Cloning and transgenic animals

Student activity • observation and reasoning

YEAR 11 / LESSON 96 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How are cloning and genetic engineering different processes?

Use the supplied examples, record your reasoning and correct it using evidence.

Equipment

- Student booklet, pencil and ruler
- Nuclear-transfer and gene-transfer process cards

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Course coverage: Shared recap: 5.12–5.16 genetic engineering. Biology-only extension: 5.19B–5.20B mammalian cloning and human-protein production.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Shared recap: distinguish copying an organism's nuclear genetic information from deliberately introducing a gene.

2. Biology extension: sequence removal of an egg nucleus, transfer of a diploid nucleus from an adult body cell, activation and embryo development.

3. Biology extension: describe transfer to a surrogate and distinguish nucleus donor, egg donor and surrogate roles using Dolly as the example.

4. Biology extension: explain that nuclear genetic similarity does not guarantee an identical phenotype and that mitochondrial DNA largely comes from the egg donor.

5. Biology extension: explain how an engineered animal can carry a gene for a human protein, and cloning can reproduce animals with that nuclear genotype.

6. Evaluate welfare, success-rate and product-purification issues; do not confuse cloning alone with inserting a new gene.

Cleanup

- Return models and keep the corrected work.

Record your evidence

Blank spaces are for your own work

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Reference and task data

The detailed mammalian-cloning and cloned-transgenic-animal content is Biology-only. Shared learners recap recombinant DNA principles. Pearson 5.20B concerns use of cloned transgenic animals to produce human proteins, not merely the generic gene-transfer definition. Use diagrams only.

Example / trial	Observation / evidence	Explanation / limit
Evidence / comparison		
Explanation		
Limit / correction		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Does cloning by itself insert a new gene?

2. What is a transgenic organism?

3. Biology: which nucleus is transferred in adult-cell cloning?

4. Biology: why remove the egg nucleus?

5. Biology: does the surrogate supply the clone's nuclear genome?

6. Biology: why must a therapeutic protein be purified and checked?