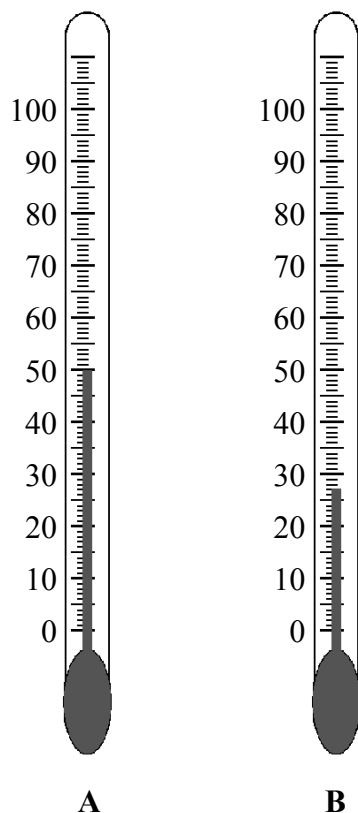


1. The diagram shows a piece of apparatus with two different readings.



(a) (i) Write down the name of the piece of apparatus shown in the diagram.

..... (1)

(ii) What does it measure?

..... (1)

(b) (i) Write down the readings shown by A and B and give the unit.

Reading for A

Reading for B

(3)

(ii) What is the difference between the two readings?

..... (1)

Q1

(Total 6 marks)



2. Asha wanted to test some foods.

Her teacher told her the following reagents were available.

Biuret	Benedict's	ethanol	iodine
---------------	-------------------	----------------	---------------

(a) Choose the reagent Asha should use to test foods for starch.

.....
(1)

(b) Asha used the table below to show her results.

Complete the table by writing the colour she obtained for each food.

Food	Colour obtained	Starch present
bread		yes
milk		no

(2)

(c) Asha decided to test her foods for glucose.

(i) Describe the test she would do.

.....
.....
.....
.....
(2)

(ii) What result would she see if glucose was present?

.....
(1)

(iii) Suggest how she might use the results to say how much glucose was present.

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

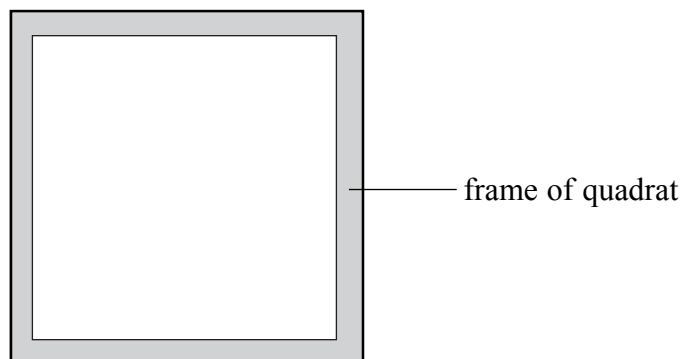
(Total 7 marks)

Q2



3. Sunhil wanted to estimate the population size of pea plants in two fields, field **X** and field **Y**.

He decided to use a quadrat that was 0.5 m by 0.5 m (shown in the diagram below).



He counted the number of pea plants in the quadrat. He did this at 10 different places in each field and called his quadrats, **A** to **J**.

- (a) He wrote down the number of pea plants in each quadrat for field **X** in a table. He arranged his results in ascending order (lowest number first).

Results for field **X**

Quadrat letter	H	F	C	D	J	A	G	B	I	E
Number of pea plants	13	14	17	18	22	24	26	27	33	36

- (i) Calculate the total number of pea plants in these 10 quadrats for field **X**.

Answer
(1)

- (ii) The total area of these 10 quadrats is 2.5 m² and field **X** has an area of 5000 m².

Using the results for (i), calculate the estimated total population size of pea plants for field **X**. Show your working.

Answer
(2)



Leave blank

- (b) Sunhil then wrote down the results of the quadrat readings for field Y in a table in the order he placed the quadrats.

Results for field Y

Quadrat letter	A	B	C	D	E	F	G	H	I	J
Number of pea plants	22	35	15	14	23	37	34	25	38	27

Fill in the table below for field Y. Rearrange the results in ascending order of the number of pea plants, in the same way that Sunhil did for field X.

Quadrat letter										
Number of pea plants										

(1)

- (c) What conclusion may be drawn about the number of pea plants in field Y compared to field X?

.....
.....

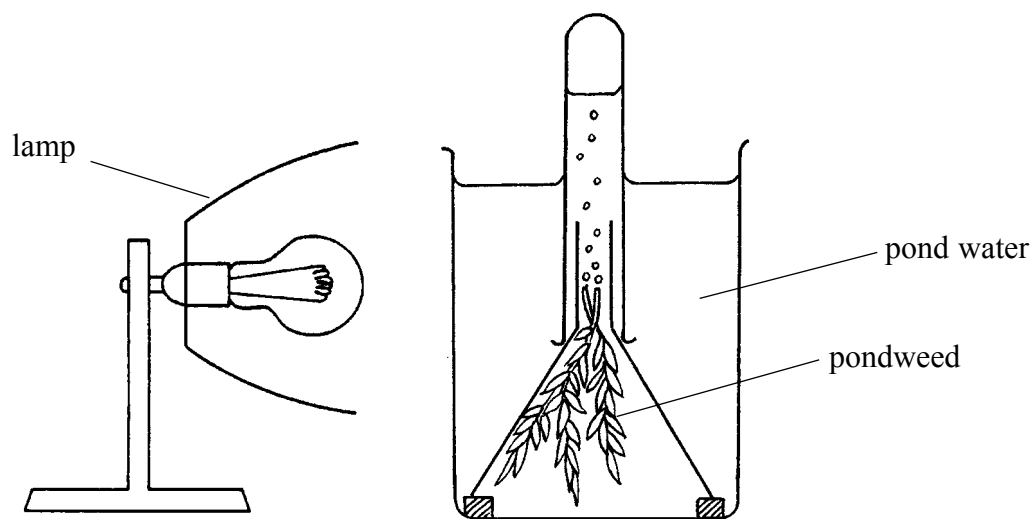
(1)

(Total 5 marks)

Q3



4. Lee wanted to investigate the effect of different light intensities on photosynthesis. He set up the apparatus shown in the diagram.



(a) Name the gas that the pondweed gives off during photosynthesis.

.....
(1)

(b) Using this apparatus, suggest how Lee could change the light intensity.

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

(c) Describe how the apparatus could be used to measure how fast photosynthesis was occurring.

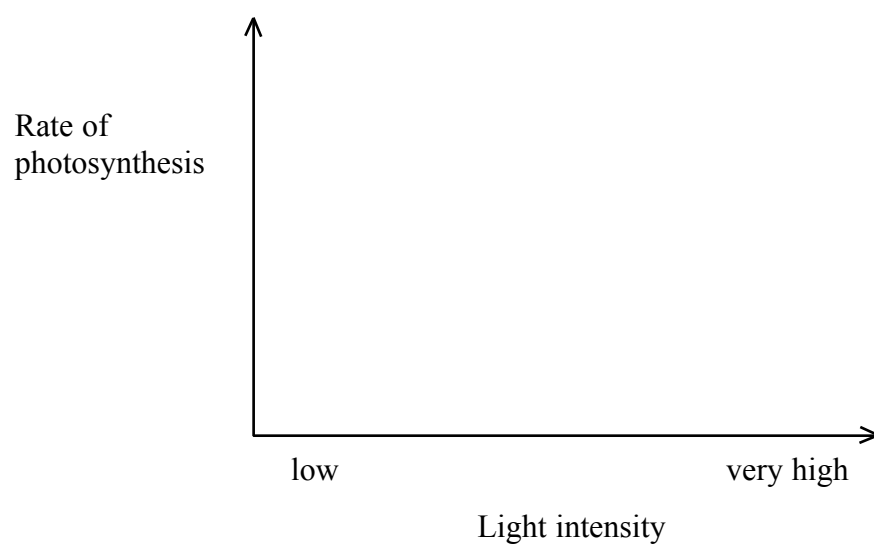
.....
.....
.....
(2)



Leave blank

(d) Lee carried out the experiment at a range of light intensities, from low to very high light intensities.

Predict the results you would expect. Sketch a graph using the axes below to show your prediction.



(2)

(e) Name **two** factors other than light intensity that can affect the rate of photosynthesis.

1

2

(2)

Q4

(Total 8 marks)



5. The picture shows a student using an exercise machine.

Seven female eighteen-year-old students took part in an investigation using this exercise machine. They investigated how breathing rate is affected by the length of time they exercised.

The breathing rate of each student was measured at rest. The students then exercised for 2 minutes and their breathing rate was measured immediately after this. The students then had 10 minutes to recover from the exercise.

The students then exercised for 4 minutes and their breathing rate was measured immediately after this. The students had a further 10 minutes to recover.

This sequence was repeated for 6 minutes of exercise, then 8 minutes of exercise and finally for 10 minutes of exercise.



(a) (i) Give **two** ways in which the students made this investigation a fair test.

1

.....

2

.....

(2)

(ii) Why is it important to make the investigation a fair test?

.....

.....

(1)



(b) The table shows the results of the investigation for the seven students. The mean (average) result is also shown in the table.

Length of time of exercise in minutes	Breathing rate in breaths per minute							
	Student A	Student B	Student C	Student D	Student E	Student F	Student G	Mean (average)
0	15	13	14	14	17	16	16	15
2	17	16	17	16	18	18	17	17
4	19	25	19	18	20	20	19	20
6	21	20	20	20	22	23	21	21
8	23	22	23	22	23	24	24	23
10	24	25	25	24	25	?	26	25

(i) Calculate the missing value for student **F** after 10 minutes of exercise.

.....
(1)

(ii) Look at the pattern of all the results in the table. Draw a circle round **one** result in the table that is anomalous (unexpected).

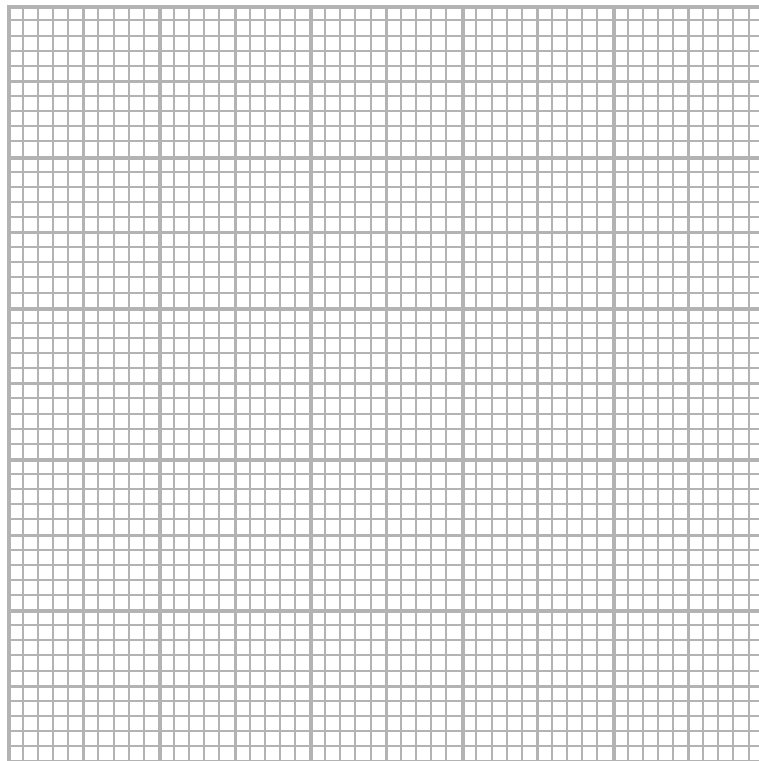
(1)

QUESTION 5 CONTINUES ON THE NEXT PAGE



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- (c) On the grid below, plot a line graph to show how the mean breathing rate in breaths per minute varies with the length of time of exercise in minutes.



(5)

- (d) (i) Describe the relationship between the breathing rate and the length of time of exercise.

.....

.....

.....

(2)



Leave
blank

(ii) Using your biological knowledge, explain the relationship between breathing rate and length of time of exercise.

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

(3)

(e) (i) Suggest **one** way in which the students could modify this investigation to improve the reliability of the results.

.....
.....

(1)

(ii) Suggest **one** way in which the students could modify the method to improve the accuracy of the results. Explain how this modification could improve the results.

Modification

.....

Explanation

.....

(2)

Q5

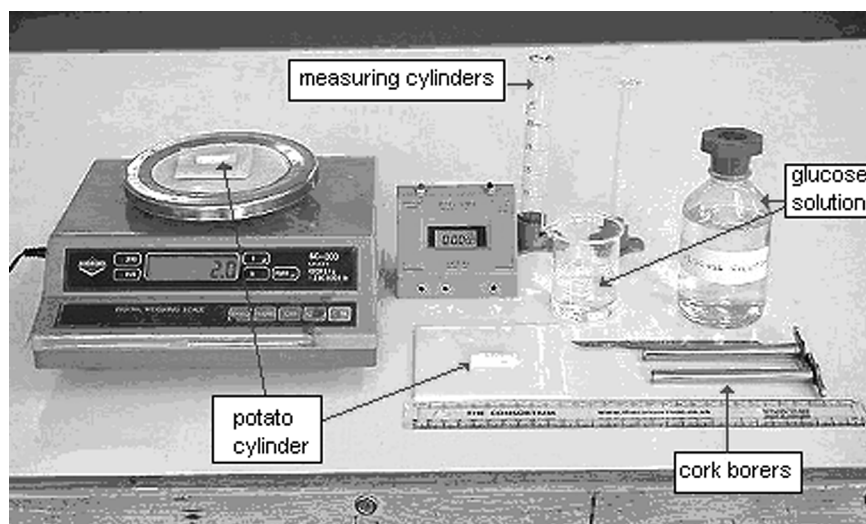
(Total 18 marks)

TURN OVER FOR QUESTION 6



6. Water can move into or out of potato tissue by osmosis.

The photograph shows some apparatus that could be used to investigate how the concentration of glucose solution affects this movement of water.



Describe how the apparatus in the photograph could be used to investigate movement of water into and out of potato tissue. You may use other pieces of apparatus if you wish.

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(Total 6 marks)

Q6

TOTAL FOR PAPER: 50 MARKS

END

