



General Certificate of Secondary Education

Centre Number

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Candidate Number

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Biology

Unit 3 Practical Skills
Booklet B
Higher Tier



[GBL34]

GBL34

Assessment

TIME

1 hour.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

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 eight** questions.

INFORMATION FOR CANDIDATES

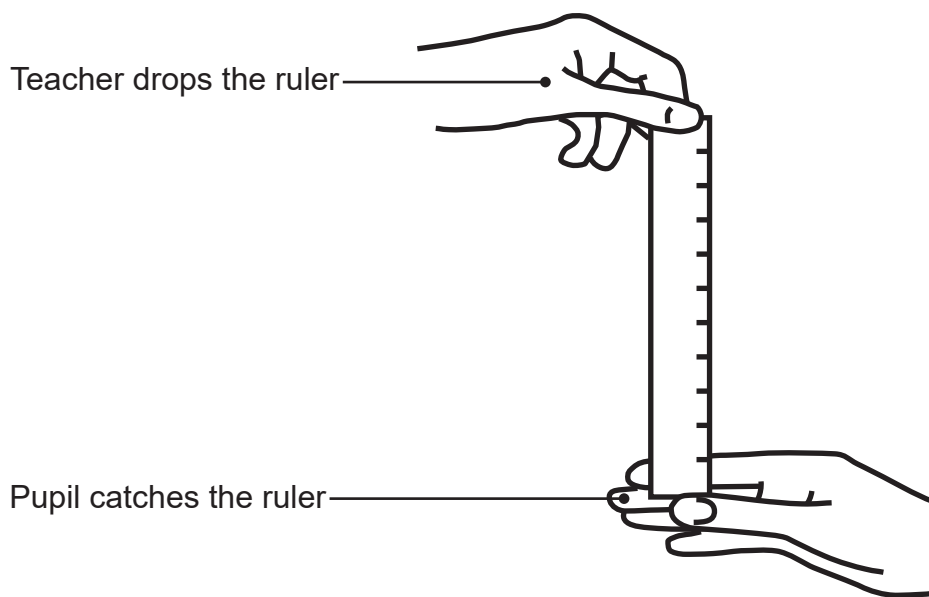
The total mark for this paper is 70.

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 **6(a)**.



- 1 The diagram shows an experiment carried out to measure the reaction speeds of four pupils.



Source: Principal Examiner

The teacher held a ruler above a pupil's hand.

When the teacher dropped the ruler, the pupil caught it.

The experiment was carried out three times for each of the four pupils.

The **average** distance travelled by the ruler was calculated for each pupil.

(a) Suggest why.

[1]



The table shows the results.

Pupil	Distance travelled by the ruler/mm			
	Test 1	Test 2	Test 3	Average
A	240	215	190	215
B	195	120	90	135
C	175	110	300	195
D	130	100	85	105

Look at the table.

(b) Which pupil reacted quickest?

[1]

(c) The pupils concluded that their reactions improved with practice.

(i) Use data for pupil **B** to explain how they reached this conclusion.

[2]

One pupil's results **did not** support this conclusion.

(ii) Identify this pupil and explain your choice.

Pupil _____

Explanation _____

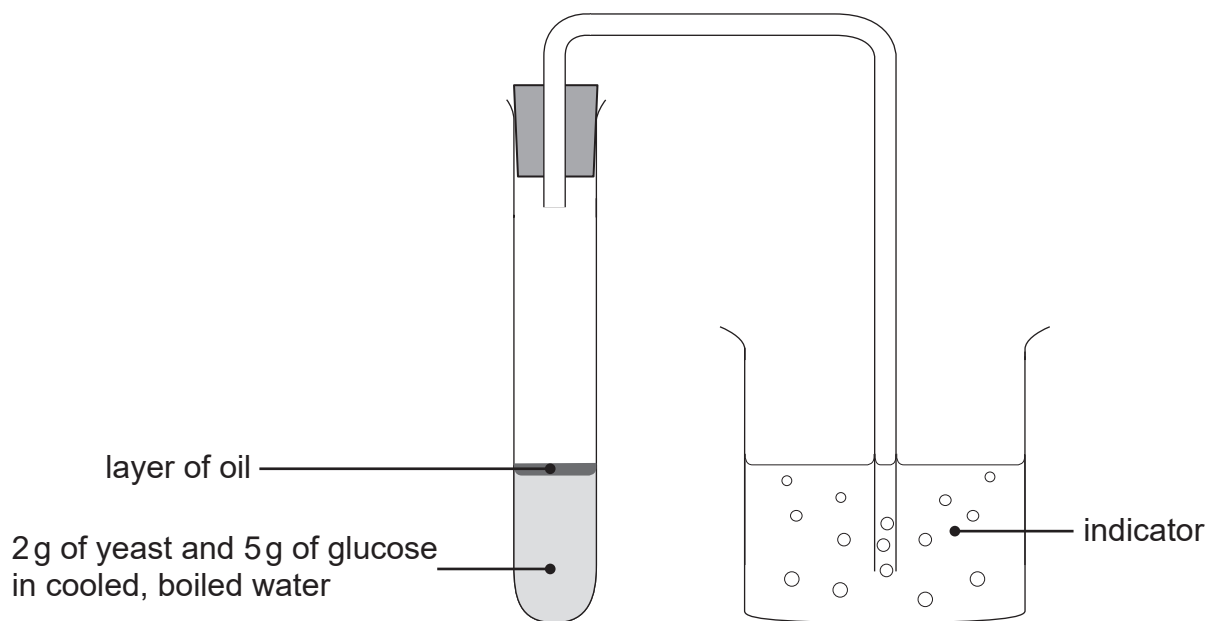
[2]

[Turn over



- 2 A student carried out an experiment to investigate the effect of changing the concentration of glucose on the rate of respiration in yeast.

The diagram shows the experiment she set up.



Source: Principal Examiner

- (a) Suggest why the water was boiled and then cooled before the yeast and glucose were added.

boiled _____

cooled _____

_____ [2]

Look at the diagram.

- (b) Name the type of respiration carried out by the yeast.

_____ [1]



The student then counted the number of bubbles of gas produced by the yeast in 15 minutes and used this to calculate the number per minute.

She repeated the experiment by using boiling tubes containing different masses of glucose.

The table shows her results.

Boiling tube	Mass of glucose / g	Number of bubbles produced per minute
1	5	4
2	10	12
3	15	18
4	20	22
5	25	22

(c) Name the gas produced by the yeast.

[1]

(d) Give **three** ways the contents of each boiling tube changed during the 15 minutes.

1. _____

2. _____

3. _____

[3]

[Turn over



(e) Give evidence from the table which suggests there was a maximum rate at which the yeast carried out respiration.

[2]





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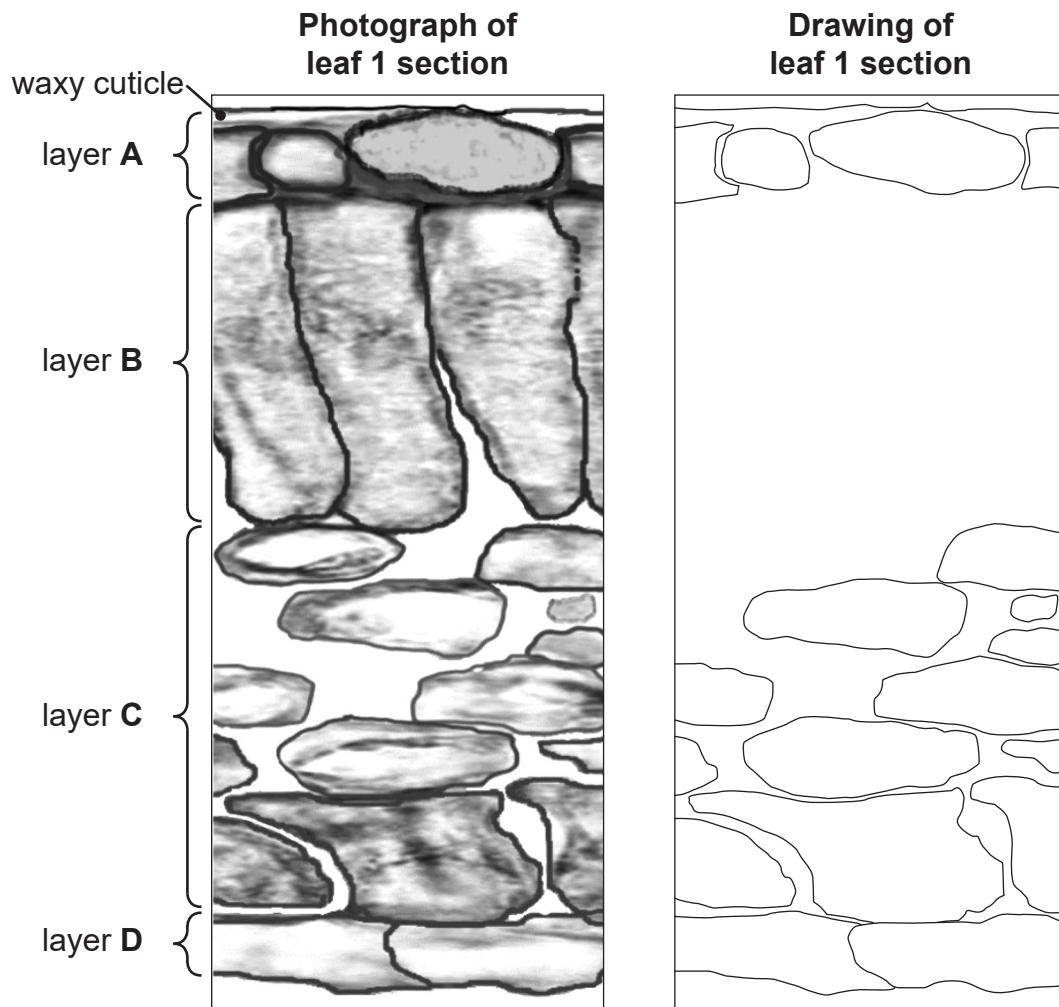
[Turn over



3 A pupil viewed two leaf sections using a microscope.

The photograph shows a section of **leaf 1**.

The pupil made a drawing of this leaf section.



Source: Chief Examiner

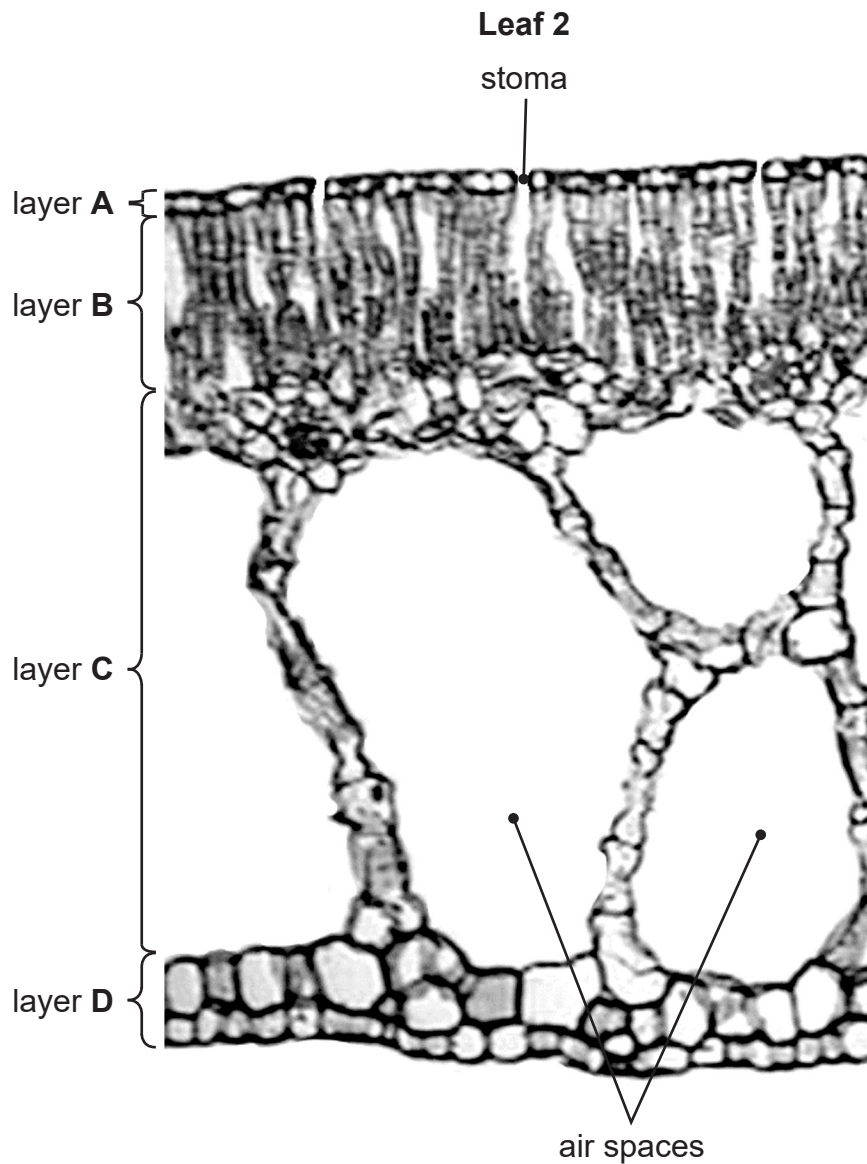
(a) Complete the drawing of **layers B** and **C** of this leaf section.

[3]



(b) The photograph shows a section of leaf 2.

This leaf comes from a plant which lives on the surface of the water in a pond.



Source: Chief Examiner

(i) Suggest how this leaf is adapted to float on the surface of the water.

[1]

[Turn over



(ii) Suggest why floating **on the surface** of the water is an advantage to this plant.

[1]

(iii) Describe **two** ways layer **A** differs in leaf 2 and leaf 1.

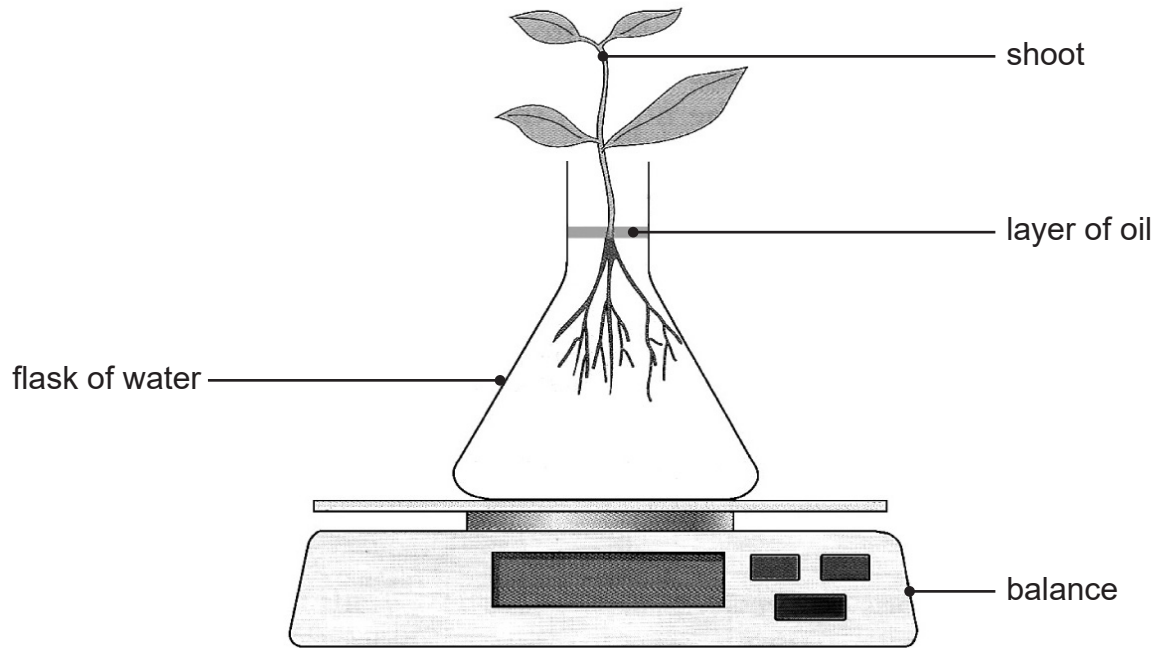
1. _____

2. _____

[2]



- 4 The diagram shows a weight potometer used by pupils to investigate water loss from a shoot over 24 hours.



- (a) Explain why the pupils added a layer of oil to the top of the water in the flask.

[1]



- (b) The pupils placed the shoot in different environmental conditions for 24 hours and calculated the rate of water loss.

The table shows their results.

Experiment	Environmental conditions	Rate of water loss /g per hour
1	light, warm, no wind	6.5
2	dark, warm, no wind	2.9
3	light, warm, windy	9.5
4	light, cold, no wind	4.4
5	dark, cold, no wind	0.5

Source: Principal Examiner

- (i) Calculate by how many times greater the maximum rate of water loss was than the minimum rate of water loss.

Show your working.

_____ times greater [3]



(ii) Which environmental condition caused the difference in the rate of water loss between experiments 1 and 2?

[1]

(iii) Explain how this environmental condition caused this difference.

[2]

(iv) Which **two** experiments would the pupils use to compare the effect of wind on the rate of water loss?

_____ and _____

[1]

(c) Give **one environmental** factor, not investigated by these pupils, which may affect the rate of water loss from a shoot.

Explain how this factor affects the rate of water loss.

Factor _____

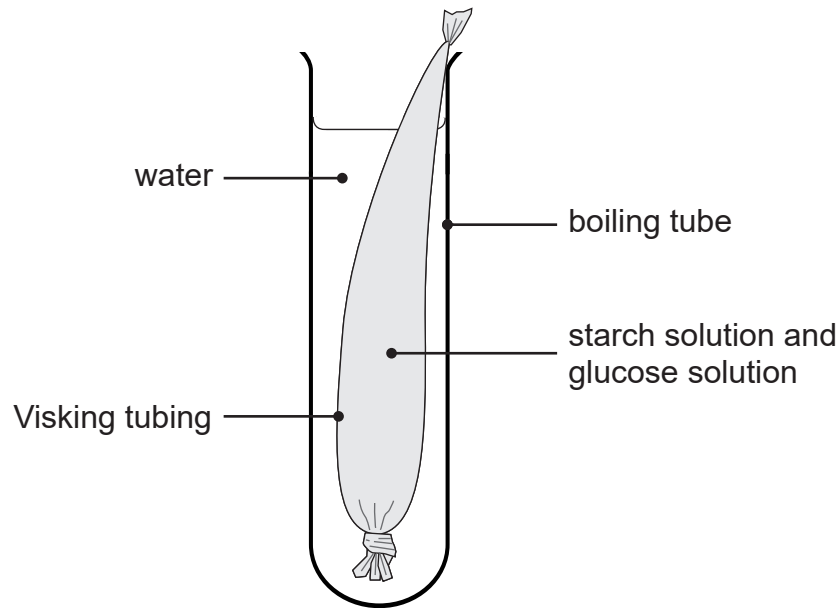
Explanation _____

[3]

[Turn over



- 5 (a) The diagram shows apparatus used by students to demonstrate the absorption of digested food molecules.



Source: Principal Examiner

The students filled Visking tubing with equal volumes of starch solution and glucose solution.

They rinsed the outside of the Visking tubing in water before placing it in a boiling tube containing water.

- (i) Explain why.

[1]



After 30 minutes the students removed the Visking tubing and tested the contents of the boiling tube with Benedict's reagent and iodine solution.

The result of the test with Benedict's reagent was positive.
The result of the test with iodine solution was negative.

(ii) What can be concluded about the contents of the boiling tube from these results?

Benedict's reagent _____

Iodine solution _____

_____ [2]

The Visking tubing is a selectively permeable membrane.

(iii) Use your understanding of a selectively permeable membrane to explain the results of each test.

_____ [2]

(b) This apparatus is sometimes called a model of the digestive system.

Which part of the apparatus represents

- the wall of the digestive system?

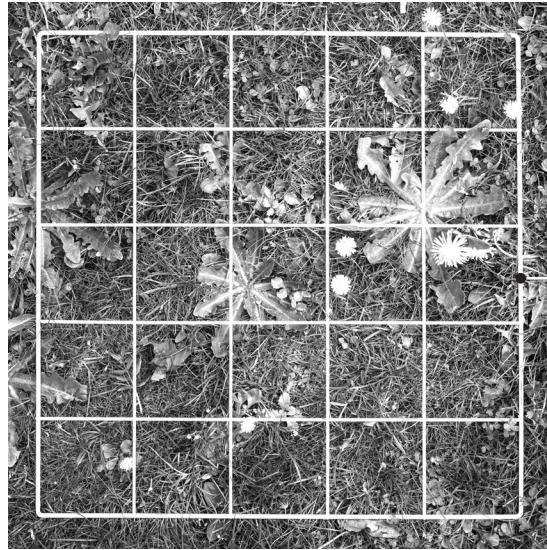
- the blood?

[2]

[Turn over



- 6 The photograph shows apparatus used by a group of pupils to compare the percentage cover of plant species from a woodland into a field grazed by cattle.



apparatus X

Source: © Science Photo Library

- (a) Describe how the pupils would use this apparatus to carry out a **transect** from the woodland into the field.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.



- (b) The table shows the percentage cover of plant species found along the transect from the woodland into the field grazed by cattle.

Distance along transect/m	Percentage cover of plant species				
	Bluebells	Buttercups	Grass	Moss	Wood sorrel
0 (woodland)	65	15	5	13	2
10	52	16	14	12	6
20	35	19	38	8	0
30	0	23	76	1	0
40 (field)	0	15	80	5	0

- (i) Which plant species was most evenly distributed along the transect?

[1]

- (ii) Explain what can be concluded about the biodiversity of the woodland (0 m) compared to the field (40 m).

Use data to support your answer.

[3]



(iii) Suggest **two** abiotic factors that may have caused the difference in the biodiversity between the woodland and the field.

1. _____

2. _____

[2]

(iv) Suggest **two** biotic factors that may have affected the biodiversity in the field.

1. _____

2. _____

[2]

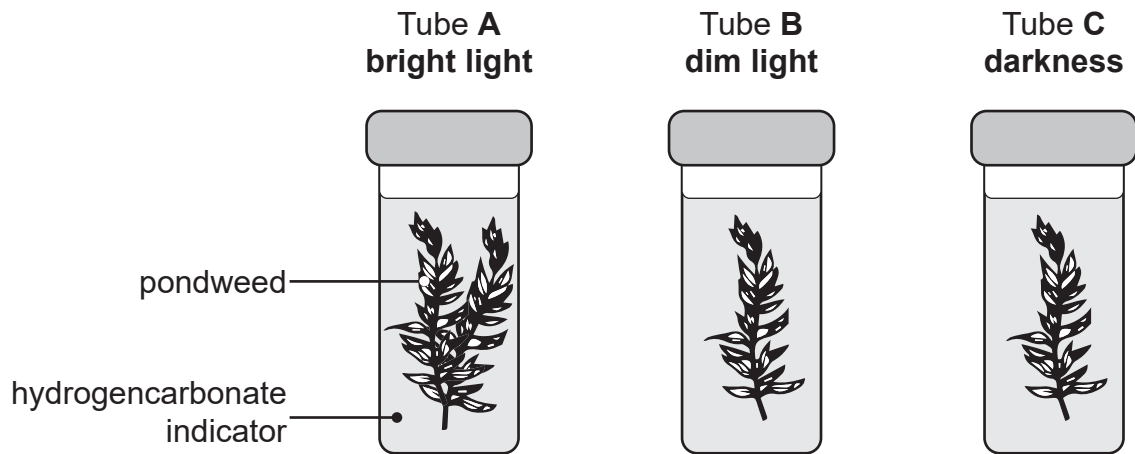


7 Students carried out an experiment to investigate the effect of light on gas exchange in pondweed.

They used hydrogencarbonate indicator to show any changes in the concentration of carbon dioxide.

They left three tubes in different light conditions for 24 hours.

The diagram shows the students' experiment.



Source: Principal Examiner

(a) Describe the contents of a suitable control tube for this experiment.

[2]

The table shows the students' results.

Tube	Colour of hydrogencarbonate indicator after 24 hours
A	
B	red
C	yellow



(b) Give the colour of the hydrogencarbonate indicator at the start of the experiment.

_____ [1]

(c) Complete the table to give the result for tube A after 24 hours.

[1]

(d) Explain the results for tube C.

_____ [3]

(e) Explain the results for tube B.

_____ [3]

It is not valid to compare the results of the three tubes in this experiment.

(f) Suggest why.

_____ [1]

[Turn over



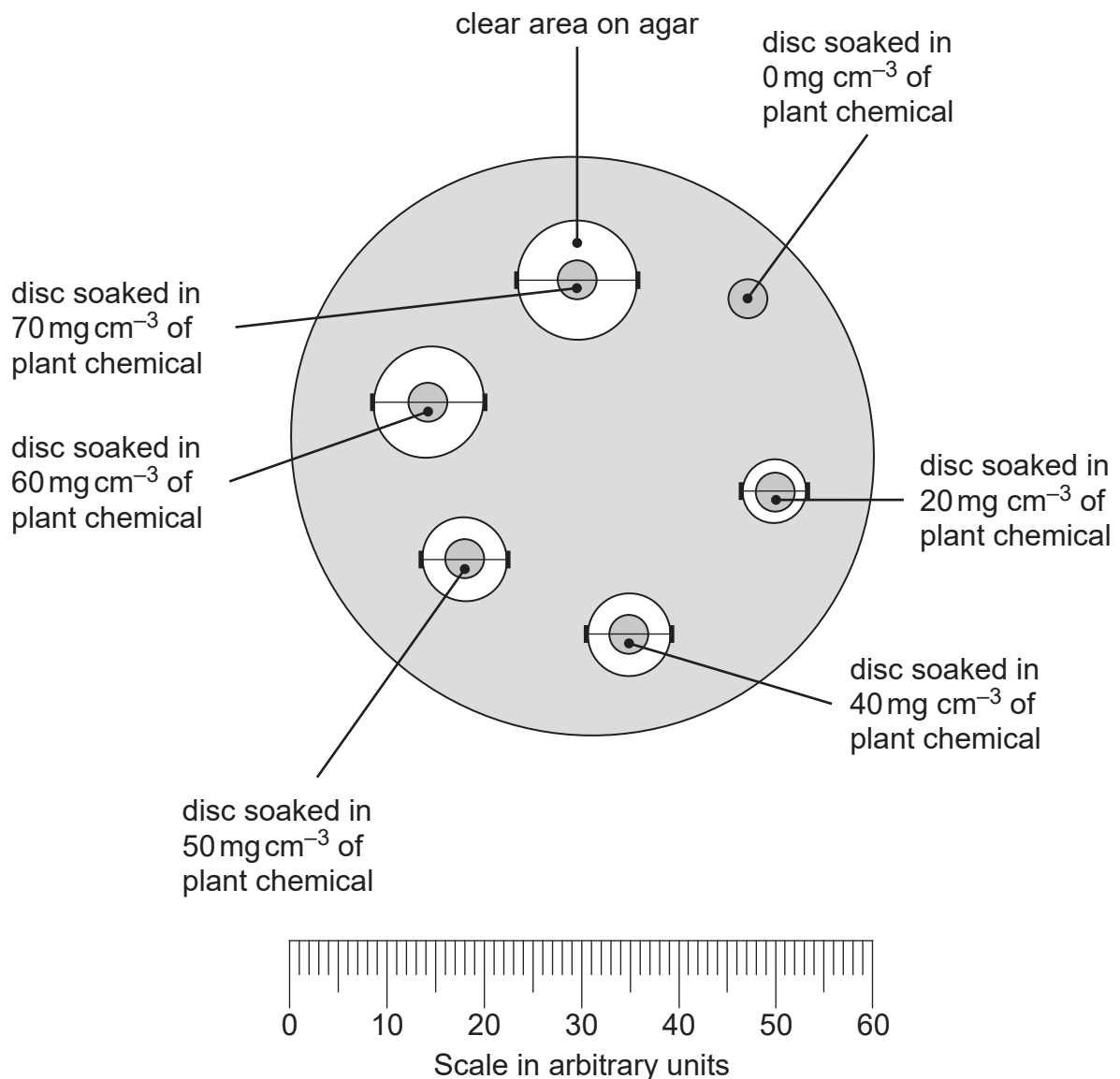
- 8 (a) A pupil set up an experiment to investigate the effect of an antimicrobial plant chemical on the growth of bacteria.

He soaked filter paper discs in different concentrations of the plant chemical.

He placed these discs on an agar plate inoculated with one type of bacteria.

He sealed the agar plate and incubated it.

The diagram shows the appearance of the plate after 48 hours.



Source: Principal Examiner



(i) What is an antimicrobial chemical?

[1]

The lines shown as **I—|—|** in the diagram opposite are the diameters of the clear areas on the agar.

To be effective as an antimicrobial chemical, the diameter of the clear area on the agar must be at least 10 arbitrary units.

(ii) What is the **minimum** concentration of this plant chemical needed to be effective as an antimicrobial chemical?

Use the scale provided to give evidence to support your answer.

[2]

(b) Give the maximum temperature the pupil should have used to safely incubate the agar plate.

Explain your answer.

[2]

THIS IS THE END OF THE QUESTION PAPER



Sources

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Question Number	Marks
1	
2	
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8	

Total Marks	
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Examiner Number

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