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(a) Explain what is meant by a 'clone'.
[3]
(b) Outline, with reference to specific examples, the advantages and disadvantages of cloning.
The quality of your written communication will be assessed and you should make clear reference
to specific examples.
[7]
[Total: 10]



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2	The English elm, Ulmus procera, can produce structures when under stress. These structures
	can then grow to form new individual elms.
	(a) State the name given to this process.
	[1]
	This process is an example of asexual reproduction.
	(b) Explain why.
	[2]
	(c) Outline, in detail, how this process occurs in the English elm.
	[4]
	(d) State two examples of 'stress' that the English elm may face.
	[2]
	(e) Explain the advantages and disadvantages of this process for the English elm.
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	[4]







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3

A potato plant can propagate by producing structures called tubers from which new plants can
protrude.
The fungi Colletotrichum atramentarium is responsible for a disease called 'black dot' in potatoes.
Hybrid varieties of potato that are resistant to 'black dot' have been cultivated. These varieties
are then inoculated with spores of the fungi that causes 'black dot'.
(a) Suggest how scientists at research stations can then produce large numbers of potato that
are resistant to the 'black dot' disease.
[5]
(b) Suggest how these hybrid varieties of potato may have been produced.
[5]
[Total: 10]



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4	(a) Describe the process of tissue culture and how it is an example of large-scale cloning.					
	[4]					
	Tissue culture is an example of artificial vegetative propagation.					
	(b) With reference to natural vegetative propagation in one named species, outline the					
	differences between natural and artificial vegetative propagation.					
	[4]					
	(c) State two advantages and disadvantages of tissue culture.					
	advantages					
	1					
	2					
	[2]					
	disadvantages					
	1					
	2					
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	[Total: 12]					





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5 Cloning can be a natural or artificial process.

A variety of artificial cloning procedures are based on stem cells.

(a) Describe what is meant by the term 'stem cell'.

[2]

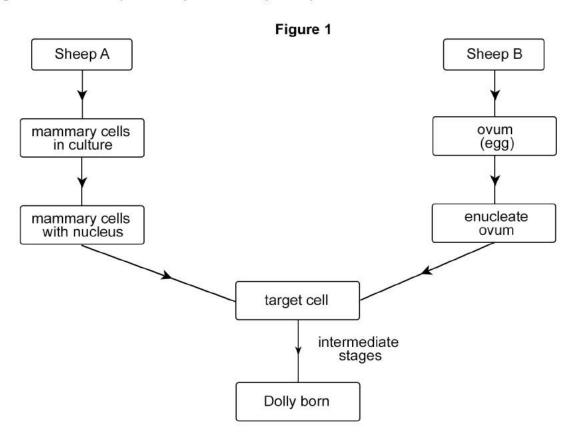
(b) State and describe a use of 'stem cells' for artificial cloning.

[3]

Artificial cloning can either be reproductive and non-reproductive.

'Dolly the sheep', a Finn Dorset ewe, was the first cloned animal.

Figure 1 shows the process by which 'Dolly' was produced.





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c) State and explain whether 'Dolly' is a clone of Sheep A or Sheep B.
[2]
(d) Explain the purpose of the enucleated ovum.
[4] [Total: 11]
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