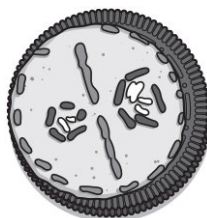


Supplying the Cell (F)

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



Mitosis is part of the cell cycle.

Which part of the cell cycle has the student modelled?

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

Your answer

[1]

2. Which type of cell can divide to produce a range of different cell types?

- A Heart cell
- B Neurone cell
- C Sperm cell
- D Stem cell

Your answer

[1]

3. What is meant by the term cell differentiation?

- A Cells become organs
- B Cells become organ systems
- C Cells become specialised
- D Cells become tissues

Your answer

[1]

4. Why are stem cells useful for repairing damaged tissues?

- A They are easily obtained from any organ.
- B They are not attacked by pathogens such as bacteria.
- C They are haploid.
- D They can divide to form different types of cell.

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.

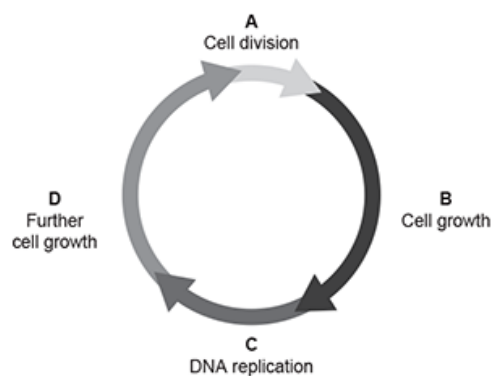
Sucrose solution	Volume of chip (mm ³)
A	50
B	500
C	5000
D	50 000

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

Your answer

[1]

6. During which phase of the cell cycle does mitosis happen?

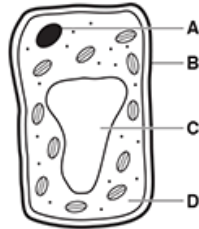


Your answer

[1]

7. The diagram shows a plant cell observed using a light microscope.

Which label is pointing to a structure that contains genetic material?

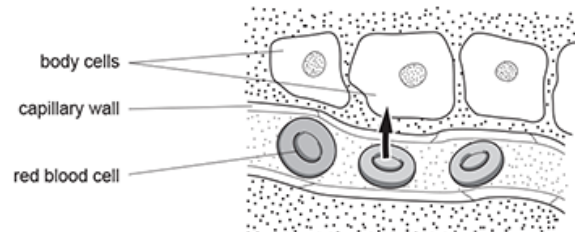


Your answer

[1]

8. The diagram shows the direction of **oxygen** transfer from red blood cells to body cells.

What process does the arrow show?



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

Your answer

[1]

9. Look at some of the stages in mitosis.

- 1 The nuclear membrane forms.
- 2 The nuclear membrane breaks down
- 3 Chromosomes separate.
- 4 Chromosomes line up on the equator

What is the correct order of these stages during mitosis?

- A 1 → 3 → 2 → 4
- B 1 → 4 → 3 → 2
- C 2 → 4 → 3 → 1
- D 3 → 2 → 4 → 1

Your answer

[1]

10. Which process produces gametes?

- A Diffusion
- B Fertilisation
- C Meiosis
- D Mitosis

Your answer

[1]

11. Why do plant root hair cells use active transport to take in minerals?

- A Minerals are dissolved in water in the soil.
- B Minerals are needed by the plant in very low concentrations.
- C Minerals are present at very high concentrations in the soil.
- D Minerals are present at very low concentrations in the soil.

Your answer

[1]

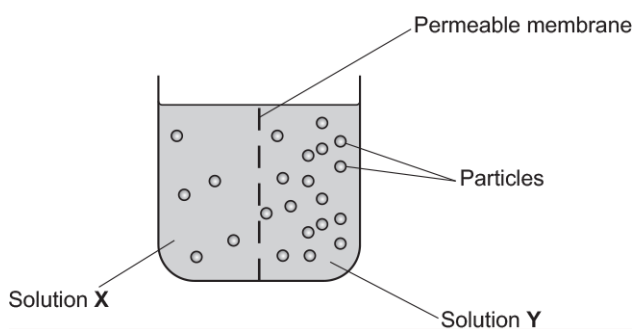
12. Which one of these stages comes **first** during mitosis?

- A The nuclear membrane forms.
- B The nuclear membrane breaks down.
- C Chromosomes separate.
- D Chromosomes line up on the equator.

Your answer

[1]

13. Look at the diagram. It shows the particles dissolved in two solutions.



The particles can diffuse through the permeable membrane.

Which statement about the particles is true in this diagram?

- A Particles move in both directions across the permeable membrane.
- B Particles only move from X to Y.
- C Particles only move from Y to X.
- D Particles stop moving when the concentrations become equal.

Your answer

[1]

14. Treatment for cancer often involves powerful medicines that stop cells dividing all over the body.

Write down the name of the type of cell division that occurs when body cells divide.

.....
[1]

15. A salt marsh is a large, muddy area of land where a river joins the sea.

When the tide comes in, the salt marsh gets covered with seawater.

Suggest **one** reason why salt marshes are difficult places for plants to grow

.....
[1]

16. The lining of the uterus is shed during menstruation.

New cells are needed to replace the lining of the uterus.

Describe the processes that occur to make these new cells.

.....
[3]

17 (a). 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.
- Use a scalpel to cut the piece of cauliflower lengthways into small 3–5 mm pieces called explants.
- Measure the mass of the explants.

- i. Suggest why the scientist uses a scalpel rather than a kitchen knife.

[1]

- ii. Write down **one** safety precaution that the scientist should take when using a scalpel.

[1]

- iii. The explants are then prepared for cloning by placing on an agar jelly plate.

Agar jelly contains water, sugars and minerals.



Agar jelly plate

When the explants are placed on the agar jelly plate they have no roots or leaves.

Explain why the explants must be placed on the agar jelly plate.

[2]

- (b). To grow the explants, the scientist places the agar jelly plate in a warm room near to a window.

- i. Explain why this will help the explants grow and develop into clones.

[2]

ii. Using a heated cabinet with light bulbs inside the cabinet would improve this method.

Explain why.

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

iii. The scientist examines the agar jelly plate regularly.

Growth of the explants is visible in the plate within 10 days and parts of the explants are turning green.



What conclusion can be made about why the explants have parts that are turning green?

----- **[1]**

(c). The mass of the explants at the start was 15 g.

After 10 days the mass of the explants was 28 g.

Calculate the percentage increase in mass of the explants.

Give your answer to 1 decimal place.

Percentage increase = % **[3]**

(d). The cells in cauliflower explants behave the same way as embryonic stem cells do in animals.

Explain why it is more difficult to clone adult animals than to clone cauliflowers.

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

18. Retinitis pigmentosa is a genetic condition.

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

If people have retinitis pigmentosa then the cells in their retina are damaged.

- i. Scientists want to use stem cells as a treatment for this condition.

Why might stem cells be able to repair the retina?

[2]

- ii. Write down **two** reasons why medical treatments are tested on animals first.

[2]

19. Erythromycin is an antibiotic drug.

It is important to get the dose of erythromycin right.

Too much erythromycin can be harmful.

However, recently some strains of bacteria have developed resistance to low concentrations of erythromycin.

To see how effective erythromycin is, it is tested using bacteria grown on agar plates.

This method is used:

- A petri dish is used that has the bacteria growing evenly over the surface.
- A disc of filter paper is soaked in erythromycin.
- The disc is placed on the agar in the centre of the petri dish using sterile forceps.
- The dish is incubated at 37°C.

- i. Why did the scientists incubate the dish at 37°C rather than at higher or lower temperature?

[2]

- ii. Why is the filter paper disc moved using sterile forceps?

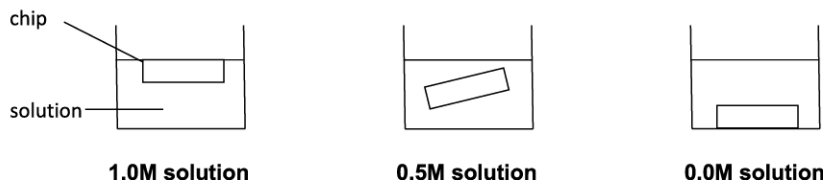
[1]

20 (a). An investigation is done to investigate osmosis in potatoes.

Three chips are cut from a potato.

Each chip is 5.0 cm long.

Each chip is left in a different concentration of sucrose solution for two hours.



These are the results after two hours:

chip in **1.0M solution**

chip in **0.5M solution**

chip in **0.0M solution**

Explain why the chip in the **0.0M solution** increased in length.

[2]

(b). Explain why the chip in the **0.5M solution** stayed the same length.

[2]

(c).

i. Calculate the percentage change in length of the chip in the **1.0M solution**.

answer = %

[2]

- ii. In experiments like this, what is the advantage of calculating percentage change, not just the actual change?

----- [1]

(d).

- i. Measuring the length of the chips is a quick and easy way to get results but it does **not** measure the total change to the chips.

Explain why.

----- [1]

- ii. What could the students measure to see the total change to the chips?

----- [1]

21. Look at the table. Which row describes active transport?

	only occurs across a membrane	can move substances from a low to high concentration	uses ATP	only moves substances from high to low concentration
A			✓	✓
B	✓	✓	✓	
C	✓	✓		
D	✓		✓	✓

Your answer

[1]

22. In many countries people rely on bananas for food.

Black sigatoka is a disease of banana plants.

It is caused by a fungus.

Banana plants grown by farmers are usually produced asexually.

This process uses mitosis.

This means that if one banana plant can die of black sigatoka then they all can.

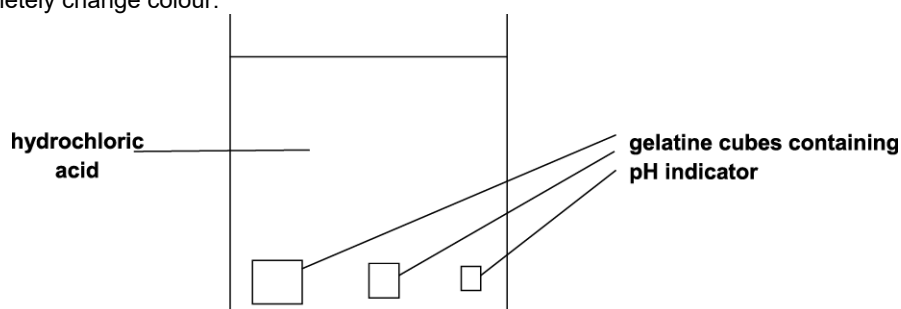
Write down why.

----- [1]

23. Some students investigate the effect of the ratio of surface area:volume on the rate of diffusion in animal cells.

They use hydrochloric acid and gelatine cubes stained blue with pH indicator.

They put different sized cubes into a beaker of hydrochloric acid and time how long it takes for the cubes to completely change colour.



The table shows their results.

length of 1 side of cube (cm)	surface area:volume ratio (cm ⁻¹)	time to completely change colour in seconds
1	132
2	3	328
3	2	673

i. Calculate the surface area:volume ratio for the cube with sides of 1 cm.

answer = cm⁻¹

[1]

- ii. Calculate the rate of colour change for each of the three cubes.

Write your answers in the table below.

Show your answers in standard form.

length of 1 side of cube (cm)	rate of colour change (s^{-1})
1
2
3

[2]

- iii. Use the results and your calculations in parts (i) and (ii)

Explain why most single celled organisms do **not** need a transport system (e.g. the circulatory system of multi cellular organisms).

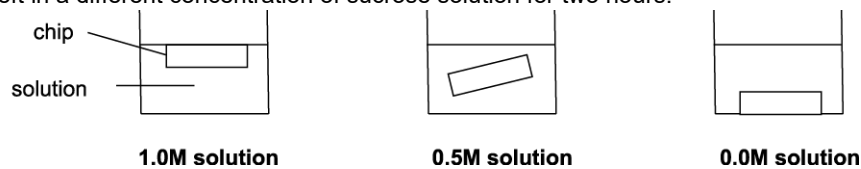
[2]

24 (a). An investigation is done to investigate changes in potatoes placed in different sucrose solutions.

Three chips are cut from a potato.

Each chip is 5.0 cm long.

Each chip is left in a different concentration of sucrose solution for two hours.



These are the results after two hours:

chip in **1.0M solution**

chip in **0.5M solution**

chip in **0.0M solution**

In this experiment what process causes some of the chips to change length?

..... **[1]**

(b). Explain why the chip in the **0.0M solution** increased in length.

.....

 **[2]**

(c). Explain why the chip in the **0.5M solution** stayed the same length.

.....

 **[2]**

END OF QUESTION PAPER