		Page
1.1	Contents	1
1.2	Format	2 - 3
1.3	Analysis	4 - 9
1.4	Tips	10 -17
1.5	Questions - SPM 2008 Question paper (paper 2 & 3)	18 - 47
1.6	Marking scheme	48 - 74
1.7	Example of student's answer	75– 126
1.8	Practice Module	127 – 205
1.9	Marking Skill	206-256

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 • Multiple choice Each item followed by four alternative answers A, B, C or D	Subjective Item • Section A : structured Item • Section B :Essay Item	Subjective Item : • Structure Item • Open ended Respond (Essay)
3	Total Question	50 (Answer all the questions)	Section A : • 5 items (Answer all the questions – Section B : • 4 items (**Answer any two questions)** • **Refer to SPM 2008 format (latest)**	Structure Item • 1 – 2 item (Answer any one question) Open ended responds: • 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 (SPM 2004-2008)

	Chapter	2005					2006					2007					2008				
		P1	P2		P3		P1	P2		P3		P1	P2		P3		P1	P2		P3	
		Obj	S	E	1	2	Obj	S	E	1	2	Obj	S	E	1	2	Obj	S	E	1	2
	1.Introduction to Biology	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2. Cell structure and cell organisation	4	1	-	-	-	2	1	-	-	-	4	1/2	-	-	-	2	1/2	1/5		
F	3. Movement of substances across the plasma membrane	3	-	-	-	1	4	-	1	-	1	2	1	-	-	-	3		4/5		1
O	4. Chemical composition of the cell	3	1	-	-	-	2	-	-	1	-	1	1	-	-	-	3				
R	5. Cell Division	2	1	-	-	-	3	-	-	-	-	2	-	-	-	-	2	1			
M	7. Nutrition	6	-	-	1	-	4	1	2	-	-	9	-	-	1	-	8		1		
	8. Respiration	2	1	-	-	-	2	-	-	-	-	4	-	1/3	-	1	1				
4	9. Dynamic Ecosystem	3	1	-	-	-	4	-	-	-	-	5	-	1	-	-	5			1	

	10. Endangered Ecosystem	3	-	1	-	-	2	-	-	-	-	3	-	1 1/3	-	-	3		1		
F	10. Transport	5	-	-	-	-	5	-	1	-	-	4	-	-	-	-	6	1/2	1		
O	11. Locomotion and Support	3	-	1	-	-	3	-	-	-	-	-	-	-	-	-	3				
R	12. Coordination and Response	5	-	-	-	-	5	1	-	-	-	7	2/3	1	-	-	5	1			
M	13. Reproduction and growth	5	-	1	-	-	9	1	-	-	-	6	2/3	1	-	-	5	1			
5	14. Inheritance	4	-	1	-	-	2	1	-	-	-	2	-	1	-	-	2	1			
	15. Variation	2	-	-	-	-	3	-	-	-	-	3	-	-	-	-	2				

EXPERIMENTS CHECKLISTS FORM 4 (SPM 2003-2008)

No	Topic	2003		2004		2005		2006		2007		2008	
		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		X				
5	CHAPTER 4: Chemical composition of the cell Activity 4.3: Studying the effects of temperature on salivary amylase activity (page 36)												
6	CHAPTER 4: Chemical composition of the cell Activity 4.4: Studying the effects of pH on the activity of pepsin (page 39)												
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 Activity 4.5: Studying the effects of substrate concentration on salivary amylase activity (page 42) /(SPM : Concentration of albumen)							X					
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)					X							
11	CHAPTER 6: Nutrition Activity 6.3: Determining the vitamin C contain in various fruit juices. (page 65 – 66)			X									
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			
14	CHAPTER 6: Nutrition Activity 6.11 Investigating the effects of carbon dioxide concentration on the rate of photosynthesis.		X										
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)												

16	CHAPTER 7: Respiration Activity 7.2 : Investigating the process of anaerobic respiration in yeast (page 85)												
17	CHAPTER 8: Dynamic Ecosystem Activity 8.5 Investigating the distribution of plants using the quadrat sampling technique (page 111- 112) Modified (using Grid)											X	
18	CHAPTER 8: Dynamic Ecosystem Activity 8.6 Estimating the population size of animals using capture, mark, release and recapture technique (page 113)				X								
19	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		
20	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 2003-2008)

No	Topic	2003		2004		2005		2006		2007		2008	
		Q1	Q2	Q1	Q2	Q1	Q2	Q1	Q2	Q1	Q2	Q1	Q2
1	CHAPTER 1:TRANSPORT To study one of the factor of affecting the rate of transpiration.												
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 11/2 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 explaination.
- 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 correctly from data**
- **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)

If wrong / reject observation automatic inference will reject / wrong

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
Manipulated variable: **Variables that are changed in the experiment** Examples: Temperature of water bath, mass of food, concentration of sucrose solution, type of fruits	**Change in mass/concentration / water** **Or used different mass/ concentration / type of food** Example : • 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
Responding variable: **Variable that are measure after experiment / result** Example i) Final length of potato strip, ii) Final temperature of water, iii) Rate of transpiration iv) Rate of enzyme reaction	**Must state the apparatus or state the formula using** **Example :** **i) <u>Measure and record</u>** the final length of potato strip using **ruler** **ii) <u>Measure and record</u>** the final temperature of water using **thermometer** **iii) Calculate** the rate of transpiration using formula **: distance divided by time** **iv) Calculate t**he rate of enzyme reaction using **formula concentration of albumen dived by time**
Controlled variable: **Variable that constant during experiment** **Example:**	Must state the PARAMETER and VALUE and APPERATUS

Initial temperature of water, volume of water, concentration of starch, type of enzyme	Example : **Fix** the **temperature** at **37^{0}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 - Title of the graph
- Both axes labeled with correct units
- Uniform scale
- All points plotted correctly
- Smooth curve and correct shape

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

viii) Relationship between space and time

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

Example : The lower the concentration of enzyme so longer time used to hydrolysis starch

ix) Predicting

Give once value that may be true base on the trend / data before.

x) Defining by operation

- Base on experiment, refer observation
- Including data, color, or time
- Can't base on theory

xi) Classifying

Can group the answer base on the certain character

1.4.3.2 Question 2

i) Problem statement

- In question form.
- Relationship between manipulated and responding variable
- End of sentence has question mark (?)

ii) Aim of investigation

- State the objective the experiment.

iii) Hypothesis

Make a statement of hypothesis by relating **the manipulated** variable with the **responding** variable and showing the specific **relationship.**

iv) Variables

- **Manipulated variable**
- **Responding variable**
- **Controlling variable**

v) List of apparatus and materials

Don't separate between apparatus and materials

vi) Technique used

State method and apparatus used to get responding variable

Example : **Measure and record** final length of potato strips using ruler
Measure and record the mass of food using beam balance
Record final temperature of water using thermometer

vii) Experimental Procedure or method

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

viii) Presentation of data

- Record data in suitable table (blank table)
- Title of column and row with correct unit (manipulated and responding variable)

ix) Conclusion

- Write hypothesis again.

Example : The higher the temperature the higher rate of transpiration

Can't just write : hypothesis accepted

1.5 PAPER 2 – SPM 2008

Section A

[60 marks]

Answer **all** questions in this section

1 Diagram 1.1 shows part of the stage of meiosis cell division in an animal cell. The chromosome behavior in stage S is not known.

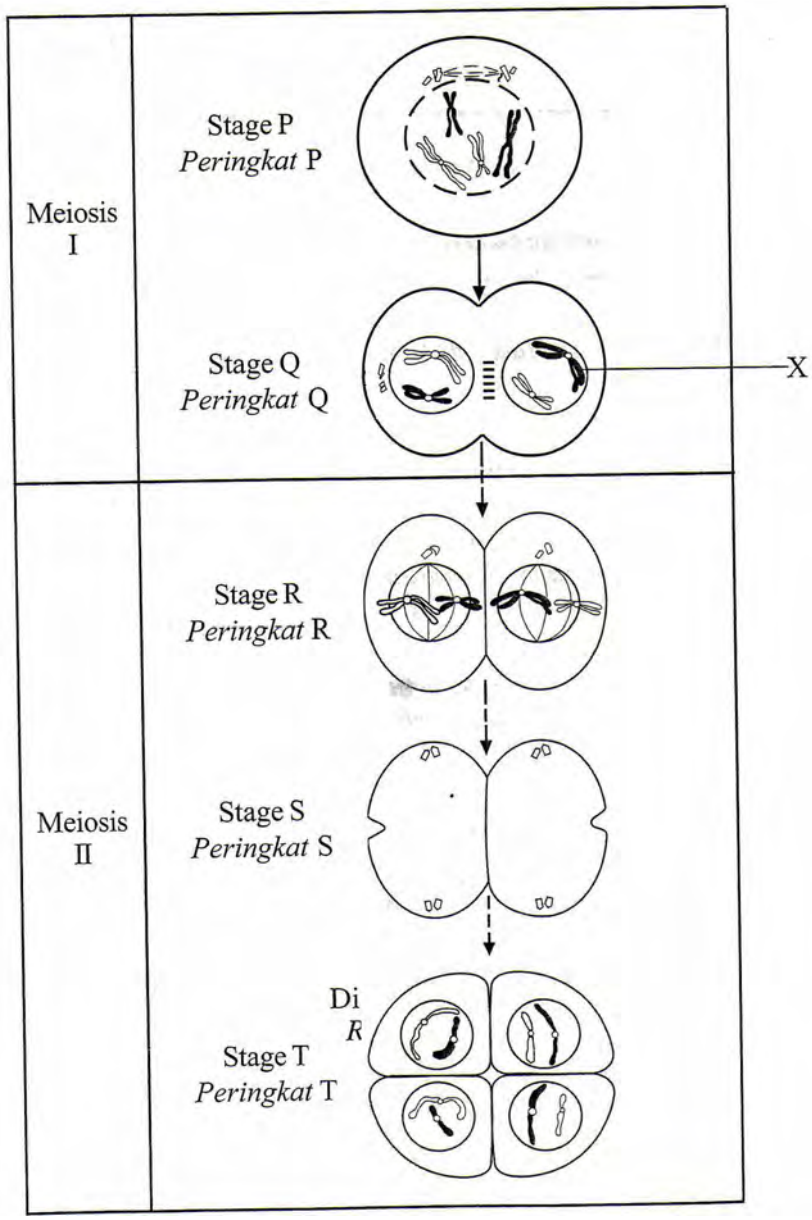


Diagram 1.1

(a) Name the structure labeled X

…… ……..

[1 mark]

(b) (i) In Diagram 1.1 complete the diagram in stage S to show chromosome behavior. [1 mark]

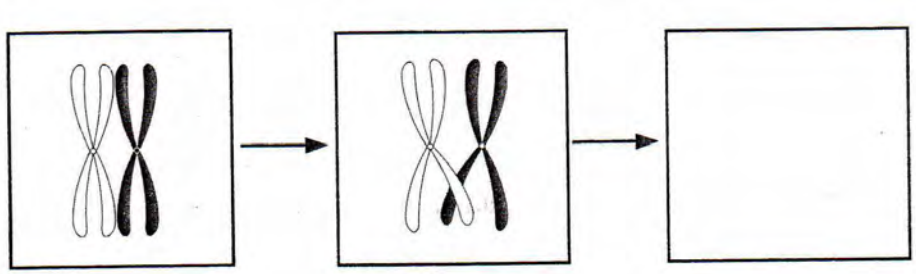
(ii) State one of the changes which occurs in stage S

…….

…….

[1 mark]

(c) Diagram 1.2 shows process Y which takes place in stage P



Beginning Of process Y End of process Y

Diagram 1.2

(i) In Diagram 1.2, draw a diagram showing the appearance of the chromosome at the end of process Y

[1 mark]

(ii) Name the process Y

…….

[1 marks]

(iii) State one importance of process Y to an organism.

…….

…….

[1 marks]

(d) Diagram 1.3 shows skin cells. Cells X are cancerous cells which are formed after the normal cells are exposed to factor W.

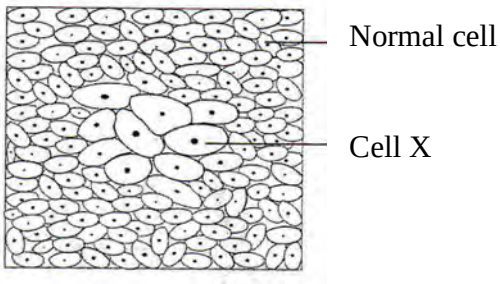


Diagram 1.3

(i) Give two examples of factor W.

1.……...…

2.……...……

[2 marks]

(ii) Explain the formation of cells X.

……

……

……

[1 marks]

(ii) State two ways to prevent the development of cells X.

1 ……

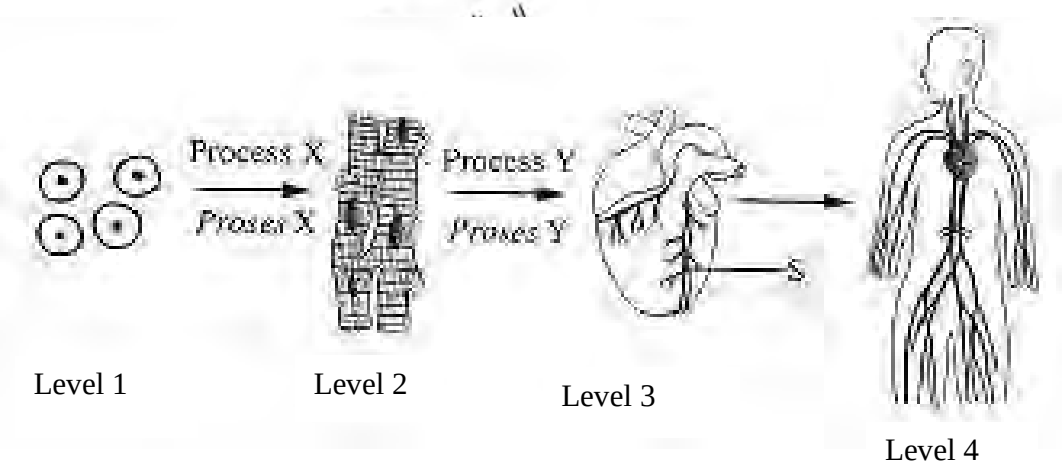
……

2……

……

[2 marks]

2. Diagram 2 shows four levels of cell organization in humans.



(a) Complete Table 2 by naming Level 2 and Level 3

Level	Name
1	Cell
2	
3	
4	System

Table 2

[2 marks]

(b) (i) The cell undergo process X to become specific cells that perform a specific function.

Name the process X.

…….

[1 mark]

(ii) What is the function of the structure in level 2?

…….

[1 mark]

(iii) The structure in level 4 is one of the body systems.

Name this system.

…….

[1 mark]

(iv) State **one** function of the system in 2(b)(iii).

…….

[1 mark]

(c) (i) Name and explain the condition which can cause a blockage in blood vessel S.

Name :

…….

Explaination:

…….

…….

…….

[3 marks]

(ii) A person is suffering from the condition in 2 (c)(i).

State three effects on the person's health.

1…….

2…….

3…….

[3 marks]

3. Diagram 3.1 shows the inheritance of fur colour in rabbits.

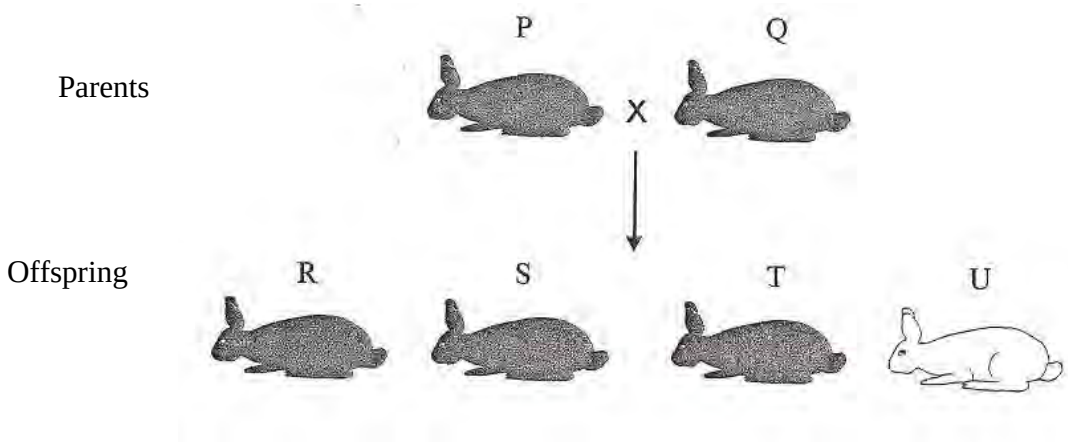


Diagram 3.1

(a) State the genotype and phenotype of rabbit P

Genotype : …….

Phenotype : …….

[2 marks]

(b) B represents the dominant allele for black fur while b represents the recessive allele for white fur.

(i) Explain why B and b are called allele.

……..

……...

[2 marks]

(ii) What happens to allele B and b during the formation of gametes?

……...

[1 mark]

(c) Diagram3.2 shows a cross between offspring R and offspring S. R is heterozygous for fur colour.

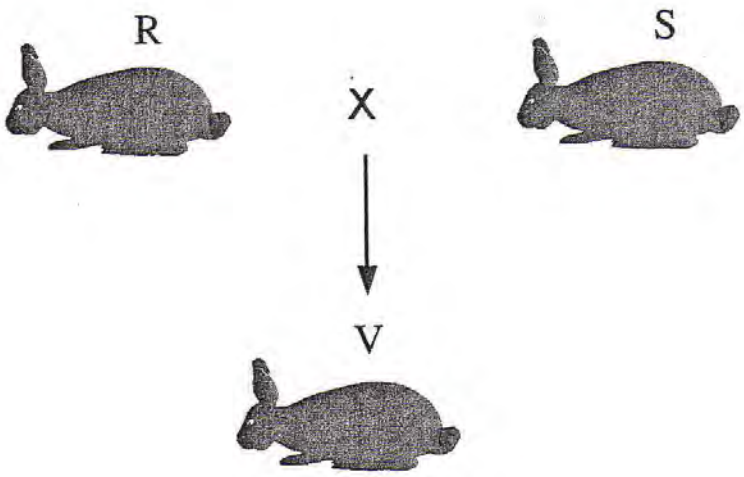


Diagram 3.2

(i) What are the possible genotypes of S?

……...

[1mark]

(ii) Explain the inheritance of fur colour by rabbit V.

…..……..

……

……..……..

[2 marks]

(d) Diagram 3.3 shows offspring R is crossed with offspring U.

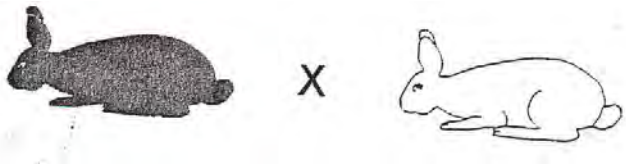


Diagram 3.3

(i) Draw a schematic diagram to show the product of this cross.

Parents

Gametes

Offspring

[3 marks]

(ii) What is the probability of producing with black fur in 3(d)(i) ?

……...

[1mark]

4. Diagram 4 shows two types of twins

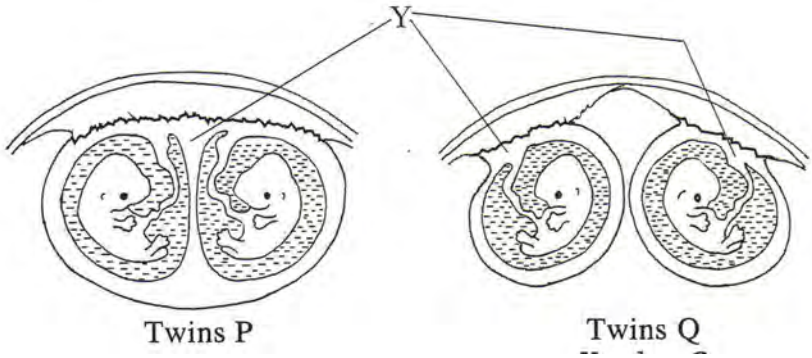


Diagram 4

(a) (i) Name the type of twins Q

……...

[1 mark]

(ii) Explain how twins Q are formed

……...

……

[2 mark]

(b) (i) Name the structure Y.

……...

[1 mark]

(ii) State **two** functions of structure Y.

1 ……...

2 ……

[2 mark]

(c) State two differences between twins P and twins Q.

……

……

……

……

[2 mark]

(d) Twins P are brought up by two different adopted families. The twins do not have the same body size when they are adult.

Explain why.

……

……

……

[2 mark]

(e) A woman who is a heavy smoker become pregnant.

Explain why she should stop smoking.

……

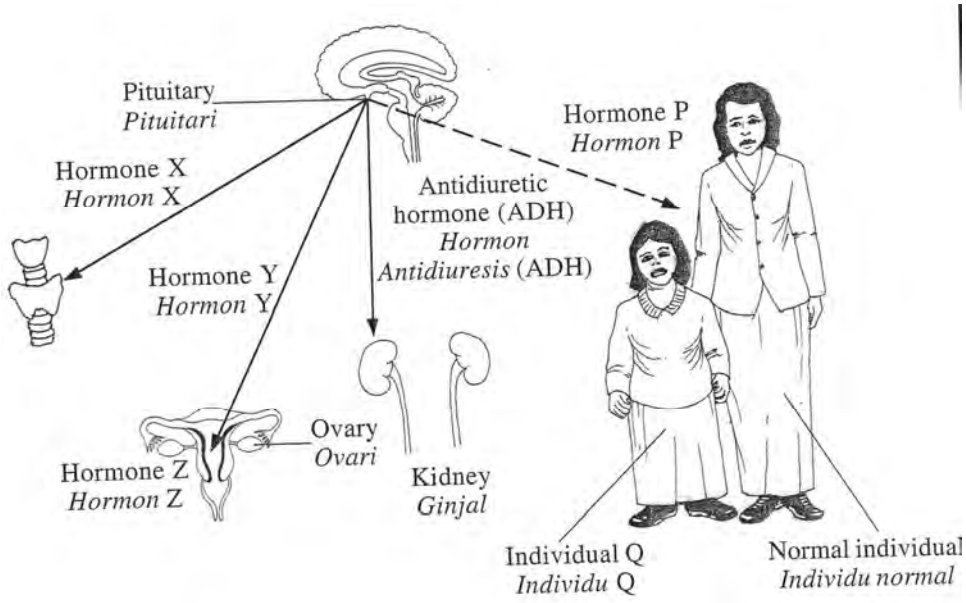
……

……

[2 mark]

5. Diagram 5 shows the role of the pituitary gland as a 'master gland'.

Hormone Y is responsible for the development of a follicle in the ovary.



Key :

⟶ organ affected by hormone

- - - - - - → general effect of hormone

(a) (i) Name hormone X

……...

[1 mark]

(ii) State the function of hormone X.

……..……..

……..…...

[1 mark]

(b) Hormone Y stimulates the development of a Graffian follicle in the ovary and sperm in the testis.

Name hormone Y.

……...

[1 mark]

(c) The presence of hormone Y causes the secretion of hormone Z.

Hormone Z affects the development of the uterus.

(i) Name hormone Z.

……...

[1 mark]

(ii) State the role of hormone Z in the development of the uterus.

……...

[1 mark]

(d) (i) Name hormone P

……...

[1 mark]

(ii) Explain how hormone P is responsible for the physical appearance of individual Q in Diagram 5.

……...

……...

[2 mark]

(e) (i) State the circumstances in which more ADH is secreted, as shown in Diagram 5.

……..……...

……..……...

[1 mark]

(ii) Explain the role of ADH in producing less and concentrated urine.

……...

……...

[2 mark]

(f) Give **one** reason why pituitary gland is considered ad the 'master gland'

……..……...

……..…...

[1 mark]

Section B

[40 marks]

Answer any **two** questions from this section

6 (a) Diagram 6.1 shows the structure of a unicellular organism which lives in a freshwater pond

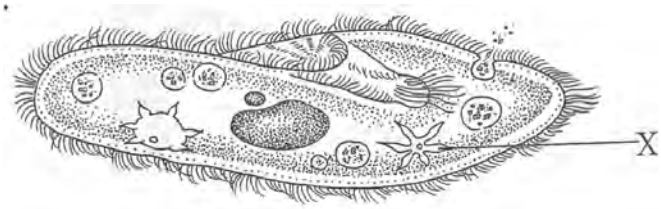


Diagram 6.1

Explain the function of X in osmoregulation.

[4 marks]

(b) Explain the similarities and differences between facilitated diffusion and active transport in the movement of molecules across the cell membrane.

[8 marks]

(c) Diagram 6.2 and Diagram 6.3 show two ways of preserving fish and vegetable.

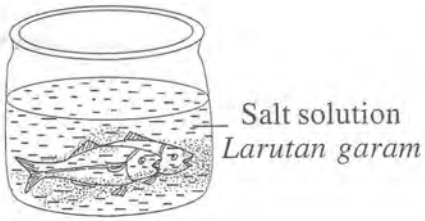


Diagram 6.2

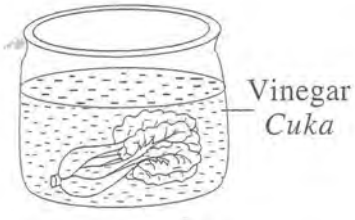


Diagram 6.3

Explain how the preservatives are effective in the preservation of each type of the food.

[8 marks]

7 (a) (i) Diagram 7.1 shows an electron micrograph of cellular components of human blood

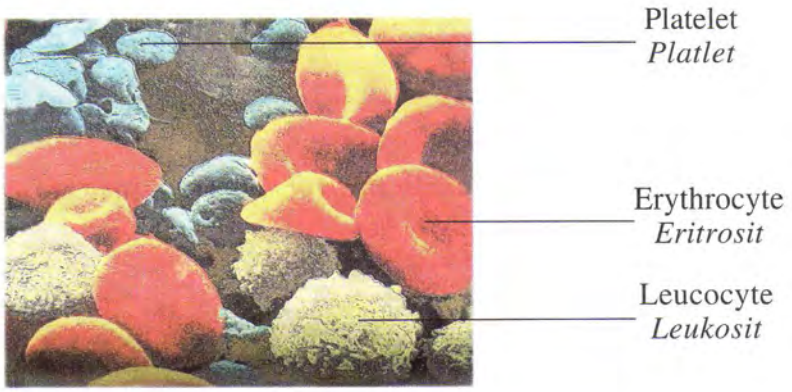


Diagram 7.1

Based on Diagram 7.1, explain how platelets help to stop bleeding when a wound occurs.

[4 marks]

(ii) A blood test shows that a man's erythrocytes count is below normal. Explain the possible consequences of this condition on his health.

What type of food should he include in his diet to improve this condition?

[8 marks]

(b) Diagram 7.2 shows the blood circulatory system in organism S and organism T

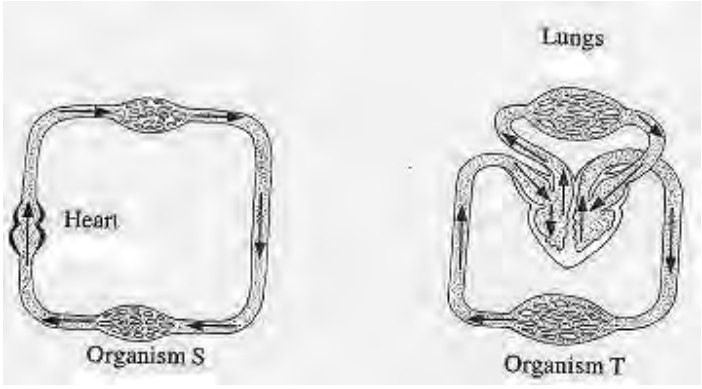


Diagram 7.2

Based on Diagram 7.2

(i) Give **one** example of organism S and organism T [2 marks]

(ii) Describe the similarities and differences between the blood circulatory system in organism S and organism T. [6 marks]

8. (a) (i) After absorption of nutrients in small intestine, the undigested food substances in the colon result in the formation of faeces.

Explain the formation of faeces. [4 marks]

(ii) Malnutrition is a condition due to taking an unbalanced diet in which certain nutrients are lacking, in excess or in the wrong proportions.

Explain the effect on a child who is given insufficient amounts of any two nutrients of food for a long period of time. [6 marks]

(b) Table 8 shows the food intake by a boy aged 15 years in his daily menu. The daily energy requirement for him is 12 500kJ.

Type of food	Quantity taken / g	Energy content/kJ
Rice	400	1 600
Potato chips	500	1 000
Chicken curry	300	300
Boiled egg	150	630
Butter	50	3 000
Milk	280	300
Sausage	300	500
Sardine	150	900

Table 8

(i) Based on the table 8, state the value of energy contained in this daily food intake.

Does the food intake satisfy his daily energy requirement?

[2 marks]

(ii) This boy takes this menu continuously for a long time.

Explain the consequences to his health.

[8 marks]

9. (a) (i) Diagram 9.1 shows a phenomenon which occurs in the earth's atmosphere.

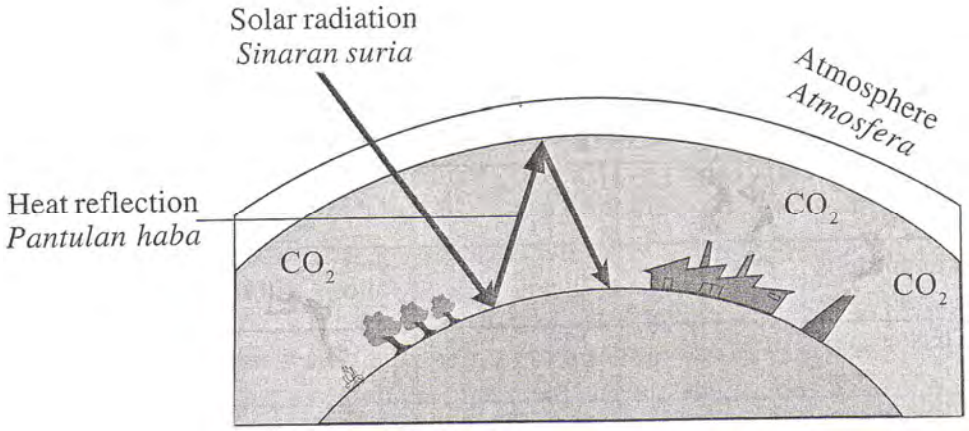


Diagram 9.1

Explain the effect of the phenomenon on the environment if the concentration levels of carbon dioxide, CO_2 are increasing.

[3 marks]

(ii) Diagram 9.2 shows the activity of forest burning.

Discuss how this activity cause disasters to the environment.

[7 marks]

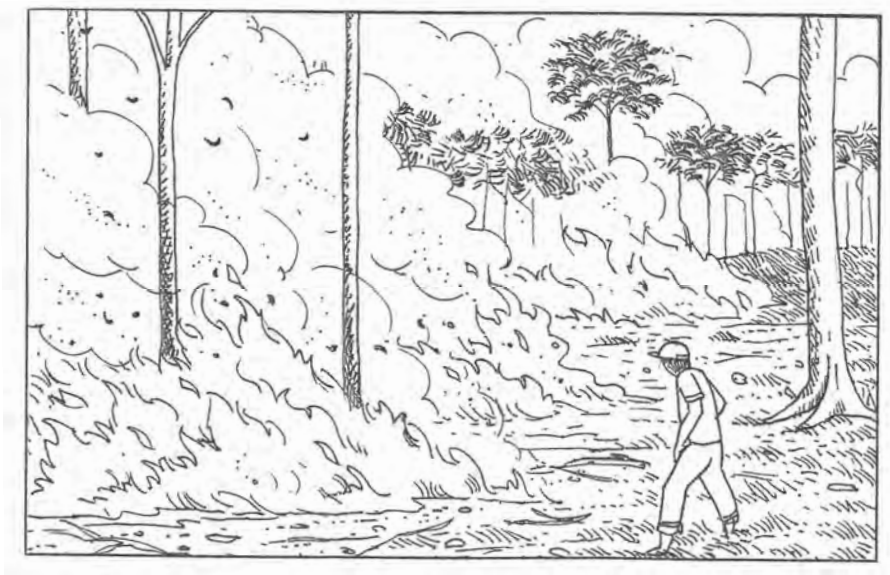
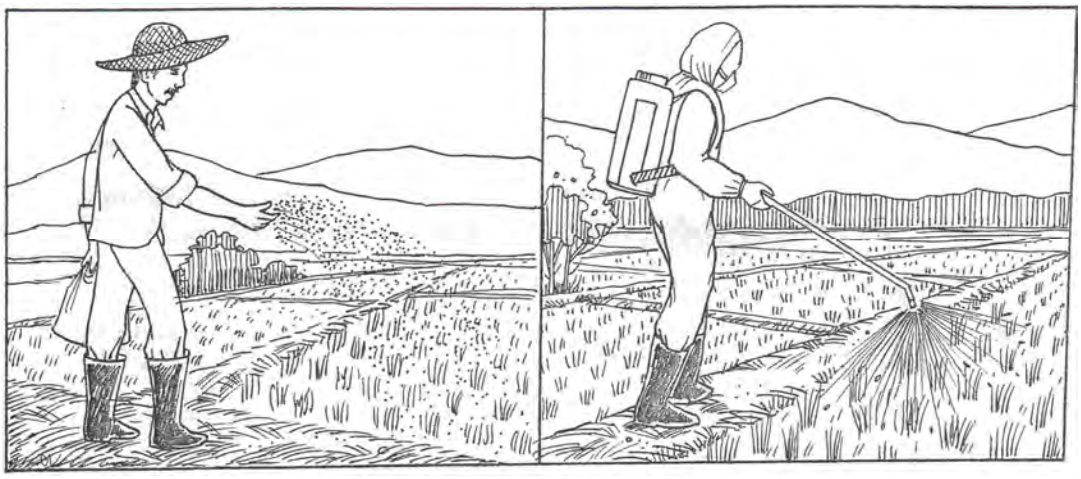


Diagram 9.2

(b) Diagram 9.3 shows two agricultural activities which use chemical products.



Spreading fertilizers Spraying insecticides

Discuss the good and bad effects of both activities shown in Diagram 9.3. The discussion should be based on the impact to agriculture and environment.

[10 marks]

END OF QUESTIONS PAPER

1.5.2 PAPER 3

1. *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. Agroup 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.

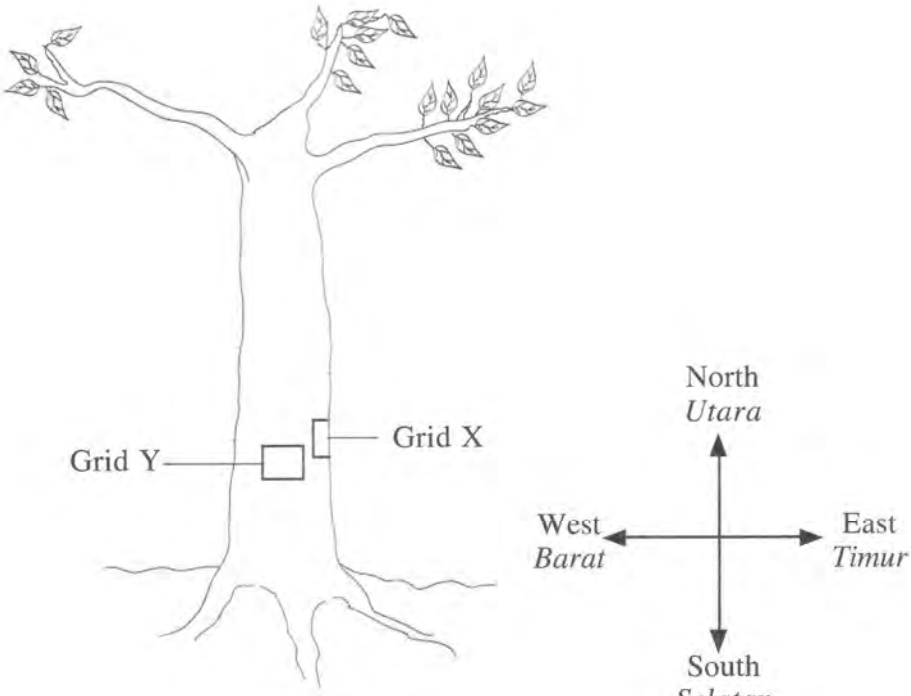


Diagram 1
Rajah 1

   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 *Pleucoccus* sp. on Grid X and Grid Y.

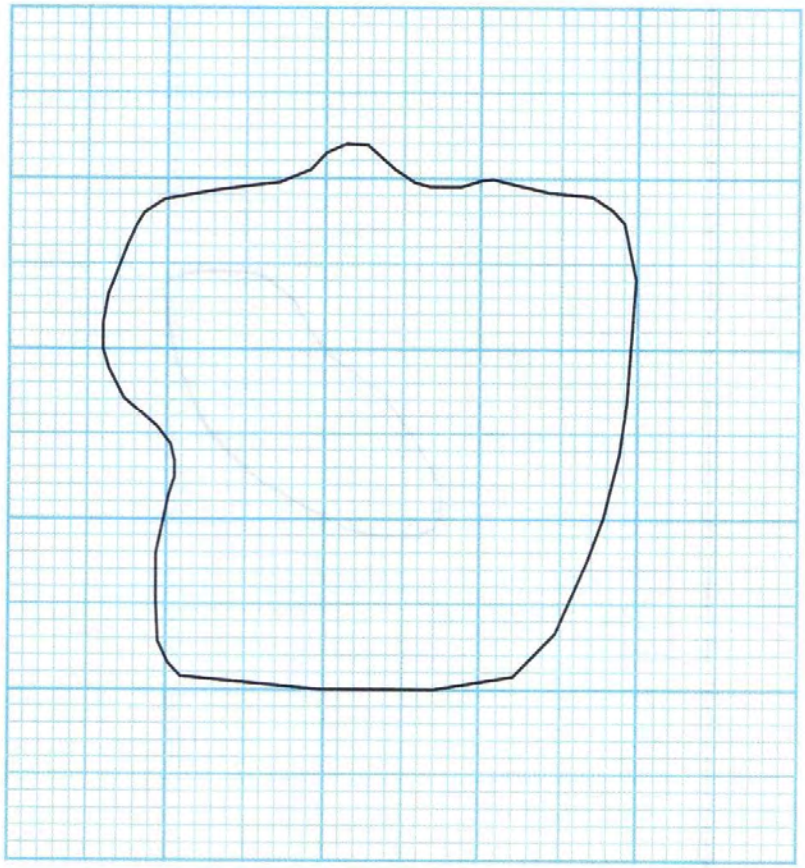
Grid	Total surface area covered by *Pleucoccus* sp.
X	 ..... cm^2

Table 1 (a)

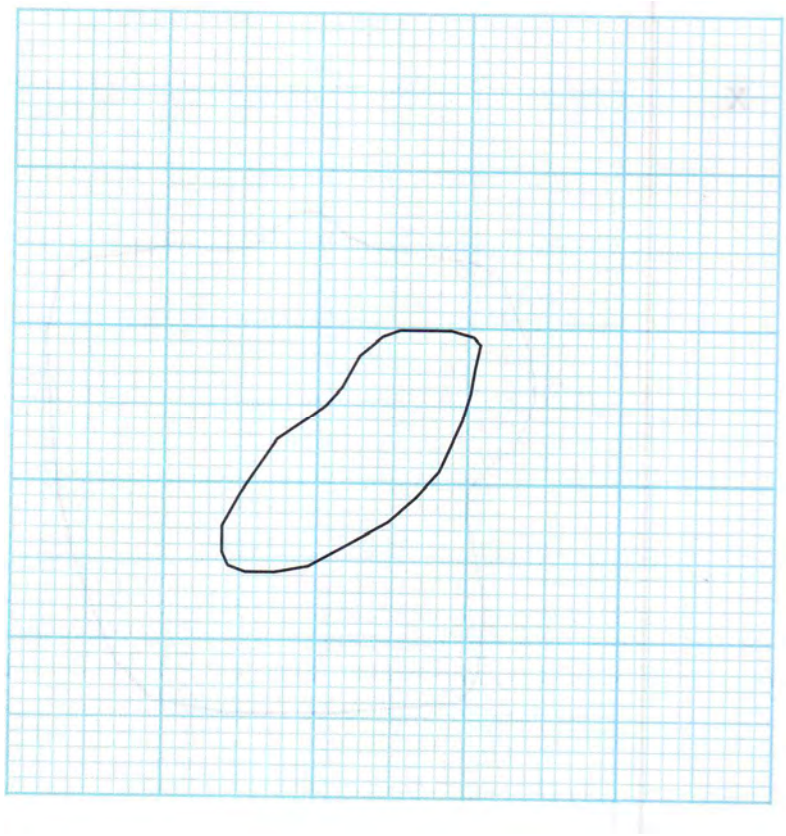
Grid	Total surface area covered by *Pleucoccus* sp.
Y	 …….. cm^2

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).

For examiner's use

[3 marks] 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)(ii)

For Examiner's Use

(c) Complete Table 2 based on this experiment.

Variable	Method to handle the variable
Manipulated variable …… …… ……	…… …… ……
Responding variable …… …… ……	…… …… ……
Controlled variable …… …… ……	…… …… ……

TABLE 3

[3 marks]

1(c)

(d) State the hypothesis is for this experiment.

……

……

……

……

[3 marks]

1(d)

For Examiner's Use

(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
- Potion of the grid
- Total surface area covered by *Pleucococcus* sp.

1(e)(i)

[3marks]

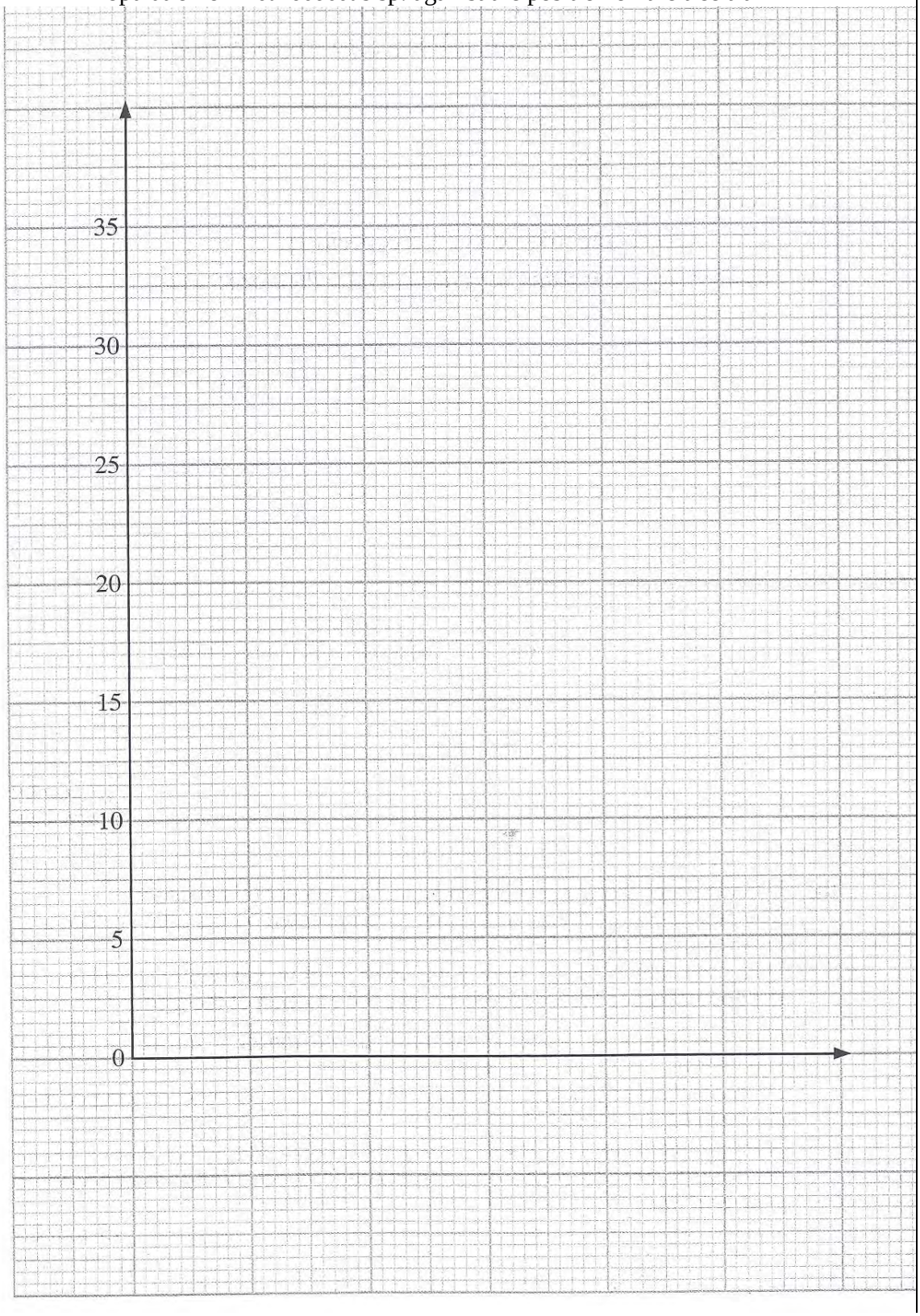
(e) (ii) Use the graph paper provided on the page 8 to answer this question.
The population of *Pleucococcus* sp is represented by the total surface area covered in the grid.

Using the data in 1(e)(i) , draw a bar chat to show the relationship between the population of *Pleucococcus* sp. and the position of the grids.

1(e)(ii)

[3 marks]

Population of *Pleurococcus* sp. against the position on the tree trunk



(f) Based on the bar chat in 1(e)(ii), explain the relationship between the population distribution of pleurococcus sp and the light intensity.

For Examiner's Use

……

……

……

[3 marks]

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)

For Examiner's Use

(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

1(i)

[3 marks]

Total

2. A semipermeable membrane is defined as a membrane that allows certain molecules to diffuse through it but does not allow the diffusion of other molecules. The diffusion of molecules through a semipermeable membrane depends on the size of the molecules.

   Based on the above information, plan a laboratory experiment to study the size of molecules that can diffuse through a semipermeable membrane.

   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 PAPER

MARK SCHEAM PAPER 2 : SPM 2008

No.	Sample Answers	Marks	
1 (a)	Able to name the structure labeled X Answer Chromatid- Kromatid// Chromosome	1	1
(b)(i)	Able to draw the cells in stage S based on two criteria - sister chromatid/ chromosome separate - each of them moves to the opposite poles (Refer to the sample student's answer)	1	1
(ii)	Able to state one of the changes which occurs in stage S Sample answers P1 - Chromosome separate P2 - The chromosomes becomes chromatid P3 - The chromatids move to opposite poles of the cell *(Any 1 P)*	1	1
(c)(i)	Able to draw the appearance of the chromosomes at the end of process Y based on two criteria - The homologous chromosomes separate - There is exchange of genetic material in both chromosomes.	1	1
(ii)	Able to name process Y Answer Crossing over	1	1
(ii)	Able to state the importance of process Y to an organism Sample answer To produce variation/ source of **variation** in the organism	1	1
(d)(i)	Able to name examples of factor W P1 – Rays – ex: X-rays/ radioactive/ gamma rays P2 – Chemical – ex: food flavoring/ colouring/ addictive/ preservative/ carcinogenic substances/ drugs/ melamine	1+1	2
(ii)	Able to explain the formation of cell X Sample answer P1 – Factor W cause mutation/ changes in genetics material/ gene/ RNA/ DNA/ chromosomes P2 – Result in uncontrolled/ irregular cell division/ abnormal mitosis	1+1	2
(iii)	Able to state two ways to prevent the development of cell X Sample answer P1 – Prevent from exposure to radioactive rays/ any other rays examples		

	P2 – Prevent from taking in food containing addictive/ any other chemicals example P3 – Treatment of the disease *(Any 2 P)*	1+1	2 12
2(a)	Able to name the structures in level 2 and level 3 Answer Level 2: tissue Level 3:Organ	1+1	2
(b)(i)	Able to name the process X Answer Differentiation	1	1
(ii)	Able to state the function of the structure in Level 2 Sample answer P1 – Able to contract and relax P2 – Build up the organ/ wall of heart	1	1
(iii)	Able to name the system (blood) circulatory system	1	1
(iv)	Able to state one function of the system Sample answer P1 – Transport nutrient/ antibody/ hormone/ digested food P2 – help in body defence against disease/ produce antibody/ kill pathogen P3 – involves in homeostasis/ balance of body fluid *(Any one)*	1	1
(c)(i)	Able to name and explain the condition which causes the blockage in the blood vessel Answer Name: Atherosclerosis/ Thrombosis/ any other suitable example Explanation: P1 – Deposition of cholesterol/ fats/ clumping blood platelet P2 – Formation of thrombus P3 – Beneath the artery wall/ inside the lumen of blood vessel P4 – causing the narrowing of lumen *(Any two)*	1+2	3
(ii)	Able to state three effects on the person's health if the blood vessel is blocked Sample answers P1 – Heart attack/ cardiovascular disease/ myocardial infraction P2 – Angina/ heaty at the chest P3 – Cardiac arrest/ heart failure P4 – breathing difficulties/ reference to lack of oxygen for tissues	1x3	3 12

	P5 – Stroke *(Any 3P)*		
3(a)	Able to state the genotype and phenotype of rabbit P Answer Genotype : Bb/ heterozygous Phenotype : Black fur	1+1	2
(b)(i)	Able to explain why B and b are called alleles Sample answers P1 – different form of a gene P2 – Occupy the same locus on a pair of homologous chromosomes P3 – each allele is responsible for the trait/ characteristics *(Any 2 P)*	1+1	2
(ii)	Able to state what happen to alleles B and b during the formation of gametes Sample answer Alleles are separated/ segregated	1	1
(c)(i)	Able to state the possible genotype of S Answer Bb or BB	1	1
(ii)	Able to explain the inheritance of fur colour by rabbit V Sample answer P1 – R has Bb// S has BB P2 – V received one dominant allele/ gene during fertilization	1+1	2
(d)(i)	Able to draw a schematic diagram of the cross breeding Sample answer Parent Bb bb Gamete B b b Offspring Bb bb	1 1 1	3
(ii)	Able to state the probability of producing an offspring with black fur Answer 50%	1	1
			12

4(a)(i)	Able to state the type of twins Q Answer Fraternal twin/ non-identical twin	1	1
(ii)	Able to explain the formation of twins Q Sample answer P1 – Two ovum are released at the same time P2 – Each ovum is fertilized by different sperm P3 – Two different zygotes are formed *(Any 2 P)*	1+1	2
(b)(i)	Able to name the structure Y Answer Placenta	1	1
(ii)	Able to state two functions of structure Y Sample answer P1 – Supply nutrients for the foetus P2 – Secretes hormones (oestrogen/ progesterone) P3 – Removes waste products P4 – Form a selective barrier between the mother's blood and the foetal blood *(Any 2 P)*	1+1	2
(c)	Able to state two differences between twins P and Q Sample answer P1 – Twins P share the same placenta whereas twins Q have their own placentas P2 – Twins P are formed by a single pair of sperm and ovum but twins Q are Formed by two pairs of sperm and ovum P3 – Twins P possess identical genetic information whereas twins Q have different genetic information P4 – Twins P are similar in physical appearance but not twins Q. P5 – Twins P have the same gender/ sex but twins Q may be has different gender/ sex *(Any 2 P)*	1+1	2

(d)	Able to explain the differences in physical appearance for twins P Sample answer P1 – Different eating habit/ nutrition/ diet P2 – Different daily activities	1+1	2
(e)	Able to explain why should stop smoking Sample answer C1 – nicotine can diffuse through the placenta to the foetus E1 – this will cause brain damage/ retarded the brain C2 – carbon monoxide can diffuse through the placenta to the foetus E2 – this will deprive its tissues of oxygen/ retarded growth/ miscarriage C3 – carcinogenic substances E3 – causes mutation *(Any C and E)*	1+1	2 12
5(a)(i)	Able to name hormone X Answer THS/ Thyroid stimulating hormone	1	1
(ii)	Able to state the function of hormone X Answer Stimulating thyroid gland to produce thyroxine	1	1
(b)	Able to name hormone Y Answer FSH/ Follicle stimulating hormone	1	1
(c)(i)	Able to name hormone Z Answer Oestrogen	1	1
(ii)	Able to state the role of hormone Z Answer Stimulates the development/ thickening/ repair of endometrium of the uterus	1	1
(d)(i)	Able to name hormone P Sample answer Growth hormone/ Somatotrophin/ GH	1	1
(ii)	Able to explain the effect of hormone P on the appearance of the individual Q Answer F : less production of growth hormone P1: cause stunted growth	1+1	2

	P2: resulting in dwarfism *(F and any P that equivalent)*		
(e)(i)	Able to state the circumstances Sample answer Not enough water in blood/ higher blood osmotic pressure/ drinking too little water	1	1
(ii)	Able to explain the role of ADH Sample answer P1 – collecting duct/ distal tubule become **more** permeable to water P2 – **more** water is reabsorbed	1+1	2
(f)	Able to explain why pituitary gland is considered as 'master gland' Answer It controls the activity of other endocrine glands	1	1 12
6(a)	Able to explain the function of contractile vacuole in osmoregulation Sample answer P1 – X is a contractile vacuole P2 – contractile vacuole regulates water P3 – Excess water will diffuse into contractile vacuole by osmosis P4 – it enlarges in size P5 – and contracts P6 – expelling the water *(Any 4P)*	Max 4	4
(b)	Able to explain the similarities between facilitated diffusion and active transport Sample answer S1 – Both need carrier protein P1 – to bind with molecules/ substances/ ions S2 – Both transport specific molecules P2 – because carrier protein has specific site S3 – Both processes occur in living cell P3 – because it need to change shape *(Any 4 points)*	Max 4	
	Able to explain the differences between facilitated diffusion and active transport Sample answer	Max 4	8

	Facilitated diffusion	**Active transport**
D1	Down the concentration gradient	Against the concentration gradient
E1	Molecules move from higher concentration to lower concentration	Molecules move from lower concentration to higher concentration
D2	Molecules move in both directions across the plasma membrane	Molecules move in one direction across the plasma membrane

	E2	Molecules can move through pore protein and carrier protein	Molecules can move through carrier protein		
	D3	No energy/ ATP used	Energy/ ATP is used		
	E3	Molecules can move through pore protein without binding and carrier protein for binding	Energy needed for binding with the active site		

(Any 4 points)

(c)

Able to explain how the preservatives are effective in the preservation of fish. — Max 4

Sample answer
F1 – salt solution is hypertonic to the fish
F2 – more water will diffuse out of the fish into salt solution by osmosis.
F3 – fish becomes dehydrated
F4 – and prevent the growth of bacteria/ kills the bacteria
F5 – bacterial cells are also crenated
F6 – the fish last longer
(Any 4 F)

Able to explain how the preservatives are effective in the preservation of vegetable. — Max 4 — 8

Sample answer
V1 – vinegar is acidic medium/ solution
V2 – vinegar will diffuse into the vegetables
V3 – and it becomes acidic
V4 – acidic condition prevent bacterial growth
V5 – the vegetable last longer
(Any 4 V)

20

7(a)(i)

Able to explain the function of platelets to stop the bleeding — Max 4 — 4

Sample answer
P1 – platelets produce thrombokinase
P2 – thrombokinase converts prothrombin to thrombin
P3 – thrombin convert fibrinogen to finrin
P4 – fibrin forms a network to trap erythrocytes
P5 – to form a clot/ scab
(Any 4 P)

(ii)

Able to explain the possible consequences on his health — Max 8 — 8

Sample answer
P1 - less haemoglobin to combine with oxygen
P2 – to form oxyhaemoglobin
P3 – less oxygen transported to the body cells
P4 – for cellular respiration
P5 – less energy is produced
P6 – resulting in tiredness/ fatigue
P7 – pale looking appearance
P8 – and can cause anaemia

P9 – eat food rich in iron
P10 – for example: cockles/ liver/ spinach
(Any 8 P)

(b)(i) Able to give an example of organism S — 1
Answer
Fish

Able to given an example of organism T
Answer
Human/ mammals — 1 — 2

(ii) Able to describe the similarities between the circulatory system of organism S and T — Max 2
Sample answer
S1 – both have a closed circulation
S2 – both have hearts
S3 – blood flows in blood vessels
S4 – heart acts as a pumping organ
(Any 2 S)

Able to describe the differences between the circulatory system of organism S and T

	Organism S	**Organism T**
D1	Single circulation	Double circulation
D2	Heart has 2 chambers	Heart has four chambers
D3	Absence of septum	Presence of septum
D4	Oxygenated blood flows from gills to cells/ tissues	Oxygenated blood flows from lungs to heart
D5	The deoxygenated blood is pumped to the gills then to the body cells and taken back to the heart.	The oxygenated blood is pumped to the lungs and then the deoxygenated blood is returned to the heart. The oxygenated blood is pumped to the body cells and then returned to the heart.

(Any 4 D) — Max 4 — 6

20

8(a)(i)	Able to explain the formation of faeces in human Sample answer P1 – contents that are undigested enter the colon/ large intestine P2 – contents consist of a mixture of water and fibers P3 – it move slowly along the colon by peristalsis P4 – water is reabsorbed P5 – to form faeces *(Any 4 P)*	Max 4	4
(ii)	Facts - Able to state a specific nutrient deficiency disease Significant - Able to state the importance of the nutrient Consequence – Able to give one consequence deficient in nutrient Sample answer Protein (Combination 1) F1 – A child who is deficient in protein may suffer from kwashiorkor/ marasmus S1 – protein is needed for normal growth C1 – lack of protein can causes stunted growth to the children Vitamin A (Combination 2) F2 – A child who is deficient in vitamin A may suffer from night blindness S2 – vitamin A is needed to promote healthy retina C2 – lack vitamin A reduce the ability to see in dim light Fiber (Combination 3) F3 – A child who is deficient in roughage/ fiber may suffer constipation S3 – roughage is needed to stimulate peristalsis C3 – it will cause uneasy defaecation/ colon cancer Calcium (Combination 4) F4 - A child who is deficient in calcium may suffer osteoporosis S4 – calcium is needed to form a healthy bones and teeth C4 – lack of calcium causes the mass of bones to decrease *(Any 2 combination)* Any other examples	2x3	6
(b)(i)	F1 – able to state value of energy produced from the food taken daily F2 – able to compare the energy produced from the food taken daily with the daily energy requirement of the boy Sample answer F1 – the energy produced from the food taken daily is 8230kJ F2 – the energy produced is less than the daily energy requirement	1 1	2

(ii)	Able to explain the consequences of this menu to his health (Fact + Consequences: 1+1) Sample answer The menu is unbalanced diet because F1 – does not taken balance diet C1 – lead to malnutrition F2 – does not contain sufficient C2 – leads to constipation F3 – contain only certain vitamin C3 – causes deficiency diseases F4 – contain high fat C4 – causes obesity F5 – contain high protein C5 – causes gout/ liver failure F6 – contain high carbohydrate C6 – causes obesity/ diabetes mellitus *(Any 4 combination F and C)*	2x4	8 20
9(a)(i)	Able to explain the effect of the phenomenon to the environment Sample answer P1 – increase in carbon dioxide concentration traps heat P2 – increase in global temperature P3 – cause melting of polar ice P4 – this phenomenon is called green house effect *(Any 3 P)*	Max 3	3
(ii)	Able to discuss how the activity causes disasters to the environment Sample answer F1 – Release <u>a lot of</u> carbon dioxide P1 – it traps heat P2 – and causes global warming/ green house F2 – release heavy smoke which results in the formation of haze/ smog P3 - reduce light intensity for photosynthesis P4 – rate of photosynthesis decreases P5 – prevents vision/ resulting in the air accidents P6 – it also cause health hazards/ lungs diseases/ eye problems	Max 7	7

	F3 – destroy the flora and fauna P7 – causes loss of herbs for medical purposes/ timber P8 – lost of habitat/ extinction of flora and fauna P9 – lack of water catchments area P10 – barren land/ flashflood/ landslide/ soil erosion/ water pollution *(Any 7points)*		
	Able to discuss the effect of spraying chemical fertilizers on agriculture and environment Sample answer Good Impact G1 – supplying minerals/ nutrients G2 – increase in yield production/ increase growth rate *(Any 1 G)* Bad Impact B1 – Excess fertilizers may be washed away into the river B2 – causing enrichment of water B3 – results in rapid growth of algae/ aquatic plants/ algal bloom/ eutrophication B4 – increase the BOD in water/ increase water pollution/ decrease the oxygen content in the river B5 – cause the dead of the aquatic organisms/ fish *(Any 4 B)*	Max 5	
	Able to discuss the effect of spraying chemical insecticides on agriculture and environment Sample answer Good Impact G3 – an effective way to kill insects G4 – since some chemicals are toxin only to specific animals/ weeds *(Any 1 G)* Bad Impact B6 – it may be hazardous to farmers if inhaled B7 – it may contaminated the underground water/ river/ water pollution B8 – causes the death of fishes/ aquatic animals B9 – in the long term the insects/ may develop into a mutant strain B10 – no longer effective for the insects *(Any 4 B)*	Max 5	10 20

END OF MARK SCHEME PAPER 2

1.6.2 MARKING SCHEME BIOLOGY PAPER 3 SPM 2008
Question1

1(a) [KB0602 – Measuring Using Number]

3

Able to record the total surface area covered by the *Pleurococcus sp*. 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	Able to state **two** different correct observations. [Values must be same with in table 1(a) and 1(b).] Sample answer: 1. The total surface area covered by *Pleurococcus sp.* in Grid X / facing east is 33cm^2 . 2. The total surface area covered by *Pleurococcus sp.* in Grid Y / facing south is 5cm^2 . 3. The <u>total surface area</u> covered by *Pleurococcus sp.* in Grid X / facing east is more than in Grid Y / facing south.
2	Able to state one correct observation and one inaccurate oobservations Sample Answer: 1. The total surface area covered by *Pleurococcus sp.* in Grid X / facing east is big / large / more. 2. The total surface area covered by *Pleurococcus sp.* in Grid Y / facing south is small / little . 3. Surface area covered by *Pleurococcus sp.* in Grid X / facing east is more than in Grid Y / facing south.
1	Able to state only one correct observation or two different observations at idea level (id). Example Answer (idea level): 1. *Pleurococcus sp* is found in Grid X 2. *Pleurococcus sp* is found in Grid Y 3. *Pleurococcus sp* is found in both Grid X and Grid Y
0	No response or wrong response.
	Scoring

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 (b) (ii) [KB0604 – Making inference]

Score	Criteria
3	Able to state two inferences Note : Inference must match observation Sample Answers: 1. In Grid X, there is a more growth of *Pleurococcus sp*. / photosynthesis because it receive more sunlight / light intensity. 2. In Grid Y, there is a less growth of *Pleurococcus sp.* / photosynthesis because it receive less sunlight / light intensity. 3. In Grid X, *Pleurococcus sp* growth more compare to Grid Y because it receives more sunlight. // Vice versa
2	Able to state one correct inference and one inaccurate inference. Or able to state **two** inferences inaccurately Sample answers: 1. In Grid X, there is a more growth / photosynthesis of *Pleurococcus sp*. // there is more sunlight / light intensity. 2. In Grid Y, there is a less growth / photosynthesis of *Pleurococcus sp*. //there is less sunlight / light intensity. 3. There is more growth / photosynthesis of *Pleurococcus sp*/ more sunlight / light intensity in Grid X than in Grid Y 4. Grid X has more sunlight and growth.
1	Able to state only one correct inference or able to state two inferences at idea level. Sample Answer: 1. In Grid X, *Pleurococcus sp.* influenced by humidity / temperature. 2. In Grid Y, *Pleurococcus sp* influenced by humidity. 3. Grid X is more humid than Grid Y
0	No response OR wrong response.
	Scoring:

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 (e) [KB0610 – Controlling Variables]

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td>3</td><td>Able to state all 3 variables and the methods to handle the variable.
Sample Answer :
<table>
<tr><th>Variables</th><th>Method to handle the variable correctly</th></tr>
<tr><td>Manipulated variable:
Position / direction / locationof the grids (X,Y), //amount of sunlight, // Grid X and Grid Y</td><td>Place /change/put the grid on the tree trunk that are facing east or south // placed at different direction/location / different light intensities.</td></tr>
<tr><td>Responding variable :
Total surface area covered by Pleurococcus sp.// population distribution of Pleurococcus sp.</td><td>Count/calculate/recored the number squares covered with the pleurococcus sp. in a Grid X/Grid Y/ by using a graph paper.

** Accept :measured and recorded
Reject : Quadrat sampling</td></tr>
<tr><td>Constant variable:
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 same tree to place Grid X and Grid Y
2. Sampling experiment is carried out at the same time.
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>
</table></td></tr>
<tr><td>2</td><td>Able to state correctly.

▪ Reject way how to handle variable if variable is wrong.</td></tr>
<tr><td>1</td><td>Able to state 2-3 correctly</td></tr>
<tr><td>0</td><td>No response or only one criteria correct.</td></tr>
</table>

1 (d) [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.(Grid X and Grid Y, direction of grid, light intensity) P2: Stating responding variable (Total surface area,/ growth/population distribution) H : Relationship (more, higher ,Inversely, increases) Sample Answer : 1. When the *Pleurococcus sp*. is facing east / in Grid X /it receives more sunlight , the total surface area covered increases. 2. When the *Pleurococcus sp*. is facing south /in Grid Y / it receives less sunlight, total surface area covered decreases. 3. The higher the light intensity, the higher the total population distribution / the total surface area covered by *Pleurococcus sp*.
2	Able to state a hypothesis relating the manipulated variable inaccurately. Sample Answer: 1. When *Pleurococcus sp*. receives sunlight, total surface area covered increased. 2. When *Pleurococcus sp*. receives sunlight, total surface area covered decreased. 3. Sunlight / light intensity influence the total surface area covered by *Pleurococcus sp*.
1	Able to state a hypothesis relating the manipulated variable at idea level. Sample Answer : 1. The *Pleurococcus sp* needs sunlight / can grow.
0	No response or wrong response if no P1 or P2 no mark for each.

1 (e) (i) [KB0606 – Communication]

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td>3</td><td>Able to construct a table correctly with the following aspects:

1 : Titles with correct units
2 : Position of grids.
3 : Total surface area
Sample answer :
<table>
<tr><td>Position of grid</td><td>Total surface area covered by Pleurococcus sp. / cm^2</td></tr>
<tr><td>X / East</td><td>32 -36</td></tr>
<tr><td>Y / South</td><td>4 – 8</td></tr>
</table></td></tr>
<tr><td>2</td><td>Any two aspects correct</td></tr>
<tr><td>1</td><td>Any one aspect correct</td></tr>
<tr><td>0</td><td>No response or wrong response.</td></tr>
</table>

1 (e)(iii) [KB0612 – Relationship between space and time]

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td>3</td><td>Able to draw the graph correctly with the following aspects:

P(paksi) : Title of x-axis and y-axis
T(titik) : Two bars drawn and label correctly (height correctly)
B(bentuk) : Two bars labelled</td></tr>
<tr><td>2</td><td>Able to state any two correct.</td></tr>
<tr><td>1</td><td>Able to state any one correct</td></tr>
<tr><td>0</td><td>No response or wrong response.</td></tr>
</table>

1 (f) [KB0608 – Interpreting Data]

Score	Criteria
3	Able to explain the relationship between the population of *Pleurococcus sp* and the light intensity correctly based on the following criteria: R1- The population / total surface area covered by *Pleurococcus sp.* / growth increased / greater // decrease / lower R2 – Compare compass (direction of grid) / compare between Grid X and Grid Y // more / less photosynthesis R3 - (Degree) / more / less light intensity. Sample answer : 1. The population distribution / growth / total surface covered by *Pleurococcus sp.* 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. ** Reject more sunlight
2	Sample answer: 1. The population of *Pleurococcus sp.* is greater for Grid X which receives high light intensity. 2. The population of *Pleurococcus sp.* is less for Grid Y which receives low light intensity.
1	Able to interpret data correctly with the only one aspect correctly. 1. Grid X has more sunlight
0	No response or wrong response.

1 (g) [KB0609 –Defining by Operation]

Score	Criteria
3	Able to define operationally the population distribution for the Pleurococcus sp. : D1 : Definition Total Surface area covered by *Pleurococcus sp*. / 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. Sample answer: 1. Population distribution is defined as the total surface area covered by *Pleurococcus sp*. within a 10cm x 10 cm grid using graph paper at different direction is influences by light intensity. 2. Population distribution is defined as 33cm^2 and 5cm ^{2} area covered by *Pleurococcus sp*. within 10cm x 10cm / grid / using graph paper at east and south position of the tree trunk.
2	Any two criteria stated Area covered by *Pleurococcus sp*. in facing east is 35cm^2 and facing south is 5 cm^2 .
1	Any one criteria stated. 1. Total surface area covered by *Pleurococcus sp* 2. Grid X facing east and Grid Y facing south
0	No response or wrong response

1 (h) [KB0605 – Predicting]

Score	Criteria
3	Able to predict the outcome of the experiment correctly based on the following criteria: Prediction : C1 : Prediction of total surface area of *Pleurococcus sp.* C2 : Effects of direct sunlight. C3 : Effect of light intensity of *Pleurococcus sp.* 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 **** Reject : Direct sunlight.** **** C1 wrong automatically reject C2 and C3** 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
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) [KB0602 –Classifying]

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td>3</td><td>Able to classify the biotic and abiotic factors correctly:

Sample answers
<table>
<tr><th>Biotic factor</th><th>Abiotic factor</th></tr>
<tr><td>Fish
Water Lily
Snail</td><td>pH
Humidity
Temperature
Soil</td></tr>
</table>
7 ticks</td></tr>
<tr><td>2</td><td>5-6 ticks</td></tr>
<tr><td>1</td><td>3-4 ticks</td></tr>
<tr><td>0</td><td>No response or wrong response</td></tr>
</table>

SCORE TOTAL - 11 X 3 = 33 marks

Mark scheme Question 2 Paper 3 2008.

Aim Of Investigation / Objective : To study the size of molecules / substances that can diffuse pass through a semipermeable membrane

KB061201 – (KB061203 – Statement of Identified Problem)

Score	Criteria
3	Able to state a problem statement relating the manipulated variable with the responding variable correctly. P1 : MV (size of molecule // substances / solute / solution / at least pair of suitable solution (one small & one large)) P2 : RV (Diffuse through …… and can't diffuse out / through semipermeable membrane / visking tubing / test with benedict and iodine. H : Question form and have question mark Sample Answer : 1. What substances / solution / solute can diffuse through a visking tubibg / semipermeable membrane? 2. What size of molecule can diffuse through a visking tubing / semipermeable membrane ? 3. Can glucose and starch be detected outside the visking tubing/ semipermeable membrane when tested with Benedict solution? 4. What substances can cause a raise / change / increase / decrease in liquid level in the capillary tube ?
2	Able to state problem statement inaccurately . Sample Answer: 1. What size of molecule can diffuse through a visking tubing / semipermeable membrane. 2. Can glucose diffuse through visking tubing / semepermeable membrane ? 3. Different size of molecules can diffuse through visking tubing / semipermeable membrane.
1	Able to state a problem statement at idea leves. Sample Answer: 1. What molecules can diffuse through a membrane? 2. Can starch and glucose / sucrose enter a membrane.
0	No response or wrong response

KB061202 (KB061203 – Making Hypothesis)

Score	Criteria
3	Able to state a hypothesis relating the MV to the RV correctly P1 : (MV) – small and large P2 : (RV) – Diffuse through visking tubing / semipermeable membrane // positive / negative food test H : Relationship – can ……..can't Answer must have P1, P2 and H Sample Answer : 1. Small molecules / substances can diffuse through the visking tubing but not the large molecules 2. Water / glucose molecules can diffuse through the visking tubing but not starch / sucrose molecules. 3. Water molecules can course arise / change in lever of sucrose in the capillary tube.
2	Able to state a hypothesis inaccurately Sample Answer : 1. The diffusion / movement of molecules through visking tubing is based on the size of molecules / type of substances. 2. Different sizes of molecules can diffuse through visking tubing. 3. The movement of molecules through the semipermeable membrane is based on the size of the molecules.
1	Able to state an idea of a statement of hypothesis. Sample Answer: 1. Some molecules can pass through the semipermeable membrane / visking tubing. 2. Small molecule / glucose can pass through visking tubing.
0	No response or wrong response

KB061203 – Planning Investigation (KB061203-Controlling variable)

Score	Criteria
	Able to state three variables correctly: Manipulated variable: Size of molecules / type of substances / solute // glucose and sucrose/ starch and water Responding variable : Change in water level in the capillary tube // result of food test / positive test for glucose / negative test for starch / change in color / final mass / diffusion of molecule in visking tubing Controlled variable: Visking tubing / any other semipermeable membrane / time / temperature / concentration of substances in visking rubbing.// initial mass

KB061205 (KB061203-Listing of Materials and Apparatus)

Score	Criteria
3	Able to list all the important apparatus and material correctly Sample answer: Experiment using capillary tube. M1 Apparatus : Beaker / test tube / boiling tube, retort stand, capillary tube, ruler , stopwatch Materials: Visking tubing, sucrose solution, distilled water, thread, marker **4/5 A + 4M** Experiment using food test. M2 Apparatus : Boiling tube, test tube, beaker, Bunsen burner, syringe,/ measuring cylinder, stopwatch. Materials : Iodine solution, visking tubing, starch suspension, / sucrose solution , glucose solution, distilled water, thread. **4/5 A + 5M**
2	Able to list al least 3 apparatus and at least 3 materials correctly **M1 – 3A + 3M** **M2 – 3A + 3/4M**
1	Able to list al least 2 apparatus and at least 2 materials correctly **M1 – 2A + 2M** **M2 – 2A + 2/3M**
0	No response or incorrect response **M1 – 1A + 1M** **M2 – 1/2A +1M**

KB061203 – Planning Investigation (Technique - B1 = 1m)

Score	Criteria
	Able to state suitable technique used for the experiment <u>Experiment 1</u> Using a ruler to record the change in the level /height of the liquid in the capillary tube <u>Experiment 2</u> Carrying out food test on the liquid outside the visking tubing in the beaker / glucose / starch using Benedict solution / iodine solution and record the result

KB061204 (KB061203-Method / procedure of investigation)

Score	Criteria
3	Able to state five steps of the experimental correctly based on the following aspects: **K1** : **Preparation of material & apparatus (any 3)** 1. Soak / immerse 2. Tie one end 3. Fill 4. Tie the other 5. Immerse **K2** : Operating the constant variable **(any one)**: i) Fix value of volume / time / temperature ii) Initial mass / volume of solution in visking tubing **Remark** :Should state the **value** used **any one to get K2** **K3** : **Operating the responding variables (any one)**. 1. Carry out food result // Recorded the final height of the colored liquid // recorded the color change // recorded the change in mass **K4** : **Operating the manipulated variable (any one)** i) Repeat experiment with another suitable solution/ substances ii) Use two solution with different size of molecule

	K5 : Steps to increase reliability of result accurately (any one) i) Rinse outside surface of the visking tubing ii) Rinse the U-tube iii) The visking tubing tightly iv) Repeat the experiment to get average reading Sample Answer: Method / Procedure : 1. Soak a visking tubing of 15 cm long, in water for about 5 minutes to soften it. 2. Open the visking tubing and end tie of the tube tightly with a piece of cotton thread to from a bag 3. Fill the visking tubing with 10ml (30%) glucose solution using a syringe. 4. Tie the other end of the visking tubing tightly with a piece of cotton thread 5. Rinse the outer surface of the bag with distilled water. 6. Immerse the visking tubing into a beaker filled with distilled water 7. After 20 minutes, carry out a Benedict Test / the present of glucose /sucrose is tested on the liquid outside the visking tubing in the beaker. 8. Repeat steps 1-6 using starch / sucrose solution (instead of glucose) 9. Carry out an Iodine Test // present of starch is tested / Non-redusing Sugar Test for starch / sucrose on the liquid outside the visking tubing in the beaker. **K1 – Step 1,2,3,4,6 (at least 3K1 steps)** **K2- Step 1, 3, 7 (any one)** **K3 – Step 9+10 / 7+10 (any one)** **K4 – Step 8 (operating manipulated variable)** **K5 – Step 2, 4, 5 (any one)** **Able to state five K**
2	Able to state **three to four K**
1	Able to state **two K**
0	No response or wrong response

KB061203 – Planning Investigation (KB061203-Data Presentation – B2 =1m)

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td></td><td>Able to construct a table to record data based on the following aspects
1. Correct title
2. Correct substance

Sample answer:
<table><tr><td>Content in visking tubing</td><td>Content in beaker</td><td>Change in liquid level in capillary tube (cm^2)</td></tr><tr><td>Sucrose</td><td>Water</td><td></td></tr><tr><td>Water</td><td>sucrose</td><td></td></tr></table>
Or
<table><tr><td rowspan="2">Solution in visking tubing</td><td colspan="2">Solution out side</td></tr><tr><td>Benedict test</td><td>Iodine test</td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table></td></tr>
</table>

KB061203 – Planning Investigation (KB061203-Conclusion)

Score	Criteria
	Able to make the right conclusion correctly: Sample answer: Water molecules can diffuse through the visking tubing but not the sucrose molecule.

KB061203 - Planning (Planning for investigation)

Score	Criteria
3	Scoring Criteria: Able to state 7-9 planning investigation of experiment following:
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

PAPER 3 (EXERCELANCE STUDENT'S ANSWER)

1. *Pleurococus. Sp* is a unicellular green alga found on the bark of trees. The population distribution of *Pleurococus. Sp* is affected by abiotic factors such as l ight intensity. A group of students carried out an experiment to investigate the effect of light intensity on the population distribution of *Pleurococus. Sp.*

   Diagram 1 shows a tree plant trunk on which *Pleurococus. Sp* was growing.

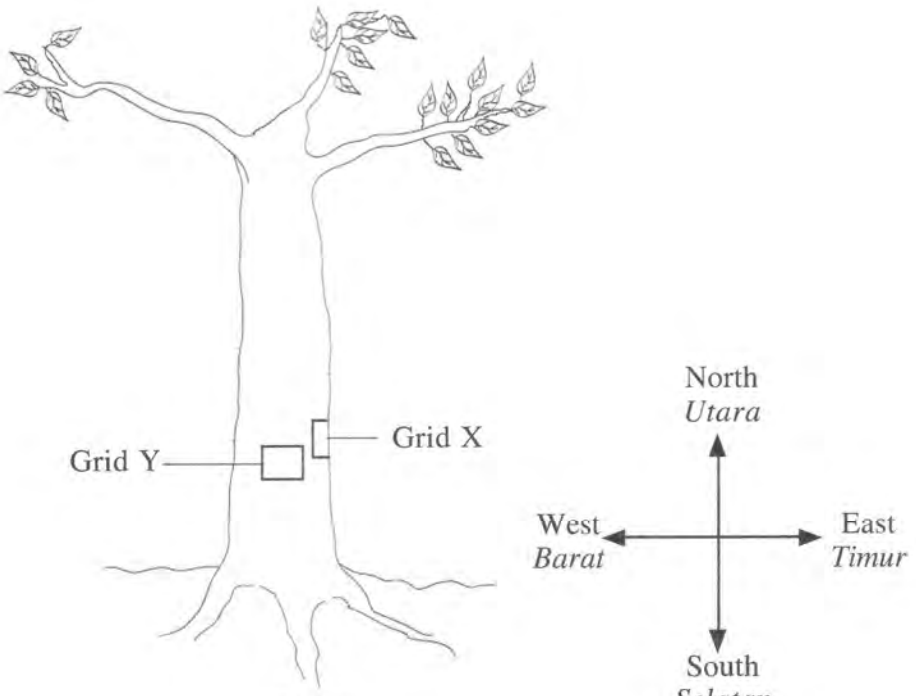


Diagram 1
Rajah 1

Two samples of the distribution of *Pleurococus. 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 *Pleucoccus* sp. on Grid X and Grid Y.

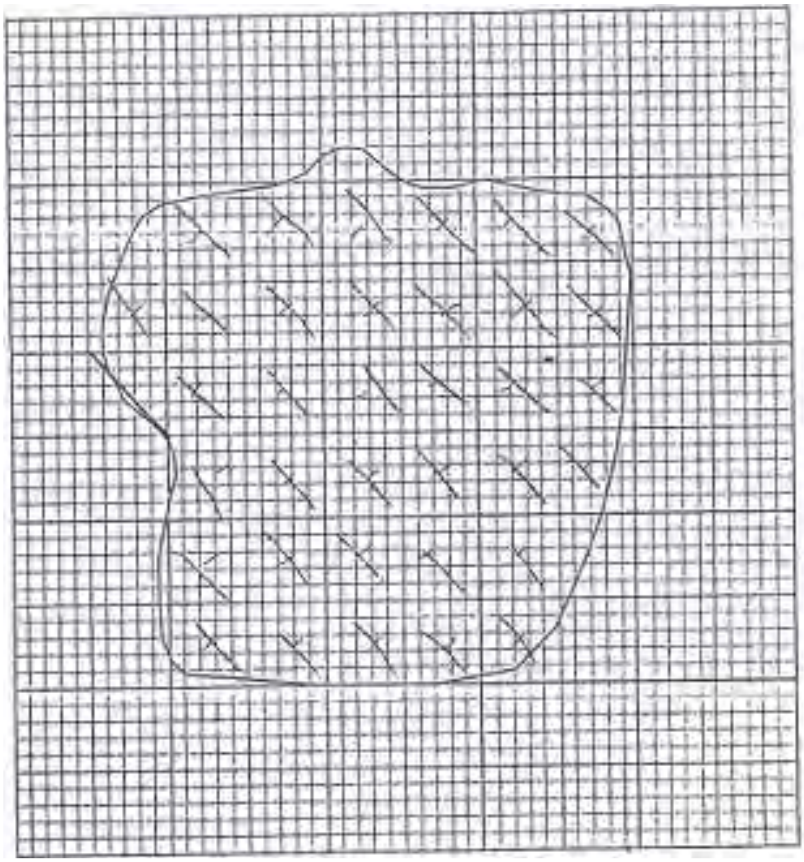
Grid	Total surface area covered by *Pleucoccus* sp.
X	 ……36…….. cm^2

Table 1 (a)

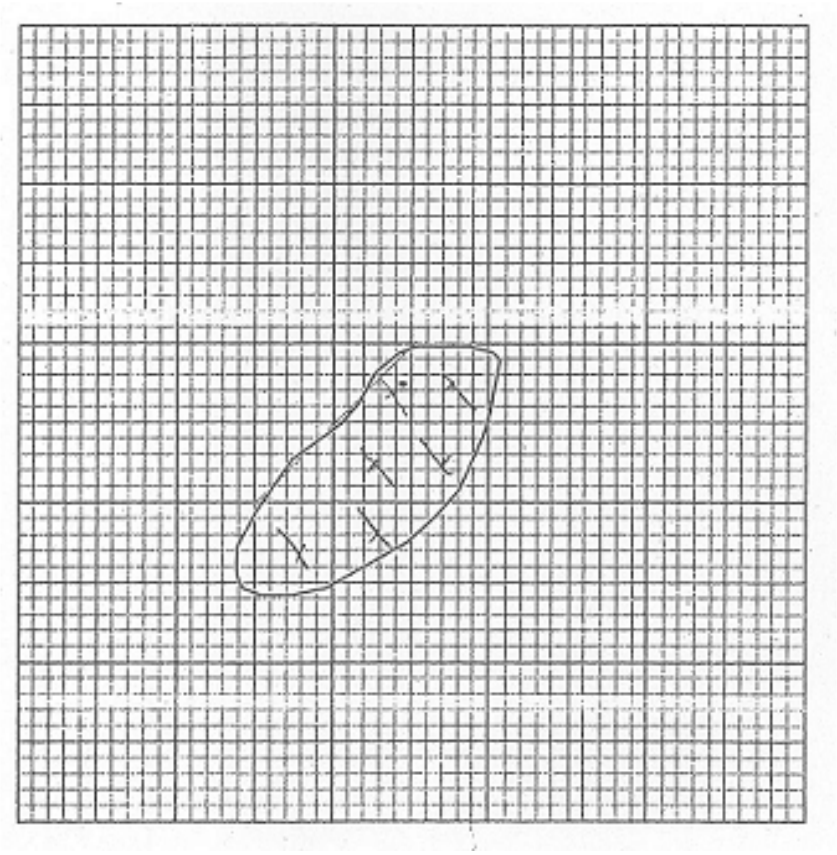
Grid	Total surface area covered by *Pleucoccus* sp.
Y	 ……6…….. cm^2

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).

For examiner's use

[3 marks] 1(a)

(b) (i) State two different observations made from the diagrams in Table 1 (a) and Table 1 (b)

Observation 1:

The total surface area covered by Pleurococcus sp. in Grid X is $36cm^2$

Observation 2:

The total surface area covered by Pleurococcus sp. is $6cm^2$ in Gris Y

1(b)(i)

[3 marks]

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

Inference from observation 1:

Pleurococcus sp in Grid X receives more light intensity and it will grow faster

……

Inference from observation 2 :

Pleurococcus sp Grid Y receives less light intensity and it will slow in growth

1(b)(ii)

[3 marks

(c) Complete Table 2 based on this experiment.

For Examiner's Use

Variable	Method to handle the variable
Manipulated variable Light intensity	Place Grid X facing East that receives more sunlight and Grid Y facing South which receives less sunlight
Responding variable Total surface area covered by Pleurococcus sp	Measured and record the total surface area covered by Pleurococcus sp by using graph paper
Controlled variable Size of grid	Both grid with the same size that is 10cm x 10cm is used in experiment. .....

Table 3

[3 marks]

1(c)

(d) State the hypothesis is for this experiment.

The higher the light intensity received by Pleurococcus sp. the larger the total surface area covered by it.

.....

[3 marks]

1(d)

For Examiner's Use

(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
- Potion of the grid
- Total surface area covered by *Pleucococcus* sp.

Grid	Total surface area covered by pleurococcus sp (cm^2)
X	36
Y	6

1(e)(i)

[3marks]

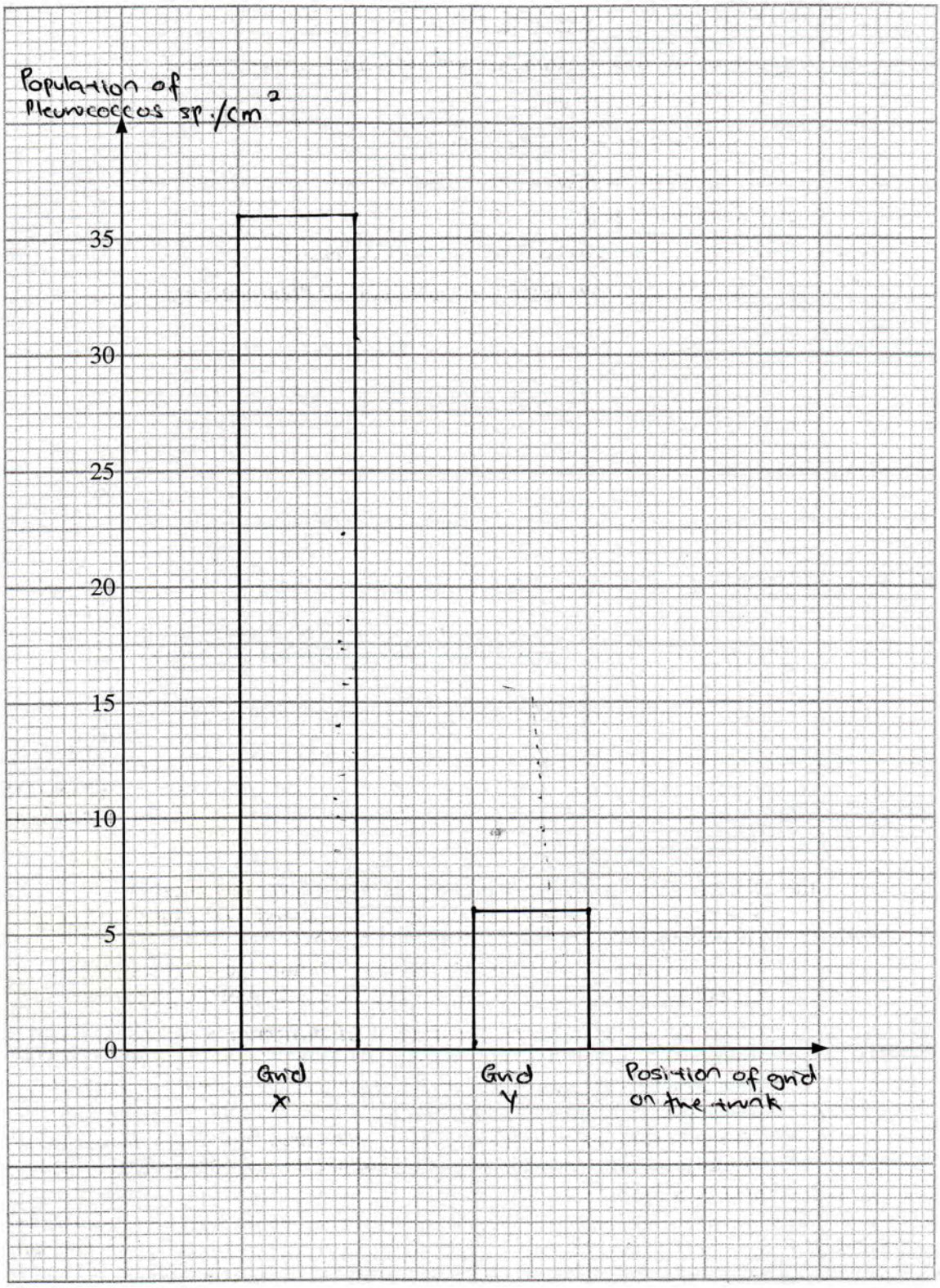
(e) (ii) Use the graph paper provided on the page 8 to answer this question.
The population of *Pleucococcus* sp is represented by the total surface area covered in the grid.

Using the data in 1(e)(i) , draw a bar chat 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



(f) Based on the bar chat in 1(e)(ii), explain the relationship between the population distribution of pleurococcus sp and the light intensity.

The population distribution of Pleurococcus sp increase as the light intensity increase. High light intensity is needed for photosynthesis and production or formation of green algae. Hence as the light intensity increase, the rate of photosynthesis of algae increases

[3 marks]

For Examiner's Use

1(f)

(g) State the operational definition for population distribution of *Pleurococcus* sp.
Hydrilla sp. Explain your prediction.

Population distribution of Pleurococcus sp is the total area of production of Pleurococcus sp at certain place. The population is made by place the grid at different place with different light intensity and the area covered is calculated.

[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.

Increase which is 40cm^2 . This is because the Pleurococcus sp get higher light intensity which increase rate of photosynthesis.

……..……..

[3 marks]

1(h)

For Examiner's Use

(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
Fish Water –lily Snail	Humidity Temperature Soil pH paper

Table 3

[3 marks]

1(i)

Total

PAPER 3 SAMPLE ANSWER (MODERATE STUDENT'S)

1. *Pleurococus. Sp* is a unicellular green alga found on the bark of trees. The population distribution of *Pleurococus. Sp* is affected by abiotic factors such as light intensity. Agroup of students carried out an experiment to investigate the effect of light intensity on the population distribution of *Pleurococus. Sp.*

   Diagram 1 shows a tree plant trunk on which *Pleurococus. Sp* was growing.

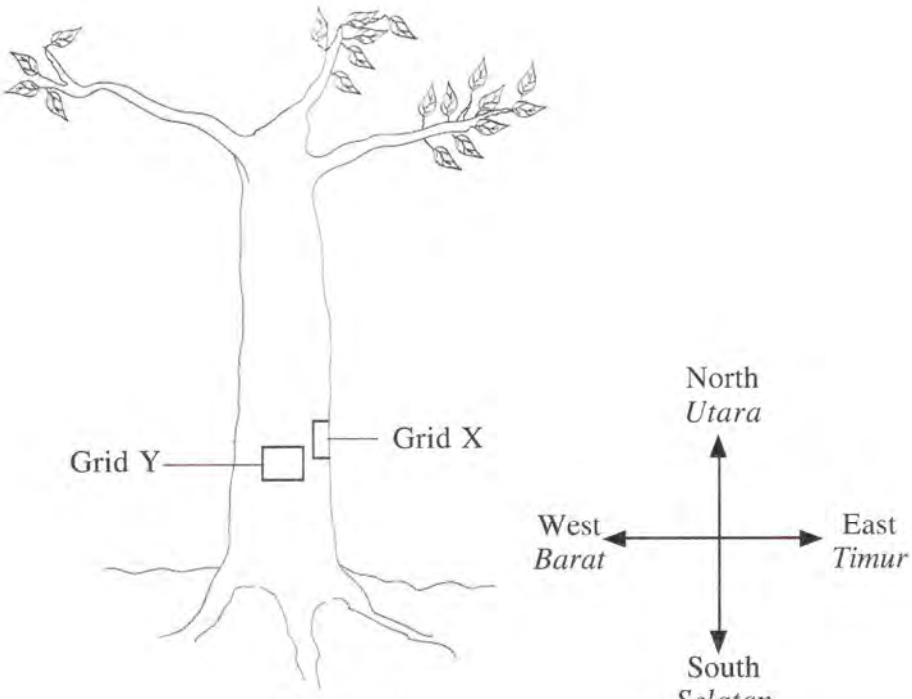


Diagram 1
Rajah 1

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Table 1(a) and Table 1 (b) show the total surface area covered by *Pleucoccus* sp. on Grid X and Grid Y.

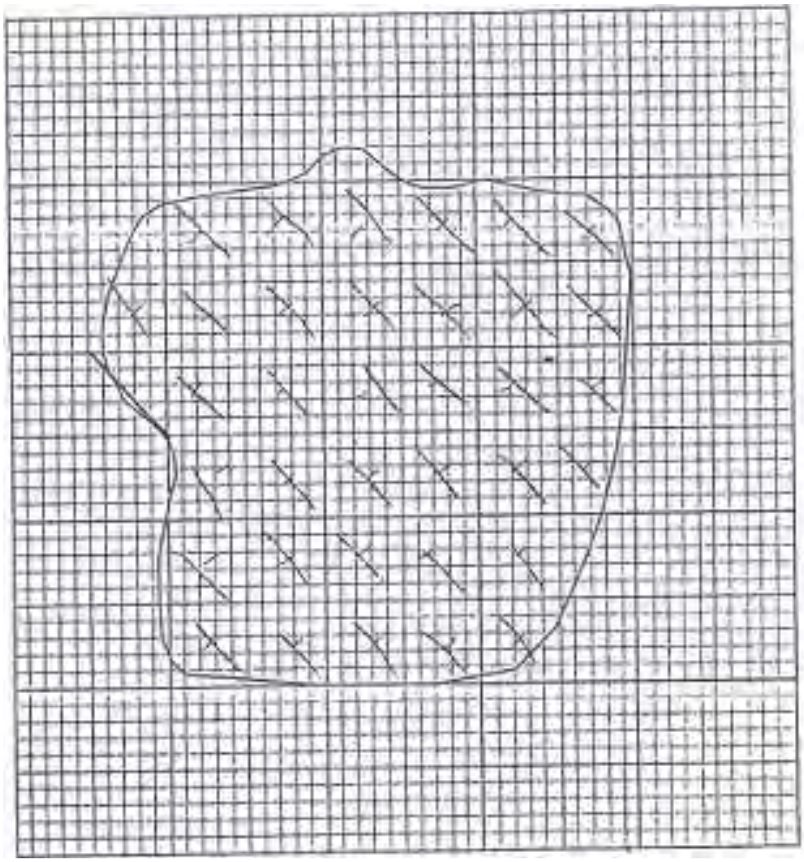
Grid	Total surface area covered by *Pleucoccus* sp.
X	 ……36…….. cm^2

Table 1 (a)

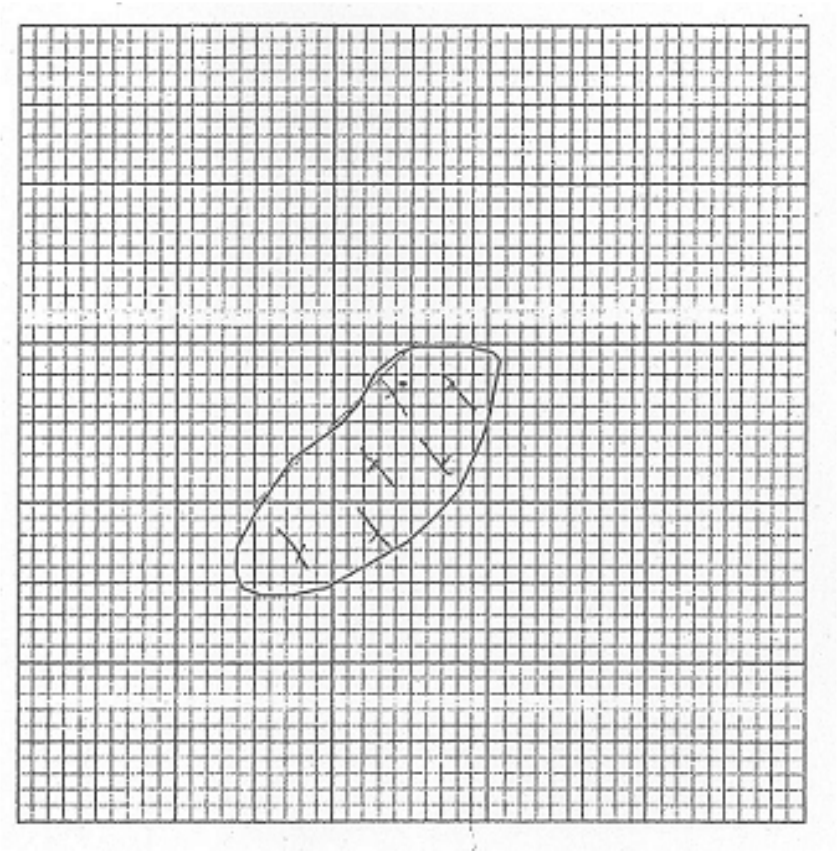
Grid	Total surface area covered by *Pleucoccus* sp.
Y	 ……5.5…….. cm^2

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).

For examiner's use

[3 marks] 1(a)

b) (i) State two different observations made from the diagrams in Table 1 (a) and Table 1 (b)

Observation 1:

The total surface area covered by Pleurococcus sp. in Grid X is $36cm^2$

Observation 2:

The total surface area covered by Pleurococcus sp. is 5.5 cm^2 in Gris Y

1(b)(i)

[3 marks]

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

Inference from observation 1:

Pleurococcus sp in Grid X receives more light intensity

……

Inference from observation 2 :

Pleurococcus sp Grid Y receives less light intensity

1(b)(ii)

[3 marks]

For Examiner's Use

(c) Complete Table 2 based on this experiment.

Variable	Method to handle the variable
Manipulated variable Position of the grid ……	Place Grid X facing East and Grid Y facing South
Responding variable Total surface area covered by *Pleurococcus sp* ……	Measured the total surface area covered by *Pleurococcus sp* by using grid
Controlled variable Type of plant …… ……	The experiment is carried out on the same tree throughout the two experiment

TABLE 2

[3 marks]

1(c)

(d) State the hypothesis is for this experiment.

The higher the light intensity towards the plant the higher the population distribution *Pleurococcus sp.* the larger the

……

[3 marks]

1(d)

For Examiner's Use

(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
- Potion of the grid
- Total surface area covered by *Pleucococcus* sp.

Grid	Total surface area covered by pleurococcus sp
X	36
Y	5.5

1(e)(i)

[3marks]

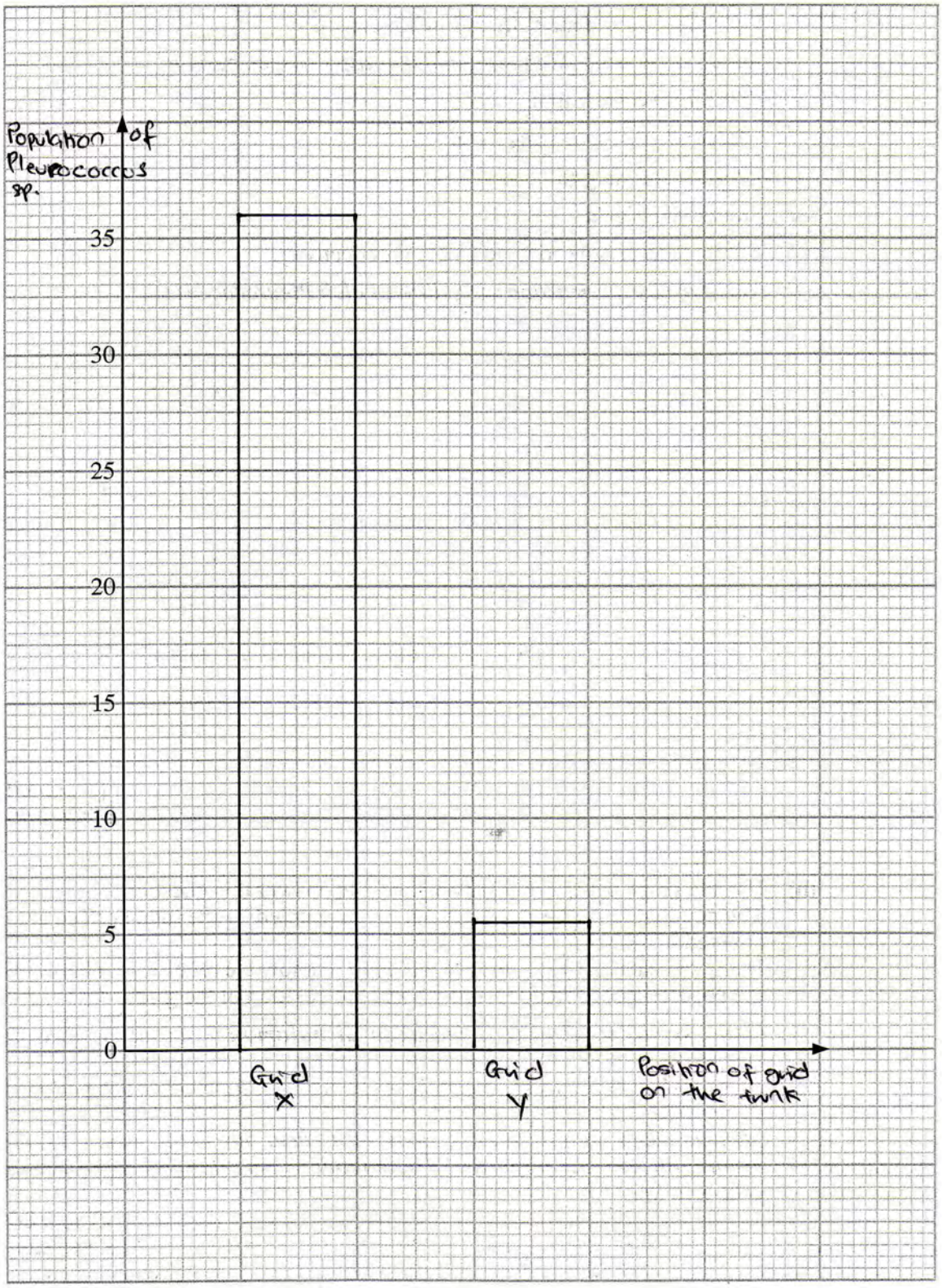
(e) (ii) Use the graph paper provided on the page 8 to answer this question.
The population of *Pleucococcus* sp is represented by the total surface area covered in the grid.

Using the data in 1(e)(i) , draw a bar chat 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



(f) Based on the bar chat in 1(e)(ii), explain the relationship between the population distribution of pleurococcus sp and the light intensity.

The population distribution of Pleurococcus sp in Grid X is higher because it receive more intensity increase.

[3 marks]

For Examiner's Use

1(f)

(g) State the operational definition for population distribution of *Pleurococcus* sp. *Hydrilla sp*. Explain your prediction.

Total surface area covered by Pleurococcus sp. add it can measured by using graph paper.

[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.

The total surface area will increase . This is because the Pleurococcus sp get more light intensity.

……..……..

[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
Fish Water –lily Snail Soil	Humidity Temperature pH paper

Table 2

[3 marks]

For Examiner's Use

1(i)

Total

SAMPLE ANSWER PAPER 3 QUESTION 1 (POTENSIAL STUDENT'S)

1. *Pleurococus*. *Sp* is a unicellular green alga found on the bark of trees. The population distribution of *Pleurococus*. *Sp* is affected by abiotic factors such as light intensity. Agroup of students carried out an experiment to investigate the effect of light intensity on the population distribution of *Pleurococus*. *Sp*.

   Diagram 1 shows a tree plant trunk on which *Pleurococus*. *Sp* was growing.

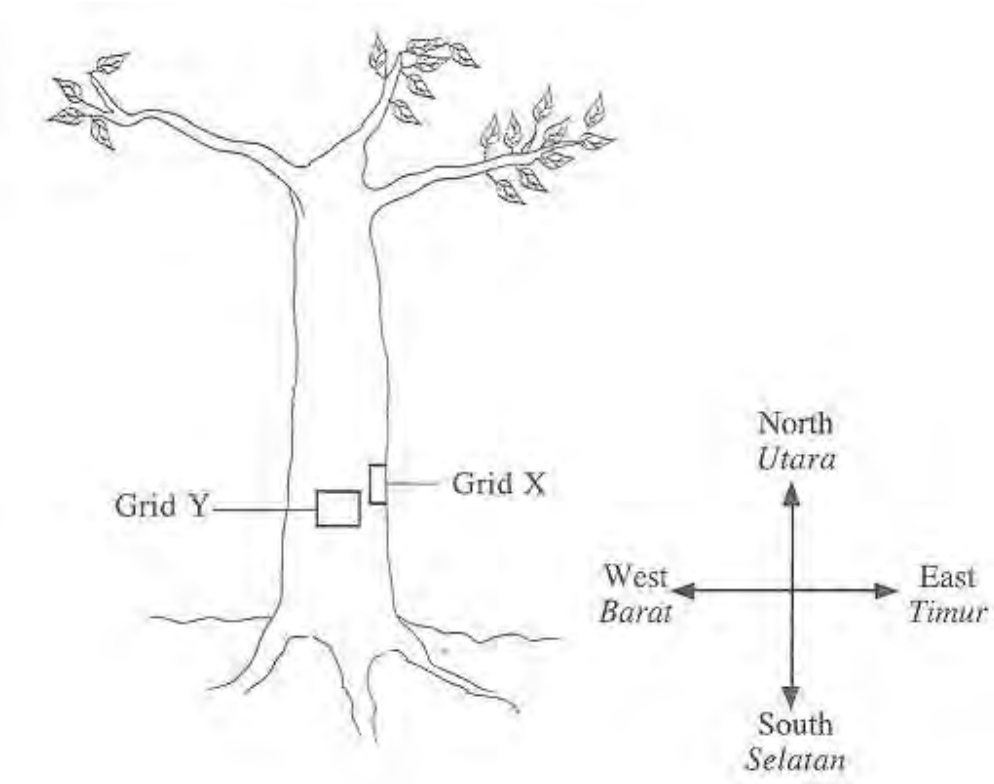


Diagram 1

Two samples of the distribution of *Pleurococus*. *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 *Pleucoccus* sp. on Grid X and Grid Y.

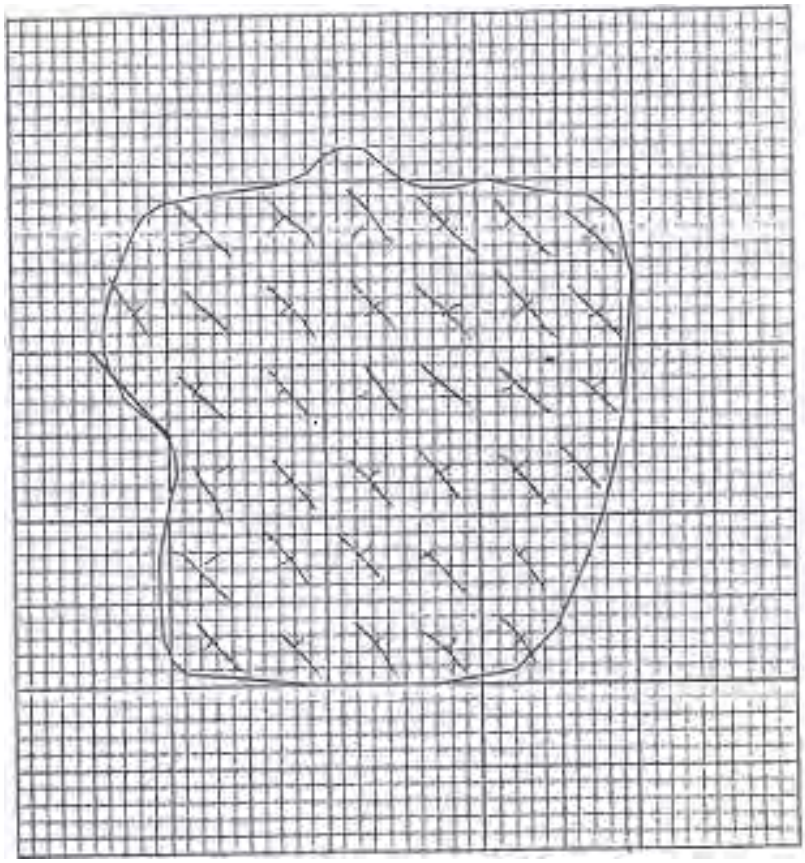
Grid	Total surface area covered by *Pleucoccus* sp.
X	 ……31…….. cm^2

Table 1 (a)

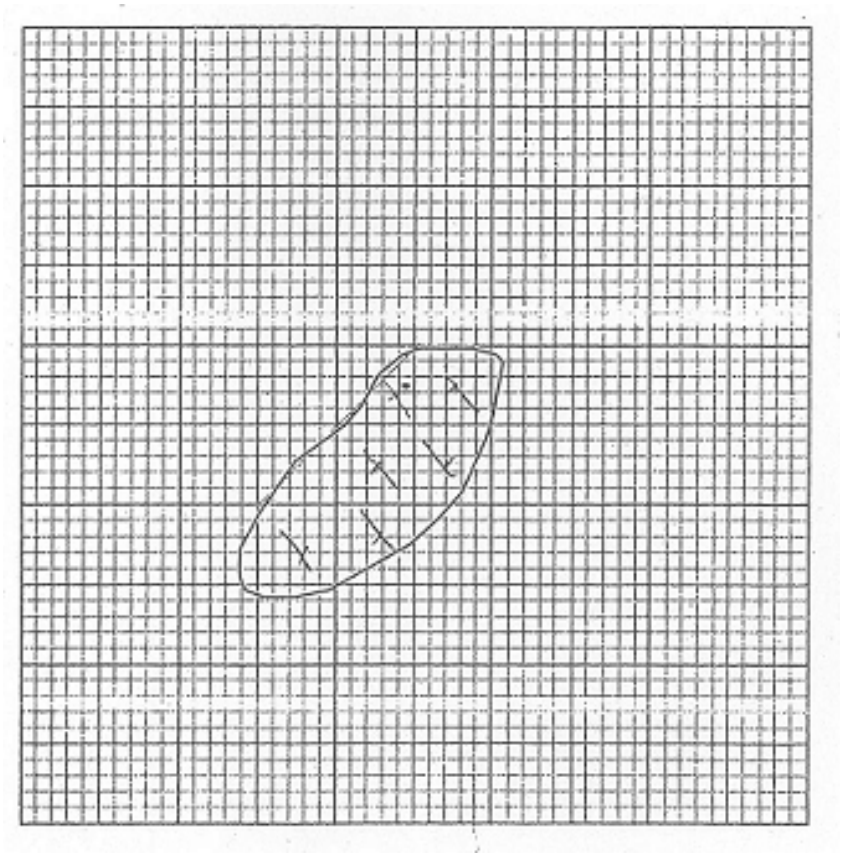
Grid	Total surface area covered by *Pleucoccus* sp.
Y	 ……4.5…….. cm^2

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).

For examiner's use

[3 marks] 1(a)

b) (i) State two different observations made from the diagrams in Table 1 (a) and Table 1 (b)

Observation 1:

The total surface area covered by Pleurococcus sp. in Grid X is higher than in Grid Y

Observation 2:

The total surface area covered by Pleurococcus sp. in Grid Y is lesser than in Grid X

1(b)(i)

[3 marks]

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

Inference from observation 1:

Pleurococcus sp in Grid X receives more light intensity

……

Inference from observation 2 :

Pleurococcus sp Grid Y receives less light intensity

1(b)(ii)

[3 marks]

For Examiner's Use

(c) Complete Table 2 based on this experiment.

Variable	Method to handle the variable
Manipulated variable Position of the grid ……	Place Grid X facing East and Grid Y facing South
Responding variable Total surface area covered by *Pleurococcus sp* ……	Calculate the total surface area covered by *Pleurococcus sp* by using quadrate sampling technique
Controlled variable Place of experiment …… ……	By using the same tree for experiment to get some temperature of surrounding

TABLE 2

[3 marks]

1(c)

(d) State the hypothesis is for this experiment.

Total Surface area of *Pleurococcus sp.* in Grid X is the larger than in Grid Y

……

[3 marks]

1(d)

For Examiner's Use

(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
- Potion of the grid
- Total surface area covered by *Pleucococcus* sp.

Grid	Total surface area covered by Pleurococcus sp
X	31
Y	4.5

1(e)(i)

[3marks]

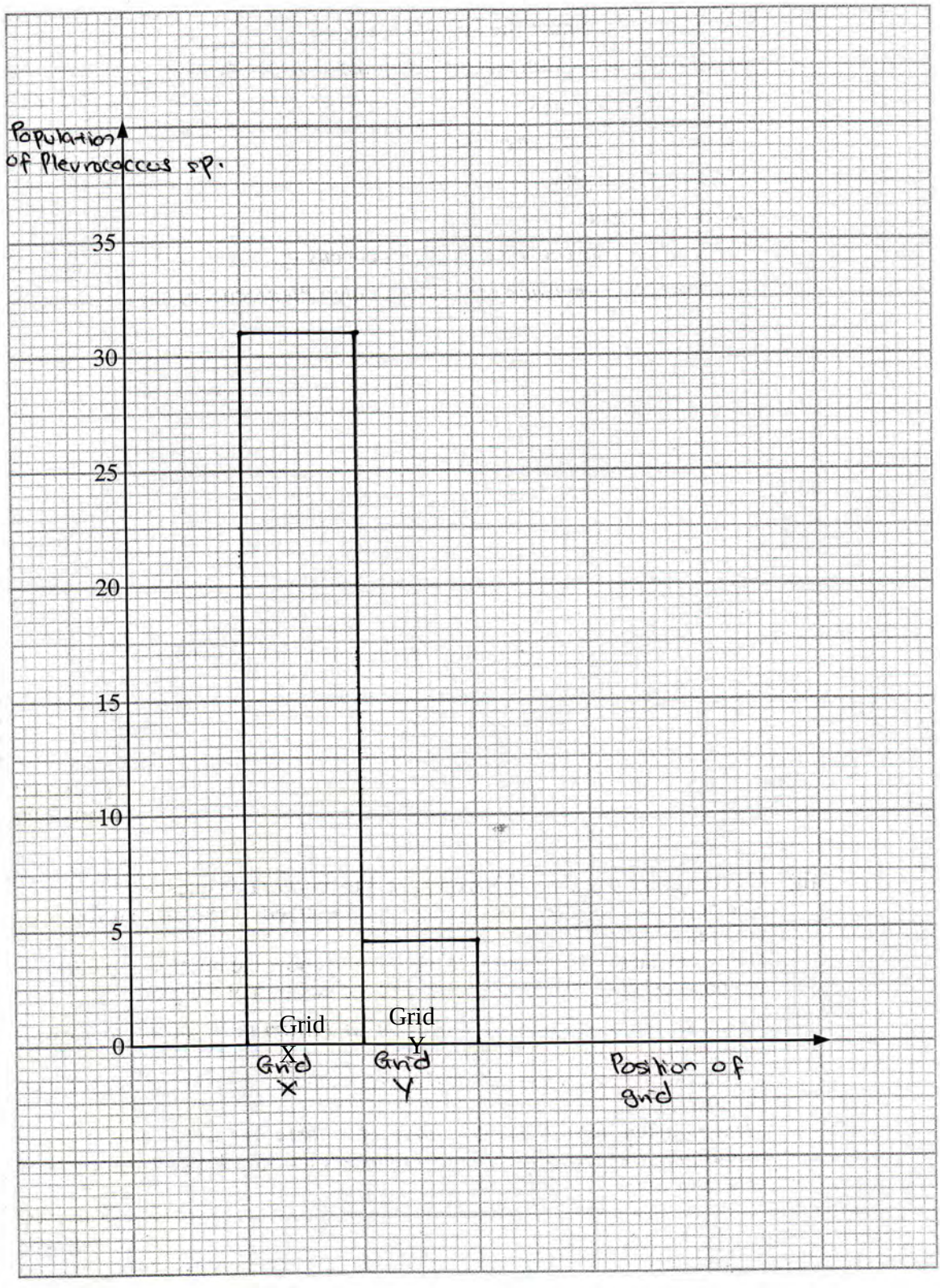
(e) (ii) Use the graph paper provided on the page 8 to answer this question.
The population of *Pleucococcus* sp is represented by the total surface area covered in the grid.

Using the data in 1(e)(i) , draw a bar chat 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



(f) Based on the bar chat in 1(e)(ii), explain the relationship between the population distribution of *Pleurococcus sp* and the light intensity.

The population distribution of *Pleurococcus sp* in Grid X is higher because it receive more intensity increase.

[3 marks]

For Examiner's Use

1(f)

(g) State the operational definition for population distribution of *Pleurococcus* sp. *Hydrilla sp*. Explain your prediction.

Population distribution Pleurococcus sp. is affected by light intensity, temperature and humidity. High light intensity will increase the population distribution of Pleurococcus sp and increase the rate of photosynthesis.

[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.

The total surface area will increase . This is because the Pleurococcus sp get direct sunlight.

……..……..

[3 marks]

1(h)

For Examiner's Use

(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
Fish Water –lily Snail Soil	Humidity Temperature pH paper

Table 2

1(i)

[3 marks]

Total

EXAMPLE ANSWER (QUESTION 2)

A semipermeable membrane is defined as a membrane that allows certain molecules to diffuse through it but does not allow the diffusion of other molecules. The diffusion of molecules through a semipermeable membrane depends on the size of the molecules.

Based on the above information, plan a laboratory experiment to study the size of molecules that can diffuse through a semipermeable membrane.

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]

(EXERCELLENCE STUDENT'S ANSWER)

Objective of investigation:
To study the size of molecules that can diffuse through a semipermeable membrane

Problem statement :
What is the size of molecules that can diffuse through a semipermeable membrane?

Hypothesis :
Only the molecules which its size is smaller than the pore in a semipermeable membrane can diffuse through the semipermeable membrane , molecule with its size large than pore in semipermeable membrane are unable to diffuse through.

Variables :
Manipulated variable : molecules with different sizes
Responding variable : ability of the molecules of different sizes to diffuse through a semipermeable membrane
Fix variable : type of semipermeable membrane

Materials and apparatus:
Iodine solution, 0.5% glucose solution, 0.5% starch suspension, Benedict solution, distilled water, thread, visking tubing, 1000cm^3 beaker, Bunsen burner, test tube holder, dropper, measuring cylinder.

Technique :
Test and record the color change when test the content of solution inside and outside visking tubing with iodine and Benedict solution after 30 minutes.

Procedure :

1. A visking tubing is cut and soaked with water for 10 minutes.
2. Then, end of the visking tubing is tied as tight as possible to avoid leakage

3. The visking tubing is filled with 20ml of 0.5% glucose solution and 0.5% starch suspension.
4. A few drops of solution in the visking tubing is taken out using a dropper
5. Then the other end of the visking tubing is also tied tightly
6. The visking tubing is totally immersed into the beaker containing distilled water.
7. The apparatus is left aside for 30minutes.
8. After 30 minutes the visking tubing is taken out from the beaker.
9. Iodine test and Benedict test is done in both the solution in the beaker and the solution in visking tubing.
10. The observation are recorded and tabulated

Presentation of data :

Solution in	Change color when test with	
	Benedict solution	Iodine solution
Beaker		
Visking tubing		

Conclusion:

The hypothesis is accepted. Only the smaller size of molecules able to diffuse through semipermeable membrane and the larger molecules unable to diffuse through it.

(MODERATE STUDENT'S ANSWER)

Objective of investigation:
To study the effect of size of molecules on the diffusion through a semipermeable membrane

Problem statement :
Does all the size of molecules can diffuse through a semipermeable membrane?

Hypothesis :
Smaller molecules such as water can diffuse through a semipermeable membrane.

Variables :
Manipulated variable : Type of solution
Responding variable : The present of particular molecules in distilled water
Fix variable : Volume of solution used

Materials and apparatus:
Iodine solution, 0.5% glucose solution, 0.5% starch suspension, Benedict solution, distilled water, thread, visking tubing, beaker,

Technique :
Observe and record the change of colour in the 20% glucose solution inside the visking tubing after one hour

Procedure :

1. The beaker is half filled with water of 30^0C
2. A visking tube is filled with 20ml of starch suspension
3. The visking tube is immersed in the water bath for 30 minutes.
4. After 30 minutes, the visking tubing is taken out from the water bath
5. The water in the beaker is separated into 2 test tube.
6. One of the test tube is dropped with iodine solution using dropper. The changes is observed.

7. The other test tube is added with Benedict solution and was boiled in a water bath for 20 minutes. The changes is observed and recorded
8. Step 1-7 is repeated using glucose solution replacing the starch solution.

Presentation of data :

Solution in	Change color when test with	
Beaker		
Visking tubing		

Conclusion:

Smaller molecules such as water can diffuse through a semipermeable membrane.

(POTENSIAL STUDENT'S ANSWER)

Objective of investigation:
To investigate the size of molecules can diffusion through a semipermeable membrane

Problem statement :
Does the bigger size of molecules diffuse through a semipermeable membrane

Hypothesis :
Starch molecule can't diffuse through a semepermeable membrane .

Variables :
Manipulated variable : Type of solution
Responding variable : The color changes to the iodine solution
Fix variable : Volume of starch suspension and glucose solution

Apparatus :
visking tubing, beaker, measuring cylinder.

Materials:
Iodine solution, starch suspension, glucose solution

Technique :
The result are observed and the data is recorded

Procedure :

1. 50 ml of starch suspension is measured using a measuring cylinder
2. The starch solution is poured in the iodine solution
3. Then the visking tubing is placed in the iodine solution
4. After an hour the observation are made and recorded into a table
5. Steps 1 to 5 are repeated but replacing starch solution with 50ml of glucose solution.

Presentation of data :

Type of solution	Observation
Starch solution	
Glucose solution	

Conclusion:

As starch is a bigger molecule compared to glucose, starch can't pass through a semipermeable membrane. Hypothesis is accepted.

EXAMPLE STUDENT'S ANSWER (PAPER 2 – SPM 2008)

Section A

[60 marks]

Answer **all** questions in this section

1 Diagram 1.1 shows part of the stage of meiosis cell division in an animal cell. The chromosome behavior in stage S is not known.

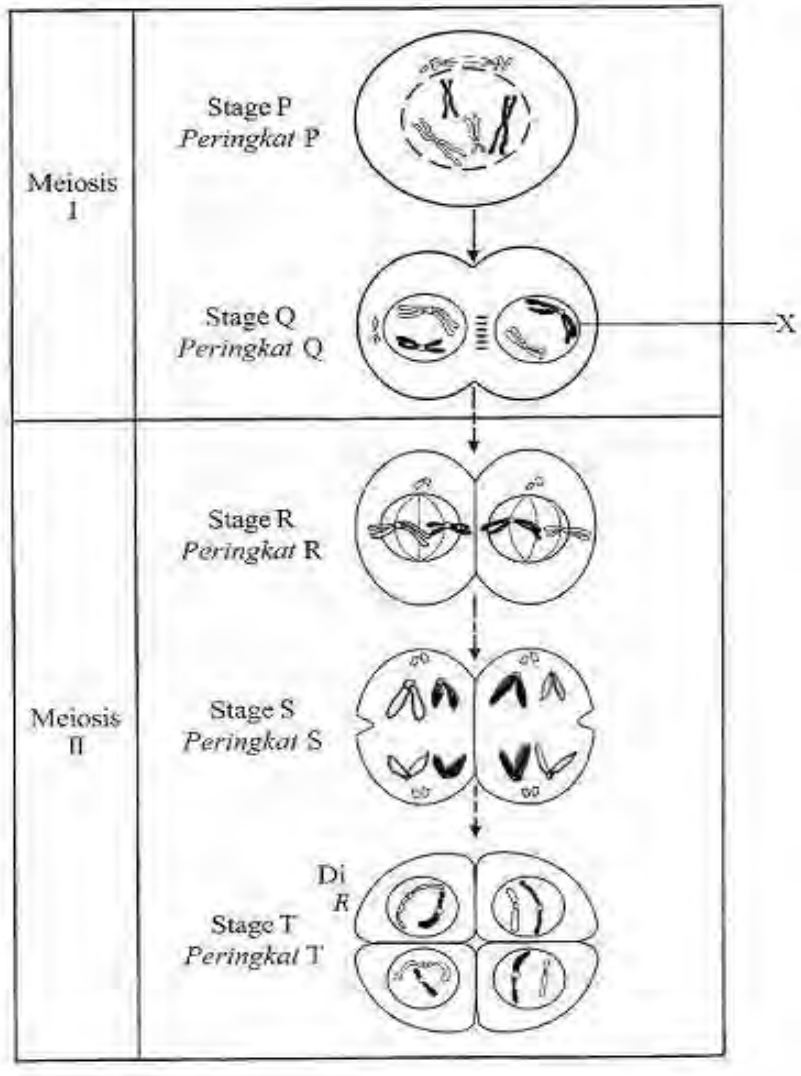


Diagram 1.1

(a) Name the structure labeled X

Chromatid [1 mark]

(b) (i) In Diagram 1.1 complete the diagram in stage S to show chromosome behavior. [1 mark]

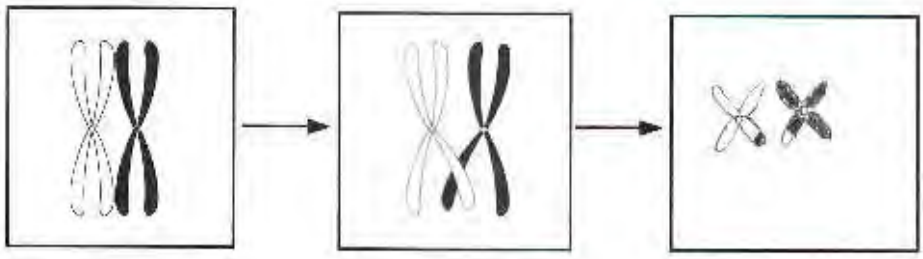
(ii) State one of the changes which occurs in stage S

The chromosome are divided into chromatid

……

[1 mark]

(c) Diagram 1.2 shows process Y which takes place in stage P



Beginning Of process Y End of process Y

Diagram 1.2

(i) In Diagram 1.2, draw a diagram showing the appearance of the chromosome at the end of process Y

[1 mark]

(ii) Name the process Y

Chiasma

[1 marks]

(iii) State one importance of process Y to an organism.

It cause variation to the organism

……

[1 marks]

(d) Diagram 1.3 shows skin cells. Cells X are cancerous cells which are formed after the normal cells are exposed to factor W.

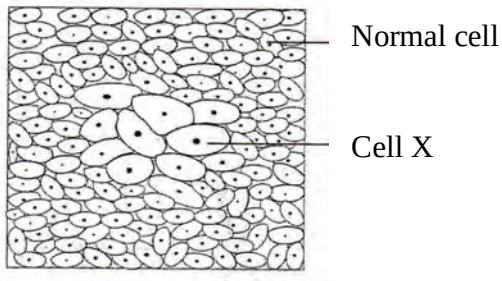


Diagram 1.3

(i) Give two examples of factor W.

1. Radioactive X - ray
2. Ultra-violet ray

[2 marks]

(ii) Explain the formation of cells X.

Factor W will cause mutation to DNA of the cell. It will change the genetic sequence and causing a change in the chemical reaction in our body. The cell is mutated will grow rapidly by mitosis.

[1 marks]

(ii) State two ways to prevent the development of cells X.

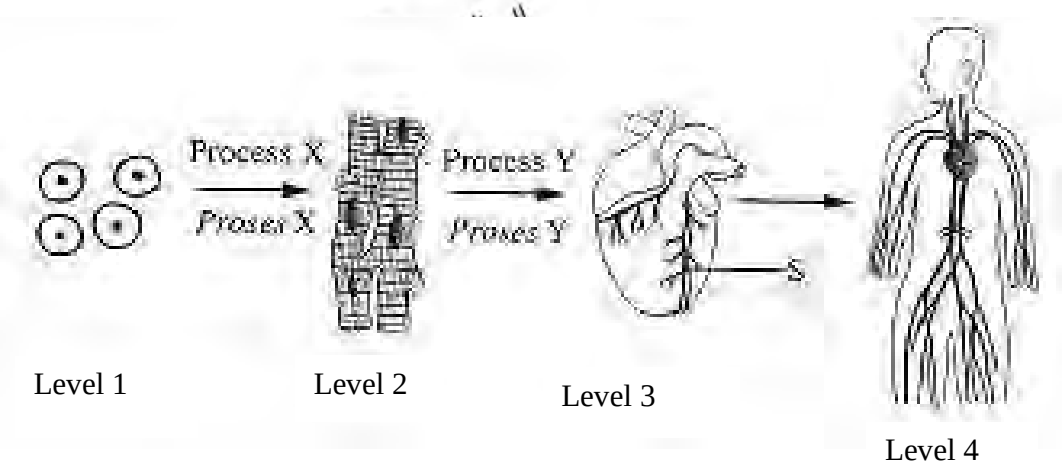
1 Kill all the cancerous cell by radiation treatment

.....

2 Avoid being exposed to excessive sunlight and radioactive substances

[2 marks]

2. Diagram 2 shows four levels of cell organization in humans.



(a) Complete Table 2 by naming Level 2 and Level 3

Level	Name
1	Cell
2	Tissues
3	Organs
4	System

Table 2

[2 marks]

(b) (i) The cell undergo process X to become specific cells that perform a specific function.

Name the process X.

Cell organisation

[1 mark]

(ii) What is the function of the structure in level 2?

Form the muscle of the heart so that the heart can pump the blood simultaneously.

[1 mark]

(iii) The structure in level 4 is one of the body systems.

Name this system.

Blood circulatory system.

[1 mark]

(iv) State **one** function of the system in 2(b)(iii).

To pump oxygen and nutrients to the body cells.

[1 mark]

(c) (i) Name and explain the condition which can cause a blockage in blood vessel S.

Name :

Thrombosis

Explanation:

The cholesterol from food eaten cause the blockage of blood vessel. The cholesterol deposited on the wall of vessel. The blood cannot flow through the blocked vessels cause hypertension.

[3 marks]

(ii) A person is suffering from the condition in 2 (c)(i).

State three effects on the person's health.

1 The person will suffers angina

2 If the artery leads to brain, the person will suffer stroke

3 Cancer

4 Heart attack

[3 marks]

3. Diagram 3.1 shows the inheritance of fur colour in rabbits.

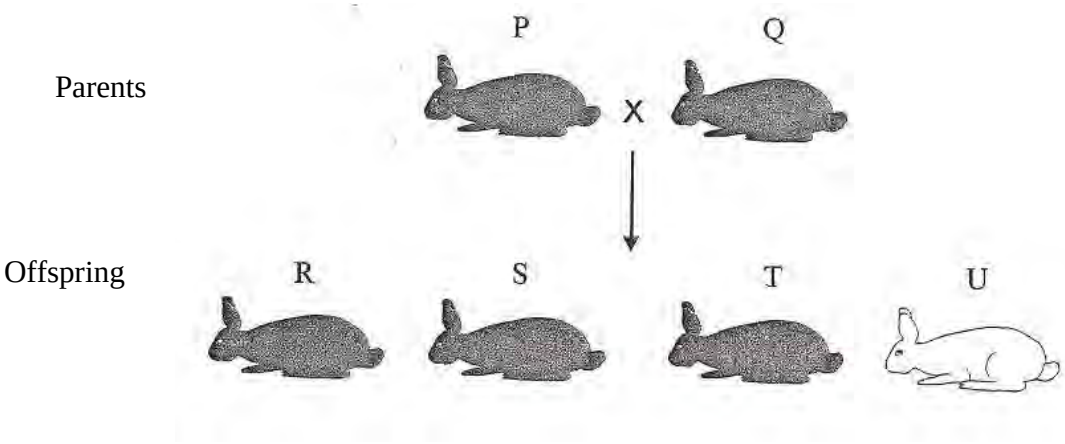


Diagram 3.1

(a) State the genotype and phenotype of rabbit P

Genotype : Bb

Phenotype : Black fur [2 marks]

(b) B represents the dominant allele for black fur while b represents the recessive allele for white fur.

(i) Explain why B and b are called allele.

B and b are called alleles as they are will determine the characteristics of the offspring and are from the paternal and maternal origin 2 of each are of the maternal and paternal origin

[2 marks]

(ii) What happens to allele B and b during the formation of gametes?

Separate or segregate and form gametes. Each gamete only receives one of the pair of allele [1 mark]

(c) Diagram3.2 shows a cross between offspring R and offspring S. R is heterozygous for fur colour.

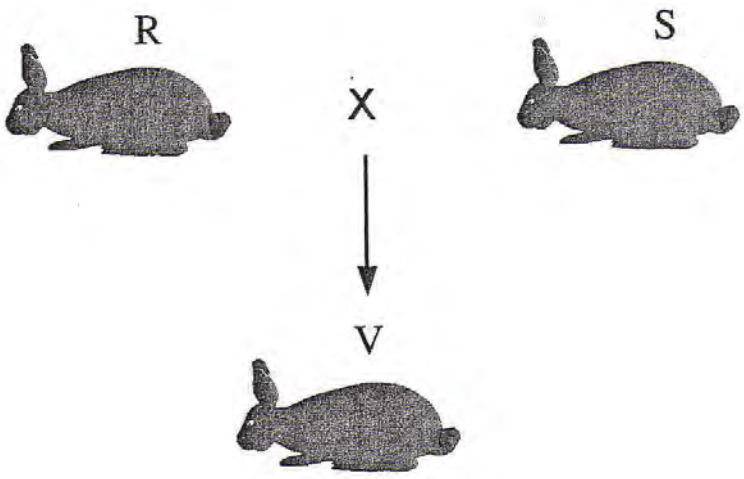


Diagram 3.2

(i) What are the possible genotypes of S?

BB

[1mark]

(ii) Explain the inheritance of fur colour by rabbit V.

Rabbit R has genotype of Bb while rabbit S has genotype of BB. When the gametes are randomly fertilized, rabbit V will have a genotype of BB or Bb. In both these genotype, the black colour is dominant to the white colour of the fur.

[2 marks]

(d) Diagram 3.3 shows offspring R is crossed with offspring U.

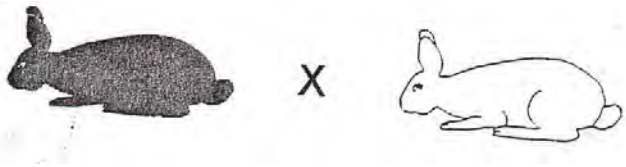
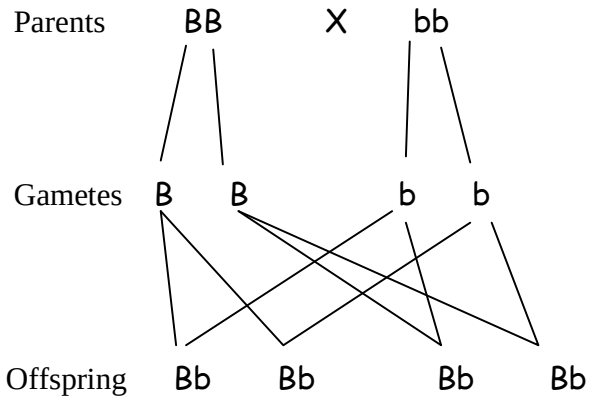


Diagram 3.3

(i) Draw a schematic diagram to show the product of this cross.



[3 marks]

(ii) What is the probability of producing with black fur in 3(d)(i) ?

1 :1 or 100%

[1mark]

4. Diagram 4 shows two types of twins

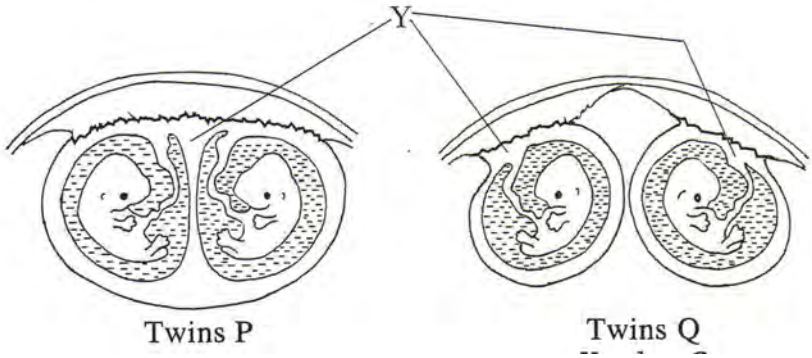


Diagram 4

(a) (i) Name the type of twins Q

Fraternal twins.

[1 mark]

(ii) Explain how twins Q are formed

Two sperms will undergoes fertilization process with two ovum and produces two zygotes .

[2 mark]

(b) (i) Name the structure Y.

Placenta.

[1 mark]

(ii) State **two** functions of structure Y.

1 To provide nutrients to the baby such as glucose.

2 To separate the blood circulatory system of the baby and mother.

[2 mark]

(c) State two differences between twins P and twins Q.

1. Twins P share their placenta whereas twins Q has their own placenta.

2. Twins P has same sex

[2 mark]

(d) Twins P are brought up by two different adopted families. The twins do not have the same body size when they are adult.

Explain why.

Because they are control by environmental factor. The both twins are not same in an insufficient of intake food or practicing regular exercise..

[2 mark]

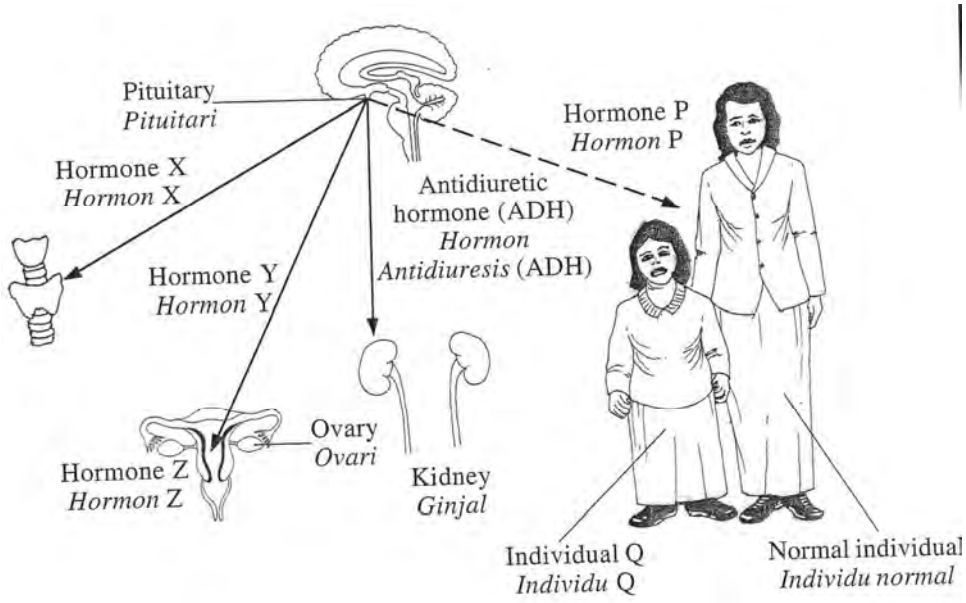
(e) A woman who is a heavy smoker become pregnant.

Explain why she should stop smoking.

Smoke which contain tobacco tar, nicotine will affect the baby. This substances are very small and can easily diffuse through the placenta.

[2 mark]

5. Diagram 5 shows the role of the pituitary gland as a 'master gland'.
Hormone Y is responsible for the development of a follicle in the ovary.



Key :

——→ organ affected by hormone

- - - - - - → general effect of hormone

(a) (i) Name hormone X

Thyroid stimulating hormone (TSH)

[1 mark]

(ii) State the function of hormone X.

Needed for growth

[1 mark]

(b) Hormone Y stimulates the development of a Graffian follicle in the ovary and sperm in the testis.

Name hormone Y.

Follicle stimulating hormone

[1 mark]

(c) The presence of hormone Y causes the secretion of hormone Z.

Hormone Z affects the development of the uterus.

(i) Name hormone Z.

Oestrogen

[1 mark]

(ii) State the role of hormone Z in the development of the uterus.

To repair endometrium lining

[1 mark]

(d) (i) Name hormone P

Growth hormone

[1 mark]

(ii) Explain how hormone P is responsible for the physical appearance of individual Q in Diagram 5.

Less production of hormone P, cause growth are slow.

[2 mark]

(e) (i) State the circumstances in which more ADH is secreted, as shown in Diagram 5.

More ADH secreted when blood osmotic pressure will increase

[1 mark]

(ii) Explain the role of ADH in producing less and concentrated urine.

ADH will stimulate the kidney to reabsorb more water into the body thus producing less and more concentrated urine.

[2 mark]

(f) Give **one** reason why pituitary gland is considered ad the 'master gland'

It control the other glands and signals other glands whether to secrete hormone or not.

[1 mark]

SECTION B (SAMPLE STUDENT'S ANSWER)

QUESTION 6

(a) When water is low, osmotic pressure is high. Water will diffuse into X. Water diffuse from high concentration to low concentration region. Water diffuse into X by osmosis.

(b) The similarities between facilitated diffusion and active transport is that both involve the protein structure such as carrier protein. Both involves the binding of molecules. The binding site of carrier protein which then changes shape to transport the molecules. Both transport useful molecules to and from cell for cellular activity.

The differences between facilitated diffusion and active transport are facilitated diffusion involves movement of molecules down the concentration gradient but in active transport it is against the concentration from low concentration to higher concentration.

Active transport requires energy in the form of ATP to carry the molecule. In facilitated diffusion, molecules such as sodium ion and potassium ions are involve. Pore protein are only required in facilitated diffusion but not in active transport.

(c) In diagram 6.2 the salt solution used is more hypertonic compare to the cytoplasm of the cell of fish. Thus water from the fish diffused out by osmosis through the semipermeble membrane into the salt solution. the cell of fish is plasmolyse. Thus, with not much water in the cells of fish the bacterial growth is inhibited. The fish is preserved and last longer.

QUESTION 7

(a) (i) When there is a cut on the skin, the blood vessel is damage and form a wound. The fibres is expose to blood. Hence, platelet will help of vitamin K and calcium ion produce a blood clothing factor of plasma protein call thromboplastin. The thromboplastin is then the inactive plasma protein which is called protrombin to active plasma protein which is called thrombin. Then thrombin will acts as an enzyme to convert the soluble protein, fibrinogen to insoluble protein, fibrin. Then fibrin will form a stiky networt around the wound. There is blood clothing occurs. The blood would stop bleeding.

(ii) The man has a low number of erythrocytes. The function of erythrocytes is to carried oxygen to all part of body. The lack of erythrocyte cause the man to have anemia. He feel tired easily because oxygen is not transported to the muscle cells. Besides that, he fainted easily because oxygen is insufficient in the brain. He will feel dizzy occasionally. In several case, it causes death when the brain is out of oxygen or the supply of oxygen to the heart is cut off. He should included spinach, milk and liver in his diet. These food contain high value of iron. Iron is needed to produce heamoglobin in the erythrocytes.

(b) (i) Organism S – fish
Organism T – human

(ii) The differences between blood circulatory system in organism T and organism S is that the blood flow through the heart twice in organism T but only flow once in organism S. The heart for organism T consists of four chambers whereas the heart for organism S only consist of two chambers.

There are similarities between them. Firstly both blood circulatory system are closed system. Blood flow in blood vessels.

QUESTION 8

(a) (i) The undigested food will enter into the colon that is large intestine. The undigested food will accumulate in the colon with present of vitamin B_{12}. All undigested substances such as water, fiber, will accumulate in colon. Those undigested substances will move with peristalsis until it reach at rectum. Then, a large number of those substances will produces pressure to be out of the body.

(ii) Protein is needed for the growth of the child and also for the replacement of new cell in the body. Protein also important for build strong muscle and bone and teeth. If insufficient of protein, the child may get kwashiorkor. This condition will make the stomach of the child swell and become very big. Insufficient of protein also will slow the growth of the child. The child also will have make bone and teeth. The cell can't be growth and the child will become thin and has low metabolism.

For insufficient of carbohydrate, the child may become weak due to insufficient of energy supply. Carbohydrate supply energy for the child doing daily activities. Insufficient of carbohydrate will make the child become thin and small and weak.

For insufficient of fibre, the child may be suffer for absorption in by period of time. For insufficient of vitamin, the child may lack of nutrients to help the body to do daily activity. Lack of vitamin A, it can cause night blindness, vitamin D can cause rickets

(b) (i) The value of energy is 8230kJ. The food he take did not satisfy this daily energy activity.

(ii) The boy will be very tired as a teenager he must do various activity. He will feel tired as energy his consumed is less the actual energy requirement. Other than that his growth will be retarded as he do not have enough nutrient. Teenager need lot of nutrient as this is the time that a boy growth rate is higher. The boy will suffer constipation as there is not fibre in his diet. He consumed potato chip and sausage which are high containing mineral salt. This will cause hypertension and more seriously high blood pressure.

QUESTION 9

(a) (i) If the concentration levels of carbon dioxide are increasing, the solar radiation from sunlight will trap by carbon dioxide. The gases trap by carbon dioxide which is greenhouse gases will cause greenhouse effect because the heat is reflected back to the earth. Global warming is happen due to the greenhouse effect.

(ii) Forest burning will release carbon dioxide into the atmosphere. Global warming will be caused due to the rise in carbon dioxide level. Furthermore, forest is known as carbon dioxide sinkhole because they take in carbon dioxide during photosynthesis.

Forest burning also releases soot and causes haze. This can cause lung infection like bronchitis and irritant the eye. The vision of the surrounding will be reduced. The soot release affects the stomata of leave.

Forest burning also causes animals to lost their habitat. Flora and fauna will be extinct. Forest burning also releases sulphur dioxide into the atmosphere and will causes acid rain.

(b) Spreading fertilizers will increase the nutrient of soil and can increase the yield of crops. Spraying insecticides can kill pets and ensure a higher yield in production.

But when fertilizer are spread, rain water will wash the artificial nutrients into the river or lake. Those will cause eutrophication. . Aquatic life cannot be sustained because of the high BOD value. Spreading fertilizer also induce the growth of weeds.

Spraying insecticide on the crops will kill the pests, but after some time the pests will be resistant towards the insecticide. A stronger insecticide is then used. When spraying insecticide, poisonous gas is released into the air. The quality of air will be reduced.

MODULE – PAPER 1

1

Ribosome can be found freely in the cytoplasm or can be attached to Organelle Q.

Which of the following is organelle Q?

A. Cytoplasm
B. Mitochondria
C. Smooth Endoplasmic Reticulum
D. Rough Endoplasmic Reticulum

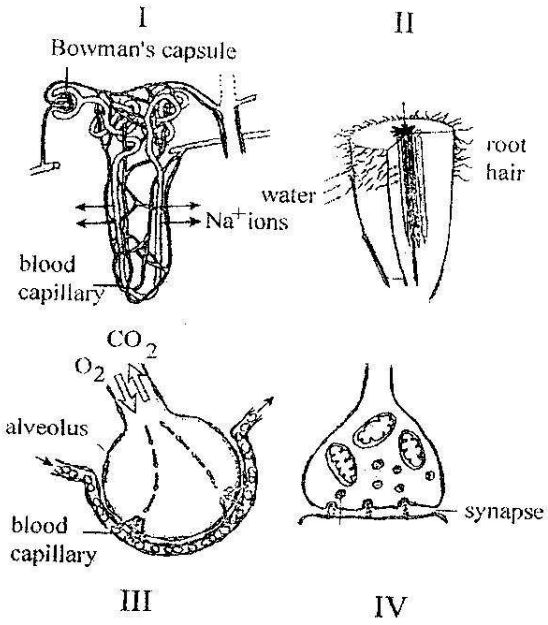
2

Cell	→	Tissue	→	Organ	→	System	→	Body
W		X		Y		Z		

The above shows the structural organisation of a cell. Which of the labels W, X, Y and Z represent the stomach?

A. W
B. X
C. Y

3 Which of the following shows passive transport?



A. I and II only
B. II and III only
C. I, II and III only
D. I, II, III and IV

4 Which of the following statements is true about active transport?

A. The net movement of molecule or ions from of higher concentration to a region of lower concentration.
B. The water molecules move from a region of higher concentration to a region of lower concentration across the plasma membrane.
C. The movement of molecules or ions from a region of higher concentration to a region of lower concentration across the plasma membrane that requires ATP.
D. The movement of molecules or ions from a region of lower concentration to a region of higher concentration across the plasma membrane that requires ATP.

5 Figure 1 shows the rates of three enzymatic action.

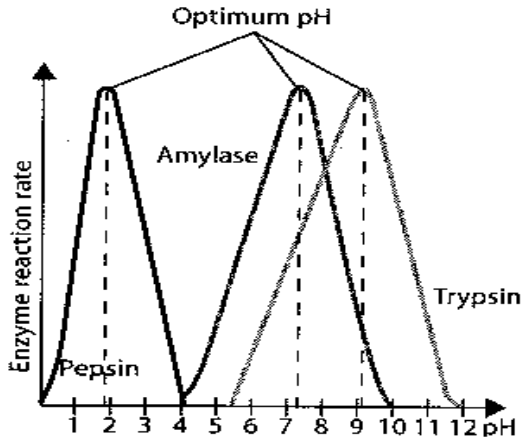


Figure 1

Which of the following best describe Figure 1?

A. All the enzymes have the same optimum pH.
B. Different enzymes have different optimum pHs.
C. Different enzymes have different optimum temperatures.
D. An enzymatic reaction is specific.

6 Which of the following is not true about saturated fats and unsaturated fats?

A. Saturated fats contain less hydrogen atoms compared to unsaturated fats.
B. Saturated fats do not contain double bonds while unsaturated fats have at least one double bond.
C. Saturated fats contain more cholesterol compared to unsaturated fats.
D. Saturated fats are more likely to solidify at room temperature.

7 The figure 2 below how an enzyme works.

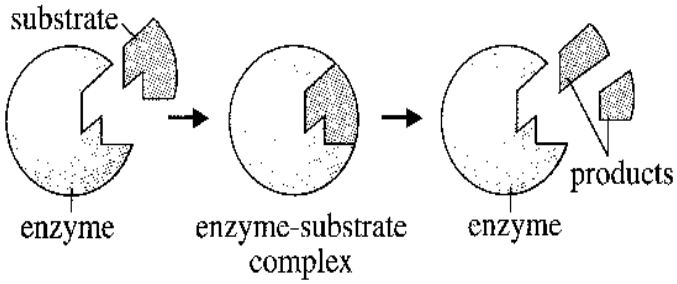


Figure 2

Which property of the enzyme is not shown in Figure 2?

A. An enzyme-catalysed reaction is specific.

B. The structure of the enzyme does not change at the end of a reaction.

C. The enzyme can be used to catalyse another similar substrate.

D. The enzyme is affected by substrate concentration.

8 The figure 3 below shows a cell cycle.

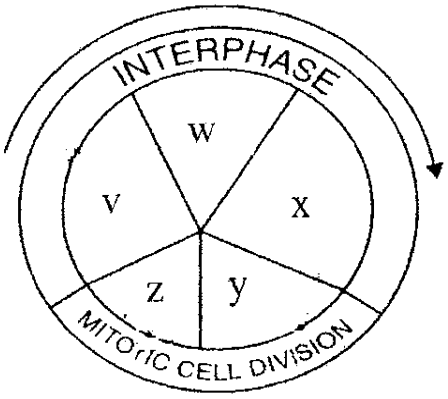


Figure 3

Which of the processes below occur during V?

A. Replication of DNA.

B. Replication of centrioles

C. Chromosomes condense and become shorter and thicker.

D. High metabolic rate and synthesis of proteins and cellular.

9 Figure 4 shows part of the digestive system of a rabbit.

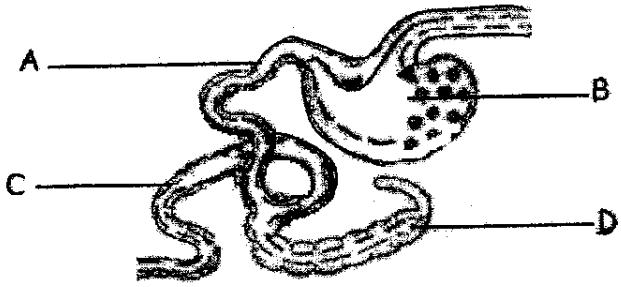


Figure 4

Which of the following A, B, C and D contains microbes that help cellulose digestion?

10 Figure 5 shows packes of processed milk.

Figure 5

The method of processing milk is meant to preserve the milk for a longer period. Name the process.

A. Refrigeration
B. Irradiation
C. Vacuum packaging
D. Ultra-high temperature processing

11 Figure 6 is a graph which shows the results from an experiment to investigate the factors affecting the rate of photosynthesis.

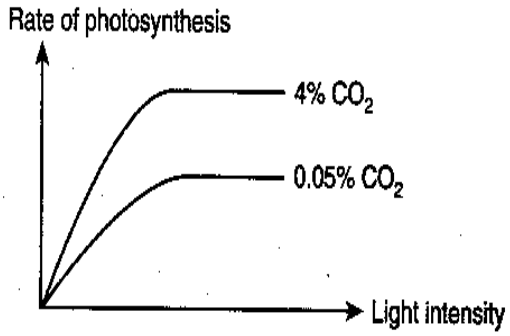


Figure 6

Which of the following combinations is true?

	Factor under investigation	**Limiting factor**
A	Light intensity	Concentration of carbon dioxide
B	Temperature	Light intensity
C	Concentration of carbon dioxide	Light intensity
D	Concentration of carbon dioxide	Temperature

12

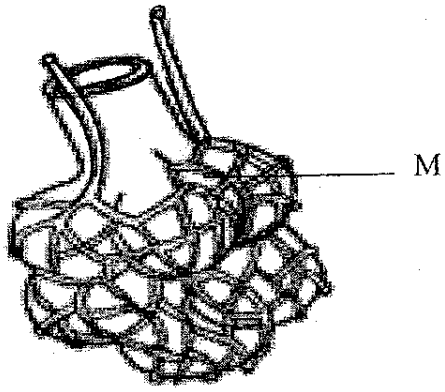


Figure 7

Which of the following is not true about structure M?

A. Has a thick wall
B. Has a rounded shape
C. Has moist surface
D. Has lots of blood capillaries

13 Which of the following are true about anaerobic respiration?

I During anaerobic respiration, only a small quantity of energy is release
II Organisms that respire anaerobically are known as anaerobes
III Anaerobic respiration occurs in cytoplasm
IV Oxygen is needed during anaerobic respiration

A. I, II and III only
B. I, III and IV only
C. II, III and IV only
D. I, II, III and IV

14 Figure 8 shows the interaction between two organisms.

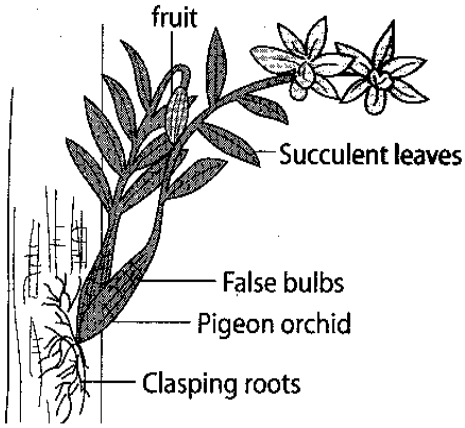


Figure 8

What are the benefits obtain by the pigeon orchid?

I Food
II Sunlight
III Protection
IV Support

A. I and III only
B. II and IV only
C. I, II and III only
D. I, II, III and IV

15 Figure 9 shows the distribution of mangroves.

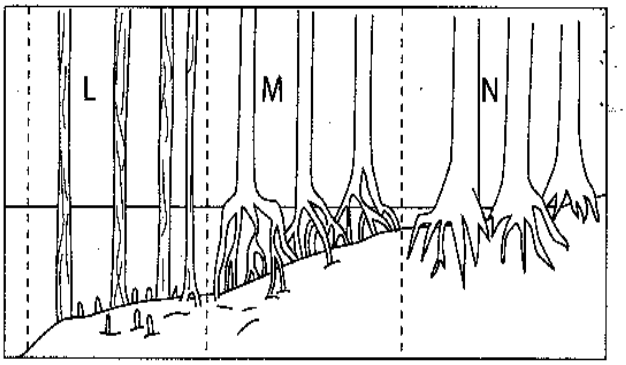


Figure 9

Which of the following is matched correctly?

	L	M	N
A	*Avicennia sp*	*Sonneratia sp*	*Rhizophora sp*
B	*Sonneratia sp*	*Rhizophora sp*	*Bruguiera sp*
C	*Rhizophora sp*	*Bruguiera sp*	*Sonneratia sp*
D	*Bruguiera sp*	*Sonneratia sp*	*Avicennia sp*

16 Which of the following refers to the phenomenon in which heat is reflected from the surface of the Earth and trapped in the atmosphere?

A. Ozone depletion
B. Greenhouse effect
C. Global warming
D. Increase in temperature

17

Besides genetic factors, a diet high in fats and low in fibre, lack of exercise, obesity and smoking contribute to the risk of cardiovascular disease.

Based on the statement above, which of the following helps to maintain a person's healthy cardiovascular system?

A. Quit smoking
B. Do less exercise
C. Eat excessive fatty food
D. Eat less fibre

18 Figure 10 shows water exudes from the specialpores at the edge of leaves.

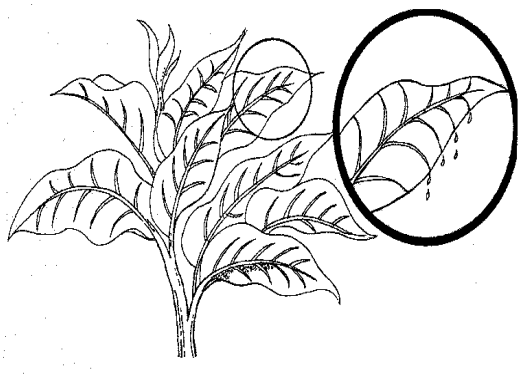


Figure 10

The process in which water exudes from the special pores at the edges of leaves is called ……..

A. guttation
B. Transpiration
C. Respiration
D. Root pressure

19 How does the earthworm's skeleton system help it to move?

A. By antagonistically contracting its myotomes muscles
B. By antagonistically contracting its biceps and triceps muscles
C. By antagonistically contracting its flexor and extensor muscles
D. By antagonistically contracting its longitudinal and circular muscles

20 Figure 11 shows the muscles of a grasshopper.

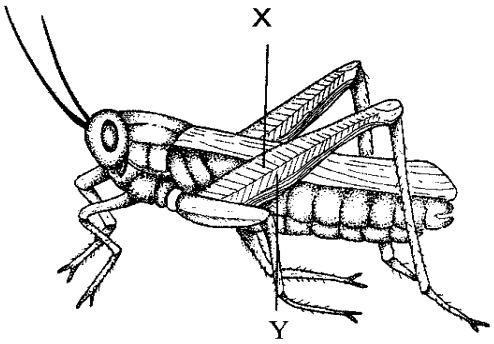


Figure 11

Name the muscles X and Y.

	X	Y
A	Flexor	Extensor
B	Extensor	Flexor
C	Biceps	Triceps
D	Triceps	Biseps

21 Figure 12 shows the organization of the human nervous system.

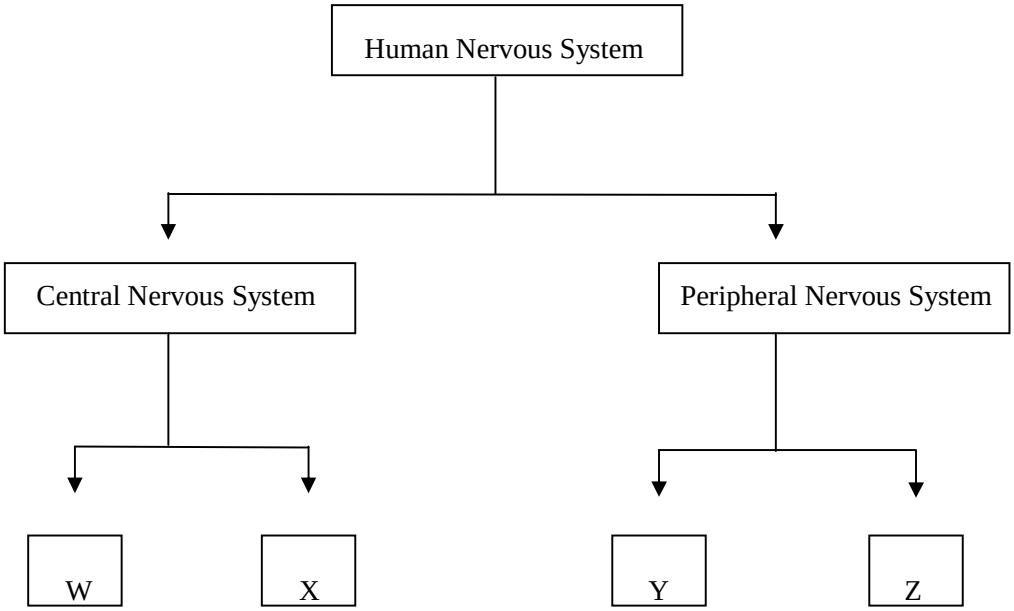


Figure 12

What is W, X, Y and Z?

	W	X	Y	Z
A	Cranial nerves	Brain	Spinal nerves	Spinal cord
B	Spinal cord	Spinal nerves	Cranial nerves	Brain
C	Brain	Spinal cord	Spinal nerves	Cranial nerves
D	Spinal nerves	Brain	Spinal cord	Cranial nerves

22 Figure 13 shows the process of producing an embryo sac.

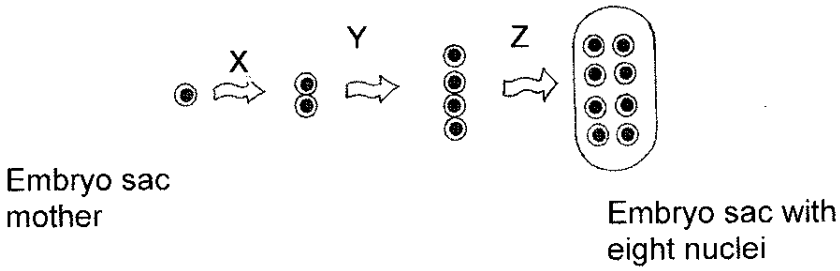


Figure 13

What type of cell division occurs at stages X, Y and Z?

	X	Y	Z
A	Meiosis I	Mitosis	Meiosis II
B	Mitosis	Mitosis	Meiosis I
C	Mitosis	Meiosis I	Meiosis II
D	Meiosis I	Meiosis II	Mitosis

23 Figure 14 shows a cross section of a stem of dicotyledon plant. Which of the following parts A, B, C or D is responsible in increasing the diameter of the stem?

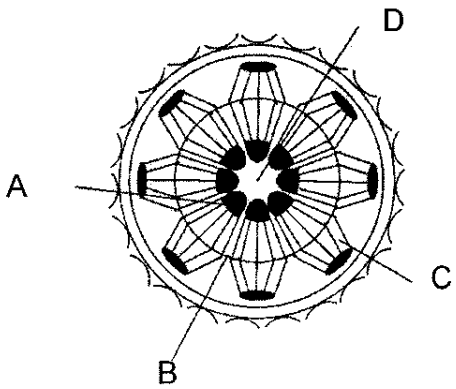


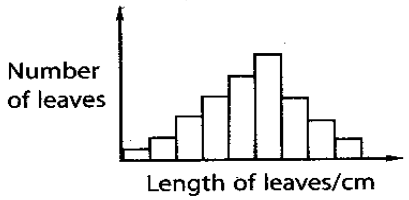
Figure 14

24 An allele is best described as …….

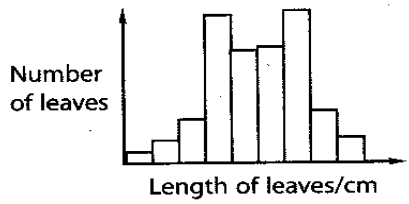
A. Genetic constituent of an organism
B. A basic unit of inheritance
C. Alternative form of a same gen
D. A distinctive inherited feature of an organism

25 Which of the following graphs shows the variation of leaves in a durian tree?

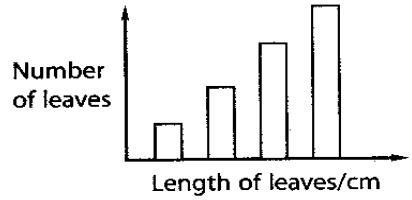
A



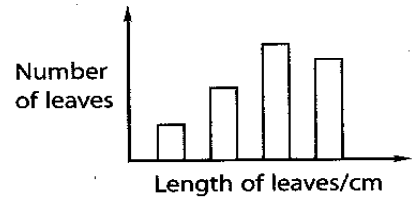
B



C



D



26 Figure 15 shows the process of synthesis and secretion of enzyme in a cell.

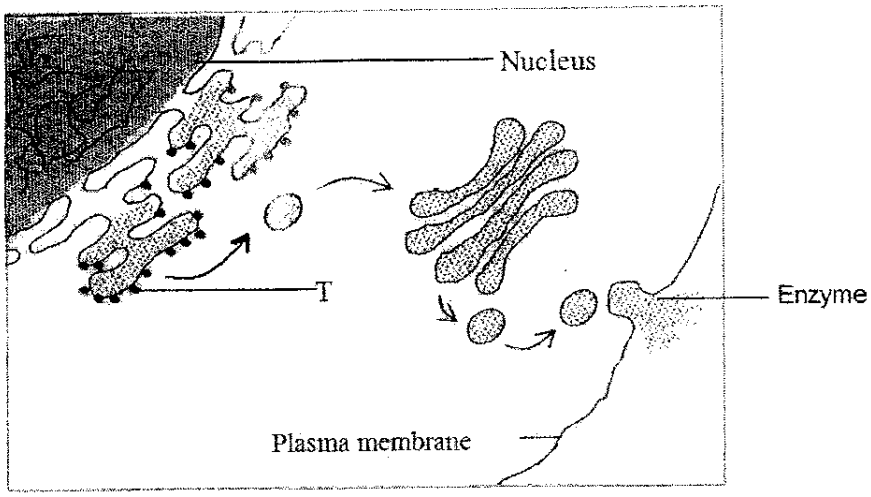
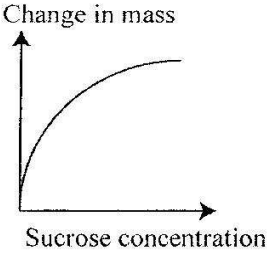


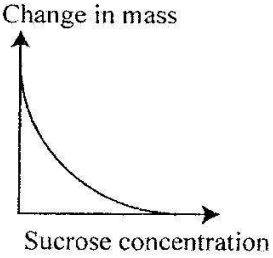
Figure 15

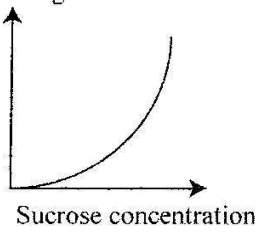
What will happen if organelle T is not present?

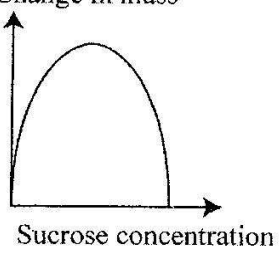
A. Energy cannot be generated
B. Enzyme cannot be synthesized
C. Protein synthesized cannot be modified
D. Protein synthesized cannot be transported

27 A cylindrical potato strips are placed in a different concentration of sucrose solution. The mass of potato strips at the beginning and end of the experiment is recorded. Which of the following graphs represents the result of the experiment?

A


C


B


D


28 Figure 16 shows the percentage of red blood cells undergoing haemolysis in various concentrations of salt solution.

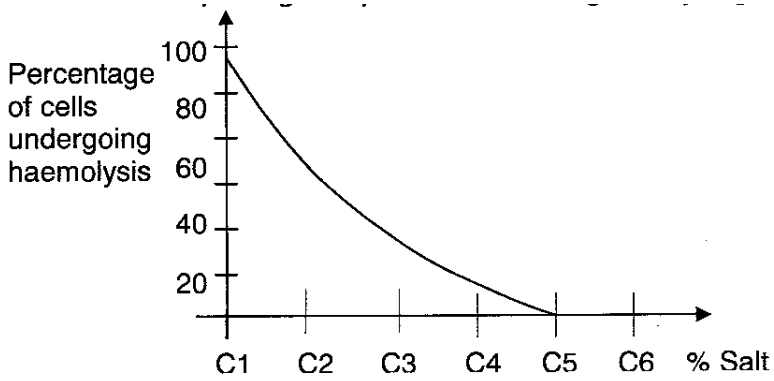


Figure 16

Which of the following statements is true?

A. C1 is isotonic to the red blood cells.

B. C3 is hypertonic to the red blood cells

C. At C5, same number of water molecules moving in and out of the red blood cells.

D. At C6, more water molecules moving in than those moving out of the red blood cells.

29 Which of the following gives the correct use of enzyme in our daily life?

	Enzyme	Use
A	Amylase	Removal of hair from hides
B	Lipase	Breakdown of starch
C	Ligninase	As a coagulant
D	Protease	Tenderisation of meat

30 Table 1 shows changes in a cell during mitosis.

Stage / Structure in cell	P	Q	R	S
Cytoplasm	Does not divides	Does not divides	Does not divides	Divides
Chromosomes	Randomly distributed in cell	Move toward cell poles	At the equator off the cell	At all poles
Spindles fibre	Present	Present	Present	Nil
Nucleus membrane	Nil	Nil	Nil	Present

What are P, Q, R and S?

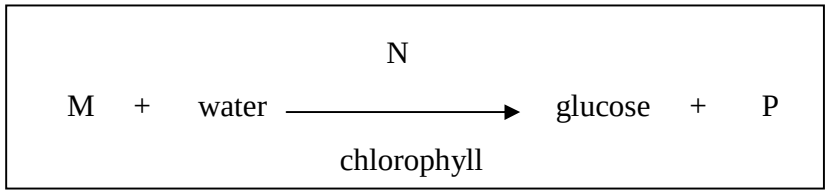
	P	Q	R	S
A	Telophase	Metaphase	Prophase	Anaphase
B	Anaphase	Prophase	Telophase	Metaphase
C	Prophase	Anaphase	Metaphase	Telophase
D	Metaphase	Telophase	Anaphase	Prophase

31 Which are the differences between mitosis and meiosis?

	Mitosis	Meiosis
I	One division	Two division
II	Chromosomes separate and move to poles	Chromatids separate and move to opposite poles
III	Daughter cells are 2n	Daughter cells are n
IV	Parent cell is 2n	Parent cell is n

A. I and III only
B. I and IV only
C. II and III only
D. II and IV only

32 The following equation for photosynthesis is incomplete.



What do the letters M, N and P represent?

	M	N	P
A	Carbon dioxide	Oxygen	Sunlight
B	Carbon dioxide	Sunlight	Oxygen
C	Oxygen	Carbon dioxide	Sunlight
D	Oxygen	Sunlight	Carbon dioxide

33 The graph in Figure 17 shows the concentration of lactic acid in the blood of an athlete.

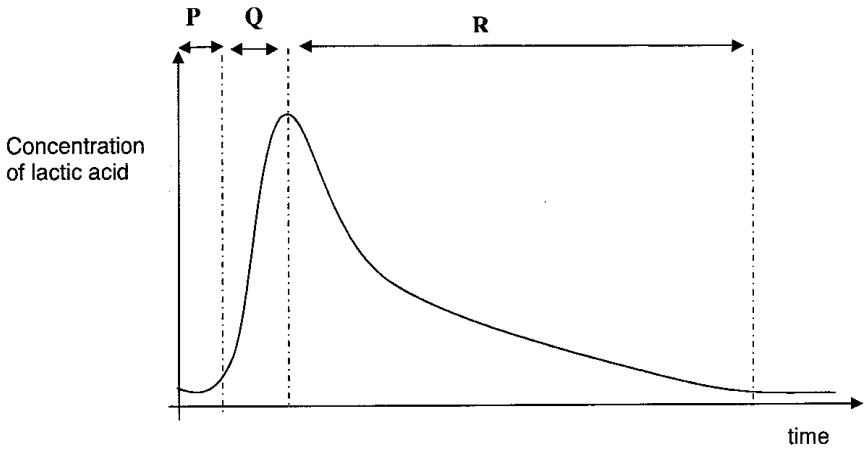


Figure 17

During which period of time was the athlete exercising?

A. Period P
B. Period Q
C. Period R
D. Period P + Q

34 The Biology's student of SMK Sinar Harian was carried out the experiment to investigate the size population of frog at their school by using the capture, mark, release and recapture technique. The result as shown below.

Number of frog in first captured	Number of frog in second captured	Number of marked frog recaptured
120	150	90

What is the size population of frog at the school?

A. 72
B. 113
C. 185
D. 200

35 The CFCs in the air condition of refrigerator have been replaced by HCFC. Which of the following statement explains the reason for the replacement?

A. HCFC reduce emission of chlorine that cause thinning of ozone layer.
B. HCFC is not easily broken by the UV and help maintain the ozone layer.
C. HCFC is a lot cooler gas compared to CFC.
D. HCFC is heavy gas so it does not rise to ozone

36 Figure 18 shows the mechanism of blood clotting.

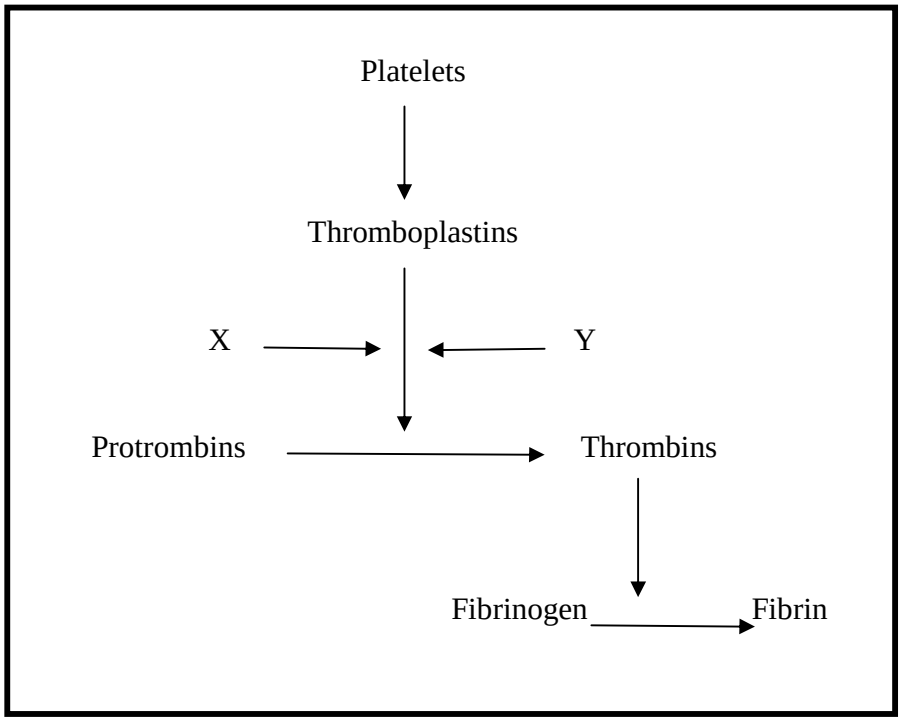


Figure 18

What is X and Y?

	X	Y
A	Iron ion	Vitamin D
B	Iron ion	Vitamin K
C	Calcium ion	Vitamin D
D	Calcium ion	Vitamin K

37 Figure 19 shows two stages in weightlifting.

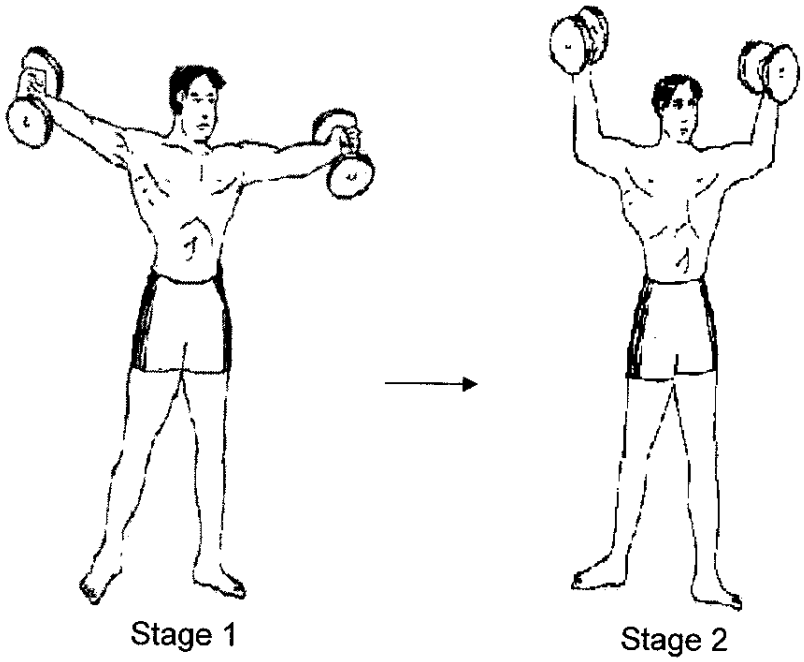


Figure 19

What is the correct sequence of muscle and joint action when moving from Stage 1 to Stage 2?

A. Triceps contracts → lower arm rotates → biceps contracts

B. Biceps contracts → lower arm rotates → biceps relaxes

C. Biceps contracts → lower arm moves in one plane → triceps Contracts

D. Biceps contracts → triceps relaxes → lower arm moves in one plane

38 The information below is about a neurological disease.

- Loss of memory and intellectual ability
- Shrinkage of brain tissues
- Lack of neurotransmitters such as acetycoline
- Usually affects the elderly

The disease is

A. Parkinson's disease
B. Alzheimer's disease
C. Osteoporosis
D. Arthritis

39 Based on the Figure 20 below, why is the structure X important to the fetous?

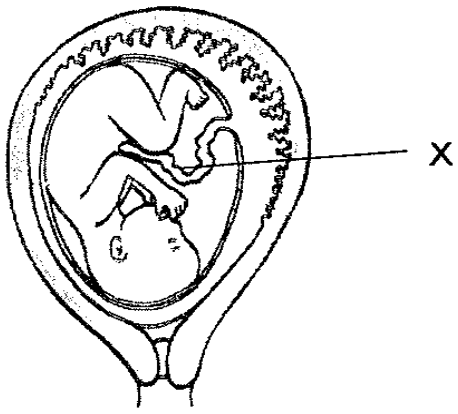


Figure 20

I Transport oxygen

II Carry out carbon dioxide

III Transport amino acid

IV Carry out urea

A. I, III and IV only

B. II, III and IV only

C. I, II and III only

D. I, II, III and IV

40 Which of the following statements best describe camouflage?

A. Fertilisation which produces different offspring

B. Protective mechanism by which an animal matches its colour to its surroudings

C. The homologous chromosomes which fail to separate during meiosis I

D. Individual who has three of a particular type of chromosome

41 Figure 21(a) and (b) shows two different processes involved in the transport of substances across the plasma membrane.

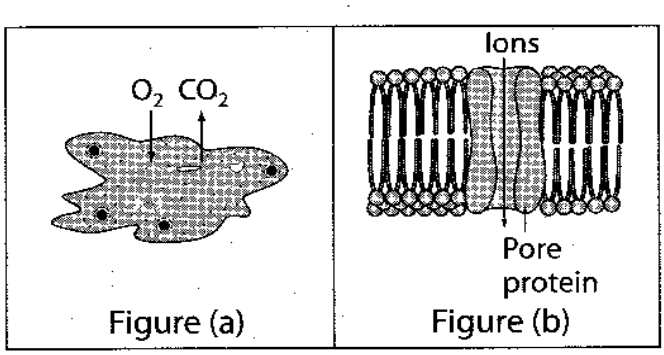


Figure 21

Which of the following show differences between the two processes?

I In Figure (b), solutes move againts the concentration gradient
II The process shown in Figure (b) requires the aid of carrier proteins.
III The process shown in Figure (b) does not need energy to transport the substances.

A. III only
B. I and II only
C. II and III only
D. I, II and III

42 The following results were obtained in an experiment to determine the concentration of vitamin C in a type of fruit juice.

Volume of 0.1% ascorbic acid needed to decolourise 1 ml of DCPIP solution =1 ml
Volume of fruit juice needed to decolourise 1 ml of DCPIP solution =0.8 ml
(0.1% pure ascorbic acid contains 1 mg ascorbic acid per cm^3)
What is the concentration of vitamin C in the fruit juice?

A. 0.8 mg cm^{-3}
B. 1.0 mg cm^{-3}
C. 1.25 mg cm^{-3}
D. 12.5 mg cm^{-3}

43

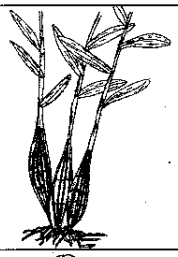
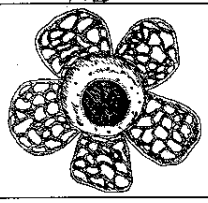
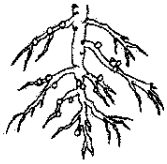
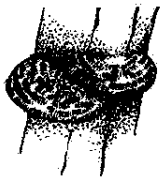
P – The opercular cavity is enlarged
Q – The mouth open
R – The floor of the buccal cavity lowers
S – Water containing dissolved oxygen is drawn into the mouth
T – The operculum closes

The information given above described the mechanism of inhalation in a fish. What is the correct sequence for information above?

A. P, R, Q, S, T
B. Q, R, P, T, S
C. Q, T, R, P, S
D. P, Q, S, R, T

44 The following characteristic enables the organisms to survive in its habitat.

I Has a modified part to store water
II Produce spore
III Has hyphae to absorb nutrients
IV Has nodule

	ORGANISMS *ORGANISMA*	CHARACTERISTICS *CIRI-CIRI*
A		I, II and III
B		II, III and IV
C		III and IV
D		II and III

45 Figure 22 shows the scene in an industrial area in Shah Alam.

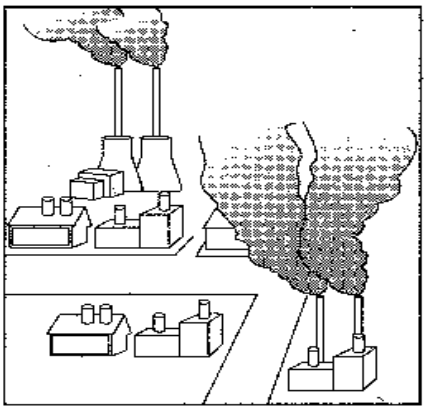


Figure 22

Acid rain occurs frequently in this area. What can you deduce about substance X that is emitted from the factories as shown above.

I X can be sulphur dioxide
II X can be nitrogen monoxide
III X can be carbon monoxide

A. I and II only
B. I and III only
C. II and IIII only
D. I, II and III only

46

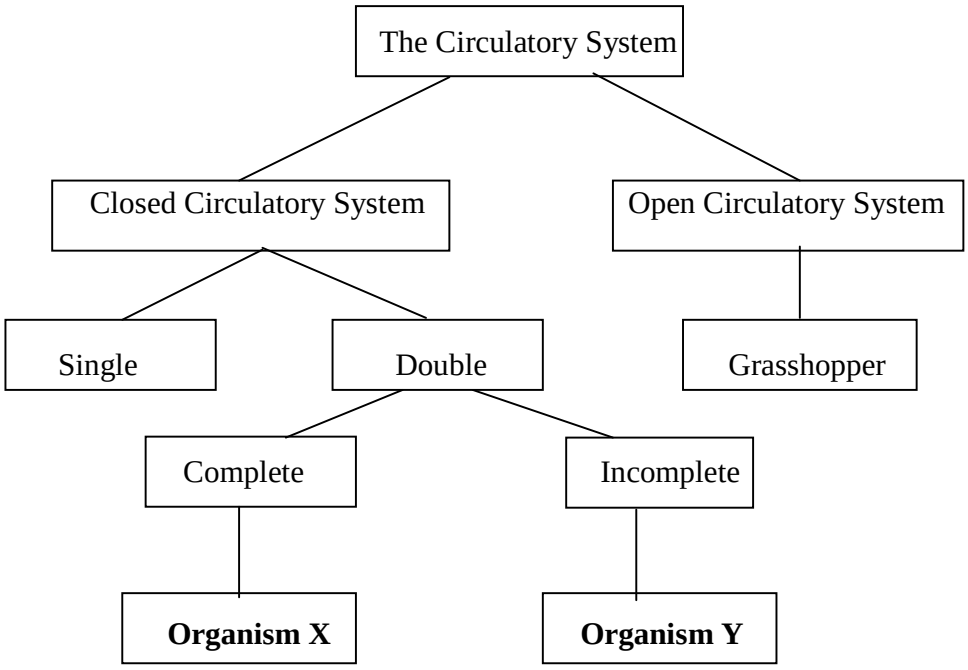


Chart 1

Chart 1 refer to the circulatory system in multicellular organisms. Which of the following are correctly represents organism X and Y?

	Organism X	Organism Y
A	Grasshopper	Fish
B	Human	Frog
C	Snake	Bird
D	Rat	Goat

47 Why the contractions of muscles need a sufficient supply of blood?

I To transport oxygen and glucose for cellular respiration.
II Because muscle need energy from the cellular respiration
III To avoid getting muscular dystrophy disease.

A. I only
B. II only
C. I, and II only
D. I, II and III only

48 Figure A shows Azri who is going to take a penalty kick. While Figure B shows Azri who had kicked the ball.

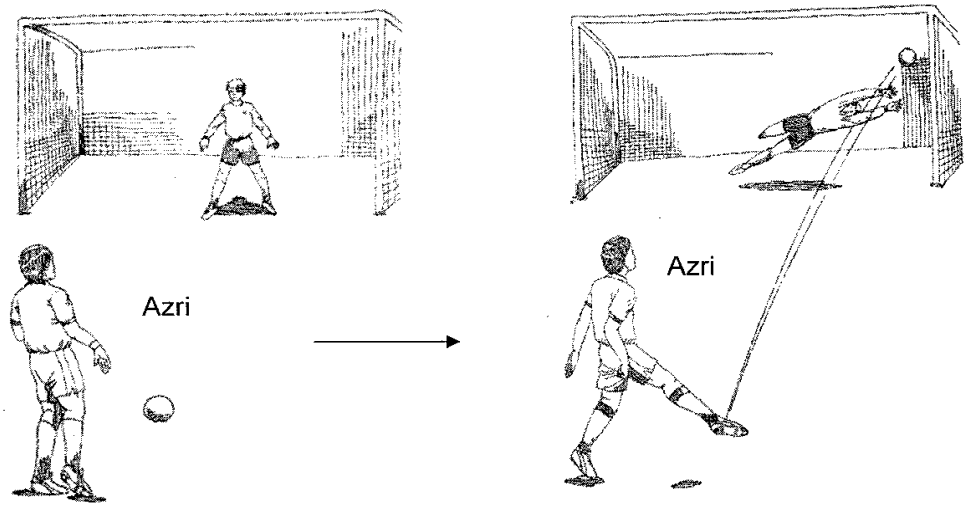


Figure A Figure B

Which of the sequences show the correct pathway of transmission of impulses for these action?

A. Stimulus → integrating centre → receptor → response
B. Stimulus → receptor → integrating centre → response
C. Receptor → integrating centre → stimulus → response
D. Receptor → stimulus → integrating centre → response

49 Figure (i) and (ii) shows the formation of sperm and formation of ovum in human respectively.

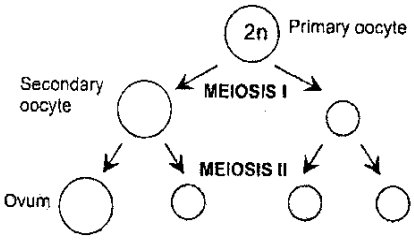


Figure (i)

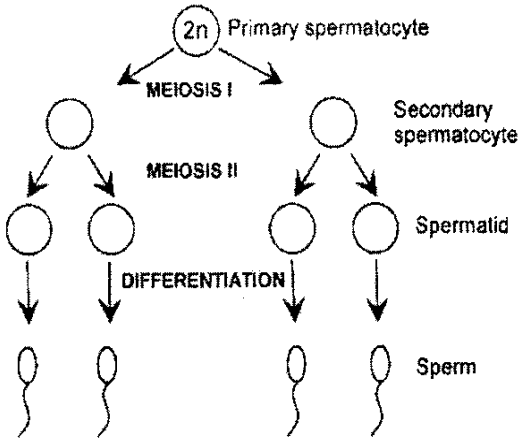


Figure (ii)

Which of the following is the similarity of both processes?

A. Polar bodies are formed in formation of ovum and sperm.
B. Secondary spermatocyte and secondary oocyte have the same number of chromosome
C. Mitosis is not involved in formation of ovum and sperm
D. Both of ovum and sperm produce four functional gametes

50 Figure 23 below shows a dihybrid inheritance in a garden pea plant.

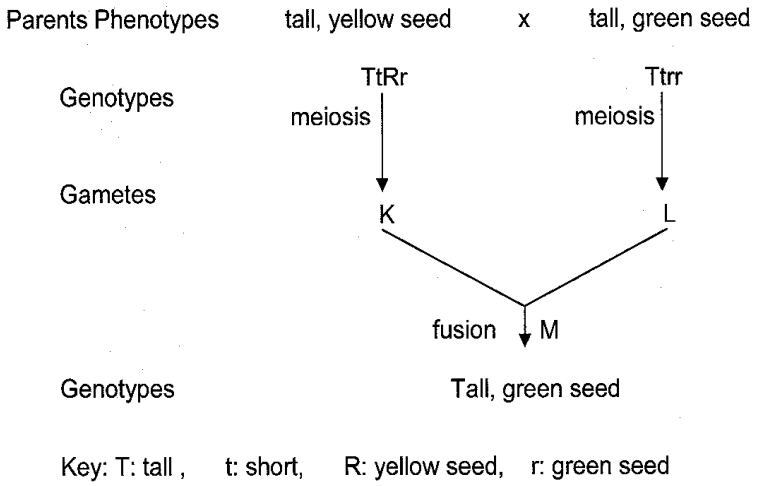


Figure 23

Which combination of gamates K and L will produce a homologues tall plant with green seed, M?

	K	L	M
A	TR	Tr	TTRr
B	Tr	tr	Ttrr
C	tR	Tr	TRtt
D	Tr	Tr	TTrr

END OF QUESTION PAPER 1

PAPER 2
Section A [60 *marks*]

Answer **all** questions in this section.

1. Table 1 shows the relationship between the density of certain organelles found in a specific cell.

Types of cell	Organelles found abundantly
Flight muscle cells in insects and birds.	P
Pancreatic cells	Q

Table 1

a. i. Name organelles P and Q

Organelle P: _____

Organelle Q: _____

[2 *marks*]

ii. State the function of each organelles found in each specific type of cell.

Function of organelle P: _____

Function of organelle Q: _____

[2 *marks*]

Diagram 1 shows some cells from the stem of a plant seen in cross section.

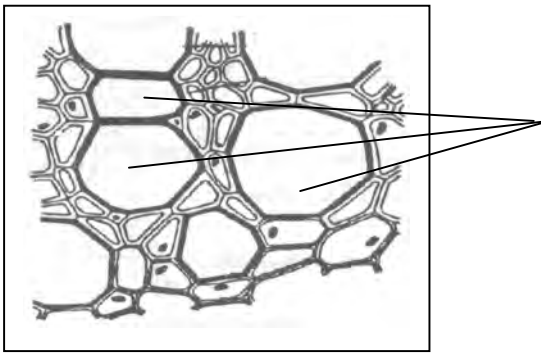


Diagram 1

b. i. What type of tissue is shown at T?

_____

[1*mark*]

ii. State one function of this tissue.

_____

[1 *mark*]

iii. State one way in which the cells of tissue T are adapted to carry out one of its function.

_____

[1 *mark*]

c. i. In the space below, draw and label your diagram to show a palisade mesophyll cell from a leaf.

[3 *marks*]

ii. How are palisade mesophyll cells adapted to carry out their function?

_____

_____

_____

[3 *marks*]

2. Diagram 2 shows the different organelles involved during the synthesis and secretion of protein in an animal cell.

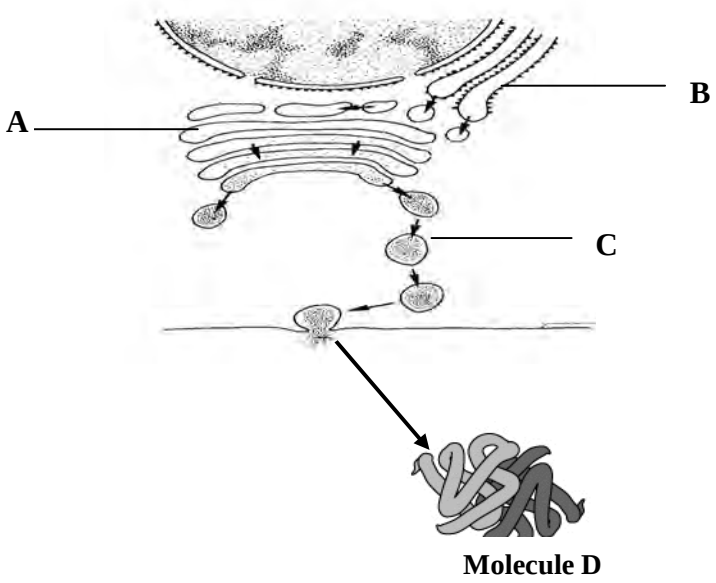


Diagram 2

a. Name the organelles labeled A, B and C.

A: _____

B:_____

C:_____

[3 *marks*]

b. State the function of X and Y.

X:_____

Y:_____

[2 *marks*]

c. Molecule D is produced from the protein excreted by the cell.

i. What is the type of structure shown by the molecule?

_____

[1 *mark*]

ii. Give one example of the structure mentioned in c.i.

_____

[1 *mark*]

d. i. Proteins are made up of amino acids, name two groups of amino acids involved.

_____

_____

[2 *marks*]

ii. Enzyme is one of the substances that made up of protein. Enzymes are involved in biochemical reactions in our body. State one example of substance or structure in our body that is proteins and state its function.

_____

_____

_____

[2 *marks*]

e. There are six elements that made up the proteins. State any one.

_____

[1 *mark*]

3. Diagram 3 shows the process of phagocytosis by neutrophil

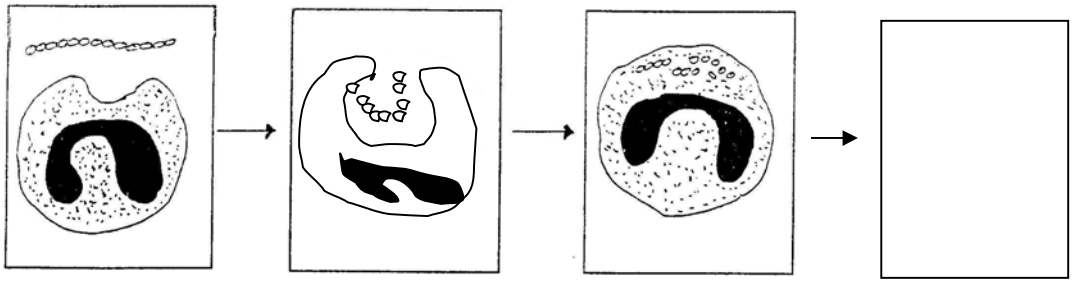


Diagram 3

a. i. Based on diagram 3, state another function of the blood circulatory system besides transportation.

_____

[1 *mark*]

ii. Which line of defence is shown in diagram 3?

_____

[1 *mark*]

iii. Describe briefly the process of phagocytosis based on diagram 3.

_____

_____

_____

[3 *marks*]

iv. Complete the diagram 3 in the box provided to show the process of phagocytosis.

[2 *marks*]

b. i. The human immunodeficiency virus (HIV) is a virus that attacks the immune system. Infection by the HIV results in acquired immunodeficiency syndrome (AIDS). Describe briefly the effect of HIV to the immune system to a person who is infected with HIV.

_____

_____

_____

[2 *marks*]

ii. State three ways how does the transmission of HIV occurs.

_____

_____

_____

_____

[3 *marks*]

4.

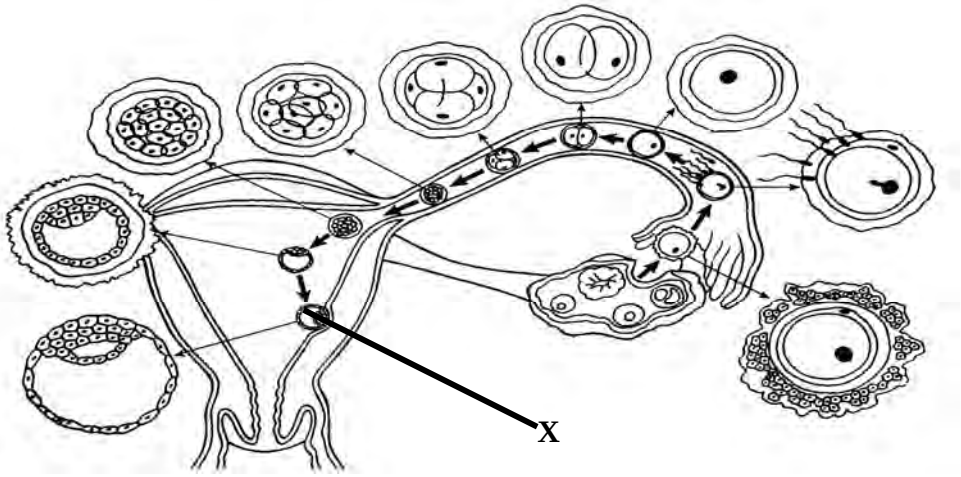


Diagram 4

Diagram 4 shows the development of an ovum in the female reproductive system after fertilisation.

a. In diagram 4 above, mark and label the following structures:

I. Secondary oocyte

II. Blastocyst

III. Zygote

[3 *marks*]

b. State the process occurs at X.

_____

[1 *mark*]

c. The process that occurs at X that undergoes by blastocyst requires endometrium to be thickened with a rich supply of blood vessel. State the hormone is needed for this process.

_____

[1 *mark*]

d. In the Fallopian tube, the zygote undergoes a series of cell division to produce a solid ball cells. State the term used to represent the solid ball cells.

_____

[1 *mark*]

e. If after ovulation, there is no sperm in the Fallopian tube, predict what will happen to the ovum.

_____

_____

_____

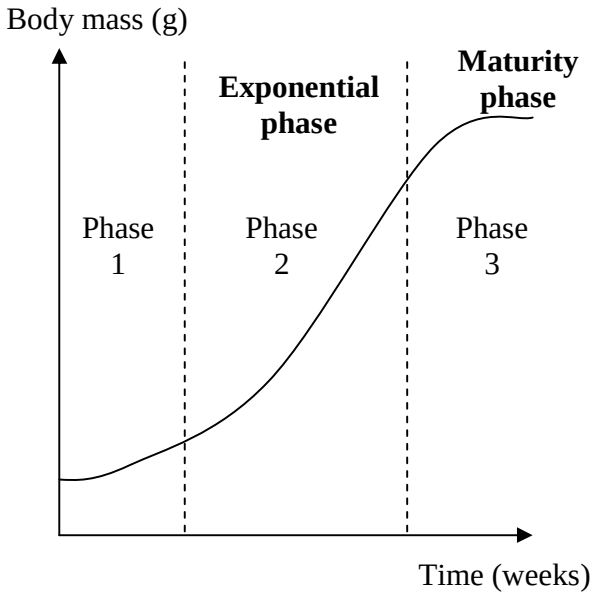
_____

[3 *marks*]

f. The zygote will develop into embryo and then into foetus, finally a baby will be born. The baby will grow up. The growth of human being can be measured by certain parameters. State one parameter.

_____

[1 *mark*]



g. The curve above shows the growth on human. Describe briefly what happen during the exponential phase.

_____

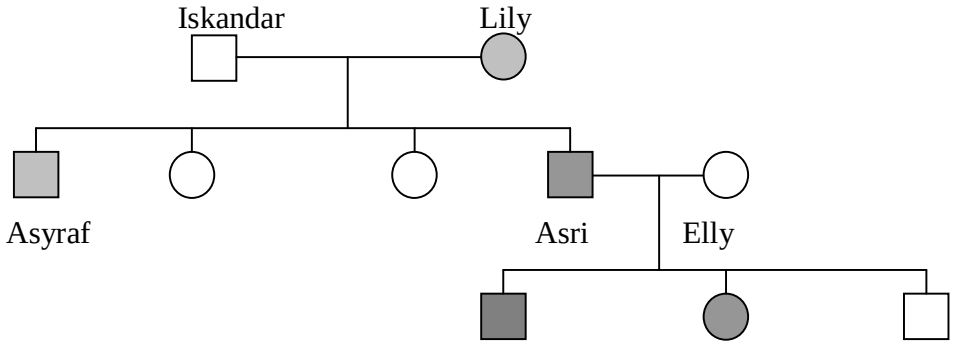
_____

_____

[2 *marks*]

.

5. Diagram 5 shows the pedigree of a family for the colour blindness. Colour blindness is a is a hereditary sex-linked disease caused by a recessive allele found on the X chromosome.



Key:

☐	Male normal	$X^C X^C$, $X^C Y$
■	Male colour blindness	$X^c Y$
○	Female normal	$X^C X^c$
●	Female colour blindness	$X^c X^c$

Diagram 5

a. i. What is Lily genotype?

_____

[1 *mark*]

ii. Explain how Lily's genotype is determined.

_____

_____

_____

[2 *marks*]

iii. What is the genotype of Iskandar?

_____

[1 *mark*]

b. Elly has a heterozygote genotype, while Asri is a colour blindness. Illustrate by using a schematic diagram to show their children genotype and phenotype probability.

[4 *marks*]

c. What is the probability of getting son with colour blindness?

_____

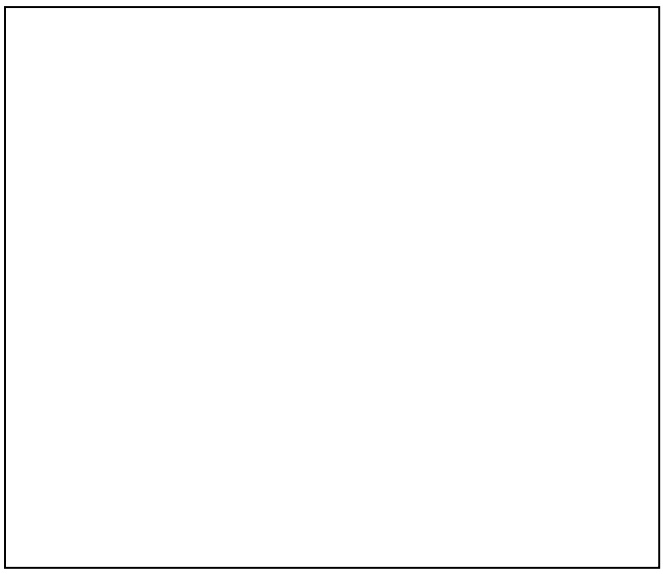
[1 *mark*]

d. What is the disadvantage of being colour blindness?

_____

[1 *mark*]

e. Colour blindness involves the sex chromosomes. When a chromosome is uncoiled, it forms a long thread that is made up of one DNA and protein. DNA is made up of units called nucleotides. Draw and label a complete structure of a nucleotide in the box below.



[2 *marks*]

Section B

[40 *marks*]

Answer any **two** questions from this section

6.a. Diagram 6 shows the reflex arc of a knee-jerk.

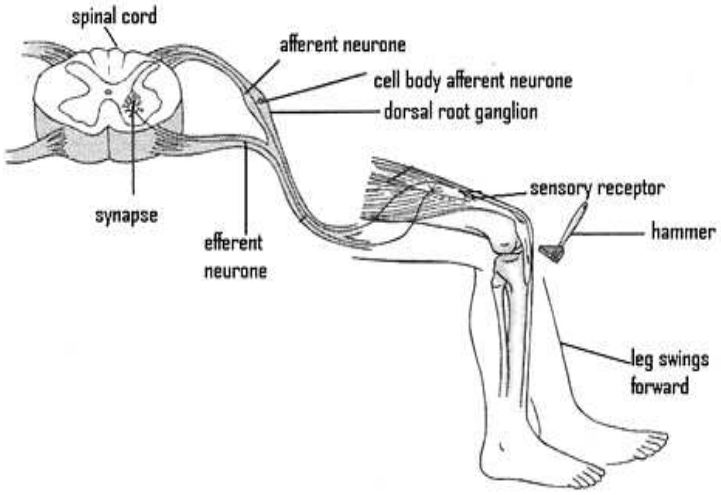


Diagram 9

Describe briefly the pathway of transmission of nerve impulses in the knee-jerk reflex action

[10 *marks*]

The pituitary gland is regarded as the master endocrine gland

b. Explain the statement above.

[2 *marks*]

After watching a horror movie with his friend, Zafran went back alone to his house. On the way back, suddenly a creature exactly like he watched in the movie across in front of him. He was shocked and panicked. He was frightened too. Without thinking, he ran away as far as he can.

c. Explain the involvement of both the nervous system and the endocrine system in that critical situation.

[8 *marks*]

7 a. Diagram 7.1 shows the structure of unicellular organism which lives in a freshwater pond and the process of producing its new offspring.

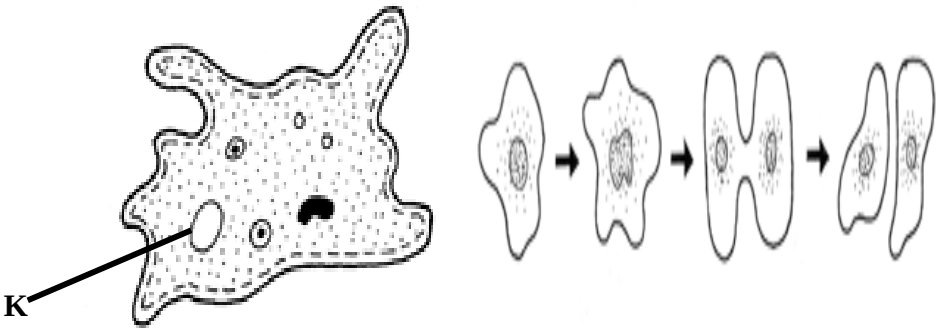


Diagram 7.1(a) Diagram 7.1(b)

Explain the function of K in osmoregulation and the process of reproduction involved based on diagram 7.1(b).

[8 *marks*]

b. Diagram 7.2 shows the structure of plasma membrane.

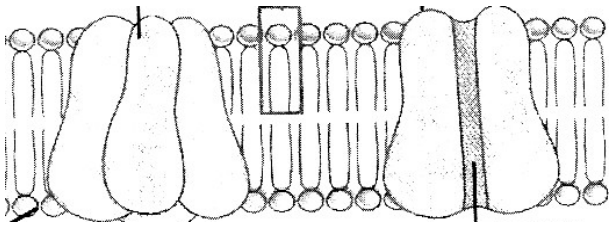


Diagram 7.2

Describe briefly the structure of plasma membrane and two functions of it in living cell.

[10 *marks*]

c. State the differences between rough endoplasmic reticulum and smooth endoplasmic reticulum.

[2 *marks*]

8. a. Table 8(a) shows an analysis of the percentage nutrient content of a balanced diet that should be taken by a person daily.

Nutrient	Percentage intake
Carbohydrate	60
Lipid	30
Protein	10
Vitamin & mineral salts	Small quantity

Table 8(a)

Table 8(b) shows the daily eating habits of Shazlin and Syuhada.

Shazlin	**Syuhada**
❖ Eats regularly at proper time. ❖ Drinks 7 glasses of water daily. ❖ Chooses food that contains carbohydrates, lipids, proteins, vitamins and mineral salts based on the standard of a balanced diet.	➢ Eats irregularly and when she remembers or when she is free. ➢ Drinks a glass plain water daily ➢ Likes to eat fast food and junk food that does not contain the right amount of carbohydrates, lipids, proteins, vitamins and mineral salts, does not follow the standard of a balanced diet.

Table 8(b)

Discuss the advantages and disadvantages of the eating habits of Shazlin compared to Syuhada over a period of time.

[10 *marks*]

b. Obesity and anorexia nervosa are two diseases caused by malnutrition. Discuss the situation.

[10 *marks*]

9.

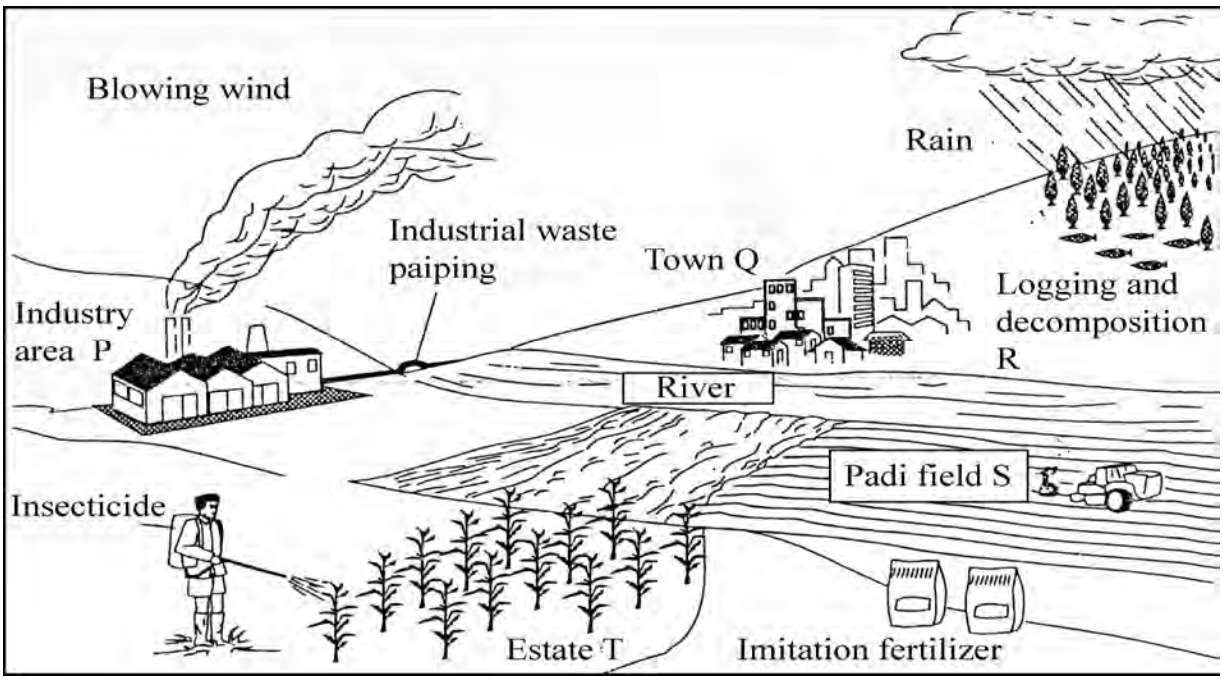


Diagram 9

a.. Based on the activities that have been carried out at places P, Q, R, S and T as shown in diagram 9 above, describe the bad effects on the environment.

[10 *marks*]

b. Describe the actions that should be taken to preserve the quality of the environment in this region.

[10 *marks*]

PAPER 3
Answer all questions

1 An experiment was carried out to study the effect of cigarette smoke on the human lungs.
Figure 1(a) shows the apparatus set up for the experiment.
Figure 1(b) shows the initial reading of temperature of the air in the U-tube.
The same apparatus is set up using different number of cigarette.
The result is given in Table 1.

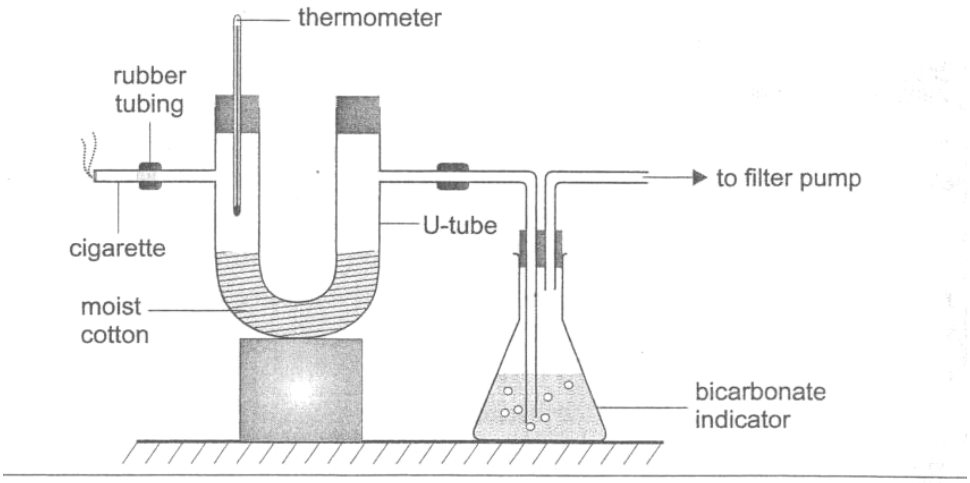


Figure 1 (a)

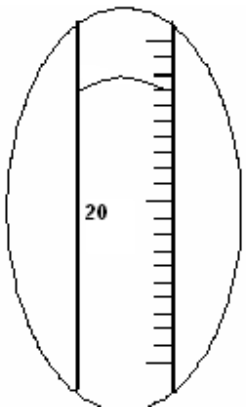


Figure 1(b)

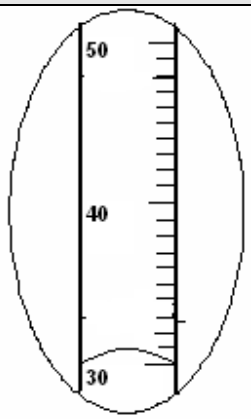
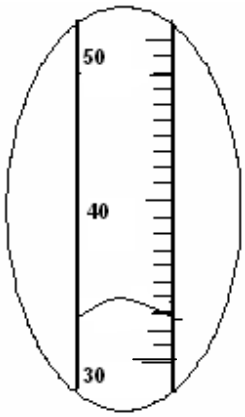
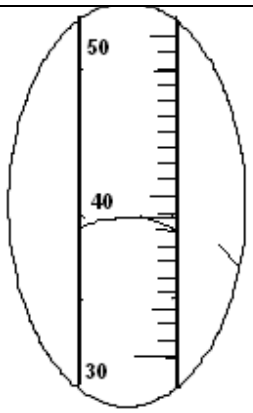
Number of cigarette	Final temperature of the air in the U-tube(°C)	Reading
1		
2		
3		

Table 1

(a) Record the final temperature of the air in the U-tube in the boxes provided in Table 1.
[3 marks]

For Examiner's use
1(a)

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

Observation 1 :

……

……

Observation 2 :

1(b)(i)

……

……

[3 marks]

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

Inference from observation 1 :

.....

.....

Inference from observation 2 :

.....

.....

1(b)(ii)

[3 marks]

(c) Complete Table 2 based on this experiment.

Variable	Method to handle the variable
Manipulated variable …… …… ……	…… …… ……
Responding variable …… …… ……	…… …… ……
Constant variable …… …… ……	…… …… ……

Table 2

[3 marks]

For Examiner's use

1(c)

(d) State the hypothesis for this experiment.

.....

.....

.....

[3 marks]

1(d)

(e) Construct a table and record all the data collected in this experiment.

Your table should have the following titles:

- Number of cigarette
- Final reading of temperature
- Increase in reading of temperature

For Examiner's use

[3 marks]

1(e)

(f) On the graph paper given, draw the graph to show relationship between the numbers of the cigarette against the reading of temperature.

[3 marks]

1(f)

(g) Based on the graph in (f), explain the relationship between the number of the cigarette and the reading of temperature.

……..

……..

……..

[3 marks]

For Examiner's use

1(g)

(h) In another experiment, the number of cigarette is increase to 10 cigarettes. Predict the reading of the temperature.
Explain your prediction.

……..

……..

……..

[3 marks]

1(h)

(i) Based on the result from this experiment, what can be deduced about cigarette smoke?

……..

……..

……..

[3 marks]

1(i)

(j) The following list is part of the apparatus and material used in this experiment.

Thermometer, U-tube, cigarette, cotton wool, bicarbonate indicator, matches, filter pump

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

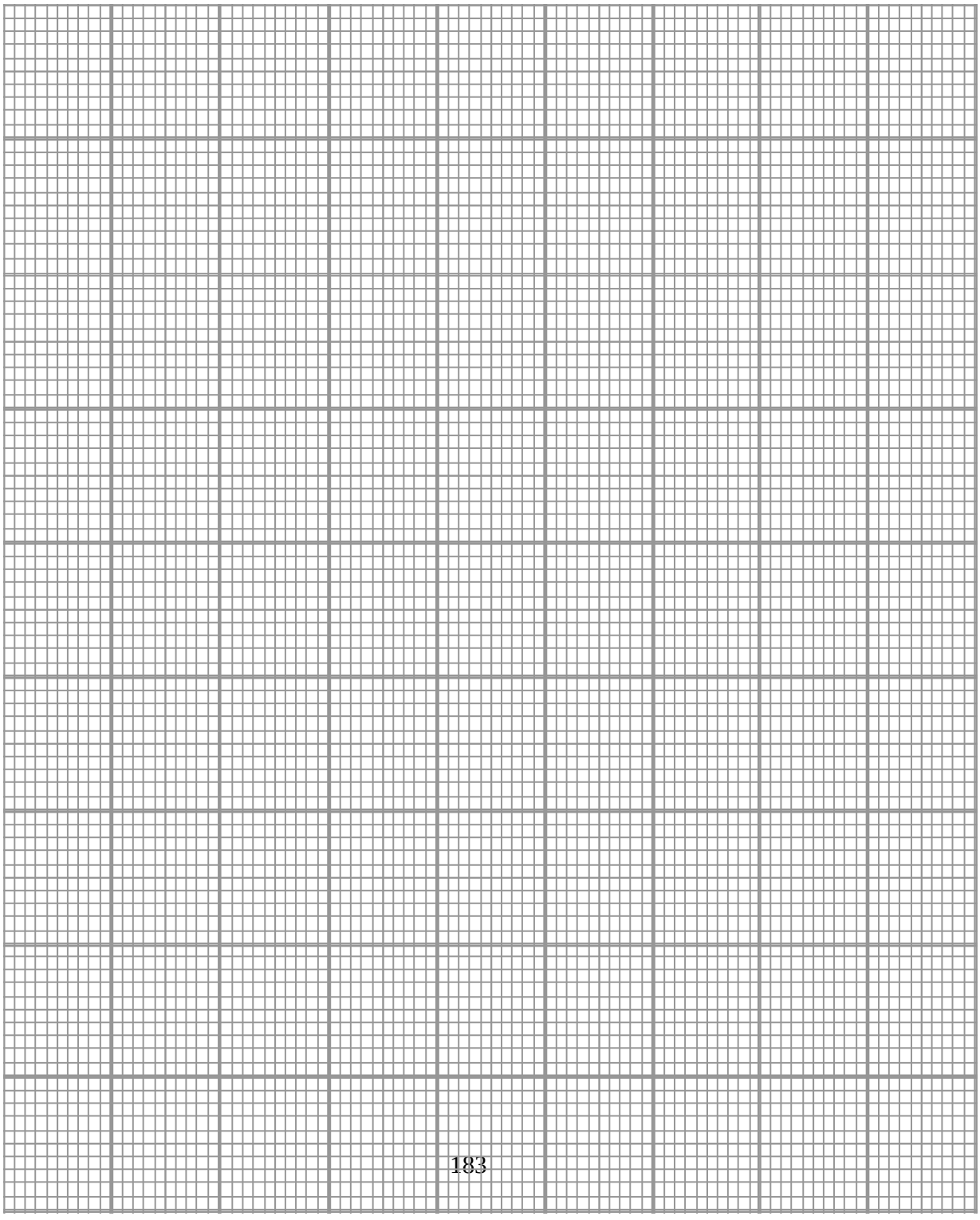
[3 marks]

For Examiner's use

1(j)

TOTAL

Graph of the number of cigarette against the reading of temperature.



Question 2

2. Human traits are determined by genetic and environmental factors. There are variations in traits. Human height is a continuous variation. This can be shown through histogram of frequency against height shows the normal (bell like) distribution

Trait manusia ditentukan oleh factor genetic dan persekitaran.Terdapat variasi dalam trait. Ketinggian manusia adalah variasi selanjar. Ini boleh fitunjukkan melalui histogram frekunsi melawan ketinggian iaitu grah bentuk loceng.

Design an experiment to investigate variation in human height in a group of students. The planning of the experiment should cover 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

ANSWER'S MODUL

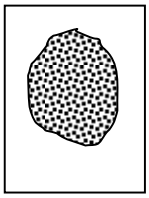
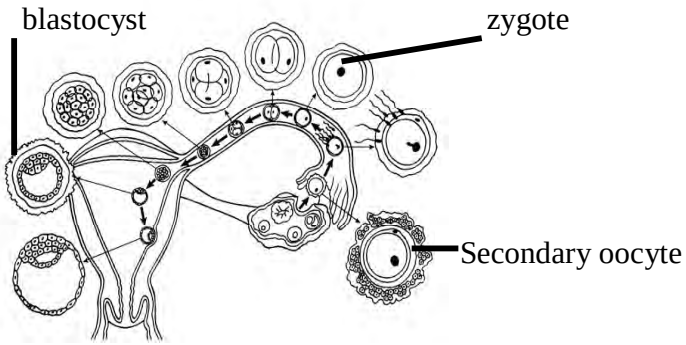
MARKING SCHEME – PAPER 1

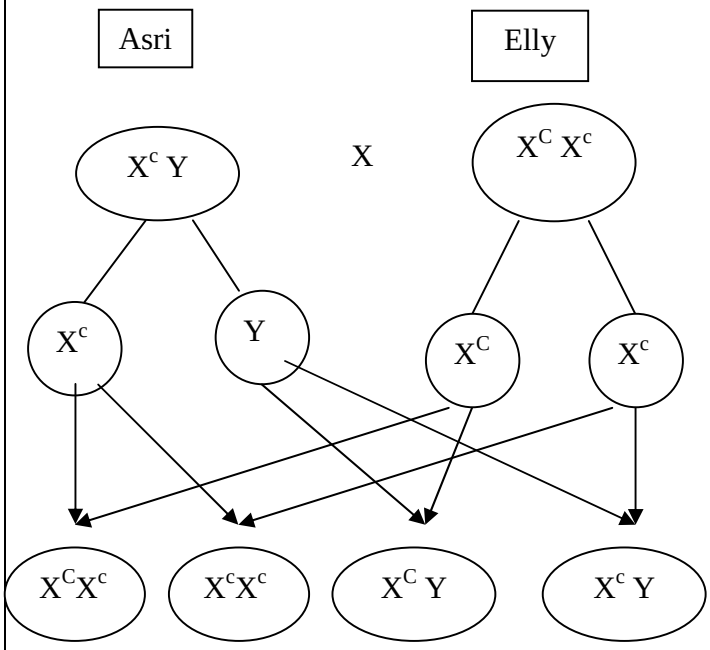
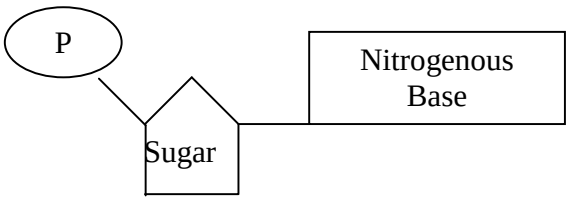
1. D	14. B	27. D	40.B
2. C	15. B	28. C	41. B
3. B	16. B	29. D	42. C
4. D	17. A	30. C	43. B
5. B	18. A	31. A	44. D
6. A	19. D	32. B	45. A
7. D	20. B	33. B	46. B
8. A	21. C	34. D	47. C
9. D	22. D	35. A	48. B
10. D	23. B	36. D	49. B
11. A	24. C	37. D	50. B
12. A	25. A	38. B	
13. A	26. B	39. D	

MARKING SCHEME BIOLOGY 2

SECTION A

NO.	MARKING CRITERIA	MARKS	NOTE /TOTAL MARKS
1a.i	P: mitochondria / mitochondrion . Q: RER / SER/ Golgi Apparatus	1 1	2
ii	P: To provide energy for contraction of muscle. Q: To secrete enzymes / hormones // To transport protein	1 1	2
b.i	Xylem	1	
ii	Transports water and mineral salts // Provides mechanical support for plant	1	
iii	(It) has lignified cell wall (to support plant tissues)	1	
c.i	Accuracy – long & cylindrical shape with cell wall, vacuole & chloroplasts Labelling – label any three structures: cell wall, vacuole, chloroplast, cytoplasm, nucleus	1 2	A=1 L=2 3 correct = 2 2 correct = 1
ii	C1:cells are packed tightly P1:receive maximum sunlight C2:contain many chloroplasts P2:effective for photosynthesis C3:long and cylindrical C4:located just below epidermis	1 1 1 1 1 1	C1 &P1//C2&P2 = 2 with C3/C4 =1 Total = 3
2a	A: Golgi apparatus B: Rough endoplasmic reticulum /ribosomes C: Secretory vesicles	1 1 1	3
b	A:processing, packaging and transporting centre of the synthesised proteins. B:transport protein /the site of protein synthesis	1 1	3
c.i	Quarternary structure	1	
ii	Haemoglobin	1	
d.i	Essential amino acids Non essential amino acids	1 1	2
ii	C1:enzyme P1:biochemical reactions C2:hormone/any hormone P2:regulate the wide range of activities in body/correct function / Any acceptable answers that correspond to proper hormone	C= 1 P=1	2

e	Carbon / hydrogen / oxygen nitrogen/sulphur/phosphorus	Any one	1
3a.i	Body defence mechanism	1	
ii	Second line of defence	1	
iii	C1:Phagocytes move towards antigens / pathogens using pseudopodium C2:Phagocytes surround the antigen / pathogen C3:Antigen / pathogen wrapped in vacuole and hydrolysed by hydrolytic enzyme C4:destroyed antigen / pathogen is removed from the phagocyte	1 1 1 1	Any 3
iv	Accuracy- nucleus and microorganisms are digested 	2	
b.i	C1: destruction of the immune system cells P1: virus reproduces inside the lymphocytes P2: virus kills lymphocytes	1 1 1	C1 = 1 With any P = 1
ii	C1: newborns can become infected with the virus from their infected mothers during delivery C2: Unprotected copulation with infected individuals C3: Sharing contaminated needles used for injecting drugs or tattoo ink	1 1 1	3
4a		1 1 1	3
b	Implantation	1	
c	Progesterone	1	
d	Morula	1	
e	C1:Ovum begins to break down/ degenerate C2:Endometrium also break down	1 1	3

f	C3:The excess bloods and tissues of the endometrium leave the uterus through the vagina. Length / Fresh mass	1 1	
g	C1: Cell divide actively / cells are undergoing division rapidly C2: Elongation also occurs C3: So, the size of organism increases rapidly	1 1 1	any 2
5a.i	X^c X^c	1	
ii	C1:The allele for colour blindness is recessive. C2:Both alleles must be recessive to produce the phenotype of colour blindness	1 1	2
iii	X^CY	1	
b		1 1 1 1	If the genotype of parents are wrong, no mark will be awarded at all
c	25% / or 1/4	1	
d	Cannot distinguish between red and green colours	1	
e	 Accuracy – 3 units: sugar 5 carbon, phosphate group, nitrogenous base Labelling – any 2	A=1 L = 1	2

MARKING SCHEME BIOLOGY 2
JUJ 2009

SECTION B

NO.	MARKING CRITERIA	MARKS	NOTE /TOTAL MARKS
6a	C1: The rubber hammer hits a tendon C2:the stimuli is detected by receptor C3:he receptors are stimulated and impulse is generated C4: the impulse is transmitted by afferent neurone / sensory neurone to spinal cord C5: the impulse cross a synapse C6:neurotransmitter are released from the terminal dendrites of the afferent neurone into the synaptic cleft C7: the nerve impulses are then transmitted to efferent neurone / motor neurone C8: then the efferent neurone carries the impulses from the spinal cord to effector / muscle tissues / extensor / quadriceps C9: the (muscle) tissues / extensor / quadriceps contracts and the other tissue / flexor relaxes C10: the leg is jerking forward C11: impulses are sent to the brain and the brain becomes aware of the knee-jerk reflex only after it has occured	1 1 1 1 1 1 1 1 1 1 1	Any 10
b	C1: it secretes several hormones that control other endocrine glands E1:for example, TSH is secreted to stimulate thyroid to release thyroxine // any hormones with correct function	1 1	2
c	C1:The situation is called “fight or flight” situation C2:The nervous system and endocrine systems both work together C3:Nerve impulses from the eyes (receptors) travel to the brain C4:The information is interpreted and the brain sends nerve impulses to the adrenal glands C5:The adrenal glands are stimulated to release adrenaline / noradrenaline C6:The hormone increases the heartbeat rate/blood pressure and blood flow to the muscle C7:The breathing rate become faster and deeper // is increasing	1 1 1 1 1 1 1	Any 8

	C8:metabolic activity and glucose/sugar/fatty acids level in blood increase C9:The skeletal muscles receive more energy and enable a person to fight off an attacker or flee immediately	1 1	
7a	C1: K is contractile vacuole C2: K/ contractile vacuole regulate water content in *Amoeba* C3: excess water diffuses into contractile vacuole C4: when the contractile vacuole is filled into maximum size, it contracts to expel the water R1: *Ameoba* reproduces asexually R2: by binary fission if the environment is conducive // spores if the environment is not conducive R3: it divides after it has grown to certain size R4: its nucleus and then cytoplasm divide equally R5: two new *Amoeba* are formed with their own nucleus	1 1 1 1 1 1 1 1 1	4 Any 4
b	C1: plasma membrane consists of phospholipids bilayer and proteins C2: hydrophilic heads of phospholipids molecules face outwards and attracted to water C3: hydrophobic tails face inwards away from water C4: the phospholipids molecules can move laterally C5: this gives the membrane its fluidity C6: there are different type of protein molecules scattered in the membrane C7: this gives the membrane mosaic appearance C8: there are pore protein and carrier protein C9:some protein molecules have short branched carbohydrate chains attached (to the and it is called glycoprotein) F1: forms boundary / separates the content of the cell from the outer environment F2: regulate the movement of substances into and out of the cytoplasm.	1 1 1 1 1 1 1 1 1 1 1 1	Any 8 of C And 2F (8C+2F)
c	C1:Rough ER has ribosomes attached to its surface while smooth ER does not have ribosomes attached to its surface C2: Rough ER transport protein while smooth ER is the site of important metabolic reactions / synthesis of lipids / detoxification of drugs and poisons	1 1	2
8a	C1: Shazlin eats regularly at a fixed time while Syuhada	1	

	eats irregularly C2: Gastric juice which is secreted at fixed times can carry out digestion by Shazlin perfectly C3: while on Syuhada, her gastric juice cannot digest anything at long time intervals and can cause her to have a gastric ulcer. C4: Shazlins system receives the optimum amount of water while Syuhada is short on her intake of water C5: it can cause dehydration for Syuhada C6: In Shazlin's system, the biochemical processes are occurring at an optimal level C7: while for Syuhada, there is an imbalance of the osmotic blood pressure and the amount of urine excreted C8: Shazlin is in a healthy state C9: while Syuhada has a risk of developing cancer / vitamin deficiency disorder / osteoporosis C10: Shazlin always maintains a balanced diet C11:but Syuhada's diet is short of carbohydrates, proteins, vitamins and mineral salts and contains excessive food flavouring and colouring.	1 1 1 1 1 1 1 1 1 1	Any 10
b	Obesity G1: A condition in which excess fat is stored under the skin and causes a person to be overweight G2: Caused by metabolic disturbances or inappropriate eating patterns and lack of exercise /hormonal imbalance G3: Happens when the intake of food calories exceeds food calories used G4: Such a patient is more likely to suffer from diseases such as diabetes mellitus / heart problems / high blood pressure / kidney problems / gallstones G5: Can be prevented through hormonal treatment, reduced calorie intake and increased exercise Anorexia nervosa N1:An eating disorder characterized by refusal to maintain a minimally accepted body weight / very fearful of weight gain / distorted body image N2: Symptons: No appetite for food and excessive weight loss N3: Caused when somebody starving oneself due to the fear of being fat and hence not attractive. N4:can lead to malnutrition, loss of both fat and muscle tissue N5: and this eventually leads to disruption of the function of heart , endocrine system and reproductive	1 1 1 1 1 1 1 1 1 1	5G with N1 + any 4N

	system N6: because anorexia nervosa is a psychological illness, it can be treated through counseling	 1	
9a	C1:The factories at P release a lot of pollutants smoke/ sulphur dioxide/ nitrogen oxide/ carbon dioxide. E1: cause air pollution E2: cause acid rain C2:Industrial waste is also channeled into the rivers via pipes and E3: cause river/ water pollution C3:At Q, the daily activities of the residents such as throwing rubbish/sewage/effluent/domestic waste E4: cause river/ water pollution C4: Town Q, mirrored walls /building E5:increase the temperature/ lead to global warming C5: At R, Logging is underway /carried out E5: can cause landslide/soil erosion / /loss of habitat/loss of flora and fauna/lost of water catchment area/soil erosion E6: increases the earth temperature/lead to global warming C6: At the paddy fields in S, imitation fertilizer is used. E7:The excess fertilizer flows into the river, causing eutrophication E8: alga bloom/ BOD value is increased C7: At estate T, insecticide is used E9: the insecticide seep into ground water E10: cause water is contaminated	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5 sets of C with E but must be correspondingly Example C1+E1 C2+E3 C3+E4 C5+E6 C6+E8 5 X 2 = 10marks
b	C1:(Through the Environmental Quality Act, 1974, 1985.Sewage and Industrial Effluents Regulations, 1979) states that every industrial factory must prepare their own sewage system / treatment plant/ an incinerator E1: to reduce the water pollution C2:conserve and preserve the forests and the wildlife inside E2: to preserve biodiversity	1 1 1 1	

	C3: factories should install the filter E3: to reduce the pollutants from being released easily C4: a worker is not allowed to be exposed to sounds exceeding 95 dB for 4 hours continuously E4: to reduce the noise / stress C5: control the usage of pesticides at an allowed level E5: to ensure the good health of consumers C6: only cut down matured trees E6: to maintain the ecosystem C7: replanting more trees / ban logging E7: to reduce the heat / sunlight reaches the heat C8: sustainable development / strategic planning for the development C9: Reduce the use of fossil fuels C10**:** Use alternative power source which is nature friendly instead of using the fossil fuel C11: Any acceptable answers	1 1 1 1 1 1 1 1 1 1 1 1	Any 5C and 5E

MARKING SCHEME MODULE BIOLOGY PAPER 3

<table>
<tr><th>No</th><th>Mark Scheme</th><th>Score</th></tr>
<tr><td colspan="3">KB0603 – Measuring Using Number</td></tr>
<tr><td rowspan="4">1(a)</td><td>Able to record all 3 readings for the final temperature of air in the U-tube correctly.

Sample answer

<table>
<tr><th>Number of cigarette</th><th>Final temperature of air in the U-tube(°C)</th></tr>
<tr><td>1
2
3</td><td>31
34
39</td></tr>
</table>
</td><td>3</td></tr>
<tr><td>Able to record any 2 readings for the final temperature of air in the U-tube correctly.</td><td>2</td></tr>
<tr><td>Able to record any one readings for the final temperature of air in the U-tube correctly</td><td>1</td></tr>
<tr><td>No response or incorrect response.</td><td>0</td></tr>
<tr><td colspan="3">KB0601 - Observation</td></tr>
<tr><td>(b) (i)</td><td>Able to state two different observations correctly.

Sample answer

1. The final temperature of air in the U-tube that use 1 cigarette is 31 °C
2. The final temperature of air in the U-tube that use 3 cigarettes is 39 °C
3. The final temperature of air in the U-tube that use 1 cigarette is less compare to the final temperature of air in the U-tube that use 3 cigarettes</td><td>3</td></tr>
</table>

	4. The final temperature of air in the U-tube that use 3 cigarettes is more compare to the final temperature of air in the U-tube that use 1 cigarette. 5. The final temperature of air in the U-tube that use 3 cigarettes has the greatest increase in reading of temperature.	
	Able to state one observation correctly and one-two inaccurate observations Sample answer 1. The final temperature of air in the U-tube is 31ºC 2. The final temperature of air in the U-tube that use 3 cigarettes is the highest.	2
	Able to state one correct observation and one – two observations at idea level. Sample answer 1. The final temperature of air in the U-tube rises. 2. The cotton in U-tube changes colour.	1
	No response or incorrect response or *one inaccurate/idea level of observation and another one is wrong.*	0
	KB0604 - Making inference	
(b) (ii)	Able to make inferences correctly Sample answer 1. 1 butt of cigarette release less heat 2. 3 butts of cigarette release more heat	3
	Able to make one correct inference and one-two inaccurate inferences. Sample answer 1. 1 butt of cigarette release heat	2
	Able to state one correct inference and one-two inferences at idea level Sample answer 1. Heat is releases	1
	No response or incorrect response or one inaccurate/idea level of inference and another one is wrong.	0
	KB0610-Controlling variables	
(c)	Able to state all 3 variables and 3 methods to handle the variable.	3

<table>
<tr><td></td><td>Sample answer

<table><tr><th>Variable</th><th>Method to handle the variable</th></tr><tr><td><u>Manipulated variable</u>
Number of cigarette butt</td><td>Increase the number of cigarette butt in every experiment to 2 and 3</td></tr><tr><td><u>Responding variable</u>
Temperature</td><td>Measure/record the final temperature of the air in the U-tube using thermometer.</td></tr><tr><td><u>Constant variable</u>
Type of cigarette

The volume of bicarbonate indicator</td><td>Fix the same type of cigarette
.
Use the same volume of bicarbonate indicator, 50cm^3.</td></tr></table>
All 6 ticks</td><td></td></tr>
<tr><td></td><td>4 to 5 ticks</td><td>2</td></tr>
<tr><td></td><td>2-3 ticks</td><td>1</td></tr>
<tr><td></td><td>No response or incorrect response or only 1 tick</td><td>0</td></tr>
</table>

<table>
<tr><th colspan="3">KB0611-State hypothesis</th></tr>
<tr><td>(d)</td><td>Able to state hypothesis relating manipulated variable and responding variable correctly with the following aspect :
P1 – Manipulated variable- number of cigarette
P2 – Responding variable-increases of thermometer/heat
H - relationship

Sample answer
1. When number of cigarette butt increases the heat release is also increase</td><td>3</td></tr>
<tr><td></td><td>Able to state a hypothesis relating the manipulated variable and the responding variable inaccurately.

Sample answer</td><td>2</td></tr>
</table>

<table>
<tr><td></td><td>1. The number of cigarette butt affect the final reading of thermometer.</td><td></td></tr>
<tr><td></td><td>Able to state a hypothesis relating the manipulated variable and responding variable at idea level

Sample answer
1. Cigarette butt affect the final reading of thermometer.</td><td>1</td></tr>
<tr><td></td><td>No response or incorrect response
• If no P1 and P2, no mark for H</td><td>0</td></tr>
<tr><td colspan="3">KB0606 – Communicating data</td></tr>
<tr><td>(e)</td><td>Able to construct a table correctly with the following aspects :
1. Able to state the 3 titles with units correctly. 1- mark
2. Able to record all data correctly. 1 - mark
3. Able to calculate the increase in temperature in U-tube 1 - mark

Sample answer
<table><tr><th>Number of cigarette</th><th>Final thermometer reading (°C)</th><th>Increase in the temperature of air in the U-tube(°C)</th></tr><tr><td>1</td><td>31</td><td>3</td></tr><tr><td>2</td><td>34</td><td>6</td></tr><tr><td>3</td><td>39</td><td>11</td></tr></table></td><td>3</td></tr>
<tr><td></td><td>Any two aspects correctly</td><td>2</td></tr>
<tr><td></td><td>Any one aspect correctly</td><td>1</td></tr>
<tr><td></td><td>No response or incorrect response</td><td>0</td></tr>
<tr><td>(f)</td><td>Able to draw the graph correctly with the following aspects:

P : Correct title with unit on both horizontal and vertical axis and uniform scale on the axes. 1 - mark</td><td>3</td></tr>
</table>

	T : All points plotted correctly accordingly to the table. 1 – mark B : Able to join all points to form smooth graph 1 - mark	
	Any two aspects correctly	2
	Any one aspects correctly	1
	No response or incorrect response	0
	KB 0608 – Interpreting Data	
(g)	Able to interpret data correctly and explain with the following aspects : P1 : Able to state relationship between manipulated variable and responding variable. P2 : Able to state 1 / 2 / 3 butts of cigarette increases . P3 : Able to state . Sample answer 1. When the number of cigarette butt increase, the final temperature of the air in U-tube will also increase because (1/2/ 3) butt of cigarette is **release heat** therefore **increase temperature**.	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	
(h)	Able to predict and explain the outcome of the experiment correctly with the following aspects : P1 : Correct prediction – Able to state the temperature in U-tube increase / more than 39ºC P2 : Explanation : Able to state cigarette smoke **release heat** P3 : Explanation : Able to state that temperature **increase more** Sample answer P1 : The temperature in U-tube increases / more than 39ºC	3

<table>
<tr><td></td><td>P2 : because cigarette smoke release heat
P3 : therefore the temperature in the thermometer increases more</td><td></td></tr>
<tr><td></td><td>Able to predict and explain the outcome of the experiment with the two aspects correctly.</td><td>2</td></tr>
<tr><td></td><td>Able to predict and explain the outcome of the experiment with the one aspects correctly.</td><td>1</td></tr>
<tr><td></td><td>None of the above or no response</td><td>0</td></tr>
<tr><td colspan="3">KB0609 – Defining by operation</td></tr>
<tr><td>(i)</td><td>Able to define operationally based on the result of the experiment with the following aspects :

P1 : Cigarette smoke
P2 : releases heat/changes the colour of white cotton/change colour of bicarbonate indicator from red to yellow
P3 : Cause the temperature increases/contain tar/it acidic
Sample answer
1. Cigarette smoke releases heat/ changes the colour of white cotton/change colour of bicarbonate indicator from red to yellow cause the temperature increases/it contain tar/it acidic</td><td>3</td></tr>
<tr><td></td><td>Able to define operationally based on the result of the experiment with two aspects correctly.</td><td>2</td></tr>
<tr><td></td><td>Able to define operationally based on the result of the experiment with only one aspect correctly</td><td>1</td></tr>
<tr><td></td><td>None of the above or no response</td><td>0</td></tr>
<tr><td colspan="3">KB0602 - Classifying</td></tr>
<tr><td>(i)</td><td>Able to match the apparatus and material to obtain data for the three variables correctly

Sample answer
<table>
<tr><th>Variables</th><th>Apparatus</th><th>Material</th></tr>
<tr><td>Manipulated</td><td>Filter pump</td><td>cigarette</td></tr>
<tr><td>Responding</td><td>thermometer</td><td>Cotton wool/ bicarbonate indicator</td></tr>
<tr><td>Controlled</td><td>U-tube</td><td>matches</td></tr>
</table></td><td>3</td></tr>
</table>

	Able to match the apparatus and material for any two way variables correctly	2
	Able to match the apparatus and material for any one way variable correctly	1
	No response or incorrect response	0

Question 2

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 variation P2 : height H : relationship and question mark(?) Sample answer What type of variation does human height belong to**?**	**3**
	Able to state a problem statement inaccurately Sample answer What is the human height belong to.	**2**
	Able to state a problem statement at idea level Sample answer Variation affecting the human height.	**1**
	No response or incorrect response	**0**

AIM OF INVESTIGATION

No.	Mark Scheme	Score
KB061203	Able to state the **aim** of the investigation correctly Sample answer To study variation in height among student in the class.	

HYPOTHESIS

No.	Mark Scheme	Score
KB061202	Able to state a **hypothesis** relating the manipulated variable to the responding variable correctly P1 : Number of student P2 : height H : relationship Sample answer **There is a variation in height among students**	**3**
	Able to state a hypothesis inaccurately Sample answer The height among the student	**2**
	Able to state a hypothesis at idea level Sample answer Number of student affected the variation	**1**
	No response or incorrect response	**0**

VARIABLES

No.	Mark Scheme	Score
KB061203	Able to state all three **variables** correctly Sample answer Manipulated : Height of student Responding : Number of student Fixed : Age, sex, class of student	

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 Sample answer Apparatus : **Height Scale, meter ruler** Materials : **Student**	**3**
	Able to list 1 apparatus and 2 materials	**2**
	Able to list 1apparatus 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 Sample answer To measure the height of students using a meter ruler/height skill	**B1 = 1**

PROCEDURE

No.	Mark Scheme	Score
KB061204	Able to describe the steps of experiment correctly Sample answer 1. The height of each student in your class is measured **using height scale/meter rules.** 2.**The height of students is divided into intervals starting with 130 cm and finish up with 174 cm** 3. The number of students in each height interval is counted and recorded. 4. A histogram for the number of students against height is constructed **Note :** K1 : Preparation of materials and apparatus 1. Height scale is prepared 2. Students of the class are measured 3. the height of student is divided each interval. **(All 3 steps)** K2 : Operating fixed variable (use the student of class 5A) K3 : Operating responding variable (number of student which measured their height)	
	K4 : Operating manipulated variable (state the height of student of this experiment)	
	K5 : Precaution/ To improve data collected (get the average reading of height)	
	All the 'K'	**3**
	Any 3 - 4 K	**2**
	Any 2 K	**1**
	No response or incorrect response	**0**

<table>
<tr><th>No.</th><th>Mark Scheme</th><th>Score</th></tr>
<tr><td>KB061203</td><td>Able to present all data with units correctly

<u>Sample answer</u>
<table>
<tr><td>Height(cm)</td><td>130-134</td><td>135-139</td><td>140-144</td><td>145-149</td><td>150-154</td><td>155-159</td><td>160-164</td><td>165-169</td><td>170-174</td></tr>
<tr><td>Number of students</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td><td>B2 = 1</td></tr>
</table>

<u>CONCLUSION</u>

No.	Mark Scheme	Score
KB061203	Able to make the right **conclusion** correctly <u>Sample answer</u> There is a variation in the height among students. Hypothesis accepted Reject : (only) Hypothesis accepted	

<u>PLANNING OF EXPERIMENT</u>

No.	Mark Scheme	Score
KB061203	Able to write the **experimental planning** 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**

MARKING SKILL

PAPER 3 (EXERCELANCE STUDENT'S ANSWER)

a) *Pleurococus*. *Sp* is a unicellular green alga found on the bark of trees. The population distribution of *Pleurococus*. *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 *Pleurococus*. *Sp*.

Diagram 1 shows a tree plant trunk on which *Pleurococus*. *Sp* was growing.

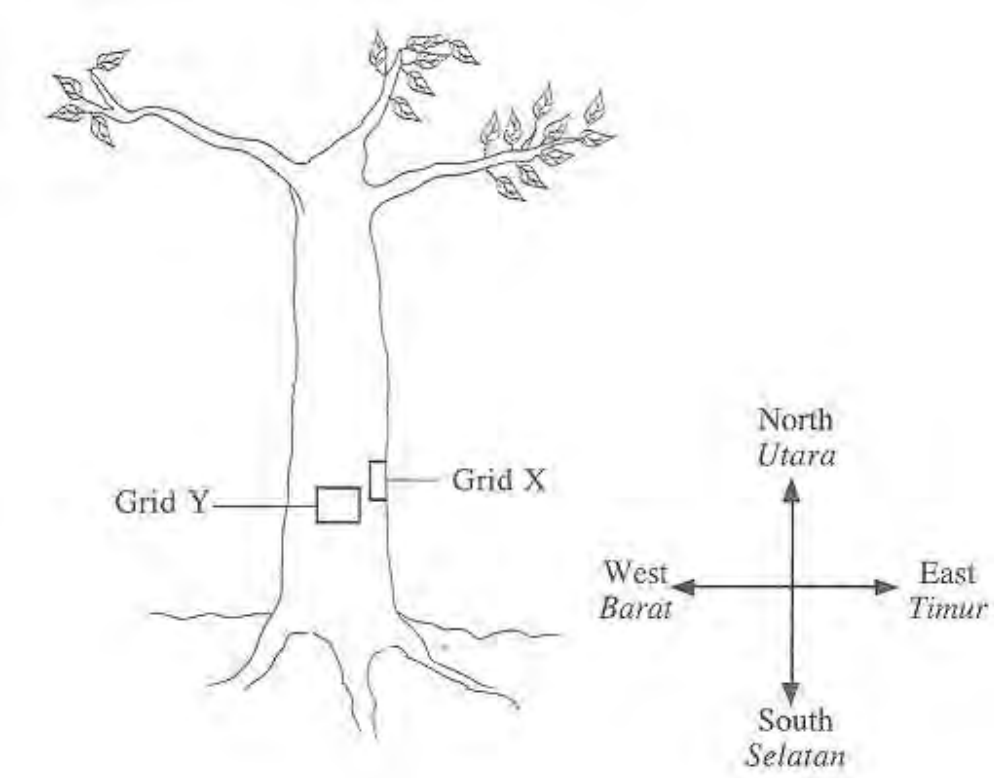


Diagram 1

Two samples of the distribution of *Pleurococus*. *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 *Pleucoccus* sp. on Grid X and Grid Y.

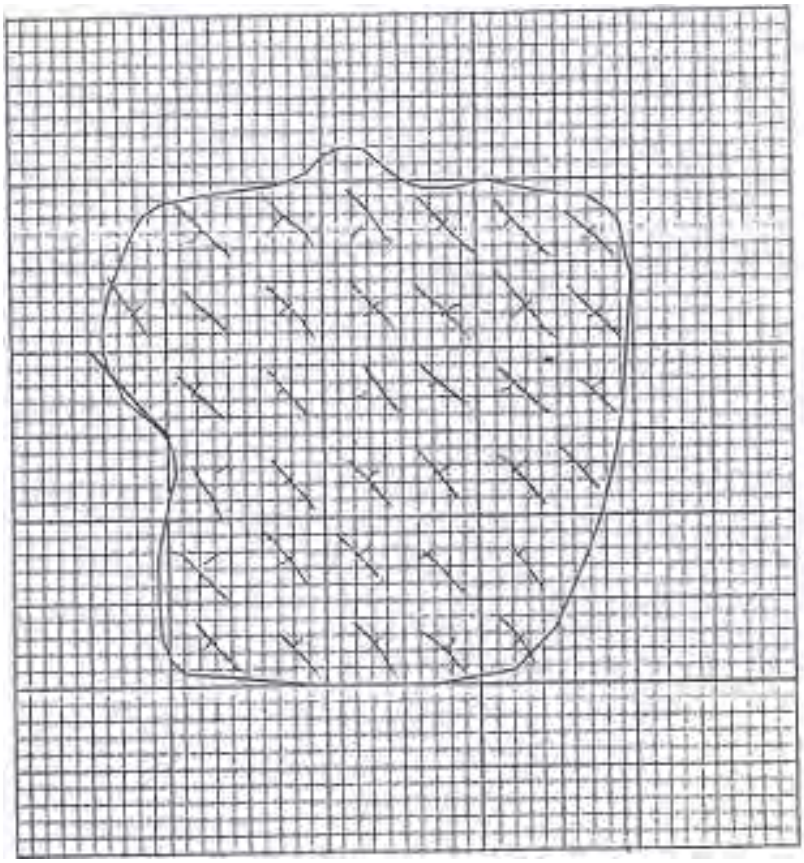
Grid	Total surface area covered by *Pleucoccus* sp.
X	 ……(36)…….. cm^2

Table 1 (a)

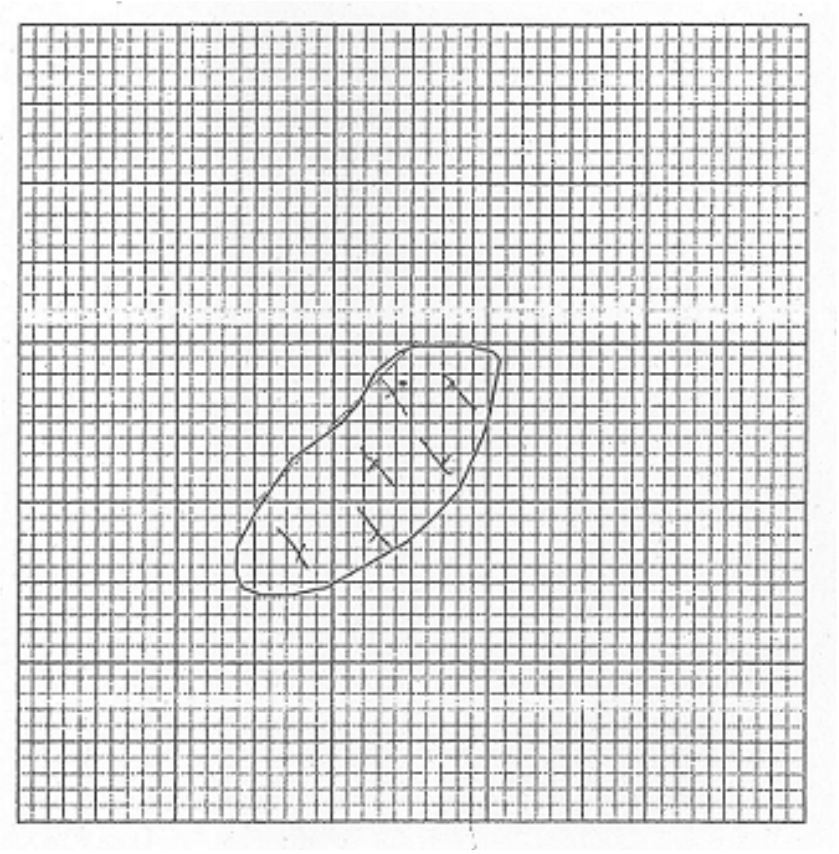
Grid	Total surface area covered by *Pleucoccus* sp.
Y	 ……(…6…)…….. cm^2

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).

For examiner's use

[3 marks]

1(a) 3

(b) (i) State two different observations made from the diagrams in Table 1 (a) and Table 1 (b)

Observation 1:

The total surface area covered by Pleurococcus sp. in Grid X is $36cm^2$

Observation 2:

The total surface area covered by Pleurococcus sp. is $6cm^2$ in Gris Y

[3 marks]

1(b)(i) 3

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

Inference from observation 1:

Pleurococcus sp in Grid X receives more light intensity and it will grow faster

.....

Inference from observation 2 :

Pleurococcus sp Grid Y receives less light intensity and it will slow in growth

[3 marks

1(b)(ii) 3

9

(c) Complete Table 2 based on this experiment.

For Examiner Use

Variable	Method to handle the variable
Manipulated variable Light intensity	Place Grid X facing East that receives more sunlight and Grid Y facing South which receives less sunlight
Responding variable Total surface area covered by Pleurococcus sp	Measured and record the total surface area covered by Pleurococcus sp by using graph paper
Controlled variable Size of grid	Both grid with the same size that is 10cm x 10cm is used in experiment. .....

Table 3

[3 marks]

1(c) 3

(d) State the hypothesis is for this experiment.

The higher the light intensity received by Pleurococcus sp. the larger the total surface area covered by it.

.....

[3 marks]

1(d) 3

6

For Examiner's Use

(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
- Potion of the grid
- Total surface area covered by *Pleucococcus* sp.

Grid	Total surface area covered by pleurococcus sp (cm^2)
X	36
Y	6

1(e)(i)

[3marks] 3

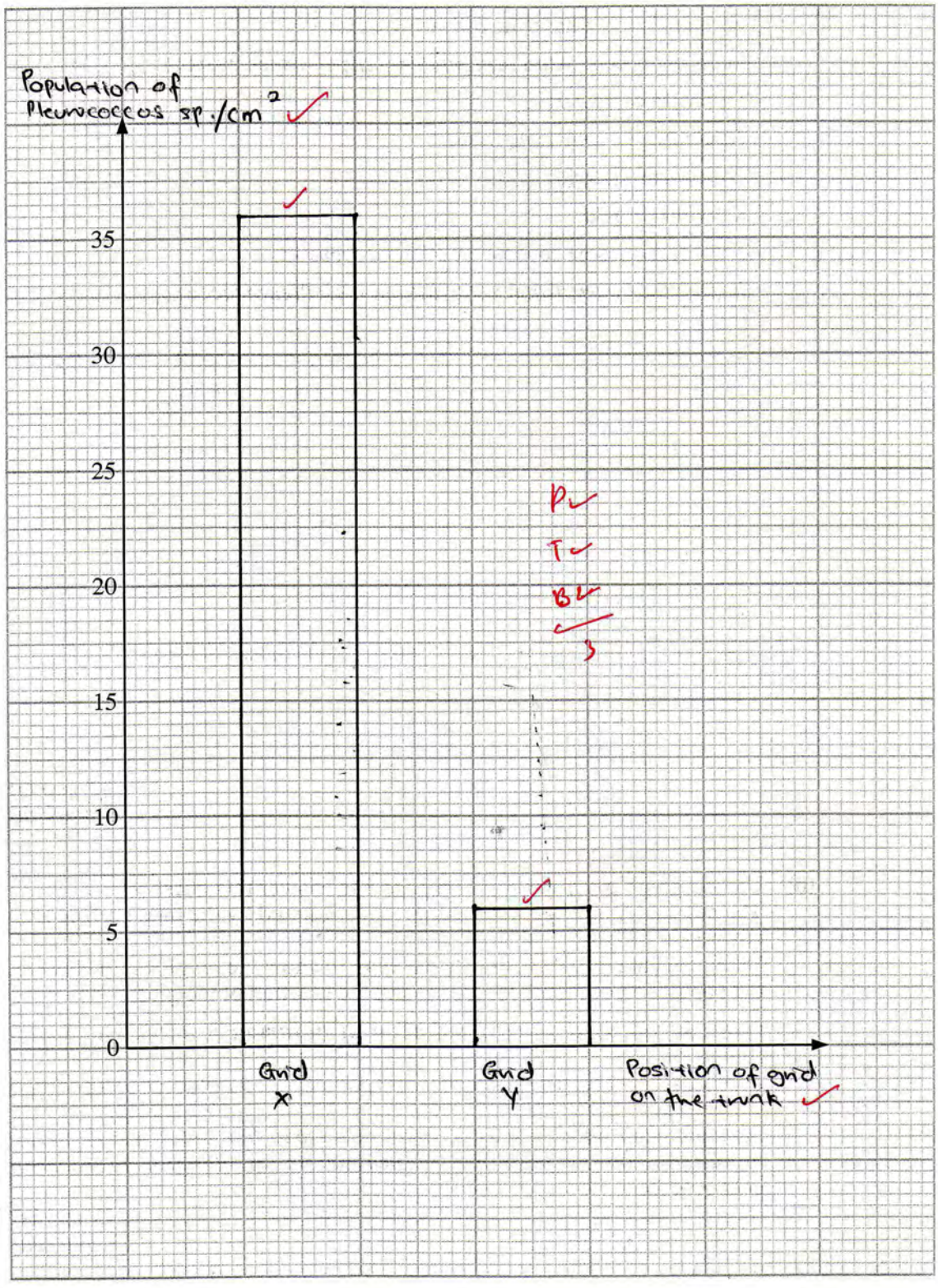
(e) (ii) Use the graph paper provided on the page 8 to answer this question.
The population of *Pleucococcus* sp is represented by the total surface area covered in the grid.

Using the data in 1(e)(i) , draw a bar chat to show the relationship between the population of *Pleucococcus* sp. and the position of the grids.

[3 marks] 1(e)(ii) 3

6

Population of *Pleurococcus* sp. against the position on the tree trunk



4551

(f) Based on the bar chat in 1(e)(ii), explain the relationship between the population distribution of pleurococcus sp and the light intensity.

The population distribution of Pleurococcus sp increase as the light intensity increase. High light intensity is needed for photosynthesis and production or formation of green algae. Hence as the light intensity increase, the rate of photosynthesis of algae increases

[3 marks]

For Examine Use

1(f) 3

(g) State the operational definition for population distribution of *Pleurococcus* sp. *Hydrilla sp.* Explain your prediction.

Population distribution of Pleurococcus sp is the total area of production of Pleurococcus sp at certain place. The population is made by place the grid at different place with different light intensity and the area covered is calculated.

[3 marks]

1(g) 2

(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.

Increase which is 40cm^2 . This is because the Pleurococcus sp get higher light intensity which increase rate of photosynthesis.

.....

[3 marks]

1(h) 3

8

For Examiner Use

(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
Fish ✓	Humidity ✓
Water –lily ✓	Temperature ✓
Snail ✓	Soil ✓
	pH paper ✓

Table 3

[3 marks]

1(i)

3

3

Total

32

PAPER 3 (MODERATE STUDENT'S ANSWER)

Pleurococus. *sp* is a unicellular green alga found on the bark of trees. The population distribution of *Pleurococus*. *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 *Pleurococus*. *sp*.

Diagram 1 shows a tree plant trunk on which *Pleurococus*. s*p* was growing.

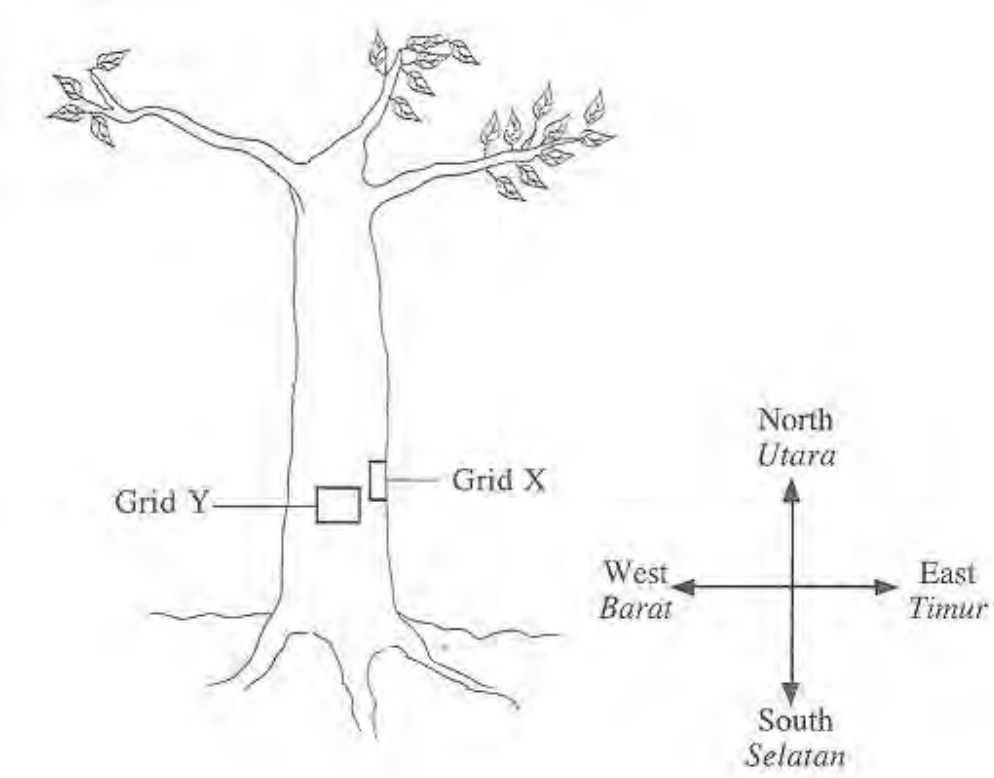


Diagram 1

Two samples of the distribution of *Pleurococus*. *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 *Pleucoccus* sp. on Grid X and Grid Y.

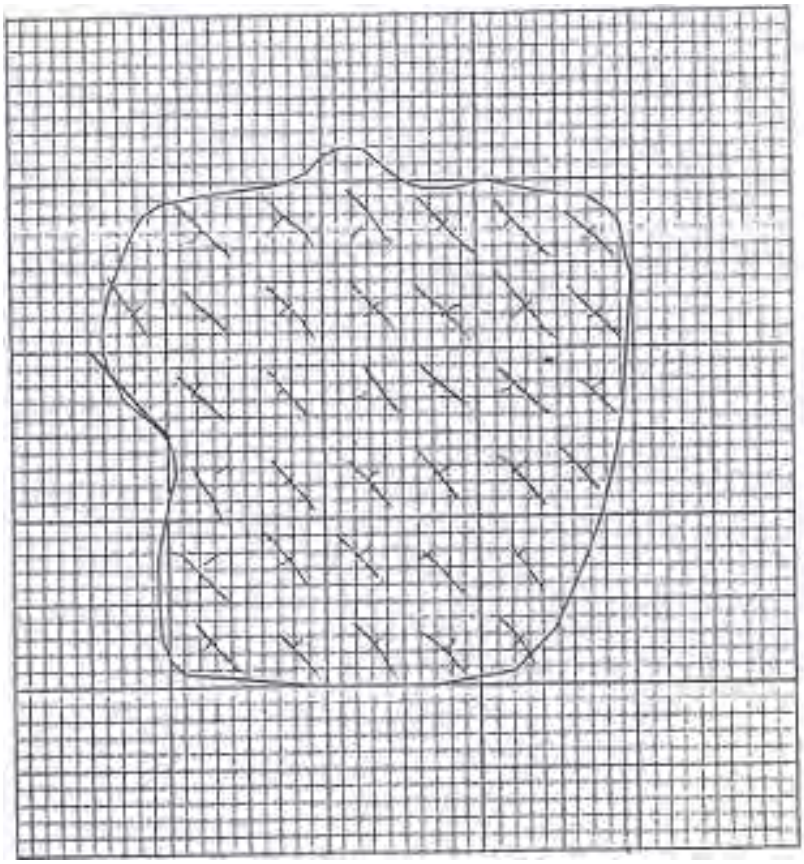
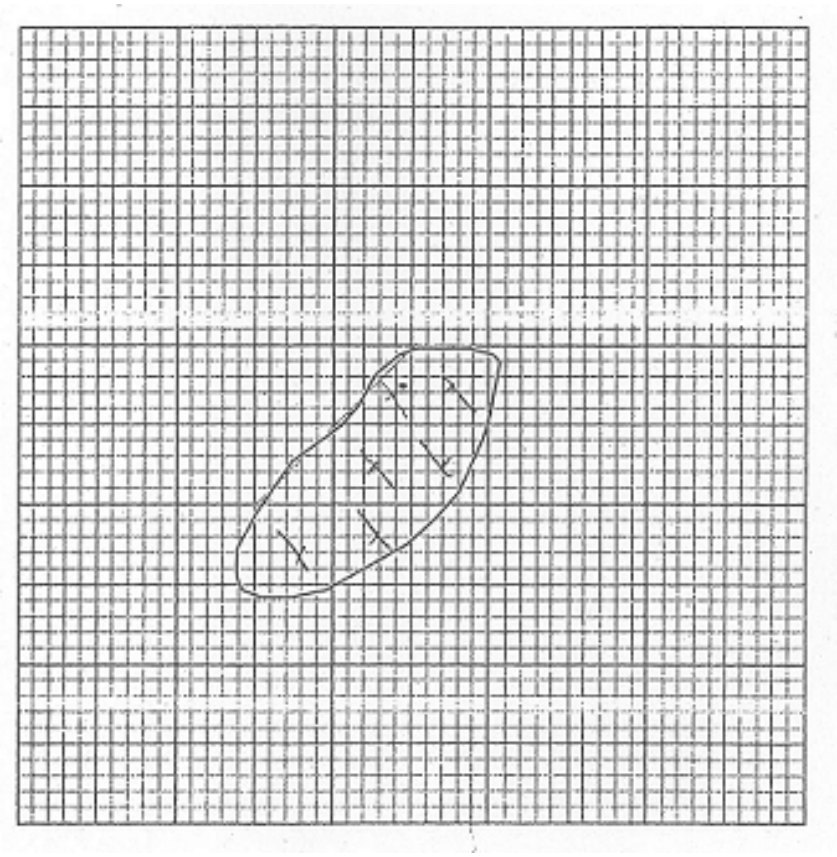
Grid	Total surface area covered by *Pleucoccus* sp.
X	 ✓ ……(36)…….. cm^2

Table 1 (a)

Grid	Total surface area covered by *Pleucoccus* sp.
Y	

……(…5.5)…….. cm^2

a) Record the total surface area covered by *Pleurococcus* sp.in the spaces provided in Table 1(a) and Table 1 (b).

Table 1 (b)

For examiner's use

[3 marks] 1(a) 2

b) (i) State two different observations made from the diagrams in Table 1 (a) and Table 1 (b)

Observation 1:

The total surface area covered by Pleurococcus sp. in Grid X is $36cm^2$

Observation 2:

The total surface area covered by Pleurococcus sp. is 5.5 cm^2 in Gris Y

1(b)(i) 3

[3 marks]

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

Inference from observation 1:

Pleurococcus sp in Grid X receives more light intensity

.....

Inference from observation 2 :

Pleurococcus sp Grid Y receives less light intensity

1(b)(ii) 2

[3 marks]

7

For Examiner Use

(c) Complete Table 2 based on this experiment.

Variable	Method to handle the variable
Manipulated variable (Position of the grid)	(Place Grid X facing East and Grid Y facing South)
Responding variable (Total surface area covered by *Pleurococcus sp*)	(Measured the total surface area covered by *Pleurococcus sp* by using grid
Controlled variable (Type of plant)	The experiment is carried out on the same tree throughout the two experiment

TABLE 2

[3 marks]

1(c) 2

(d) State the hypothesis is for this experiment.

The higher the light intensity towards the plant the higher the population distribution *Pleurococcus sp.* the larger the

.....

[3 marks]

1(d) 3

5

For Examiner's Use

(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
- Potion of the grid
- Total surface area covered by *Pleucococcus* sp.

Grid	Total surface area covered by pleurococcus sp
X	36
Y	5.5

1(e)(i)

[3marks] 2

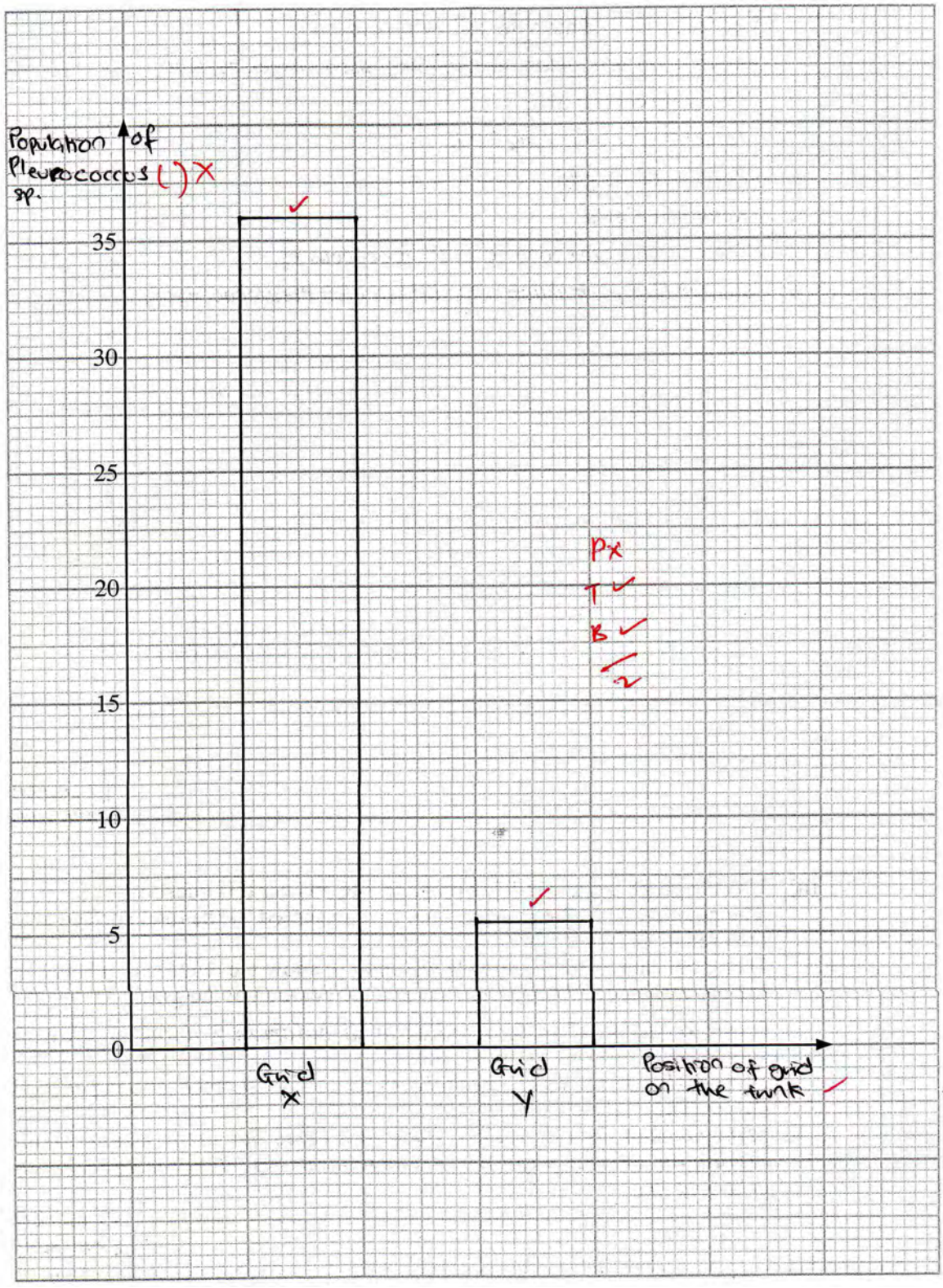
(e) (ii) Use the graph paper provided on the page 8 to answer this question.
The population of *Pleucococcus* sp is represented by the total surface area covered in the grid.

Using the data in 1(e)(i) , draw a bar chat to show the relationship between the population of *Pleucococcus* sp. and the position of the grids.

[3 marks] 1(e)(ii) 2

4

Population of *Pleurococcus* sp. against the position on the tree trunk



For Examine Use

(f) Based on the bar chat in 1(e)(ii), explain the relationship between the population distribution of pleurococcus sp and the light intensity.

The population distribution of Pleurococcus sp in Grid X is higher because it receive more intensity increase.

[3 marks]

1(f) 2

(g) State the operational definition for population distribution of *Pleurococcus* sp. *Hydrilla sp.* Explain your prediction.

Total surface area covered by Pleurococcus sp. and it can measured by using graph paper.

[3 marks]

1(g) 2

(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.

The total surface area will increase . This is because the Pleurococcus sp get more light intensity.

.....

[3 marks]

1(h) 2

6

(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
Fish ✓ Water -lily ✓ Snail ✓ Soil ✗	Humidity ✓ Temperature pH paper ✓

Table 2

[3 marks]

For Examiner Use

1(i)

2

Total

24

PAPER 3 (POTENSIAL STUDENT'S ANSWER)

Pleurococus. *Sp* is a unicellular green alga found on the bark of trees. The population distribution of *Pleurococus*. *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 *Pleurococus*. *Sp*.

Diagram 1 shows a tree plant trunk on which *Pleurococus*. *Sp* was growing.

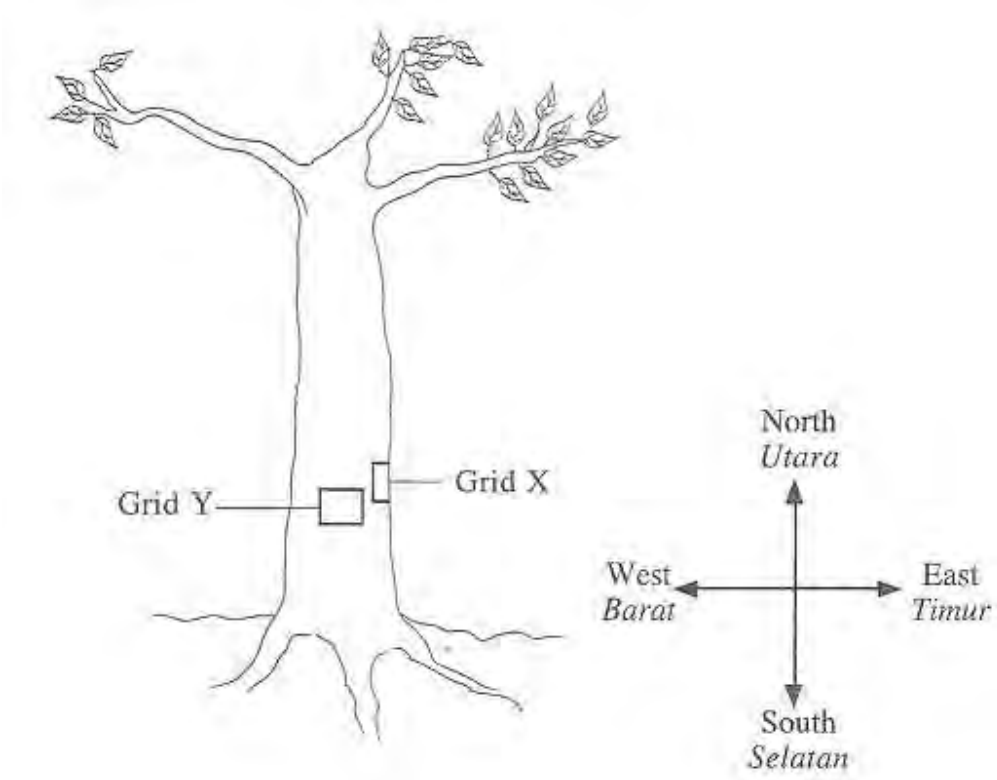


Diagram 1

Two samples of the distribution of *Pleurococus*. *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 *Pleucoccus* sp. on Grid X and Grid Y.

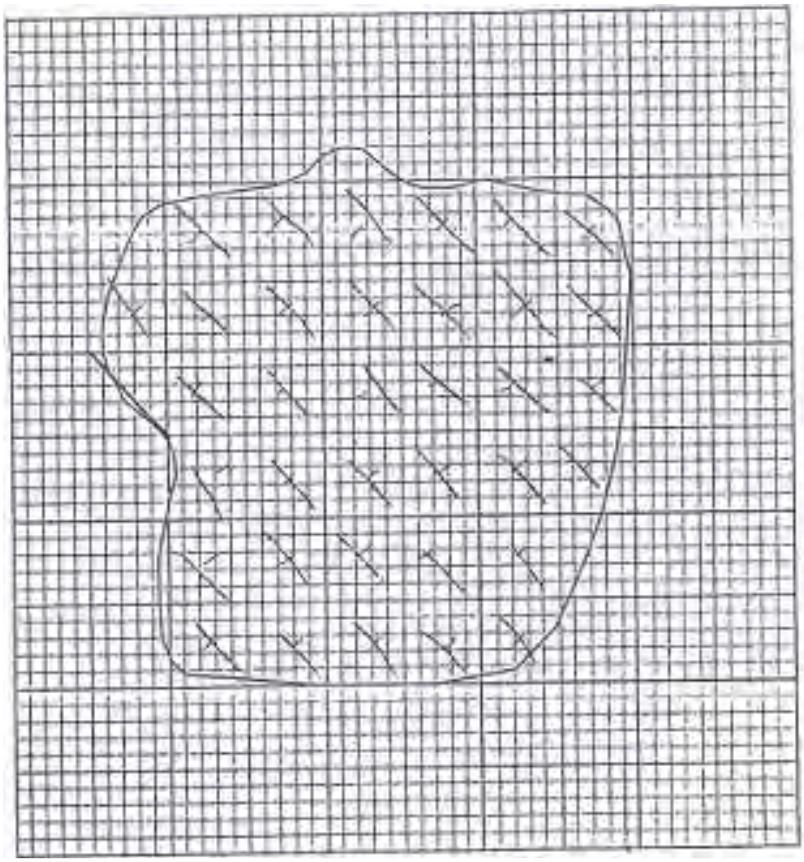
Grid	Total surface area covered by *Pleucoccus* sp.
X	 ……(31)…….. cm^2

Table 1 (a)

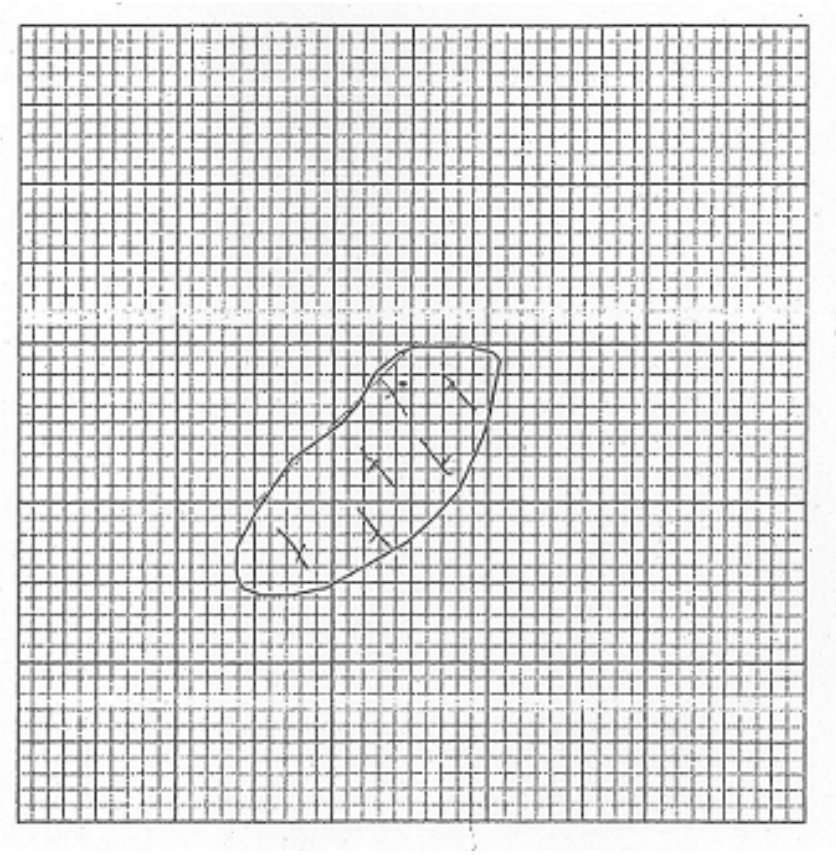
Grid	Total surface area covered by *Pleucoccus* sp.
Y	 ……4.5……. cm^2

Table 1 (b)

b) Record the total surface area covered by *Pleurococcus* sp.in the spaces provided in Table 1(a) and Table 1 (b).

For examiner's use

[3 marks] 1(a) 0

b) (i) State two different observations made from the diagrams in Table 1 (a) and Table 1 (b)

Observation 1:

The total surface area covered by Pleurococcus sp. in Grid X is higher than in Grid Y

Observation 2:

The total surface area covered by Pleurococcus sp. in Grid Y is lesser than in Grid X

1(b)(i) 3

[3 marks]

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

Inference from observation 1:

Pleurococcus sp in Grid X receives more light intensity

.....

Inference from observation 2 :

Pleurococcus sp Grid Y receives less light intensity

1(b)(ii) 0

[3 marks]

3

For Examiner Use

(c) Complete Table 2 based on this experiment.

Variable	Method to handle the variable
Manipulated variable Position of the grid	Place Grid X facing East and Grid Y facing South
Responding variable Total surface area covered by *Pleurococcus sp*	Calculate the total surface area covered by *Pleurococcus sp* by using quadrate sampling technique
Controlled variable Place of experiment	By using the same tree for experiment to get some temperature of surrounding

TABLE 2

[3 marks]

1(c) 1

(d) State the hypothesis is for this experiment.

Total Surface area of *Pleurococcus sp.* in Grid X is the larger than in Grid Y

.....

[3 marks]

1(d) 3

4

For Examiner's Use

(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
- Potion of the grid
- Total surface area covered by *Pleucococcus* sp.

Grid	Total surface area covered by Pleurococcus sp
X	31
Y	4.5

1(e)(i)

[3marks] 2

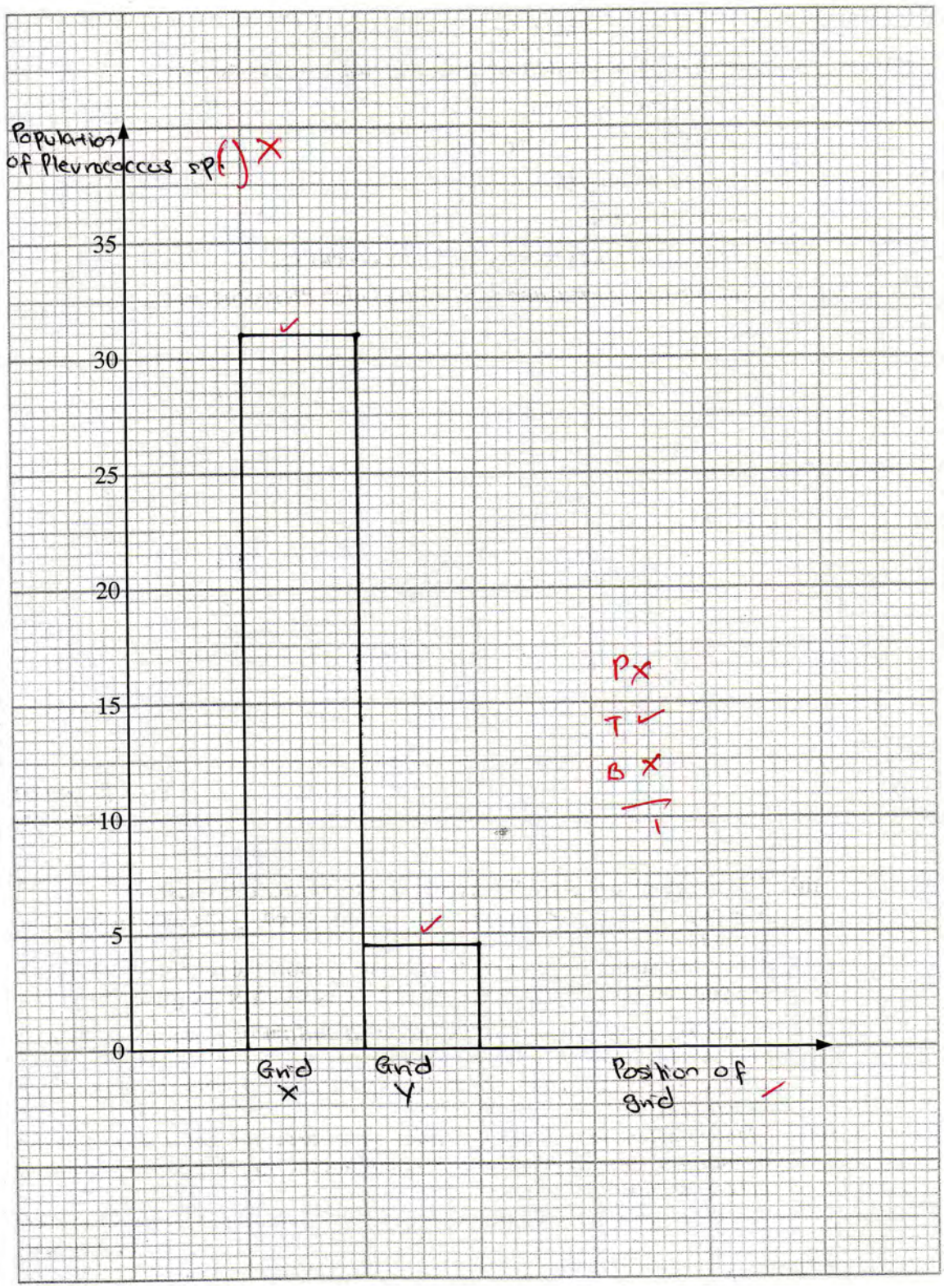
(e) (ii) Use the graph paper provided on the page 8 to answer this question.
The population of *Pleucococcus* sp is represented by the total surface area covered in the grid.

Using the data in 1(e)(i) , draw a bar chat to show the relationship between the population of *Pleucococcus* sp. and the position of the grids.

[3 marks] 1(e)(ii) 1

3

Population of *Pleurococcus* sp. against the position on the tree trunk



For Examine Use

(f) Based on the bar chat in 1(e)(ii), explain the relationship between the population distribution of pleurococcus sp and the light intensity.

R1 ✓

The population distribution of Pleurococcus sp in Grid X is higher because it receive more intensity increase. R 3✓

1(f)

[3 marks] 2

(g) State the operational definition for population distribution of *Pleurococcus* sp. *Hydrilla sp.* Explain your prediction.

D3 ✓

Population distribution Pleurococcus sp. is affected by light intensity, temperature and humidity. High light intensity will increase the population distribution of Pleurococcus sp and increase the rate of photosynthesis.

1(g)

[3 marks] 1

(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.

G1 ✓

The total surface area will increase . This is because the Pleurococcus sp get direct sunlight.

.....

[3 marks] 1(h) 1

4

(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
Fish ✓ Water -lily ✓ Snail ✓ Soil ✗	Humidity ✓ Temperature ✓ pH paper ✓

Table 2

[3 marks] 2

For Examiner Use

1(i) 2

Total 16

(EXCERCELLENCE STUDENT'S ANSWER)

Objective of investigation:
To study the size of molecules that can diffuse through a semipermeable membrane

Problem statement :
What is the size of molecules that can diffuse through a semipermeable membrane?

Hypothesis :
Only the molecules which its size is smaller than the pore in a semipermeable membrane can diffuse through the semipermeable membrane , molecule with its size large than pore in semipermeable membrane are unable to diffuse through.

Variables :
Manipulated variable : molecules with different sizes
Responding variable : ability of the molecules of different sizes to diffuse through a semipermeable membrane
Fix variable : type of semipermeable membrane

Materials and apparatus:
Iodine solution, 0.5% glucose solution, 0.5% starch suspension, Benedict solution, distilled water, thread, visking tubing, 1000cm^3 beaker, Bunsen burner, test tube holder, dropper, measuring cylinder.

Technique :
Test and record the color change when test the content of solution inside and outside visking tubing with iodine and Benedict solution after 30 minutes.

Procedure :

1. A visking tubing is cut and soaked with water for 10 minutes.
2. Then, end of the visking tubing is tied as tight as possible to avoid leakage

4551

3. The visking tubing is filled with 20ml of 0.5% glucose solution and 0.5% starch suspension.
4. A few drops of solution in the visking tubing is taken out using a dropper
5. Then the other end of the visking tubing is also tied tightly
6. The visking tubing is totally immersed into the beaker containing distilled water.
7. The apparatus is left aside for 30minutes.
8. After 30 minutes the visking tubing is taken out from the beaker.
9. Iodine test and Benedict test is done in both the solution in the beaker and the solution in visking tubing.
10. The observation are recorded and tabulated

Presentation of data :

Solution in	Change color when test with	
	Benedict solution	Iodine solution
Beaker		
Visking tubing		

Conclusion:

The hypothesis is accepted. Only the smaller size of molecules able to diffuse through semipermeable membrane and the larger molecules unable to diffuse through it.

9/9 03 = 3

16

4551

(MODERATE STUDENT'S ANSWER)

Objective of investigation:
To study the effect of size of molecules on the diffusion through a semipermeable membrane

Problem statement :
Does all the size of molecules can diffuse through a semipermeable membrane?

Hypothesis :
Smaller molecules such as water can diffuse through a semipermeable membrane.

Variables :
Manipulated variable : Type of solution
Responding variable : The present of particular molecules in distilled water
Fix variable : Volume of solution used

Materials and apparatus:
Iodine solution, 0.5% glucose solution, 0.5% starch suspension, Benedict solution, distilled water, thread, visking tubing, beaker,

Technique :
Observe and record the change of colour in the 20% glucose solution inside the visking tubing after one hour

Procedure :

1. The beaker is half filled with water of 30°C
2. A visking tube is filled with 20ml of starch suspension
3. The visking tube is immersed in the water bath for 30 minutes.
4. After 30 minutes, the visking tubing is taken out from the water bath
5. The water in the beaker is separated into 2 test tube.
6. One of the test tube is dropped with iodine solution using dropper. The changes is observed.

7. The other test tube is added with Benedict solution and was boiled in a water bath for 20 minutes. The changes is observed and recorded
8. Step 1-7 is repeated using glucose solution replacing the starch solution.

Presentation of data :

Solution in	Change color when test with	
Beaker		
Visking tubing		

Conclusion:
Smaller molecules such as water can diffuse through a semipermeable membrane.

(POTENSIAL STUDENT'S ANSWER)

Objective of investigation:
To investigate the size of molecules can diffusion through a semipermeable membrane

Problem statement :
Does the bigger size of molecules diffuse through a semipermeable membrane

Hypothesis :
Starch molecule can't diffuse through a semepermeable membrane .

Variables :
Manipulated variable : Type of solution
Responding variable : The color changes to the iodine solution
Fix variable : Volume of starch suspension and glucose solution

Apparatus :
visking tubing, beaker, measuring cylinder.

Materials:
Iodine solution, starch suspension, glucose solution

Technique :
The result are observed and the data is recorded

Procedure :

1. 50 ml of starch suspension is measured using a measuring cylinder
2. The starch solution is poured in the iodine solution
3. Then the visking tubing is placed in the iodine solution
4. After an hour the observation are made and recorded into a table
5. Steps 1 to 5 are repeted but replacing starch solution with 50ml of glucose solution.

Presentation of data :

Type of solution	Observation
Starch solution	
Glucose solution	

Conclusion:
As starch is a bigger molecule compared to glucose, starch can't pass through a semipermeable membrane. Hypothesis is accepted.

EXAMPLE STUDENT'S ANSWER (PAPER 2 – SPM 2008)

Section A

[60 marks]

Answer **all** questions in this section

1 Diagram 1.1 shows part of the stage of meiosis cell division in an animal cell. The chromosome behavior in stage S is not known.

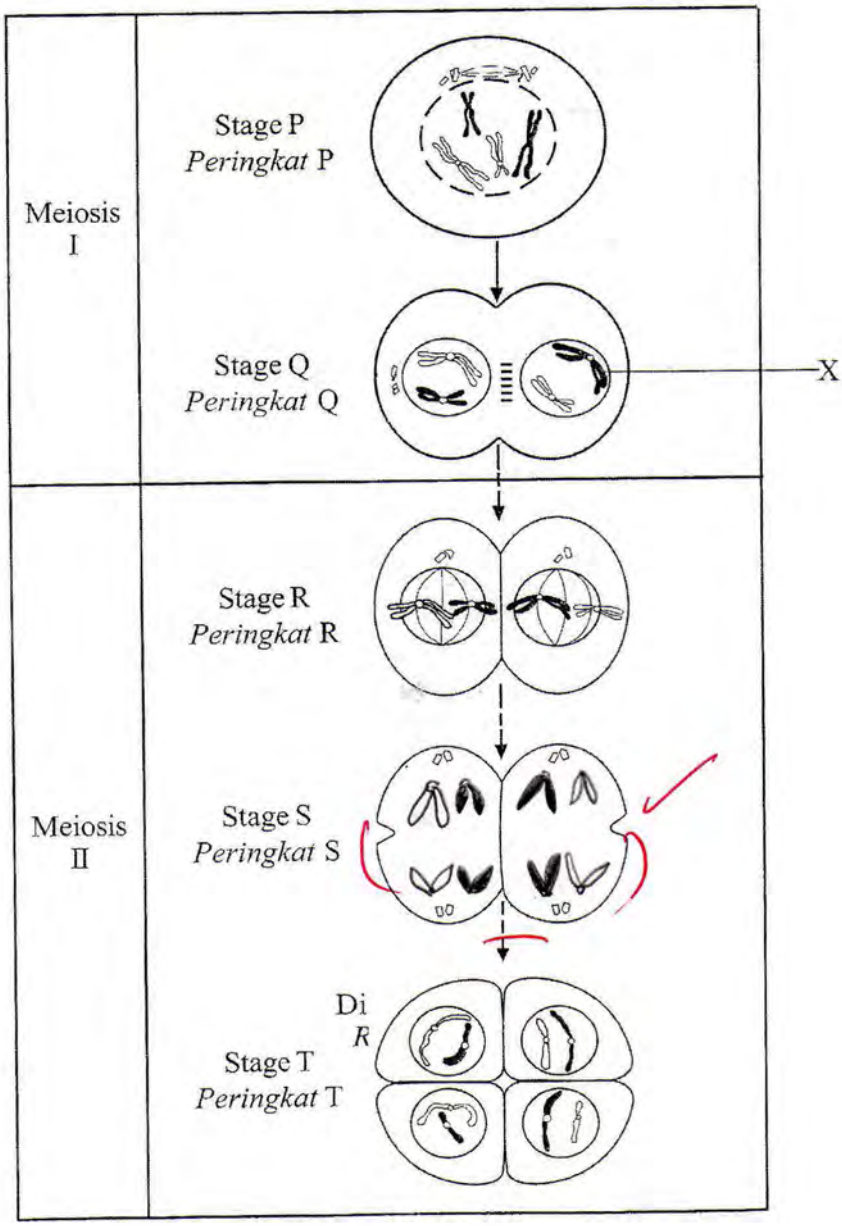


Diagram 1.1

(a) Name the structure labeled X

(Chromatid) [1 mark]

(b) (i) In Diagram 1.1 complete the diagram in stage S to show chromosome behavior. [1 mark]

(ii) State one of the changes which occurs in stage S

(The chromosome are divided into chromatid)

.....

[1 mark]

(c) Diagram 1.2 shows process Y which takes place in stage P

Beginning Of process Y End of process Y

Diagram 1.2

(i) In Diagram 1.2, draw a diagram showing the appearance of the chromosome at the end of process Y

[1 mark]

(ii) Name the process Y

Chiasma

[1 marks]

(iii) State one importance of process Y to an organism.

It cause variation to the organism

.....

[1 marks]

(d) Diagram 1.3 shows skin cells. Cells X are cancerous cells which are formed after the normal cells are exposed to factor W.

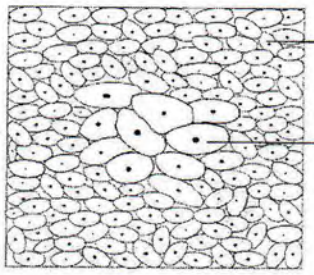


Diagram 1.3

(i) Give two examples of factor W.

1. Radioactive X - ray P1

2. Ultra-violet ray P1

[2 marks]

(ii) Explain the formation of cells X.

Factor W will cause mutation to DNA of the cell. It will change the genetic sequence and causing a change in the chemical reaction in our body. The cell is mutated will grow rapidly by mitosis.

2 [2 marks]

(ii) State two ways to prevent the development of cells X.

1 Kill all the cancerous cell by radiation treatment

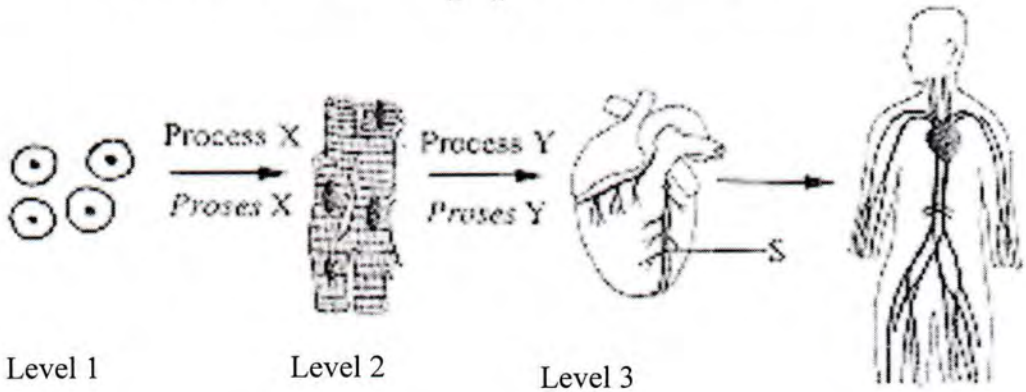
.....

2 Avoid being exposed to excessive sunlight and radioactive substances

2 [2 marks]

4551

2. Diagram 2 shows four levels of cell organization in humans.



(a) Complete Table 2 by naming Level 2 and Level 3

Level	Name
1	Cell
2	Tissues
3	Organs
4	System

Table 2

2 [2 marks]

(b) (i) The cell undergo process X to become specific cells that perform a specific function.

Name the process X.

Cell organisation

0 [1 mark]

(ii) What is the function of the structure in level 2?

Form the muscle of the heart so that the heart can pump the blood simultaneously.

1 [1 mark]

(iii) The structure in level 4 is one of the body systems.

Name this system.

Blood circulatory system.

[1 mark]

(iv) State **one** function of the system in 2(b)(iii).

To pump oxygen and nutrients to the body cells.

0 [1 mark]

(c) (i) Name and explain the condition which can cause a blockage in blood vessel S.

Name :

Thrombosis

Explanation:

The cholesterol from food eaten cause the blockage of blood vessel. The cholesterol deposited on the wall of vessel. The blood cannot flow through the blocked vessels cause hypertension.

2 [3 marks]

(ii) A person is suffering from the condition in 2 (c)(i).

State three effects on the person's health.

1 The person will suffers angina

2 If the artery leads to brain, the person will suffer stroke

3 Cancer

4 Heart attack

8

2 [3 marks]

3. Diagram 3.1 shows the inheritance of fur colour in rabbits.

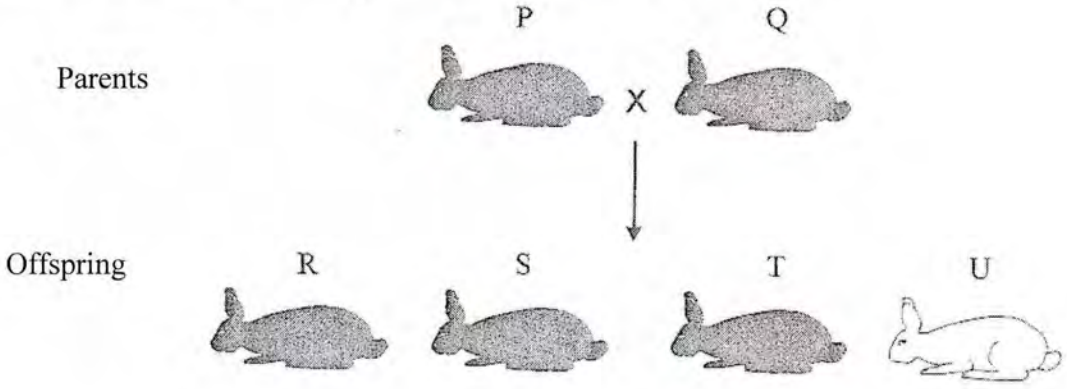


Diagram 3.1

(a) State the genotype and phenotype of rabbit P

Genotype : Bb

Phenotype : Black fur

2 [2 marks]

(b) B represents the dominant allele for black fur while b represents the recessive allele for white fur.

(i) Explain why B and b are called allele.

P3 ✓

B and b are called alleles as they are will determine the characteristics of the offspring and are from the paternal and maternal origin 2 of each are of the maternal and paternal origin

1 [2 marks]

(ii) What happens to allele B and b during the formation of gametes?

Separate or segregate and form gametes. Each gamete only receives one of the pair of allele

1 [1 mark]

(c) Diagram3.2 shows a cross between offspring R and offspring S. R is heterozygous for fur colour.

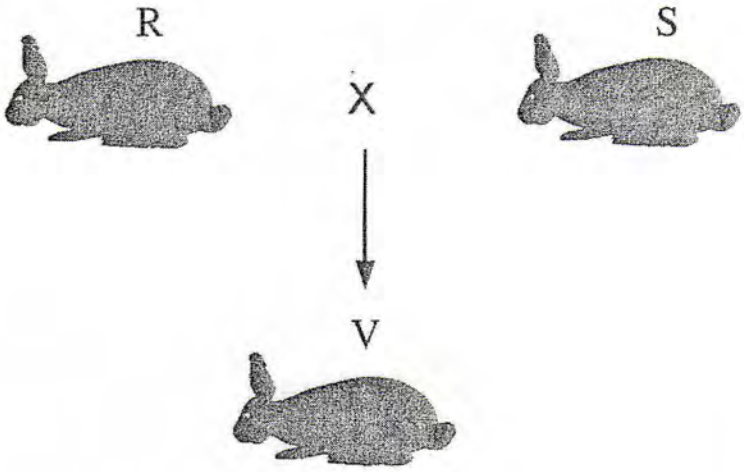


Diagram 3.2

(i) What are the possible genotypes of S?

BB

[1mark]

(ii) Explain the inheritance of fur colour by rabbit V.

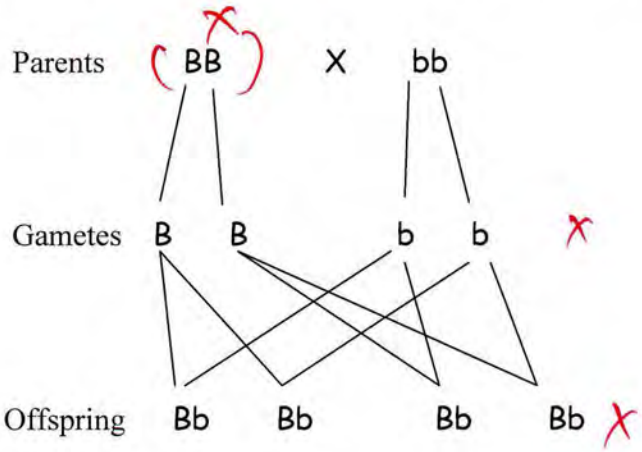
Rabbit R has genotype of Bb while rabbit S has genotype of BB. When the gametes are randomly fertilized, rabbit V will have a genotype of BB or Bb. In both these genotype the black colour is dominant to the white colour of the fur.

[2 marks]

(d) Diagram 3.3 shows offspring R is crossed with offspring U.

Diagram 3.3

(i) Draw a schematic diagram to show the product of this cross.



[3 marks]

(ii) What is the probability of producing with black fur in 3(d)(i) ?

1 :1 or 100%

[1mark]

7

4. Diagram 4 shows two types of twins

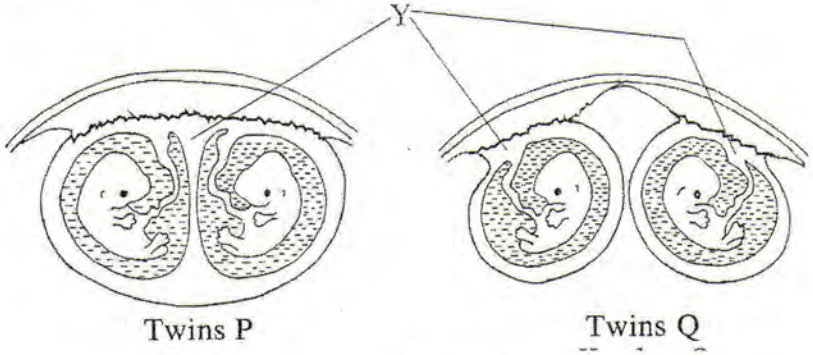


Diagram 4

(a) (i) Name the type of twins Q

Fraternal twins.

[1 mark]

(ii) Explain how twins Q are formed

Two sperms will undergoes fertilization process with two ovum and produces two zygotes.

[2 mark]

(b) (i) Name the structure Y.

Placenta.

[1 mark]

(ii) State **two** functions of structure Y.

1 To provide nutrients to the baby such as glucose.

2 To separate the blood circulatory system of the baby and mother.

[2 mark]

(c) State two differences between twins P and twins Q.

1. Twins P share their placenta whereas twins Q has their own placenta.

2. Twins P has same sex not compare.

[2 mark]

(d) Twins P are brought up by two different adopted families. The twins do not have the same body size when they are adult.

Explain why.

Because they are control by environmental factor. The both twins are not same in an insufficient of intake food or practicing regular exercise.

[2 mark]

(e) A woman who is a heavy smoker become pregnant.

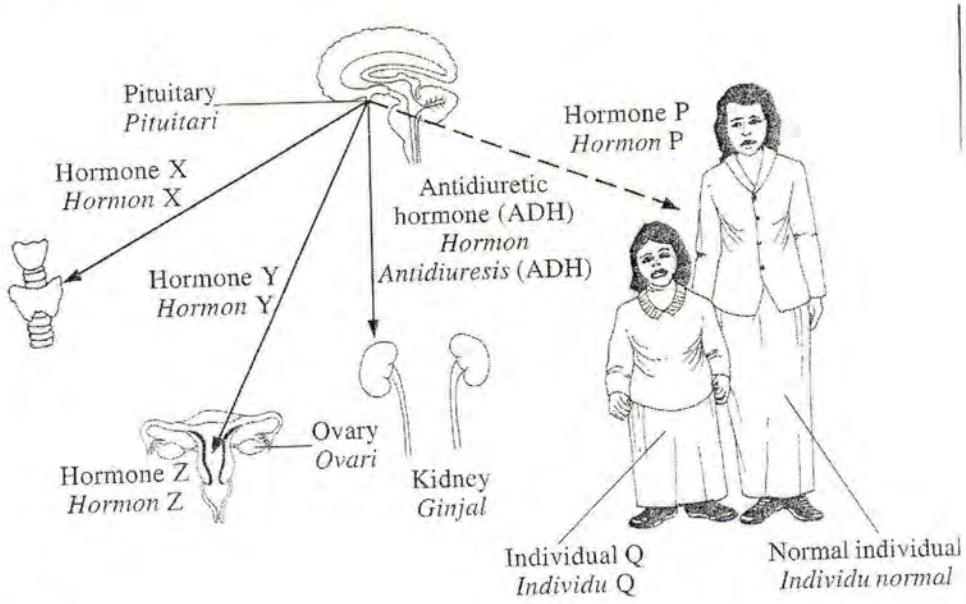
Explain why she should stop smoking.

Smoke which contain tobacco tar, nicotine will affect the baby. This substances are very small and can easily diffuse through the placenta.

10

[2 mark]

5. Diagram 5 shows the role of the pituitary gland as a 'master gland'.
Hormone Y is responsible for the development of a follicle in the ovary.



Key :

⟶ organ affected by hormone

⇢ general effect of hormone

(a) (i) Name hormone X

Thyroid stimulating hormone (TSH) ✓

[1 mark]

(ii) State the function of hormone X.

Needed for growth ✗

[1 mark]

(b) Hormone Y stimulates the development of a Graffian follicle in the ovary and sperm in the testis.

Name hormone Y.

Follicle stimulating hormone

[1 mark]

(c) The presence of hormone Y causes the secretion of hormone Z.

Hormone Z affects the development of the uterus.

(i) Name hormone Z.

Oestrogen

[1 mark]

(ii) State the role of hormone Z in the development of the uterus.

To repair endometrium lining

[1 mark]

(d) (i) Name hormone P

Growth hormone

[1 mark]

(ii) Explain how hormone P is responsible for the physical appearance of individual Q in Diagram 5.

Less production of hormone P, cause growth are slow.

[2 mark]

(e) (i) State the circumstances in which more ADH is secreted, as shown in Diagram 5.

More ADH secreted when blood osmotic pressure will increase

[1 mark]

(ii) Explain the role of ADH in producing less and concentrated urine.

ADH will stimulate the kidney to reabsorb more water into the body thus producing less and more concentrated urine.

[2 mark]

(f) Give **one** reason why pituitary gland is considered ad the 'master gland'

It control the other glands and signals other glands whether to secrete hormone or not.

[1 mark]

9

SECTION B (SAMPLE STUDENT'S ANSWER)

QUESTION 6

(a) When water is low, osmotic pressure is high. Water will diffuse into X. Water diffuse from high concentration to low concentration region. Water diffuse into X by osmosis.

(b) The similarities between facilitated diffusion and active transport is that both involve the protein structure such as carrier protein. Both involves the binding of molecules. The binding site of carrier protein which then changes shape to transport the molecules. Both transport useful molecules to and from cell for cellular activity.

The differences between facilitated diffusion and active transport are facilitated diffusion involves movement of molecules down the concentration gradient but in active transport it is against the concentration from low concentration to higher concentration.

Active transport requires energy in the form of ATP to carry the molecule. In facilitated diffusion, molecules such as sodium ion and potassium ions are involve. Pore protein are only required in facilitated diffusion but not in active transport.

(c) In diagram 6.2 the salt solution used is more hypertonic compare to the cytoplasm of the cell of fish. Thus water from the fish diffused out by osmosis through the semipermeble membrane into the salt solution. the cell of fish is plasmolyse. Thus, with not much water in the cells of fish the bacterial growth is inhibited. The fish is preserved and last longer.

4551

QUESTION 7

(a) (i) When there is a cut on the skin, the blood vessel is damage and form a wound. The fibres is expose to blood. Hence, platelet will help of vitamin K and calcium ion produce a blood clothing factor of plasma protein call thromboplastin. The thromboplastin is then the inactive plasma protein which is called protrombin to active plasma protein which is called thrombin. Then thrombin will acts as an enzyme to convert the soluble protein, fibrinogen to insoluble protein, fibrin. Then fibrin will form a stiky networt around the wound. There is blood clothing occurs. The blood would stop bleeding.

- max: 4

(ii) The man has a low number of erythrocytes. The function of erythrocytes is to carried oxygen to all part of body. The lack of erythrocyte cause the man to have anemia. He feel tired easily because oxygen is not transported to the muscle cells. Besides that, he fainted easily because oxygen is insufficient in the brain. He will feel dizzy occasionally. In several case, it causes death when the brain is out of oxygen or the supply of oxygen to the heart is cut off. He should included spinach, milk and liver in his diet. These food contain high value of iron. Iron is needed to produce heamoglobin in the erythrocytes.

- 6

(b) (i) Organism S - fish
Organism T - human

- 2

(ii) The differences between blood circulatory system in organism T and organism S is that the blood flow through the heart twice in organism T but only flow once in organism S. The heart for organism T consists of four chambers whereas the heart for organism S only consist of two chambers.

There are similarities between them. Firstly both blood circulatory system are closed system. Blood flow in blood vessels.

- 3

QUESTION 8

(a) (i) The undigested food will enter into the colon that is large intestine. The undigested food will accumulate in the colon with present of vitamin B_{12}. All undigested substances such as water, fiber will accumulate in colon. Those undigested substances will move with peristalsis until it reach at rectum. Then, a large number of those substances will produces pressure to be out of the body.

(ii) Protein is needed for the growth of the child and also for the replacement of new cell in the body. Protein also important for build strong muscle and bone and teeth. If insufficient of protein, the child may get kwashiorkor. This condition will make the stomach of the child swell and become very big. Insufficient of protein also will slow the growth of the child. The child also will have make bone and teeth. The cell can't be growth and the child will become thin and has low metabolism.

For insufficient of carbohydrate, the child may become weak due to insufficient of energy supply. Carbohydrate supply energy for the child doing daily activities. Insufficient of carbohydrate will make the child become thin and small and weak.

For insufficient of fibre, the child may be suffer for absorption in by period of time. For insufficient of vitamin, the child may lack of nutrients to help the body to do daily activity. Lack of vitamin A, it can cause night blindness, vitamin D can cause rickets

(b) (i) The value of energy is 8230kJ. The food he take did not satisfy this daily energy activity.

(ii) The boy will be very tired as a teenager he must do various activity. He will feel tired as energy his consumed is less the actual energy requirement. Other than that his growth will be retarded as he do not have enough nutrient. Teenager need lot of nutrient as this is the time that a boy growth rate is higher. The boy will suffer constipation as there is not fibre in his diet. He consumed potato chip and sausage which are high containing mineral salt. This will cause hypertension and more seriously high blood pressure.

QUESTION 9

(a) (i) If the concentration levels of carbon dioxide are increasing, the solar radiation from sunlight will trap by carbon dioxide. The gases trap by carbon dioxide which is greenhouse gases will cause greenhouse effect because the heat is reflected back to the earth. Global warming is happen due to the greenhouse effect.

(ii) Forest burning will release carbon dioxide into the atmosphere. Global warming will be caused due to the rise in carbon dioxide level. Furthermore, forest is known as carbon dioxide sinkhole because they take in carbon dioxide during photosynthesis.

Forest burning also releases soot and causes haze. This can cause lung infection like bronchitis and irritant the eye. The vision of the surrounding will be reduced. The soot release affects the stomata of leave.

Forest burning also causes animals to lost their habitat. Flora and fauna will be extinct. Forest burning also releases sulphur dioxide into the atmosphere and will causes acid rain.

(b) Spreading fertilizers will increase the nutrient of soil and can increase the yield of crops. Spraying insecticides can kill pets and ensure a higher yield in production.

But when fertilizer are spread, rain water will wash the artificial nutrients into the river or lake. Those will cause eutrophication. Aquatic life cannot be sustained because of the high BOD value. Spreading fertilizer also induce the growth of weeds.

Spraying insecticide on the crops will kill the pests but after some time the pests will be resistant towards the insecticide. A stronger insecticide is then used. When spraying insecticide, poisonous gas is released into the air. The quality of air will be reduced.