



Rewarding Learning

General Certificate of Secondary Education
2024

Centre Number

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Candidate Number

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Double Award Science: Biology

Unit 7 Practical Skills
Booklet B
Higher Tier



[GDW76]

GDW76

TUESDAY 11 JUNE, MORNING

TIME

30 minutes.

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 four** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 35.

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(a)**.



- 1 Sand dunes can be found near a beach.
They consist of soil made up of sand and humus.
Many different plant species grow on sand dunes.

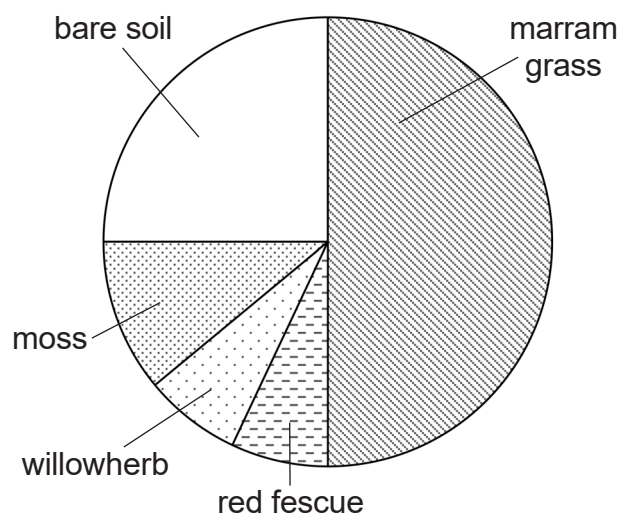
A student used a quadrat to measure the percentage (%) cover of different plant species and bare soil in two areas on a sand dune.

Area 1: near the sea

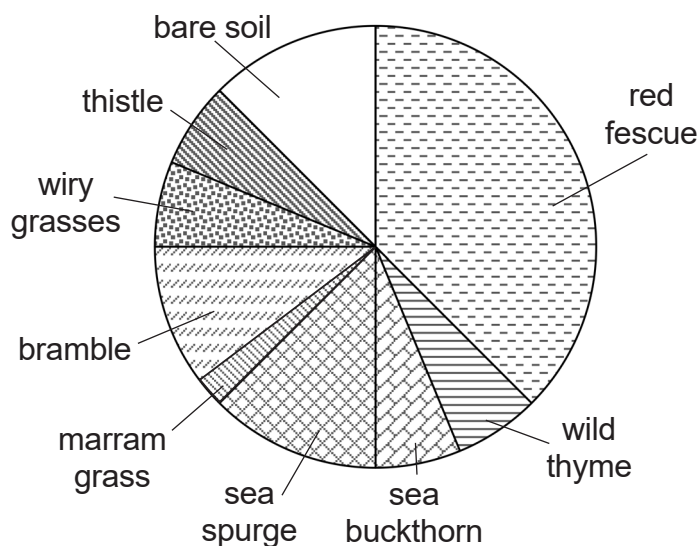
Area 2: further inland (away from the sea)

- (a) The pie charts show the results for the percentage (%) cover of different plant species and bare soil in the two areas.

Near the sea



Further inland (away from the sea)



(i) How many different plant species are there:

near the sea _____

further inland? _____

[1]

(ii) 12.5% of the quadrat in the area further inland was bare soil.

What percentage (%) of the quadrat in the area near the sea was bare soil?

_____ % [1]

(iii) Name the plant species that shows an **increase** in percentage (%) cover from the area near the sea to the area further inland.

[1]

(iv) Name the plant species that shows the **biggest decrease** in percentage (%) cover from the area near the sea to the area further inland.

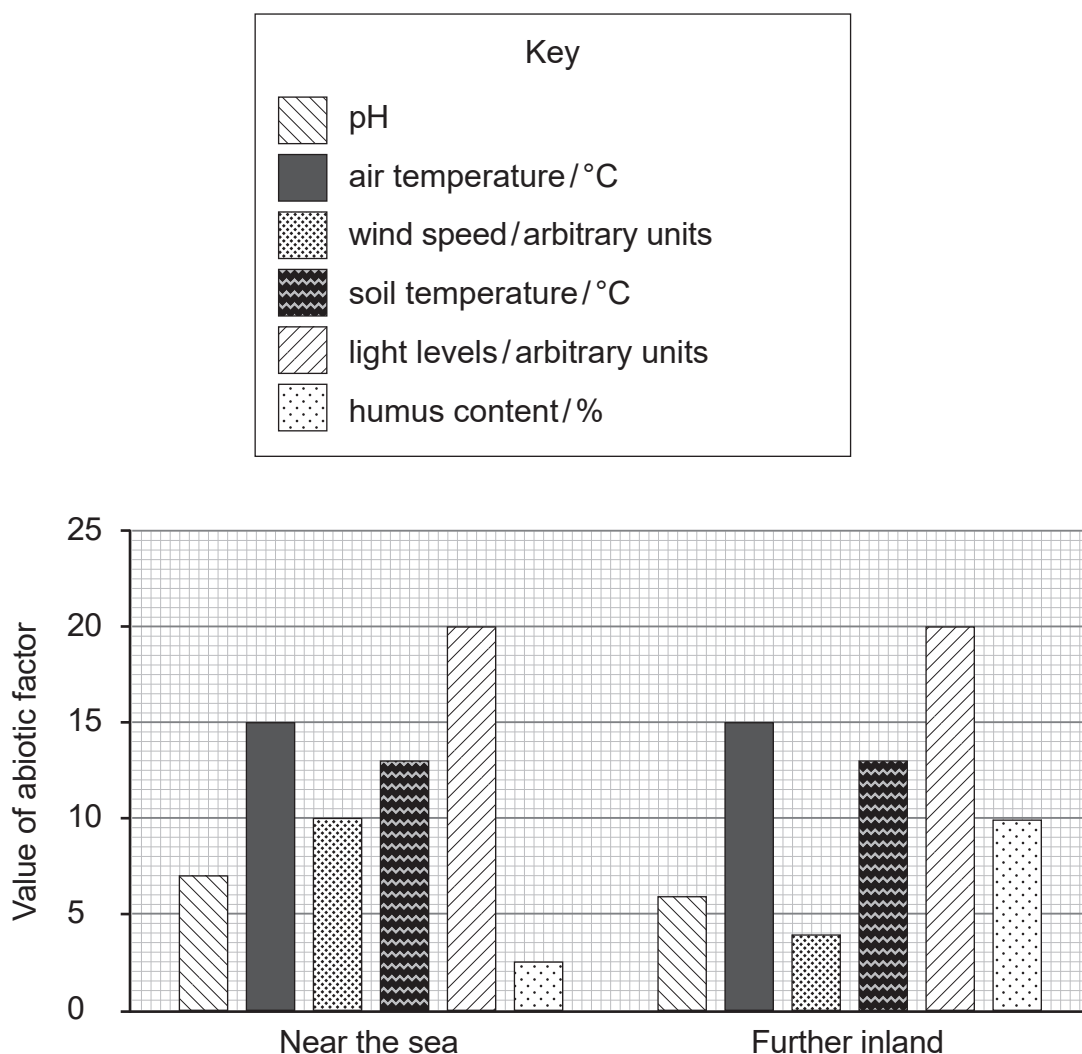
[1]

[Turn over]



(b) The student also measured several abiotic factors in the two areas.

The bar chart shows his results for the abiotic factors measured near the sea and further inland.



(i) Which of these abiotic factors is measured using an anemometer?

[1]



- (ii) Bramble grows further inland but not near the sea.

Use the bar chart to **describe** the three conditions that allow bramble to grow further inland.

1. _____

2. _____

3. _____
_____ [3]

- (c) (i) The student found humus in the soil in both areas.

What is humus formed from?

_____ [1]

- (ii) Name **one** type of microorganism involved in the formation of humus.

_____ [1]



- 2 The photographs show some of the aseptic techniques carried out when inoculating an agar plate with one type of bacterium.

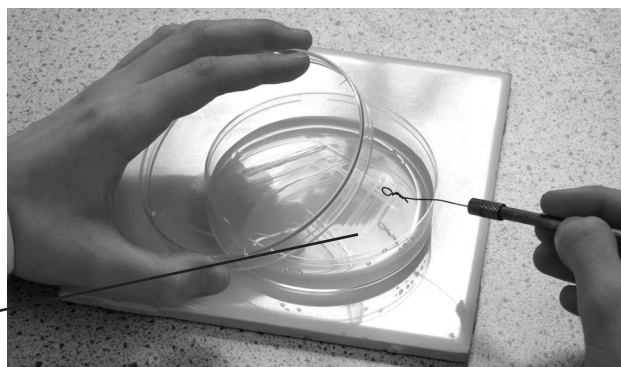
Photograph A

culture bottle
containing one
type of bacterium



Photograph B

agar plate



- (a) Use the photographs and your knowledge to describe the aseptic techniques used to safely:

- remove the bacteria from the culture bottle
- inoculate the agar plate with the bacteria from the culture bottle.

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



[illegible]

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- This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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-
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-
-
- [6]

[Turn over



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- (b) Give the correct temperature needed to **safely** grow the bacteria on the agar plate.

Circle the correct answer in the list.

2 °C	20 °C	30 °C
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[1]

- (c) It is important to clean work surfaces after working with bacteria.

Explain why.

[1]





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(Questions continue overleaf)



- 3 Some plants produce chemicals that affect the growth of other plants. This gives them an advantage over the other plants, because they are more successful at obtaining the resources they need to grow.

A scientist investigated the effect of one of these chemicals, extracted from the giant milkwood plant, on the growth of the roots of barley seeds.

The scientist used 60 barley seeds divided into six groups, **A** to **F**, with 10 seeds in each group.

She added different concentrations of the chemical to each group of barley seeds.

After seven days, she measured the length of the root of each barley seed and calculated the average length of the barley roots in each group.

The table shows her results.

Group	Concentration of chemical / arbitrary units	Average length of barley roots / mm
A	0	19.0
B	2	17.0
C	4	19.0
D	6	15.0
E	8	9.5
F	10	5.0

- (a) (i) Which concentration of the chemical produced an anomalous result?

Explain your answer.

Concentration _____

Explanation _____

_____ [2]



- (ii) Ignoring the anomalous result, give the general trend shown by the results of the experiment.

[1]

- (iii) An increase in the concentration of the chemical from 6 to 8 arbitrary units resulted in the **biggest** change in the average length of the barley roots.

Use the information in the table to give **two** pieces of data that support this statement.

[2]

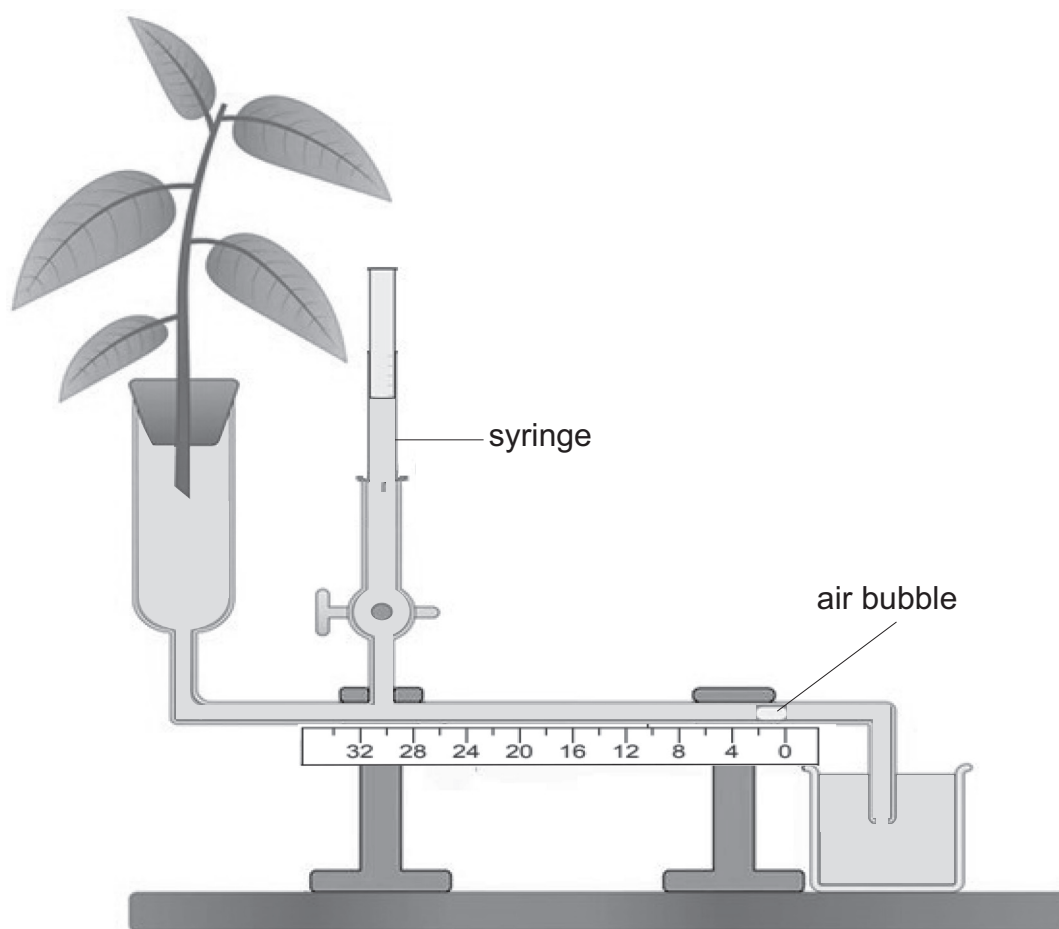
- (b) Suggest **one** possible explanation for the results of the experiment.

[1]

[Turn over



- 4 (a) The diagram shows the apparatus used to investigate the rate of water uptake by a plant shoot in different environmental conditions.



- (i) Name the apparatus.

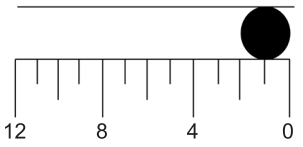
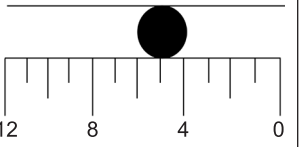
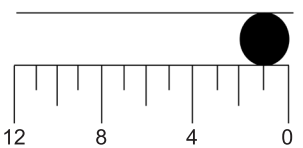
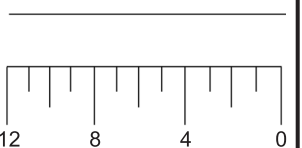
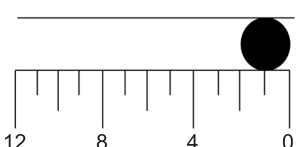
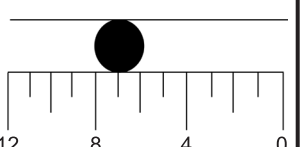
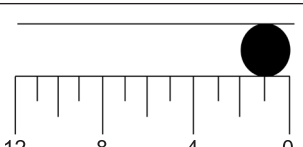
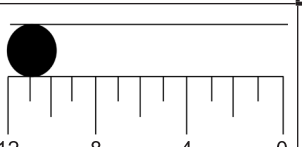
[1]

- (ii) How is the air bubble reset to zero between investigations?

[1]



The table shows the distance moved by the air bubble when the plant shoot is placed in different environmental conditions for 30 minutes.

Experiment	Environmental conditions			Position of air bubble at the start	Position of air bubble at the end	Distance moved by air bubble in 30 minutes/mm
	Temperature /°C	Wind	Humidity			
A	20	none	low			4
B	30	none	low			8
C	20	high	low			
D	30	high	low			10

(b) Complete the table by

(i) drawing the position of the air bubble at the end of experiment **B** [1]

(ii) calculating the distance moved by the air bubble in experiment **C**. [1]

[Turn over



- (c) Explain the increase in the distance moved by the air bubble between experiment **A** and experiment **B**.

[2]

The results for experiments **A** and **B** show how one environmental factor affects the distance moved by the air bubble.

The results for experiments **B** and **D** show how a different environmental factor affects the distance moved by the air bubble.

- (d) Which environmental factor caused the air bubble to move the **greater** distance?

Use data to explain your answer.

[3]



(e) Experiment **A** was repeated with high humidity.

Circle the **two** correct statements that describe and explain what happened when experiment **A** was repeated.

the air bubble moved
4 mm in
30 minutes

the air bubble moved
less than 4 mm in
30 minutes

the air bubble moved
more than 4 mm in
30 minutes

the diffusion gradient
for water between the
inside and outside of
the leaf remained
the same

the diffusion gradient
for water between the
inside and outside of
the leaf increased

the diffusion gradient
for water between the
inside and outside of
the leaf decreased

[2]

THIS IS THE END OF THE QUESTION PAPER



SOURCES

Question 1(a): Chief Examiner

Question 1(b): Chief Examiner

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Question 3: Modified from <https://www.sciencedirect.com/science/article/pii/S0570178319300351>
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Question 4(a): Modified from Shutterstock.com 1958120458

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Question Number	Marks
1	
2	
3	
4	

Total Marks	
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Examiner Number

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