

Supplying the Cell (H)

1. Arsenic is a toxin that stops respiration in cells.

What other cell process would be stopped because of arsenic?

- A Active transport
- B Diffusion
- C Osmosis
- D Transpiration

Your answer

[1]

2. In people with multiple sclerosis their immune cells stop working as they should. HSCT is a treatment for multiple sclerosis which destroys all the immune cells.

Once the immune cells are destroyed, cells from a patient's bone marrow can replace the immune cells.

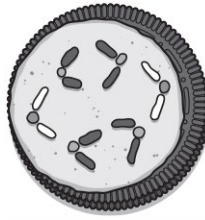
What type of cell is used to replace the destroyed immune cells?

- A Neurone cell
- B Red blood cell
- C Stem cell
- D White blood cell

Your answer

[1]

3. A student models the process of mitosis using cookies and sprinkles.



Mitosis is part of the cell cycle.

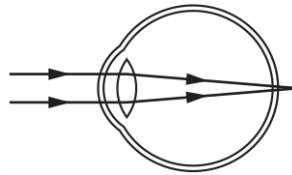
Which process in the cell cycle has the student modelled?

- A Cell division
- B Chromosome movement
- C DNA replication
- D Growth of cell

Your answer

[1]

4. Look at the diagram showing an eye defect.



What is the defect and which lens could be used to correct it?

- A Long-sightedness, corrected with a concave lens
- B Long-sightedness, corrected with a convex lens
- C Short-sightedness, corrected with a concave lens
- D Short-sightedness, corrected with a convex lens

Your answer

[1]

5. An experiment is carried out to find the concentration of potato tissue.

Four chips are cut from a potato.



At the start, each chip is 50 mm long, 10 mm wide and 10 mm high.

Each chip is put in a different sucrose solution **A**, **B**, **C** and **D**.

The volumes of the chips are calculated after 1 hour.

Sucrose solution	Volume of chip (mm ³)
A	50
B	500
C	5000
D	50 000

Which sucrose solution has the same concentration as the potato tissue?

Your answer

[1]

6. A plant cell is placed in a solution with a higher solute concentration than the cell contents.

What will happen to the plant cell?

- A** Absorb water until it bursts.
- B** Absorb water until it is turgid.
- C** Lose cytoplasm and shrink.
- D** Lose water and become flaccid.

Your answer

[1]

7. Which is a function of carrier proteins in a cell membrane?

- A Transfer impulses across a synapse
- B Transfer molecules by active transport
- C Transport amino acids in protein synthesis
- D Transport molecules around the blood

Your answer

[1]

8. A scientist clones a cauliflower plant.



He uses small pieces of the cauliflower plant called explants.

This is the method the scientist uses to get the explants:

- Place the equipment in a beaker of bleach and swab the bench with 70% alcohol.
- Collect a small piece of cauliflower and place on a white tile.
- Using a scalpel cut the piece of cauliflower lengthways into small 3–5 mm pieces called explants.
- Measure the mass of the explants.

The scientist prepares the explants for cloning on an agar jelly plate.

He does this by placing the explants on the agar.

To grow the explants into cauliflower plants, the scientist places the agar jelly plate in a warm room near to a window.

- i. Before they form new plant structures, the explants must take in sugars from the agar jelly.

Explain why explants cannot make their own sugars.

----- [2]

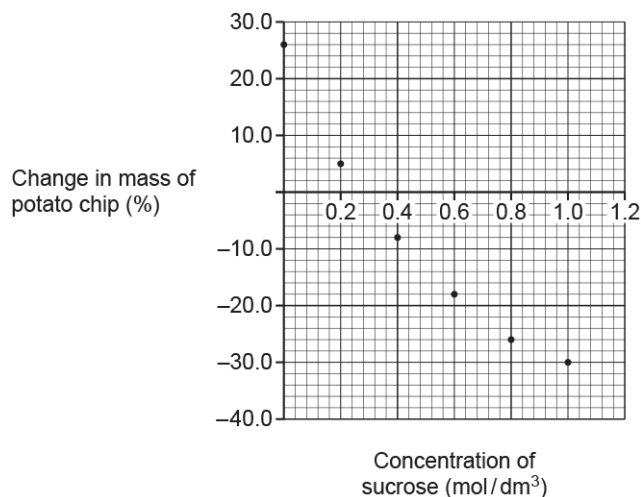
- ii. The experiment could be improved by placing the agar jelly plate with explants into a heated cabinet containing light bulbs.

Describe how this cabinet could be further improved to maximise the growth and development of the explants.

----- **[2]**

9 (a). Plant cells are affected by osmotic conditions.

Look at the graph. It shows the percentage change in mass of potato chips in different concentrations of sucrose.



- i. Draw a curve of best-fit on the graph.

[1]

- ii. Use the graph to estimate the concentration of sucrose that has the same water potential as the potato cells.

Concentration = mol / dm³ **[1]**

- iii. In a different experiment a sucrose concentration of 0.0 mol / dm³ increases the mass of a carrot chip by 30%.

The carrot chip shows a 10% decrease in mass compared with its original mass for every 0.2 mol / dm³ increase in sucrose concentration.

Calculate the x-axis intercept for the carrot chip.

x-axis intercept = mol / dm³ of sucrose **[1]**

(b). Osmotic conditions can increase the size of plant tissue but stem cells are responsible for growth of new cells.

What name is given to plant tissue that contains stem cells?

[1]

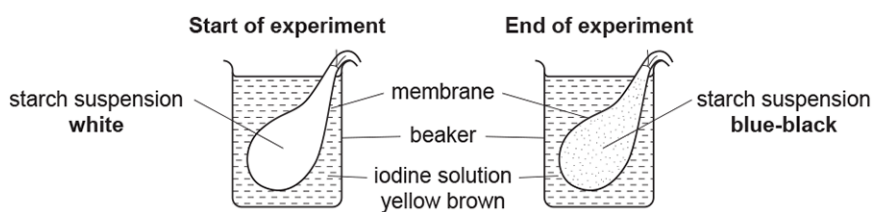
10. Scientists are using human embryonic stem cells to grow cells to treat type 1 diabetes.

Explain why scientists use embryonic rather than adult stem cells.

[2]

11. An experiment is set up to investigate how substances move into and out of cells.

Look at the results.



Explain the results of this experiment.
 Use ideas about molecules in your answer.

[3]

12. Retinitis pigmentosa is a genetic condition that affects the eyes.

It is caused by a mutation to a gene. This mutation produces a recessive allele.

The condition causes rod cells in the retina to break down.

- i. Explain why stem cells could be used as a treatment for this condition.

[2]

- ii. Why is it an advantage to use stem cells from the patient rather than from another person?

[1]

13.

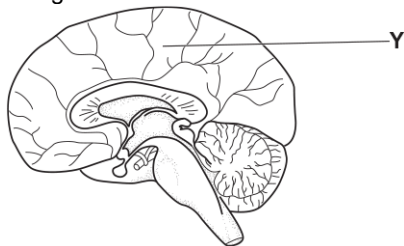
- i. Motor neurone disease (MND) is a condition that affects reaction times. MND affects the speed of nerve impulse in motor neurones.

Stem cells taken from the skin of people with MND are used in research. The stem cells can be grown in the lab and used to measure the speed of the nerve impulse.

Which special feature of stem cells makes this possible?

[1]

- ii. The diagram shows the brain.



Name part Y and explain why it is an important area of the brain in the research of MND.

Part Y:

Explanation:

[2]

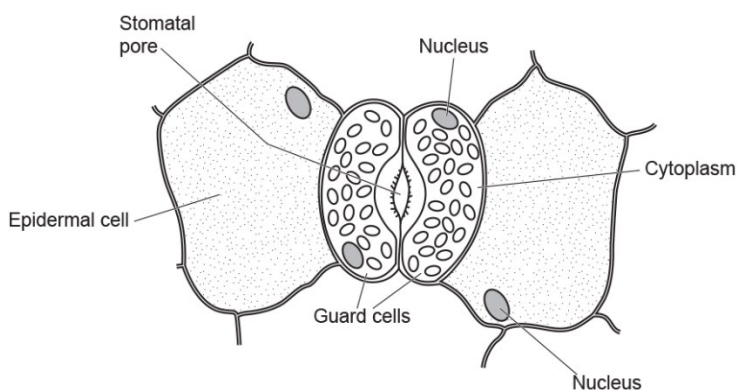
iii. Measuring the speed of the nerve impulse in the brain is more difficult than using stem cells.

Suggest **two** reasons why.

[2]

14.

The diagram shows structures on the surface of a leaf.



i. Photosynthesis occurs in the guard cells but not the epidermal cells.

Explain why this is important in the control of the rate of transpiration in the plant.

[4]

ii. Explain why guard cells are an example of specialised cells.

[2]

END OF QUESTION PAPER