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CAMBRIDGE
International Education

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CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8602708993

BIOLOGY **0610/63**

Paper 6 Alternative to Practical **May/June 2026**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages. Any blank pages are indicated.

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1 A student investigated osmosis in cylinders of potato tissue placed in different concentrations of salt solution.

Water will move by osmosis into or out of cells, from an area of lower salt concentration to an area of higher salt concentration.

Salt is a solute. If there is no difference in the solute concentrations inside and outside of the cells, there will be no net movement of water by osmosis.

The student was provided with five cylinders of potato tissue. The cylinders all had the same diameter.

The student used this method:

step 1 Label five test-tubes **A**, **B**, **C**, **D** and **E**.

step 2 Use the volumes of 4% salt solution and distilled water shown in Table 1.1 to make the salt solutions in test-tubes **A**, **B**, **C**, **D** and **E**.

(a) (i) Complete Table 1.1 by writing in the final salt solution concentration in test-tube **B**.

Table 1.1

test-tube	volume of 4% salt solution / cm^3	volume of distilled water / cm^3	final percentage concentration of the salt solution
A	0.0	20.0	0.0
B	2.5	17.5	.....
C	5.0	15.0	1.0
D	10.0	10.0	2.0
E	20.0	0.0	4.0

[1]

step 3 Place the potato cylinders on a white tile and cut each cylinder to a length of exactly 40 mm.

step 4 Put one potato cylinder into each test-tube.

step 5 Start the stop-clock and keep the potato cylinders in the test-tubes for **60** minutes.

step 6 After 60 minutes, remove the potato cylinder from test-tube **A** and measure the final length of the potato cylinder.

step 7 Repeat step 6 with the potato cylinders in test-tubes **B**, **C**, **D** and **E**.

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(ii) Figure 1.1 shows the actual size of the potato cylinders after soaking in the different solutions for 60 minutes.

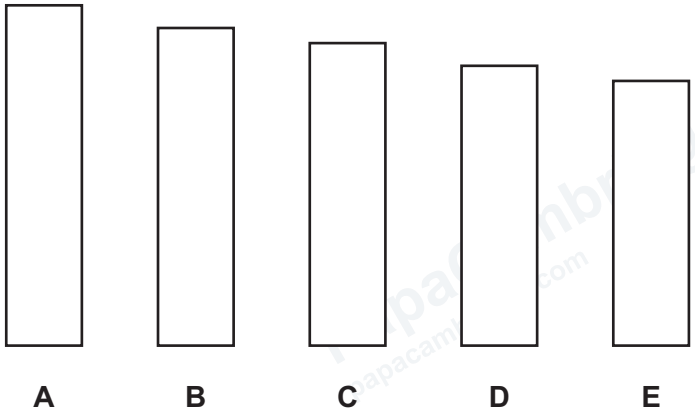

Figure 1.1

Measure the lengths of the potato cylinders shown in Figure 1.1.

Prepare a table and record your measurements in your table.

[4]

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(iii) Calculate the change in length for each potato cylinder, using the formula:

change in length = final length - starting length

potato cylinder **A** .....

potato cylinder **B** .....

potato cylinder **C** .....

potato cylinder **D** .....

potato cylinder **E** .....

[1]

(iv) Suggest which concentration of salt solution is closest to the concentration of solutes in the potato cells.

..... [1]

(v) State the independent variable in this investigation.

..... [1]

(vi) State **two** variables that were kept constant in this investigation.

1 .....

.....

2 .....

.....

[2]

(vii) Suggest **two** improvements to the method used in this investigation.

1 .....

.....

2 .....

.....

[2]

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(viii) Identify **one** hazard in **step 3** and describe an appropriate safety precaution.

hazard .....

.....

safety precaution .....

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[2]

(b) Potatoes contain starch.

State the result of a positive test for starch.

..... [1]

[Total: 15]

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2 **(a)** Figure 2.1 is a photomicrograph of the smallest bone in the human body.



magnification ×43

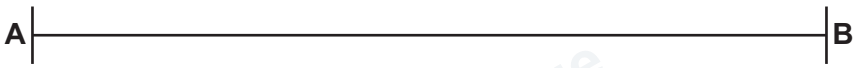

Figure 2.1

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(i) Draw a large diagram of the bone shown in Figure 2.1.

[4]

(ii) Line **AB** represents the width of the bone.

Measure the length of line **AB** in Figure 2.1.

length of line **AB** ..... mm

Calculate the actual width of the bone, using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{AB} \text{ in Figure 2.1}}{\text{actual width of the bone}}$$

Give your answer to **two** significant figures.

Space for working.

..... mm

[3]

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(b) (i) Milk is a liquid food that contains fat.

The enzyme lipase catalyses the breakdown of the fat in milk into fatty acids and glycerol.

As the concentration of fatty acids increases, the pH of the milk decreases.

Plan an investigation to determine how temperature affects the activity of lipase.

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.....[6]

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(ii) Milk also contains protein.

State the name of the solution needed to test for protein.

..... [1]

[Total: 14]

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3 **(a)** Snake's-head fritillary, *Fritillaria meleagris*, is a rare plant found in wet meadows.

Figure 3.1 is a photograph of part of a snake's-head fritillary plant.



Figure 3.1

Scientists first discovered a single snake's-head fritillary plant in a meadow in 1925.

They counted the number of snake's-head fritillary plants in the meadow over a number of years.

Table 3.1 shows the scientists' data.

Table 3.1

time after the snake's-head fritillary plant was first discovered / years	number of snake's-head fritillary plants counted
36	10
49	30
60	50
68	110
80	950
92	725
99	740

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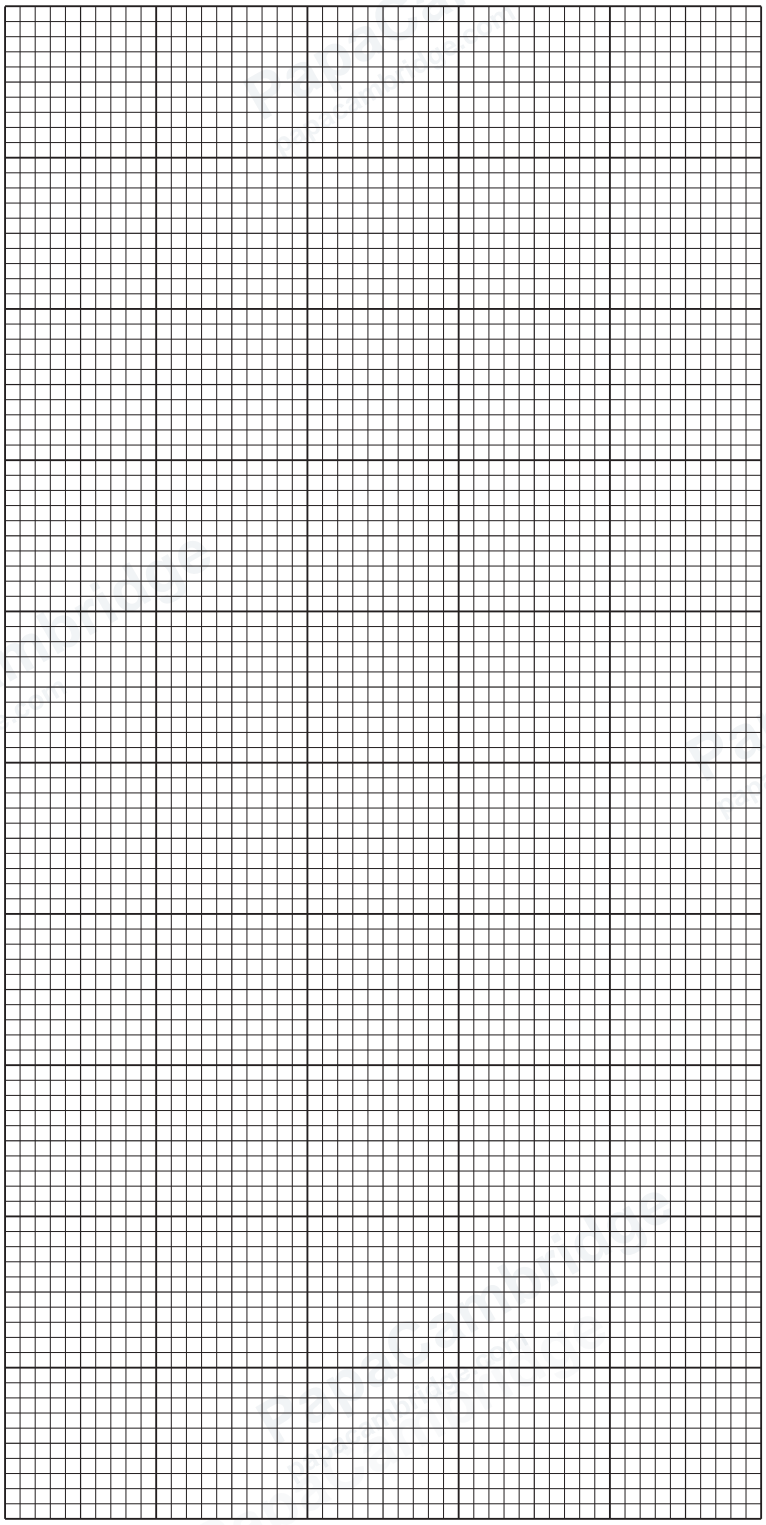
(i) Plot a line graph on the grid of the data in Table 3.1.



[4]

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(ii) Describe how the number of plants shown in your graph changes over time.

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..... [2]

(iii) State the dependent variable in this investigation.

..... [1]

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(b) (i) A student wanted to estimate the number of snake's-head fritillary plants in a meadow.

- Using simple random sampling, the student counted 9 snake's-head fritillary plants in an area of the meadow that was 40 m^2.

  Calculate the mean number of snake's-head fritillary plants per m^2.

  ..... per m^2

- The meadow was rectangular shaped with a length of 300 m and a width of 1100 m.

  Calculate the area of the meadow.

  ..... m^2

- Estimate the number of snake's-head fritillary plants in the whole meadow.

  ..... plants
  [3]

(ii) Suggest why the student counted a sample of plants rather than counting all of the snake's-head fritillary plants in the meadow.

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..... [1]

[Total: 11]

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