

Class	Register Number	Name
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南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL
End-of-Year Examination 2015
Secondary Three

BIOLOGY

Paper 2

Tuesday

Additional materials: Writing papers

Theory Paper
6 October

1 hour 45 minutes
0930 - 1115

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

Write your name, register number and class in the spaces at the top of this page and on any separate answer paper used.

Write in dark blue or black pen on both sides of the paper.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A (40 marks)

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

Section B (30 marks)

Answer **all** questions including questions **7, 8** and **9 *Either* or 9 *Or***.

Write your answers on the separate writing paper provided.

At the end of the examination,

1. fasten all your work securely together;
2. tick **9 *Either*** (for *Either*) or **9 *Or*** (for *Or*) next to the question number 9 in the grid below to indicate which question you have answered.

INFORMATION FOR CANDIDATES

You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.

The number of marks is given in the brackets [] at the end of each question or part question.

The use of an approved scientific calculator is expected, where appropriate.

Examiner's Use	
Section A	
Section B	
7	
8	
9 <i>Either</i>	
9 <i>Or</i>	
Total	

This document consists of **15** printed pages.

Setters: BKoh & AMak

NANYANG GIRLS' HIGH SCHOOL

[Turn over

Section A

Answer **all** questions.

Write your answers in the spaces provided.

- 1 (a)** Fig. 1.1 is an electron micrograph which shows part of a cell.

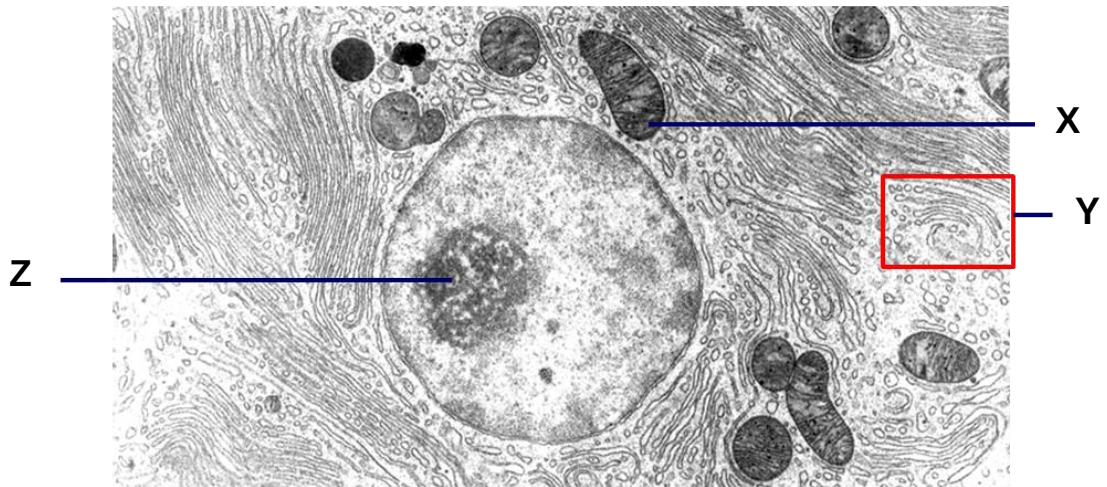


Fig. 1.1

- (i)** Identify X. [1]

.....

- (ii)** Z is part of a nucleus. Identify Z. [1]

.....

- (iii)** State the functions of Y. [2]

.....

.....

.....

.....

- (b) Fig 1.2 shows a plant cell. The cell has a magnification of **10 250 X**.



Fig 1.2

- (i) Measure the length of the cell from **P** to **Q** (marked by two crosses). [1]

Answer =

- (ii) Calculate the actual length of the cell from **P** to **Q**. Show your working and express your answer to the nearest whole number, in micrometres (μm). [2]
(1 metre = 100 centimetres = 1 000 000 micrometres)

Answer =

[Total: 7]

- 2 (a) (i) State one similarity and one difference between endocytosis and exocytosis. [2]

- (ii) Give an example of endocytosis. [1]

- (iii) Give an example of exocytosis. [1]

- (b) Samples of red blood cells were placed in a series of sodium chloride solutions of different concentrations in different containers. After 3 hours, the samples were examined to determine the percentage of cells which had burst. The results are shown in Fig. 2.1.

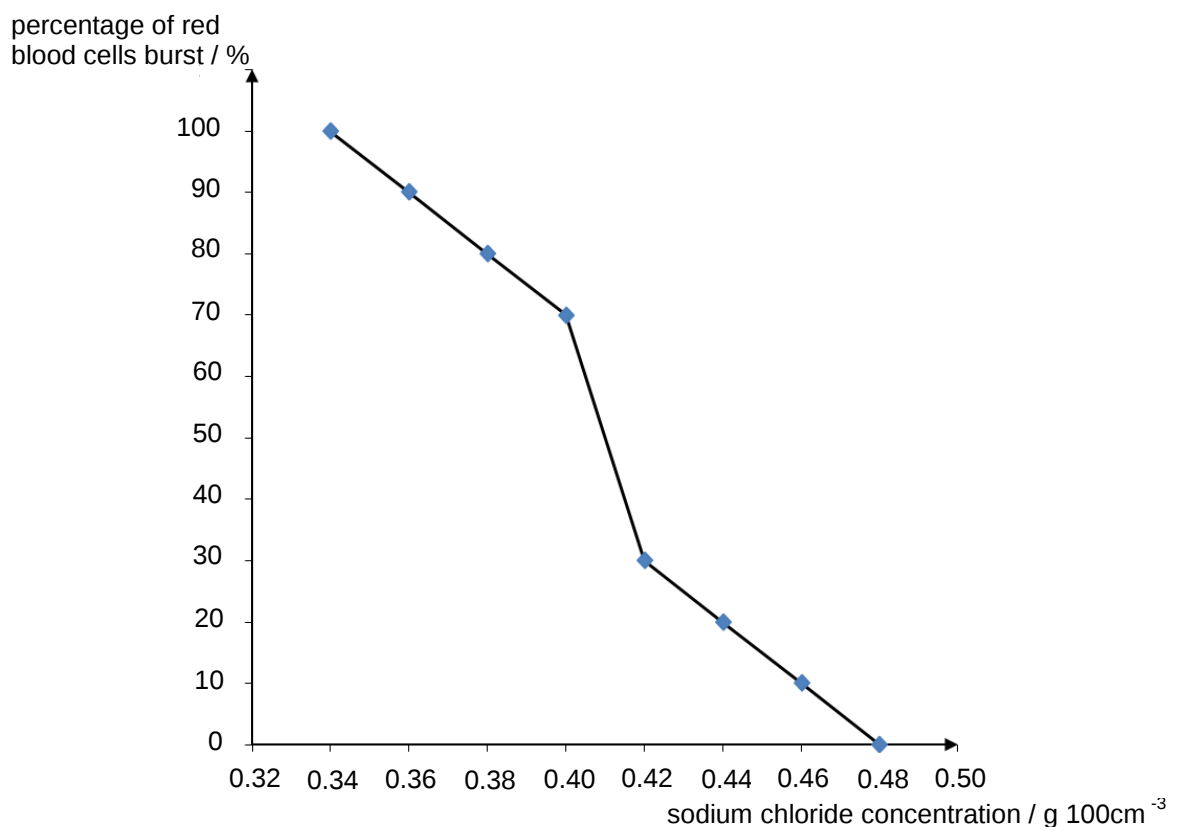


Fig. 2.1

- (i) Using Fig. 2.1, determine the concentration of the sodium chloride solution which resulted in the bursting of all the red blood cells. [1]

- (ii) If cells from a carrot are to be placed in the same range of sodium chloride solutions, predict the percentage of cells burst and explain your answer. [2]

[Total: 7]

- 3 (a) List two characteristics of enzymes. [2]

- (b) Describe one similarity and one difference between the lock-and-key hypothesis and the induced fit hypothesis of enzyme action. [2]

- (c) Fig. 3.1 shows the energy profile diagram for a chemical reaction.

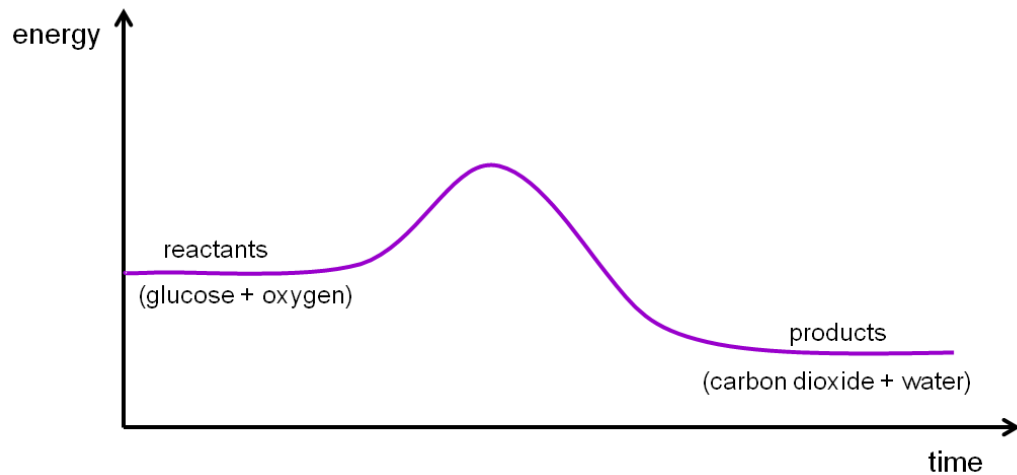


Fig. 3.1

On Fig. 3.1, draw a graph, in blue pen, to show the energy profile diagram for an enzyme-catalysed reaction. [1]

[Total: 5]

4 Lactase is widely used in the production of dairy products.

- (a) Give two reasons for converting lactose to glucose and galactose using lactase in dairy products. [2]

- (b) Laboratory experiments show that when the enzyme lactase is mixed with lactose, the initial rate of reaction is highest at 48°C. In food processing, lactase is used at a much lower temperature, often at 5°C. Suggest two advantages of using lactase at low temperatures. [2]

[Total: 4]

- 5 (a) Fig. 5.1 represents a transverse section through a leaf at 200X magnification.

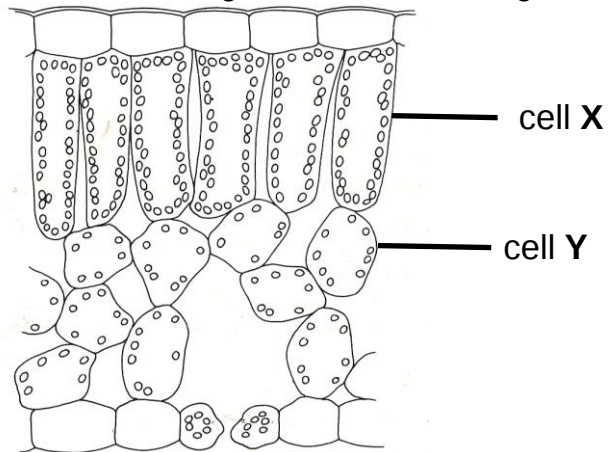


Fig. 5.1

- (i) State two differences between cell X and cell Y. [2]

- (ii) Fig. 5.2 shows a cross section of part of a fig leaf. The two arrows indicate a pair of guard cells.

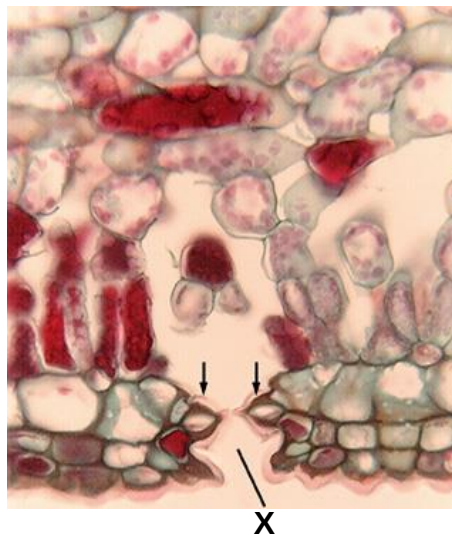


Fig. 5.2

Suggest how X helps the plant to reduce water loss.

[2]

- (b) A potted plant was destarched by placing it in the dark for two days. It was then placed in a set-up shown in Fig. 5.3 and left under the sun to test a factor necessary for photosynthesis.

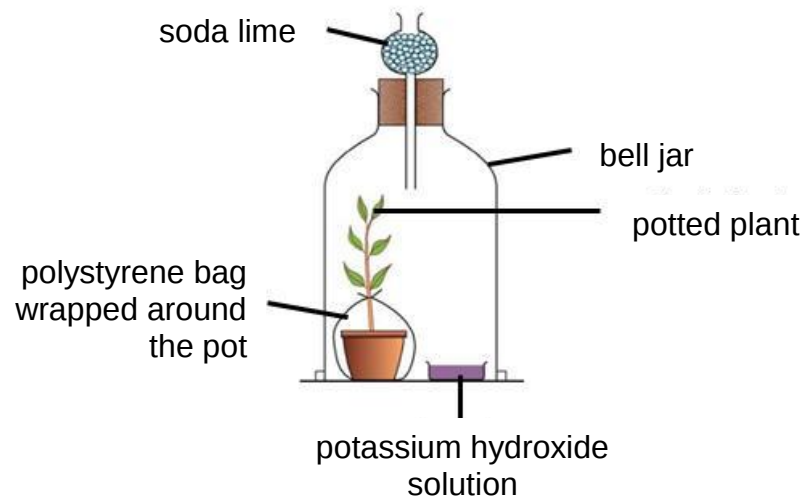


Fig. 5.3

- (i) How is the use of soda lime different from potassium hydroxide? [1]
-
-
- (ii) Suggest a suitable control that can be set up for this experiment. [2]
-
-
-
-
- (c) Some weed killers stop the plant from photosynthesising. These are often applied to the soil where the weeds are growing. Explain how the weed killer reaches its site of action in the leaves. [2]
-
-
-
-

[Total: 9]

- 6 (a)** Fig. 6.1 shows an internal view of the human heart.

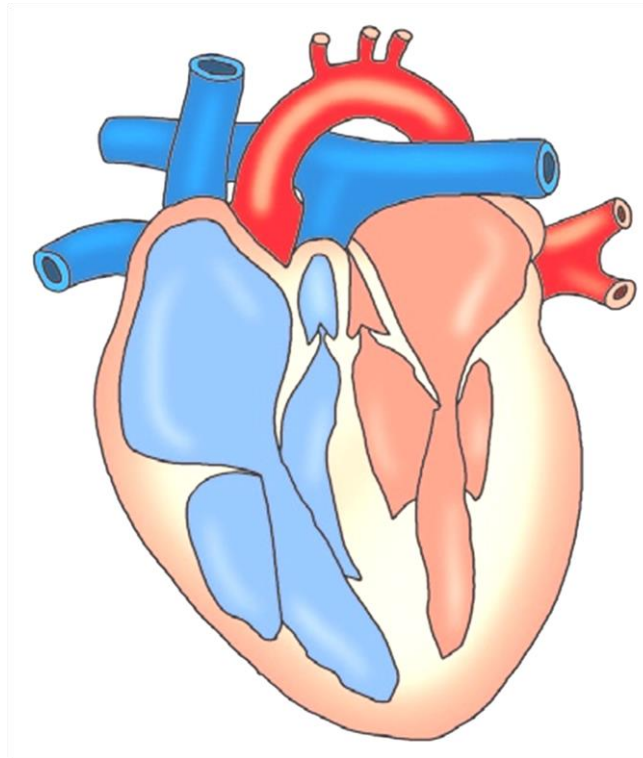


Fig 6.1

- (i) Use a blue pen to show the path of deoxygenated blood into and out of the heart in Fig 6.1. [1]
- (ii) Some babies are born with a disorder known as patent ductus arteriosus. This disorder results in a condition in which the hole between the aorta and the pulmonary artery fails to close after birth. This causes the baby to have poor growth and a shortness of breath. [1]

Predict how the blood circulation of a baby with this disorder will be affected.

.....

.....

- (iii) Explain why babies with this disorder may have poor growth. [1]

.....

.....

- (b) Fig 6.2 shows an external view of the human heart. A blockage was detected at X.

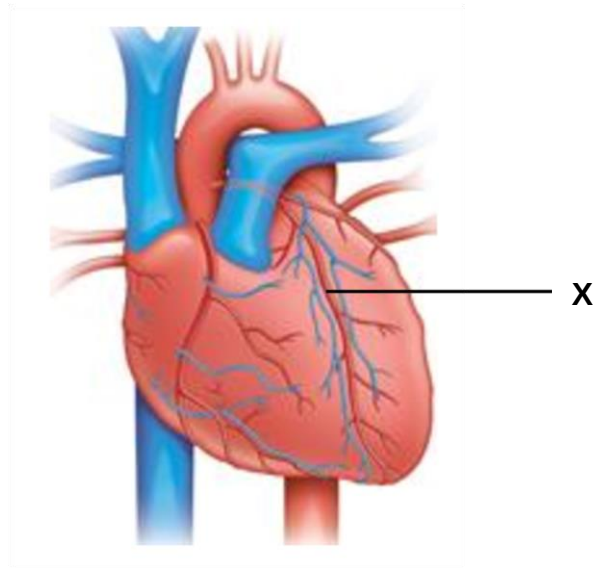


Fig 6.2

- (i) Suggest one cause of such a blockage. [1]

.....

- (ii) If the blockage continues at X, predict what will happen to this person. [2]

.....

.....

.....

.....

- (c) At rest, the rate of blood flow to the heart is 240 cm^3 per minute. During exercise, this rate rises to 720 cm^3 per minute.

Calculate the percentage increase in the rate of blood flow during exercise. [2]
Show your working.

Answer = _____

[Total: 8]

Section B

Answer **three** questions on separate writing paper provided.

The last question is in the form of either/or and only **one** of the alternatives should be attempted.

Each question carries **ten** marks.

- 7 Fig. 7.1 shows an apparatus setup which measures the oxygen uptake by an insect larva over a period of time.

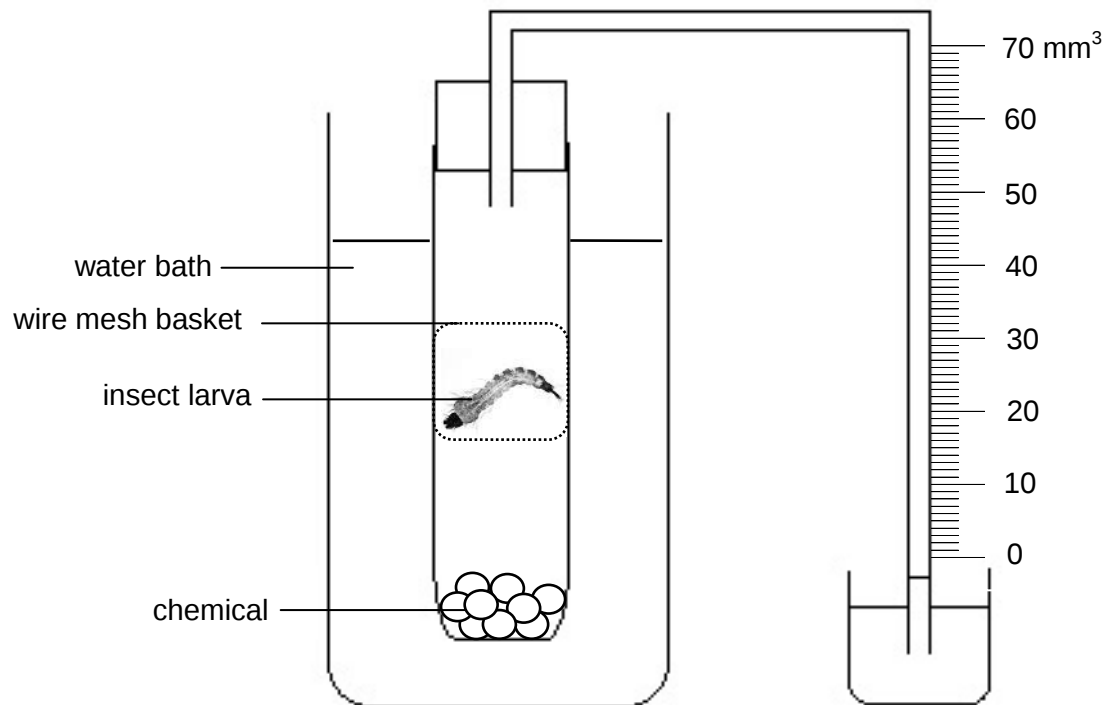


Fig. 7.1

During respiration, the insect larva took in oxygen and released carbon dioxide. As the carbon dioxide released was absorbed by the chemical in the tube, the volume of gas inside the apparatus decreased as oxygen was taken up by the larva. This caused the level of liquid in the narrow tube to rise. The levels of liquid and the times at which the student took readings, are shown in Fig. 7.2.

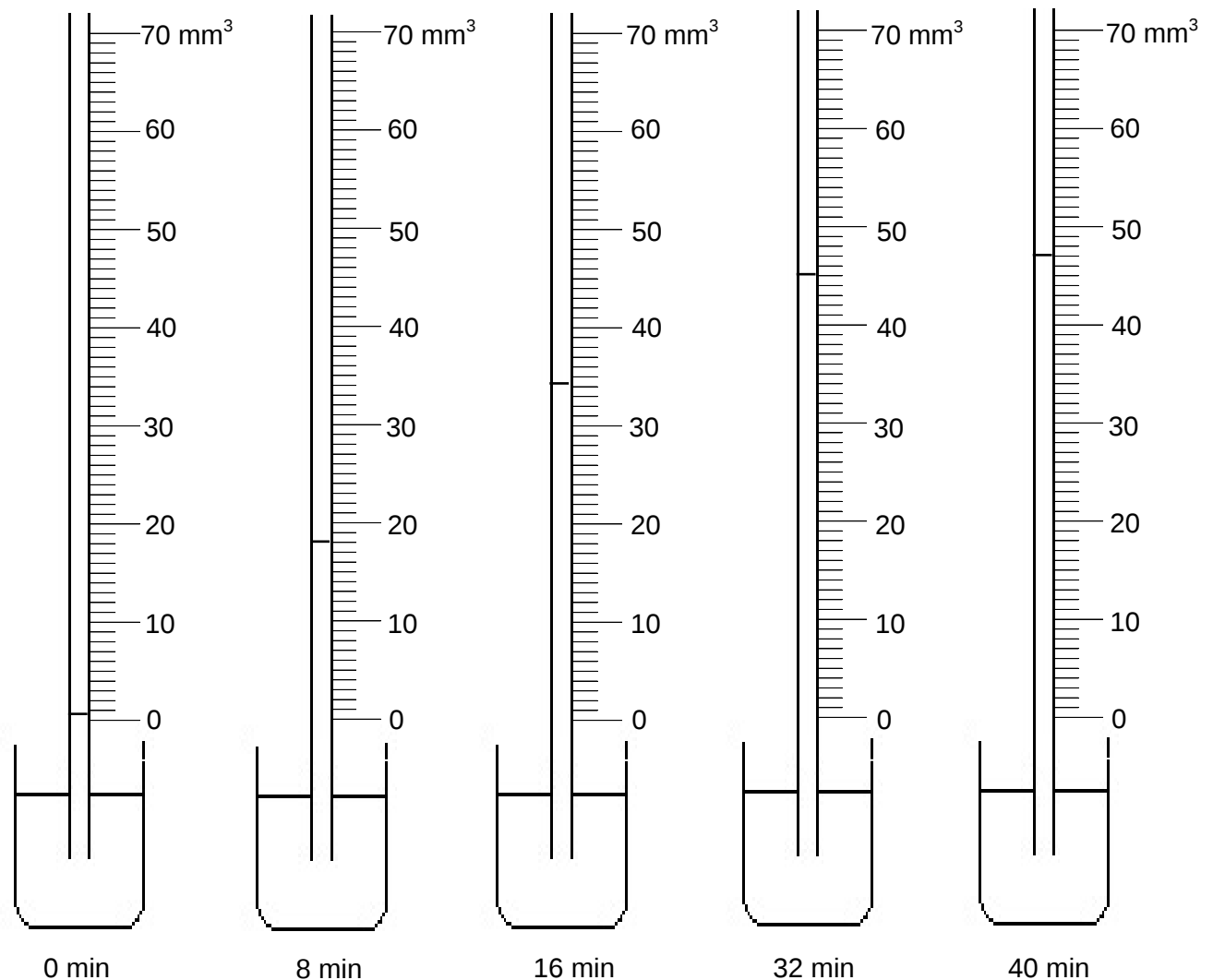


Fig. 7.2

- (a) Record the results in a suitable table. [2]
- (b) Plot the oxygen uptake against time in the graph paper provided. [4]
- (c) Using the gradient of the graph, calculate the rate of oxygen uptake by the larva at 10 minutes. Show your workings on the graph. [2]
- (d) Suggest a reason for the slowing down of the rate of oxygen uptake towards the end of the investigation. [1]
- (e) If the insect larva is replaced with a green moss in the presence of sunlight in the same set-up, suggest what the expected result would be. [1]

[Total: 10]

- 8** **(a)** At 7 am, Jane consumed a carbohydrate-rich meal before starting a hectic day at work. Describe and explain how her blood glucose concentration changed from 7 am to 12 pm. [5]
- (b)** Diabetes mellitus is a condition associated with consistently high glucose concentration in the blood of Man and other mammals. In the early twentieth century, in order to study the cause of this disease, a series of experiments was performed. Diabetic monkeys were fed with carbohydrate-rich meal. Their pancreases were then removed. Table 8.1 shows the details of these experiments that involve substance X, which is normally produced by the pancreas.

Table 8.1

experiment	treatment	result
I	injecting substance X	signs of diabetes disappeared
II	injecting substance X which had been treated with protease	signs of diabetes remained
III	injecting substance X which had been treated with lipase	signs of diabetes disappeared
IV	oral feeding of substance X	signs of diabetes appeared

- (i)** Explain the results of each experiment, I to IV. [4]
- (ii)** Suggest a method to detect diabetes without drawing any blood from the monkeys. [1]

[Total: 10]

9 Either

- (a) Photosynthesis is an important process taking place in plants. Give two reasons why this process is important to ensure the survival of all living organisms. [2]
- (b) Briefly describe an experiment to show that carbon dioxide molecules are taken up by the leaves in a plant. [4]
- (c) There are two types of plants, C₃ and C₄ plants, which differ in the type of photosynthetic mechanism they have. This has a direct effect on how efficiently they photosynthesise.

Fig. 9.1 shows a graph of the rate of photosynthesis of C₃ and C₄ plants against the rate of water uptake.

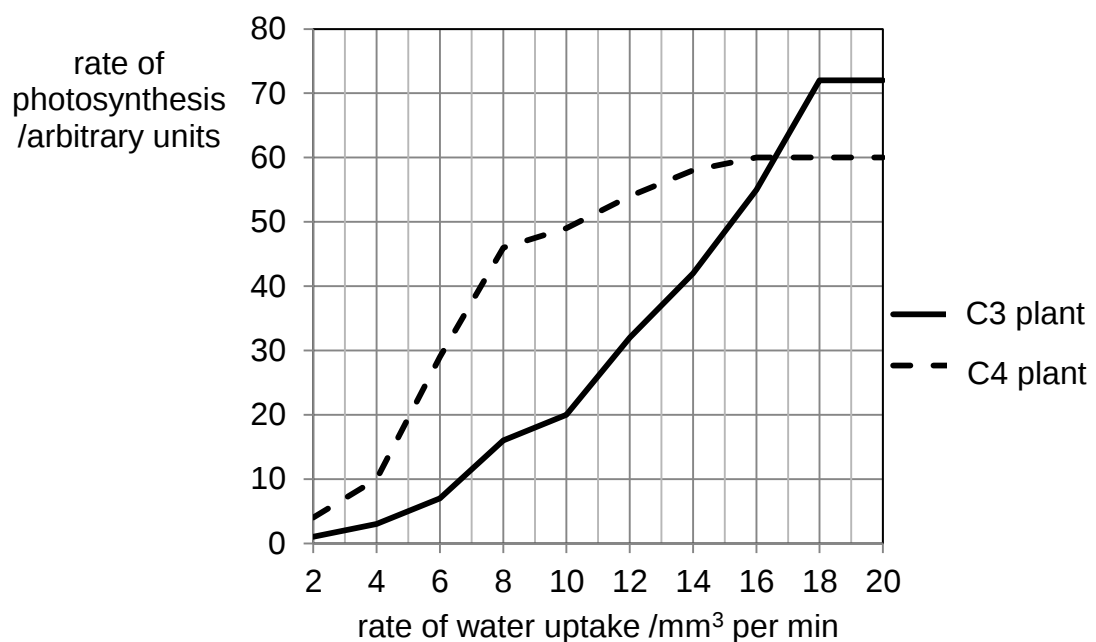


Fig. 9.1

- (i) Using Fig. 9.1, describe the relationship between water uptake and the rate of photosynthesis in C₄ plant. [3]
- (ii) Explain why C₄ plant will grow better in desert areas. [1]

[Total: 10]

9 Or

(a) State two enzymes which must be present during the clotting process. [2]

(b) Fig. 9.2 shows the effect of temperature on the clotting time of blood.

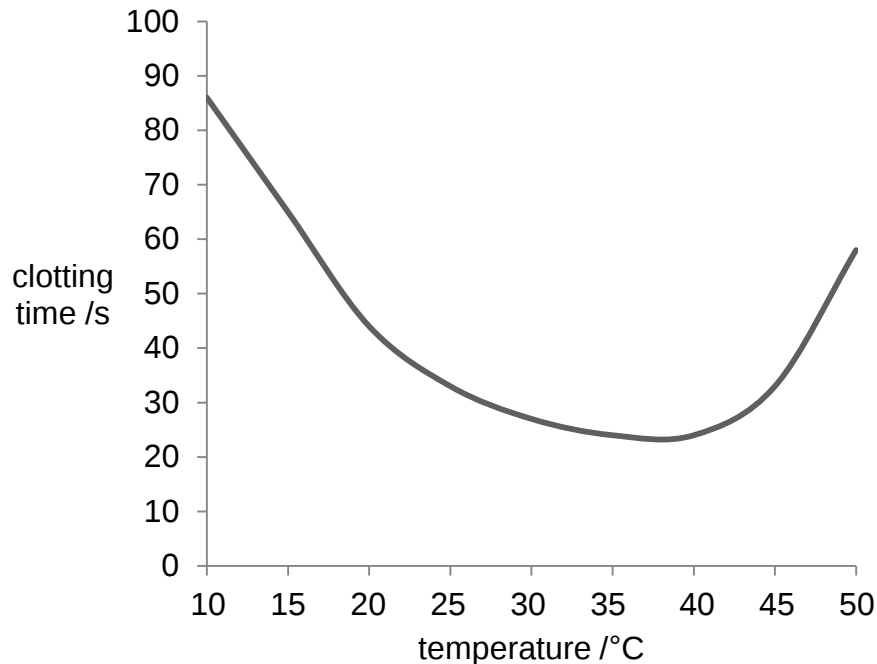


Fig. 9.2

- (i) With reference to the graph, describe and explain how temperature affects the clotting time. [3]
- (ii) Briefly discuss two other factors that could affect the clotting time of blood. [4]
- (c) During a long plane ride, the chance of developing blood clots in the veins of the lower limbs increases. This possibly fatal condition is known as deep vein thrombosis. Explain what the commuter can do to prevent deep vein thrombosis during the long plane ride. [1]

[Total: 10]

End of paper