in temperature, °C | 1 | | | | 2 | 1 mark | | | 3 | | | 2 |
| Number of cigarette | Initial temperature, °C | Final temperature, °C | Change in temperature, °C | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | |
| 2 | 1 mark | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | |
| | <p>Able to present a table with at least three title correctly <i>(without change in temperature)</i></p> | 1 | | | | | | | | | | | | | | | |
| | <p>No response or incorrect response</p> | 0 | | | | | | | | | | | | | | | |

Marks : 3 X 5 = 15 marks
 2 x 1 = 2 marks
TOTAL = 17 marks

5. Praktis Bestari JUJ 2010 (Chapter 8 : Dynamic Ecosystem)

PROBLEM STATEMENT

| No. | Mark Scheme | Score |
|--|---|-----------------|
| <p>2(i) KB061201</p> | <p>Able to state a problem statement relating the manipulated variable with the responding variable correctly C1 : Manipulated Variable (Species X and Y) C2: Responding Variable (Percentage coverage / population size of plant R: Relation in question form and question symbol [?] <u>Sample answer</u> Problem statement: 1. What is the percentage coverage / population size of plant from species X and Y in the school field? 2. Does the type of plant species affects the percentage coverage / population size of the plants ? 3. Which type of the plant species/ species X or Y has the highest percentage coverage/ population size? # Without question mark (?) – score 2</p> | <p>3</p> |
| | <p>Able to state a problem statement less accurately <u>Sample answer</u> Example: Problem statement: 1. Species X and Y have different population size/ percentage coverage/ density. 2. What is the percentage coverage/ population size / density of plants?</p> | <p>2</p> |
| | <p>Able to state a problem statement at idea level <u>Sample answer</u> Problem statement: 1. Which plant is dominant?</p> | <p>1</p> |
| | <p>No response or incorrect response</p> | <p>0</p> |

AIM OF INVESTIGATION

| No. | Mark Scheme | Score |
|--------------------|--|-------|
| 2 (ii) KB061203 | <p>Able to state the objective of the investigation correctly</p> <p><u>Sample answer</u> To estimate/ determine / study the population size // percentage coverage of plant from species X and Y using the quadrat sampling technique.</p> | |

HYPOTHESIS

| No. | Mark Scheme | Score |
|---------------------|---|-------|
| 2 (iii) KB061202 | <p>Able to state a hypothesis relating the manipulated variable to the responding variable correctly</p> <p>P1 : The percentage coverage// population size P2 : species X and Y H : relationship</p> <p><u>Sample answer</u> <i>Example</i></p> <ol style="list-style-type: none"> The percentage coverage// population size of species X plant is higher than species Y in the school field. Different plant species have different percentage coverage// population size . Plant species X is more dominant than species Y in this habitat. | 3 |
| | <p>Able to state a hypothesis inaccurately</p> <p>*Have P1 and P2 or P1/P2 and H</p> <p><u>Sample answer</u></p> <ol style="list-style-type: none"> Plant species affects percentage coverage// population size Species X/ Y has the highest percentage coverage// population size. | 2 |
| | <p>Able to state a hypothesis at idea level</p> <p><u>Sample answer</u></p> <ol style="list-style-type: none"> Species X is dominant. (<i>only P2</i>) | 1 |
| | No response or incorrect response | 0 |

VARIABLES

| No. | Mark Scheme | Score |
|----------------------------------|--|---------------|
| 2 (iv) KB061203 | <p>Able to state all three variables correctly</p> <p><u>Sample answer</u> Manipulated : Type of plant species// species X and Y// two example of plant species .</p> <p>Responding : Population size // percentage coverage of plants</p> <p>Fixed : Quadrat size, school field</p> | / tick |

LIST OF APPARATUS AND MATERIALS

| No. | Mark Scheme | Score |
|--------------------------------|--|----------|
| 2(v) KB061205 | <p>Able to list all the important apparatus and materials correctly *compulsory apparatus and materials</p> <p><u>Sample answer</u> Apparatus : Plastic quadrat, marker pen, A4 Paper, graph paper.</p> <p>Materials : Plant species X and Y // any 2 plant spesies <i>4 apparatus + 2 materials</i></p> | 3 |
| | Able to list any 3 apparatus and 1 * materials | 2 |
| | Able to list any 2 apparatus and 1 * materials | 1 |
| | <p>No response or incorrect response <i>1 apparatus + 3 * materials</i> Remark : <i>√ for title materials and apparatus for planning experiment.</i></p> | 0 |

TECHNIQUE USED

| No. | Mark Scheme | Score |
|--|---|----------------------|
| <p>2 (iv) KB061203</p> | <p>Able to state the operating responding variable correctly using suitable apparatus</p> <p><u>Sample answer</u></p> <p>1. Measure and record the area of each type of species using a quadrat 1m x 1m</p> <p>2. Calculate the percentage coverage of plant // species A and B using the formula: :</p> $\frac{\text{Total area covered by the species}}{\text{Number of quadrats X area of one quadrat}} \times 100\%$ <p>3. Calculate the density of plant species using the formula:</p> $\frac{\text{Total number of organisms in all quadrats}}{\text{Number of quadrats X area of one quadrat}}$ | <p>B1 = 1</p> |

PROCEDURE

| No. | Mark Scheme | Score |
|---|---|-------|
| <p>2 (vii) KB061204</p> | <p>Able to describe the steps of experiment correctly based on the following aspects:</p> <p>K1 : How To Set Up The Apparatus</p> <p>K2 : Operating the constant variable (<i>any 1</i>)</p> <p>K3 : Operating the responding variable (<i>any 1</i>)</p> <p>K4 : Operating the manipulated variable (<i>any 1</i>)</p> <p>K5 : Steps to increase reliability of results accurately (<i>any 1</i>)</p> <p>Sample answers</p> <p>Example of Procedure.</p> <ol style="list-style-type: none"> 1. Survey and select a suitable sampling area 2. School field was chosen as the field study. 3. Quadrats of size 1m x 1m was used. 4. Two plants species / species X and Y was identified 5. The quadrats were thrown at random in the school field. 6. The area of (coverage) each plant species/ species X and species Y was counted.// the number of individual plant species in each quadrat was counted. 7. If more than half of the squares in the quadrat is covered, the area of plant species will be counted . The area is not counted if only less than half is | |

covered.

8. Steps 5 to 7 was repeated for nine quadrats.

9. The area covered by plant species / species X and species Y / number of individual plant species studied in each quadrat were recorded and tabulated in a table.

10. The percentage coverage / density / frequency of plant species / species X and species Y were calculated by using this formula

$$= \frac{\text{Total area covered plant species in all quadrats}}{\text{Total number of quadrats} \times \text{area of a quadrat}} \times 100\%$$

$$\text{Frequency of species} = \frac{\text{Number of quadrat containing plant species}}{\text{Total number of quadrats}} \times 100\%$$

K1 (any 3)

1. Survey and select a suitable sampling area
2. School field was chosen as the field study.
3. The quadrats were thrown at random in the school field.
4. Two plants species / species X and Y was identified

K2 (any 1)

1. Fix the Quadrats of size 1m x 1m
2. Fix the same student

K3 (any 1)

1. The area of (coverage) each plant species/ species X and species Y was counted.
2. The area covered by plant species / species X and species Y / number of individual plant species studied in each quadrat were recorded and tabulated in a table.

3. The percentage coverage / density / frequency of plant species / species X and species Y were calculated by using this formula:

$$= \frac{\text{Total area covered plant species in all quadrats}}{\text{Total number of quadrats} \times \text{area of a quadrat}} \times 100\%$$

$$\text{Frequency of species} = \frac{\text{Number of quadrat containing plant species}}{\text{Total number of quadrats}} \times 100\%$$

| | <p>K4 (any 1) 1. Steps 5 to 7 was repeated for nine quadrats.</p> <p>K5 (any 1) 1. If more than half of the squares in the quadrat is covered, the area of plant species will be counted . The area is not counted if only less the half is covered. 2. Make sure the sampling area not overlapping</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|---|---------------|--------------------------------------|---|---|---|---|---|---|----|--|------------------------------|--|------------------------------|---|---|---|---|---|---|---|---|---|----|---|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|---------------|
| | All 5 K | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Any 3 - 4 K | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Any 2 K | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | No response or incorrect response or 1 K only. <i>Remark:</i> <i>1K - ✓ for title procedure for planning experiment.</i> | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. | Mark Scheme | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 (viii) KB061203 | <p>Able to construct a table to record data based on the following aspects :</p> <p>1. Correct title and units (<i>*titles –compulsary</i>)</p> <p><u>Sample answer</u></p> <table border="1"> <thead> <tr> <th rowspan="2">Plant species</th> <th colspan="10">area of plant species in the quadrat</th> <th rowspan="2">Total area of plant species(m²)</th> <th rowspan="2">Percentage coverage area (%)</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> </tr> </thead> <tbody> <tr> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Y</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | Plant species | area of plant species in the quadrat | | | | | | | | | | Total area of plant species(m ²) | Percentage coverage area (%) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | X | | | | | | | | | | | | | Y | | | | | | | | | | | | | B2 = 1 |
| Plant species | area of plant species in the quadrat | | | | | | | | | | Total area of plant species(m ²) | Percentage coverage area (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Y | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

CONCLUSION

| | | |
|---------------------------|---|--------------|
| No. | Mark Scheme | Score |
| 2(ix) KB061203 | <p>Able to make the right conclusion correctly</p> <p><u>Sample answer</u> The percentage coverage// population size of species X plant is</p> | |

| | | |
|--|---|--|
| | <p>higher than species Y in the school field? or</p> <p>2. Different plant species have different percentage coverage// population size . or</p> <p>3. Plant species X is more dominant than species Y in this habitat.Hypothesis is accepted.</p> <p>Reject : (only) Hypothesis accepted</p> | |
|--|---|--|

PLANNING OF EXPERIMENT

| No. | Mark Scheme | Score |
|--|--|----------|
| <p>2(x) KB061203</p> | <p>Able to write the experimental planning</p> <p>1. Problem Statement</p> <p>2. Aim</p> <p>3. Hypothesis</p> <p>4. Variables</p> <p>5. Materials and Apparatus</p> <p>6. Technique</p> <p>7. Procedure</p> <p>8. Result</p> <p>9. Conclusion</p> | |
| | 7 - 9 ticks | 3 |
| | 4 - 6 ticks | 2 |
| | 2 - 3 ticks | 1 |
| | <p>0 – 1 tick</p> <p>No response or incorrect response</p> | 0 |

6. Modul JUJ 2011 (Chapter 10 :Transport)

PROBLEM STATEMENT (01)

| No. | Mark Scheme | Score |
|--|---|-----------------|
| <p>2(i) KB061201</p> | <p>Able to state a problem statement relating the manipulated variable with the responding variable correctly P1 : level of humidity P2 : rate of transpiration H : question form and question mark(?) <u>Sample answer</u> 1. What is the effect of level of humidity on the rate of transpiration? 2. How does level of humidity affect the rate of transpiration?</p> | <p>3</p> |
| | <p>Able to state a problem statement less accurately <u>Sample answer</u> 1. What is the level of humidity on the rate of transpiration. (<i>no H</i>) 2. What is the effect of level of humidity on the transpiration? (<i>incomplete P2</i>) 3. What is the effect of humidity on the rate of transpiration? (<i>incomplete P1</i>)</p> | <p>2</p> |
| | <p>Able to state a problem statement at idea level <u>Sample answer</u> 1. What is the rate of transpiration. (<i>no P1 and H</i>) 2. What is the effect of level of humidity. (<i>no P2 and H</i>)</p> | <p>1</p> |
| | <p>No response or incorrect response</p> | <p>0</p> |

HYPOTHESIS (02)

| No. | Mark Scheme | Score |
|---|--|-----------------|
| <p>2 (iii) KB061202</p> | <p>Able to state a hypothesis relating the manipulated variable to the responding variable correctly P1 : level of humidity P2 : rate of transpiration H : relationship <u>Sample answer</u> 1. The higher the level of humidity, the lower the rate of transpiration.</p> | <p>3</p> |

| | |
|--|----------|
| <p>Able to state a hypothesis inaccurately *Have P1 and P2 or P1/P2 and H</p> <p><u>Sample answer</u> 1. The level of humidity is affected/influences by the rate of transpiration. (no H)</p> | 2 |
| <p>Able to state a hypothesis at idea level</p> <p><u>Sample answer</u> 1. Humidity affects the rate of transpiration (only P2) 2. If more humidity, more transpiration be happened.</p> | 1 |
| <p>No response or incorrect response</p> | 0 |

VARIABLES (03)

| No. | Mark Scheme | Score |
|----------------------------|--|----------|
| 2 (iv) KB061203 | <p>Able to state all three variables correctly</p> <p><u>Sample answer</u> Manipulated : level of humidity – 1m</p> <p>Responding : rate of transpiration / Distance travel of bubble in 5 minutes -1m</p> <p>Fixed : light intensity, wind movement, temperature, size of plant use - 1m</p> | 3 |
| | Able to state only two variables correctly | 2 |
| | Able to state only one variables correctly | 1 |
| | No response or incorrect response | 0 |

LIST OF APPARATUS AND MATERIALS (04)

| No. | Mark Scheme | Score |
|--|--|-----------------|
| <p>2(v) KB061205</p> | <p>Able to list all the important apparatus and materials correctly</p> <p><u>Sample answer</u> Apparatus : <u>Capillary tubing</u>, <u>rubber tubing</u>, a beaker, a basin of water, stopwatch, <u>ruler</u></p> <p>Materials : <u>a leafy shoot</u>, Vaseline, <u>coloured water</u>, transparent polythene bag, thread</p> <p><i>4 apparatus +4 materials</i></p> | <p>3</p> |
| | <p>Able to list any 3 material and 3 apparatus</p> | <p>2</p> |
| | <p>Able to list any 2 material and 1 apparatus</p> | <p>1</p> |
| | <p>No response or incorrect response</p> | <p>0</p> |

PROCEDURE (05)

| No. | Mark Scheme | Score |
|---|---|-------|
| <p>2 (vii) KB061204</p> | <p>Able to describe the steps of experiment correctly based on the following aspects:</p> <p>K1 : Preparation of materials and apparatus (any 3) K2 : Operating the constant variable (<i>any 1</i>) K3 : Operating the responding variable (<i>any 1</i>) K4 : Operating the manipulated variable (<i>any 1</i>) K5 : Steps to increase reliability of results accurately (<i>any 1</i>)</p> <p><u>Sample answers</u></p> <ol style="list-style-type: none"> 1. A hibiscus plants is cut under water 2. The end stem of the leafy shoot is immersed in water. 3. The capillary tube is filled with water and held upright in beaker filled with water. 4. The leafy shoot is inserted into rubber tubing which ia attached to the capillary tube. 5. The hibiscus plant and capillary tube is held upright using a retort stand. 6. The capillary tube is marked with points X and Y which are 5 cm apart. 7. The capillary tube is lifted just above the water level to trap | |

| | | |
|--|---|-----------------|
| | <p>an air bubble in the tube</p> <p>8. The time taken for air bubble to move from point X- Y is recorded using stopwatch</p> <p>9.The experiment (K2) repeat step 1 – 7 but the hibiscus plant covered by transparent polythene bag</p> | |
| | <p>K1 (All 4)</p> <ol style="list-style-type: none"> 1. Cut under water 2. fill the beaker with water 3. Fill the capillary tube with water 4. inserted leafy plant to rubber tubing 5.lifted capillary tube | |
| | <p>K2 (any 1)</p> <ol style="list-style-type: none"> 1. mark the capillary tube 5 cm apart 2. Fix the type of plant <p>K3</p> <ol style="list-style-type: none"> 1. Record the time taken of air bubble to move from X -Y <p>K4</p> <ol style="list-style-type: none"> 1. Repeat the experiment with plant covered with transparent polythene bag <p>K5 (any 1)</p> <ol style="list-style-type: none"> 1. use vaselin for airtight. 2. cut the leafy shoot under water to prevent air bubble. | |
| | <p>All 5 'K'</p> | <p>3</p> |
| | <p>Any 3 - 4 K</p> | <p>2</p> |
| | <p>Any 2 K</p> | <p>1</p> |
| | <p>No response or incorrect response or 1 K only.</p> | <p>0</p> |

| No. | Mark Scheme | Score | | | | | | |
|--|---|-------------------------|--|--|--|--|--|-----------------|
| <p>2 (viii) KB061203</p> | <p>Able to construct a table to record data based on the following aspects :</p> <ol style="list-style-type: none"> 1. Correct title and units (<i>*titles –compulsary</i>) – 1m 2. <i>List the MV – 1m</i> <p><u>Sample answer</u></p> <table border="1"> <tr> <td>Condition of enviroment</td> <td>Time taken for the air bubble to move a distance of 5 cm (second)</td> </tr> <tr> <td>Plant without covered with transparent polythene bag</td> <td></td> </tr> <tr> <td>Plant covered with transparent polythene bag</td> <td></td> </tr> </table> | Condition of enviroment | Time taken for the air bubble to move a distance of 5 cm (second) | Plant without covered with transparent polythene bag | | Plant covered with transparent polythene bag | | <p>2</p> |
| Condition of enviroment | Time taken for the air bubble to move a distance of 5 cm (second) | | | | | | | |
| Plant without covered with transparent polythene bag | | | | | | | | |
| Plant covered with transparent polythene bag | | | | | | | | |

Scoring:

01 = 3M

02 = 3M

03 = 3M

04 = 3M

05 = 3M

06 = 2M

Total = 17M

7. Modul JUJ 2010 (Chapter 4 :Chemical Composition of The Cell)

Aim Of Investigation

/ Objective : To study the effects of temperature on the rate of enzyme reaction.

KB061201 – (KB061203 – Statement of Identified Problem)

| Score | Criteria |
|-------|---|
| 3 | <p>Able to state a problem statement relating the manipulated variable with the responding variable correctly.</p> <p>P1 : MV / temperature P2 : RV / Rate of enzyme reaction P3 : Question form and have question mark (?)</p> <p><u>Sample Answer :</u> 3. What are the effects of temperature on (salivary) amylase activity on starch? 4. What is the effects of temperature on the rate of enzyme reaction? 5. Cool water or warm water can help the cleaning more effective?</p> |
| 2 | <p>Able to state problem statement inaccurately .</p> <p><u>Sample Answer:</u> 3. What are the effects of temperature on enzyme? 4. The rate of enzyme reaction is affected by the temperature.</p> |
| 1 | <p>Able to state a problem statement at idea level.</p> <p><u>Sample Answer:</u> 1. Enzyme is influence by temperature?</p> |
| 0 | No response or wrong response |

KB061202 (KB061203 – Making Hypothesis)

| Score | Criteria |
|-------|---|
| 3 | <p>Able to state a hypothesis relating the MV to the RV correctly</p> <p>P1 : (MV) P2 : (RV) H : Relationship</p> <p><u>Sample Answer :</u></p> <ol style="list-style-type: none"> 2. When the temperature increase the rate of amylase / enzyme reaction (on starch) increase 3. When the temperature increase the rate of enzyme reaction decrease |
| 2 | <p>Able to state a hypothesis inaccurately</p> <p><u>Sample Answer :</u></p> <ol style="list-style-type: none"> 1. When the temperature increase the rate of reaction increase 2. The rate of reaction of enzyme reaction is optimum at 40°C / 37°C <ul style="list-style-type: none"> • Optimum + value of temperature |
| 1 | <p>Able to state a hypothesis at idea level.</p> <p><u>Sample Answer:</u></p> <ol style="list-style-type: none"> 2. The temperature affects the enzyme reaction 3. The enzyme reaction is optimum at 40°C / 37°C 4. When the temperature optimum enzyme reaction is maximum <ul style="list-style-type: none"> • Optimum + value of temperature |
| 0 | No response or wrong response |

KB061203 – Planning Investigation (KB061203-Controlling variable)

| Score | Criteria |
|-------|--|
| | <p>Able to state three variables correctly:</p> <p><u>Sample answer:</u></p> <p><u>Manipulated variable:</u> Temperature (of medium of reaction)</p> <p><u>Responding variable :</u></p> <ol style="list-style-type: none"> 1. The rate of enzyme reaction (catalysed by salivary amylase) 2. The time taken for the completion of the hydrolysis of starch // time taken for reaction of enzyme. <p><u>Controlled variable:</u></p> |

| | |
|--|---|
| | <ol style="list-style-type: none"> 1. Volume of amylase / saliva 2. Concentration of amylase 3. Volume of starch suspension 4. Concentration of starch suspension 5. pH value 6. Type of enzyme |
|--|---|

KB061205 (KB061203-Listing of Materials and Apparatus)

| Score | Criteria |
|-------|---|
| 3 | <p>Able to list all the important apparatus and material correctly <i>Sample answer:</i></p> <p>Apparatus : Beaker, test tube, thermometer, syringe, stop watch, Bunsen burner <u>and</u> tripod stand, wire gauze.</p> <p>Materials : 1% *starch suspension // albumen // dirty cloth, *amylase suspension pepsin// washing liquid, water, ice cube, iodine solution // any reagent for food test.</p> <ul style="list-style-type: none"> • Must have substrate and enzyme <p>6A + 5M</p> |
| 2 | <p>Able to list at least 4-5 apparatus and at least 3 materials correctly</p> <p>4-5A + 3M (name enzyme, name substrate , any other M)</p> |
| 1 | <p>Able to list at least 3 apparatus and at least 2 materials correctly</p> <p>3A + 2M (name enzyme, name substrate)</p> |
| 0 | <p>No response or incorrect response</p> <p>To get (√ 05) must have 1A + 1M</p> |

KB061203 – Planning Investigation (Technique - B1 = 1m)

| Score | Criteria |
|----------------|--|
| Bonus 1: 1M | <p>Able to state suitable technique used for the experiment</p> <p><i>Sample answer:</i></p> <p>Using stopwatch to record the time taken for the starch to disappear / complete the hydrolysis of starch / (any food test) //</p> <p>Calculate the rate of enzyme reaction using the formula $\frac{1}{t}$ (minutes)</p> |

KB061204 (KB061203-Method / procedure of investigation)

| Score | Criteria |
|-------|--|
| 3 | <p>Able to describe the steps of the experimental correctly: <u>Sample Answer:</u></p> <ol style="list-style-type: none"> 10. Use a syringe to put 5 ml of 1% starch (suspension) into each of test tube, labeled A₁, B₁, C₁, D₁ and E₁. 11. Use a second syringe to put 2 ml of saliva / amylase solution into each test tube, labeled A₂, B₂, C₂, D₂ and E₂ 12. Immerse test tube A₁ and A₂ into water bath 13. After 5 minutes of immersion, pour the starch suspension from tube A₁ into test tube A₂ / mix starch and enzyme / Stir the mixture using a glass rod 5. Start the stopwatch immediately 6. Use a dropper to put a drop of mixture from test tube A₂ onto the iodine solution / iodine test in groove of the white tile. 7. Repeat the iodine test for every minutes for 10 minutes. 8. Rinse the dropper after each sampling 9. Record the time taken for the completion of the hydrolysis of starch, that is when the mixture gives a negative iodine test. 10. Keep the test tubes with the mixture in their respective water baths. Throughout the experiment/ maintain the water bath at the respective temperature. 11. Repeat the experiment with the temperature 20⁰C, 40⁰C. 12. Record the result in the table. <p>** Cold water : 1⁰C – 25⁰C Warm water : 30⁰C – 40⁰C</p> <p>** Reject : 0⁰C , hot water</p> <p>K1 – Step 1,2,3,4,5,6,7 (preparation of materials and apparatus) any 4K1 steps K2- Step 1, 2 (operating fix variable) (any one) K3 – Step 9,12 (operating responding variable) (any one) K4 – Step 11 (operating manipulated variable) K5 – Step 8, 10, rinse the mouth before collecting saliva, repeat the experiment to get average reading (any one)</p> <p>Able to state five K</p> |
| 2 | Able to state 3-4 K |
| 1 | Able to state 2 K |
| 0 | No response or wrong response |
| | 1K - √ Procedure |

KB061203 – Planning Investigation (KB061203-Data Presentation – B2 =1m)

| Score | Criteria | | | | | |
|------------------|--|---|--|---|--|--|
| Bonus 2 : 1m | Able to construct a table of result with units | | | | | |
| | <i>Sample answer:</i> | | | | | |
| | <table border="1"> <tr> <td>Temperature / °C</td> <td>Time taken for the starch to disappear / minutes</td> <td>Rate of reaction $\frac{1}{t}$ (minutes)</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table> | Temperature / °C | Time taken for the starch to disappear / minutes | Rate of reaction $\frac{1}{t}$ (minutes) | | |
| Temperature / °C | Time taken for the starch to disappear / minutes | Rate of reaction $\frac{1}{t}$ (minutes) | | | | |
| | | | | | | |

KB061203 – Planning Investigation (KB061203-Conclusion)

| Score | Criteria |
|-------|--|
| | Able to make the right conclusion: |
| | <i>Sample answer:</i> |
| | <ol style="list-style-type: none"> 1. When the temperature increase, the rate of amylase reaction increases until 37°C. 2. The rate of amylase reaction is highest at 37°C |

KB061203 - Planning (Planning for investigation)

| Score | Criteria |
|-------|--|
| 3 | Able to state 7-9 planning investigation of experiment following: Scoring Criteria: <ul style="list-style-type: none"> • Problem Statement • Objective of investigation • Hypothesis • Variables • List of apparatus and materials • Technique used • Experimental procedure • Presentation of data • Conclusion |
| 2 | Scoring Criteria : State 4 - 6 items |
| 1 | Scoring Criteria: State 2-3 items |
| 0 | No response or wrong response Or 0-1 items |

Mark: 3 X 5 = 15 marks
 B1 = 1 mark(technique)
 B2 = 1 mark(Data presentation)

TOTAL = 17 marks

END OF MARKING SCHEME