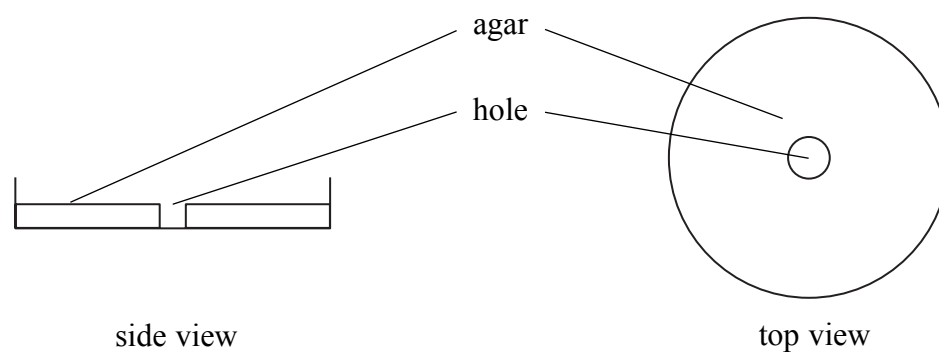


Answer ALL the questions. Write your answers in the spaces provided.

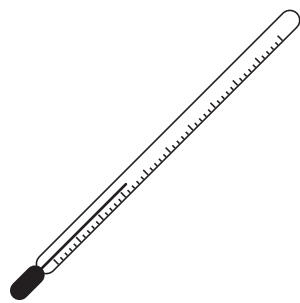
1. Marie investigated the diffusion of a dye (coloured liquid) through agar (jelly). Her teacher gave her a plate filled with agar. The plate had a hole cut out of the middle of the agar.

The diagram shows the side view and the top view of the agar plate.

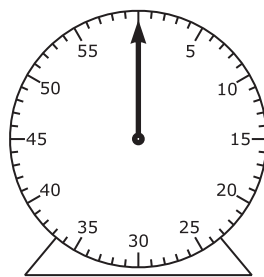


Marie put five drops of the dye into the hole in the middle of the plate. She found out how long it took for the dye to diffuse to the outer edge of the plate.

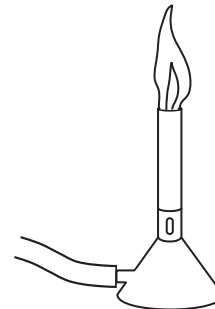
- (a) Choose **two** pieces of apparatus that Marie used.



A



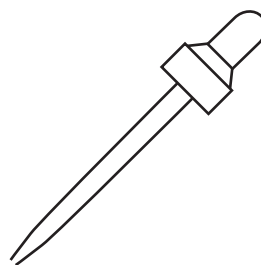
B



C



D



E

State the letter of each piece.

1

2

(2)





<p>(b) Marie wore plastic gloves when putting the drops of dye into the hole in the middle of the plate.</p> <p>Complete the sentence with the correct word from the list</p> <p style="text-align: center;">accurate reliable safe</p> <p>This was to make the experiment (1)</p> <p>(c) What would happen if Marie had used a dye with a higher concentration?</p> <p>The rate of diffusion would</p> <ul style="list-style-type: none"><input type="checkbox"/> be faster<input type="checkbox"/> stay the same<input type="checkbox"/> be slower <p style="text-align: right;">(1)</p> <p style="text-align: right;">(Total 4 marks)</p>	<p>Leave blank</p> <hr/> <hr/> <hr/> <p>Q1</p> <input type="text"/>



N 3 6 8 6 2 A 0 3 1 6



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2. Sunil wants to test some foods.

(a) He has the following reagents available.

Benedict's biuret ethanol iodine

Choose the reagent he should use to test for

(i) starch..... (1)

(ii) glucose..... (1)

(b) Put a cross (☒) in the correct box to show the colour of the reagent at the end of the test

(i) if the result is **positive** for starch

A ☒ yellow

B ☒ red

C ☒ orange

D ☒ green

E ☒ blue-black

(1)

(ii) if the result is **negative** for glucose

A ☒ blue

B ☒ green

C ☒ orange

D ☒ red

E ☒ yellow

(1)

Q2

(Total 4 marks)

5

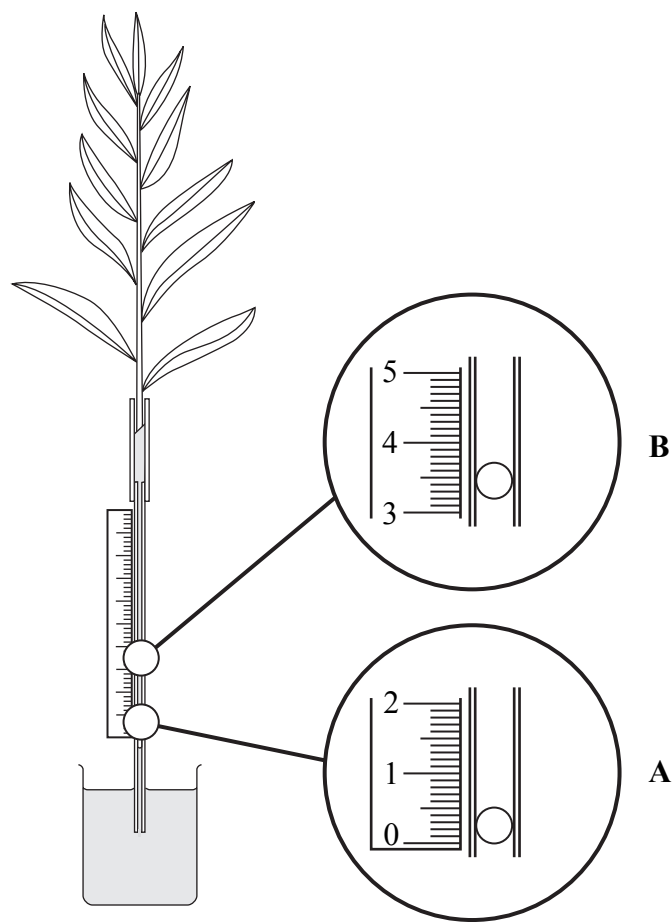
Turn over



N 3 6 8 6 2 A 0 5 1 6

3. The diagram shows apparatus that was used in an experiment to measure the rate of water loss from a leafy shoot. The experiment was carried out at 20 °C.

Circle **A** shows the position of an air bubble at the start of the experiment and circle **B** shows the air bubble after 15 minutes.



(a) (i) How far did the air bubble move in the first 15 minutes of the experiment?

Answer cm
(1)

(ii) How far would the air bubble move in 30 minutes, assuming that the rate of transpiration is constant?

Answer cm
(1)



Leave
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(b) Describe and explain how the results would differ if the experiment was carried out at 30 °C instead of at 20 °C.

.....
.....
.....
.....
.....
.....

(2)

(c) Name **two** factors, other than temperature, that affect the rate of water loss from plants.

1

2

(2)

Q3

(Total 6 marks)



4. Cress is a plant that can be long-stemmed or short-stemmed as shown in the diagram.



long-stemmed cress plant

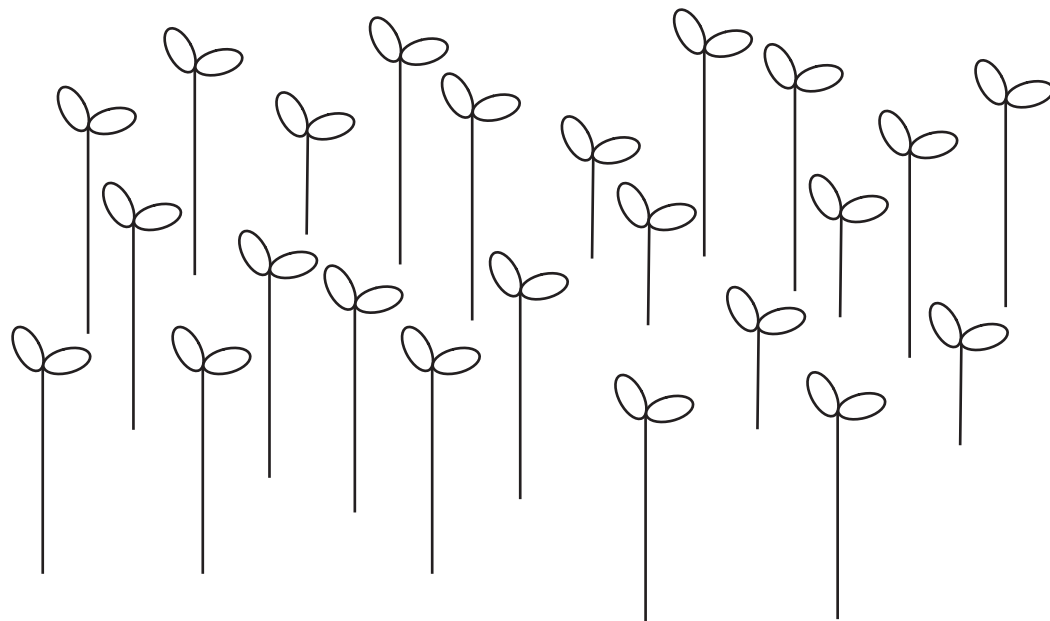


short-stemmed cress plant

The length of the stem is controlled by a single gene with two alleles. The allele for a long stem is dominant to the allele for a short stem.

(a) Omar set up a cross between homozygous long-stemmed plants and homozygous short-stemmed plants. He found that all the offspring plants had long stems.

He then set up a cross between two of these offspring plants and the results are shown below.



Leave blank

(i) Complete the table below to show the tally and number of each type of cress plant.

Type of cress plant	Tally of type of cress plant	Number of cress plants
Long-stemmed		
Short-stemmed		

(3)

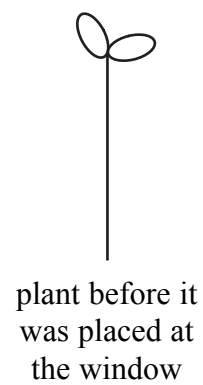
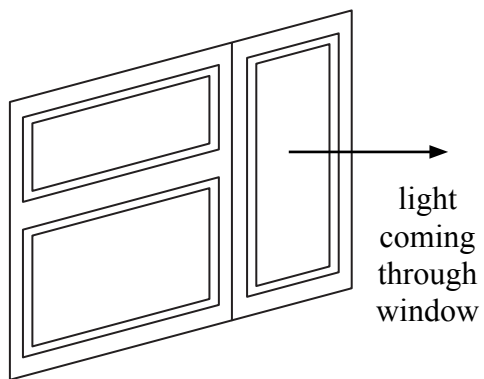
(ii) Suggest why the ratio of long-stemmed cress plants to short-stemmed cress plants is not exactly 3:1.

.....
.....
.....

(1)

(b) Omar left the cress plants close to light coming through a window. He noticed that something happened to them after a few hours.

In the space below, draw what one of the plants would look like after a few hours.



plant after a few hours

(1)

Q4

(Total 5 marks)



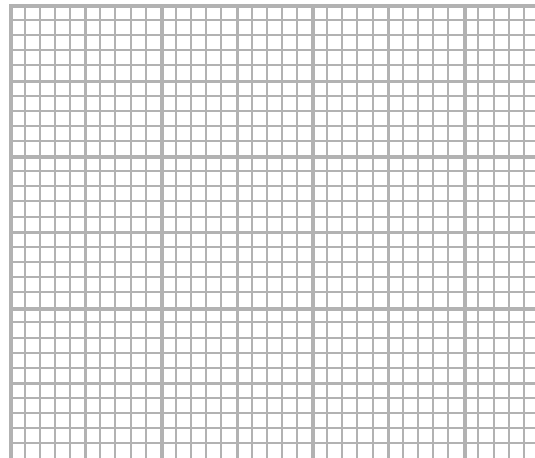
5. Neil investigated how breathing rate is affected by the length of time spent doing exercise. He used five of his friends. He measured the breathing rate of each friend at rest. He then measured the breathing rates after they had completed 2 minutes, 4 minutes, 6 minutes, 8 minutes, 10 minutes and 12 minutes of exercise.

He then calculated the average breathing rate of the five friends at rest and after they had completed 2 minutes, 4 minutes, 6 minutes, 8 minutes, 10 minutes and 12 minutes of exercise.

The averages he calculated are shown in the table below.

Length of time of exercise in minutes	Average breathing rate in breaths per minute
0	12
2	15
4	18
6	21
8	23
10	25
12	26

- (a) Plot a graph on the grid below to show how breathing rate changes with the length of time spent doing exercise. Use a ruler to join the points with straight lines.



(5)



Leave
blank

(b) (i) Describe how the breathing rate changes as the length of time spent doing exercise increases.

.....
.....
.....
.....

(2)

(ii) Explain the relationship between breathing rate and the length of time spent doing exercise.

.....
.....
.....
.....
.....
.....
.....
.....

(3)

(c) Suggest **one** way in which Neil could make his results more reliable.

.....
.....

(1)

Q5

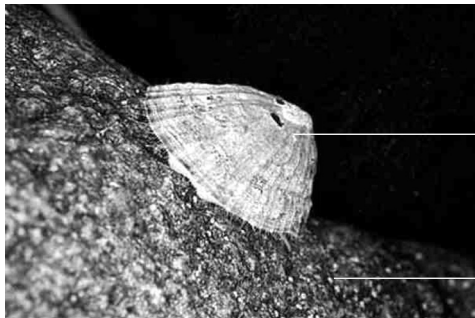
(Total 11 marks)

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6. Limpets are animals that live on rocks found by the sea. They are attached to the rocks and do not move very much. A picture of a limpet attached to a rock is shown below.



limpet

rock

Design an investigation to find out if distance from the sea affects the population size of limpets found on the rocks.

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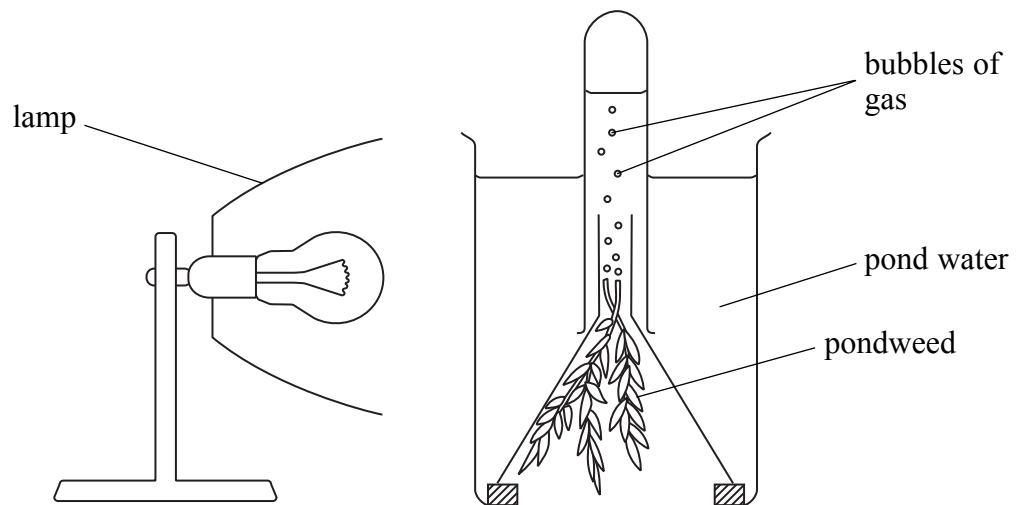
Q6

(Total 6 marks)



7. Patrick wanted to investigate the effect of light intensity on photosynthesis.

He set up the apparatus shown in the diagram.



(a) Name the gas contained in the bubbles.

..... (1)

(b) Suggest how Patrick could change the light intensity in this investigation.

.....
..... (1)

(c) Name **three** variables that Patrick would need to keep constant.

1
2
3 (3)



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(d) Patrick counted the number of bubbles of gas released in one minute at low, medium and high light intensities. He did the experiment three times at each light intensity and calculated an average. He forgot to calculate the average result for the medium light intensity. He wrote his results as shown below.

Low first time 10 bubbles second time 12 bubbles third time 11 bubbles

Average 11 bubbles

High first time 37 bubbles second time 51 bubbles third time 50 bubbles

Average 46 bubbles

Medium first time 33 bubbles second time 29 bubbles third time 28 bubbles

(i) Calculate the average result for the medium light intensity.

..... (1)

(ii) In the space below draw a suitable table and use it to show Patrick's results.

(4)

(iii) Which result in the table is anomalous?

..... (1)



Leave
blank

(e) Describe and explain the effect of light intensity on the numbers of bubbles of gas produced in Patrick's experiment.

.....
.....
.....
.....
.....

(2)

(f) Patrick measured the rate of gas production by counting the bubbles released in a minute. Suggest a more accurate way of measuring the rate of gas production.

.....
.....
.....

(1)

Q7

(Total 14 marks)

TOTAL FOR PAPER: 50 MARKS

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