

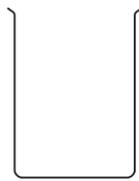
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Answer ALL the questions. Write your answers in the spaces provided.

1. Fernando wanted to find out how wind affected transpiration (water loss) from a leafy shoot. To do this Fernando had to set up a potometer.

The apparatus he used to set up his potometer is shown below.



A



B



C



D



E



F

- (a) Complete the table below to identify the letter that labels each piece of apparatus. The first one has been done for you.

| Name of apparatus | Letter of apparatus |
|-------------------|---------------------|
| Rubber tube | F |
| Elastic band | |
| Glass tube | |
| Knife | |
| Beaker | |
| Ruler | |

(5)

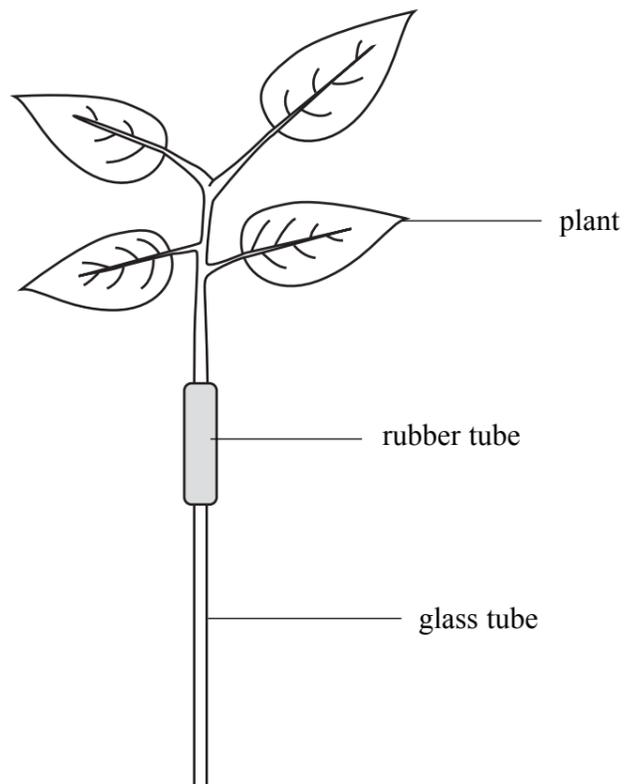


(b) Fernando used the apparatus to make his potometer. He filled the rubber tube, the beaker and the glass tube with water. The stem of a plant was attached to the rubber tube. One end of the glass tube was attached to the rubber tube and the other end was put into the water in the beaker. He then put an air bubble in the water inside the glass tube.

Fernando wanted to estimate transpiration by measuring how far the bubble moved in an hour. To help him to do this he used the elastic band to attach the ruler to the glass tube.

Fernando made a drawing of his potometer as shown below. The drawing is not finished.

(i) Complete the drawing.



(3)



Leave
blank

(ii) Fernando wanted to create a stream of moving air (wind) around the plant.
Suggest how he could do this.

.....
(1)

(c) Fernando estimated transpiration by measuring the movement of the bubble in still air
and in moving air (wind). The table shows the results he obtained.

| Movement of bubble in cm per hour | |
|-----------------------------------|---------------|
| In still air | In moving air |
| 8 | 12 |

Describe the effect that moving air had on the rate of transpiration.

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

Q1

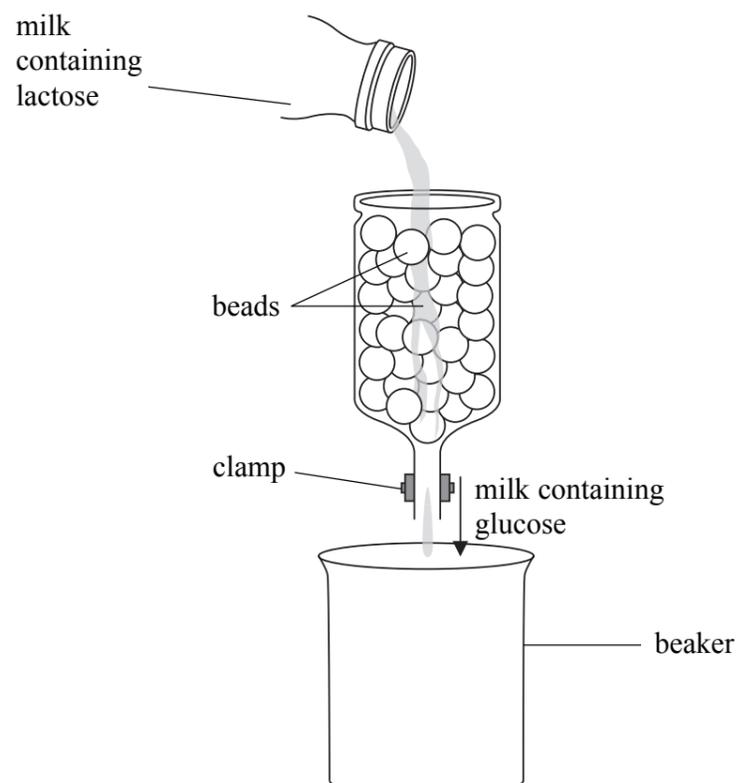
(Total 11 marks)

| | |
|--|--|
| | |
|--|--|



2. Nicola investigated the digestion of lactose, a sugar found in milk.

The diagram shows the apparatus she used.



The beads contained an enzyme called lactase. This enzyme digests lactose into two sugars called glucose and galactose.

The outer coat of the beads allows milk to enter and sugars to leave. The outer coat also prevents the enzyme from leaving.

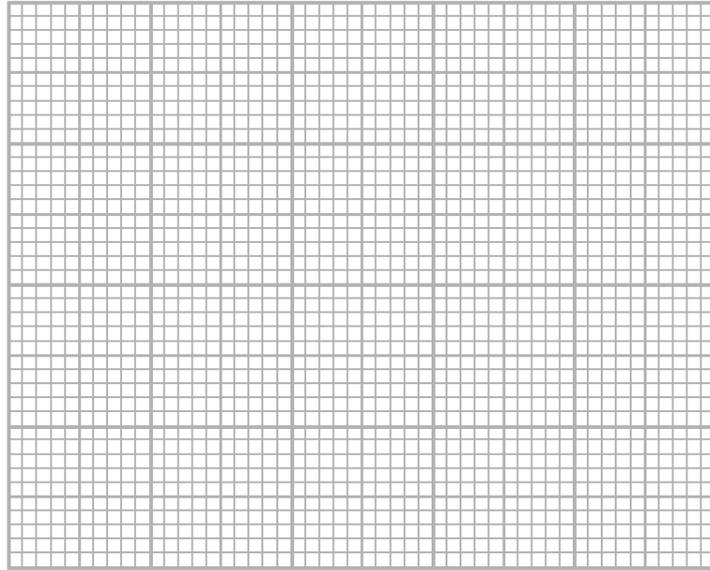
An experiment was carried out in which milk was allowed to flow through the apparatus at different speeds. The speed of flow was changed using the clamp on the exit tube.

The milk collected in the beaker was tested for the concentration of glucose it contained at each flow speed. The table shows the results.

| Speed of milk flow through apparatus in cm^3 per minute | Glucose concentration in beaker milk in mmol per litre |
|--|--|
| 4 | 156 |
| 6 | 132 |
| 10 | 100 |
| 18 | 55 |
| 32 | 25 |



- (a) (i) Use the information in the table to plot a line graph on the grid below.
Join the points with straight lines.



(5)

- (ii) Describe the relationship between the speed of flow and the concentration of glucose.

.....
.....

(1)

- (iii) Suggest an explanation for the relationship between the speed of flow and the concentration of glucose.

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

(2)



Leave blank

(b) The investigation was carried out at 20 °C.

(i) Name **two** variables, apart from temperature, that needed to be kept the same during the investigation.

1

2

(2)

(ii) Suggest how the results would be different if the investigation had been carried out at 25 °C. Explain your answer.

.....

.....

.....

.....

(2)

(c) How would the concentration of glucose in the beaker be different if the beads used were bigger in size?

.....

.....

(1)

(d) Give **one** way in which the results in this investigation could be made more reliable.

.....

.....

(1)

Q2

(Total 14 marks)



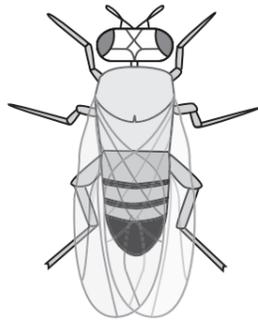
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Turn over for Question 3

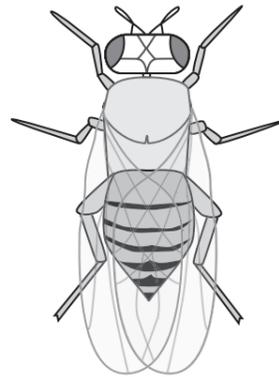


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3. The diagrams show a male and a female fruit fly.

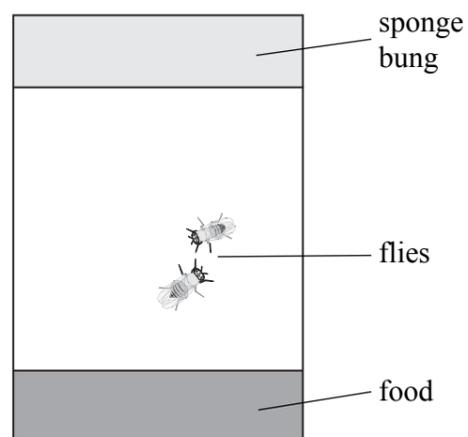


Male



Female

John carried out a breeding investigation using these fruit flies. He placed a male and a female fly in a tube containing some food (a food tube) and allowed them to breed. The food tube he used is shown in the diagram.



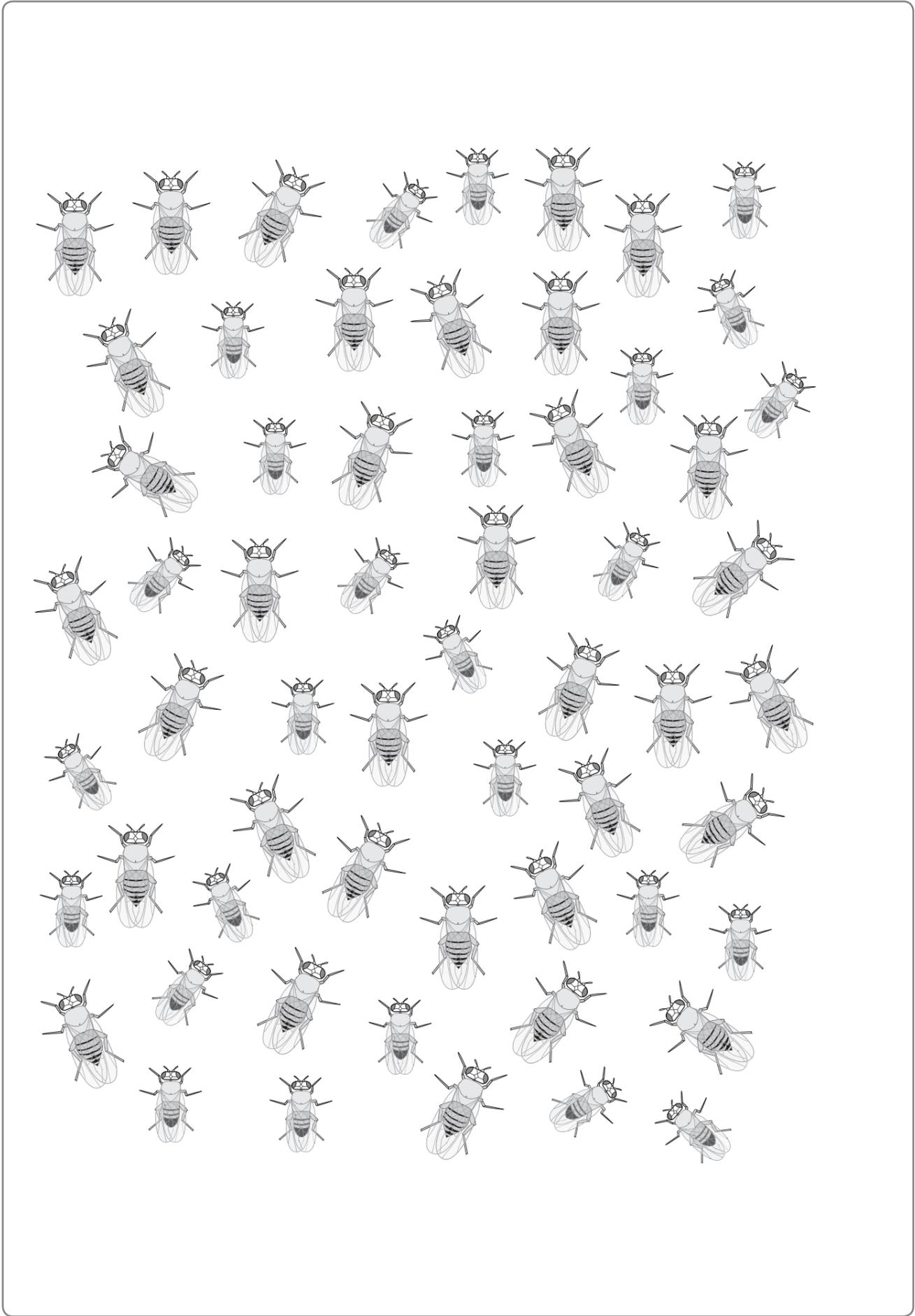
(a) The flies produced 60 offspring as shown on the next page.

Count the number of male and female offspring and use a tally system to write your answers in the table below.

| Sex of fly | Tally count | Number counted |
|------------|-------------|----------------|
| Male | | |
| Female | | |

(4)





(b) John had expected to get 30 males and 30 females.

(i) Draw a genetic diagram to show why he expected to get equal numbers of males and females. Use your knowledge of how sex is inherited in humans to help you.

(3)

(ii) Suggest why the numbers of male and female flies obtained were not equal.

.....

(1)

(c) John repeated the breeding investigation four more times using different food tubes and different males and females.

The results are in the table.

| Food tube | Number of male offspring | Number of female offspring |
|--------------|--------------------------|----------------------------|
| 1 | 32 | 28 |
| 2 | 29 | 33 |
| 3 | 10 | 6 |
| 4 | 36 | 32 |
| Total | | |

(i) Complete the table by writing in the total number of male and female flies obtained in the four food tubes.

(1)



| | | | |
|--|---|--|--|
| <p>(ii) Which food tube produced an anomalous (unexpected) result?</p> <p>.....</p> <p style="text-align: right;">(1)</p> <p>(iii) Suggest one reason why this food tube produced an anomalous result.</p> <p>.....</p> <p style="text-align: right;">(1)</p> <p style="text-align: right;">(Total 11 marks)</p> | <p>Leave blank</p> <p>Q3</p> <table border="1"><tr><td></td><td></td></tr></table> | | |
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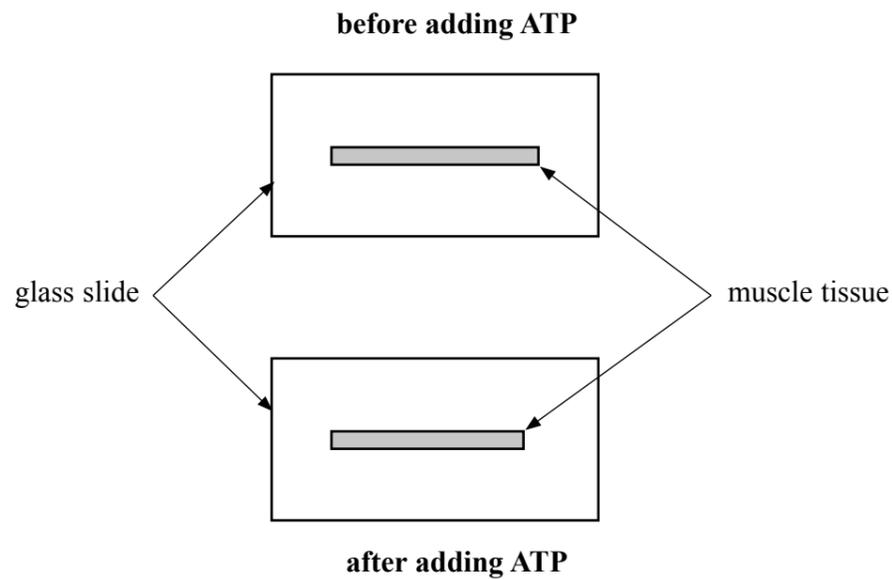


4. The energy released by cell respiration is trapped in a molecule called ATP.

Verity wanted to find out how a solution of ATP affected the contraction (shortening) of muscle tissue.

She placed a long strip of muscle tissue on a glass microscope slide.
She then added a solution of ATP.

The diagram shows the result of Verity's experiment.



She used the formula below to calculate the percentage change in length that had taken place.

$$\% \text{ change in length} = \frac{\text{length of muscle tissue before ATP added} - \text{length of muscle tissue after ATP added}}{\text{length of muscle tissue before ATP added}} \times 100$$

(a) Use the diagram and the formula to calculate the percentage change in length.

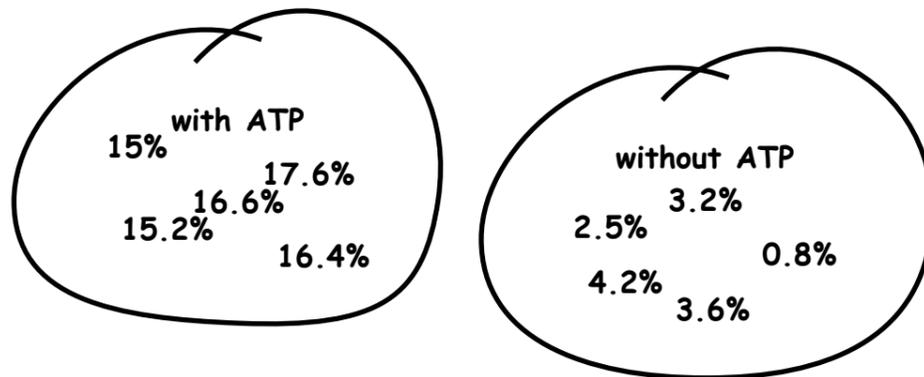
Show your working.

Answer %
(2)



(b) Michael was another student in the same class as Verity. Michael did the same experiment five times with an ATP solution and five times with pure water.

He wrote his answers in his notebook as shown below.



(i) Put Michael's results into a suitable table.

(4)

(ii) Explain why Michael's investigation was better than Verity's.

.....

.....

.....

.....

(2)

Q4

(Total 8 marks)



