



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE
NAME

CENTRE
NUMBER

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SCIENCE

5126/04

Paper 4 Biology

October/November 2009

1 hour 15 minutes

Additional Materials: Answer Booklet/Paper

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO NOT WRITE IN ANY BARCODES.

Section A

Answer **all** questions.
Write your answers in the spaces provided on the question paper.

Section B

Answer any **two** questions.
Write your answers on the separate answer paper provided.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [] at the end of each question or part question.

| For Examiner's Use | |
|--------------------|---|
| Section A | |
| Section B | / |
| | |
| | |
| Total | |

This document consists of **11** printed pages and **1** blank page.



Section A

Answer **all** the questions in the spaces provided.

1 Fig. 1.1 shows the unicellular animal, paramecium.

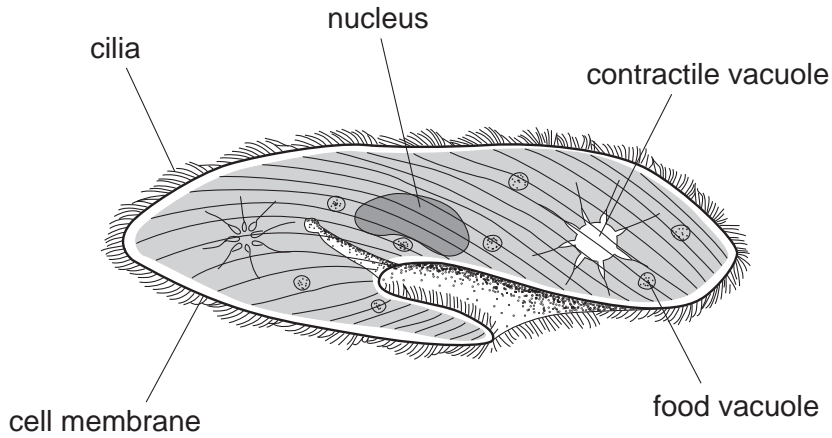


Fig. 1.1

(a) (i) How does Fig. 1.1 show that paramecium is **not** a plant?

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

(ii) What is the function of the cell membrane?

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

(b) Fig. 1.2 shows a specialised plant cell.

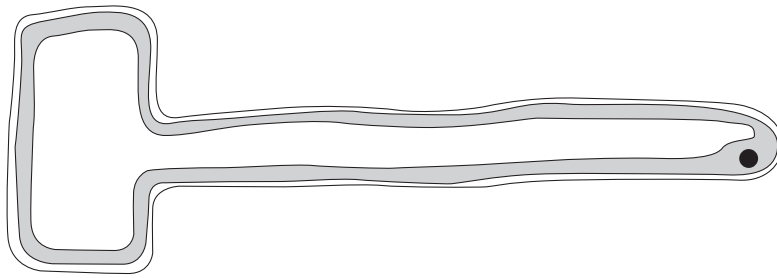


Fig. 1.2

(i) Identify this cell.

..... [1]

(ii) Explain how the structure of this cell is related to its function.

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

2 Fig. 2.1 shows an open stoma on the lower surface of a leaf.

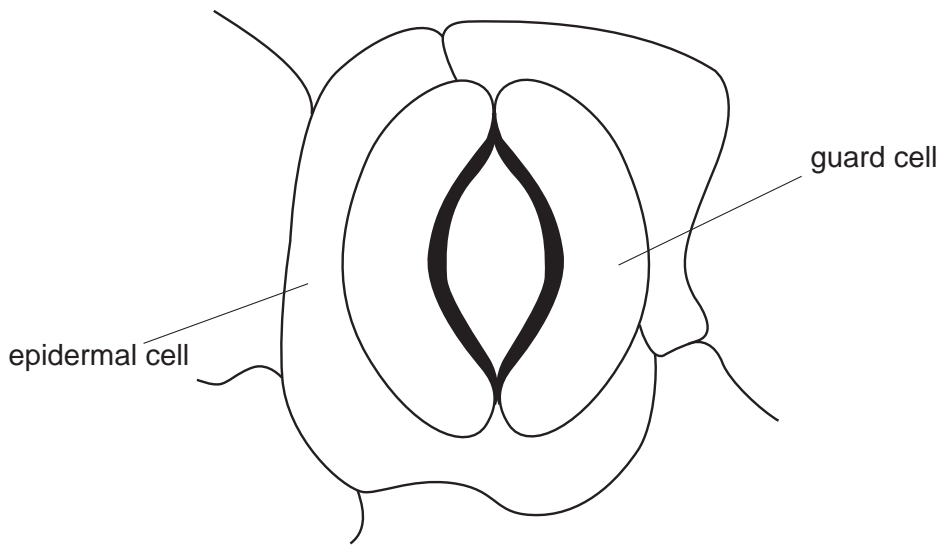


Fig. 2.1

(a) Stomata can open and close. This involves the process of osmosis.

(i) Define *osmosis*.

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

(ii) Explain how osmosis is involved in the opening of a stoma.

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

(b) The opening of stomata is essential for photosynthesis.

(i) Write the equation for photosynthesis.

..... [1]

(ii) Explain why the opening of stomata is essential for photosynthesis.

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

(iii) In what other ways is the opening of stomata important for a plant?

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

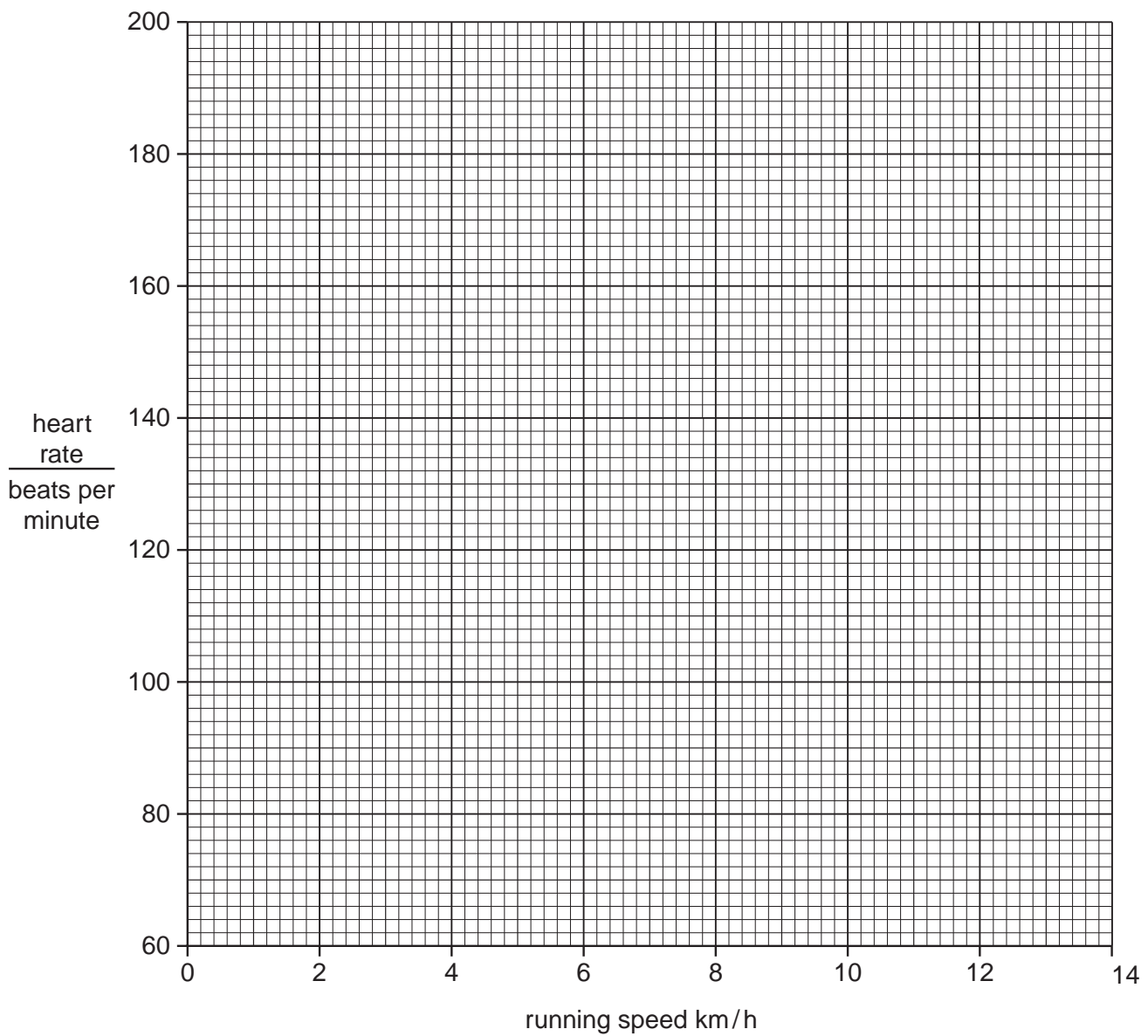
- 3 A scientist monitors the heart rate of an athlete exercising on a running machine.

Results of her experiment are shown in the table.

| | | | | | | |
|----------------------------------|----|-----|-----|-----|-----|-----|
| speed of running machine in km/h | 2 | 4 | 6 | 8 | 10 | 14 |
| heart rate in beats per minute | 87 | 104 | 122 | 139 | 156 | 192 |

- (a) (i) Plot these results on the grid. [2]

- (ii) Draw a line of best fit. [1]



(b) Use your graph to predict the heart rate of this athlete when he is running at a speed of 12 km/h.

heart rate = beats per minute [1]

(c) The heart pumps blood around the body. This supplies oxygen for aerobic respiration in the body cells.

(i) How is oxygen carried in the blood?

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

(ii) Write a word equation for aerobic respiration.

..... [1]

(iii) Use ideas about aerobic respiration to explain the shape of the graph.

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

4 The kidney is an organ involved in excretion.

(a) Define the term *excretion*.

.....

.....

..... [2]

(b) Fig. 4.1 compares some of the contents of blood plasma entering the kidney with the contents of urine.

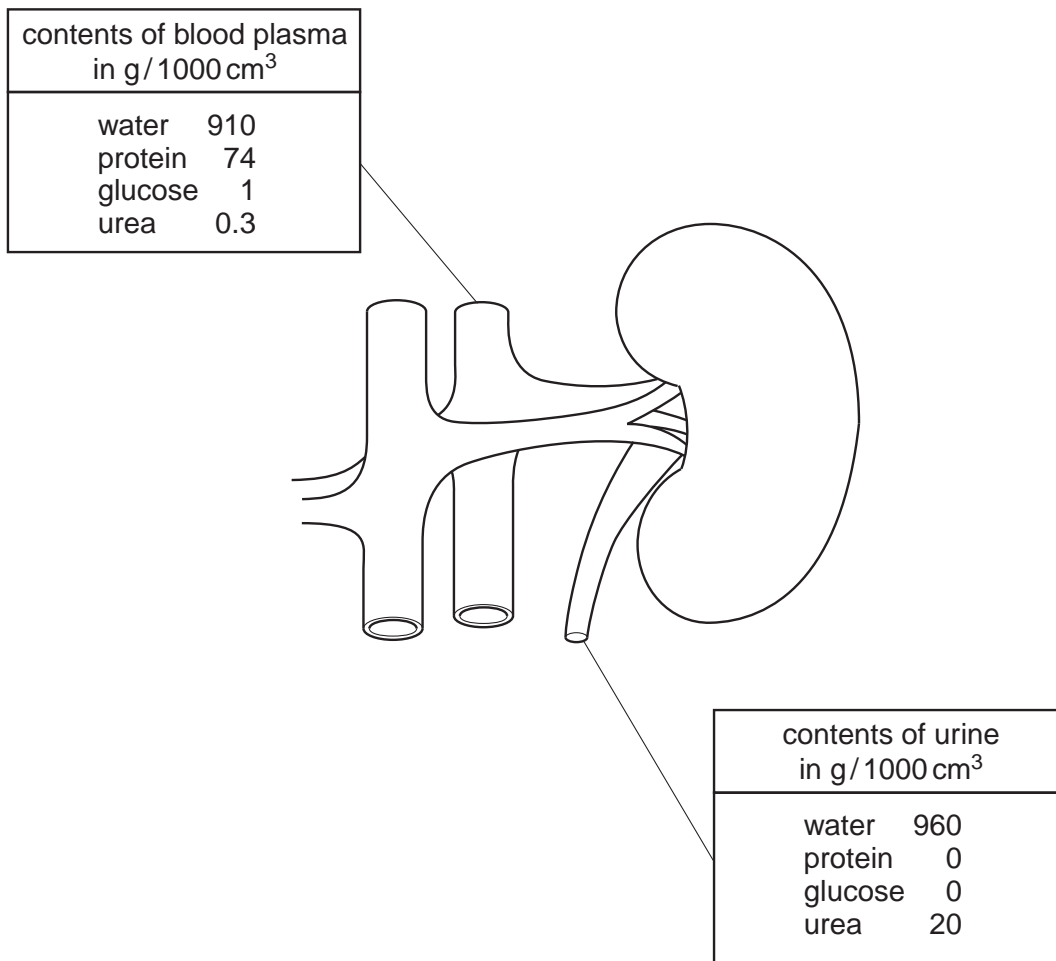


Fig. 4.1

(i) Describe how information from Fig. 4.1 can be used to decide which substances are removed from blood plasma by the kidneys.

.....

.....

..... [3]

(ii) Explain how the urea in blood plasma is formed in the body.

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

(c) The lungs are another organ of excretion.

(i) Which substance is excreted from the lungs?

..... [1]

(ii) This substance passes from the blood to air in the lungs.

Explain how the structure of alveoli in the lungs helps this process.

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

- 5 Fig. 5.1 shows how the concentrations of sugar in the leaves and stem of a green plant change during a 24-hour period.

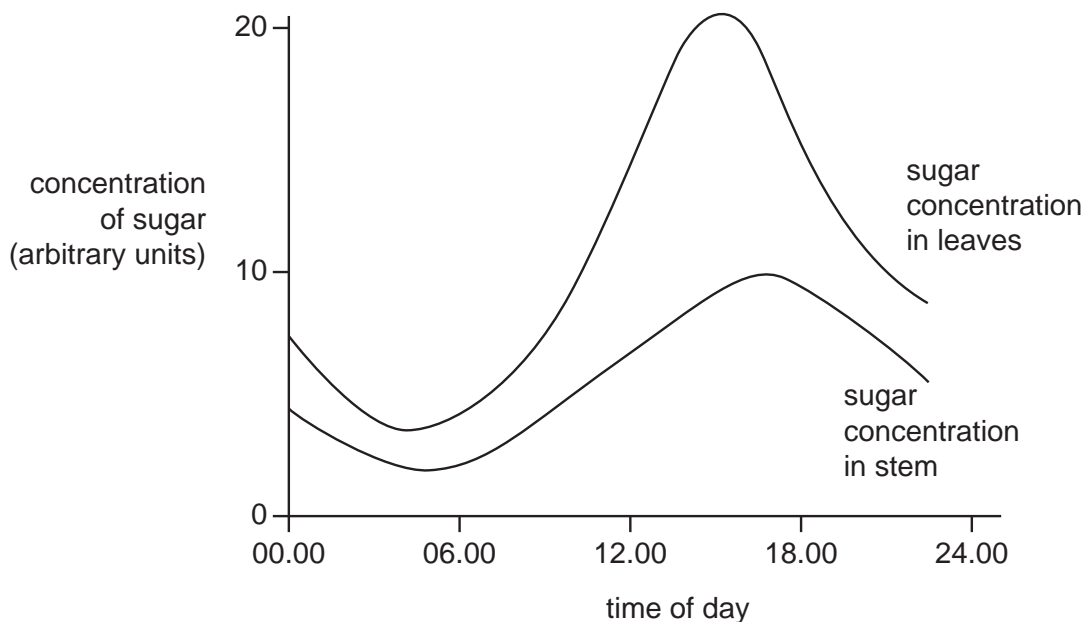


Fig. 5.1

In a green plant, sugar is made by the process of photosynthesis.

- (a) (i) Use information from Fig. 5.1 to describe how the rate of photosynthesis in the leaves varies during this 24-hour period.

.....

 [2]

- (ii) Suggest an explanation for these changes in the rate of photosynthesis.

.....

 [2]

(b) Sugar made in the leaves is transported down the stem to the roots.

- (i) How does the graph show that this statement is true?

.....
 [1]

- (ii) Through which cells of the stem is sugar transported?

..... [1]

Section B

Answer **two** questions from this section.

Write your answers on the separate answer paper provided.

- 6 (a)** Describe the differences between sexual and asexual reproduction.
Suggest **one** advantage of each to the survival of a species. [4]
- (b)** The colour of the flower of a variety of plant is controlled by a pair of alleles.
Red is dominant and blue is recessive.
A gardener uses pollen from a (heterozygous) red-flowered plant, **Rr**, to fertilise a (homozygous) blue-flowered plant, **rr**. He uses seeds from this blue-flowered plant to grow 100 new plants.
Predict and explain the numbers of red-flowered and blue-flowered plants that he obtains.
You may use a genetic diagram to make your answer clear. [6]
- 7 (a)** A digestive amylase catalyses the breakdown of starch to form maltose.
Starch forms a deep blue colour with iodine solution, but maltose does not.
Using this information, describe how you would investigate the effect of changing pH on the activity of this digestive amylase. [6]
- (b)** Describe the absorption of digested food in humans, and explain why food must be digested before this absorption can take place. [4]
- 8 (a)** Sewage from a town is pumped into a local river.
A coal-burning power station releases sulfur dioxide into the air.
A farmer sprays insecticide onto his crops.
Explain how each of these actions can result in pollution and describe the undesirable effects produced. [7]
- (b)** Suggest reasons for the recycling of paper. [3]

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