Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

Ecologists developed a method for estimating the biomass of trees in a plantation.
The plantation consisted of trees of the same species.

They collected samples of wood from trees. For each sample they:

- determined the density of the freshly cut wood
- dried the wood in an oven at 103 °C for 24 hours
- determined the volume of the dried wood sample
- determined the density of the dried wood.

The table below shows data about one wood sample.

Volume of freshly cut wood sample / dm^3	Density of freshly cut wood / g per dm^3	Volume of dried wood sample / dm^3	Density of dried wood sample / g per dm^3
1.345	993.0	1.125	769.0

(a) The loss of mass of the wood sample was due to loss of water. Water has a density of 1 g per cm^3.

Use the data in the table to calculate the percentage of water in the freshly cut wood sample. Show your working.

Percentage of water = _____

(2)

(b) The ecologists dried the samples in an oven at 103 °C for 24 hours. Describe how the ecologists could have determined whether or not this drying removed all the water from a sample of wood.

_____

_____

_____

_____

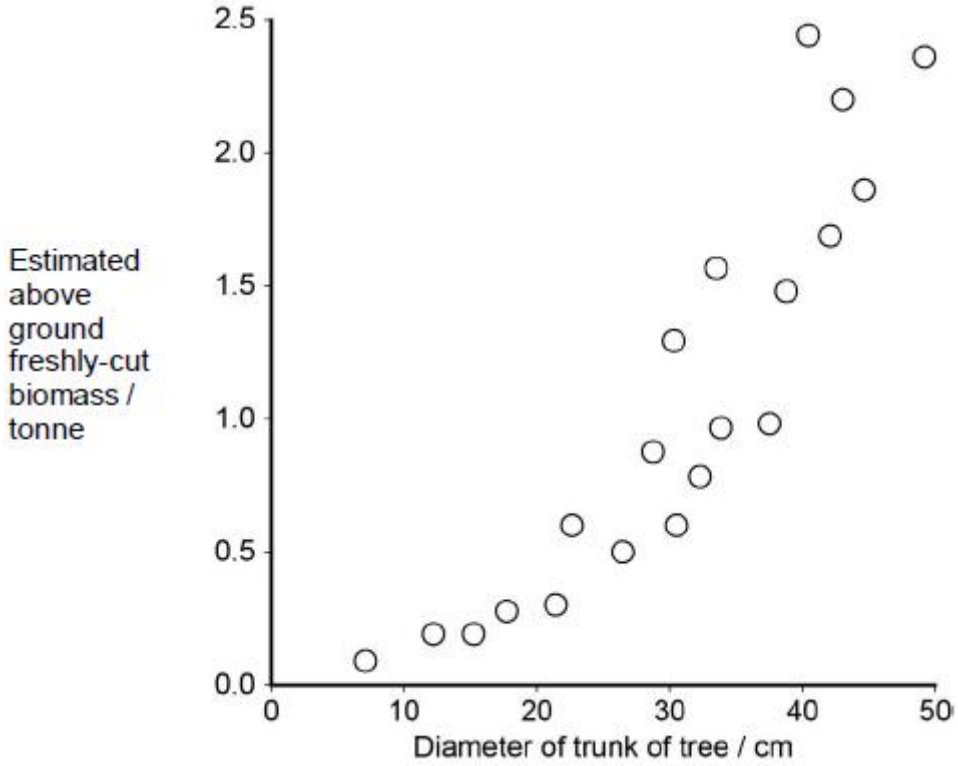
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(2)

(c) Ecologists then investigated the relationship between the diameter of the trunk of the trees and their biomass.

The graph below shows their results. Each point is the result for **one** tree.



What does the graph show about the relationship between the diameter of the trunk of the trees and their biomass?

_____

_____

_____

_____

_____

(2)

(d) Plantations of trees are often created to remove carbon dioxide from the atmosphere, to help to balance the carbon dioxide released by burning fossil fuels.

For different species of tree, information is available for:

- the relationship between diameter of trunk and freshly cut biomass
- the percentage of water in fresh-cut wood
- the mean dried density of wood.

Using only the information provided in part **(c)**, suggest how the mass of carbon in the wood of a plantation of trees of a particular species could be estimated.

Start with measuring the diameter of a large number of trees.

Assume that the dry biomass of a tree consists of biological molecules that contain carbon.

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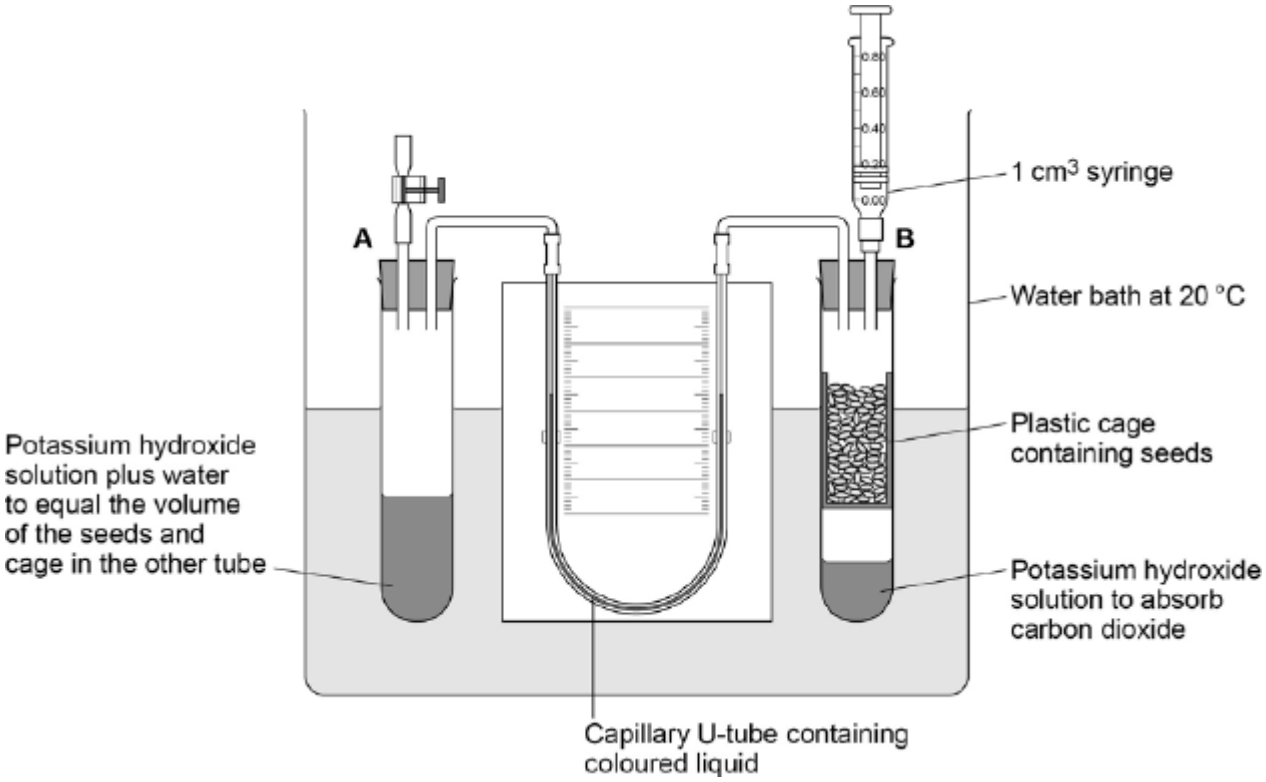
(4)

(Total 10 marks)

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Q2.

The figure below shows the apparatus used for measuring the rate of oxygen consumption in aerobic respiration by seeds.



(a) For the first 10 minutes, the tap attached to tube **A** was left open and the syringe from tube **B** was removed.

Suggest **three** reasons why the apparatus was left for 10 minutes.

1. _____

_____

2. _____

_____

3. _____

_____

(3)

(b) Suggest and explain why the chosen temperature was 20 °C for this experiment.

_____

_____

_____

_____

(2)

After 10 minutes, the tap attached to tube **A** was closed and the syringe was attached to tube **B**. Every minute, the syringe plunger was moved until the levels in the U-tube were the same. The

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reading on the syringe volume scale was then recorded.

The results are shown in the table below.

Time / minutes	Reading on syringe volume scale / cm^3
0	0.84
1	0.81
2	0.79
3	0.76
4	0.73
5	0.70
6	0.68
7	0.66
8	0.63
9	0.62
10	0.58

(c) During the experiment, the coloured liquid in the tubing moved towards tube **B**.

Explain what caused this.

_____

_____

_____

_____

_____

_____

(3)

(d) The mass of the seeds was 1.6 g. Use the information in the table above to calculate the rate of oxygen consumption in $cm^3\ g^{-1}\ hour^{-1}$ by the seeds.

Show your working.

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

(2)

(Total 10 marks)

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