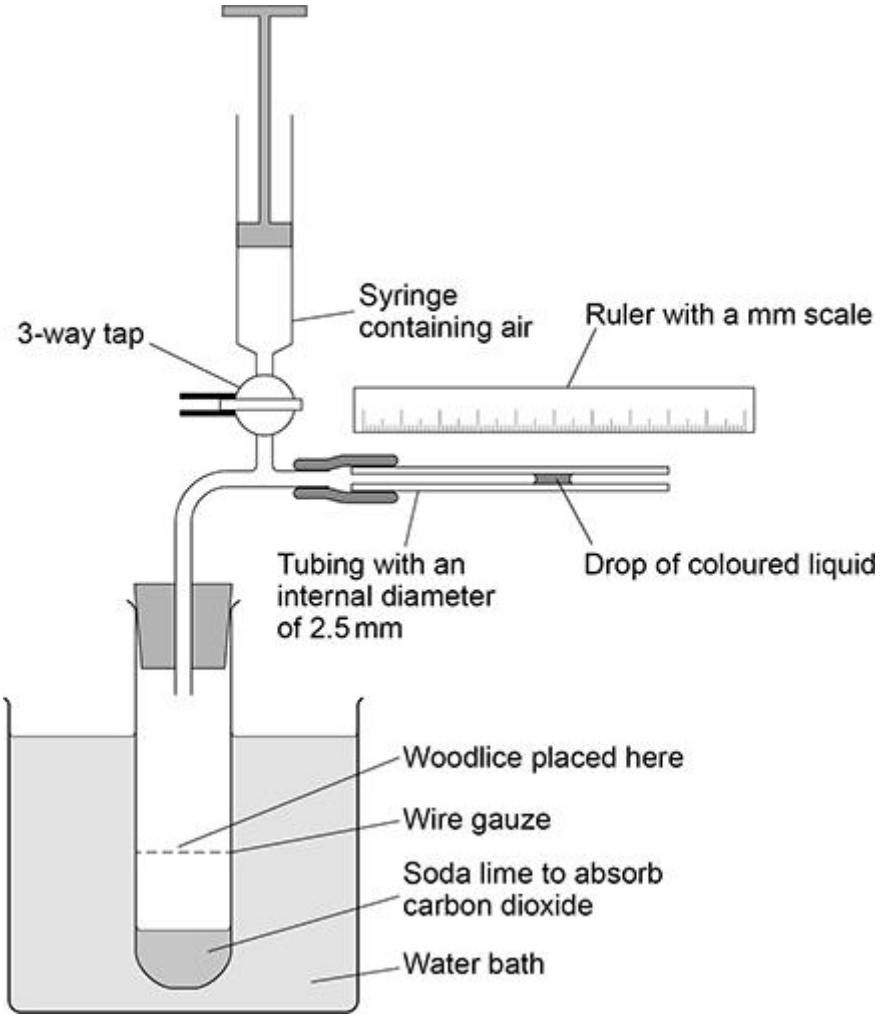
Q1.

A student investigated the effect of temperature on the rate of aerobic respiration in woodlice.

Figure 1 shows the apparatus they used.

Figure 1



The student altered the temperature of the water bath and measured how far the drop of coloured liquid moved every minute for 5 minutes.

(a) Other than those stated, suggest **two** variables the student should have kept constant in this investigation.

1 _____

_____

2 _____

_____

(1)

(b) Describe how the student used the apparatus in **Figure 1** to reset the drop of coloured liquid back to the **right-hand** end of the tubing.

(2)

(c) The student also set up a control experiment.

Suggest a suitable control experiment **and** explain why it was necessary.

Control experiment

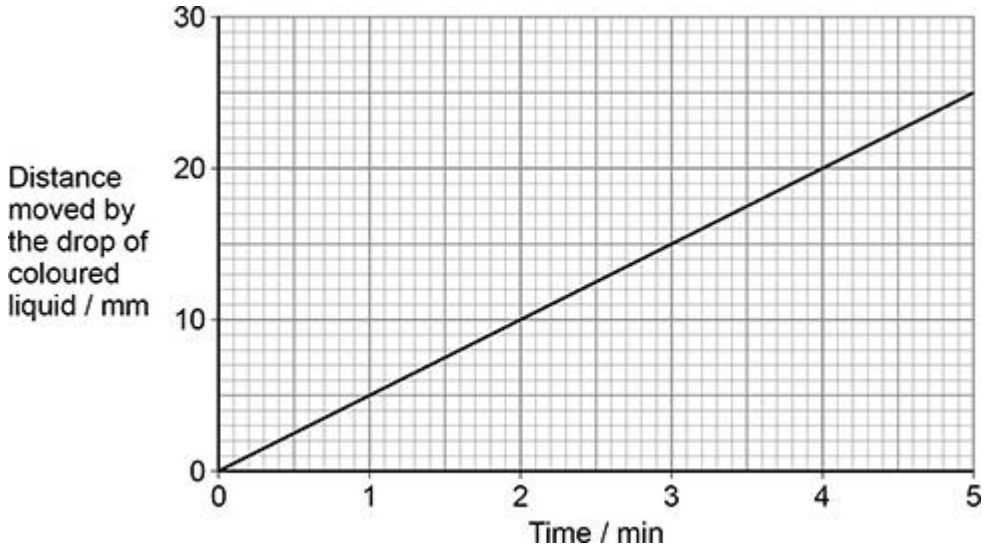
Explanation

(2)

(d) **Figure 2** shows the student's results at 25 °C

The mass of the woodlice in the tube was 3.78 g

Figure 2



Use **Figure 1** and **Figure 2** to calculate the mean rate of oxygen uptake by the woodlice in $mm^3\ s^{-1}\ g^{-1}$

The formula for the volume of the capillary tubing is $\pi r^2 l$.

Use $\pi = 3.14$ in your calculation.

Show your working **and** give your answer to 2 decimal places.

Answer _____ $mm^3\ s^{-1}\ g^{-1}$

(3)

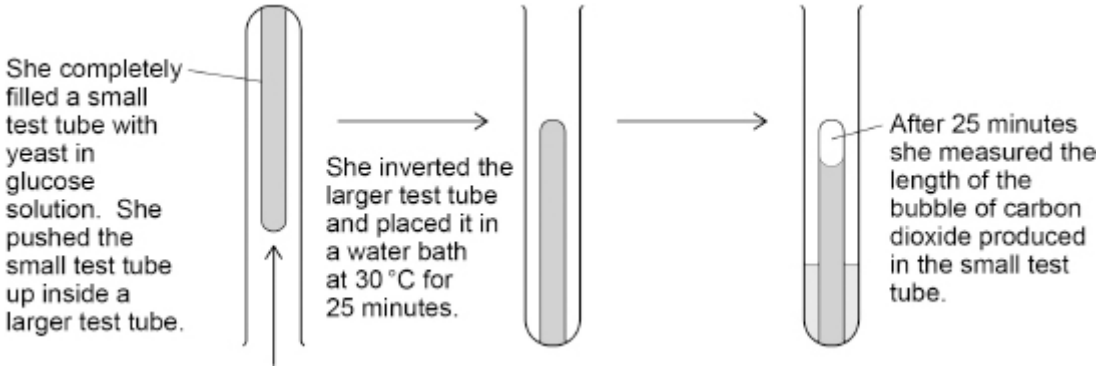
(Total 8 marks)

Q2.

A student investigated the effect of different sugars on the rate of respiration in yeast. Yeast normally respires glucose.

Figure 1 shows the method she used for her first experiment.

Figure 1



(a) Other than those stated, suggest **two** variables the student needed to keep constant in her investigation.

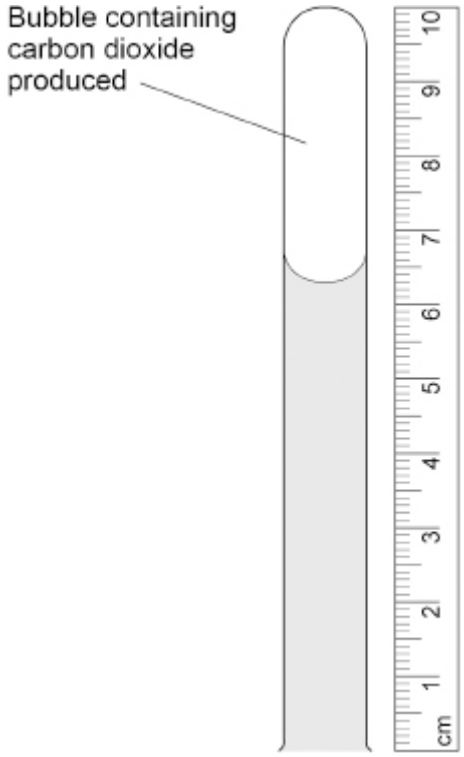
1 _____

2 _____

(1)

Figure 2 shows the result she obtained for yeast in glucose solution.

Figure 2



(b) Use **Figure 1** and **Figure 2** to calculate the rate of carbon dioxide production in mm s^{-1} for yeast in glucose solution.

Give your answer in standard form **and** to **2** significant figures.

Show your working.

Answer _____ mm s^{-1}

(2)

(c) The student repeated the experiment using yeast in maltose solution. She found the rate of carbon dioxide production was slower than with yeast in glucose solution. Suggest why.

_____

_____

_____

_____

_____

(2)

(d) A second student used a different method to investigate the effect of different sugars on the rate of respiration in yeast.

He set up a tube with yeast in glucose solution and added bromothymol blue. Bromothymol blue changes from blue to yellow when carbon dioxide is produced.

To determine the rate of respiration, he timed how long it took for the solution to change from blue to yellow.

Suggest:

- why the method the second student used would be less accurate than the method the first student used
- how the accuracy of the method the second student used could be improved.

This method would be less accurate because

_____

_____

_____

The accuracy of this method could be improved by

_____

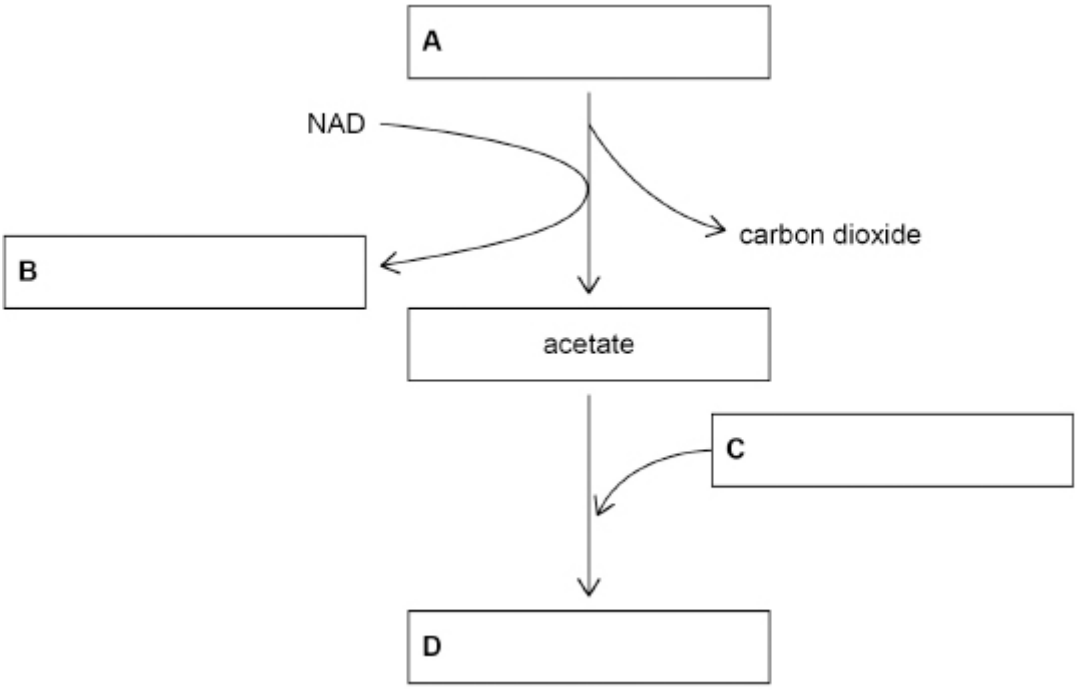
_____

_____

(2)

(e) Complete the boxes **A** to **D** in **Figure 3** to show the link reaction.

Figure 3



(2)

(Total 9 marks)

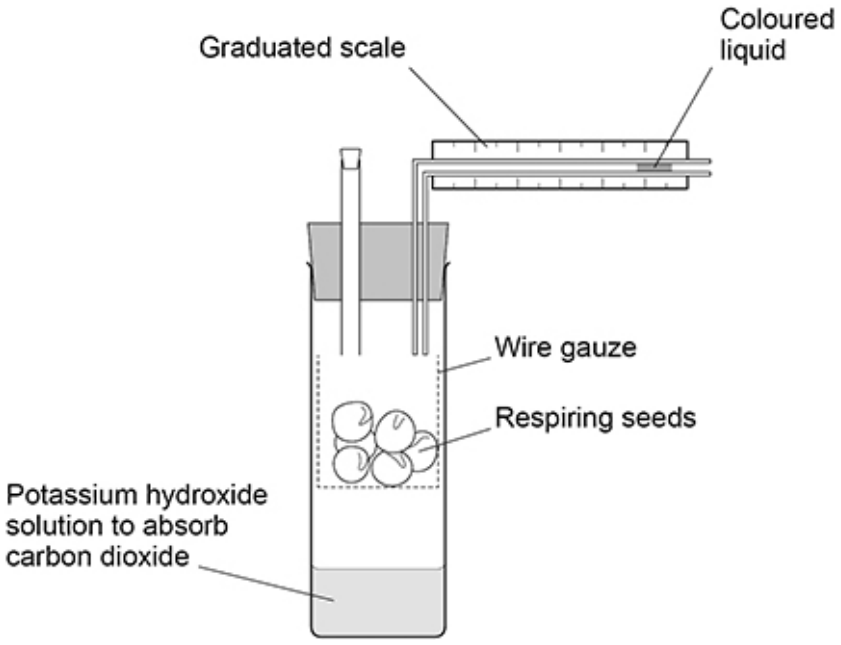
Q3.

(a) Put a Tick (✓) in the box next to the process that occurs in anaerobic respiration but does **not** occur in aerobic respiration.

Phosphorylation of glucose	☐
Reduction of NAD	☐
Reduction of pyruvate	☐
Substrate-level phosphorylation	☐

(1)

A student used the apparatus shown in the diagram below to measure the rate of aerobic respiration of seeds for 48 hours.



(b) During the 48 hours, the coloured liquid moved to the left.

Explain why.

_____

_____

_____

_____

(3)

(c) Apart from time, give **two** measurements the student would have to make to determine the rate of aerobic respiration of these seeds in cm^3 $hour^{-1}$

1 _____

2 _____

(2)

(d) The student used the same apparatus to determine the volume of carbon dioxide the seeds produced during 48 hours.

Give the change the student would need to make to the contents of the apparatus **and** describe how he could calculate the volume of carbon dioxide produced.

(3)

(e) The student calculated that during the 48 hours, 6.2×10^{-4} cm^3 of oxygen was absorbed by 40 g of seeds.

Calculate the oxygen uptake in $cm^3\ g^{-1}\ hour^{-1}$

Answer _____ $cm^3\ g^{-1}\ hour^{-1}$

(1)

(Total 10 marks)