

Cloning

Q:1 The use of cloned animals in food production is controversial.

It is now possible to clone 'champion' cows.

Champion cows produce large quantities of milk.

(a) Describe how adult cell cloning could be used to produce a clone of a 'champion' cow.

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(4 marks)

(b) Read the passage about cloning cattle.

The Government has been accused of 'inexcusable behaviour' because a calf of a cloned American 'champion' cow has been born on a British farm. Campaigners say it will undermine trust in British food because the cloned cow's milk could enter the human food chain.

But supporters of cloning say that milk from clones and their offspring is as safe as the milk we drink every day.

Those in favour of cloning say that an animal clone is a genetic copy. It is not the same as a genetically engineered animal. Opponents of cloning say that consumers will be uneasy about drinking milk from cloned animals.

Use the information in the passage and your own knowledge and understanding to evaluate whether the government should allow the production of milk from cloned 'champion' cows.

Remember to give a conclusion to your evaluation.

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(5 marks)

Q:2 Scientists have brought an extinct species of mountain goat, the Pyrenean ibex, 'back to life'. These scientists used skin cells from preserved Pyrenean ibex in cloning experiments.

The Scientists:

- removed the nuclei from domestic goat egg cells
- transferred cell nuclei from the skin cells of the Pyrenean ibex into domestic goat egg cells
- used the domestic goats as surrogate mothers for the embryos that developed.

The scientists made 439 cloned embryos, but only 57 were suitable for transfer into the surrogate goat mothers. Only seven of the goats got pregnant and only one live offspring was born.

Some biologists are very worried about using cloning to preserve endangered animals, because cloned animals often have developmental problems. Some endangered animals are difficult to breed in captivity. For these animals cloning is another way to continue the genetic line.

The biggest threats to endangered animals today are habitat loss, illegal hunting, pollution and climate change. Many scientists say that cloning is not as important as trying to preserve the wild places on Earth. The wild places are being lost very quickly and the animals and plants living in the wild places are dying out.

(a) The Pyrenean ibex was 'brought back to life'.

How is this process different from using adult cell cloning to clone a pet animal?

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(1 mark)

(b) Evaluate the use of adult cell cloning to conserve endangered species.

Use the information given and your own knowledge and understanding.

Remember to give a conclusion to your evaluation.

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(4 marks)

Q:3 Some animals similar to kangaroos are endangered species.

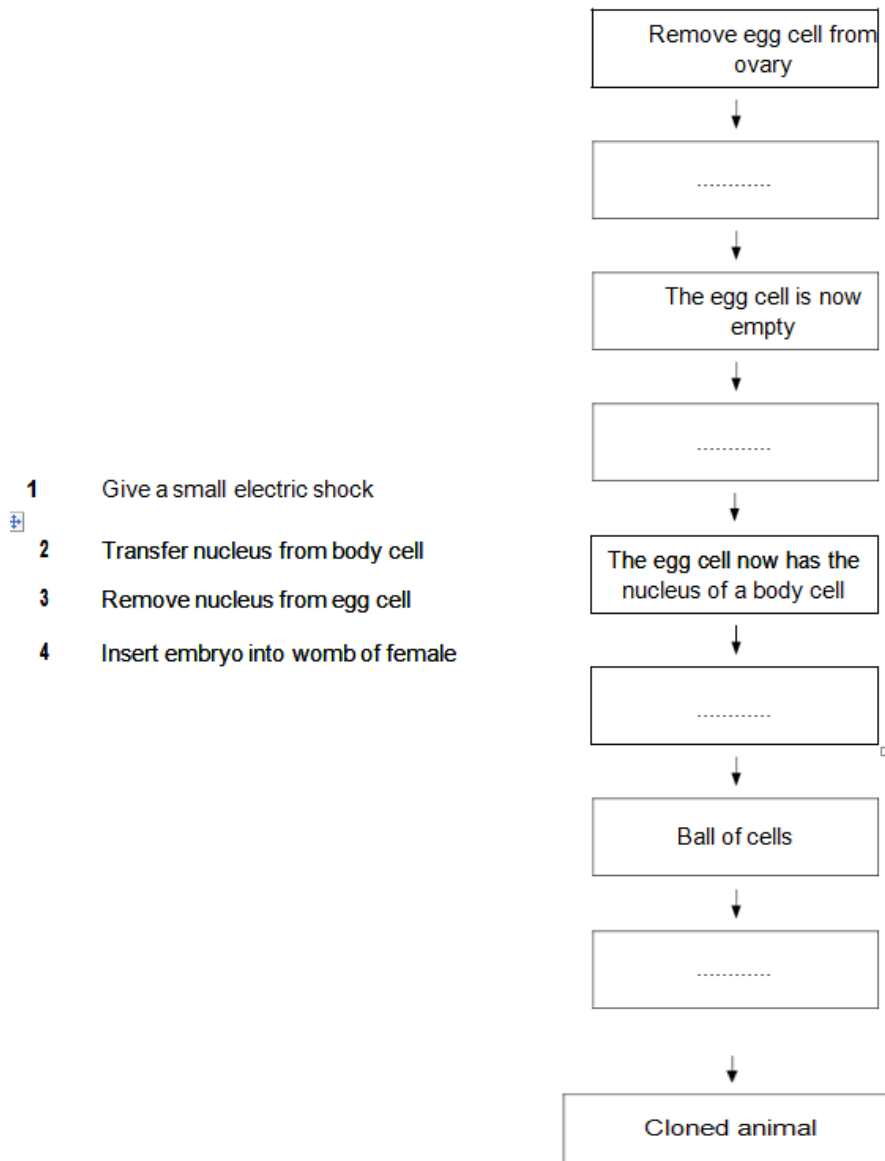
Cloning is one way of making sure that endangered species do not die out.

The flowchart on the opposite page shows one way of cloning an animal.

The four statements needed to complete the flowchart are numbered 1, 2, 3 and 4.

Complete the flow chart by writing the number of the correct statement in the empty box.

Each number should be used once only.

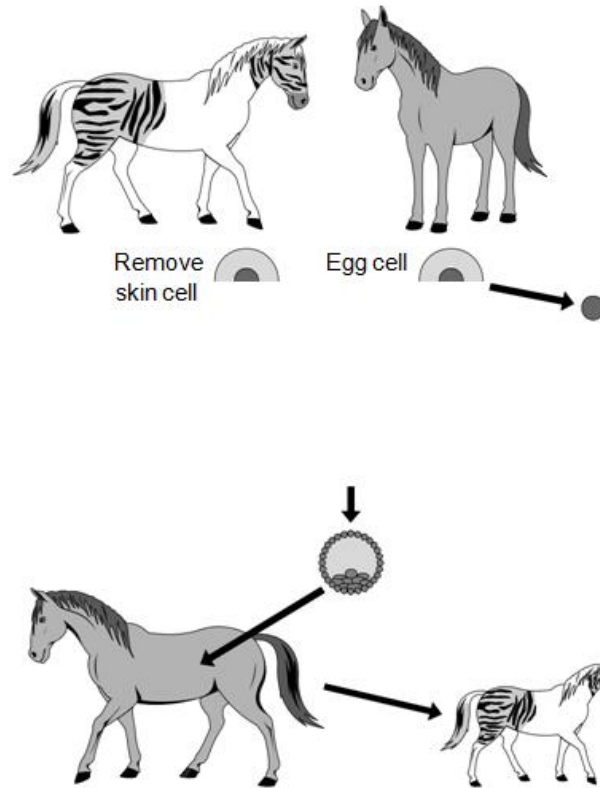


(4 marks)

Q:4 Zorses are not able to breed.

Scientists could produce more zorses from this zorse by adult cell cloning.

The diagram shows how the scientists might clone a zorse.



In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Use information from the diagram and your own knowledge to describe how adult cell cloning could be used to clone a zorse.

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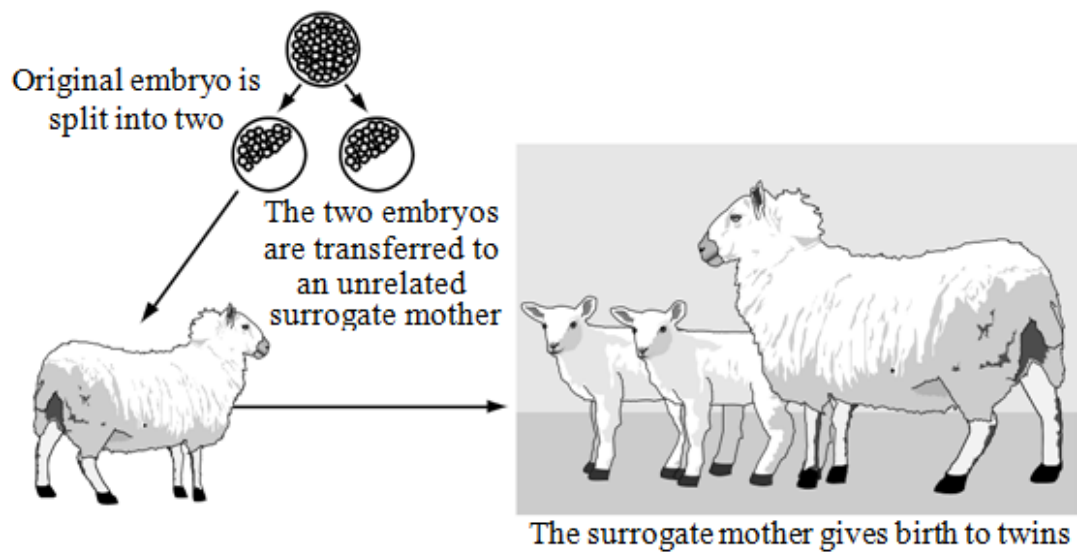
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(6 marks)

Q:5 The diagram shows one way of cloning sheep.



The surrogate mother gives birth to twins

Use words from the box to complete the sentences.

asexual	clones	different	gametes
identical	joining	sexual	splitting

The original embryo in the diagram developed following the of an egg and a sperm. This is called reproduction. The twins in the diagram have genetic information. This is because the two embryos were produced by reproduction. Because of this they are known as

(5 marks)

Q:6 Tetra is the first monkey to be cloned.



The method is described below.

- A sperm and an egg were combined and the resulting embryo was allowed to split into two cells, then four, then eight cells.
- At the eight-cell stage, the embryo itself was split by scientists to produce four two-cell embryos.

- The four embryos were then implanted into surrogate mothers. Three of the embryos did not survive. The fourth, Tetra, was born 157 days later. Her name means 'one of four'.

(a) Explain why this method could produce several identical monkeys.

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(2 marks)

(b) Suggest two reasons why these monkeys would be valuable in trials of new treatments for human diseases.

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(2 marks)

Q:7 Organisms that are in danger of extinction can be cloned. List A gives the names of three different cloning techniques. List B gives information about these techniques.

Draw a line from each technique in List A to the correct information about it in List B.

**List A
Technique**

**List B
Information**

Adult cell cloning

Small groups of cells from parts of a plant are grown on a special jelly.

Embryo transplanting

Cells from a developing animal are separated before they become specialised and then placed into host mothers.

Tissue culture

Genes are cut out from chromosomes and inserted into other organisms.

A nucleus is removed from an unfertilised egg cell. The nucleus from a body cell is inserted into the egg cell. An electric shock causes the egg to start to divide.

(3 marks)

Q:8 Scientists have recently cloned a mouse that had died and been frozen for 16 years.

(a) Explain what is meant by a clone.

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(2 marks)

(b) The scientists used an egg cell from a living mouse and the genetic material from a brain cell of the frozen mouse.

Describe how the process of adult cell cloning could be used to clone the frozen mouse.

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(3 marks)

(c) People could ask scientists to use this technique to clone long-dead relatives, whose bodies have been deep-frozen.

Most people would be opposed to cloning a human from a deep-frozen, long-dead relative.

Give one reason why.

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(1 mark)