* 0000800000001 *

Cambridge Assessment International Education

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CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

0280711912

BIOLOGY **0610/63**

Paper 6 Alternative to Practical **October/November 2024**

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 or correction fluid.
- 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 Amylase is an enzyme found in the human body that catalyses the breakdown of starch into reducing sugars.

Tea contains a chemical called tannin which affects amylase activity in the body.

A student investigated the effect of tea on the enzyme amylase.

The student used this method:

Step 1 Label three test-tubes **S1**, **S2** and **S3**.

Step 2 Put 2 cm^3 of **starch** suspension into all three test-tubes.

Step 3 Label another three test-tubes **A**, **AT** and **T**.

Step 4 Put 2 cm^3 of **amylase** solution into test-tube **A** and 2 cm^3 of **amylase** solution into test-tube **AT**.

Step 5 Put 2 cm^3 of **tea** into test-tube **AT** and 2 cm^3 of **tea** into test-tube **T**.

The test-tubes are shown in Fig. 1.1.

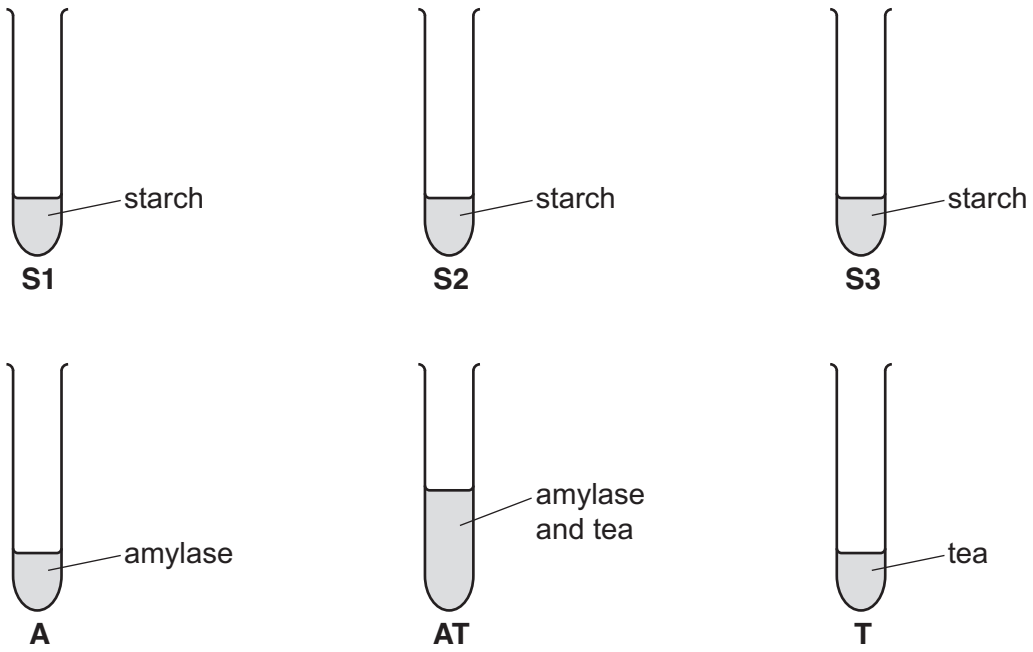

Fig. 1.1

Step 6 Place all six test-tubes into a hot water-bath.

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Step 7 Use a marker pen to label three sections on a white tile, as shown in Fig. 1.2.

Step 8 Add 10 drops of iodine solution to each section, as shown in Fig. 1.2.

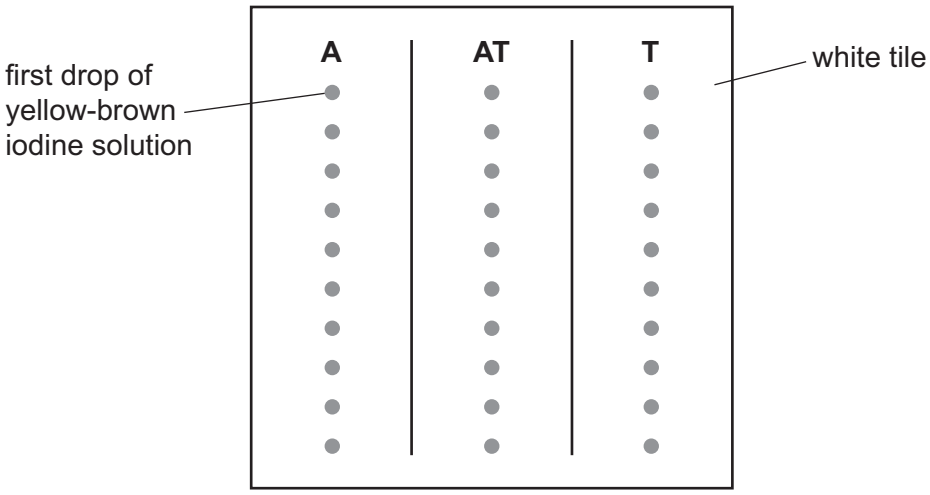

Fig. 1.2

Step 9 Start the stop-clock and pour the starch suspension in test-tube **S1** into test-tube **A**.

Step 10 Use a pipette to immediately remove a drop of the mixture from test-tube **A** and place it onto the first drop of iodine solution in section **A** on the white tile.

Return any mixture still in the pipette to test-tube **A**.

Step 11 Repeat step 10 every 30 seconds, until all 10 drops of iodine solution in section **A** have been used. Reset the stop-clock to zero.

Step 12 Repeat steps 9 to 11 using test-tubes **S2** and **AT** and section **AT** on the white tile.

Step 13 Repeat steps 9 to 11 using test-tubes **S3** and **T** and section **T** on the white tile.

The student's results are shown in Fig. 1.3.

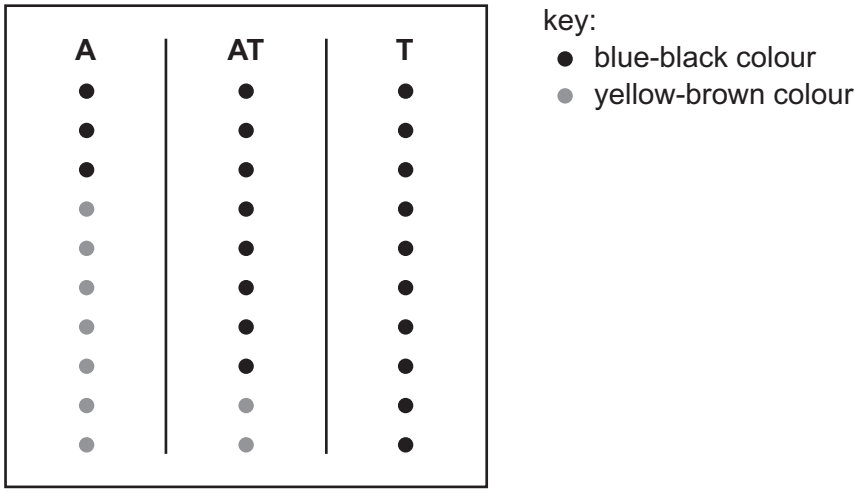

Fig. 1.3

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(a) The student needed to identify when all of the starch had been broken down in each test-tube.

(i) Describe how the student can tell if the starch has been broken down.

..... [1]

(ii) Prepare a table to record the results from Fig. 1.3.

Include in your table the time taken, in seconds, for starch to be broken down in all three test-tubes.

If starch remained after testing with all 10 drops of iodine solution, record this as **>270**.

[3]

(iii) State what can be concluded about the effect of tea on amylase activity.

.....

.....

..... [1]

(iv) State the independent variable in this investigation.

..... [1]

(v) State **one** variable that was kept constant in this investigation.

..... [1]

(vi) Test-tube **T** did **not** contain amylase and was used as a control.

Suggest a reason for including a control in this investigation.

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..... [1]

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(vii) Explain why all of the test-tubes were placed in a water-bath in step 6 before the contents of the test-tubes were mixed in step 9.

.....

.....

..... [1]

(viii) A student stated that there is an error in step 4 and step 5.

Identify this error and suggest how the procedure should be improved.

error .....

.....

improvement .....

.....

..... [2]

(ix) Describe a test which would show that reducing sugars have been produced.

.....

.....

..... [2]

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(b) Fig. 1.4 is a photograph of a tea leaf.

Fig. 1.4

Make a large drawing of the tea leaf shown in Fig. 1.4.

[4]

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(c) Biological washing powders contain enzymes that help to remove stains from clothes. This reduces the need to wash clothes at high temperatures.

Plan an investigation to determine the optimum temperature for a biological washing powder.

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..... [6]

[Total: 23]

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2 **(a)** Fig. 2.1 is a photograph of a villus, from one part of the small intestine.

magnification × 210

Fig. 2.1

(i) The length of line **AB** represents the width of the villus in Fig. 2.1.

Measure the length of line **AB**.

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

Use your measurement and the formula to calculate the actual width of the villus.

$$\text{magnification} = \frac{\text{length of line } \mathbf{AB} \text{ in Fig. 2.1}}{\text{actual width of villus}}$$

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

Space for working.

..... mm
[3]

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(ii) Fig. 2.2 shows a villus from a different part of the small intestine.

magnification ×210

Fig. 2.2

State **two** ways the villus in Fig. 2.2 differs from the villus in Fig. 2.1.

1 .....

.....

2 .....

.....

[2]

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(b) A scientist studied the length of the small intestine in different animals.

The scientist recorded:

- the body length of five different animals
- the length of the small intestine of each animal.

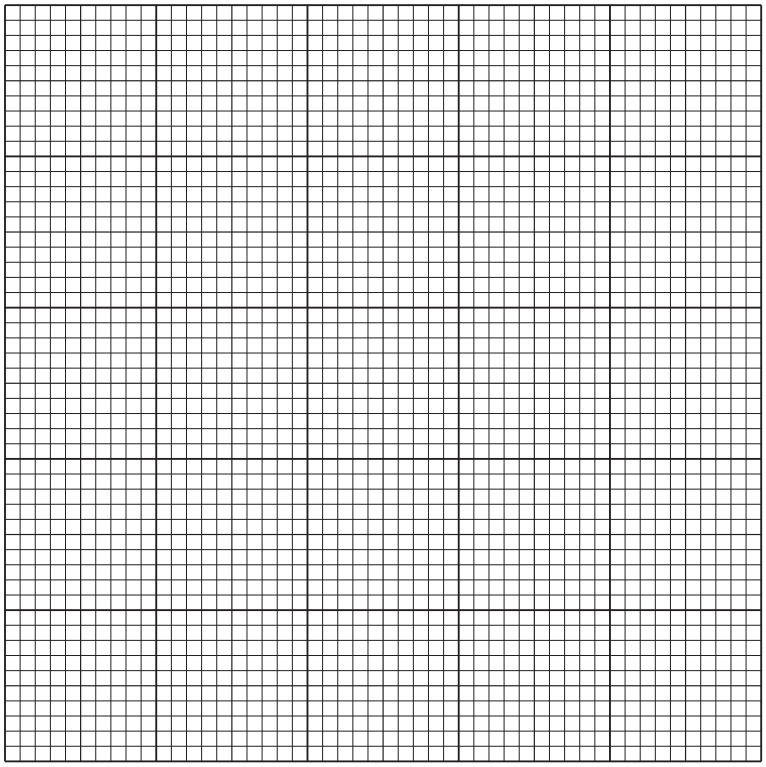
For each animal, the length of the small intestine was divided by the body length.

Table 2.1 shows the scientist's results.

Table 2.1

type of animal	small intestine length divided by the body length
cat	4
cow	20
dog	6
horse	12
human	5

(i) Plot a bar chart on the grid of the data in Table 2.1.



[4]

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(ii) Identify the dependent variable in this study.

.....

..... [1]

(iii) The horse used in the study had a body length of 2.1 m.

The small intestine length divided by the body length for the horse was 12.

Calculate the length of its small intestine.

Include the unit.

..... [2]

(iv) Table 2.2 also shows the main diet of the five animals in the study.

Table 2.2

type of animal	diet	small intestine length divided by the body length
cat	animals	4
cow	plants	20
dog	animals	6
horse	plants	12
human	plants and animals	5

Describe the relationship between the small intestine length divided by the body length and the diet of the animals.

.....

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..... [2]

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(v) Suggest why the scientist divided the small intestine length by the body length for each animal rather than looking at just the intestine length.

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..... [1]

(vi) Suggest **two** possible improvements to the method used in this study.

1 .....

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2 .....

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[2]

[Total: 17]

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