



Rewarding Learning

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

Higher Tier



[GBL34]

GBL34

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

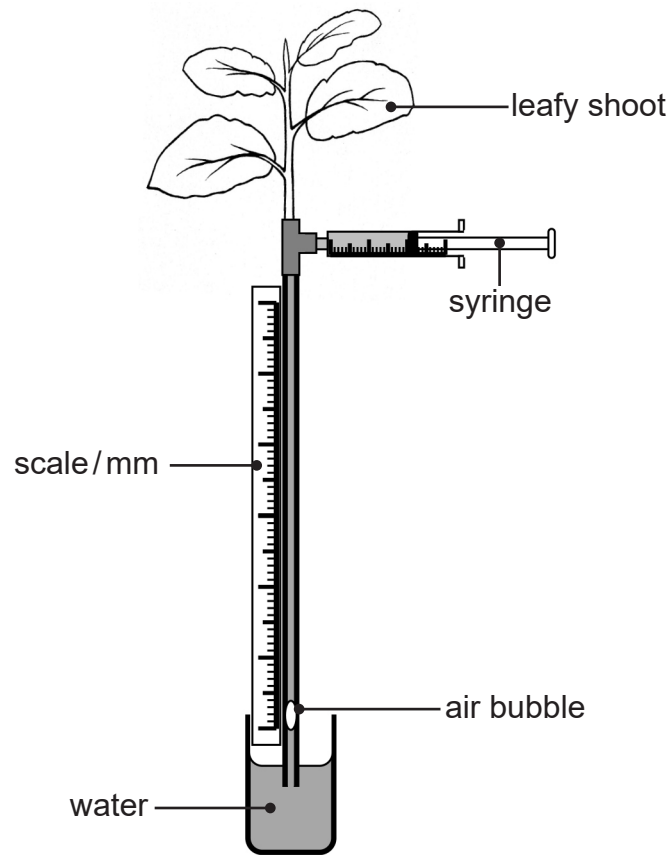
The total mark for this paper is **70**.

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 **2(c)**.



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



Source: Chief Examiner

- (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.

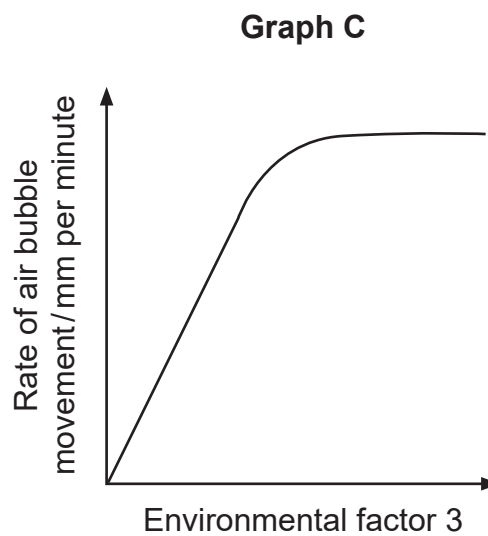
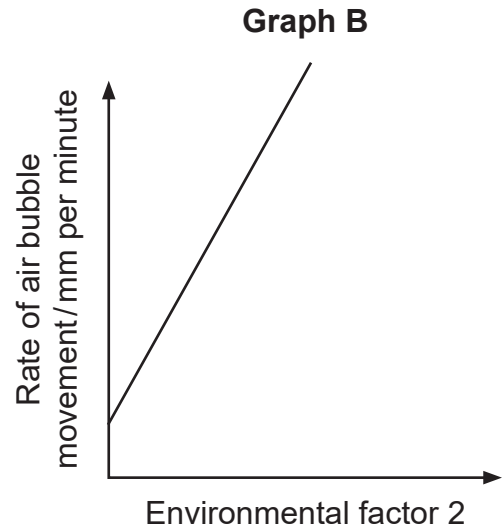
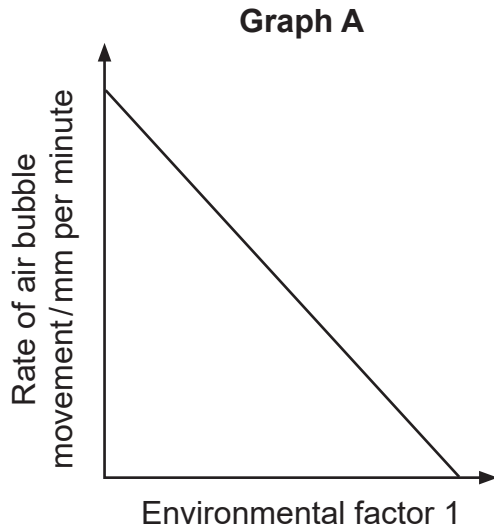
[1]

[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]

[Turn over



2 A student set up an experiment to investigate diffusion.

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

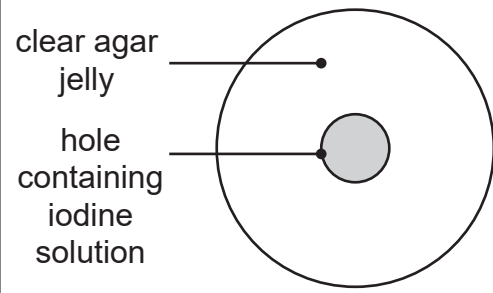
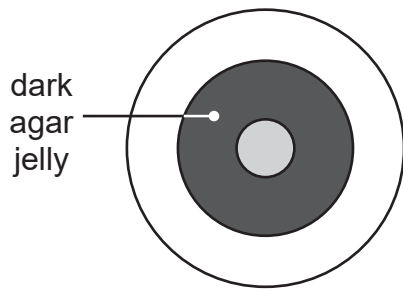
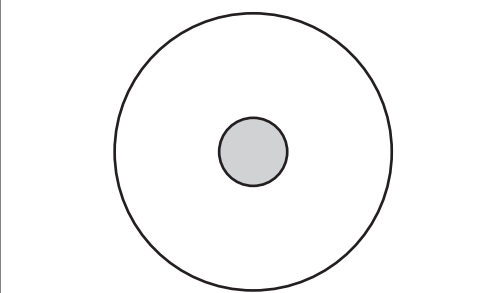
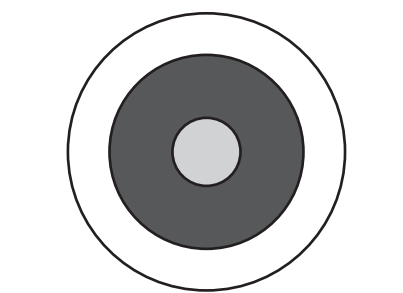
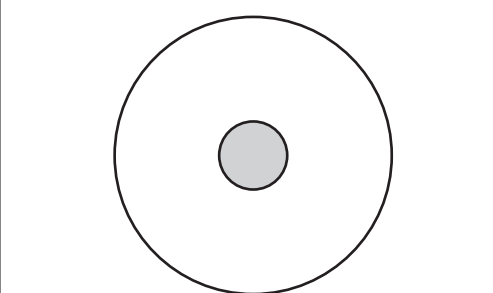
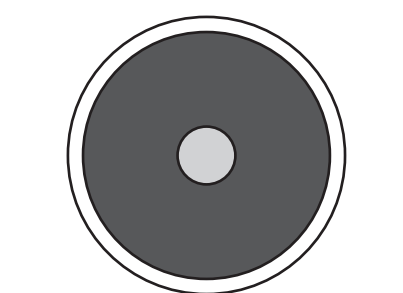
He cut a hole with the same diameter out of the centre of the agar jelly in each Petri dish.

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		
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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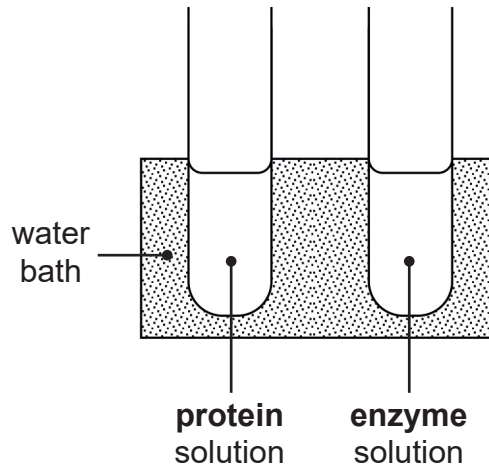
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(Questions continue overleaf)



- 3 A group of pupils carried out an experiment to investigate the effect of enzyme concentration on the activity of an enzyme which breaks down protein.

The diagram shows the apparatus they used.



Source: Principal Examiner

The pupils left the test tube of protein solution and the test tube of enzyme solution in the water bath for 10 minutes.

After this time they added the enzyme solution to the test tube of protein solution.

The protein solution was cloudy at the beginning of the experiment and became clear as the protein was broken down. The pupils recorded the time taken for the protein solution to become clear.

They repeated the experiment using different concentrations of enzyme solutions.

- (a) Name the type of enzyme which breaks down protein.

[1]

- (b) Give the function of the water bath.

[1]



(c) The table shows the pupils' results.

Concentration of enzyme solution / %	Time taken for protein solution to become clear / minutes
1	22
2	19
3	16
4	13
5	10
6	10
7	10

(i) Describe the trend shown in the results.

Use **data** to support your answer.

[3]

(ii) Use your knowledge of enzyme action to explain the trend shown in the results.

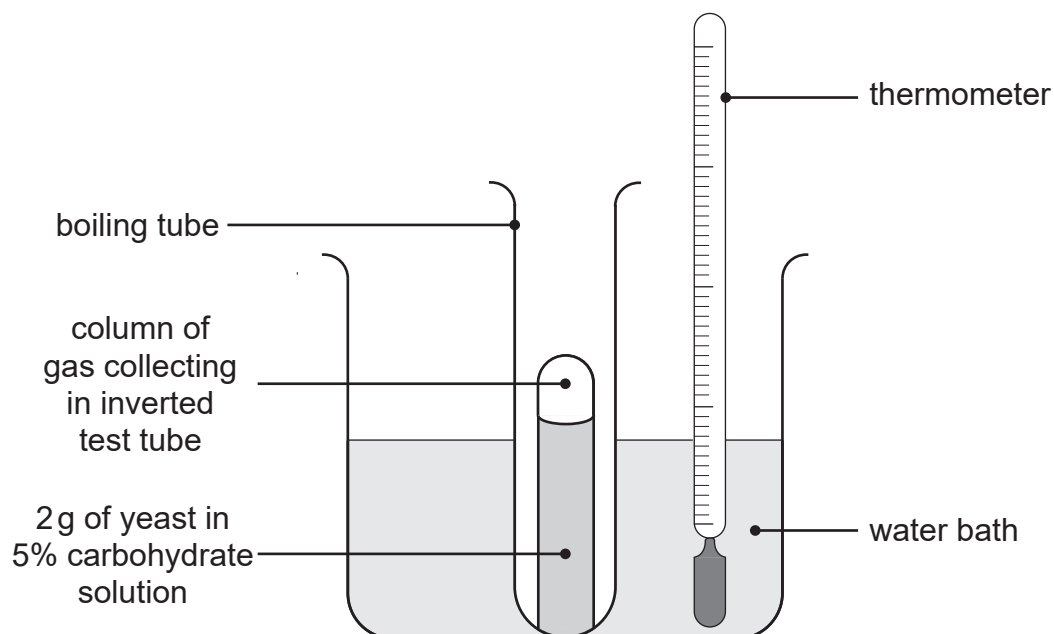
[3]

[Turn over



- 4 A student carried out an experiment to investigate the effect of using different carbohydrates on respiration in yeast.

The diagram shows the apparatus she used.



- (a) Name the gas collecting in the inverted test tube.

[1]

Source: "CCEA AS/A2 Unit 3 Biology Student Guide: Practical Skills in Biology by John Campton (ISBN: 9781510419155) 2018 © Hodder and Stoughton Educational Limited "Reproduced with permission of the Licensor through PLSclear."



- (b) The student recorded the height of the gas column at the start of the experiment and again after 20 minutes.

The table shows her results.

Carbohydrate	Structure of carbohydrate molecule	Height of gas column/mm		
		At the start	After 20 minutes	Change in height
glucose	one simple sugar	2	38	36
maltose	two simple sugars	2	16	14
starch	many simple sugars	2	4	2

- (i) Describe the relationship between the structure of the carbohydrate molecule and the change in height of the gas column.

[1]

[Turn over



(ii) The student concluded that glucose provided the yeast with the most energy during the experiment.

Use **evidence** from the table and your knowledge to explain why the student made this conclusion.

[3]

(c) Suggest what must happen to the starch before it can be used by the yeast in respiration.

[1]

(d) Give **two other** changes which occur in the contents of the inverted test tube during the experiment.

1.

2.

[2]





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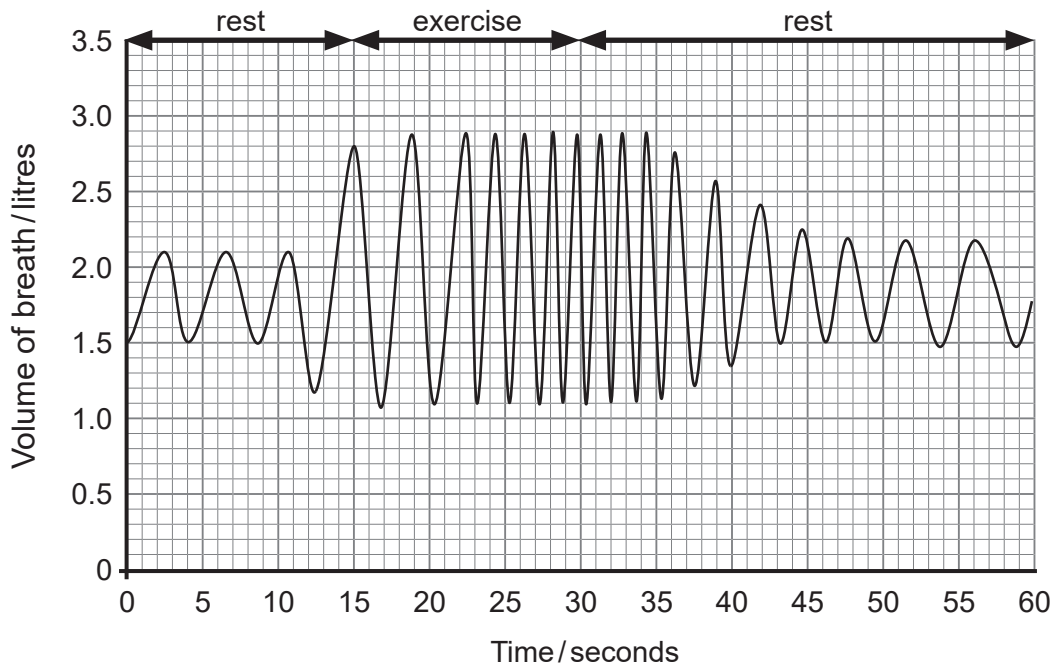
[Turn over



5 A pupil investigated the effect of exercise on breathing.

The graph shows the volume of each breath during a period of rest, followed by a period of exercise and another period of rest.

On the graph, each peak represents one breath.



Source: Principal Examiner

(a) What was the volume of a breath during the first 10 seconds of the rest period **before** exercise?

_____ litres [1]

(b) Describe the effect of exercise on the volume of each breath taken.

Use **data** from the graph to support your answer.

_____ [2]



(c) Explain why the volume of each breath changed during exercise.

[3]

(d) (i) Calculate the breathing **rate** of the pupil during the first period of rest.

Give your answer in breaths per minute.

Show your working.

_____ breaths min⁻¹ [3]

(ii) Describe how exercise affected the pupil's **breathing rate**.

Use **data** from the graph to support your answer.

[2]

(e) Give **two other** changes which occur in the body during a period of exercise.

1. _____
2. _____

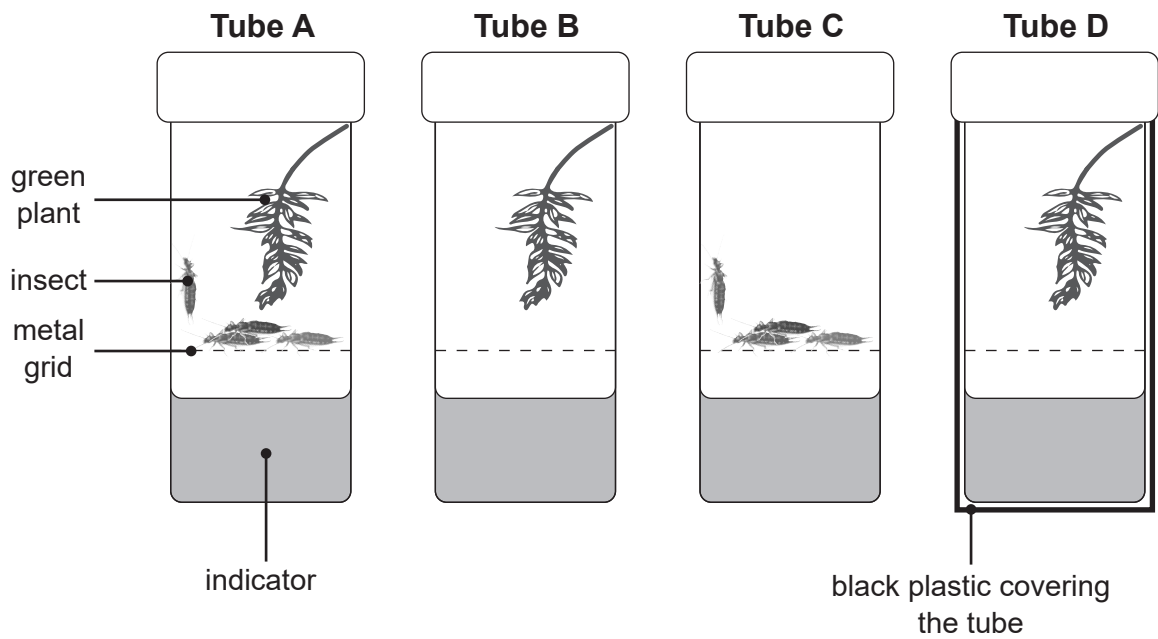
[2]

[Turn over



6 A group of pupils investigated gas exchange in insects and green plants.

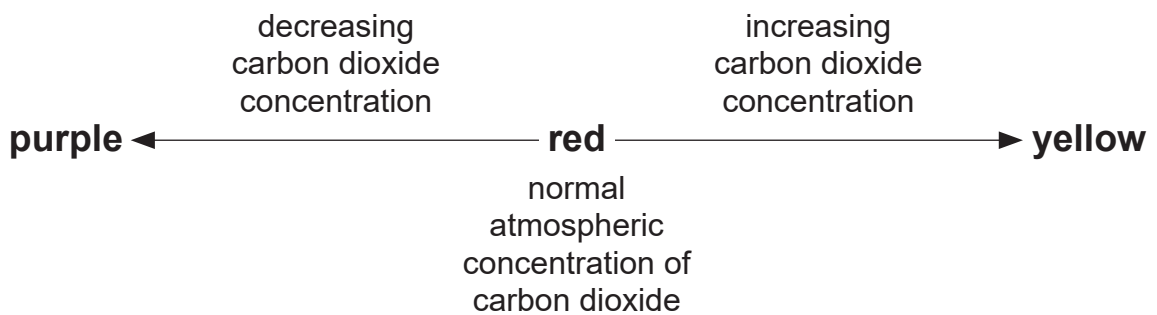
The diagram shows the apparatus they set up.



Source: Chief Examiner

The pupils left the four tubes in bright light for one hour.

The indicator used changes colour in different concentrations of carbon dioxide.



The table shows the colour of the indicator in each tube at the start of the experiment and after one hour.

Tube	Colour of indicator	
	At the start	After one hour
A	red	red
B	red	
C	red	
D	red	yellow

(a) Complete the table. [2]

(b) Name the indicator used by the pupils.

_____ [1]

(c) Explain why the indicator stayed red in test tube **A** after one hour.

_____ [3]

[Turn over



(d) Explain the result for test tube D.

[4]

(e) Suggest why the pupils should not have continued the experiment in test tube C for longer than one hour.

[2]





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[Turn over



(ii) Give **three** variables which the students controlled in this investigation.

1. _____

2. _____

3. _____ [3]

(b) Suggest how the appearance of the seedlings would differ at the end of the investigation.

_____ [2]

THIS IS THE END OF THE QUESTION PAPER



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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	

Total Marks	
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Examiner Number

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