

# Cloning and Biotechnology

## Question Paper 1

Level	A Level
Subject	Biology
Exam Board	OCR
Module	Genetics, evolution and ecosystems
Topic	Cloning and biotechnology
Booklet	Question Paper 1

**Time allowed:** 38 minutes

**Score:** /28

**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E
>69%	56%	50%	42%	34%	26%

## Question 1

Bacteria are used in many areas of biotechnology.

In which of the following processes, **A** to **D**, do bacteria **not** play an active role?

- A** bioinformatics
- B** bioremediation
- C** cheese-making
- D** manufacturing human insulin

[Total: 1]



## Question 2

Mycoprotein is a food produced using the fungus *Fusarium venenatum*.

Which statement about mycoprotein is correct?

- A. production of protein is slower than in animals and plants
- B. production is dependent on seasons
- C. waste products can be used as a substrate
- D. there are no ethical issues associated with production

[Total: 1]



### Question 3

Immobilised enzymes can be produced by which of the following methods?

- A binding enzyme to a soluble matrix
- B intermolecular hydrogen bonding of enzymes
- C absorbing enzymes onto the surface of a gel
- D enclosing enzymes within a partially permeable membrane

[Total: 1]



## Question 4

The last giant Galapagos tortoise died in 2012. Scientists froze some of the tortoise's cells.



The following statements describe processes involved in potential cloning of the giant Galapagos tortoise using the cells. They are **not** in the correct order.

- 1 A donor egg is enucleated.
- 2 The embryo develops into a mature egg, which is incubated.
- 3 A somatic cell from the tortoise is defrosted and the nucleus is removed.
- 4 Electrofusion of the host cell and new nucleus.
- 5 The somatic cell nucleus is inserted into the enucleated oocyte.
- 6 The transformed egg divides *in vitro*.

Which option states the correct order for producing a clone of the giant Galapagos tortoise?

- A** 1, 3, 4, 5, 6, 2
- B** 3, 5, 1, 4, 2, 6
- C** 1, 6, 3, 5, 4, 2
- D** 3, 1, 5, 4, 6, 2

[Total: 1]

## Question 5

Fig. 21 shows some of the steps involved in producing a genetically modified bacterium.

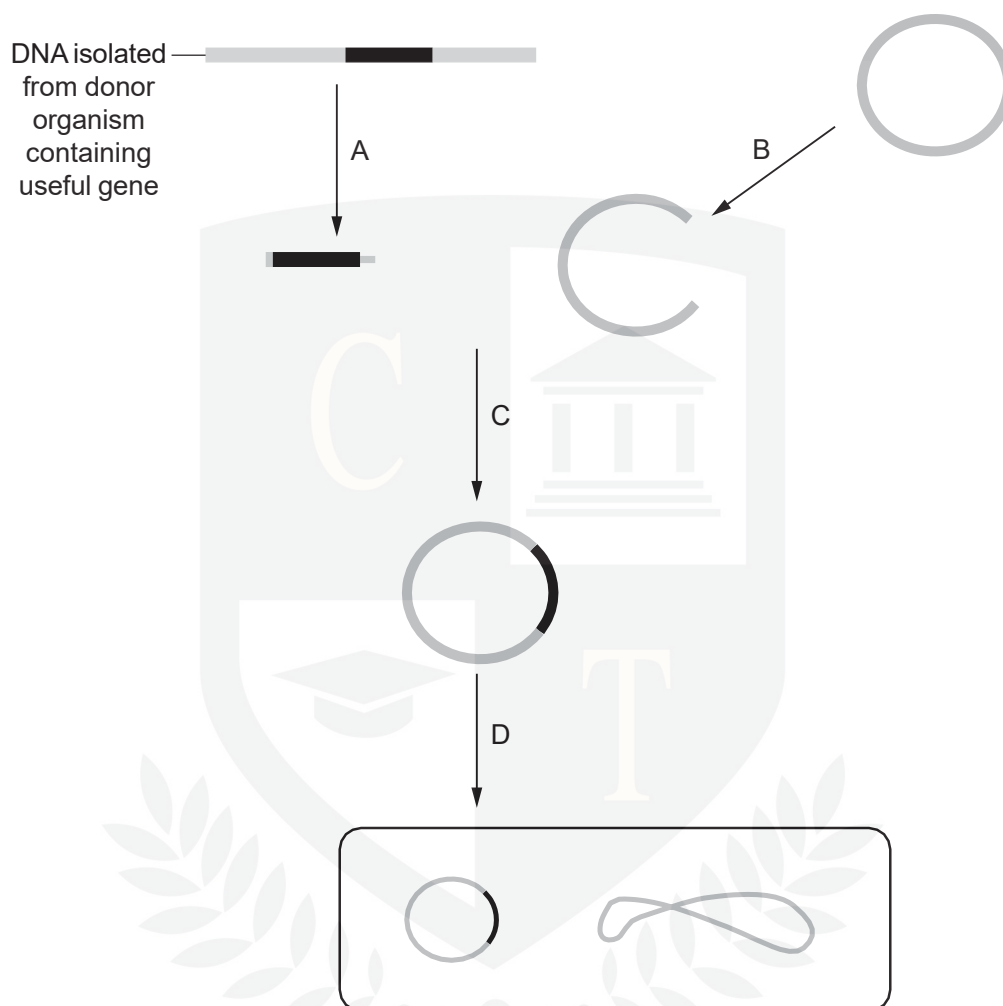


Fig. 21

(a) The following passage describes steps A and B. Complete the passage using the most appropriate terms.

A gene is cut from the DNA of the donor organism using a .....

The ..... enzyme is used to cut open a small piece of bacterial DNA so that the base sequences at the end of each piece of DNA are .....

[3]

(b) Describe the **events** that are taking place at the step labelled C. [3]

(c) Step D results in a transformed bacterium.

Many individual bacteria are not transformed successfully during this procedure.

Explain how scientists can determine the success of step D in this procedure.

[3]

(d) Bacteria can be genetically modified to produce human insulin.

The process is similar to that shown in **Fig. 21** with some differences.

First, instead of isolating DNA that contains the insulin gene, mRNA that codes for insulin is extracted from human pancreas cells.

What needs to be done with the mRNA in order for the rest of the genetic modification to be completed? [2]

(e) Some people are concerned about genetic modification.

State one valid concern that people have about the genetic modification of **bacteria**. [1]

[Total: 12]

## Question 6

Laboratory techniques are used by workers in various professions, and by scientists.

- (a) A patient has been coughing blood, and it is suspected that bacteria will be found in the blood.

A medical technician cultures the blood on an agar plate. What measures should the technician take to keep the agar plate culture sterile?

[2]

- (b) Tissue traces from a crime scene often need to be identified. DNA from the tissue is 'amplified' by the polymerase chain reaction (PCR) to get samples large enough for further analysis.

Modern PCR technique uses DNA polymerase from the bacterium *Thermus aquaticus*. Why is this enzyme chosen?

[2]

- (c) Valine, citrulline, hydroxyproline and glutamic acid are amino acids that are normally found in considerable amounts in urine. Following certain diets can result in a change in the amino acids present in the urine of some people.

Plan a method to compare the amino acids present in the urine of a person who has been following one of these diets with that of a person who has not.

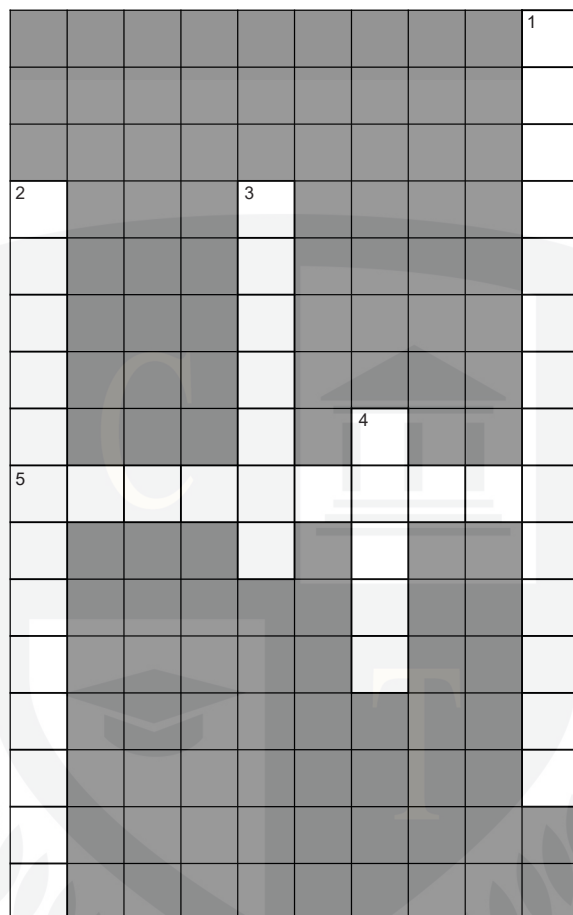
[3]

[Total: 7]



## Question 7

Fig. 5.1 is a crossword that should contain five words relating to the use of microorganisms by humans.



**Fig. 5.1**

Use the clues below to write the five appropriate words in the correct spaces on Fig. 5.1.

**[5]**

### ACROSS

**5** Microbial culture method in which nutrients are added and the product harvested throughout the fermentation process.

### DOWN

**1** Technique that makes enzymes more thermostable and allows them to be re-used.

**2** The industrial use of living organisms to produce food, drugs or other products.

**3** Sterile technique that prevents the growth of undesirable microorganisms.

**4** Kingdom of eukaryotic microorganisms with cell walls made of chitin.

**[Total: 5]**