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0821272549

BIOLOGY **0610/53**

Paper 5 Practical Test **October/November 2025**

1 hour 15 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

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 [ ].

For Examiner's Use	
1	
2	
3	
Total	

This document has **12** pages. Any blank pages are indicated.

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1 Yeast cells produce an enzyme called invertase. Invertase catalyses the breakdown of sucrose into reducing sugars. Sucrose is **not** a reducing sugar.

You are going to investigate the effect of two different concentrations of invertase extract on a sucrose solution.

Read all the instructions but DO NOT DO THEM until you have drawn a table for your results in the space provided in 1(b).

You should use the safety equipment provided while you are doing the practical work.

Step 1 Label three test-tubes **A**, **B** and **W**.

Step 2 Use a syringe to put 2 cm^3 of sucrose solution into all three test-tubes.

Step 3 Use a clean syringe to put 2 cm^3 of 100% invertase extract into test-tube **A**.

Step 4 Use a clean syringe to put 2 cm^3 of 10% invertase extract into test-tube **B**.

Step 5 Use a clean syringe to put 2 cm^3 of distilled water into test-tube **W**.

Step 6 Put all three test-tubes into the beaker labelled **warm water-bath** for 15 minutes.

Continue with the other questions while you are waiting.

Step 7 After 15 minutes, measure the temperature of the water in the warm water-bath.

(a) Record the water-bath temperature you measured in step 7.

temperature of the water ..... °C [1]

Step 8 Use a clean syringe to add 4 cm^3 of Benedict's solution to all three test-tubes.

Step 9 Raise your hand when you are ready for hot water to be added to the beaker labelled **hot water-bath**.

Step 10 Place all three test-tubes into the hot water-bath and start the stop-clock. Leave the test-tubes in the water-bath for five minutes.

Step 11 After five minutes, record the **colour** of the liquid in each test-tube in your table in **1(b)**.

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(b) Prepare a table and record your results.

[4]

(c) State a conclusion for the results shown in test-tube **A** and test-tube **B**.

.....

.....

..... [1]

(d) Explain the purpose of test-tube **W**.

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..... [2]

(e) State the independent variable in this investigation.

..... [1]

(f) Explain why the test-tubes were placed in the warm water-bath in step 6.

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..... [1]

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(g) Explain why a clean syringe was used in steps 3, 4 and 5.

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..... [1]

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2 A student investigated the effect of temperature on the rate of respiration in yeast cells.

They used the apparatus shown in Fig. 2.1.

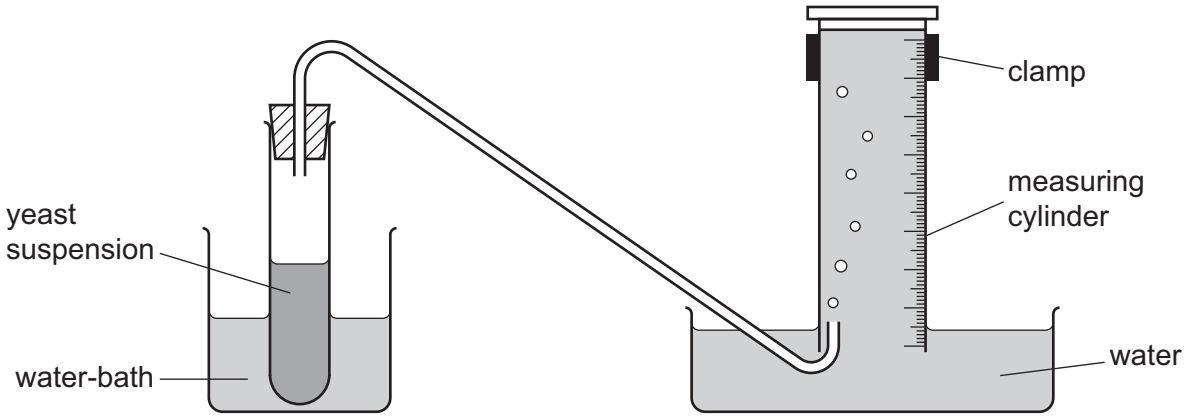


Fig. 2.1

The student used this method:

- Put 25 cm^3 of yeast suspension into a test-tube.
- Put the test-tube into a water-bath and add water at 10 °C to the water-bath.
- Leave the apparatus for five minutes before moving on to the next step.
- Start a stop-clock and count the number of bubbles produced by the respiring yeast cells in three minutes.
- Repeat the procedure using a water-bath maintained at different temperatures.

(a) (i) State **two** variables that the student kept constant in this investigation.

1 .....

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2 .....

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[2]

(ii) State **one** possible source of error when measuring the dependent variable **and** suggest an improvement to this method of measuring.

error .....

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improvement .....

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[2]

(b) Table 2.1 shows the results of the investigation.

Table 2.1

water-bath temperature / °C	number of bubbles produced in 3 minutes	rate of bubble production / bubbles per minute
10	33	11
20	45	15
30	79	
40	112	37
50	124	41
60	37	12

(i) Calculate the rate of bubble production at 30 °C.

Give your answer to an appropriate number of significant figures.

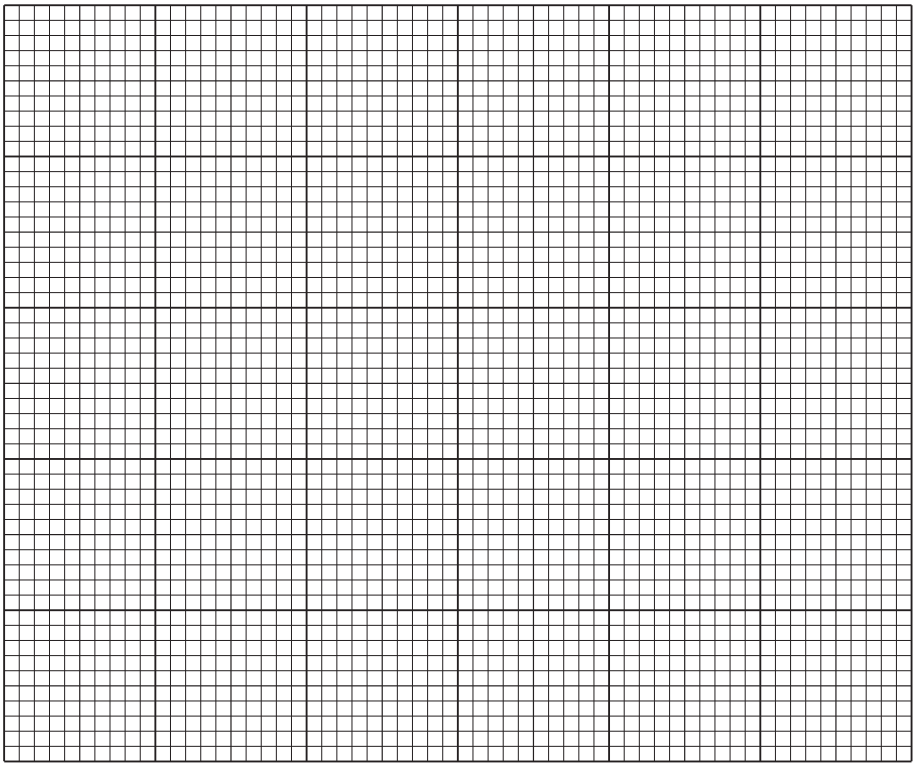
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..... bubbles per minute [2]

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(ii) Plot the data in Table 2.1 on the grid to show the effect of temperature on the **rate** of bubble production.



[4]

(iii) Describe the results of this investigation.

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..... [2]

(c) Describe how the student could confirm that the gas produced is carbon dioxide.

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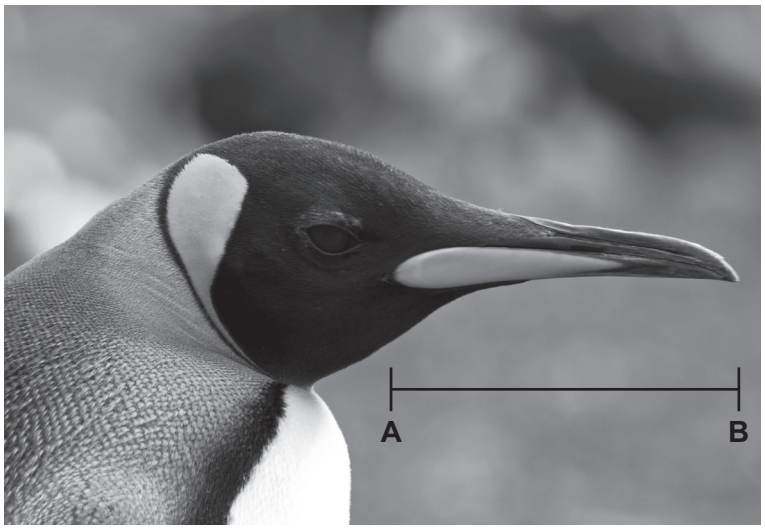
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3 **(a)** Fig. 3.1 is a photograph of the head of a king penguin.



magnification ×0.42

Fig. 3.1

(i) Make a large drawing of the head of the king penguin shown in Fig. 3.1.

[4]

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(ii) The length of line **AB** represents the length of the penguin's beak.

Measure the length of line **AB** in Fig. 3.1.

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

Use your measurement and the formula to calculate the actual length of the penguin's beak.

$$\text{magnification} = \frac{\text{length of line } \mathbf{AB} \text{ in Fig. 3.1}}{\text{actual length of the penguin's beak}}$$

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

Space for working.

..... mm
[3]

(b) Fig. 3.2 shows the heads of a gentoo penguin and a black-footed penguin.



gentoo black-footed

not to scale

Fig. 3.2

Other than size, state **two** ways the gentoo penguin differs from the black-footed penguin in Fig. 3.2.

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2 .....

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[2]

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(c) Penguins are covered in feathers. The feathers reduce heat loss by insulating the birds from the cold.

A beaker of hot water can be used to represent a penguin.

Plan an investigation to determine the effect of the thickness of an insulating material on heat loss in a beaker of hot water.

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