

Name:

Date:

B1 - Test 4
CELL BIOLOGY
Intermediate

GCSE

BIOLOGY

AQA - Triple Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

Information

- The marks for the questions are shown in brackets

1.

Rose black spot is a disease of roses.

(a) What type of microorganism causes rose black spot?

Tick **one** box.

- A bacterium
- A fungus
- A protist
- A virus

(1)

(b) Explain how different **types of organism** defend themselves against microorganisms.

(6)

(c) A student tried to grow some bacteria in the laboratory.

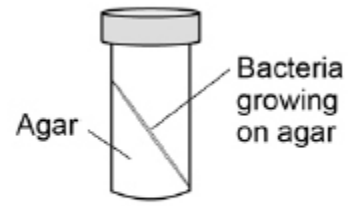
The diagram shows some of the apparatus used.



Inoculating loop



Petri dish containing agar



Bottle containing the bacteria

This is the method used.

1. Remove the lid of the Petri dish.
2. Remove the lid of the bottle containing the bacteria.
3. Use the inoculating loop to remove some of the bacteria from the bottle.
4. Spread the bacteria over the agar using the inoculating loop.
5. Put the lid back on the Petri dish.
6. Put the Petri dish into an incubator at 25 °C for 24 hours.

Steps 1–5 could cause the sample of the bacteria on the petri dish to be contaminated.

Give **three** improvements to the method to prevent contamination.

1. _____

2. _____

3. _____

(3)

(d) Why did the student grow the bacteria at 25 °C rather than at 40 °C?

Tick **one** box.

So the bacteria grew more quickly

So the bacteria grew more slowly

To prevent the growth of a harmful pathogen

To save money

(1)
(Total 11 marks)

2.

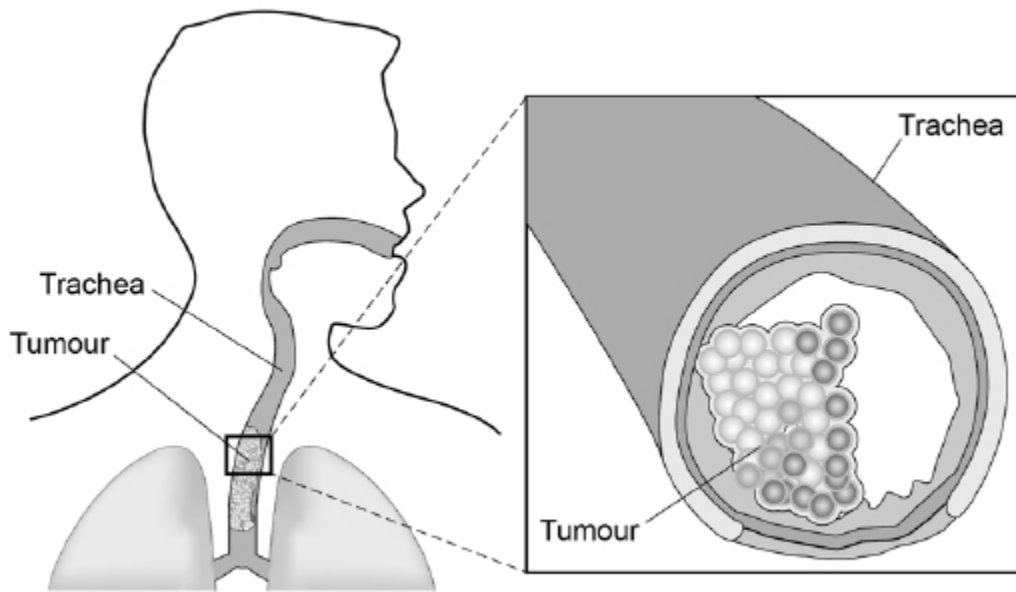
Stem cells can be used to treat some diseases.

(a) What is a stem cell?

(2)

Figure 1 shows a malignant tumour in the trachea of a patient.

Figure 1



(b) Give **one** way a malignant tumour differs from a benign tumour.

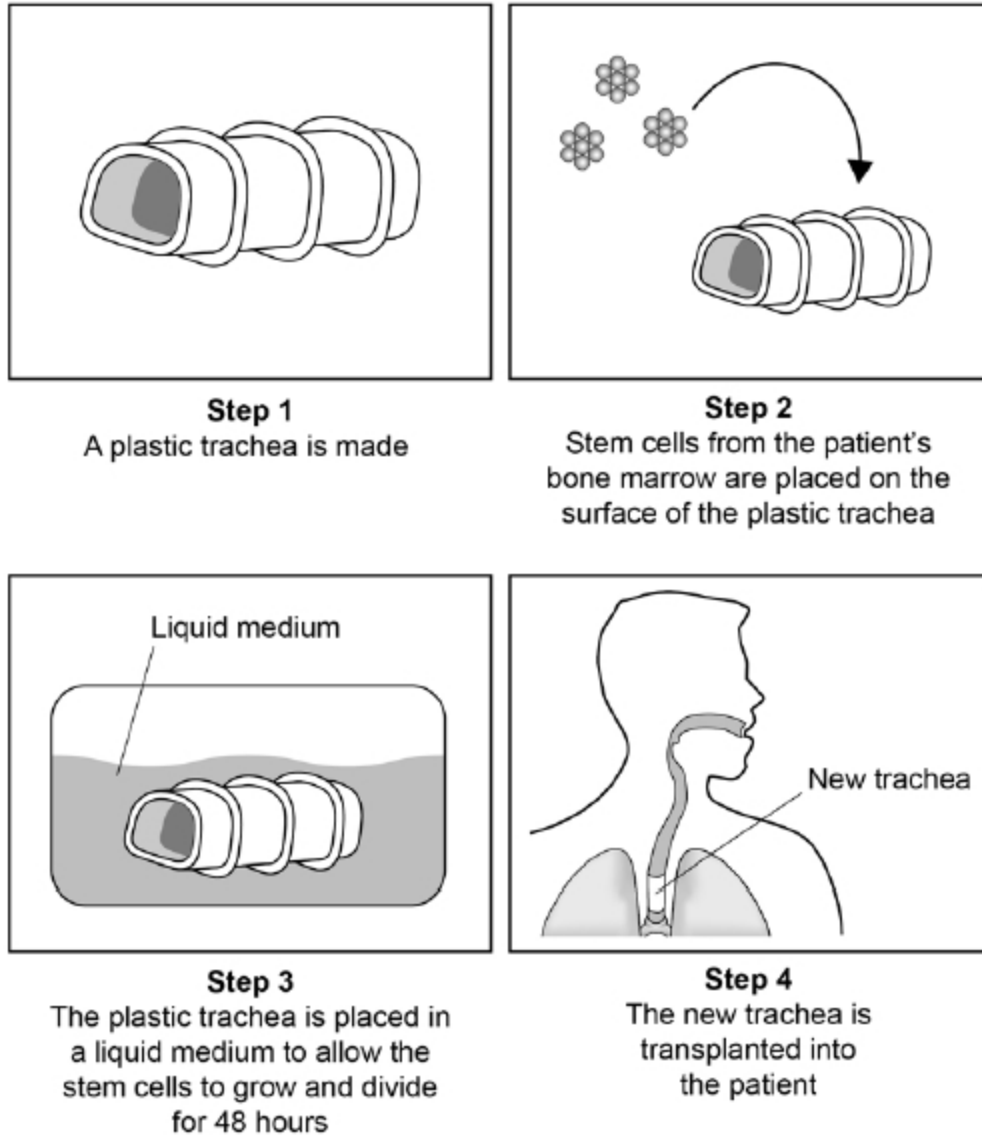
(1)

Scientists can treat the patient's tumour by replacing the trachea with a plastic trachea.

The plastic trachea has a layer of the patient's own stem cells covering it.

Figure 2 shows the procedure.

Figure 2



(c) In **Step 3** the cells are left for 48 hours to divide.

Name the type of cell division in **Step 3**.

(1)

(d) In **Step 3** the cells are given oxygen and water.

Name **two** other substances the cells need so they can grow and divide.

1. _____

2. _____

(2)

(e) Give **two** advantages of using the stem cell trachea compared with a trachea from a dead human donor.

1. _____

2. _____

(2)

(f) Sometimes the stem cell trachea is not strong enough.

Doctors can put a stent into the trachea.

Suggest how a stent in the trachea helps to keep the patient alive.

(2)

(g) Stem cells can also be obtained from human embryos.

Evaluate the use of stem cells from a patient's own bone marrow instead of stem cells from an embryo.

Give a conclusion to your answer.

(6)

(Total 16 marks)

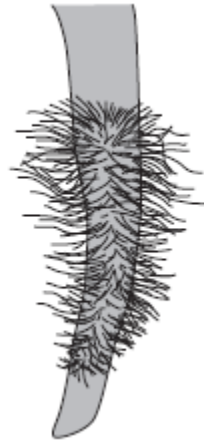
3.

Plant roots absorb water from the soil by osmosis.

(a) What is osmosis?

(3)

(b) The image below shows part of a plant root.



The plant root is adapted for absorbing water from the soil.

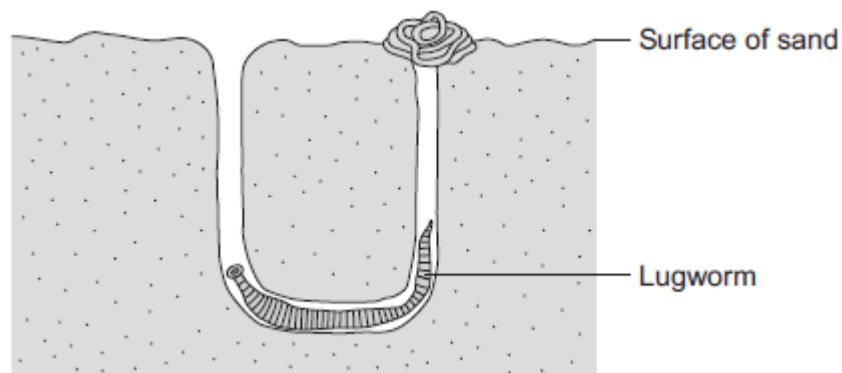
Use information from the diagram to explain how this plant root is adapted for absorbing water.

(3)
(Total 6 marks)

4.

The lugworm lives in a U-shaped burrow in the sand on the seashore.

The diagram below shows a lugworm in its burrow.



(a) Some scientists investigated the effect of different salt concentrations on lugworms.

The scientists:

- collected 50 lugworms from the seashore
- separated them into five groups of 10 lugworms
- weighed each group of 10 lugworms
- placed each group into a different concentration of salt solution and left them for 8 hours
- took each lugworm out of the solution and placed it on blotting paper for 30 seconds
- re-weighed each group of 10 lugworms.

(i) Why did the scientists use groups of 10 lugworms and not just 1 lugworm at each concentration?

(1)

(ii) Suggest why the scientists placed each lugworm on blotting paper for 30 seconds before they reweighed the groups of lugworms.

(1)

(iii) How might the method of blotting have caused errors in the results?

(1)

(iv) Suggest **one** improvement the scientists could make to their investigation.

(1)

(b) The table below shows the scientists' results.

Concentration of salt in arbitrary units	Mass of 10 lugworms at start in grams	Mass of 10 lugworms after 8 hours in grams	Change in mass in grams	Percentage (%) change in mass
1.0	41.2	61.8	+20.6	+50
2.0	37.5	45.0	+7.5	
3.0	55.0	56.1	+1.1	+2
4.0	46.2	22.2	-24.0	-52
5.0	45.3	22.6	-22.7	-50

(i) The scientists calculated the **percentage** change in mass at each salt concentration.

Why is the **percentage** change in mass more useful than just the change in mass in grams?

Use information from the table in your answer.

(2)

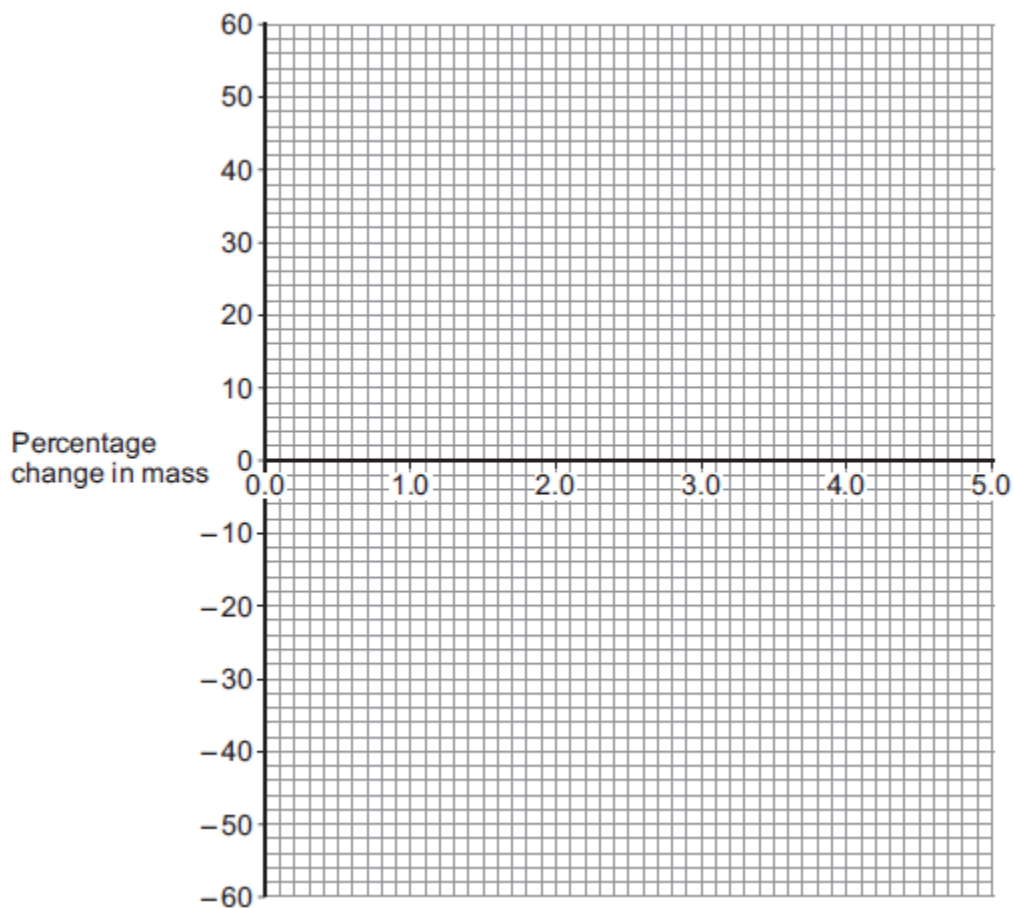
(ii) Calculate the percentage change in mass for the 10 lugworms in the salt solution with a concentration of 2.0 arbitrary units.

Percentage change in mass = _____ %

(2)

(c) (i) On the graph paper below, draw a graph to show the scientists' results:

- plot the **percentage** change in mass
- label the horizontal axis
- draw a line of best fit.



(4)

(ii) The scientists thought one of their results was anomalous.

Draw a ring around the anomalous result on your graph.

(1)

(iii) Suggest what might have happened to cause this anomalous result.

(1)

(d) (i) What do you think is the concentration of salts in the lugworm's natural environment?

Use information from your graph to give the reason for your answer.

Concentration = _____ %

Reason _____

(2)

(ii) The mass of the lugworms decreased in the salt solution with a concentration of 5.0 arbitrary units.

Explain what caused this.

(3)

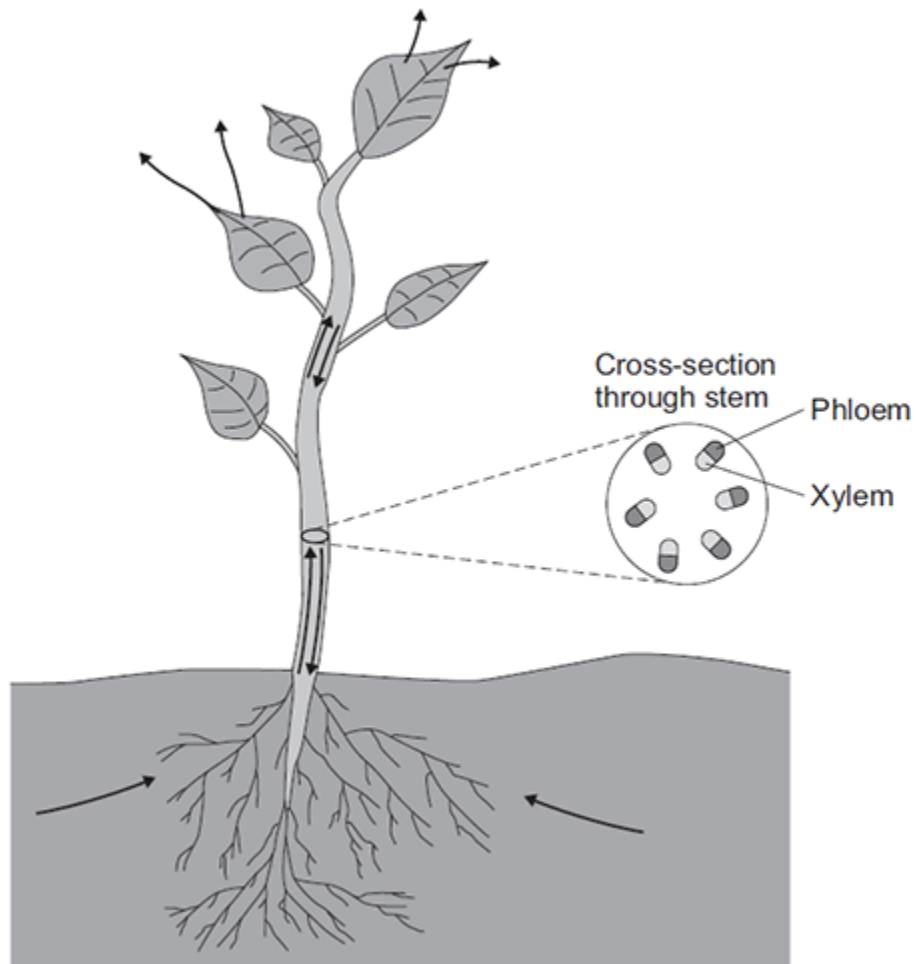
(Total 19 marks)

5.

In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Plants transport many substances between their leaves and roots.

The diagram below shows the direction of movement of substances through a plant.



Describe how **ions**, **water** and **sugar** are obtained and transported through plants.

In your answer you should refer to materials moving upwards in a plant and to materials moving downwards in a plant.

(Total 6 marks)

6.

A student is given a tube containing a liquid nutrient medium. The medium contains one type of bacterium.

(a) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

The student is told to grow some of the bacteria on agar jelly in a Petri dish.

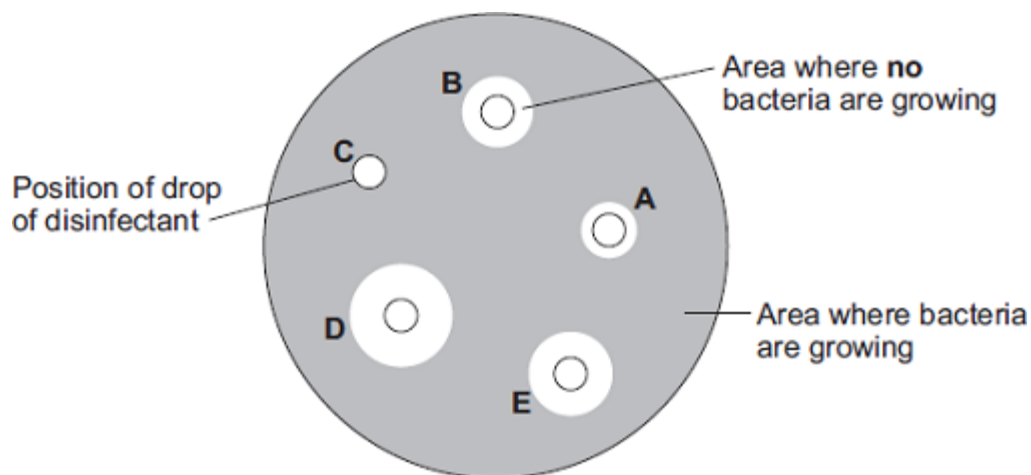
Describe how the student should prepare an uncontaminated culture of the bacterium in the Petri dish.

You should explain the reasons for each of the steps you describe.

(6)

- (b) After the culture had been prepared, the student added one drop of each of five disinfectants, **A**, **B**, **C**, **D** and **E**, onto the culture.

The diagram shows the appearance of the Petri dish 3 days later.



- (i) There are areas on the agar jelly where **no** bacteria are growing.

Why?

(1)

- (ii) The student concluded that disinfectant **D** would be the best for using around the home.

Give **one** reason why the student might be correct.

Give **one** reason why the student might **not** be correct.

(2)

(Total 9 marks)

7.

Cells contain a solution of salts and sugars.

A student is investigating how cells change when they are put into water.

(a) The student:

- looks at a plant cell using a microscope
- adds water to the cell.

The plant cell swells up.

Explain why, as fully as you can.

(3)

(b) When **animal** cells are put in water, they swell up, and then burst.
When **plant** cells are put in water, they swell up, but do **not** burst.

How does the structure of plant cells prevent them from bursting?

(1)

(Total 4 marks)