

Cloning: practice questions

5 questions • 16 marks • mark scheme at the back

For Pearson Edexcel International GCSE Biology 4BI1 and Science (Double Award) 4SD0. **Biology only** is not in the Double Award and is only examined on Paper 2.

Name

Total / 16

1 **Biology only** [1 mark]

In micropropagation, the small pieces of plant tissue that are used to grow new plants are called

- A. ☐ explants
- B. ☐ plasmids
- C. ☐ vectors
- D. ☐ zygotes

2 **Biology only** [3 marks]

Describe how micropropagation is used to grow new plants.

3 **Biology only** [4 marks]

Describe the stages in the production of a cloned mammal such as Dolly the sheep.

4 **Biology only** [2 marks]

A nursery uses micropropagation to produce thousands of orchid plants with attractive flowers. State two advantages of using micropropagation instead of seeds.

Biology only

Some sheep are cloned transgenic animals that produce a human protein in their milk. Explain how these sheep are produced and why cloning is useful.

[illegible]

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1] Biology only

A A – explants (1)

2. [3] Biology only

- small pieces of tissue (explants) are taken from the parent plant (1)
- aseptic technique / sterilised to prevent contamination by microorganisms (1)
- explants grown in vitro on sterile nutrient agar with nutrients and growth hormones (1)
- cells divide to form plantlets (1)
- Max 3

3. [4] Biology only

- nucleus removed from an unfertilised egg cell (enucleated egg cell) (1)
- diploid nucleus taken from a mature body cell (1)
- diploid nucleus introduced into the enucleated egg cell (1)
- egg cell divides to form an embryo (1)
- embryo implanted into a surrogate mother / uterus (1)
- Max 4

4. [2] Biology only

- plants are genetically identical to the parent / keep the desirable characteristics (1)
- many plants produced quickly / in a small space / all year round (1)
- seeds give offspring that vary, but micropropagated plants are all the same (1)
- Max 2

5. [6] Biology only

Level 3 5-6	A clear, well-ordered explanation of how the transgenic sheep is produced and cloned (human gene, nuclear transfer, surrogate), with a clear reason why cloning is useful. Scientific terms are used accurately.
Level 2 3-4	An explanation covering some of the production stages and at least one reason for cloning, but with gaps or some confusion.
Level 1 1-2	A few simple statements, for example that a human gene is put into a sheep, or that clones are identical. Little explanation.

Indicative content

- a human gene for the protein is inserted into sheep cells, making them transgenic
- a diploid nucleus from a transgenic cell is put into an enucleated egg cell
- the egg divides to form an embryo, implanted into a surrogate mother
- the lamb born is a transgenic clone that makes the human protein, e.g. in milk
- the protein can be collected and purified, and used to treat human conditions, e.g. alpha-1-antitrypsin or clotting factors
- cloning gives many genetically identical animals that all carry the gene and make the protein