

MODUL EMaS JPNTrg

MODULE 2 BIOLOGY FORM 4

CHAPTER 4 : CHEMICAL COMPOSITION OF THE CELL

CHAPTER 5 : CELL DIVISION



Module Panels:

1. Tn. Haji Meli bin Hussin
SM Sains K. Terengganu
2. En. Mohd Nor bin Ismail
SMK Tun Telanai, Marang
3. En. Zulkifli bin Awang
SMK Ibrahim Fikri, K. Terengganu
4. Pn.Hjh Muslimah Bt Mahmood
SM Sains Sultan Mahmud , K. Terengganu
5. Pn. Hjh Rohayah Bt Md Nor
SMK Sultan Mansor, K. Terengganu

CHAPTER 4 : CHEMICAL COMPOSITION OF THE CELL
CHAPTER 5 : CELL DIVISION

SECTION A

Instruction : Each question is followed by four options. A, B, C and D. Choose one correct answer for each question.

1. Figure 1 shows a stage during mitosis in a plant cell.

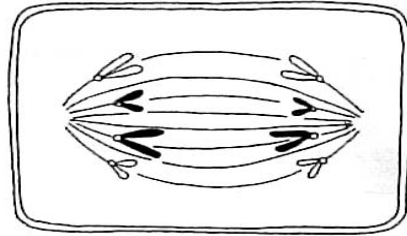
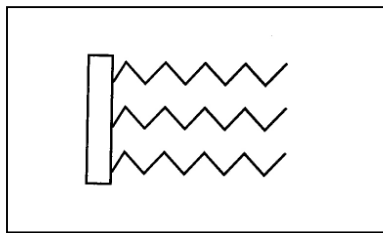


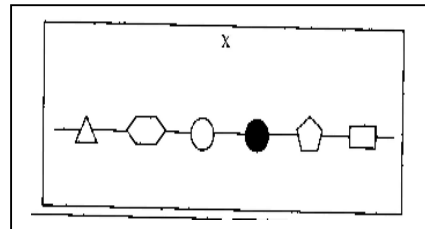
Figure 1

Which of the statements about the cell in Figure 1 is not true?

- A The cell produces diploid daughter cells
 - B The cell is at anaphase
 - C The cell is found at the apical meristem
 - D The cell has eight chromosomes at interphase
2. Figure 2 shows the molecular structure of three food classes.



X



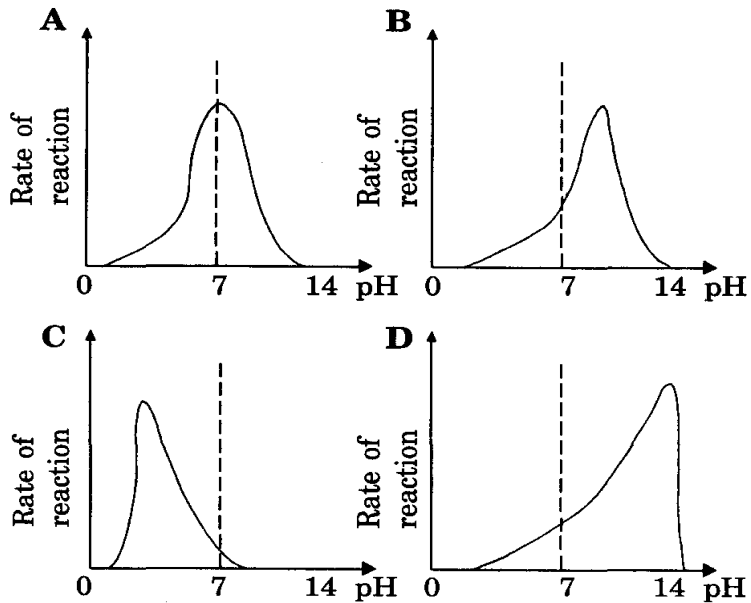
Y

Figure 2

	X	Y
A	Carbohydrate	Protein
B	Lipid	Protein
C	Protein	Carbohydrate
D	Lipid	Carbohydrate

3. Which of the following is not a function of water?
- A Provides a moist surface for the diffusion of gases
 - B Facilitates the movement of joints
 - C An insulator of heat in the body
 - D Facilitates the hydrolysis of food by enzymes

4. Which of the following graphs best represents the effect of pH on the rate of reaction of enzymes secreted by the pancreas?



5. Figure 3 shows how an enzyme works.

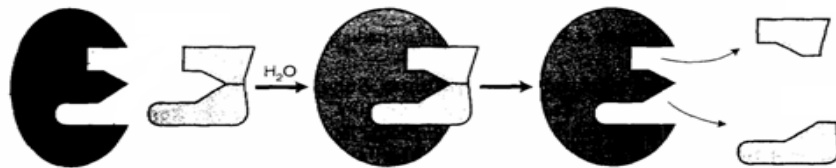


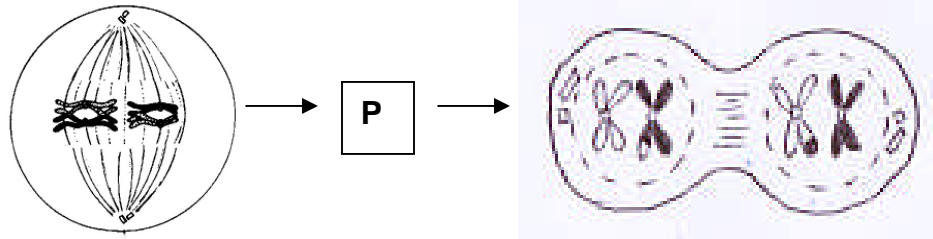
Figure 3

Which property of an enzyme is shown in Figure 3?

- A Enzyme reaction is specific
 - B Enzyme reaction is affected by pH
 - C Enzyme reaction is affected by temperature
 - D Enzyme structure changes at the end of reaction
6. An animal species has a diploid number of chromosomes, $2n = 12$, in each of its nuclei. Which of the following is true regarding the animal cell during and after meiosis?

	Number of nucleus divisions during meiosis	Number of chromosomes in gametes after meiosis
A	1	3
B	1	6
C	2	3
D	2	6

7. The diagram shows several stages in meiosis.



What is the chromosome behaviour in stage P?

- A Chromosome condense and thicken
- B Chromosomes arrange themselves around equatorial plane
- C Homologous chromosomes pair together and cross-over occurs
- D Homologous chromosomes separate and move to the opposite poles

8. Figure 4 shows a graph rate of enzyme reaction P, Q and R in the different pH.

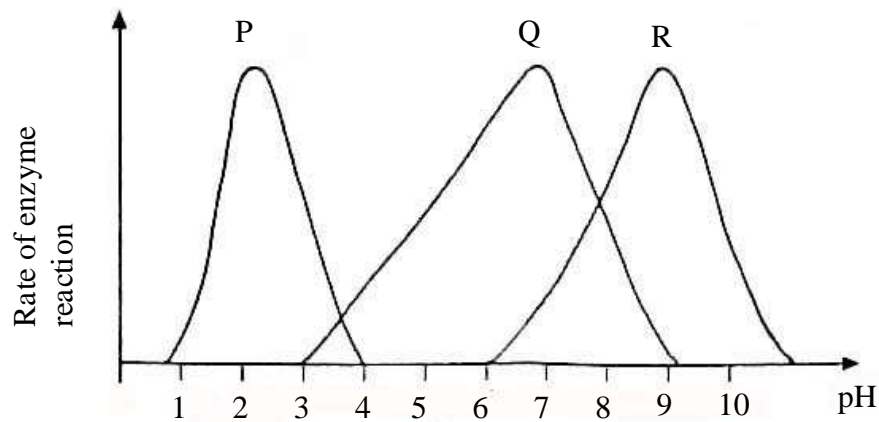


Figure 4

What is the enzyme P, Q and R?

- | | P | Q | R |
|---|--------|---------|---------|
| A | Pepsin | Lipase | Tripsin |
| B | Renin | Lipase | Tripsin |
| C | Renin | Amilase | Tripsin |
| D | Pepsin | Tripsin | Amilase |

9. In the human body, active cell division does not occur in the

- A bone marrow
- B brain
- C testis
- D epidermis

10. Figure 5 shows the synthesis of extracellular enzymes.

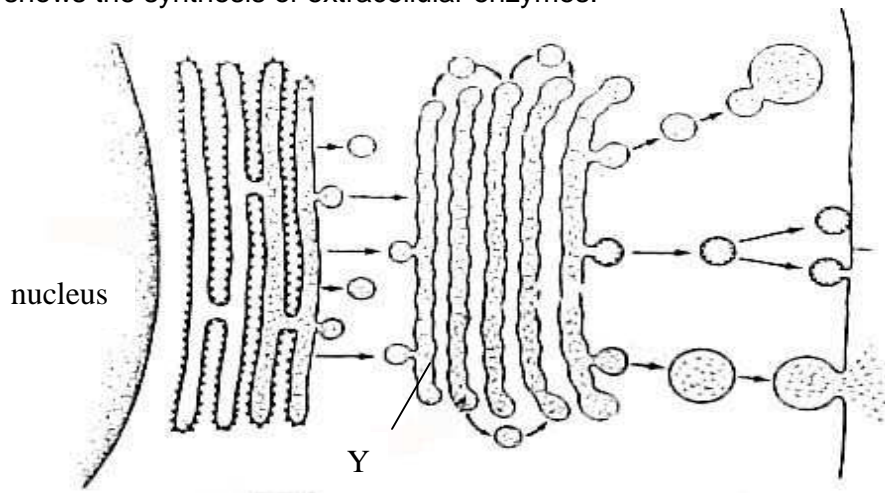


Figure 5

Which of the following is the function of organelle Y

- I synthesis of proteins
 - II modifying of proteins
 - III sorting of proteins
 - IV packaging of proteins
- A I and II only C I, II and III only
 B II and III only D II, III and IV only

11. Figure 6 shows the stage of sexual reproduction in animal.

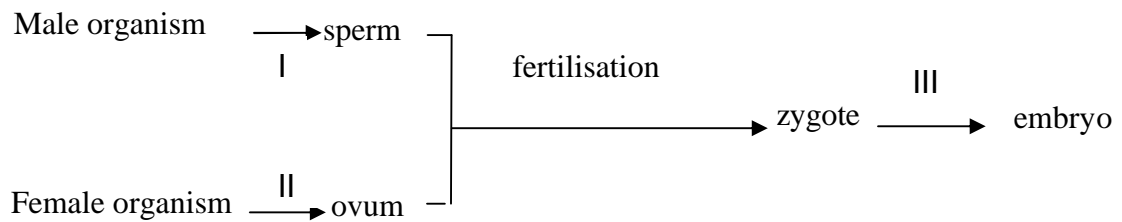


Figure 6

Choose the process which occurs at stage I, II and III.

- | | I | II | III |
|---|---------|---------|---------|
| A | Meiosis | Mitosis | Mitosis |
| B | Mitosis | Meiosis | Mitosis |
| C | Meiosis | Meiosis | Mitosis |
| D | Meiosis | Mitosis | Meiosis |

12. Figure 7 shows a stage during cell division.

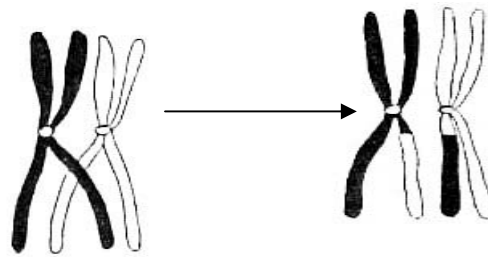
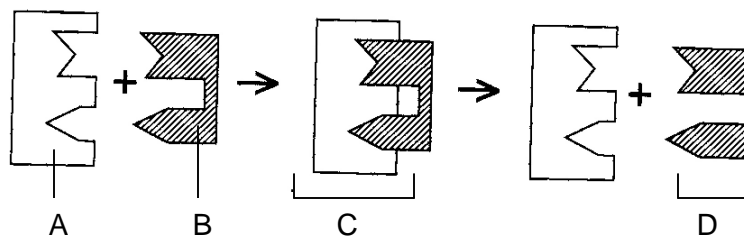


Figure 7

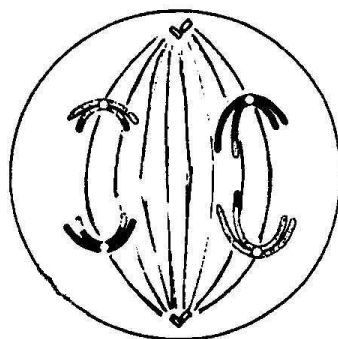
Where can you find this stage in a plant?

- | | | | |
|---|---------|---|-----------------|
| A | anther | C | apical meristem |
| B | cambium | D | shoot tips |

13. The figure shows the breaking down of a complex molecule by an enzyme. Which of the molecule A, B, C or D, represents the substrate?



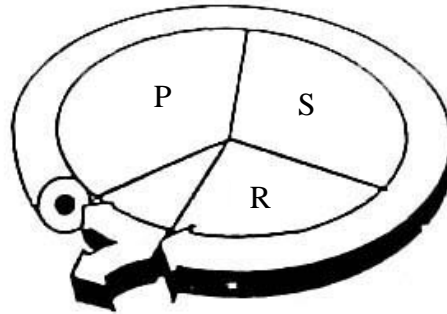
14. The diagram illustrates a stage during a cell division



Which of the statement is true about the cell?

- A A pair of sister chromatids separate and move towards the opposite poles of the cells
- B After a cell division, each daughter cell has four chromosomes
- C After a cell division, each daughter cell has two chromosomes
- D The cell in the diagram at anaphase II

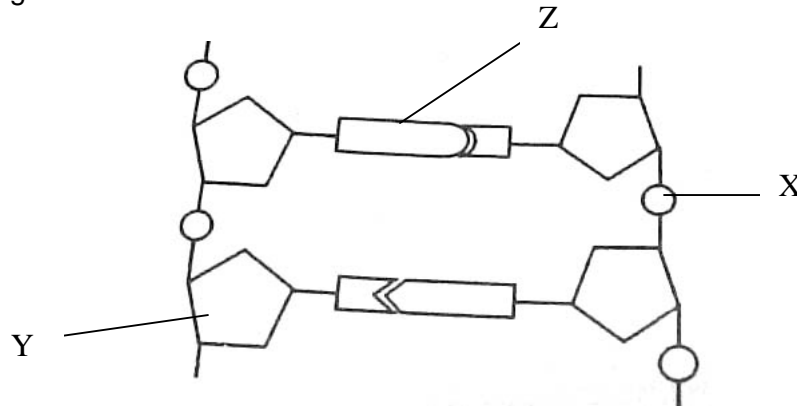
15. The figure shows the phases of a cell cycle in an organism



What are P and S?

	P	S
A	G1	S
B	G1	M
C	G2	S
D	G2	M

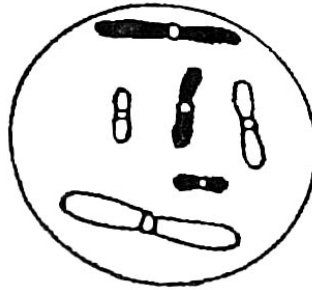
16. The diagram shows a DNA model .



The components labelled X, Y and Z are

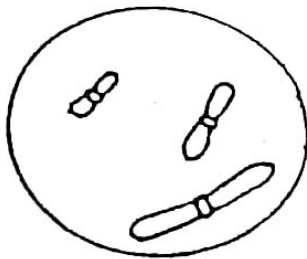
	X	Y	Z
A	Deoxyribose sugar	Nitrogenous base	Phosphate group
B	Nitrogenous base	Phosphate group	Deoxyribose sugar
C	Phosphate group	Deoxyribose sugar	Nitrogenous base
D	Phosphate group	Nitrogenous base	Deoxyribose sugar

17. The figure shows the chromosomes in a parent cell.

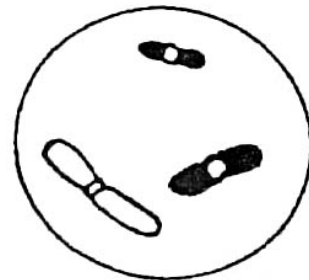


Which of the following are **not** the possible combinations of chromosomes in the daughter cells after the parent cell has divided?

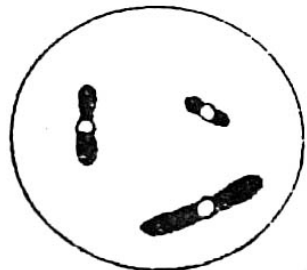
A



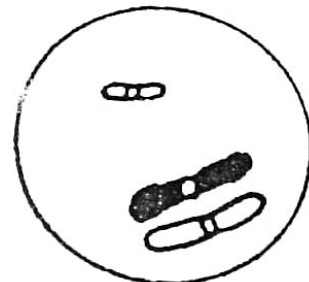
B



C



D



18. Which of the following statements represent the importance of meiosis?

- I The number of chromosomes is halved in gamete cells
- II The diploid number of chromosomes is maintained after each cell division
- III Genetic variations occur from one generation to the next
- IV The genetic content of the parent cell is maintained

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

Section B

Instruction : Answer all question in this section.

1 Figure 1(a) shows a reaction catalysed by lipase

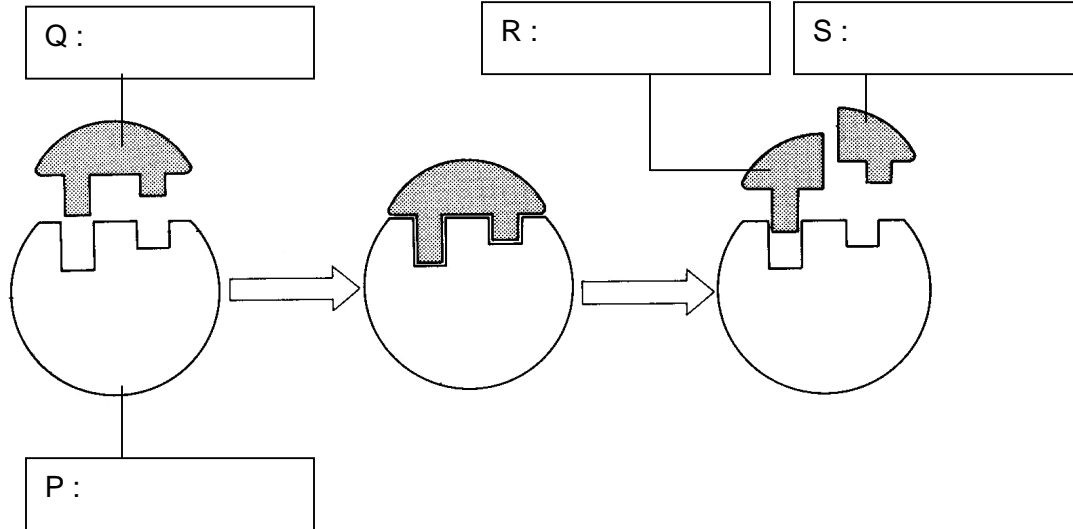


Figure 1(a)

(a) (i) Label P, Q, R and S in Figure 1(a).

[4 marks]

(ii) State two characteristics of P

1

2

[2 marks]

(b) State the principle of enzyme reaction as shown in Figure 1(a).

.....

[1 mark]

(c) Two test tubes A and B containing pepsin and albumen were set up. The apparatus was left aside for 15 minutes at room temperature. The result are shown in Table 1.

Test tube	At the beginning of the experiment	At the end of the experiment
A	Cloudy	Cloudy
B	Cloudy	Cloudy

Table 1

- (i) Explain the results for test tube A at the end of the experiment.

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

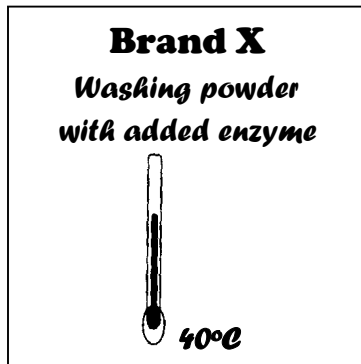
- (ii) Suggest the changes to be made to the contents in test tube A and the set up of the experiment to obtain a positive result.

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

- (iii) After making the changes in (c)(ii), predict the result obtained from test tube A.

..... [1 mark]

- (d) Figure 1(b) shows a box of washing powder.



A housewife uses cold water to wash her clothes with brand X washing powder. The cleaning is less effective. Using the above information, explain why.

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

2 Figure 2 (a) shows four randomly arranged stages of mitosis in an animal cell.

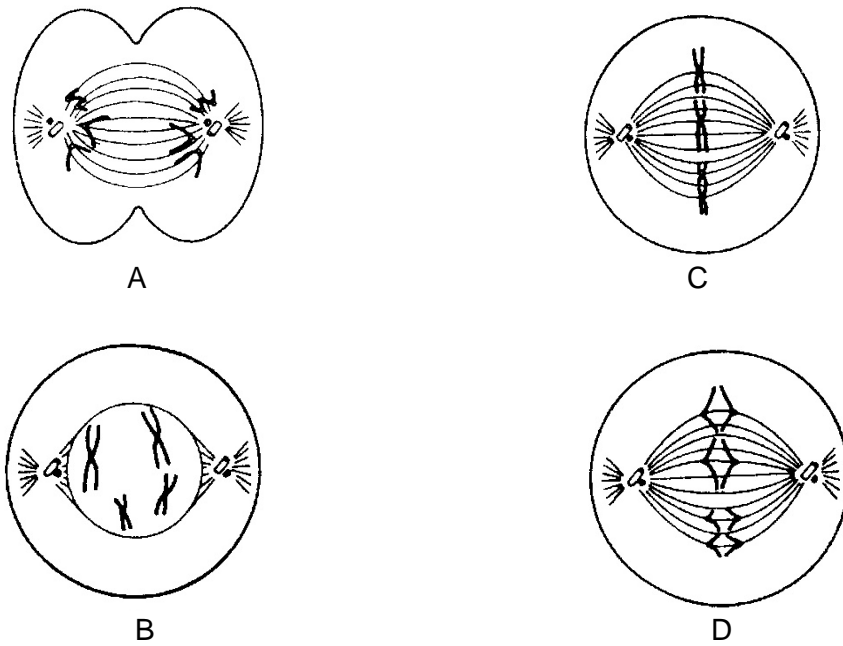


Figure 2 (a)

(a) Write the correct sequence of the stages of mitosis.

..... [1 mark]

(b) Name the stages of mitosis represented by B and C.

B :

C : [2 marks]

(c) If the parent cell in Figure 2 (a) divides three times during mitosis, state the

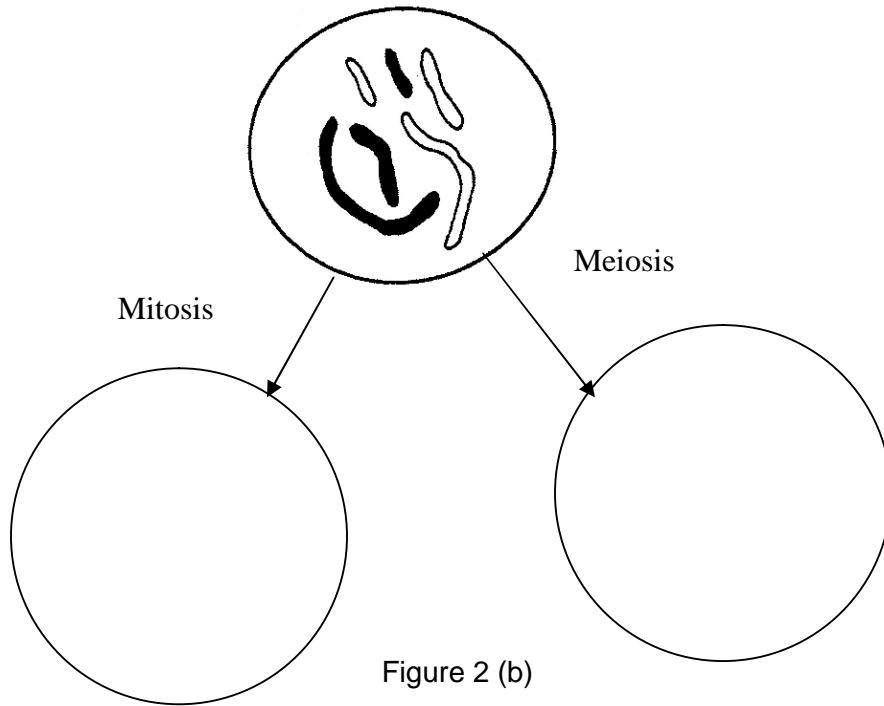
(i) number of daughter cells formed

.....

(ii) number of chromosomes in each daughter cell

..... [2 marks]

(d) Figure 2 (b) shows the nucleus of a somatic animal cell



(i) In the space above, draw the nucleus of the daughter cell produced during mitosis and meiosis. [2 marks]

(ii) Based on the diagram drawn in (d)(i), state two differences between the daughter cells formed through mitotic cell division and meiotic cell division.

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

[2 marks]

(iii) Explain how meiosis helps to maintain the diploid condition of the cell

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

[2 marks]

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- (e) Cancer is a disease which causes uncontrolled growth of tissues. Radiotherapy is a method to treat cancer by using radiation. Explain how this treatment stops the growth of cancer cells.

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

[2 marks]

- (f) An oil palm planter wants to produce a large number of oil palms in a short time. State the best technique to be used by the planter and one problem to be considered in using the technique.

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

[2 marks]

- (g) Every somatic cell which contains nucleus has a potential to form a complete new organism.

- (i) Name the technique used to produce new plants in large quantities.

.....

[1 marks]

- (ii) By using one suitable part of the plant, explain the technique in (g)(i).

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

[4 marks]

Section C

Instruction : Answer all questions.

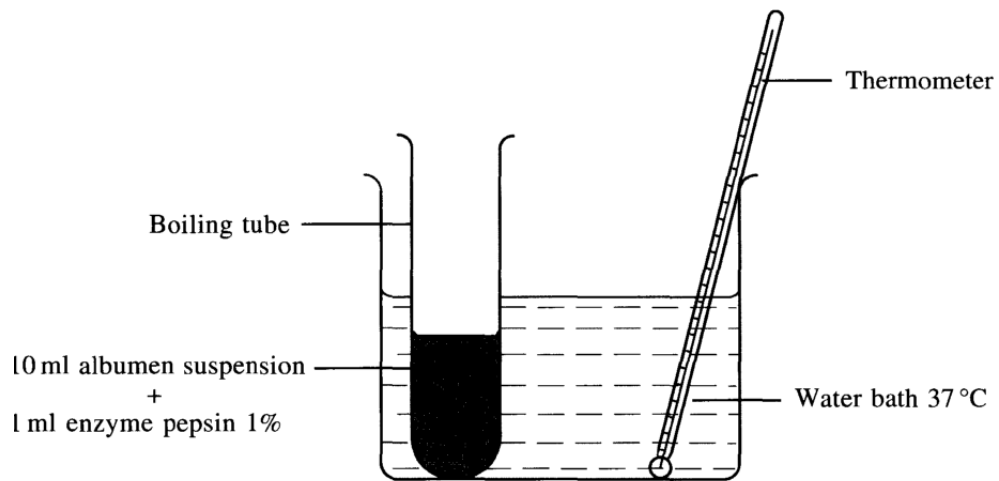
- 1 A group of students carried out an experiment to study the effect of the concentration of albumen suspension on the rate of reaction of pepsin enzyme.

Diagram 1.1 shows the method used by the students.

The time taken for the change in the cloudiness of the albumen suspension is shown in Diagram 1.2

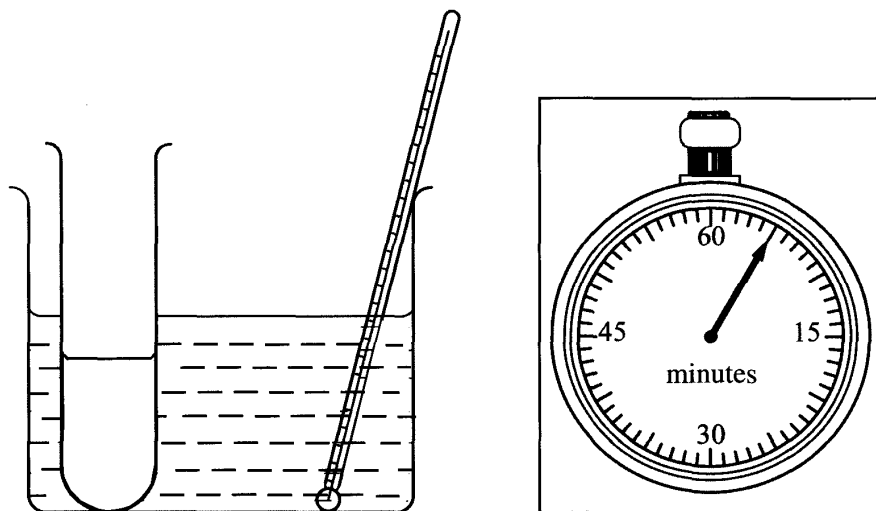
The whole experiment in diagram 1.1 was repeated using different concentrations of albumen suspension

Table 1.1 shows the results of the experiment.



OBSERVATION AT THE BEGINNING OF EXPERIMENT

Diagram 1.1



OBSERVATION AT THE END OF EXPERIMENT

Diagram 1.2

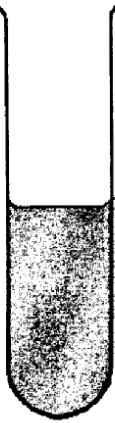
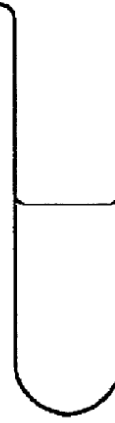
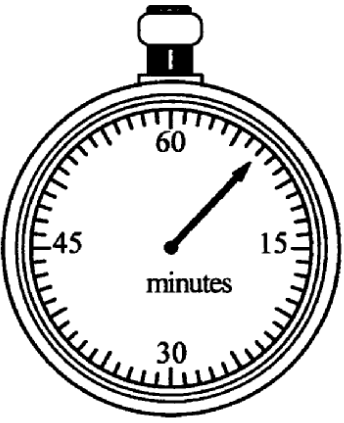


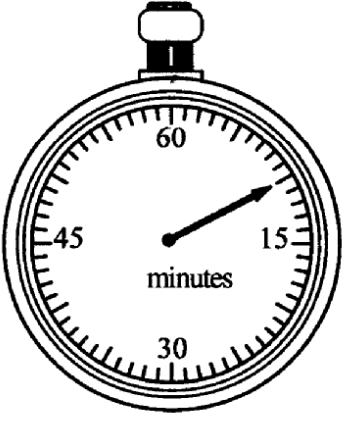


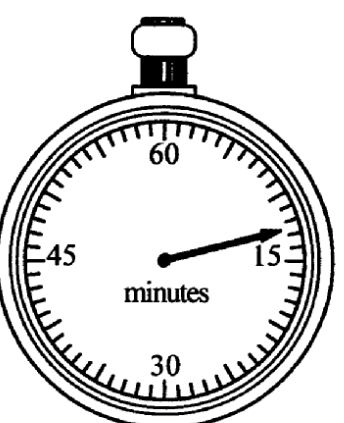
Percentage concentration of albumen suspension	OBSERVATION		Time taken /minutes
	Beginning of experiment	End of experiment	
10%	 <p>10 ml albumen suspension + 1 ml pepsin 1%</p>		
15%	 <p>10 ml albumen suspension + 1 ml pepsin 1%</p>		
20%	 <p>10 ml albumen suspension + 1 ml pepsin 1%</p>		

Table 1.1

(a) (i) Based on Table 1.1, state two observations on the relationship between the quantity of albumen and time

1

.....

2.....

.....

[3 marks]

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

1

.....

2.....

.....

[3 marks]

(b) Using the information provided in Table 1.1, complete Table 1.2 by recording the time taken for the albumen suspension to turn clear.

Percentage concentration of albumen suspension	Time taken / minutes
10 %	
15 %	
20 %	

Table 1.2

[3 marks]

(c) (i) Complete Table 1.3 based on this experiment

Variable	Method to handle the variables
Manipulated variable :
Responding variables :
Controlled variable :

Table 1.3

[3 marks]

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

Thermometer, Stop watch, Albumen suspension, Water bath, Pepsin, Syringe

Complete Table 1.4 by matching each variable with the apparatus and material used in this experiment

Variables	Apparatus	Material
Manipulated		
Responding		
Controlled		

Table 1.4

[3 marks]

(d) State the hypothesis for this experiment

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

[3 marks]

(e) (i) Based on Table 1.1, construct a table and record the results of the experiment which includes the following aspects:

- percentage concentration of albumen suspension
- time / min
- rate of enzyme reaction as percentage of albumen converted per minute

[3 marks]

(ii) On the graph paper provided, draw the graph of rate of reaction of pepsin against the concentration of albumen suspension

[3 marks]

(iii) Explain the relationship between the rate of reaction of pepsin and the concentration of albumen suspension based on the graph in 1(e)(ii).

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

[3 marks]

(f) Based on this experiment, what can you deduce about this enzyme?

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

[3 marks]

- (g) The experiment is repeated using the apparatus set up as in Diagram 1.3. The quantities of albumen suspension and pepsin enzymes used are as shown. The experiment is left for one hour.

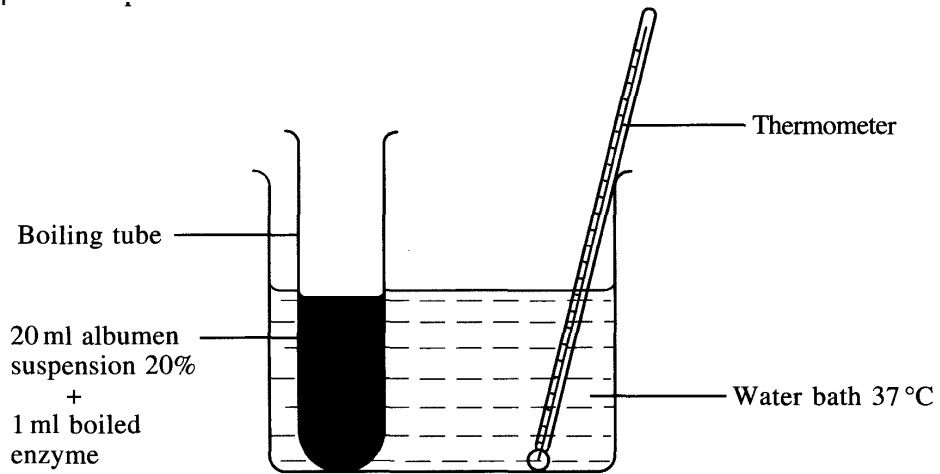
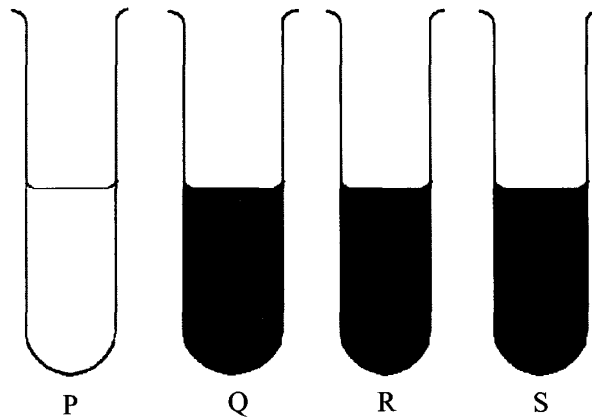


Diagram 1.3

P, Q, R and S are four possible observations after one hour. Choose one correct observation and explain your choice.



.....

.....

.....

[3 marks]

