

| | | | | | | | | |
|----------------|---------------|--|--|--|------------------|--|--|--|
| Candidate Name | Centre Number | | | | Candidate Number | | | |
| | | | | | 0 | | | |



GCSE

BIOLOGY

**UNIT 1: CELLS, ORGAN SYSTEMS AND ECOSYSTEMS
FOUNDATION TIER**

SAMPLE ASSESSMENT MATERIALS

(1 hour 45 minutes)

| For Examiner's use only | | |
|--------------------------------|---------------------|---------------------|
| Question | Maximum Mark | Mark Awarded |
| 1. | 9 | |
| 2. | 10 | |
| 3. | 11 | |
| 4. | 6 | |
| 5. | 7 | |
| 6. | 11 | |
| 7. | 6 | |
| 8. | 6 | |
| 9. | 7 | |
| 10. | 7 | |
| Total | 80 | |

ADDITIONAL MATERIALS

In addition to this paper you will require a calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen. Do not use correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page

Answer all questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

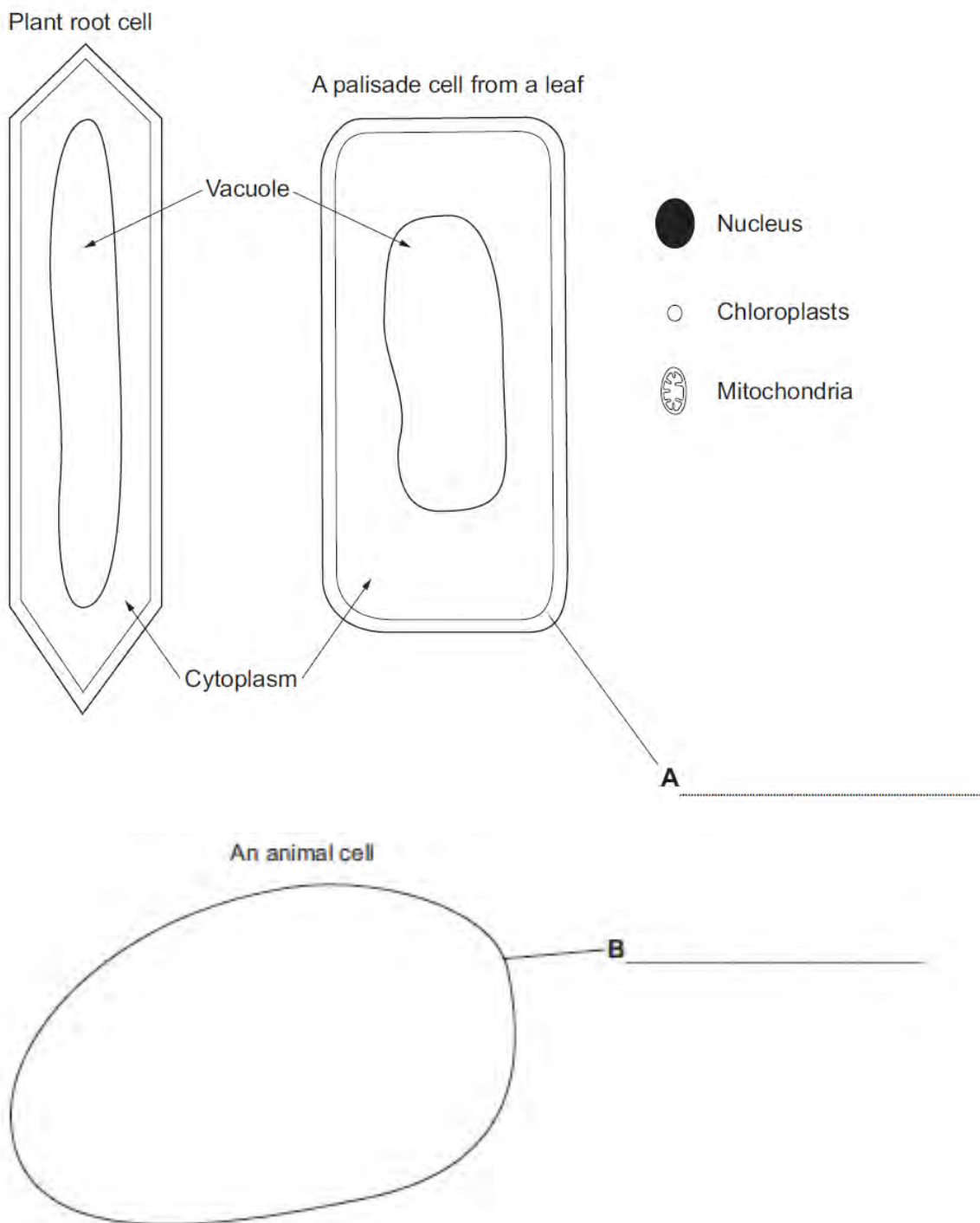
The number of marks is given in brackets at the end of each question or part-question.

Question 7 is a quality of extended response (QER) question where your writing skills will be assessed.

Answer **all** questions

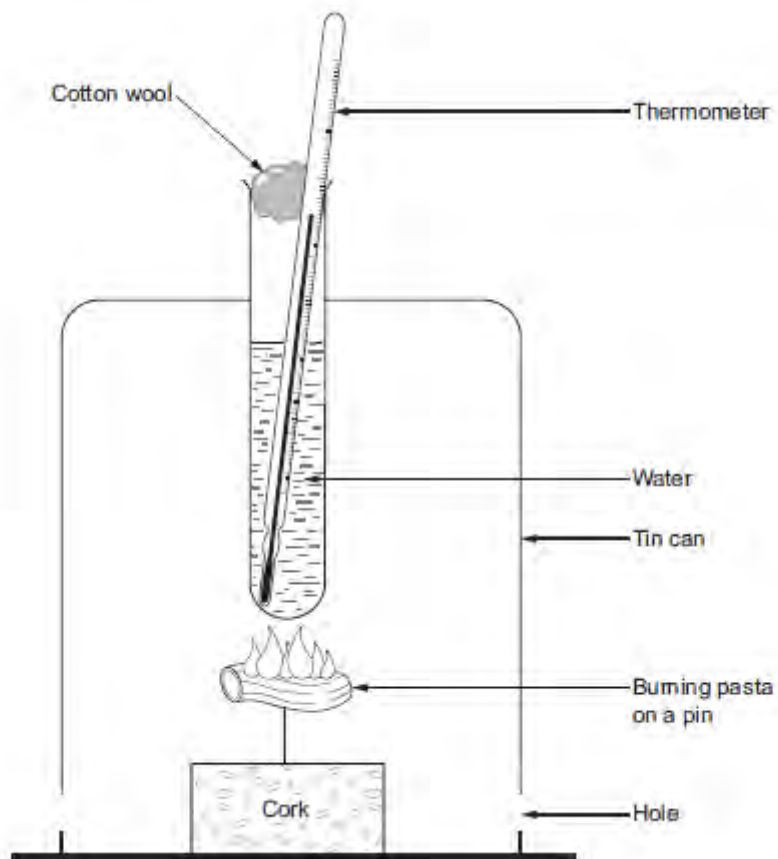
1. The drawings show sections through three different cells and some structures normally found in **SOME** of them.

(a) Using the key given, carefully **draw** chloroplasts, mitochondria and a nucleus where they belong in the cells below in their correct positions. [7]



(b) **Label** the parts **A** and **B** on the diagrams. [2]

2. The apparatus shown can be used to calculate the energy in pasta.



The results can be used as shown:

| | |
|--|----------|
| Temperature of the water at start | = 20°C |
| Temperature of the water after burning the pasta | = 80°C |
| Temperature increase | = y |
| Mass of pasta before burning | = 1.5 g |
| Mass of pasta remaining after burning | = 1.0 g |
| Mass of pasta burnt | = x g |
| Mass of water | = 20.0 g |

(a) Calculate the value of: [2]

(i) y °C

(ii) x g

GCSE BIOLOGY Sample Assessment Materials 8

- (b) Calculate the heat released from 1 g pasta using the following equation: [2]

$$\frac{20.0 \times y \times 4.2}{1000 \times x}$$

heat released =kJ/g

- (c) State **one** way in which you would modify the apparatus to improve the accuracy of this experiment. [1]

.....

- (d) The table gives information about food values in a large cup (200 cm³) of six different hot drinks.

| Drink | Energy (kJ) | Fat (g) | Sugar (g) |
|---------------------------------|-------------|---------|-----------|
| black coffee | 28 | 0 | 0 |
| chocolate mocha with whole milk | 1698 | 20 | 43 |
| cappuccino with skimmed milk | 316 | 0 | 9 |
| café latte with whole milk | 838 | 11 | 15 |
| café latte with skimmed milk | 511 | 0 | 16 |
| café americano | 48 | 0 | 0 |

Use the information in the table to answer the following questions.

- (i) Which drink gives least energy? [1]

.....

- (ii) What is the main difference in the nutritional content of skimmed milk and whole milk? [1]

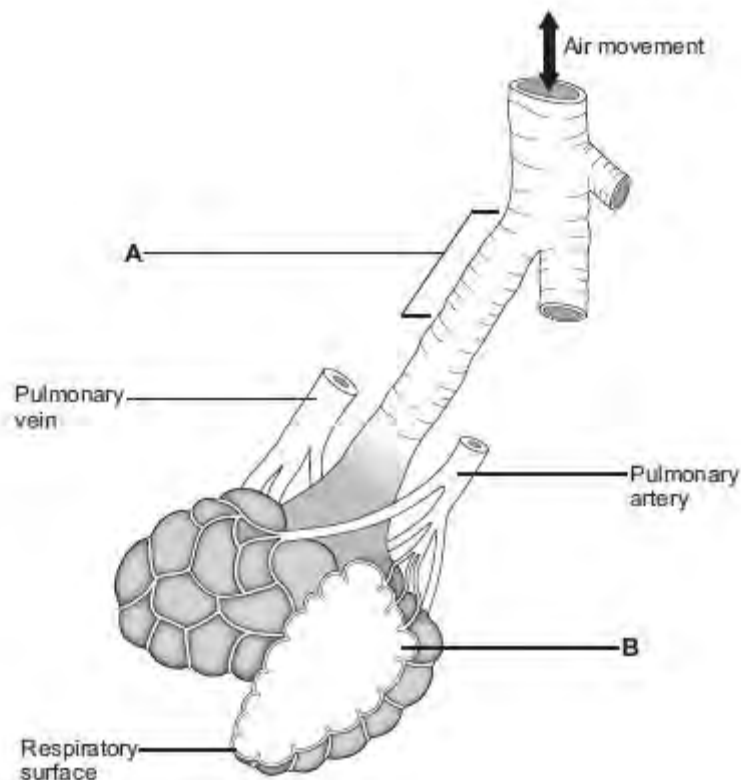
.....

- (iii) Which drink should be avoided by someone who is obese and give **two** reasons for your answer. [3]

.....

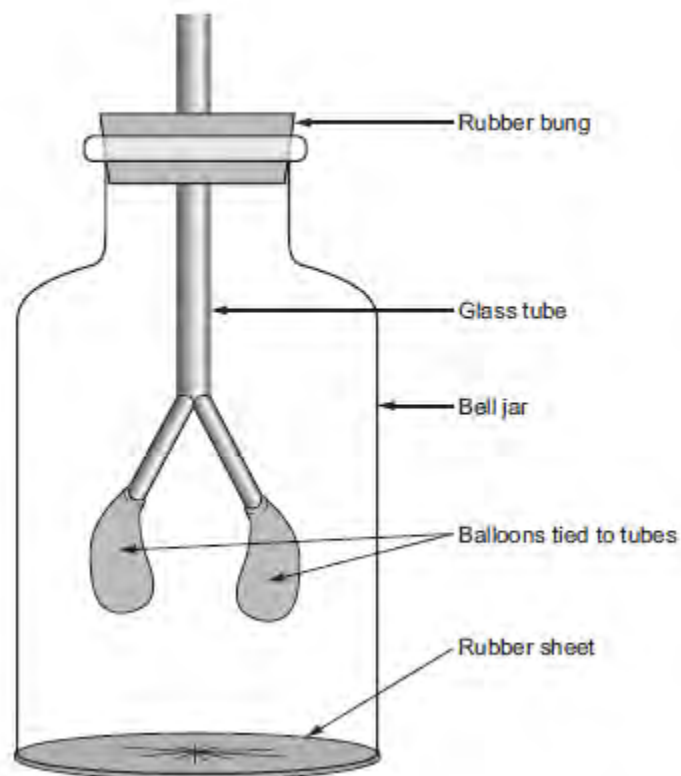
.....

3. The diagram shows some of the structures in a human lung.



- (a) (i) **On the diagram, draw one arrow** on the pulmonary artery, to show the direction of blood flow. [1]
- (ii) Name parts **A** and **B**. [2]
- A**
- B**
- (iii) State **two** ways in which the respiratory surface of the lungs is adapted to help oxygen pass into the blood. [2]
- I
- II

- (b) A model of the respiratory system is shown below.



- (i) Which of the labelled structures must move to cause air to pass in? [1]

.....

- (ii) What part of the respiratory system is represented by:

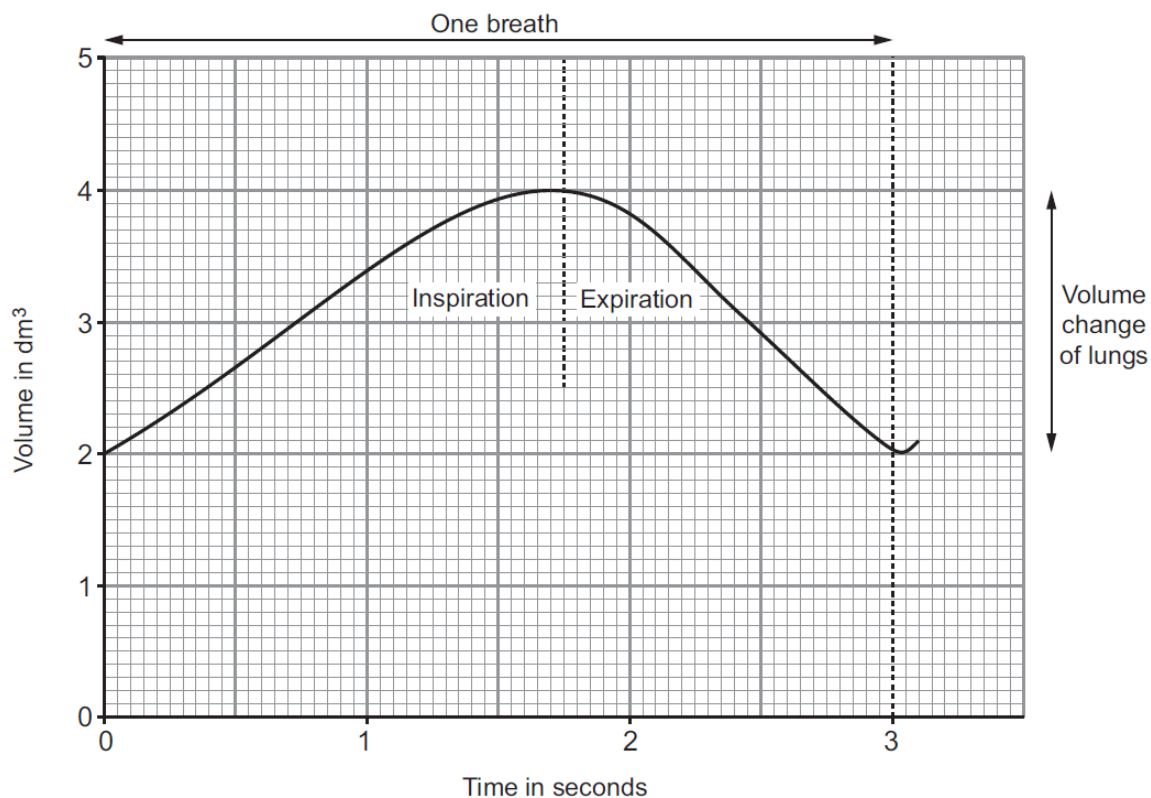
I the glass tube; [1]

.....

II the balloons? [1]

.....

- (c) The graph below represents the change in volume of the lungs during deep breathing.



Using the graph above:

- (i) Calculate the volume of air taken into the lungs during one breath. [1]

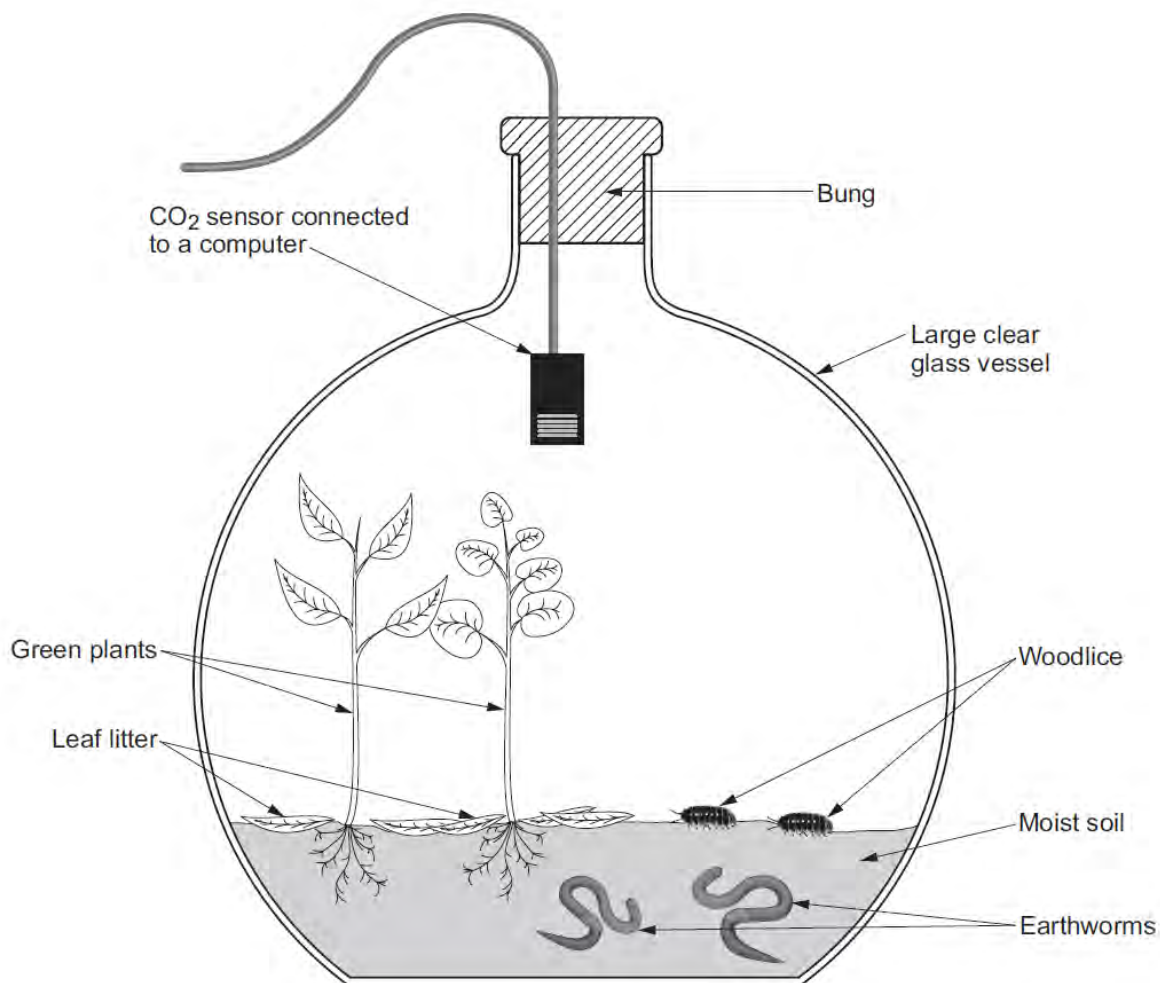
volume of air = dm³

- (ii) Air entering the lungs contains 20 % oxygen. Calculate the volume of oxygen in **one** breath taken into the lungs. [2]

volume of oxygen =dm³

4. A "bottle garden" was set up in a school laboratory and kept near a window.

A carbon dioxide sensor was inserted as shown in the diagram and linked to a computer data logger so that the concentration of carbon dioxide could be monitored over a day.



(a) State the importance of the: [2]

(i) bung;

.....

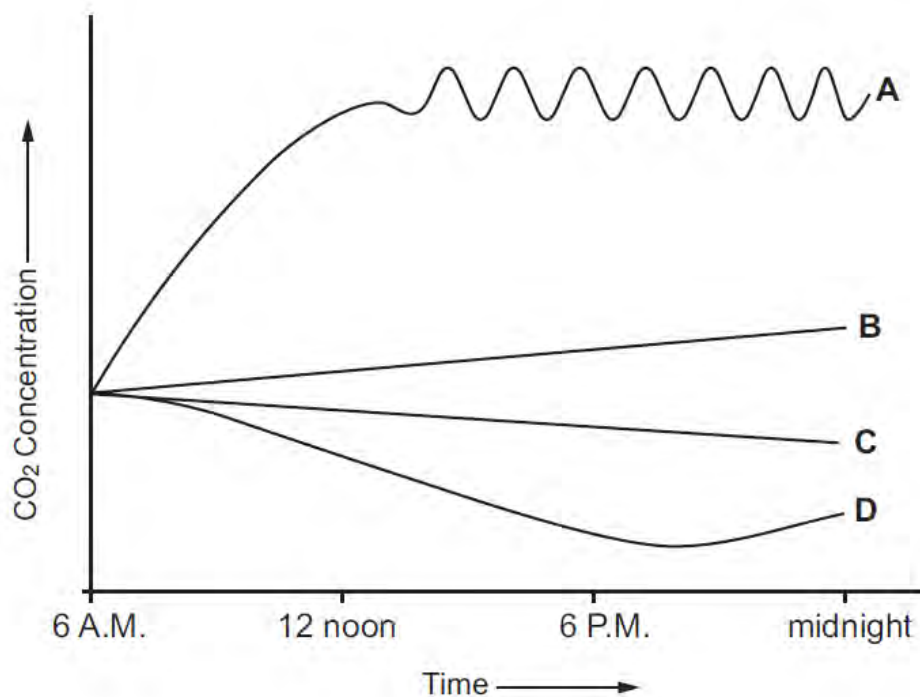
(ii) clear glass to the plants.

.....

(b) Give **two** ways in which the plants in the bottle garden are important to the animals. [2]

.....

- (c) The graph shows the changes in carbon dioxide concentration in the bottle garden over a period of time under different conditions.



- (i) Which line (A - D) best shows the change in carbon dioxide concentration in the bottle garden during the day? [1]

.....

- (ii) If the bottle garden was covered by a black cloth, which line (A - D) would represent the carbon dioxide concentration during a day? [1]

.....

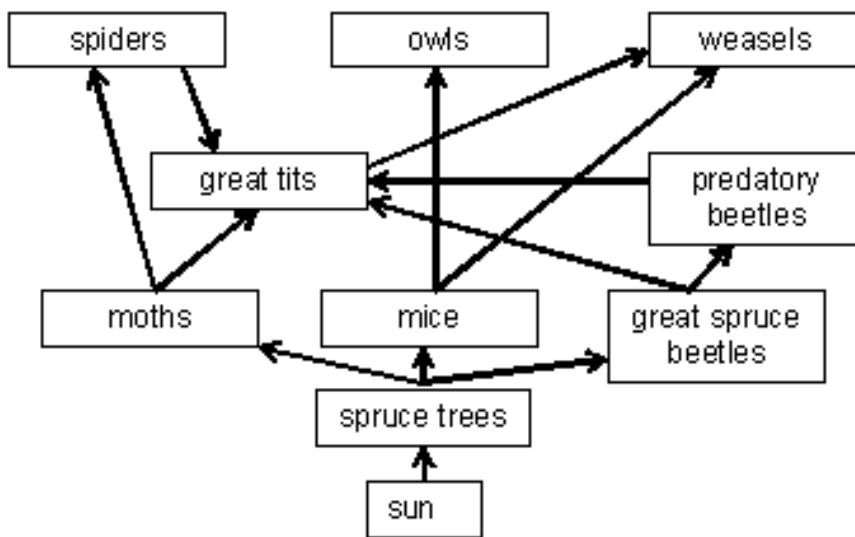
| |
|---|
| |
| 6 |

5. In the 1980s most of Wales' forestry plantations were made up of spruce trees, (*Picea abies*). In 1982, an insect pest - the great spruce beetle, (*Dendroctonus micans*) was accidentally introduced and quickly spread through the spruce forests. Biologists began a method of control by releasing 500 pairs of predatory beetles from Russia, (*Rhizophagus grandis*), in the spruce forests. This beetle had proved to have been very successful at controlling the great spruce beetle in Russia.

(a) Give **one** reason why this method of control is more environmentally friendly than using pesticides. [1]

.....

(b) The following is a simplified food web for a spruce plantation after the release of the predatory beetle.



Use the food web shown to help you state, with a reason, what you would expect to be the effects of releasing the predatory beetles on:

(i) mice [2]

reason

.....

(ii) great tits [2]

reason

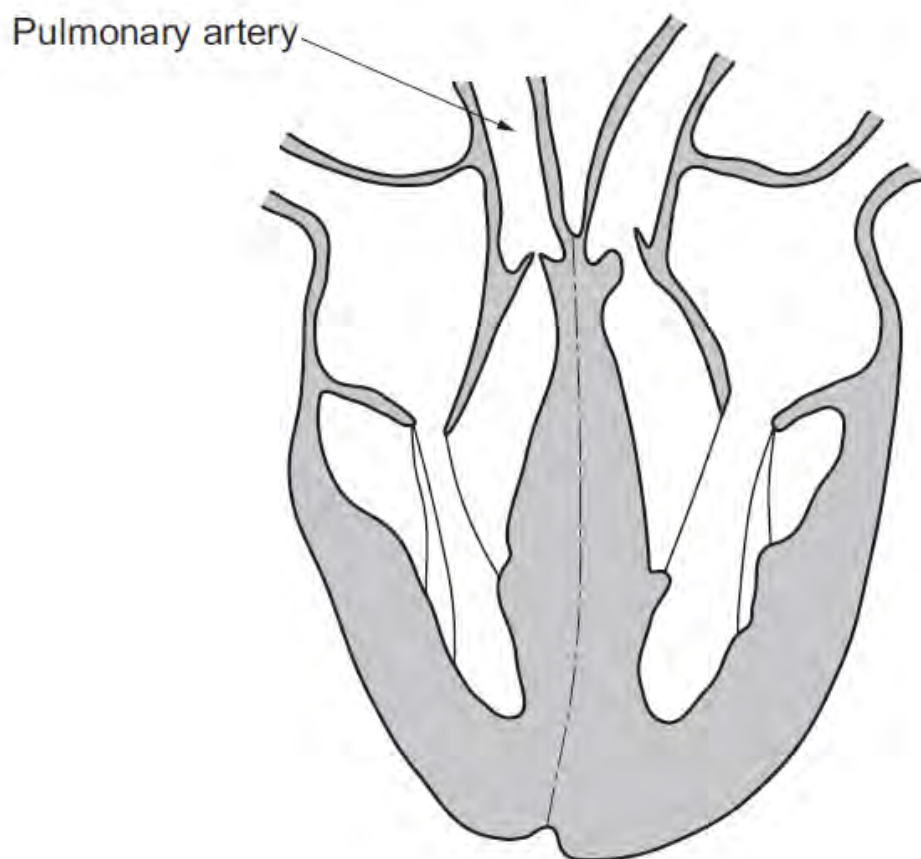
.....

(iii) the owls [2]

reason

.....

6. The diagram shows a section through a human heart.



- (a) (i) **Label** the following structures **on the diagram above:** [2]

- I left atrium;
 II aorta;
 III vena cava;
 IV right ventricle.

- (ii) State **one** way in which the blood carried in the pulmonary artery is different to that carried in all other arteries in the body. [1]

.....

- (iii) Why is the wall of the left ventricle more muscular than the right? [1]

.....

GCSE BIOLOGY Sample Assessment Materials 16

- (b) The following table shows the pulse rate (rate of heart beat) of a group of year 11 students, which had been measured over different periods of time. Heart rate has been calculated for some of them.

| Name of student | Gender | Pulse rate | Heart rate (beats per minute) |
|-----------------|--------|------------------------|----------------------------------|
| Gareth | male | 41 beats in 30 seconds | 82 |
| Colin | male | 178 beats in 2 minutes | |
| Mary | female | 80 beats in 1 minute | 80 |
| Alan | male | 16 beats in 10 seconds | 96 |
| Tracy | female | 36 beats in 30 seconds | |
| Cathy | female | 228 beats in 3 minutes | 76 |
| Tom | male | 85 beats per minute | 85 |

- (i) Calculate the heart rate for Colin and Tracy. **Write** your answers in the table. [2]
- (ii) What conclusion could be reached regarding the effect of gender on the pulse rate of the students? [1]

.....

.....

- (c) The table below shows the rate of blood flow to the heart muscle and to the leg muscles at rest and during running.

| Organ | Rate of blood flow (cm ³ / minute) | |
|--------------|---|-----------------|
| | At rest | During exercise |
| heart muscle | 250 | 350 |
| leg muscles | 1200 | 4500 |

Explain why the changes in blood flow are important during exercise. [4]

.....

.....

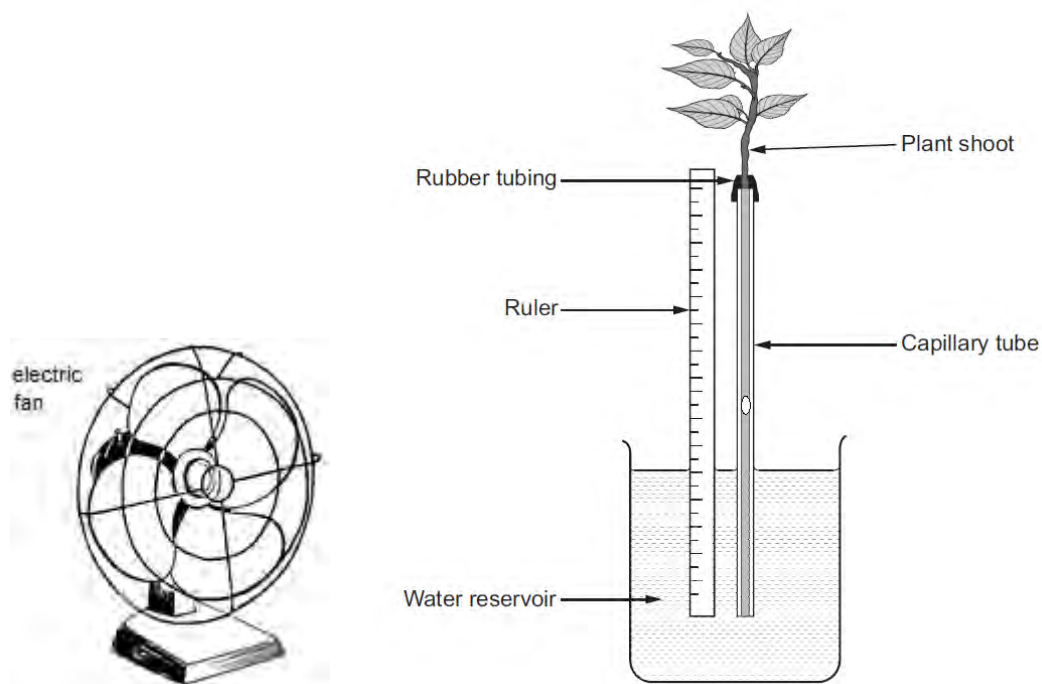
.....

.....

.....

.....

7. Using the apparatus shown in the diagram, describe how you would measure the rate of transpiration in the plant shoot in still and moving air. [6 QER]



.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

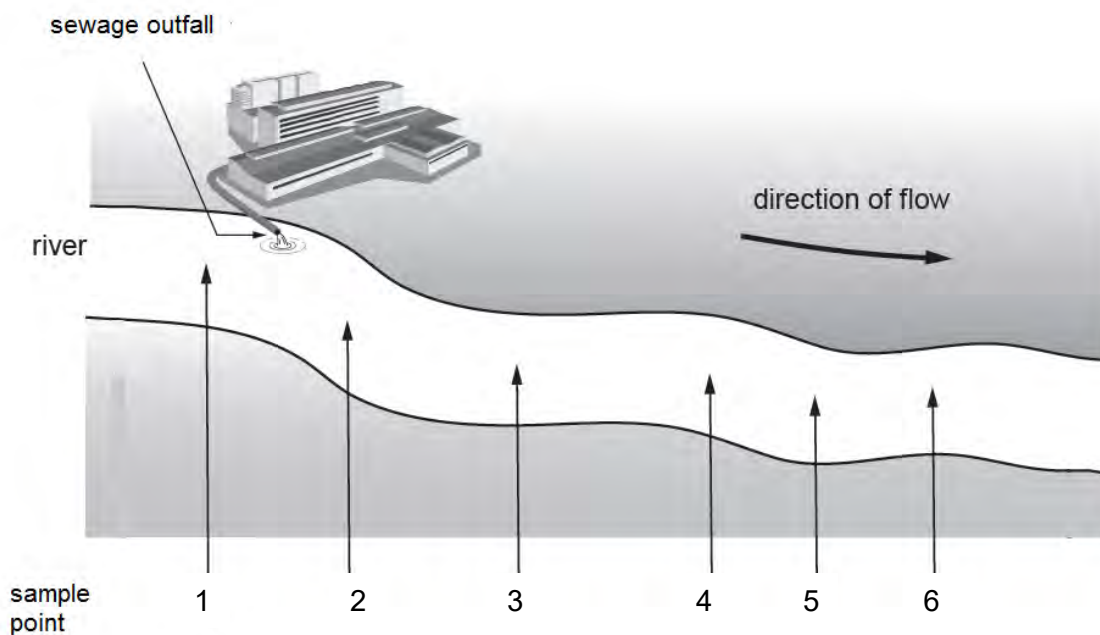
.....

.....

.....

.....

8. Samples of water were taken from a river at a sewage outfall and at a number of points downstream from the outfall as shown in the diagram below.



The table shows the oxygen concentration of the water at each of the sample points.

| Sample point | Oxygen concentration (arbitrary units) |
|--------------|--|
| 1 | 0.10 |
| 2 | 0.04 |
| 3 | 0.20 |
| 4 | 0.40 |
| 5 | 1.00 |
| 6 | 1.28 |

- (a) The oxygen concentration is twice as great at sample point 4 compared with sample point 3. Calculate how many times greater is the oxygen content at sample point 3 compared with sample point 2? [1]

answer =times greater

- (b) Explain what happens to the oxygen content of the water as the distance from the outfall increases. [2]

.....

.....

.....

- (c) Identify the sample point at which you would expect there to be the least variety of species. Give a reason for your answer. [2]

Sample point

Reason

.....

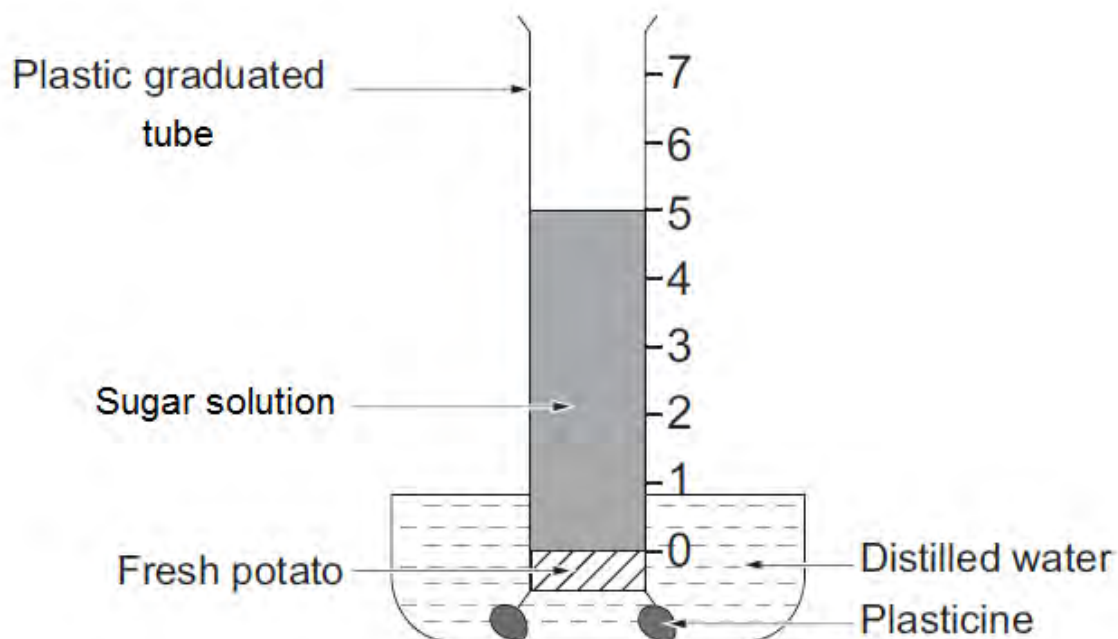
.....

- (d) What term is used to describe a species whose presence or absence may be used to show the level of pollution in a river? [1]

.....

| |
|---|
| |
| 6 |

9. The apparatus below was used to investigate the movement of water through a cell membrane. 5 cm^3 of 1 M sugar solution was added to the graduated tube at the start of the investigation.



After 30 minutes, the volume of the sugar solution was measured. The procedure was repeated with 0.2 M sugar solution.

The results are shown in the table below.

| Concentration of sugar solution (M) | Volume of sugar solution at the start (cm^3) | Volume of sugar solution after 30 min (cm^3) |
|-------------------------------------|---|---|
| 1.0 | 5 | 7 |
| 0.2 | 5 | 5 |

- (a) (i) Name the type of diffusion occurring in this experiment. [1]

.....

(ii) Explain the results for:

I 1.0 M sugar solution; [4]

.....

.....

.....

II 0.2 M sugar solution.

.....

.....

.....

(b) A similar piece of apparatus was set up using **boiled** potato and 1.0 M sucrose solution. It was left for 30 minutes. Explain why all the sugar solution passed into the distilled water. [2]

.....

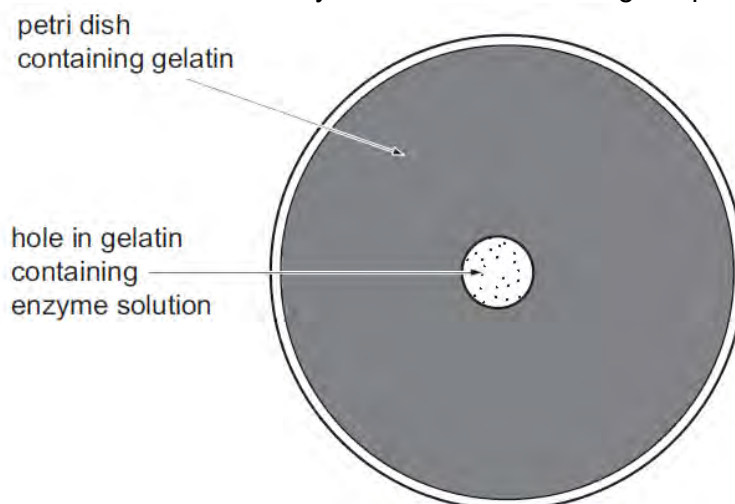
.....

.....

.....

| |
|---|
| |
| 7 |

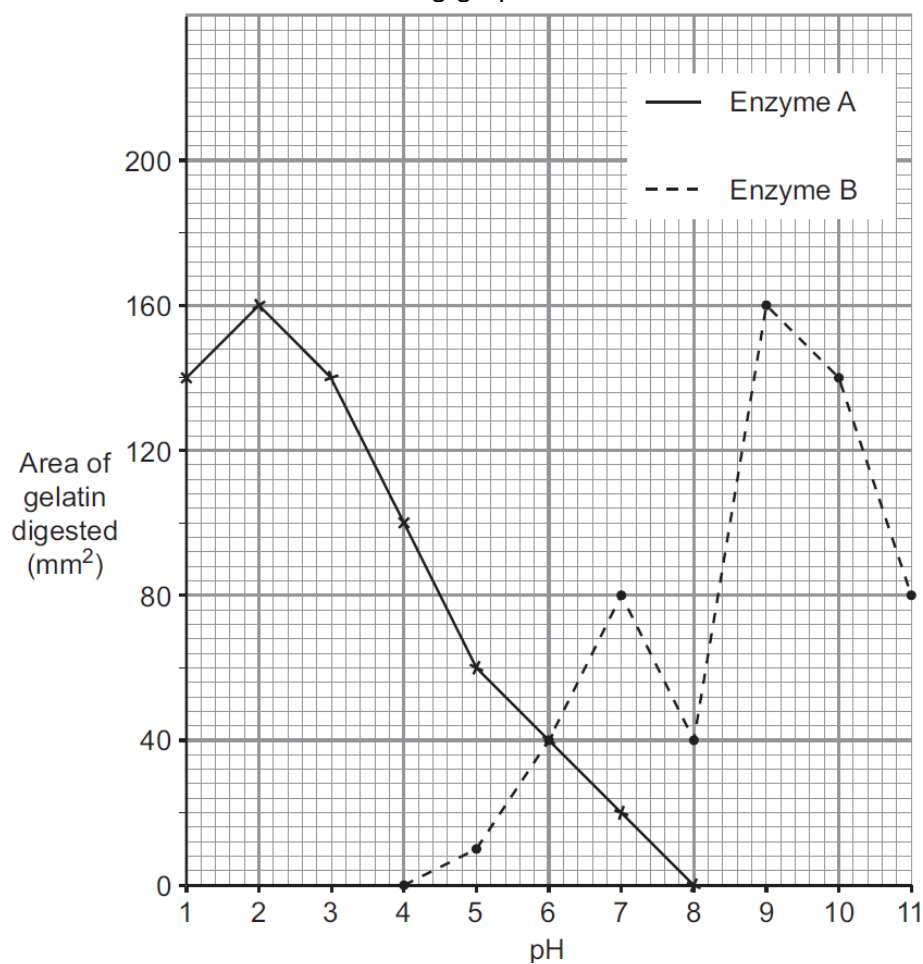
10. The effect of pH on the activity of two protein-digesting enzymes, **A** and **B**, was investigated. The enzymes, at the required pH, were placed in holes made in the middle of a layer of gelatin in separate Petri dishes as shown in the diagram. The procedure was carried out for enzymes **A** and **B** for a range of pH from 1 to 11.



Gelatin is a jelly made of protein.

After one hour, the activity of each enzyme was estimated by measuring the area of gelatin digested by the enzyme.

The results are shown in the following graph.



(a) (i) At which pH were both enzymes equally active? [1]

(ii) It was suspected that one of the results may have been due to experimental error. Identify this result. [1]

Enzyme

pH

(b) Name **three** parts of the human digestive system which produce protein-digesting enzymes. [3]

(I)

(II)

(III)

(c) Which part of the human digestive system produces enzyme **A**? Give a reason for your answer. [2]

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

| |
|---|
| |
| 7 |

END OF PAPER