

Differentiation Stem Cells

GCSE Biology · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Explain how a sperm cell is adapted to its function. (3 marks)

Step 1 · State the function

To reach and fertilise an egg.

Step 2 · Feature + reason 1

A tail so it can swim towards the egg.

Step 3 · Feature + reason 2

Many mitochondria to transfer the energy needed for swimming.

Step 4 · Feature + reason 3

An acrosome containing enzymes to digest a way into the egg.

Answer: Tail to swim; mitochondria for energy; acrosome enzymes to enter the egg

Check: Every feature is linked to a reason with 'so that' or 'to'.

2. Now try one with the steps

Describe the difference between when animal cells and plant cells differentiate. (2 marks)

Step 1 · Animals

Step 2 · Plants

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Define the term differentiation. [1]

2. What is a stem cell? [2]

3. Name the tissue in plants that contains stem cells. [1]

4. Give two adaptations of a root hair cell and explain each. [2]
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5. Explain how a nerve cell is adapted to carry impulses quickly over long distances. [2]
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6. Describe how xylem cells are adapted to transport water. [2]
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7. Give one way adult stem cells differ from embryonic stem cells. [1]
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8. Give two reasons why meristem cloning is useful to plant growers. [2]
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9. Suggest two conditions that could, in future, be treated using stem cells. [2]
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10. In a study, 15 out of 120 stem-cell transplants were rejected. Calculate the percentage that were rejected. [2]
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11. Explain why stem cells from a patient's own body are less likely to be rejected than donor cells. [2]
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12. Explain why a cut-off piece of geranium stem can grow into a whole new plant, but a human cannot regrow a lost finger. [3]
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13. Give one risk to a patient of using stem cells grown in a laboratory. [1]
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14. Evaluate the use of embryonic stem cells in medical research.

[4]

4. Before you hand it in

"Stem cells can only become one type of cell."

Stem cells are UNDIFFERENTIATED: they can become different cell types. Embryonic ones have the widest range.

"Plants and animals both stop differentiating after birth."

Plants keep stem cells (meristems) in root and shoot tips all their lives.

Listing features without reasons, e.g. 'it has a tail'

Link each feature to its job: 'a tail so it can swim to the egg'.

"Therapeutic cloning makes a copy of the whole patient."

Therapeutic cloning only produces an early embryo whose stem cells are grown into tissue for the patient.