CAMBRIDGE
International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3128156543

BIOLOGY **5090/41**

Paper 4 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 **12** pages. Any blank pages are indicated.

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1 Lactose is a sugar found in milk.

When a molecule of lactose is broken down during digestion by the enzyme lactase, two smaller sugar molecules are produced: glucose and galactose.

(a) Describe how you would test a solution to see if it contains glucose.

State what would indicate a negative result for your test and state what would indicate a positive result for your test.

.....

.....

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.....

..... [4]

(b) Some people do not produce lactase so are unable to break down the lactose in milk. If they consume any food containing lactose they become ill.

In the food industry the enzyme lactase is used to produce lactose-free milk.

Lactase is permanently attached to some small beads. Milk is then poured over these beads.

The lactase enzyme breaks down any lactose present in the milk into glucose and galactose resulting in lactose-free milk.

Some students want to carry out this process in the laboratory.

They are provided with:

- milk
- a large syringe containing lactase-covered beads
- beaker **A**
- beaker **B**.

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They are also provided with glucose test strips which change colour if glucose is present.

They follow these instructions:

- pour 10 cm^3 of the milk provided into beaker **A**
- test this milk with a glucose test strip
- pour the milk in beaker **A** into the open top of the syringe
- allow the milk to flow down over the beads
- open the tap and allow the milk coming out of the syringe to collect in beaker **B**
- test the milk in beaker **B** with a glucose test strip.

Figure 1.1 shows the apparatus the students use.

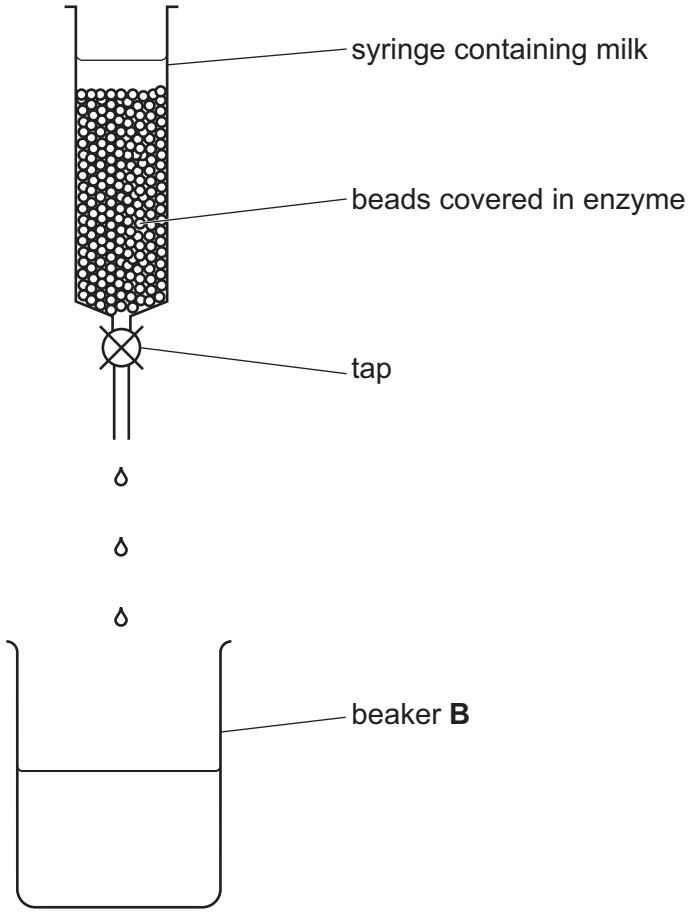


Figure 1.1

Suggest a piece of apparatus suitable for measuring 10 cm^3, other than a syringe.

..... [1]

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(c) **(i)** Predict the result shown by the glucose test strip used on the milk in beaker **B**.

Explain this prediction.

.....

.....

.....

.....

.....

..... [3]

(ii) Suggest why the milk in beaker **A** was tested with a glucose test strip before being poured into the syringe.

.....

..... [1]

(d) If the level of galactose in the milk becomes too high the lactase stops digesting any lactose still present.

Suggest the effect on the action of the lactase if the milk flows over the beads in the syringe too slowly or too quickly.

when milk flows too slowly .....

.....

when milk flows too quickly .....

.....

[3]

(e) People with diabetes need to test their urine for the presence of glucose.

Suggest why people testing at home use these glucose test strips and not the method you described in **1(a)**.

.....

..... [1]

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(f) Enzyme activity is affected by temperature.

(i) Using the method in **1(b)**, plan an investigation to determine the effect of the temperature of the milk entering the syringe on the time it takes for the first glucose to appear in the lactose-free milk.

Use the apparatus in Figure 1.1 and glucose test strips.

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..... [6]

(ii) Name the dependent variable in this investigation.

..... [1]

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(g) In one country, researchers found that a number of food substances make some people ill if they eat them.

It was estimated that 65% of the population was made ill by lactose, 10% by gluten, 8% by caffeine and 3% by nuts.

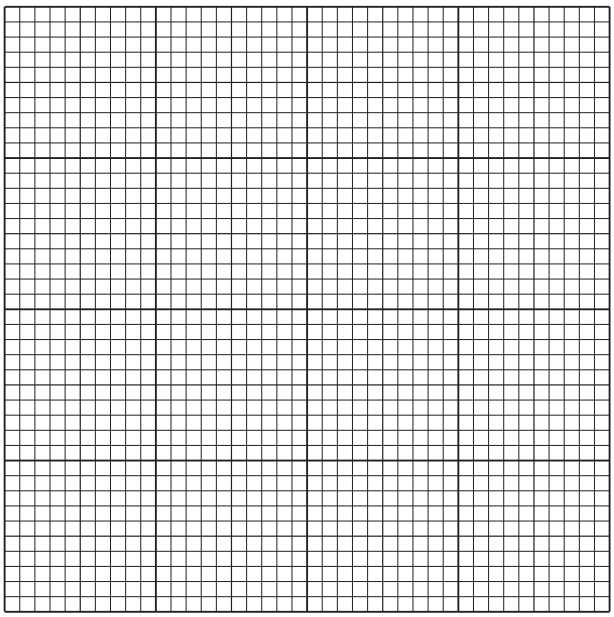
(i) Use this information to complete Table 1.1.

Table 1.1

.....	.....
lactose	65
.....	10
.....	8
nuts	.....

[3]

(ii) On the grid, construct a bar chart of the data in Table 1.1.



[4]

[Total: 27]

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2 Figure 2.1 is a photograph of a section through a human organ from a healthy individual.

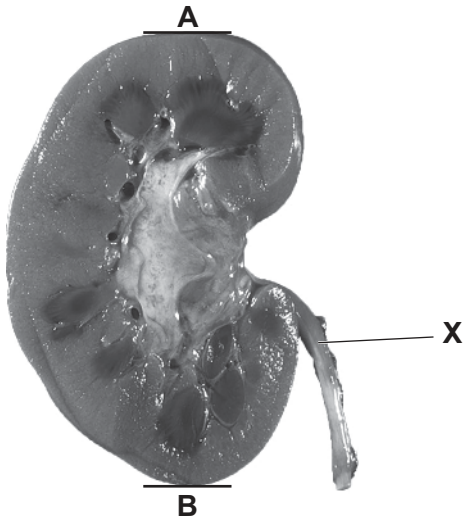


Figure 2.1

(a) (i) Identify this organ ..... [1]

(ii) Name the structure labelled **X** ..... [1]

(iii) In the space below, make a large drawing of the section of the organ as it appears in the photograph.

[5]

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(b) (i) On **Figure 2.1**, draw a straight line to join **A** and **B**.

On your drawing, draw a straight line in the same position and label it **A–B**. [1]

(ii) Measure and record the length of these **two** lines.

length of line **A–B** on Figure 2.1 .....

length of line **A–B** on your drawing .....
[2]

(iii) Calculate the magnification of your drawing compared to Figure 2.1.

Record your answer to **one** decimal place.

Space for working.

magnification × ..... [3]

[Total: 13]

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