1 (a) Describe how the process of micropropagation (tissue culture) can be used to produce plants with desirable characteristics.

(5)

(b) Plants can also be produced from seeds.
Give two advantages of using micropropagation rather than using seeds to produce plants with desirable characteristics.

(2)

1 .....

2 .....

(Total for Question = 7 marks)

2 Describe the stages used to produce a cloned mammal.

(5)

(Total for Question = 5 marks)

3 The diagram shows one side of an organ donor card.

I request that after my death

A. any part of my body may be used for the treatment of others ☐, or

B. my kidneys ☐ corneas ☐ heart ☐ lungs ☐ liver ☐ pancreas ☐ be used for transplantation.

Signature _____ Date _____

Full name _____
(BLOCK CAPITALS)

In the event of my death, if possible contact:

Name _____ Tel. _____

Remember to tell someone close to you that you want to be an organ donor. We'll need their agreement if the time ever comes.

(a) The table lists different human illnesses.

Complete the table by giving the donated organ **named on the card** needed to cure each illness. The first one has been done for you.

(5)

Illness	Organ needed to cure illness
uremia	kidney
emphysema	
coronary failure	
diabetes	
hepatitis	
poor vision	

(b) Describe the role of the liver in digestion.

(2)

(c) There is a shortage of people willing to donate their organs. Scientists hope to create cloned organisms to solve this problem.

(i) What is a **cloned** organism?

(2)

(ii) Suggest **two** advantages of using cloned organisms to provide organs rather than relying on people to donate organs.

(2)

1

2

(Total for Question = 11 marks)

4 During the cloning of mammals unfertilised eggs are collected from the female.

These unfertilised eggs are stored in a special nutrient solution before they are fertilised.

Design an investigation to find the best storage temperature for the survival of the unfertilised eggs.

Your answer should include experimental details and be written in full sentences.

(6)

(Total for Question = 6 marks)

5 The passage describes tissue culture in plants.

Complete the passage by writing a suitable word or words in each of the spaces.

(10)

Plant scientists use the technique of micropropagation to produce large numbers of genetically .....plants.

A small fragment of plant, called an ..... , is cut using a scalpel.

The scalpel needs to be ..... to reduce the risk of contamination by .....

The fragment is then placed in a vessel containing a ..... medium.

This medium needs to contain ..... , to provide the growing plants with energy. It also contains mineral ions such as magnesium for .....production and ..... for amino acids. The advantages of micropropagation include the ability to produce .....numbers of plants and it can be done at ..... time of year.

(Total for Question = 10 marks)

6 The photograph shows a mouflon sheep. The wool of this sheep is very valuable.



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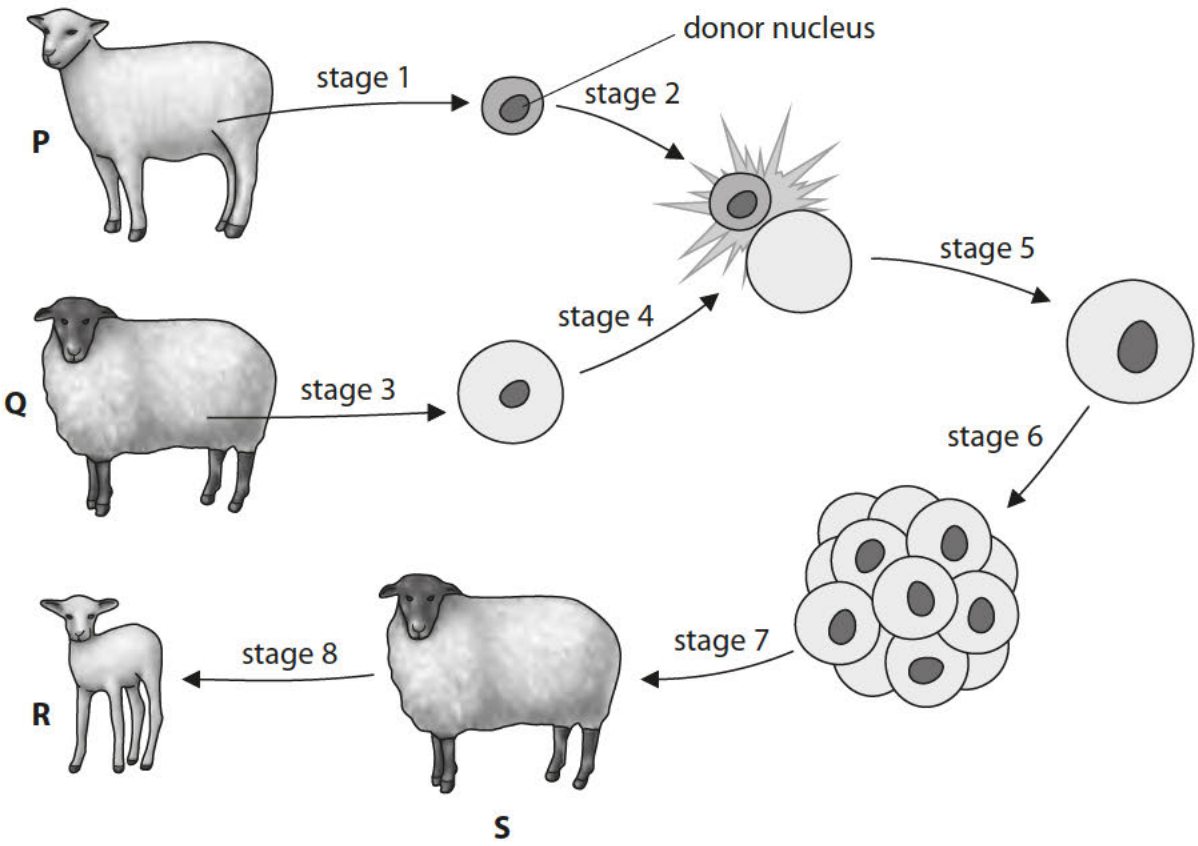
This breed of sheep is only found in small numbers on some Mediterranean islands. Scientists hope to increase the population of mouflon sheep using cloning.

Describe the steps that need to be taken to clone mouflon sheep.

(5)

(Total for Question = 5 marks)

7 The diagram shows stages in the cloning process that produced Dolly the sheep.



(a) The table lists three events that take place in the cloning process that produced Dolly the sheep.

Complete the table by giving the number of the stage when each event takes place.

(3)

Event	Stage number
cell division produces an embryo	
an embryo is put into a surrogate mother	
an egg cell is collected from a female sheep	

(b) Which sheep in the diagram is Dolly?

(1)

- ☒ **A** P
- ☒ **B** Q
- ☒ **C** R
- ☒ **D** S

(c) Which sheep are genetically identical?

(1)

- ☒ **A** P, Q, R and S
- ☒ **B** P and Q
- ☒ **C** P and S
- ☒ **D** P and R

(Total for Question = 5 marks)