

Biology
Paper 1
Oct
2008
1¼ jam

**JAWATAN KUASA KURIKULUM ZON A KUCHING
SARAWAK**

**PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2008**

BIOLOGY

Paper 1

One Hour and Fifteen Minutes

DO NOT OPEN THIS TEST PAPER UNTIL YOU ARE TOLD DO SO

- 1 This paper consists of 50 questions.*
- 2 The diagram in the questions provides you with useful information.*
- 3 The diagrams are not drawn to scale unless stated.*
- 4 You may use a non-programmable scientific calculator*

This Question Paper Consist of 25 Printed Pages

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. *This question paper consists of 50 questions.*
2. *Answer **all** questions.*
3. *Answer each question by blackening the correct space on the answer sheet.*
4. *Blacken only **one** space for each question*
5. *If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer*
6. *The diagrams in the questions provide you with useful information. The diagrams are not drawn to scale unless stated*
7. *You may use a non-programmable scientific calculator*

1. Which of the following has the highest density of chloroplast?

- A Epidermis cells
- B Guard cells
- C Mesophyll Palisade cells
- D Spongy mesophyll cells

2. Which of the following differences between plant cells and animal cells is NOT correct?

	Plant cell	Animal cell
A	Do not have centriole during cell division	Centriole present during cell division
B	Have cell wall	No cell wall
C	Have chloroplast	No Chloroplast
D	Contain glycogen granules	Contain starch granules

3. Figure 1 shows a type of muscle.



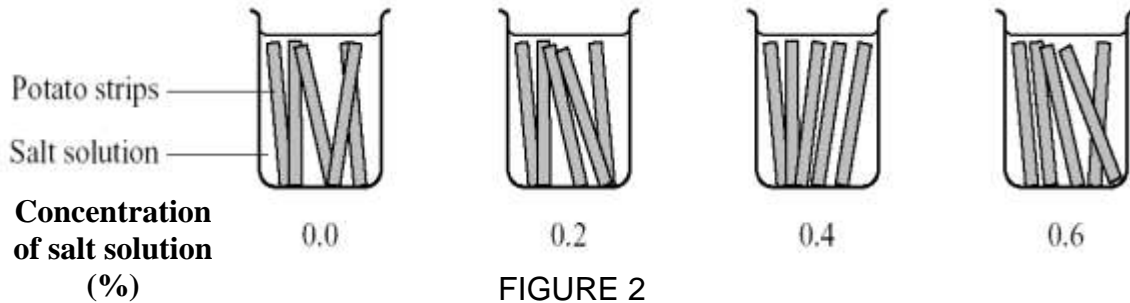
FIGURE 1

The muscle shown above is involved in

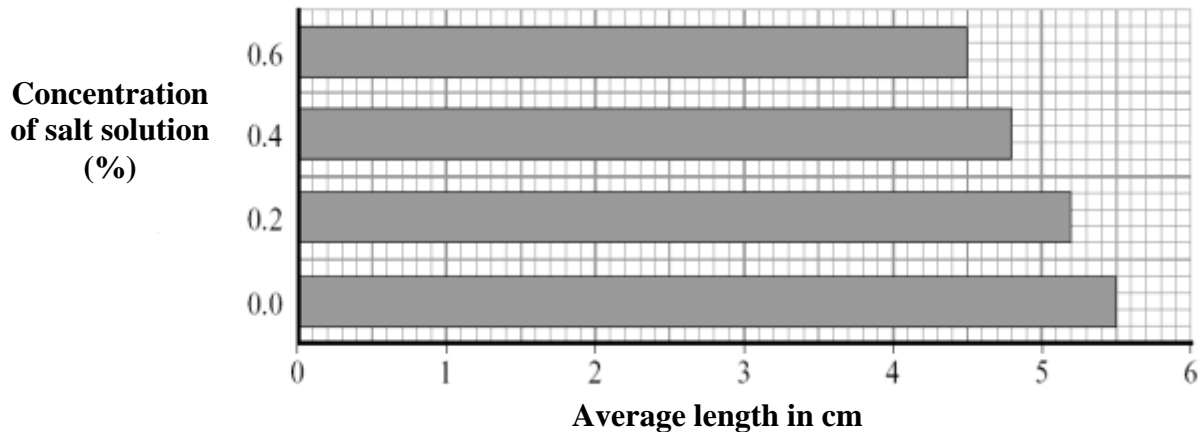
- A Heart contraction
- B Hands movement
- C Peristalsis
- D Coughing

Questions 4 to 6 are based on Figure 2 below.

Thin strips of potato of the same width and exactly 5 cm long were cut and placed in salt solutions of different concentrations.



After two hours, the strips were removed, carefully dried and their length measured. The mean length of the strips of potato were recorded and are shown in the chart below.



4. At which concentration would you expect the length of the potato strips to remain unchanged?

- A 0.3 %
- B 0.5 %
- C 0.7 %
- D 1.0 %

5. The potato strips in a salt solution with a concentration of 0.6 %

- A. decreased in length by 0.5 cm.
- B. decreased in length by 1 cm.
- C. increased in length by 0.5 cm.
- D. increased in length by 1 cm.

6. What process caused the change in length of the potato strips?

- A. Active transport
- B. Osmosis
- C. Facilitated diffusion
- D. Diffusion

7. Which of the following shows the differences between mitosis and meiosis?

	Mitosis	Meiosis
I	Involves one stage of cell division	Involves two stages of cell division
II	Produces two identical diploid daughter cells	Produces four haploid daughter cells (gametes)
III	Synapsis and crossing over takes place between homologous chromosomes	Synapsis and crossing over does not take place
IV	Does not result in genetic variation	Results in genetic variation

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

8. Figure 3 shows a plant cell undergoing mitosis.

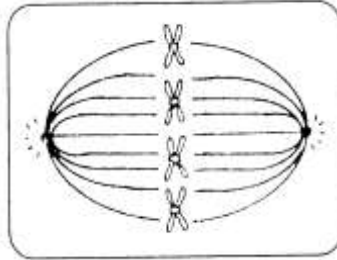


FIGURE 3

Name the stage of mitosis shown state the number of chromosomes each daughter cell?

	<u>Stage of mitosis</u>	<u>No of chromosomes</u>
A	Metaphase	4
B	Anaphase	4
C	Metaphase	8
D	Anaphase	8

9. Figure 4 shows the karyotype of an individual.

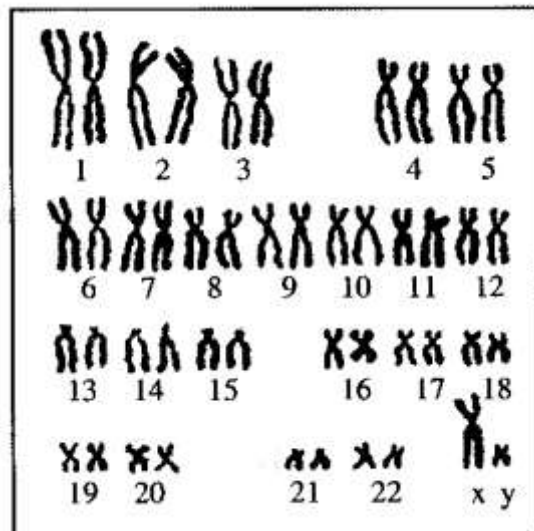


FIGURE 4

This individual is a

- A normal man
- B normal woman
- C man with Down Syndrome
- D woman with Down Syndrome

10. Figure 5 below shows stages of embryo development.

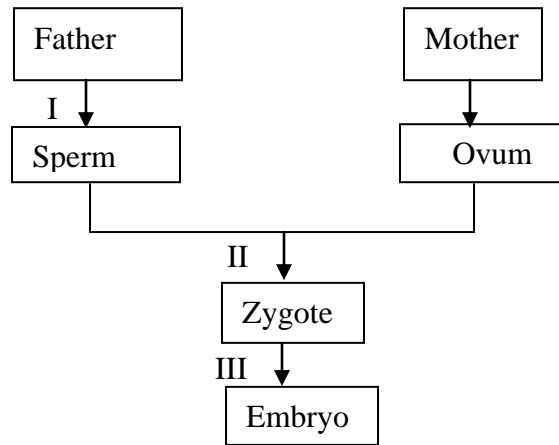


FIGURE 5

Which of the following represent I, II dan III ?

- | <u>I</u> | <u>II</u> | <u>III</u> |
|-----------|---------------|------------|
| A Mitosis | Fertilisation | Meiosis |
| B Meiosis | Mitosis | Mitosis |
| C Meiosis | Fertilisation | Mitosis |
| D Mitosis | Meiosis | Meiosis |

11. In an experiment, 5 drops of a 0.1% solution of vitamin C was needed to decolourise 2 ml of DCPIP while 10 drops of fruit juice X was needed to decolourise the same amount of DCPIP. What is the percentage of vitamin C in juice X?

- A. 0.05 %
- B. 0.1 %
- C. 0.2 %
- D. 0.5 %

12. The diagram shows the digestive system of a rabbit.

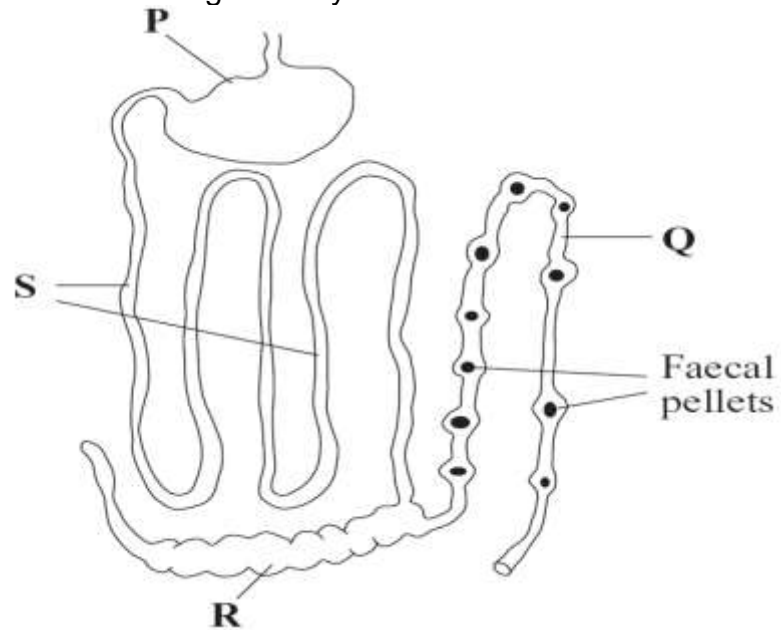


FIGURE 6

Which labeled part has the most number of cellulose digesting bacteria?

- A. P
 - B. Q
 - C. R
 - D. S
13. Different types of food have different energy values.
Calculate the energy value of chicken based on the information in Table 1 below.

Mass of chicken /g	0.7
Mass of water /g (1ml of water weighs 1g)	20.0
Initial temperature / °C (t_1)	25.0
Final temperature / °C (t_2)	88.7

TABLE 1

What is the energy value of the chicken?

- A. 63.7 kJ g⁻¹
- B. 7.64 kJ g⁻¹
- C. 20.2 kJ g⁻¹
- D. 3.39 kJ g⁻¹

14. Figure 7 shows the structure of a chloroplast.

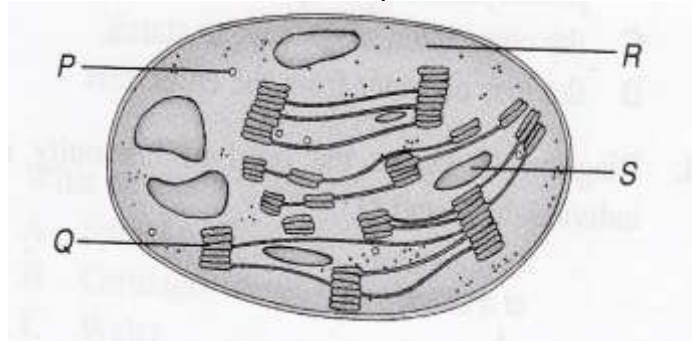


FIGURE 7

Where do the light reactions of photosynthesis occur?

- A. P
 - B. Q
 - C. R
 - D. S
15. Figure 8 is a graph showing the effect of light intensity on rate of photosynthesis of a plant.

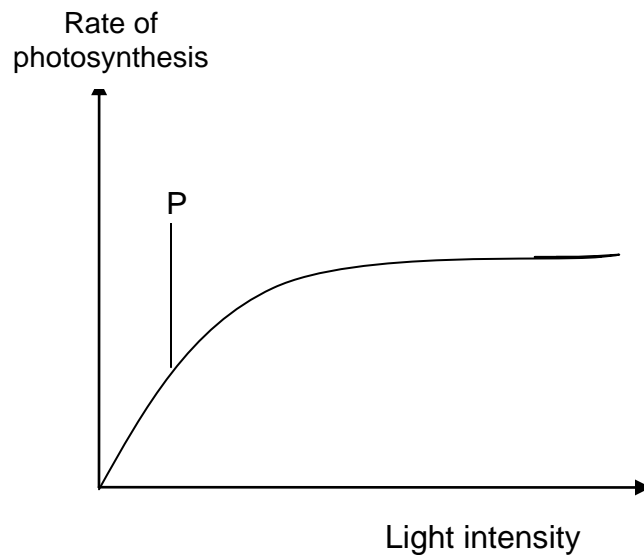


FIGURE 8

What is the limiting factor at point P on the graph?

- A. Carbon dioxide concentration
- B. Light intensity
- C. Temperature
- D. Water

16. Figure 9 below shows parts of the digestive system.

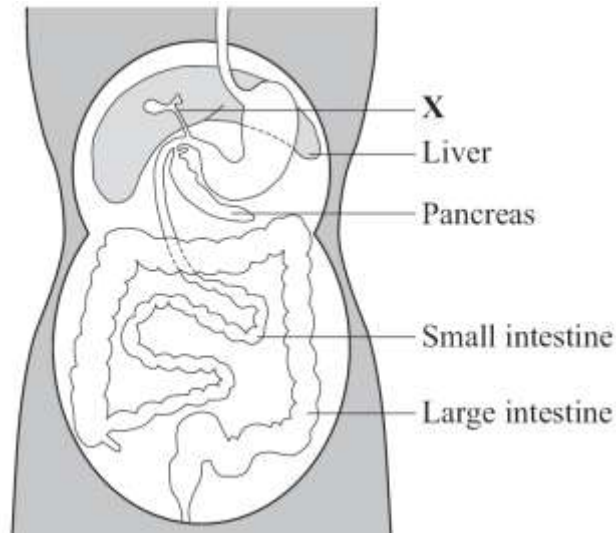


FIGURE 9

Which of the following would occur if tube X were blocked?

- I. Acid from the stomach would not be neutralized
 - II. Starch-digesting enzymes would not be released
 - III. Bile could not reach the small intestine
 - IV. Fat-digesting enzymes could not reach the small intestine
-
- A. I and III
 - B. I and IV
 - C. I, II and IV
 - D. II, III and IV

17. Figure 10 shows the schematic diagram summarising the process of photosynthesis.

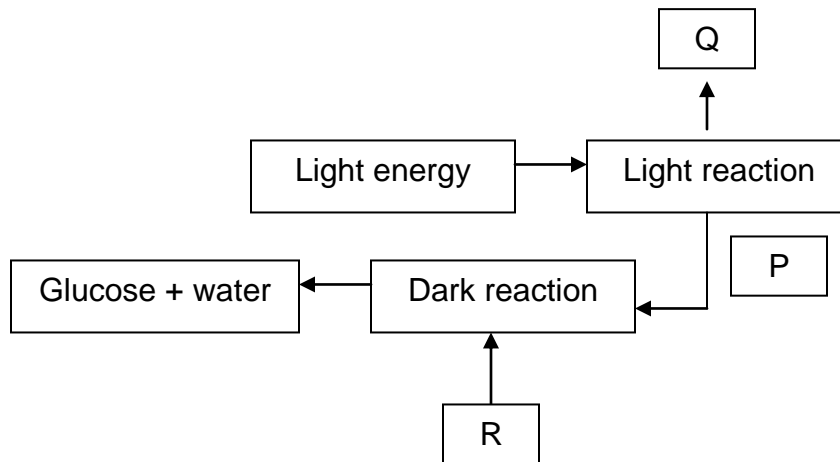


FIGURE 10

Which of the following represents P, Q and R?

	P	Q	R
A	Hydrogen	Oxygen	Carbon dioxide
B	Hydrogen	Carbon dioxide	Oxygen
C	Carbon dioxide	Oxygen	Hydrogen
D	Oxygen	Hydrogen	Carbon dioxide

18. Figure 11 shows an organism with a different respiratory system from human.



FIGURE 11

Which of the following statements about the organism is **true** ?

- A The breathing system is made up of trachea
- B Blood in the haemocoel transport respiratory gases
- C Blood is pumped into the tracheal system
- D Mixing of oxygenated blood and deoxygenated blood occur in the haemocoel

19. Figure 12 shows an experiment that measure the composition of an air sample.

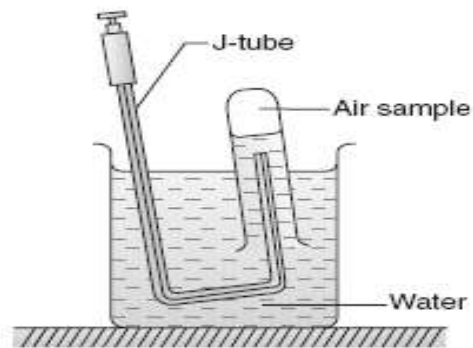


FIGURE 12

Length of exhaled air column	=	10.0 cm
Length of exhaled air column after treatment with potassium hydroxide	=	9.6 cm
Length of exhaled air column after treatment with potassium pyrogallate	=	8.5 cm

What is the percentage of oxygen content in the exhaled air?

- A. 4.0 %
- B. 8.5 %
- C. 11.0 %
- D. 15.0 %

20. In Figure 13, the amount of energy available to the primary consumers is approximately

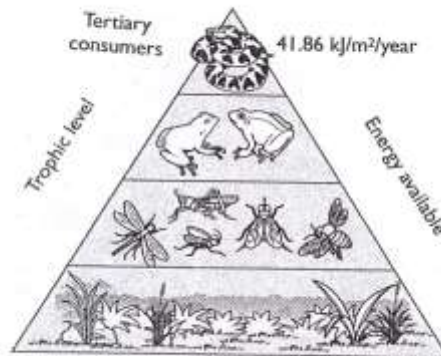
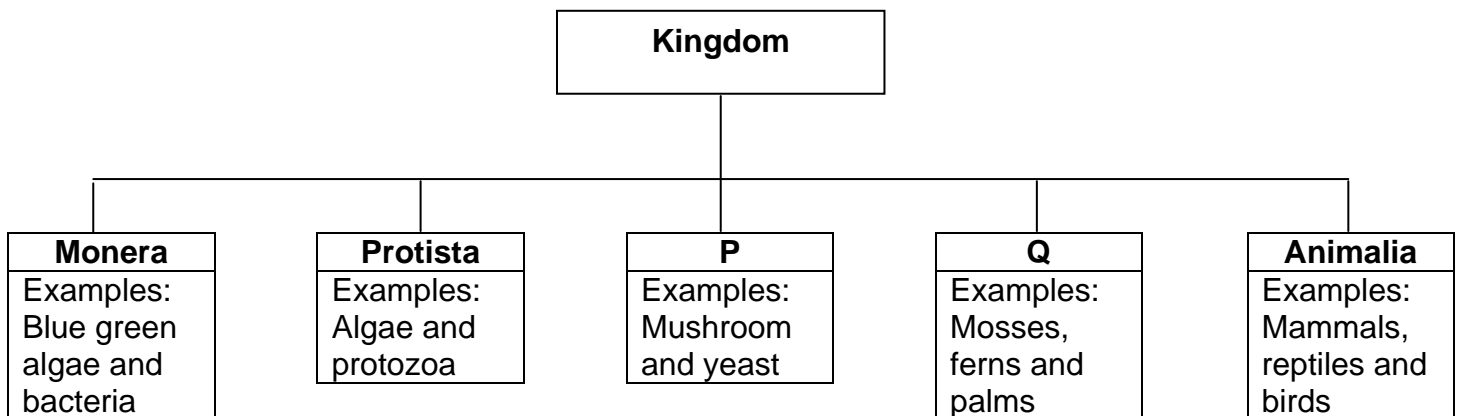


FIGURE 13

- A. 4.186 kJ/m²/year
- B. 41.869 kJ/m²/year
- C. 418.600 kJ/m²/year
- D. 4186.00 kJ/m²/year

21. The diagram below shows the classification of organisms into five kingdoms:



What are P and Q and what is the difference between their modes of nutrition?

	P	Q	Difference
A	Fungi	Plantae	P is parasitic but Q is photosynthetic
B	Plantae	Fungi	P is photosynthetic but Q is parasitic
C	Fungi	Plantae	P is saprophytic but Q is photosynthetic
D	Plantae	Fungi	P is photosynthetic but Q is saprophytic

22. As a black widow spider consumes her mate, what is the lowest trophic level she could be occupying?

- A. first trophic level
- B. second trophic level
- C. third trophic level
- D. fourth trophic level

23. A quadrat measuring 50cm x 50cm is used to determine the species density of plant X in a school field.

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Total number of plant X	5	8	6	0	4	0	7	8	0	2

Based on the results shown in the above table, what is the density of plant per metre square?

- A. 4
- B. 16
- C. 20
- D. 40

24. Figure 14 below shows an environmental phenomenon.

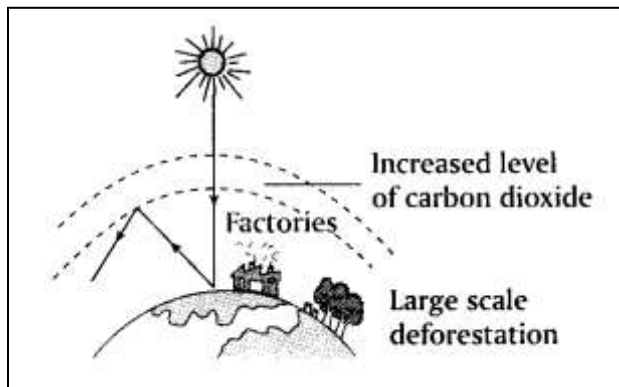


FIGURE 14

What is this phenomenon?

- A. Acid rain
- B. Air pollution
- C. Global warming
- D. Depletion of ozone layer

25. Which of the following shows the correct sequence of blood flow in the pulmonary circulation?

- A. Pulmonary artery → Lungs → Pulmonary vein → Heart
- B. Aorta → Lungs → Pulmonary artery → Heart
- C. Pulmonary artery → Heart → Pulmonary vein → Body Cells
- D. Vena cava → Heart → Pulmonary artery → Lungs

26. Figure 15 shows a part of the blood circulatory system.

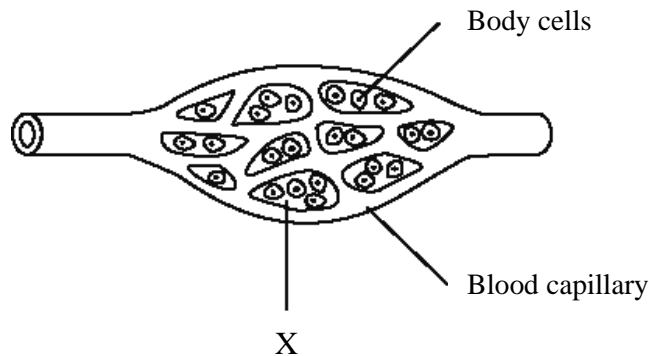


FIGURE 15

Which of the following is not found in X?

- A. Red blood cells
 - B. Oxygen
 - C. Urea
 - D. Water
27. Which of the following shows the correct sequence of the blood clotting mechanism?
- A. Thrombokinase released → Platelets stick together → Prothrombin changes into thrombin → Fibrinogen changes into fibrin
 - B. Platelets stick together → Thrombokinase released → Fibrinogen changes into fibrin → Prothrombin changes into thrombin
 - C. Platelets stick together → Thrombokinase released → prothrombin changes into thrombin → Fibrinogen changes into fibrin
 - D. Thrombokinase (released) → Prothrombin changes into thrombin → Fibrinogen changes into fibrin → Platelets stick together

28. Figure 16 shows a part of the blood circulatory system.

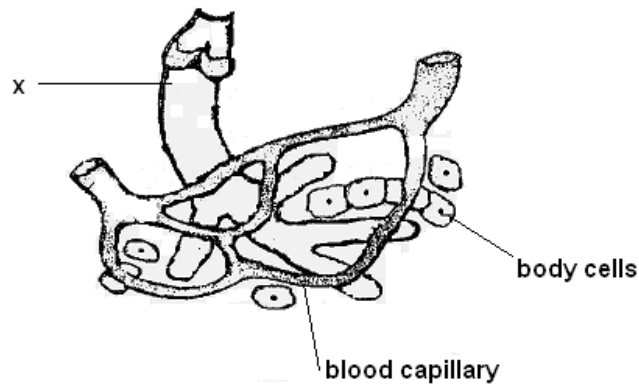


FIGURE 16

Which of the following is absorbed into the blood through X?

- A. fatty acids
- B. glucose
- C. amino acid
- D. urea

29. The graph in Figure 17 shows a type of immunity.

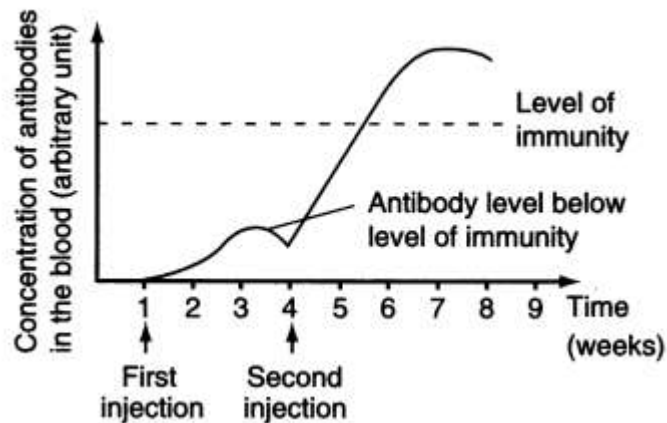


FIGURE 17

Which of the following statements is true about the graph?

- A. An individual has recovered from a disease and acquired immunity from the disease
- B. Antibody is received from the mother's milk
- C. Antibody is produced by the body after vaccine is injected.
- D. The individual is injected with antiserum from another individual.

30. Figure 18 gives a three-dimensional view of a section of a dicotyledonous stem.

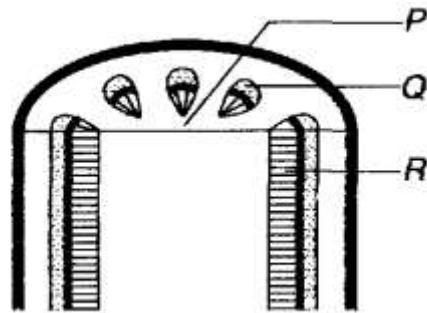


FIGURE 18

What tissues are represented by P, Q and R?

	P	Q	R
A	Pith	Xylem	Cortex
B	Cortex	Phloem	Xylem
C	Cortex	Xylem	Phloem
D	Pith	Phloem	Xylem

31. Figure 19 shows a type of tissue found in the stem of a herbaceous plant.

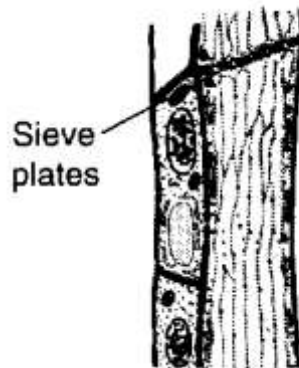
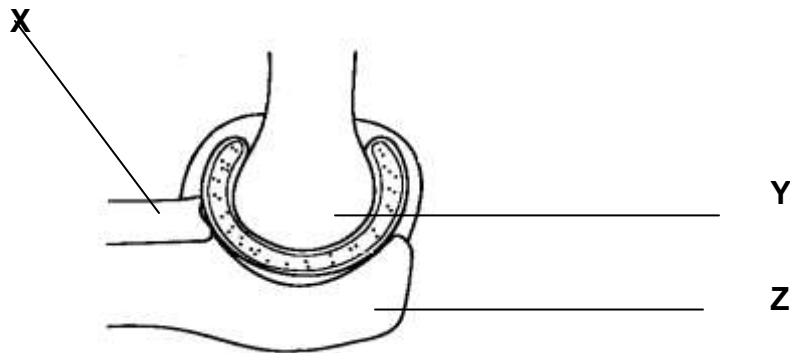


FIGURE 19

The function of this tissue is to

- A Store food in the form of starch
- B Transport of organic substances
- C Transport water and mineral salts to the whole plant
- D Provide support to the plant

32. Figure 20 below shows an elbow joint.



FIGURE

Which of the following structures is represented by X, Y and Z?

	X	Y	Z
A	Humerus	Radius	Ulna
B	Radius	Humerus	Ulna
C	Ulna	Radius	Humerus
D	Humerus	Ulna	Radius

33 . Which of the following health problems are associated with human musculoskeletal system ?

- I. Thrombosis
- II. Osteoporosis
- III. Muscular dystrophy
- IV. Parkinson's disease

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

34. Figure 21 below shows an aquatic plant.

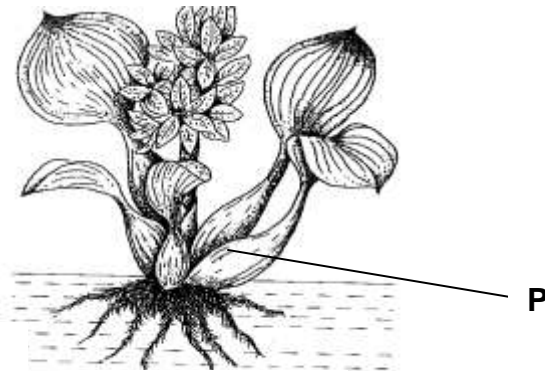


FIGURE 21

Which of the following is a function of P ?

- A. To support and protect the plant
- B. To maintain the turgidity of the plant
- C. To store starch, sugars and water in plant.
- D. To reduce the density of the plant.

35. Which of the following statements are true about the spinal cord in humans?

- I. Grey matter contains cell bodies of the afferent neurones
- II. White matter is surrounded by grey matter
- III. Dorsal root contains the axons of the afferent neurones
- IV. Ventral root contains the axons of the efferent neurones

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

36. Figure 22 shows the transmission of impulses across a synapse.

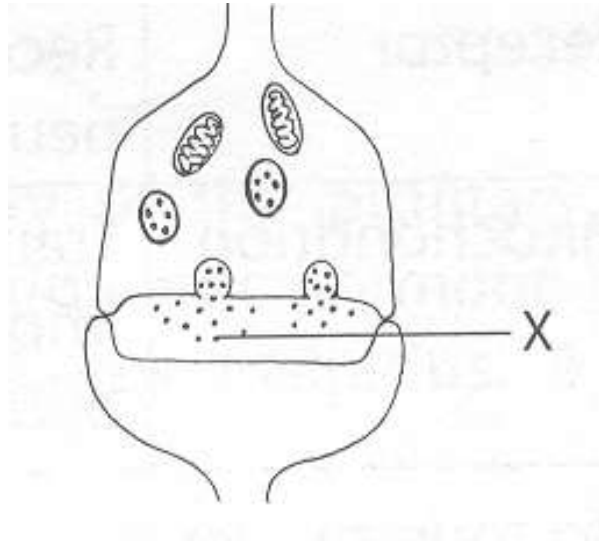


FIGURE 22

Name substance X.

- A. Adrenaline
- B. Prolactin
- C. Acetylcholine
- D. Thyroxine

37.

- Causes cretinism in childhood
- Causes myxoedema in adulthood

Deficiency of which of the following hormone causes the disorder listed above?

- A. Insulin
- B. Thyroxine
- C. Growth hormone
- D. Antidiuretic hormone

38. Two similar mango plant cuttings were placed separately into two containers P and Q. Figure 23 below shows the results after two weeks.

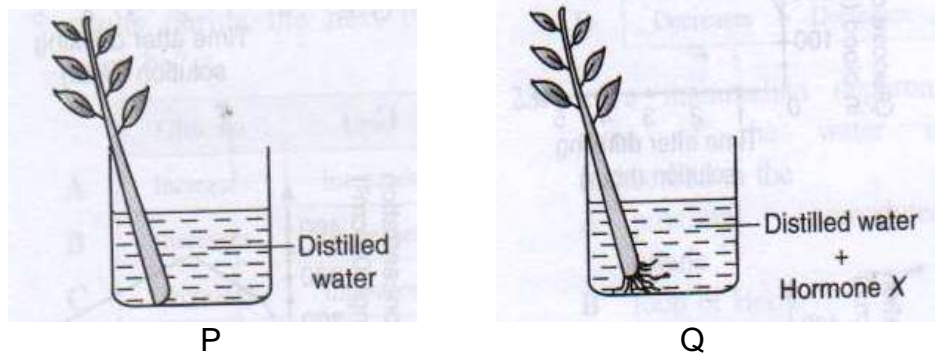


FIGURE 23

What is hormone X?

- A. Ethene
 - B. Gibberellin
 - C. Absciscic acid
 - D. Auxin
39. Phytohormone X is a gas produced in plant tissues. It promotes fruit ripening. What is X?
- A Auxin
 - B Absciscic acid
 - C Ethylene
 - D Gibberellin
40. Figure 25 shows the different levels of hormone X during the menstrual cycle. What is hormone X?

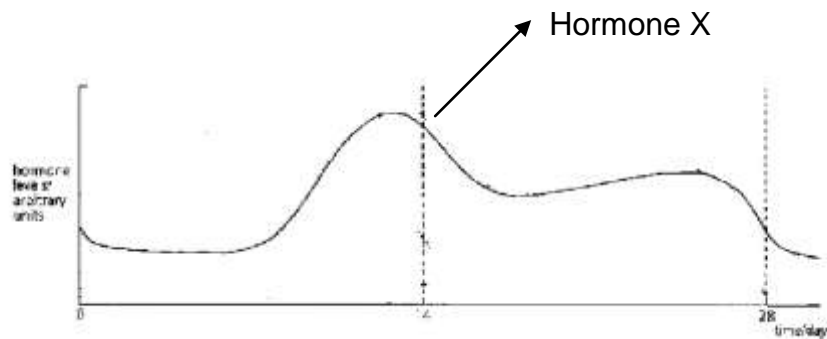


FIGURE 25

- A. Oestrogen
- B. Progesterone
- C. Luteinizing hormone
- D. Follicle stimulating hormone.

41. Figure 26 below shows the changes in the thickness of the endometrium of the uterus.

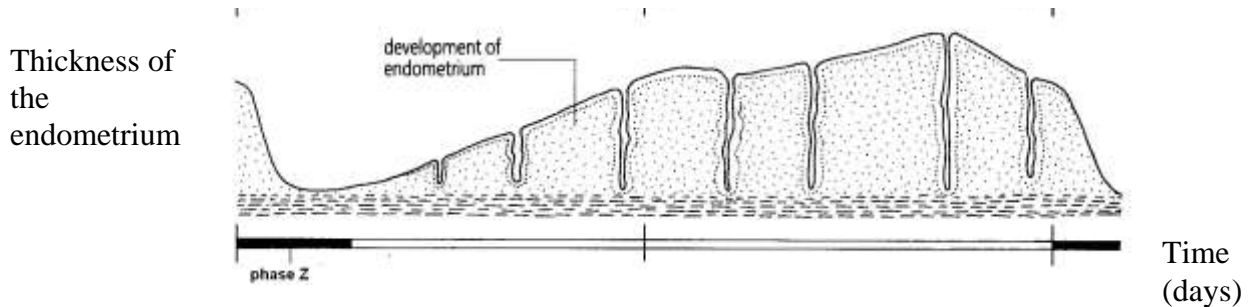


FIGURE 26

Which of the following occurs during phase Z?

- A. The women have miscarriage
- B. Endometrium is repaired and thickens.
- C. Many blood vessels develop in uterine lining.
- D. Menstruation occurs

42. After ovulation, the follicle cells form a structure called

- A. Graafian follicle
- B. Corpus luteum
- C. Ovum
- D. Oocyte

43. Figure 27 shows a section of embryo sac in the ovule of a flower. Which structure on fertilisation will form a zygote?

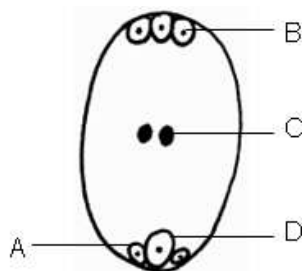


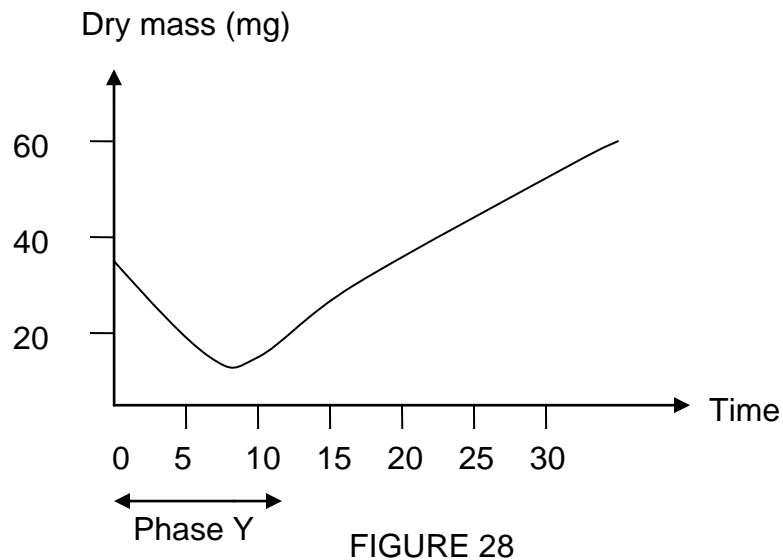
FIGURE 27

44. Which of the following are lateral meristems?

- I. Vascular cambium
- II. Cork cambium
- III. Shoot meristem
- IV. Root meristem

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

45. Figure 28 below shows the changes in dry mass of seedlings during early growth.



Which process causes the reduction of dry mass during phase Y?

- A. Photosynthesis
- B. Respiration
- C. Growth
- D. Reproduction

46. Which of the following shows the correct sequence of events in growth?

- A. Cell enlargement, cell division, cell differentiation
- B. Cell division, cell differentiation, cell enlargement
- C. Cell division, cell enlargement, cell differentiation
- D. Cell differentiation, cell enlargement, cell division.

47. Figure 29 shows the growth curve of an animal with exoskeleton.

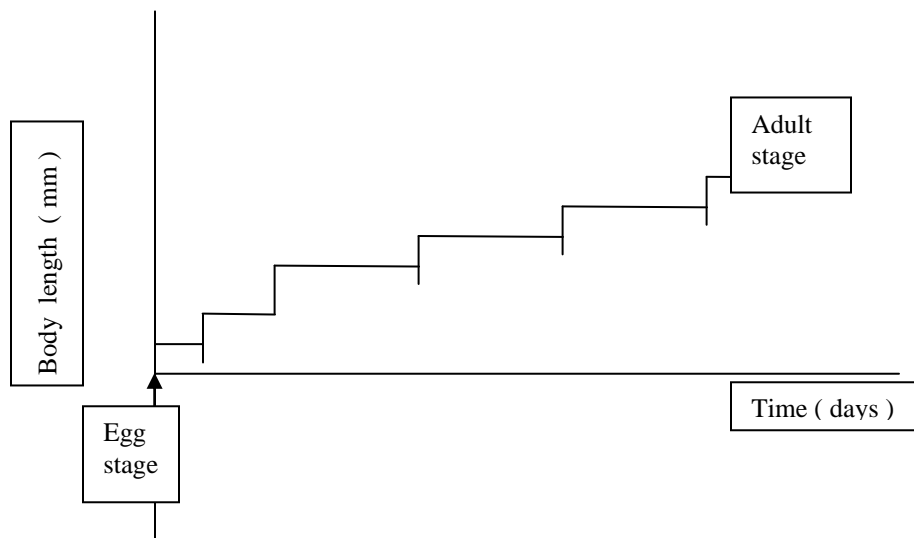


FIGURE 29

How many ecdysis have occurred?

- A 4
- B 6
- C 5
- D 7

48. Sarah has antigen A and antibody b while Aliyah has antibody a and antibody b. What is the blood group of Sarah and Aliyah?

	Sarah	Aliyah
A	Blood group A	Blood group O
B	Blood group A	Blood group AB
C	Blood group B	Blood group O
D	Blood group B	Blood group AB

49. Figure 30 below shows a model of DNA. The part labelled P is...

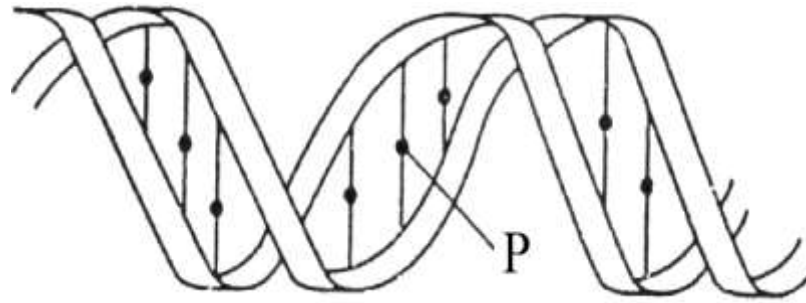


FIGURE 30

- A. Nitrogenous base.
- B. 5 carbon sugar.
- C. Nucleotide.
- D. Phosphate.

50. Figure 31 below shows a diagram to determine the sex of a baby. If a couple has a son, what are the chromosome in P, Q and R?

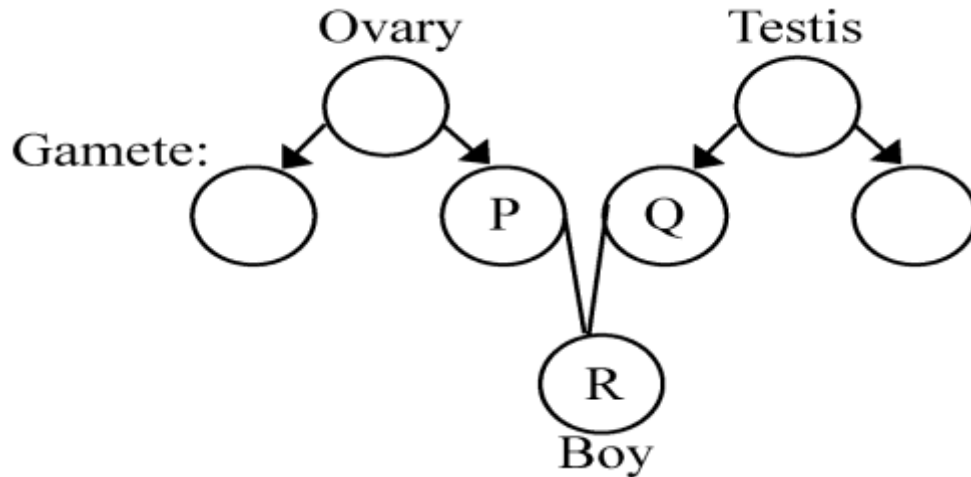


FIGURE 31

	P	Q	R
A	22 + X.	22 + X.	44 + XX.
B	22 + X.	22 + Y.	44 + XY.
C	44 + X.	44 + X.	44 + XY.
D	44 + X.	44 + Y.	44 + XY.

4551/2
Biology
Paper 2
Oct
2008
2½ hours

JAWATANKUASA KURIKULUM ZON A KUCHING
SARAWAK

PEPERIKSAAN PERCUBAAN SPM 2008

BIOLOGY
PAPER 2

Two Hours and Thirty Minutes

1. *Kertas soalan ini adalah dalam Bahasa Inggeris.*
2. *Calon dikehendaki membaca maklumat di halaman 2.*

Bahagian	Soalan	Markah Penuh	Markah
A	1	13	
	2	12	
	3	12	
	4	12	
	5	11	
	Jumlah		
B	6	20	
	7	20	
	8	20	
	9	20	
Jumlah			

Kertas soalan ini mengandungi 20 halaman bercetak.

INFORMATION FOR CANDIDATES

1. *This question paper consists of three sections :
Section A, and Section B.*
2. *Answer all questions in **Section A.** Write your answers for **Section A** clearly in the spaces provided in the question paper*
3. *Answer two questions from **Section B.** Write your answers for **Section B** on the lined paper in detail. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.*
4. *Show your working, it may help you to get marks.*
5. *If you wish to cancel any answer, neatly cross out the answer.*
6. *The diagrams in the questions are not drawn to scale unless stated.*
7. *Marks allocated for each questions or part question are shown in brackets.*
8. *The time suggested to complete **Section A** is **90 minutes**, and one hour for **Section B.***
9. *You may use a non-programmable scientific calculator.*
10. *Hand in this question paper together with your answers at the end of the examination.*

SECTION A

[60 marks]

Answer **all** questions from this section.

The time suggested to complete this section is ninety minutes.

1. Figure 1.1 shows three different types of cells.



P:

Q:

R:

FIGURE 1.1

(a) Name the cells in the spaces provided in Figure 1.1

[3 marks]

(b) State the function of cell P, Q and R.

Cell P:

.....

Cell Q:

.....

Cell R:.....

.....

[3 marks]

SULIT

(c) Figure 1.2 shows the cell organisation in a multicellular organism. Name M and N in the spaces provided in Figure 1.2.

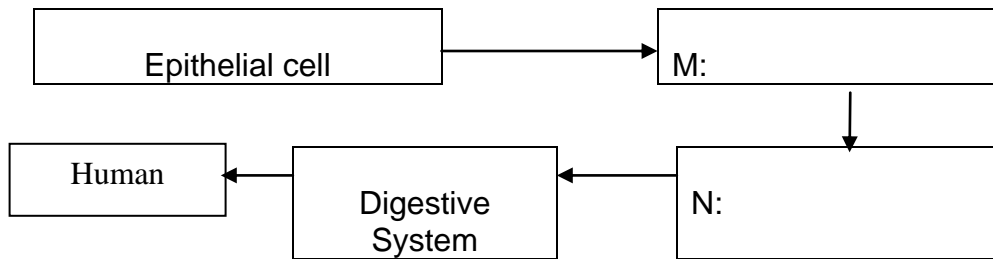


FIGURE 1.2

[2 marks]

(d) Human skin is an organ. It consists of various types of tissues that perform specific functions collectively.

(i) Name two types of tissues in the skin.

.....
.....

[2 marks]

(ii) State the function of each tissue named in (d)(i).

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

[2 marks]

SULIT

2. Figure 2.1 shows a typical animal cell and a typical plant cell as seen under the light microscope.

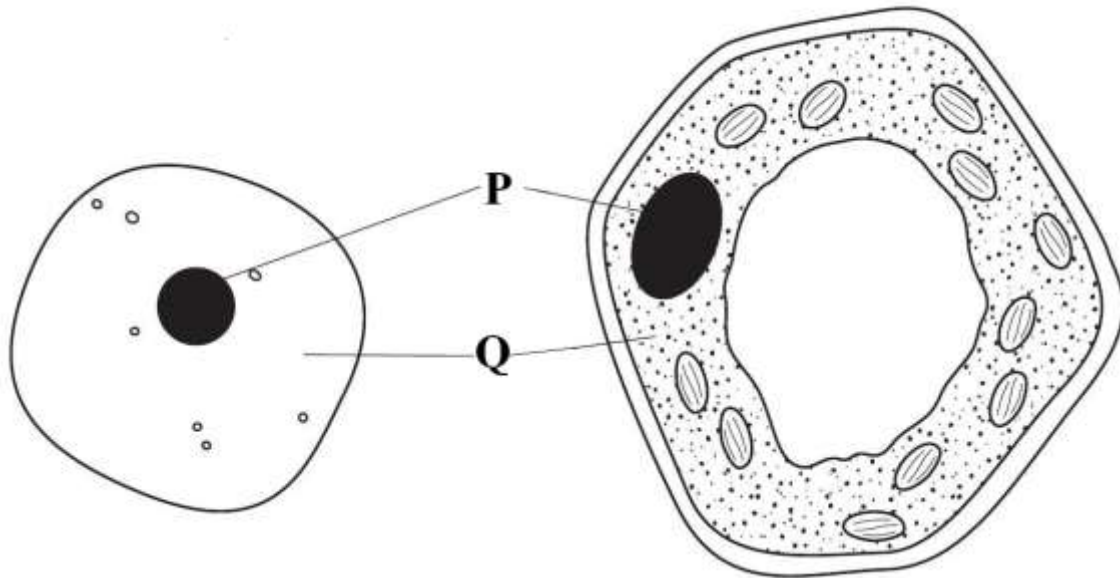


FIGURE 2.1

(a) (i) Name the structure P and Q.

P:

Q:

[2 marks]

(ii) Table 2.1 shows some structures in the cells.

	Cell Wall
	Cytoplasm
	Nucleus
	Chloroplast
	Plasma membrane

TABLE 2.1

Tick (√) the non-organelles that are found in both plant and animal cells in Table 2.1.

[3 marks]

SULIT

(b) The plasma membrane regulates the movement of substances in and out of the cell.

(i) State one characteristic of molecules that can pass through channel protein.

.....

[1 mark]

(ii) Explain how these molecules pass through the channel protein.

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

[2 marks]

(c) Figure 2.2 shows a plant cell after immersion for 15 minutes in 20% sucrose solution and Figure 2.3 shows another plant cell immersed in 0.1% sucrose solution.



FIGURE 2.2

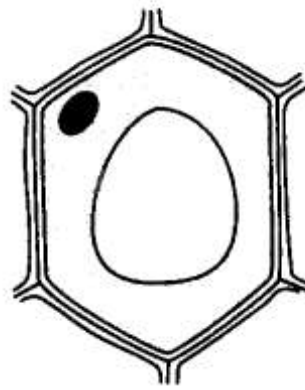


FIGURE 2.3

SULIT

Explain what happens to the plant cells shown in:

(i) Figure 2.2:

.....

.....

.....

.....

(ii) Figure 2.3

.....

.....

.....

.....

[4 marks]

3. Figure 3.1 shows the types of interaction between organisms.

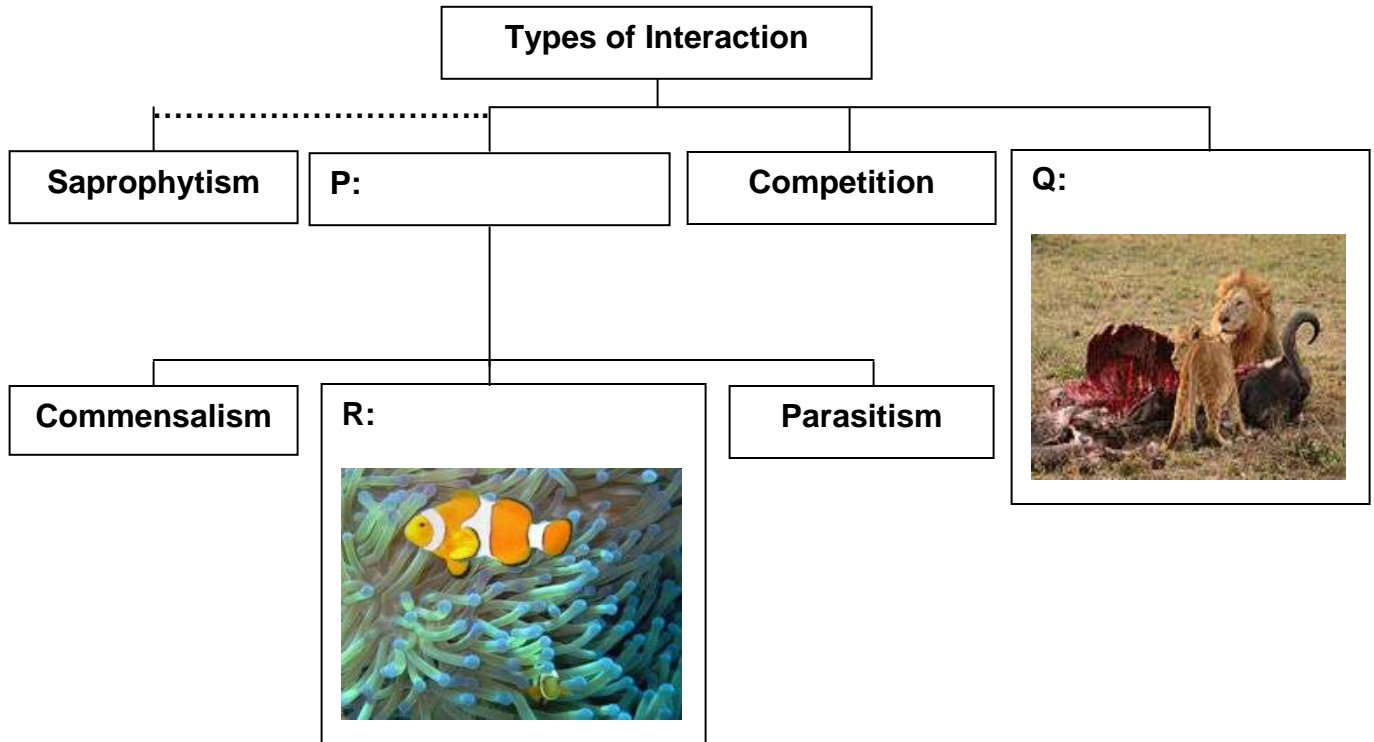


FIGURE 3.1

(a)(i) Name the interactions P, Q and R in the spaces provided in Figure 3.1.

[3 marks]

(ii) Give an example of saprophytism.

.....

[1 mark]

(iii) Based on Figure 3.1, explain the interactions of Q and R by using **another** suitable example.

Q:

.....

R:

.....

[3 marks]

(b) State the difference between commensalism and parasitism.

.....

.....

.....

.....

.....

.....

[2 marks]

(c) Figure 3.2 shows the growth curve for a population of *Staphylococcus aureus* and the population of another species of bacteria (species X) that are cultured together.

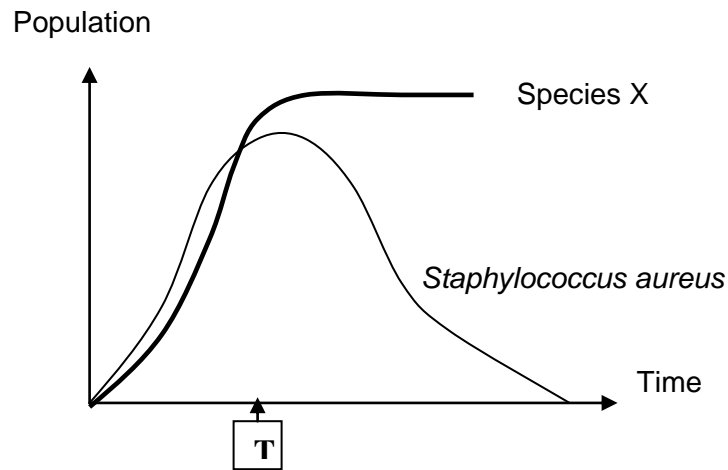


FIGURE 3.2

(i) Name the type of interaction between *Staphylococcus aureus* and species X.

.....

[1 mark]

SULIT

(ii) Explain what would happen if the supply of nutrients is increased at time T in the culture.

.....

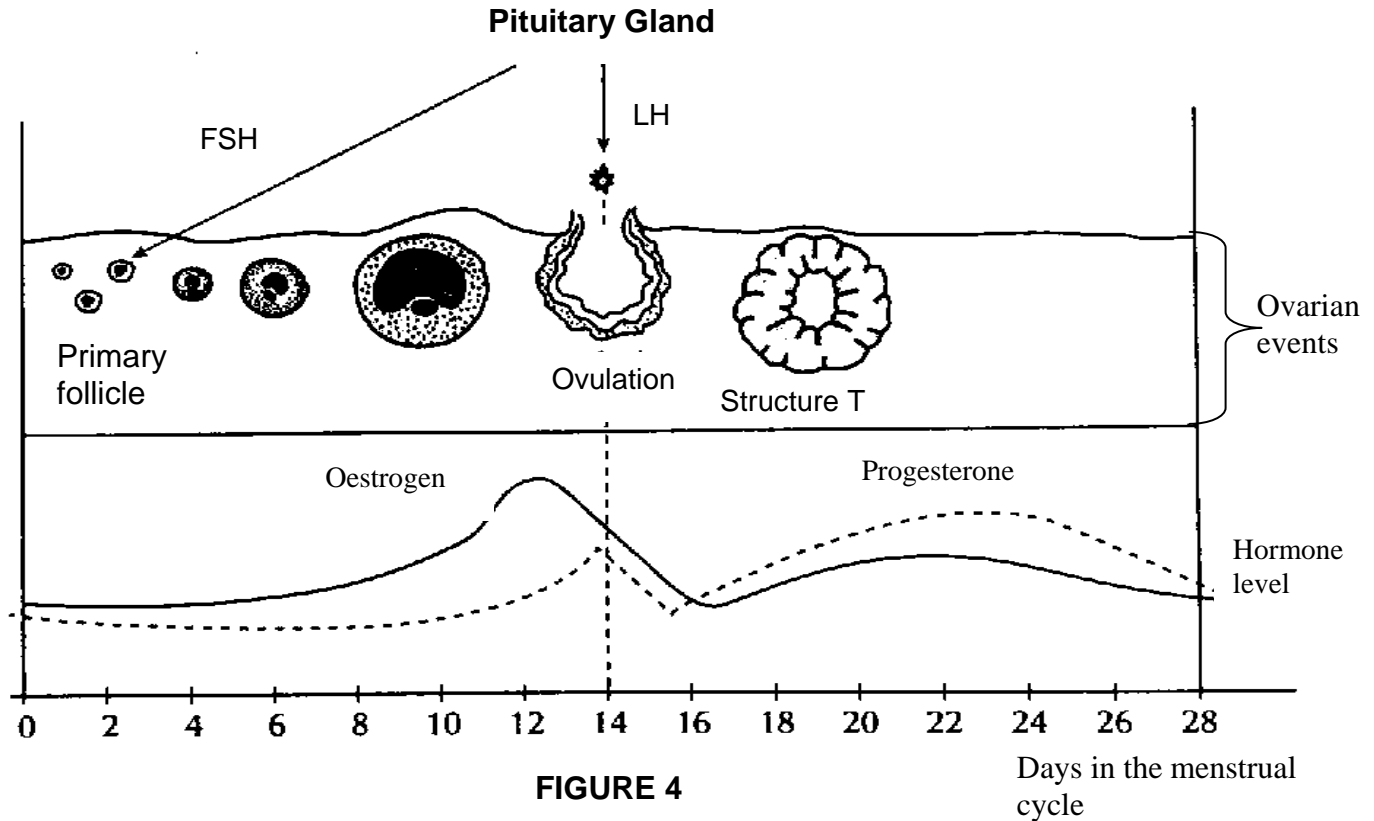
.....

.....

.....

[2 marks]

4. Figure 4 shows the changes of hormonal levels and the regulation of ovarian events during the menstrual cycle.



(a) (i) Name hormones P and Q

P:..... Q:.....

[2 marks]

(ii) State the function of hormones X and Y

Hormone X:.....

.....

Hormone Y:

.....

[2 marks]

(b) **Hormonal imbalance causes disruption of ovulation process.**

Explain the statement above using a suitable reproductive hormone.

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

[2 marks]

(c)(i) Based on Figure 4 name structure T.

.....

[1 mark]

(ii) State the relationship between structure T and level of hormone Q from 16th to 28th day.

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

[3 marks]

(d) Menstrual cycle is a monthly reproductive cycle consisting of follicle development, ovulation, the changes of the thickness of the endometrium, and menstruation. State its importance.

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

[2 marks]

SULIT

5. Figure 5.1 and 5.2 show the height and types of blood group of Form 5 students.

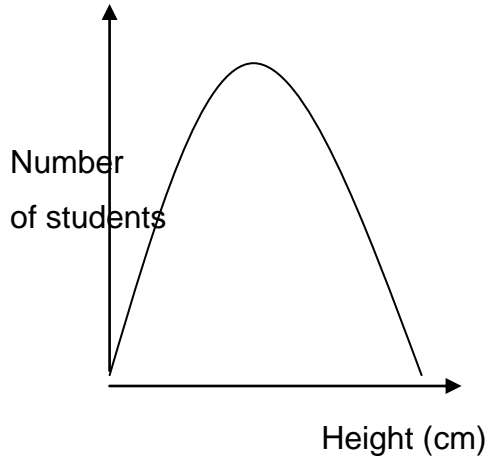


FIGURE 5.1

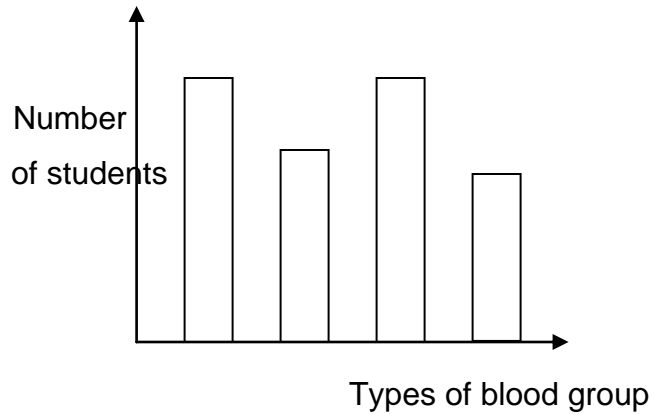


FIGURE 5.2

(a)(i) Name the types of variation shown in Figure 5.1 and Figure 5.2.

Figure 5.1:.....

Figure 5.2:.....

[2 marks]

(ii) State **two** differences between the variations in (a)(i) .

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

[2 marks]

(b) Figure 5.3 show two different types of fingerprint in humans.

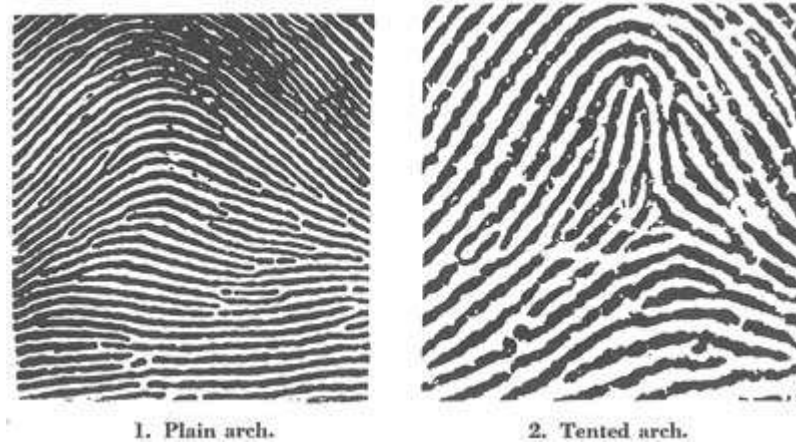


FIGURE 5.3

(i) State the factor that causes the variation in Figure 5.3

.....

[1 mark]

(ii) How does the factor in (b)(i) causes the variation.

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

[2 marks]

(c) . Figure 5.4 shows two types of *Biston betularia* that can be found in city W. M is grey coloured and N is dark melanic.



M



N

FIGURE 5.4

(i) Based on Figure 5.4, which one is able to survive in an unpolluted environment ?

.....

[1 mark]

(ii) State a reason for (a)(i).

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

[2 marks]

(iii) If the air quality in the city W declined, predict and explain what would happen to the number of dark *Biston betularia* .

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

[2 marks]

SECTION B

[40 marks]

Answer **two** questions from this section.

The time suggested to complete this section is one hour.

6. Figure 6.1 shows the structure of a villus in human small intestine.

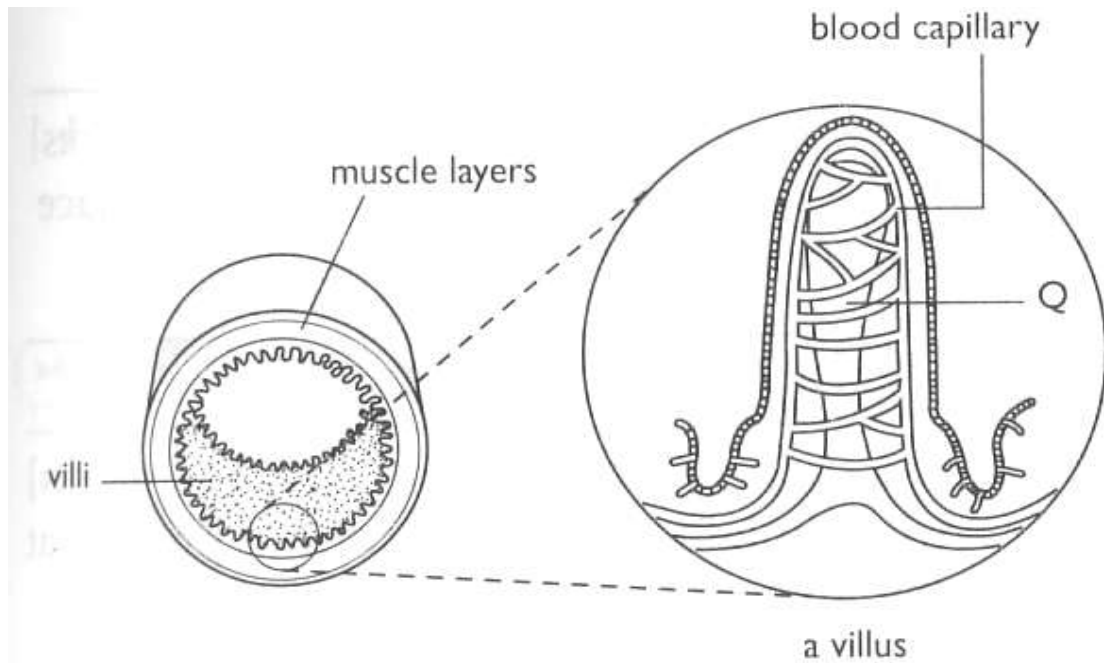


FIGURE 6.1

(a) (i) Based on Figure 6.1, explain three structural adaptations of the small intestine for effective absorption of digested food.

[6 marks]

(ii) The main food for baby is milk.
Describe the digestion of milk in the stomach.

[4 marks]

(b) Figure 6.2 shows part of the human digestive system.

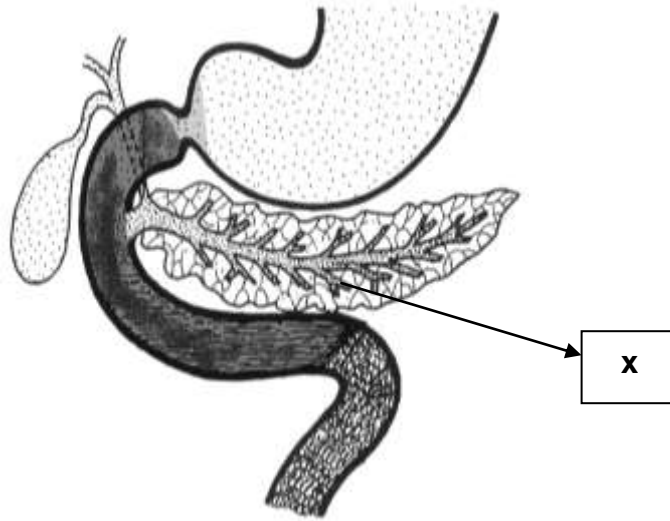


FIGURE 6.2

A patient has organ X removed.

Explain the effects of the removal of organ X on enzyme and hormones and how these affect the digestion and the level of glucose in the blood.

[10 marks]

(7) (a) Figure 7.1 shows a thirsty athlete who has just completed a 5 km run.



FIGURE 7.1

Explain how osmoregulation takes place in her body.

[10 marks]

(b)

The endocrine system and the nervous system play importance roles in maintaining homeostasis. Both systems often work together. For example, certain parts of the nervous system stimulate or inhibit the release of hormones while some hormones promote and inhibit the generation of nerve impulses. Hence, despite having the nervous system, the body needs the endocrine system.

Based on the statement, explain the differences between the endocrine system and the nervous system.

[10 marks]

8 (a) Figure 8 shows an environmental phenomenon.

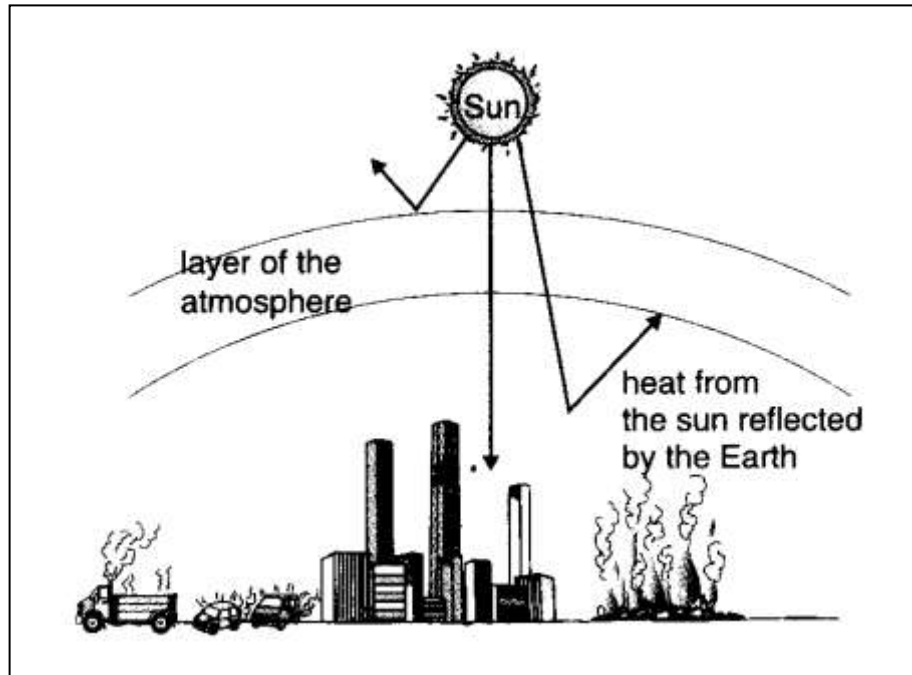


FIGURE 8

- (i) Describe how the phenomenon in Figure 8 occurs. [8 marks]
 - (ii) Suggest ways to minimize the effects of this phenomenon. [2 marks]
- (b) Human activities have a widespread impact on the ecosystem. One of the most devastating human activities on the environment is deforestation. Describe the effect and consequences of deforestation to the ecosystem.

[10 marks]

SULIT

(9) (a) Mendel’s Law of segregation is as below:

The characteristics of an organism are controlled by genes which exist in pairs. Of a pair of genes, only one gene is present in the gamete.

Illustrate above statement using a monohybrid cross between pure-bred tall pea plant and a pure-bred short pea plant.

[8 marks]

(b) Figure 9 shows a pedigree of the inheritance of colour-blindness in a family.

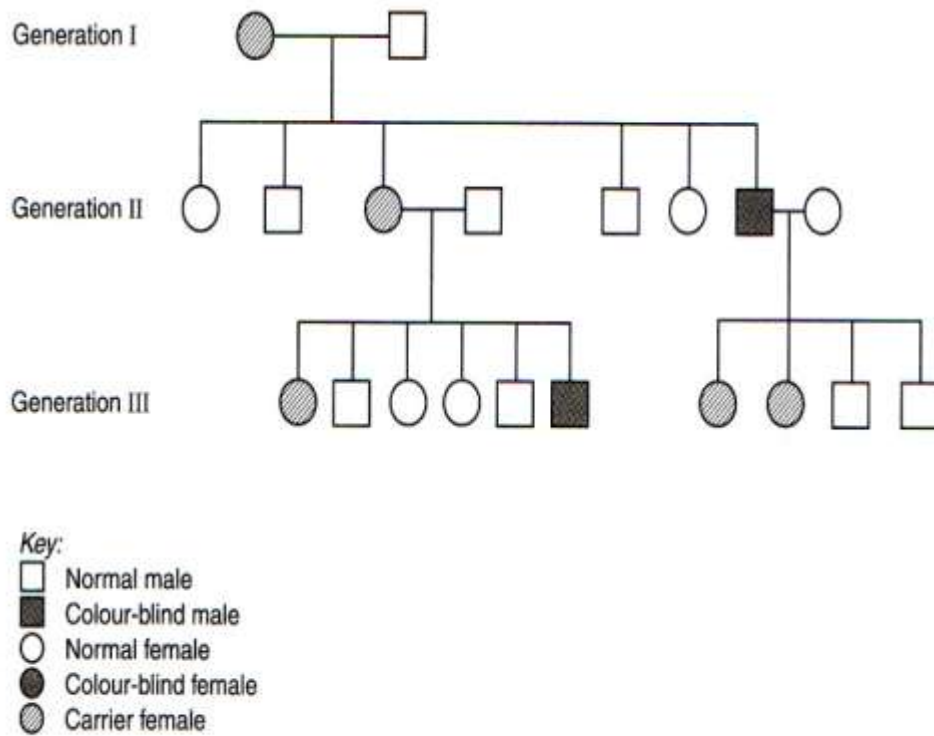


FIGURE 9

Explain the inheritance of colour-blindness based on the following statements:

[12 marks]

END OF QUESTION PAPER

4551/3
Biology
Paper 3
Oct
2008
1 $\frac{1}{2}$ hours

JAWATANKUASA KURIKULUM ZON A KUCHING
SARAWAK

PEPERIKSAAN PERCUBAAN SPM 2008

BIOLOGY

PAPER 3

One Hour and Thirty Minutes

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO

1. Write down your name and class in the spaces provided	Examiner Code		
	Question Number	Full Mark	Mark Obtained
	1	33	
	2	Response 15 Report 2	
2. Candidates are required to read the information on page 2	Total		

This question paper consists of 9 printed pages.

INFORMATION FOR THE CANDIDATES

1. *This question paper consists of two questions. Attempt all the questions.*
2. *Answers for question 1 must be written in the spaces provided in the question paper.*
3. *Write your answers for question 2 in a separate answer sheets. You can also include in your answers, where ever possible the chemical equations, diagrams, table, graph or any other means of communication which are suitable.*
4. *Show your working where ever possible to help you get more marks*
5. *Diagrams which accompany the questions are not drawn to scale, or otherwise stated.*
6. *Time suggested for each question is 45 minutes.*
7. *You are allowed to use a nonprogrammable calculator.*

Allocation of maks:

Score	Description
3	Excellent : The best possible responses
2	Good : Average responses
1	Week : Inaccurate responses
0	The responses are wrong or no response at all

1 A group of students carried out an experiment to study the effect of air movement on the rate of transpiration of a balsam plant. They set up the apparatus as shown in Diagram 1.1.

The apparatus was placed on the laboratory table under a moving fan at speed 5. The stopwatch is started when the initial air bubble position is set at 0, or zero, as in Diagram 1.2. The time taken for the air bubble to move a distance of 10 cm, or PQ is recorded down.

The whole experiment is repeated by placing the apparatus under a moving fan at speed 3 and then with the fan off. Each time, the air bubble is returned to its original position before starting the experiment. Table 1.1 shows the results of the experiment.

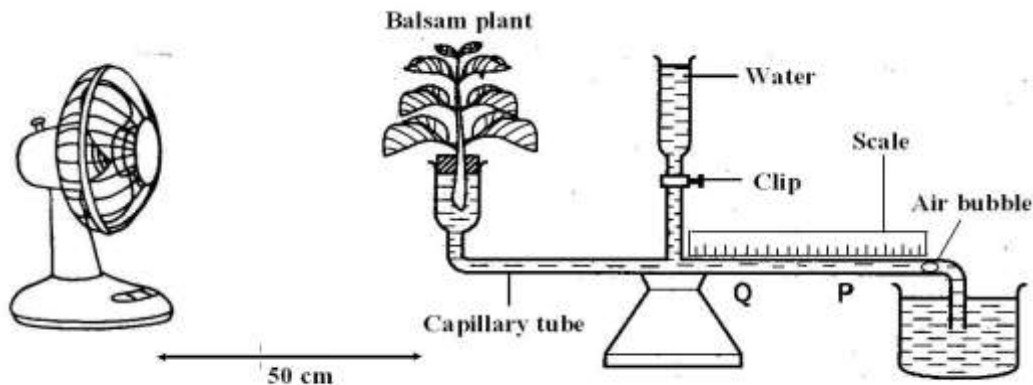


Diagram 1.1

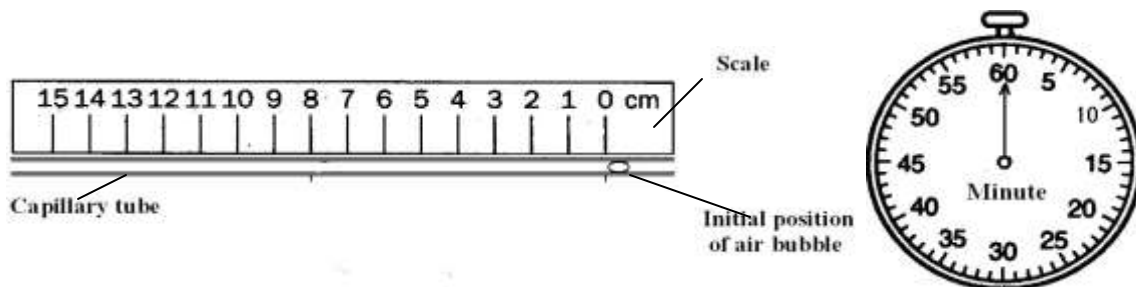


Diagram 1.2




Fan speed	Observation	Time taken
Off	
3	
5	

Table 1.1

(a) (i) State **two** different observations that can be made from Table 1.1.

Observation 1

.....

.....

Observation 2

.....

.....

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

Inference from observation 1

Inference from observation 2

[3 marks]

(b) (i) Complete Table 1.2 based on this experiment.

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

Table 1.2

[3 marks]

(ii) The following list is part of the apparatus and materials used in the experiment.

Leafy branch, capillary tube, stopwatch, metre rule, coloured water, fan

In Table 1.3, classify the above list in their respective category.

Material	Apparatus

Table 1.3

[3 marks]

(c) State the hypothesis for this experiment.

[3 marks]

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

- Fan speed
- Time taken for air bubble to move from P to Q
- Rate of transpiration

[3 marks]

- (d) (ii) Use the graph provided on page 8 to answer this part of the question. Using the data in 1(d)(i), draw a graph of the rate of transpiration against the speed of air movement.

[3 marks]

- (iii) Based on the graph in 1(d)(ii), explain the relationship between the fan speed, the time taken for the air bubble to move from P to Q and the rate of transpiration.

[3 marks]

- (e) State how the distance moved by the air bubble changes with time when the apparatus is placed under a fan at air speed of 5.

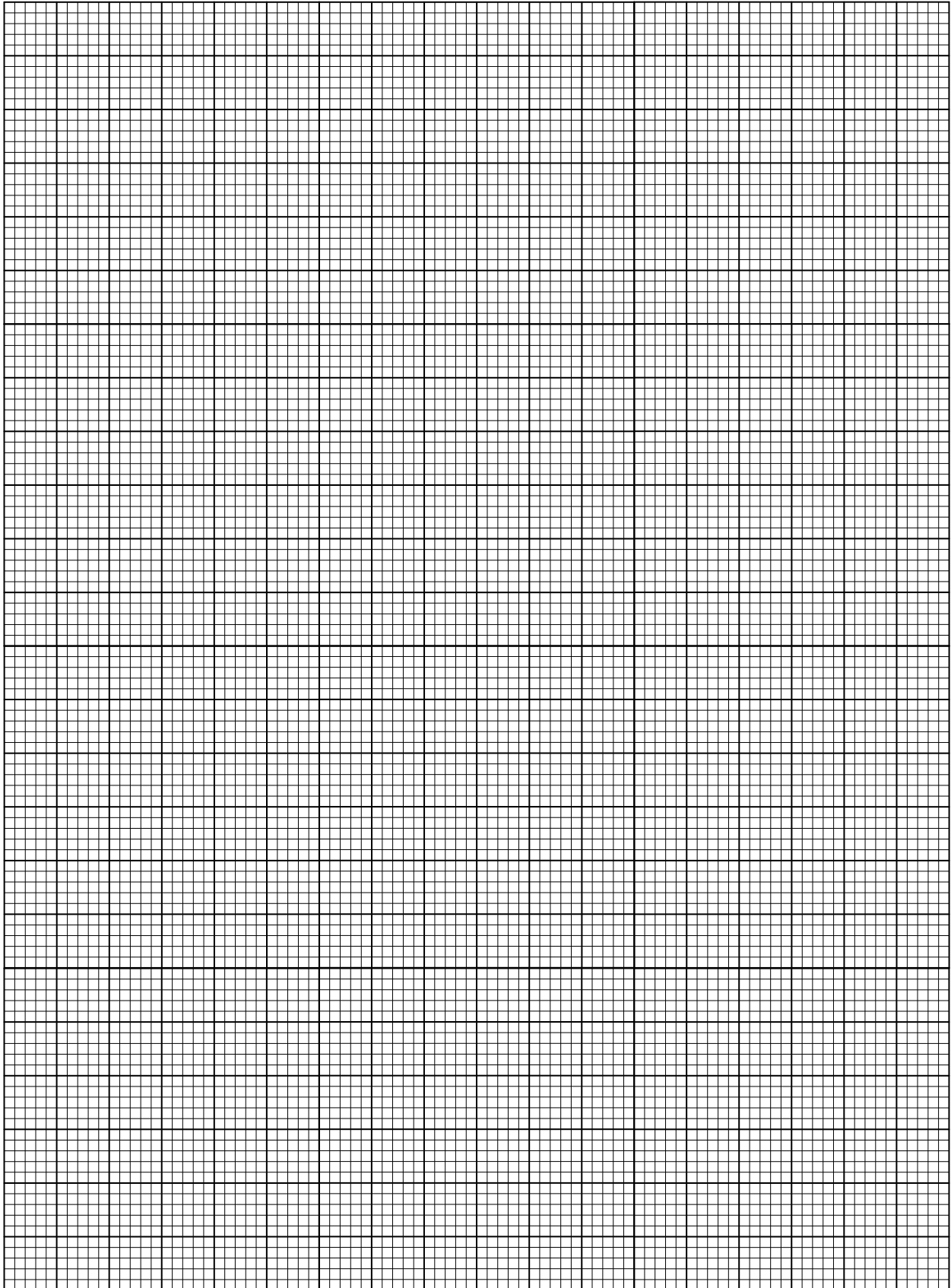
[3 marks]

- (f) Based on the result from this experiment, what can be deduced about transpiration?

[3 marks]

- (g) The experiment is repeated using the apparatus set up as in Diagram 1.1 but using a branch with smaller leaves. Predict the rate of transpiration of this branch under air speed of 5 and give an explanation for your answer.

[3 marks]



- 2 You want to investigate the pollution level of four different sources of water in your area.

Plan a laboratory experiment to determine the level of water pollution of these four sources.

The planning of your experiment must include the following aspects:

- Problem statement
- Aim of investigation
- Hypothesis
- Variables
- List of materials and apparatus
- Technique used
- Experimental procedure or method
- Presentation of data
- Conclusion

[17 marks]

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ZON A KUCHING 2008
4551/1

1	C
2	D
3	A
4	A
5	A
6	B
7	C
8	A
9	B
10	C
11	A
12	C
13	B
14	B
15	B
16	A
17	A
18	A
19	C
20	C
21	C
22	D
23	B
24	C
25	A

26	A
27	C
28	A
29	C
30	D
31	B
32	B
33	B
34	D
35	B
36	C
37	B
38	D
39	C
40	A
41	D
42	B
43	D
44	A
45	B
46	C
47	C
48	A
49	A
50	B

SECTION A: MARK SCHEME

No	Marking criteria	Mark	Total
	QUESTION 1		
1(a)	Able to name the cell in Figure 1.1 P: Guard cells Q: Smooth muscle / muscle cell R: Efferent neuron / nerve cell/ neuron	1 1 1	3
(b)	Able to state the function of P, Q and R Function of P: Regulate size of stoma. Function of Q: Contraction of Q causes movement of substances. Function of R: transmission of impulses (from CNS to effector)	1 1 1	3
(c)	Able to complete the cell organization M and N in the spaces provided in Figure 1.2. M: epithelial tissue N: small intestine / stomach	1 1	2
(d)	Able to name two types of tissues Sample answer: Epithelial tissue// connective tissue// muscular tissue// nerves tissue.	1,1	2
	Any two tissues		
	Able to state the function of each tissue named in (d)(i) Sample answer: i. Epithelial tissue Function: as a protective layer/ excretion/heat regulation	1	
	ii. Connective tissue Function: such as blood, supplies oxygen and nutrients.	1	
	iii. Muscle tissue Function: regulate body temperature	1	

	<p>iv. Nerve tissue</p> <p>Function: receive and send impulses from and to the central nervous system.</p> <p>(Any two types and functions)</p> <p>TOTAL MARKS</p>	1	2
	<p>QUESTION 2</p> <p>Able to label the structure P and Q in the spaces provided in Figure 2.1.</p> <p>Sample Answer: P: Nucleus Q: Cytoplasm</p>	1 1	2
2.(a)(i)	<p>Able to tick (✓) the non organelles that are found in plant and animal cells in Table 2.1</p> <p>Sample Answer: cell wall, plasma membrane and cytoplasm</p>	3	3
(a)(ii)	<p>Able to state the characteristics of the molecule that can pass through channel protein of plasma membrane.</p> <p>Sample answer: Small / water a soluble molecule / discharged particle/ion / dissolved gaseous.</p>	1	1
(b)(i)	<p>Able to explain how molecules pass through channel protein</p> <p>Sample answer Small molecules / ions move through the protein pore in the channel protein by simple diffusion. The molecules are at higher concentration (outside) diffuse the cell cause the molecules to diffuse to a lower concentration into the cells through the pore/ down the concentration gradient.</p>	1 1	2
(ii)			

(c)	<p>Able to explain the plant cell shown in Figure 2.2 and 2.3</p> <p>Sample answer:</p> <p>Figure 2.2</p> <p>F1: the sucrose solution is hypertonic to the plant cell sap</p> <p>E1: water molecules diffuse out by osmosis</p> <p>E2 :the cell undergoes plasmolysis/ cytoplasm shrink.</p> <p style="text-align: center;">F1 with E1 / E2</p> <p>Figure 2.3</p> <p>F2: the sucrose solution is hypotonic to the plant sap</p> <p>E3: water molecules diffuse in by osmosis</p> <p>E4: the plants become turgid</p> <p style="text-align: center;">F2 with E4 / E5</p> <p style="text-align: right;">TOTAL MARKS</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>2</p> <p>2</p> <p>12</p>
3(a) (i)	<p>Question 3</p> <p>Able to name the interaction P, Q and R in the spaces provided in diagram 3.1.</p> <p>P: Symbiosis</p> <p>Q: Mutualisme</p> <p>R: Prey-predator</p> <p>(ii) Example of saprophytism</p> <p><i>Mucor sp</i> / mushroom / fungus / saprophytic bacteria on dead organism matter.</p> <p>(iii) Able to explain the interaction of Q and R by using suitable example.</p> <p>Interaction of Q</p> <p>P1: Example lichen (algae and fungus)</p> <p>P2: relationship between two species of organism in which both benefit.</p> <p>P3: The alga produces food for itself and also for the fungus and the fungus supplies carbon dioxide and nitrogenous</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>3</p> <p>1</p> <p>Maxs: 2</p>

	<p>products for the algae to produce its food.</p> <p>Interaction of R</p> <p>P1: Example: Owl (predator) , rat/(prey) P2: control each other population. P3: When the number of predators increase, the number of preys will decrease P4: When the number of preys decrease, the number of predators will decrease.(predators will die of starvation) P5: the number of preys will start to increase.</p>	<p>1 1 1 1 1</p>	<p>Maks: 2</p>				
(b)	<p>Able to state the differences between the interaction of commensalisms and parasitism.</p> <p>Able to classify the organism in one set of interaction.</p> <table border="1"> <thead> <tr> <th>Commensalism</th> <th>Parasitism</th> </tr> </thead> <tbody> <tr> <td>Relationship between two organisms in which one organism benefits while the other neither derives any benefits nor is harmed.</td> <td>Relationship between two organisms in which one organism benefits and the other is harmed.</td> </tr> </tbody> </table>	Commensalism	Parasitism	Relationship between two organisms in which one organism benefits while the other neither derives any benefits nor is harmed.	Relationship between two organisms in which one organism benefits and the other is harmed.	<p>1, 1</p>	<p>2</p>
Commensalism	Parasitism						
Relationship between two organisms in which one organism benefits while the other neither derives any benefits nor is harmed.	Relationship between two organisms in which one organism benefits and the other is harmed.						
(c)(i)	<p>Interpecific competition</p>	<p>1</p>					
(ii)	<p>P1:The population of <i>Staphylococcus aureus</i> decreases at a slower rate P2: but eventually species X will still out compete <i>Staphylococcus aureus</i></p>	<p>1 1</p>	<p>3</p>				
	TOTAL MARKS		<p>13</p>				

QUESTION 4			
(a)(i)	Able to name hormone P and Q Hormone P: Oestrogen Hormone Q: Progesterone	1 1	2
(ii)	Able to state the function of hormones X and Y		
(b)	Function of hormone X: State the function of hormone X and Y // stimulates growth and development of several primary follicles in the ovary to become a Graafian follicle. Function of hormone Y: State the function of hormone X and Y// Causes ovulation to occur // promotes development of the corpus luteum // stimulates corpus luteum to produce progesterone and oestrogen// stimulate completion of meiosis I by changing primary oocytes into a secondary oocyte. Able to explain the effect humanal imbalance that causes the disruption of ovulation process. Sample answer: P1: If P secretion is excessive, secretion of Y is stimulated. P2 : Inhibits X, no follicle development / ovulation is Hastened Answer 2 P1: Insufficient of P secretion inhibits secretion of Y. P2: no ovulation	1 1 1 1 1	2 2 1
(c) (i)	Corpus luteum		
(c) (ii)	Able to state the relationship between the structure T and the level of hormone Q from 16 th to 28 th day P1: On the 16 th day, T is formed, hormone Q is secreted. Continuous development of T increases hormone level Q. P2: On the 24 th day, T degenerates, the level of hormone Q declines.	1 1 1	3
(d)	Able to state the importance of menstrual cycle P1: Produce female gamete (ovum for fertization) P2: Thickening endometrium – prepare for implantation of the embryo	1 1	2
TOTAL MARKS			12

Question 5									
(a) (i)	Able to name the types of variation shown in Diagram 5.1 and Diagram 5.2. Diagram 5.1: Continuous variation Diagram 5.2: Discontinuous variation	1 1	2						
(ii)	Able to state two differences between the variation in a(i)								
	<table border="1"> <thead> <tr> <th>Continuous Variation</th> <th>Discontinuous Variation</th> </tr> </thead> <tbody> <tr> <td>Phenotype influenced by genetic and environmental factors</td> <td>Phenotype generally determined by genetic factors only</td> </tr> <tr> <td>Frequency distribution is a bell-shaped curve (normal distribution)</td> <td>Frequency distribution is a bar chart, pie chart or histogram</td> </tr> </tbody> </table>	Continuous Variation	Discontinuous Variation	Phenotype influenced by genetic and environmental factors	Phenotype generally determined by genetic factors only	Frequency distribution is a bell-shaped curve (normal distribution)	Frequency distribution is a bar chart, pie chart or histogram	1 1	2
Continuous Variation	Discontinuous Variation								
Phenotype influenced by genetic and environmental factors	Phenotype generally determined by genetic factors only								
Frequency distribution is a bell-shaped curve (normal distribution)	Frequency distribution is a bar chart, pie chart or histogram								
(b) (i)	Able to state the factor that cause the variation in diagram 5.3. Sample answer: genetic factor	1							
(ii)	Able to state how the factor in b(i) cause the variation. P1: Independent assortment of chromosomes during meiosis // metaphase 1. P2: Crossing over during meiosis I // prophase II. P3: Random fusion of gametes (during fertilization)	1 1 1	2						
c(i)	Grey coloured <i>Biston betularia</i>	1	1						
(ii)	Able to state the reason for c (i) P1: The grey coloured <i>Biston betularia</i> is well camouflaged against lichen- covered tree trunks in unpolluted environment. P2: giving them protection from predators.// avoid being eaten by predator.	1 1	2						

(iii)	Sample answers P1: Dark mellanic Biston betularia increase. P2: and well camouflaged in polluted environment P3: giving them protection from predators	1 1 1	2
	TOTAL MARKS		11
	Question 6		
(a)(i)	Able to explain three structural adaptations of the ileum for effective absorption of food		
	F1 – length of intestine is long (6 m) E1 – increase time for food absorption increase SA for absorption F2 – inner surface is (highly) folded E2 – to increase the SA for absorption F3 – numerous villi (on inner surface of ileum) E3 – to increase the SA for absorption F4 – numerous microvilli (on the surface of epithelial cell) E4 – to increase the SA for absorption F5 – numerous blood capillaries and lacteal E5 – to transport absorbed nutrients (away)//to maintain concentration gradient (from diffusion of nutrients) Any three F and corresponding E	1 1 1 1 1 1 1 1 1 1	6
a.iii.	Able to describe the digestion of milk in stomach P1 – (Gastric glands in the wall of)stomach secrete gastric juice P2 – Gastric juice (contain mucus, HCl), pepsin and rennin P3 – Rennin coagulates milk by converting soluble milk protein caseinogen to the insoluble casein P4 – Casein is then hydrolyses (digested) by pepsin to peptones P5 - HCL optimises pH in the stomach for action of enzyme.	1 1 1 1 1	Max 4
6.b.i.	Able to explain the effects of the removal of organ X on enzyme and hormones and how these affect the digestion and the level of glucose in the body		
	F1 – no insulin secretion E1 – excess blood glucose cannot be converted to glycogen E2 – Blood sugar level increases	1 1 1	

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F2 – no glucagons secretions	1	
E 3 – stored glycogen cannot be converted to glucose	1	
E4 – low blood glucose level cannot be increased to normal level	1	
F3 – no trypsin secretion.	1	
E5 – protein digestion not completed	1	
F4 – no amylase secretion	1	
E6 – Starch digestion not completed	1	
F5 – no lipase secretion	1	
E7 – lipid not digested. No lipid digestion in body	1	
E8 – body do not have enough amino acids and glucose	1	
E9 – no fatty acids and glycerol.	1	
All the 5F and any corresponding E		10

7a.	Able to explain how osmoregulation takes place in his body																																		
	E1 running causes an increase in body temperature	1																																	
	E2 sweating occurs to reduce body temperature	1																																	
	E3 lost of water from the body increases the blood osmotic pressure	1																																	
	E4 increase osmotic pressure detected by osmoreceptors	1																																	
	E5 in hypothalamus of the brain	1																																	
	E6 pituitary gland is stimulated to secrete Anti diuretic hormone(ADH)	1																																	
	E7 ADH is transported by blood to the kidney	1																																	
	E8 ADH increased the permeability of the distal convoluted tubule and collecting tubule to water	1																																	
	E9 reabsorption of water increased in both tubules																																		
	E10 increase in water reduces the blood OP	1																																	
	E11 medulla oblongata is also stimulated to produce a feeling of thirst	1																																	
		Max 9																																	
	Synthesis – able to write six consecutive Es	1	10																																
7b.	Able to state the differences between the endocrine system and nervous system																																		
	<table border="1"> <thead> <tr> <th>Nervous system</th> <th>Aspect</th> <th>Endocrine system</th> <th></th> </tr> </thead> <tbody> <tr> <td>External stimulus</td> <td>Stimulus</td> <td>Internal stimulus</td> <td>2 / 0</td> </tr> <tr> <td>Sensory organs</td> <td>Receptors</td> <td>Sensory cells</td> <td>2 / 0</td> </tr> <tr> <td>Electrical and chemicals</td> <td>Impulse // nature of impulse</td> <td>Chemical // hormones</td> <td>2 / 0</td> </tr> <tr> <td>Neurones and synapse</td> <td>Medium of transmission</td> <td>Blood</td> <td>2 / 0</td> </tr> <tr> <td>Rapid/ fast</td> <td>Speed of transmission of impulse</td> <td>Slow</td> <td>2 / 0</td> </tr> <tr> <td>Specific locations//organs</td> <td>Target organs</td> <td>Various organs</td> <td>2 / 0</td> </tr> <tr> <td>Quick and short</td> <td>Response</td> <td>Long lasting</td> <td>2 / 0</td> </tr> </tbody> </table>	Nervous system	Aspect	Endocrine system		External stimulus	Stimulus	Internal stimulus	2 / 0	Sensory organs	Receptors	Sensory cells	2 / 0	Electrical and chemicals	Impulse // nature of impulse	Chemical // hormones	2 / 0	Neurones and synapse	Medium of transmission	Blood	2 / 0	Rapid/ fast	Speed of transmission of impulse	Slow	2 / 0	Specific locations//organs	Target organs	Various organs	2 / 0	Quick and short	Response	Long lasting	2 / 0		
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		Max 10	10																																

8(a)(i)	<p>Able to describe how the phenomenon in Figure 8 occurs.</p> <p>P1: The phenomenon is the greenhouse effect P2: Carbon dioxide ,chlorofluorocarbons (CFCs), methane, nitrous oxide and water vapour make up the greenhouse gases. P3: Greenhouse gases produced by burning of fossil P4: also produced belching from cattle and anaerobic respiration in paddy field. P5: effect of deforestation P6: Sunlight enter the Earth’s atmosphere . P7: Most of the radiation is absorbed by the Earth. P8: Some radiation is radiated back into space. P9: Accumulated /increased concentration of greenhouse gases trapped the radiated heat. P10. Warm the atmosphere.</p>	<p>1 1 1 1 1 1 1 1 1 1</p>	<p>Max: 8</p>
8(a)(ii)	<p>Able to suggest ways to minimize the effects of this phenomenon.</p> <p>P1: Reduce burning of fossil fuels. P2: Use alternative energy sources. P3: Slow down deforestation for farming or rice growing. P4: Replant trees which have been cut down.</p>	<p>1 1 1 1</p>	<p>4</p>
8(b)	<p>Able to describe the effect and consequences of deforestation to the ecosystem.</p> <p>F1: No roots system E1: Vegetation can rapidly succumb to soil erosion. E2: Sedimentation of the rivers.</p> <p>F2; No catchment area E3: landslide on steep hills E4: causes flash floods during rainy seasons.</p> <p>F3: Habitat destruction E5: Extinction of flora and fauna E6: Loss of biodiversity</p>	<p>1 1 1 1 1 1 1 1 1</p>	

	F4: Increase of carbon dioxide in atmosphere	1	
	E7: Greenhouse effect	1	
	E8: Global warming	1	
	E9: Climatic change	1	
	F1, F2, F3 and F4 - 4 marks		
	E1 – E9 - Any 4 Es		
	4 marks		8

9. Able to illustrate the statement using a monohybrid cross between pure-bred tall pea plant and a pure-bred short pea plant.

(a) Dominant allele for tall is represented by T
 Recessive allele for short is represented by t [1 mark]

Parents : pure bred Tall pea plant X pure bred short pea plant

Genotypes : TT X tt [1 mark]

Gametes : All T All t [1 mark]

F₁ phenotypes: All tall pea plant Tt [1mark]

Genotypes : Tt X Tt

Gametes : T t T t [1 mark]

F₂ phenotypes: TT Tt Tt tt [1mark]

Tall Pea plant Tall Pea plant Tall pea plant Short pea plant [1mark]

3 : 1 [1 mark]

Total: [8 marks]

9(b) Able to explain the inheritance of colour-blindness

F1: A man has XY chromosomes and a woman has XX chromosomes [1 mark]

F2 : Gene for colour blindness is recessive. [1 mark]

F3: Linked to the X chromosomes . [1 mark]

F4: The chromosomes has no sex-linked trait. [1 mark]

F5: Colour blind male ($X^n y$)

E1: X^n - from, mother

E2: Y - from father [2 mark]

F6: Normal male ($X^N y$)

E3: X^N - from mother

E4: Y - from father [2 mark]

F7: Carrier female ($X^N X^n$)

E5: X^N - from mother/ father

E6: X^n - from father/ mother [2 mark]

F8: Colour blind female ($X^n X^n$)

E7: X^n - from father

E8: X^n - from mother [2 mark]

TOTAL: [12 marks]

Question 1

1(a) (i)

Score	Explanation
3	<p>Able to state two different observations correctly based on the following criteria.</p> <p>C1 – Fan speed C2 – The time taken for air bubble to move a distance of 10 cm.</p> <p>Sample Answer:</p> <ol style="list-style-type: none"> The time taken for air bubble to move a distance of 10 cm at air speed 5 is 12 minutes. The time taken for air bubble to move a distance of 10 cm at air speed 0 is 37 minutes. The time taken for air bubble to move a distance of 10 cm is shorter/faster at air speed 5 than at air speed 0 // inversely.
2	<p>Able to state two different observations inaccurately.</p> <p>Sample Answer:</p> <ol style="list-style-type: none"> Under fast / slow moving/ still air, the air bubble moves. The fan speed influences the time taken for air bubble to move a distance of 10 cm.
1	<p>Able to state two different observations at idea level.</p> <p>Sample Answer:</p> <ol style="list-style-type: none"> The fan speed influences the air bubble to move. The fan speed changes / increases /decreases. The time taken for air bubble to move a distance of 10 cm changes / increases /decreases.
0	No response or wrong response (response like hypothesis)

Scoring

Correct	Inaccurate	Idea	Wrong	Score
2	-	-	-	3
1	1	-	-	2
-	2	-	-	
1	-	1	-	1
-	-	2	-	
1	-	-	1	
-	1	1	-	
-	1	-	1	0
		1	1	

1(a) (ii)

Score	Explanation
3	<p>Able to state two inferences correctly.</p> <p>Sample answer:</p> <ol style="list-style-type: none"> Under fast moving air, the rate of transpiration is high / the water molecules evaporate from surface of the leaves rapidly causing the time taken by air bubble to move a distance of 10 cm to be short/fast. Under slow moving air, the rate of transpiration is low/ the water molecules evaporate from surface of the leaves slowly causing the time taken by air bubble to move a distance of 10 cm to be long. The time taken by air bubble to move a distance of 10 cm // rate of transpiration under fast moving air is shorter/faster // higher than under slow moving air.
2	<p>Able to state two inferences inaccurately / one correct inference and one inaccurate inference.</p> <p>Sample answer:</p> <ol style="list-style-type: none"> (Under fast moving air,) transpiration occurs in plant. The rate of transpiration is affected by the fan speed.
1	<p>Able to state one correct inference or two inaccurate inference or idea.</p> <p>Sample answer:</p> <ol style="list-style-type: none"> Transpiration occurs. The fan speed changes / increases /decreases. The time taken by air bubble to move (a distance of 10 cm) changes / increases /decreases
0	No response or wrong response (inference like hypothesis)

Scoring

Correct	Inaccurate	Idea	Wrong	Score
2	-	-	-	3
1	1	-	-	2
-	2	-	-	
1	-	1	-	1
-	-	2	-	
1	-	-	1	
-	1	1	-	
-	1	-	1	0
		1	1	

1(b) (i)

Score	Explanation								
3	<p>Able to state all the 3 variables and the methods to handle the variables.</p> <p>Sample answer :</p> <table border="1"> <thead> <tr> <th>Variable</th> <th>Method to handle the variable</th> </tr> </thead> <tbody> <tr> <td>Manipulated variable : Fan speed</td> <td>Carry out the experiment / Place the apparatus under different fan speed / fast moving air, slow moving air and still air</td> </tr> <tr> <td>Responding variable: The time taken by air bubble to move a distance of 10 cm // rate of transpiration</td> <td>Take the time taken by air bubble to move a distance of 10 cm using a stop watch // using a formula, $\frac{\text{distance moved by air bubble (cm)}}{\text{time taken (minute)}}$, the rate of transpiration is calculated.</td> </tr> <tr> <td>Controlled variable: the distance moved by air bubble// temperature/ relative humidity/ light intensity// plant used</td> <td>Fix the distance at 10 cm//carry out the experiment in the lab//use the same plant / branch with the same number of leaves</td> </tr> </tbody> </table> <p>Able to get 6 ✓</p>	Variable	Method to handle the variable	Manipulated variable : Fan speed	Carry out the experiment / Place the apparatus under different fan speed / fast moving air, slow moving air and still air	Responding variable: The time taken by air bubble to move a distance of 10 cm // rate of transpiration	Take the time taken by air bubble to move a distance of 10 cm using a stop watch // using a formula, $\frac{\text{distance moved by air bubble (cm)}}{\text{time taken (minute)}}$, the rate of transpiration is calculated.	Controlled variable: the distance moved by air bubble// temperature/ relative humidity/ light intensity// plant used	Fix the distance at 10 cm//carry out the experiment in the lab//use the same plant / branch with the same number of leaves
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Controlled variable: the distance moved by air bubble// temperature/ relative humidity/ light intensity// plant used	Fix the distance at 10 cm//carry out the experiment in the lab//use the same plant / branch with the same number of leaves								
2	Able to get 4 – 5 ✓								
1	Able to get 2 – 3 ✓								
0	No response or wrong response								

1(b)(ii)

Score	Explanation										
3	<p>Able to list all materials and apparatus from the given list correctly.</p> <p>Sample answer :</p> <table border="1"> <thead> <tr> <th>Materials</th> <th>Apparatus</th> </tr> </thead> <tbody> <tr> <td>Leafy branch</td> <td>Capillary tube</td> </tr> <tr> <td>Coloured water</td> <td>Stop watch</td> </tr> <tr> <td></td> <td>Metre rule</td> </tr> <tr> <td></td> <td>Fan</td> </tr> </tbody> </table> <p>All two materials and four apparatus are correct.</p>	Materials	Apparatus	Leafy branch	Capillary tube	Coloured water	Stop watch		Metre rule		Fan
Materials	Apparatus										
Leafy branch	Capillary tube										
Coloured water	Stop watch										
	Metre rule										
	Fan										
2	Refer to scoring below										
1	Refer to scoring below										
0	Refer to scoring below										

Materials	Apparatus	Score	Comments
2M	4A	3	All the four listed labels in given list.
2M + 1A	3A	2	1 listed apparatus classified wrongly
2M	2/3 A		1/2 listed apparatus are missing
1M	4A		1 listed material is missing
2M + 2A	2A	1	2 listed apparatus classified wrongly
2M + 1A	2A		1 listed apparatus is classified wrongly and 1 is missing
2M	1/2 A + any X		1/2 listed apparatus are missing with added unlisted apparatus.
1M	2/3 A		1 listed material and 1/2 apparatus are missing
4A	2 M	0	Apparatus and materials are wrongly classified
1/2M+ any X	2/3 A + any X		Added unlisted material/apparatus with added unlisted apparatus.

1(c)

Score	Explanation
3	<p>Able to state the hypothesis correctly based on the following criteria: V1 – State the speed of air movement V2 – State the time taken by air bubble to move a distance of 10 cm // rate of transpiration R - State the relationship between V1 and V2.</p> <p>Sample answer :</p> <ol style="list-style-type: none"> The higher the fan speed, the faster/shorter the time taken by air bubble to move a distance of 10 cm // the higher the rate of transpiration // inversely. As the fan speed increases, the time taken by air bubble to move a distance of 10 cm // rate of transpiration also increases // inversely.
2	<p>Able to state the hypothesis but less accurate.</p> <p>Sample answer :</p> <ol style="list-style-type: none"> The fan speed influences / affects the time taken by air bubble to move a distance of 10 cm // the rate of transpiration. The time taken by air bubble to move a distance of 10 cm // the rate of transpiration is influenced / affected by the fan speed.
1	<p>Able to state the idea of the hypothesis</p> <p>Sample answer :</p> <ol style="list-style-type: none"> The air movement causes air bubble to move / water loss from plants. The plant takes up / loses water.
0	No response or wrong response

1(d)(i)

Score	Explanation												
3	<p>Able to construct a table correctly with the following criteria:</p> <ol style="list-style-type: none"> 1. T – Able to state the 3 titles with units correctly 2. D – Able to record all the data correctly. 3. C – Able to calculate the rate of transpiration correctly <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Fan Speed</th> <th>Time taken by air bubble to move a distance of 10 cm (min)</th> <th>Rate of transpiration (cm/min)</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>12</td> <td>0.83</td> </tr> <tr> <td>3</td> <td>23</td> <td>0.43</td> </tr> <tr> <td>0/Off</td> <td>37</td> <td>0.27</td> </tr> </tbody> </table>	Fan Speed	Time taken by air bubble to move a distance of 10 cm (min)	Rate of transpiration (cm/min)	5	12	0.83	3	23	0.43	0/Off	37	0.27
Fan Speed	Time taken by air bubble to move a distance of 10 cm (min)	Rate of transpiration (cm/min)											
5	12	0.83											
3	23	0.43											
0/Off	37	0.27											
2	Any two criteria correct												
1	Any one criterion correct												
0	No response or wrong response												

1(d)(ii)

Score	Explanation
3	<p>Able to draw the graph of rate of transpiration against the fan speed correctly with the following criteria :</p> <ol style="list-style-type: none"> 1. Axes (A) – correct titles with units on both axes and uniform scales on axes. 2. Point (P) – All points are correctly plotted. 3. Shape (S) – All points are connected smoothly. <p>All three criteria correct.</p>
2	Graph with any two criteria correct.
1	Graph with any one criteria correct.
0	No response or wrong response.

Note :

1. For points plotted / transferred wrongly but graph shows a line with positive gradient, give mark for S but no mark for P.
2. Graph with inverse axes, reject A but accept P and S if they are transferred and drawn correctly.

1(d) (iii)

Score	Explanation
3	<p>Able to interpret data correctly and explain with the following aspects :</p> <p>Relationship(R) : P1 = Able to state the <u>relationship between the manipulated variable and responding variable</u></p> <p>Explanation : P2 = Able to state rate of transpiration increases</p> <p>P3 = Able to state the time taken by air bubble to move from P to Q / a distance of 10 cm increases .</p> <p>Sample answer : 1. When the fan speed increases, the rate of transpiration increases because the time taken by air bubble to move from P to Q / a distance of 10 cm increases.</p>
2	Able to interpret data with two aspects correctly.
1	Able to interpret data with only one aspect correctly.
0	No response or wrong response

1(e)

Score	Explanation
3	<p>Able to state the changes in the distance moved by the air bubble with time when the apparatus is placed under a fan at air speed of 5 and give the fact and an explanation for the changes correctly based on the following criteria:</p> <p>C1 : Observation The distance moved by the air bubble will increase with time.</p> <p>C2 : Fact The rate of transpiration increases.</p> <p>C3 : Explanation More water is lost from the leaves per minute.</p> <p>Sample answer : 1. When the apparatus is placed under a fan at air speed 5, the distance moved by the air bubble will increase with time. The rate of transpiration increases as more water is lost from the leaves per minute.</p>
2	Able to state the changes in the distance moved by the air bubble with time correctly based on two criteria, C1 & C2 or C1 & C3.
1	Able to state the changes in the distance moved by the air bubble with time with only one criterion, C1 correctly.
0	No response or wrong response

1(f)

Score	Explanation
3	<p>Able to state the definition of transpiration operationally, based on the result of experiment with the following aspects :</p> <p>C1 – a leafy plant C2 – the (upward) movement of air bubble // uptake of water C3 – the factor that affects the time taken for the air bubble to move a distance of 10 cm / transpiration.</p> <p>Sample answer 1. Transpiration is a process occurring in a leafy plant causing (upward) movement of air bubble/uptake of water and is affected by the fan speed.</p>
2	Able to state the definition of transpiration based on the result of experiment with two criteria correctly.
1	Able to state the definition of transpiration based on the result of experiment with only one criterion correctly.
0	No response or wrong response

1(g)

Score	Explanation
3	<p>Able to predict and explain the outcome of the experiment correctly with the following aspects:</p> <p>Prediction : P1 : Able to predict the time taken by air bubble to move a distance of 10 cm// transpiration rate - shorter / slower / lower (compared with that under fast moving air from the present experiment)</p> <p>Explanation : P2 : Able to state smaller leaves have smaller surface area and smaller number of stomata P3 : Able to state less water is lost from the leaves per minute</p> <p>Sample answer : 1. The time taken by air bubble to move a distance of 10 cm shorter/slower than 12.0 minutes // the transpiration rate is lower than 0.83 cm min^{-1} because smaller leaves have smaller surface area and smaller number of stomata and thus less water is lost from the leaves per minute.</p>
2	Able to predict based on any two criteria.
1	Able to predict based on any one criterion.
0	No response or wrong response

MScheme Bio Trial Q2P3 Zone A 2008

Construct	Sample Answers	Notes on Scoring
1. Objective (Ob)	1. To investigate / study the pollution level of four sample of water from different sources.	Reject : If no “four different sources of water”. <i>tick</i>
2. Problem Statement (PS) <div style="border: 1px solid black; width: 40px; height: 20px; margin: 10px auto; text-align: center;">01</div>	Able to relate P1, P2 and R in a question form . Sample Answer: 1. What is the time taken to decolourise methylene blue solution by four different water samples? 2. What is the pollution level of the four different water samples? 1. What is the pollution level of the four different water samples? 2. Does / How do four water samples differ in pollution level? 3. Does the time taken for methylene blue to decolourised influenced by different sources water? 4. Is the pollution level of water influenced by different sources of water? 1. Pollution (level) is affected by (different sources of) water samples. 2. The (different) sources of water samples affect the pollution (level) of water. 3. The source of water samples is a factor in pollution.	P1=Manipulated var. = four different sources of water sample P2=Responding var. = time taken to decolourise methylene blue solution / pollution level R =Question P1 + P2 + R = 3 No P2 / R 2 No P2/P1 and H 1 <i>tick</i>
3.Hypothesis (Hp) <div style="border: 1px solid black; width: 40px; height: 20px; margin: 10px auto; text-align: center;">02</div>	1. Water sample A took the shortest time to decolourise methylene blue solution compared to water sample B, C and D. 2. Water sample A / water from river took the shortest // fastest tie to decolourise methylene blue solution. The pollution level is the highest in water sample A. 3. The river water / water sample D is more	P1=Manipulated var. = four different sources of water P2=Responding var. = time taken to decolourise

	polluted than the pond water / water sample A.	methylene blue/ pollution level H =Relationship P1 + P2 + H = 3
	<ol style="list-style-type: none"> 1. Water sample A took (the shortest time) to decolourise methylene blue solution. 2. The time taken is the fastest / shortest in river water / water sample A. 3. The river water / water sample D is more polluted. 	P1 + P2 or P1 + H or P2 + H 2
	<ol style="list-style-type: none"> 1. The water samples affect the pollution level / time taken to decolourise methylene blue solution. 2. Water sample decolourises methylene blue solution. 3. Water sample A/B/C/D is not polluted / polluted. 	P1 only or P2 only 1 <i>tick</i>
4. Variables (Vr)		
Manipulated :	Water samples from four different sources.	
Responding :	Time taken for the methylene blue solution to decolourise	
Fixed :	Volume of water sample / Concentration or volume of methylene blue solution	All three variables correct <i>tick</i>
5.Apparatus and Materials (AM)	<u>Materials (M):</u> 1.Methylene blue solution 2.water sample from A,B,C and D <u>Apparatus (A) :</u> 1.Reagent bottle 2.stopper 3.beaker 4.syringe 5.stop watch 5 / more A + 2 M = 3m 3- 4 A + 2M = 2m 2A + 2 M = 1m 1 or 2 A + 1 M = 0 m	Methylene blue solution and water sample from A,B,C and D should be in the materials listed. If either Methylene blue solution or water sample from A,B,C and D is missing, AM = 0m But marks are given, if they are mentioned in the procedure / diagram <i>tick</i>

05

<p>6. Technique (Tq)</p>	<p>Able to state the operating responding variable correctly, using suitable apparatus.</p> <p>Record the time taken for methylene blue solution to decolourise using a stopwatch.</p>	<p>B1 = 1m</p> <p><i>tick</i></p>
<p>7. Procedure (K)</p> <div style="border: 1px solid black; width: 40px; height: 20px; text-align: center; margin: 10px auto;">04</div>	<p>Able to list down the complete and correct procedures/steps used based on the following five criterias P1, P2, P3, P4 and P5 :</p> <p>P1 : <u>Preparation of materials & apparatus</u> (Any 4)</p> <p>K1: Water samples are collected from four different sources A,B,C and D K2: The reagent bottles are labelled 1,2,3,4 K3: The reagent bottles are closed with the stoppers immediately. K4: The stopwatch is activated. K5: The bottles are examined from time to time. K6: The results are recorded in a table.</p> <p>Remark : Able to state any four (K) steps to get P1.</p>	<p>All 5 K = 3m</p> <p>3 - 4 K only = 2m</p> <p>2 K only = 1m</p> <p>1 K = 0m</p>
	<p>P2 : <u>Operating Fixed variable</u>(any 1)</p> <p>1. Measure 250 ml of water sample from A, B, C and D separately and pour into the reagent bottle labelled 1, 2, 3 and 4 respectively. 2. 1 ml of methylene blue solution is added to the bottom of each water sample using a syringe.</p>	<p>1K only = tick</p>
	<p>P3 : <u>Operating responding variable</u></p> <p>The time taken for the methylene blue solution to decolourise / become colourless is recorded for all the water samples.</p>	
	<p>P4 : <u>Operating manipulated variable</u></p> <p>Measure 250 ml of water sample from A, B, C and D separately and pour into the reagent bottle labelled 1,2,3,4 respectively.</p>	
	<p>P5 : <u>Methods to take precautions steps</u></p> <p>State one precaution steps in the experiment. Sample Answer: 1. The contents of the bottles cannot be shaken.</p>	

	<p>2. All the reagent bottles are kept in a dark cupboard. Sample Answer: Method / Procedure :</p> <ol style="list-style-type: none"> 1. Water samples are collected from A, B, C and D 2. The reagent bottles are labelled 1,2,3,4 3. Measure 250 ml of water sample from A,B,C and D separately and pour into the reagent bottle labelled 1, 2, 3, and 4 respectively. 4. 1 ml of methylene blue solution is added to the bottom of each water sample using a syringe. 5. The reagent bottles are stoppered immediately. 6. The content of the bottles cannot be shaken. 7. All the reagent bottles are kept in a dark cupboard 8. The stopwatch is activated. 9. The bottles are examined at one hour interval. 10. The time taken for the methylene blue solution to decolourise / become colourless is recorded for all the water samples. 11. The results are recorded in a table. 																
<p>8. Recording data / Result (RD)</p>	<p>Able to construct a table to record all data with the following aspects :</p> <ol style="list-style-type: none"> 1. 3 titles with units 2. No data is required <table border="1" data-bbox="540 1073 1227 1409"> <thead> <tr> <th>Reagent bottle</th> <th>Water samples</th> <th>Time taken for methylene blue solution to decolourise (hours)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>A</td> <td></td> </tr> <tr> <td>2</td> <td>B</td> <td></td> </tr> <tr> <td>3</td> <td>C</td> <td></td> </tr> <tr> <td>4</td> <td>D</td> <td></td> </tr> </tbody> </table>	Reagent bottle	Water samples	Time taken for methylene blue solution to decolourise (hours)	1	A		2	B		3	C		4	D		<p>B2 = 1</p> <p style="text-align: right;"><i>tick</i></p>
Reagent bottle	Water samples	Time taken for methylene blue solution to decolourise (hours)															
1	A																
2	B																
3	C																
4	D																
<p>9. Conclusion (Cn)</p>	<p>Same as hypothesis above</p>	<p style="text-align: right;"><i>tick</i></p>															
<p>Planning experiment</p>	<table border="1" data-bbox="548 1535 646 1608"> <tr> <td style="text-align: center;">03</td> </tr> </table> <p style="margin-left: 100px;"> 7-9 ticks = 3m 4-6 ticks = 2m 1-3 ticks = 1m </p>	03															
03																	