

GCSE Combined Science: Trilogy

Worksheet: Cell specialisation

TIME 30 min	TOTAL 28 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Cell specialisation

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Animals and plants contain specialised cells.

0 1 . 1

Which cell is specialised to absorb water and mineral ions from the soil?

Tick (✓) **one** box.

Guard cell

☐

Palisade cell

☐

Root hair cell

☐

Xylem cell

☐

[1 mark]

0 1 . 2

Which cell carries electrical impulses around the body?

Tick (✓) **one** box.

Muscle cell

☐

Nerve cell

☐

Red blood cell

☐

Sperm cell

☐

[1 mark]

0 1 . 3

Sperm cells have a tail.
Give the function of the tail.

[1 mark]

0 1 . 4

Give **one** way a muscle cell is adapted to its function.

[1 mark]

0 2

Plants and animals contain specialised cells.

0 2 . 1

Which cell carries water up the stem of a plant?

Tick (✓) **one** box.

Palisade cell

☐

Phloem cell

☐

Root hair cell

☐

Xylem cell

☐

[1 mark]

0 2 . 2

Which feature helps a muscle cell to contract?

Tick (✓) **one** box.

A long tail

☐

A large surface area

☐

No nucleus

☐

Protein fibres that slide over each other

☐

[1 mark]

0 2 . 3

Figure 1

Specialised cell	Adaptation
Nerve cell	End walls with pores so that cell sap can move between cells
Phloem cell	Hollow tube strengthened by lignin
Sperm cell	Many mitochondria in the middle section to release energy
	Long, with branched endings that connect to other cells

Figure 1 shows three specialised cells and four adaptations.
Draw **one** line from each specialised cell to its adaptation.

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[3 marks]

0 3

Root hair cells and xylem cells are specialised plant cells.

0 3 . 1

Explain how the shape of a root hair cell helps it to absorb water.

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.....

[2 marks]

0 3 . 2

Root hair cells contain many mitochondria.
Explain why.

.....

.....

.....

.....

[2 marks]

0 3 . 3

Xylem cells form long tubes that carry water through the plant.
Give **two** ways that xylem cells are adapted to this function.

.....

.....

.....

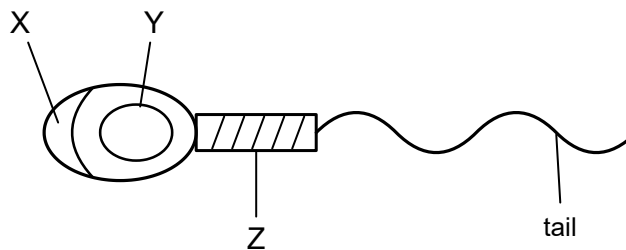
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[2 marks]

0 4

Figure 2 shows a sperm cell.

Figure 2



0 4 . 1

Structure **X** contains enzymes.
Suggest the function of these enzymes.

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.....

[1 mark]

0 4 . 2

Structure **Y** contains the genetic material.
Name structure **Y**.

.....

.....

.....

.....

[1 mark]

0 4 . 3

Section **Z** contains many mitochondria.
Explain why.

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.....

[2 marks]

0 4 . 4

The nucleus of a sperm cell contains half the genetic material of a normal body cell.
Suggest why this is important.

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.....

.....

[2 marks]

.....

0 5

Phloem tissue transports dissolved sugars around a plant. It is made of tubes of elongated cells.

- The end walls between the phloem cells have pores in them.
- Each phloem tube cell has very little cytoplasm and no nucleus.
- Next to each phloem tube cell is a companion cell, which has a nucleus and many mitochondria.

0 5 . 1

Explain how the pores in the end walls help the phloem to carry out its function.

[2 marks]

0 5 . 2

Suggest **one** advantage of phloem tube cells having very little cytoplasm and no nucleus.

[1 mark]

0 5 . 3

Suggest why companion cells contain many mitochondria.

[2 marks]

0 5 . 4

Give **two** differences between the structure of xylem cells and the structure of phloem cells.

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Cell specialisation · 28 marks

Question 1 (4 marks)

01.1 [1 mark]

Correct: Root hair cell

01.2 [1 mark]

Correct: Nerve cell

01.3 [1 mark]

- to swim (to the egg) (1)

Notes: Allow 'to move'.

01.4 [1 mark]

- contains many mitochondria (to release energy) / contains protein fibres that slide over each other to contract / can store glycogen (1)
-
-

Question 2 (5 marks)

02.1 [1 mark]

Correct: Xylem cell

02.2 [1 mark]

Correct: Protein fibres that slide over each other

02.3 [3 marks]

Answer: nerve cell – long with branched endings; phloem cell – end walls with pores; sperm cell – many mitochondria in the middle section

- nerve cell – long, with branched endings that connect to other cells (1)
- phloem cell – end walls with pores so that cell sap can move between cells (1)
- sperm cell – many mitochondria in the middle section to release energy (1)

Notes: If more than one line is drawn from a cell, award no mark for that cell.

Question 3 (6 marks)

03.1 [2 marks]

- the long hair / projection gives a large surface area (1)
- so more water is absorbed / water is absorbed faster (by osmosis) (1)

03.2 [2 marks]

- mitochondria release energy by (aerobic) respiration (1)
- energy is needed for the active transport of mineral ions (from the soil) (1)

Notes: Do not accept 'mitochondria make energy'. Do not accept 'energy to absorb water'.

03.3 [2 marks]

- the cells are dead / have no cytoplasm or nucleus (1)
- there are no end walls between the cells / they form continuous hollow tubes (1)
- the walls are strengthened with lignin (1)

Any 2 of the points above.

Question 4 (6 marks)

04.1 [1 mark]

- to digest / break down the outer layer / membrane of the egg (so the sperm can enter) (1)

04.2 [1 mark]

Answer: nucleus

- nucleus (1)

04.3 [2 marks]

- mitochondria release energy by (aerobic) respiration (1)
- (energy is needed) for the tail to move / for swimming (1)

Notes: Do not accept 'mitochondria produce energy'.

04.4 [2 marks]

- the egg (cell) also contains half the genetic material (1)
 - so the fertilised egg has the full / normal amount of genetic material / chromosomes (1)
-

Question 5 (7 marks)

05.1 [2 marks]

- the pores allow cell sap (containing dissolved sugars) to pass from one phloem cell to the next (1)
- so the cells form a continuous tube that transports sugars around the plant (translocation) (1)

05.2 [1 mark]

- more space for the cell sap to flow through / less resistance to the flow of cell sap (1)

05.3 [2 marks]

- mitochondria release energy by aerobic respiration (1)
- energy is needed to move sugars into / along the phloem (e.g. by active transport) / to keep the phloem tube cell alive (1)

Notes: Do not accept 'mitochondria produce energy'.

05.4 [2 marks]

- xylem cells are dead but phloem cells are living (1)
- xylem cells have no end walls / form continuous hollow tubes, but phloem cells have end walls with pores (1)
- xylem cell walls are strengthened with lignin, but phloem cell walls are not (1)

Any 2 of the points above.

Notes: Each answer must refer to both types of cell or be clearly comparative.
