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BIOLOGY **0610/63**

Paper 6 Alternative to Practical **May/June 2025**

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

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[Turn over

1 Potato cells contain the enzyme catalase. Catalase catalyses the breakdown of hydrogen peroxide into water and oxygen gas. The oxygen gas forms a foam. The height of the foam indicates how active the enzyme is.

A student investigated the effect of temperature on the activity of the enzyme catalase.

The student used this method:

Step 1 Label three test-tubes **C**, **R** and **H**.

Step 2 Use a syringe to add 4 cm^3 of hydrogen peroxide solution to each of the test-tubes labelled **C**, **R** and **H**.

Step 3 Place test-tube **C** into a cold water-bath.

Step 4 Place test-tube **R** in a test-tube rack to keep it at room temperature.

Step 5 Place test-tube **H** into a hot water-bath.

Step 6 Leave the test-tubes for five minutes.

Step 7 After five minutes, use a clean syringe to add 1 cm^3 of potato extract to test-tube **C**. Start the stop-clock.

Step 8 Repeat step 7 for test-tube **R** and test-tube **H**.

Fig. 1.1 shows the test-tubes 30 seconds after adding the potato extract.

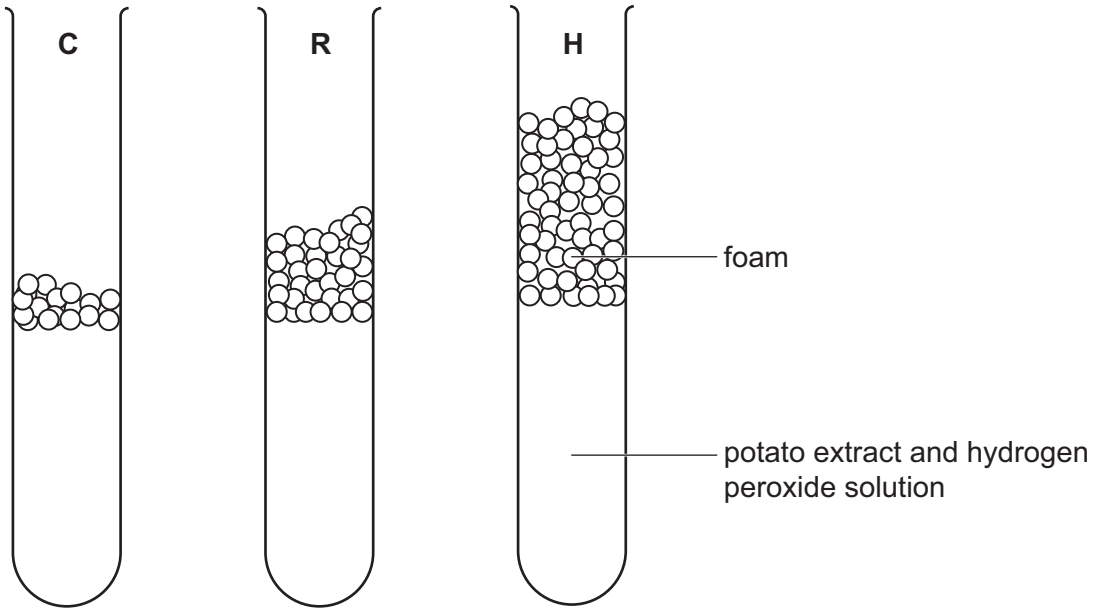


Fig. 1.1

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(a) (i) Prepare a table for the results of the investigation.

Measure the maximum height of the foam, in mm, in each of test-tubes **C**, **R** and **H** shown in Fig. 1.1.

Record these measurements in your table.

[4]

(ii) State a conclusion for these results.

.....

.....

..... [1]

(iii) State the independent and dependent variables in the investigation.

independent variable .....

.....

dependent variable .....

.....

[2]

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(iv) Explain why test-tube **C** and test-tube **H** were kept in the water-baths for five minutes in step 6.

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..... [1]

(v) The student suggests repeating the investigation twice more.

Explain how this would give you more confidence in these results.

.....

.....

..... [1]

(vi) Potato extract can be prepared by cutting a potato into pieces and then grinding it with a mortar and pestle and some water.

Describe a safety precaution that would reduce the hazards in producing potato extract using this method.

.....

.....

..... [1]

(b) (i) Another student did the same experiment and measured the height of the foam in one of the test-tubes as 29 mm. The diameter of the test-tube was 25 mm.

Calculate the volume of foam produced, and give your answer in cm^3 to **one** decimal place.

Use 3.14 as the value for π.

..... cm^3 [3]

(ii) Suggest a more accurate method of measuring the volume of oxygen gas produced.

.....

.....

..... [1]

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(c) Potatoes are a source of starch and vitamin C.

(i) Iodine solution was used to test a sample of potato for starch.

State the result of a positive test for starch.

..... [1]

(ii) State the name of a reagent that can be used to test for vitamin C.

..... [1]

(d) Photosynthesis also produces oxygen gas.

Plan an investigation to determine the effect of light intensity on the rate of photosynthesis in aquatic plants.

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..... [6]

[Total: 22]

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2 **(a)** Fig. 2.1 is a photograph of an acorn from a Caucasian oak, *Quercus macranthera*.

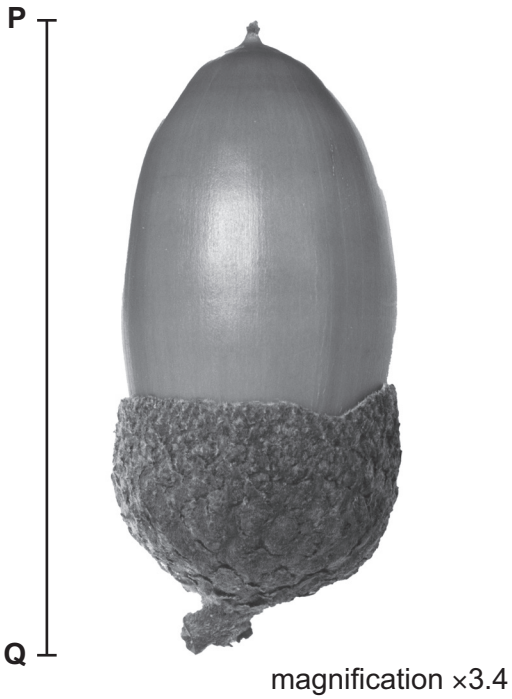


Fig. 2.1

(i) Make a large drawing of the acorn in Fig. 2.1.

[4]

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(ii) Line **PQ** represents the length of the acorn in Fig. 2.1.

Measure the length of line **PQ** in Fig. 2.1.

length of line **PQ** ..... mm

Calculate the actual length of the acorn using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ} \text{ in Fig. 2.1}}{\text{actual length of the acorn}}$$

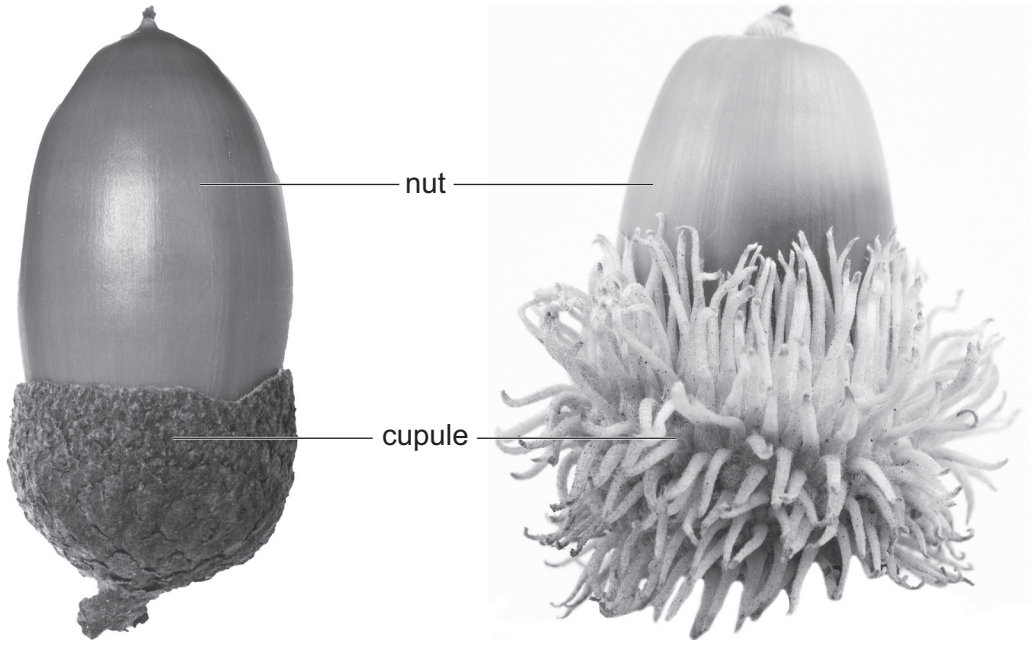
Give your answer to **two** significant figures.

Space for working.

..... mm
[3]

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(iii) Fig. 2.2 shows photographs of acorns from a Caucasian oak and from a Turkey oak, *Quercus cerris*.



magnification ×3.4

Fig. 2.2

Describe **two** visible differences between the acorns in Fig. 2.2.

1 .....

.....

2 .....

.....

[2]

(b) Different species of oak tree have acorns of different masses.

Scientists investigated if the mass of acorns affected the proportion of acorns that germinated in three different species of oak tree.

- The scientists took 100 acorns from each of three species of oak tree.
- The mass of each acorn was measured and recorded.
- Each acorn was then placed in a pot with the same type of soil in a dark room at 25 °C and watered every 48 hours.
- The scientists recorded the proportion of acorns that had germinated in 60 days.

(i) State **two** factors that were kept constant in the investigation described in **2(b)**.

1 .....

2 .....

[2]

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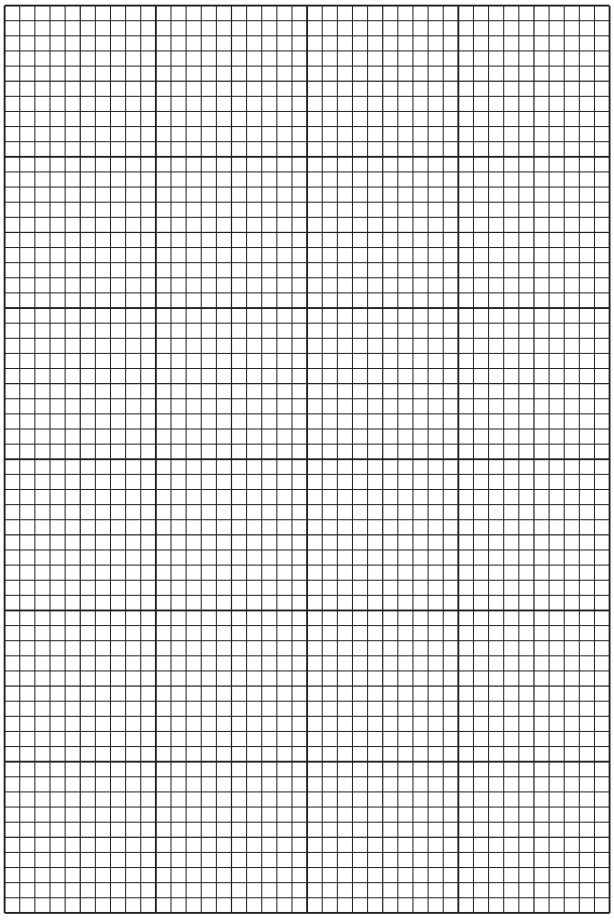
The results are shown in Table 2.1.

Table 2.1

species of oak tree	mean mass of acorns / g	proportion of acorns that germinated
A	0.52	0.44
B	1.92	0.56
C	2.30	0.64

(ii) Plot a bar chart on the grid of **all** the data in Table 2.1.

Include a key on your bar chart.



[4]

(iii) The study measured 100 acorns for each species.

Suggest why a large number of acorns was measured.

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..... [1]

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(iv) Water is required for germination.

The scientists measured the mass of one acorn from each species. The acorns were then dried in an oven and the mass of each acorn was measured again. The scientists used these data to calculate the percentage water content of the acorns.

The results are shown in Table 2.2.

Table 2.2

species of oak tree	initial mass of the acorn / g	dried mass of the acorn / g	percentage water content of the acorn
A	0.49	0.36	26.5
B	1.96	0.74	
C	2.34	0.98	58.1

Calculate the percentage water content of the acorn from species **B**.

.....% [1]

(c) State the name of the reagent used to test for protein.

..... [1]

[Total: 18]

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