



General Certificate of Secondary Education
2023

Centre Number

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Candidate Number

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Biology

Unit 3 Practical Skills
Booklet B
Foundation Tier



[GBL32]

GBL32

FRIDAY 23 JUNE, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all seven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is **70**.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question **7(c)**.



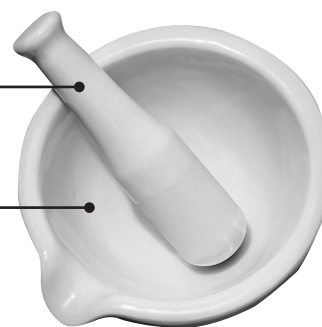
1 A student tested a biscuit for the presence of sugar.

biscuit

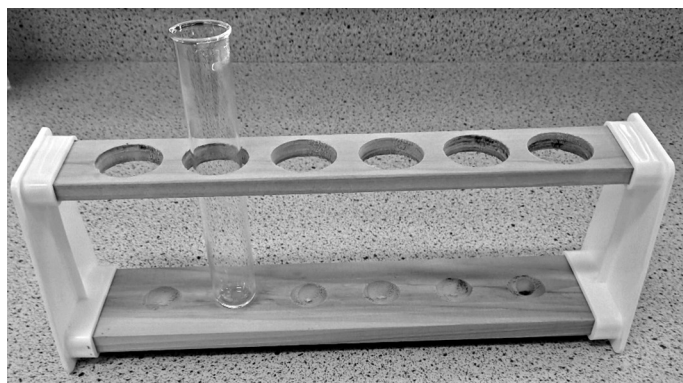


pestle

mortar



test tube and test tube rack



beaker of water



(a) Describe how the student used the apparatus shown to make a solution of the biscuit.

[3]



(b) Give **two other** pieces of apparatus the student used to test the biscuit solution for the presence of sugar.

1. _____

2. _____ [2]

(c) Name the reagent used to test for sugar.

_____ [1]

(d) Describe the colour change of the reagent if the biscuit contains sugar.

From _____ to _____ [2]

(e) Give **one** safety precaution the student should include in a risk assessment for this food test.

_____ [1]

[Turn over



- 2 Three pupils A, B and C carried out an experiment to investigate the effect of exercise on heart rate.

They measured their heart rate at rest and **after five minutes** of exercise.

The table shows their results.

Pupil	Heart rate at rest /beats per minute	Heart rate after five minutes of exercise /beats per minute	Average increase in heart rate per minute	Time taken for heart rate to return to rest /mins
A	70	120		12
B	65	100	7	5
C	80	155	15	15

Look at the table.

- (a) Suggest how the pupils measured their heart rate.

_____ [1]

- (b) Complete the table by calculating the average increase in heart rate **per minute** for pupil A.

Show your working.

[3]



Pupil C was the least fit pupil.

(c) Give **three** pieces of evidence from the table which supports this statement.

1. _____

 2. _____

 3. _____

- [3]

The exercise also affected the pupils' breathing.

(d) Give **two** ways the pupils' breathing may have changed during the exercise.

1. _____

 2. _____

- [2]

[Turn over



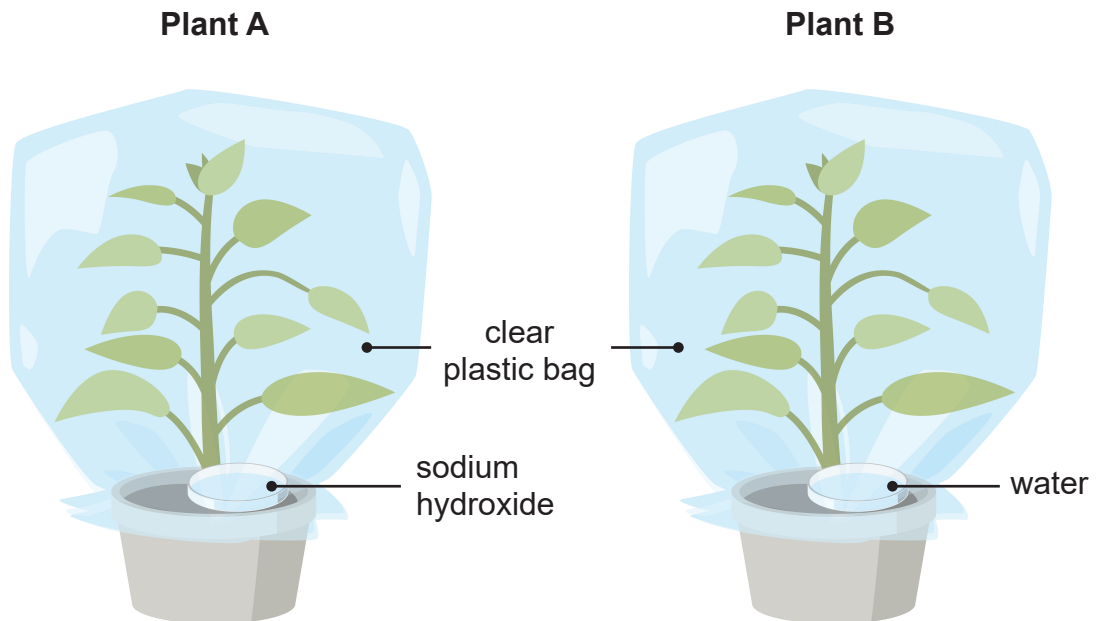
3 (a) A student investigated the effect of carbon dioxide on photosynthesis.

She destarched two plants.

(i) Describe how.

[2]

After destarching both plants, the student set up the experiment shown in the diagram.



She then left the plants in bright light for 24 hours.

After 24 hours, she tested a leaf from each plant for starch.

Look at the diagram.

(ii) Give the function of the sodium hydroxide in plant **A**.

[1]

(iii) Explain why the student included plant **B** in the experiment.

[1]

(iv) Explain why it was necessary to destarch each plant before the experiment.

[1]

[Turn over



(b) **Table 1** shows the steps the student carried out when testing a leaf from each plant for starch.

Table 1

Step	Method	Reason
1		to kill the leaf
2	Boil the leaf in ethanol	
3		to soften the leaf
4	Cover the leaf with iodine solution	

(i) Complete **Table 1**. [4]

(ii) Describe and explain **one** safety precaution needed in **step 2**.

Description _____

Explanation _____

_____ [2]



Table 2 shows the results of the starch tests carried out by the student.

Table 2

Plant	Colour of iodine solution	
	Before starch test	After starch test
A	yellow-brown	yellow-brown
B	yellow-brown	blue-black

(iii) Using the diagram in **part (a)** and **Table 2**, explain the result for plant **B**.

[3]

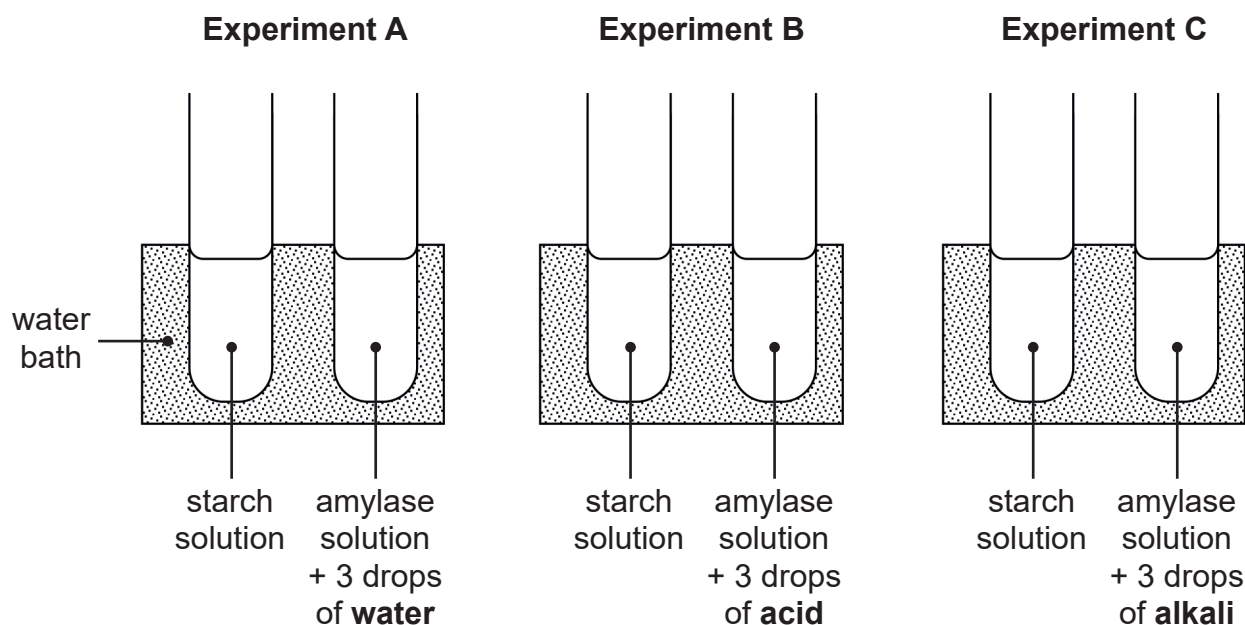
[Turn over



4 (a) The enzyme amylase breaks down starch.

A group of pupils investigated the effect of pH on the activity of amylase.

The diagram shows the experimental setup.



Source: Chief Examiner

The pupils kept the water baths at 37°C during the experiment.

They left each test tube of starch solution and each test tube of amylase solution in a water bath for 10 minutes.

In each of the experiments, after 10 minutes, they added the amylase solution to the test tube of starch solution and placed this test tube in the water bath.

They immediately tested each mixture for starch.

After 30 minutes, they tested each mixture for starch again.



Look at the diagram.

- (i) Suggest why the pupils kept each water bath at 37°C during the experiment.

_____ [1]

- (ii) Suggest why the pupils kept the starch and amylase solutions in each water bath for 10 minutes before mixing.

_____ [1]

- (b) The table shows the pupils' results.

Experiment	pH	Starch present at the start	Starch present after 30 minutes
	2	yes	yes
	7	yes	no
	11	yes	yes

- (i) Use the diagram of the experiment to complete the table by writing **A**, **B** or **C** in the empty boxes. [2]

- (ii) At which pH does amylase work best?

pH _____ [1]

[Turn over



(iii) Describe and explain the result for the starch solution at pH 2.

[4]

(iv) Draw a circle around the substance produced when amylase breaks down starch.

enzyme

protein

sugar

glycerol

[1]





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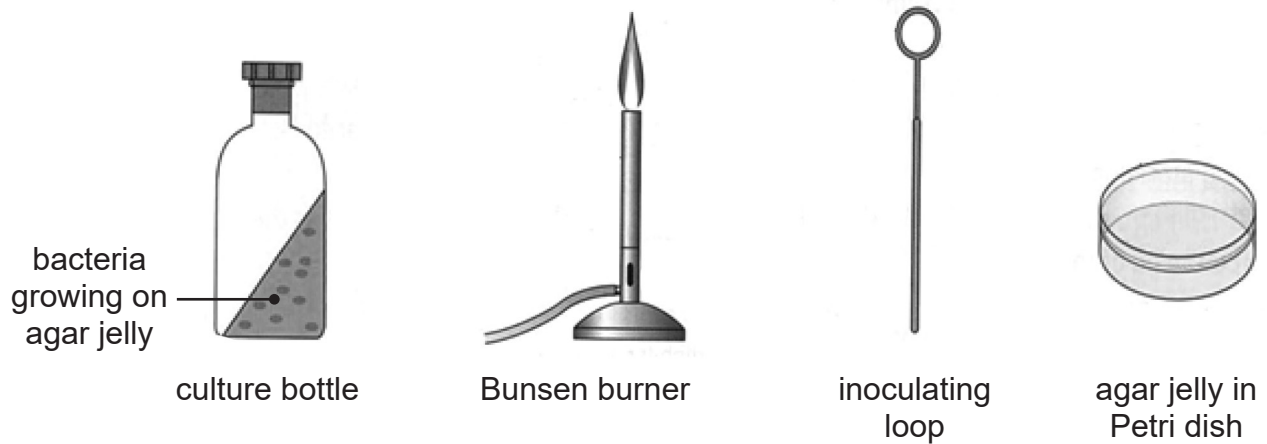
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[Turn over



- 5 A student used the apparatus shown to inoculate an agar plate with one type of bacteria.



She carried out the following method.

1. Heat the inoculating loop in the Bunsen burner flame until red hot.
2. Let the inoculating loop cool.
3. Remove the lid of the culture bottle. Do not let the lid touch the bench.
4. Pass the neck of the culture bottle through the Bunsen burner flame.
5. Glide the inoculating loop over the surface of the agar jelly in the culture bottle to obtain bacteria.
6. Pass the neck of the culture bottle through the Bunsen burner flame and replace the lid.
7. Spread the bacteria over the surface of the agar jelly in the Petri dish.
8. Heat the inoculating loop again in the Bunsen burner flame.
9. Tape the Petri dish to secure the lid, but do not completely seal it.
10. Label the base of the Petri dish and incubate upside down at 25°C.



(a) What term describes the technique used by the student in this experiment?

[1]

(b) Explain why the student

- heated the inoculating loop in the Bunsen burner flame in **step 1**.

_____ [1]

- cooled the inoculating loop in **step 2**.

_____ [1]

- did not completely seal the Petri dish in **step 9**.

_____ [1]

- incubated the agar plate upside down in **step 10**.

_____ [1]

[Turn over



(c) The student worked beside a lit Bunsen burner while inoculating the agar jelly in the Petri dish.

Explain why.

[2]

(d) Explain why the student should not incubate the Petri dish at a temperature greater than 25°C.

[1]





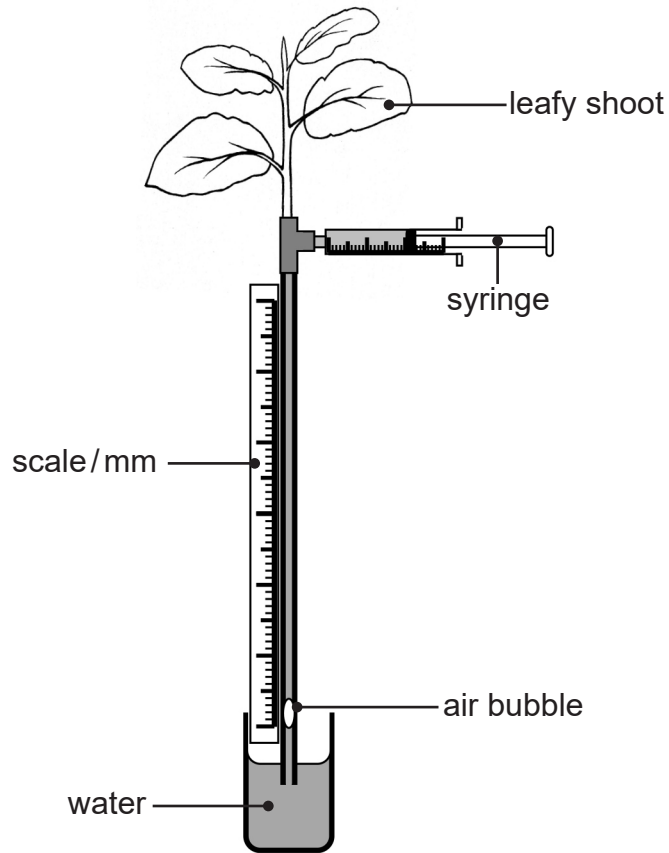
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- 6 (a) The diagram shows the apparatus which can be used to investigate the rate of water uptake by a leafy shoot.



Source: Chief Examiner

Look at the diagram.

- (i) Name this apparatus.

[1]



During the investigation the air bubble moved towards the leafy shoot.

(ii) Explain why.

[2]

(iii) Give the function of the syringe in the apparatus.

[1]

(iv) Name another piece of apparatus needed to measure the **rate** at which the air bubble moves in this investigation.

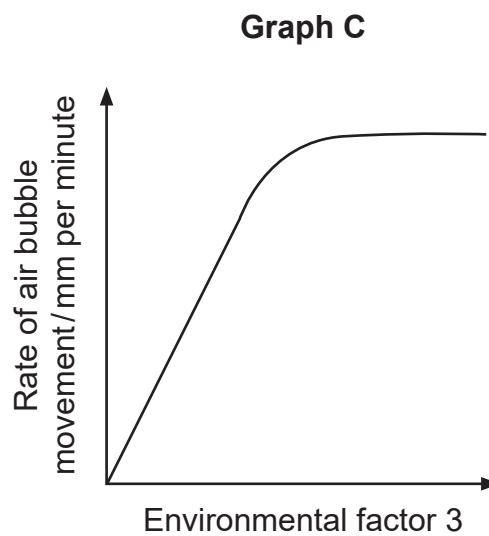
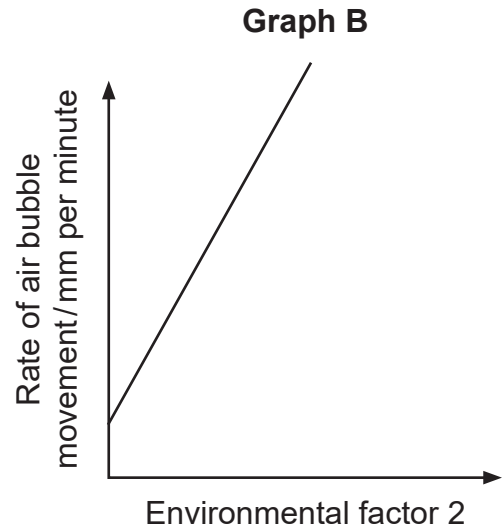
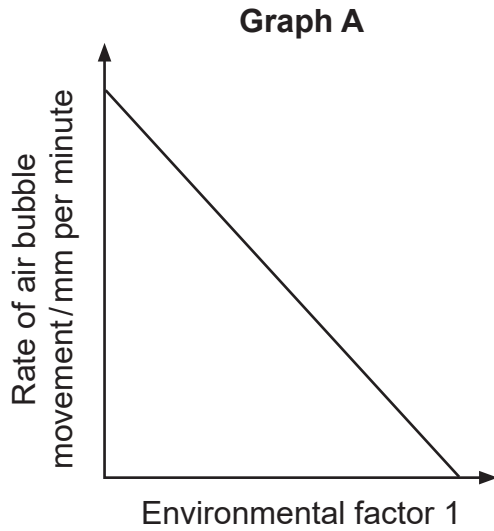
[1]

[Turn over



(b) A student used this apparatus to investigate the effect of different environmental factors on the rate at which the air bubble moves.

The graphs show the student's results for each environmental factor.



One of the environmental factors investigated is humidity.

- (i) Suggest how the student could have created humid conditions around the leafy shoot.

_____ [1]

- (ii) Suggest which graph shows the effect of humidity on the rate of air bubble movement.

Graph _____

Reason _____

_____ [2]

- (c) Give **one other** factor which could be investigated using this apparatus.

_____ [1]



7 A student set up an experiment to investigate diffusion.

He filled three Petri dishes with agar jelly **containing starch**.

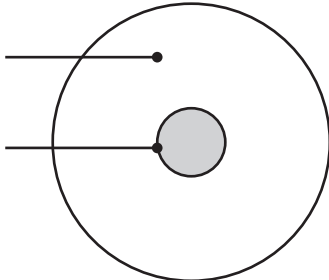
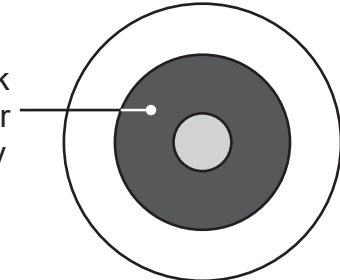
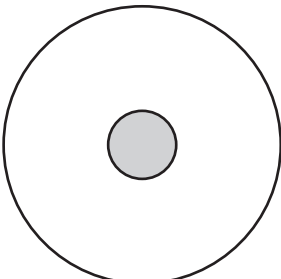
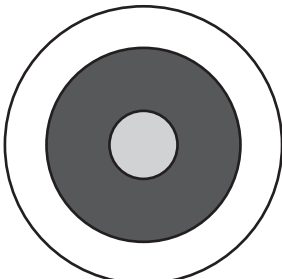
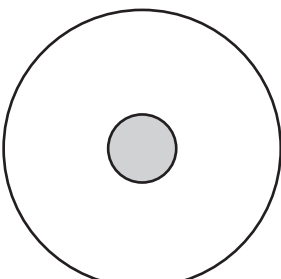
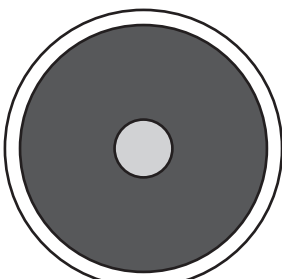
He cut a hole with the same diameter out of the centre of the agar jelly in each Petri dish.

He filled the holes with 1 cm³ of iodine solution.

He left the Petri dishes for 30 minutes at three different temperatures.

Table 1 shows the appearance of the agar jelly at the start of the student's experiment and after 30 minutes.

Table 1

Petri dish	Temperature /°C	Start of experiment	After 30 minutes
A	5	<p>clear agar jelly</p>  <p>hole containing iodine solution</p>	<p>dark agar jelly</p> 
B	15		
C	25		

Source: Chief Examiner



Table 2 shows some of the student's results.

Table 2

Petri dish		Diameter of dark area after 30 minutes / mm	Rate of diffusion / mm per minute
A	5	19	0.63
B	15	21	
C	25	30	1.00

(a) Complete Table 2 by

- adding a suitable column heading with units.
- calculating the rate of diffusion in Petri dish B.

Show your working.

[3]

(b) Suggest how the student could have made the results of his experiment more reliable.

[2]

[Turn over





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Sources

Q1, Biscuit.....© Getty

Q1, Beaker of water © GIPHOTOSTOCK / Science Photo Library

Q1, Test tube and holder....Principal Examiner

Q2, Pestle and mortar.....© Science Photo Library

Q5....."CCEA AS/A2 Unit 3 Biology Student Guide: Practical Skills in Biology by John Campton (ISBN: 9781510419155) 2018 © Hodder and Stoughton Educational Limited

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Examiner Number

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