

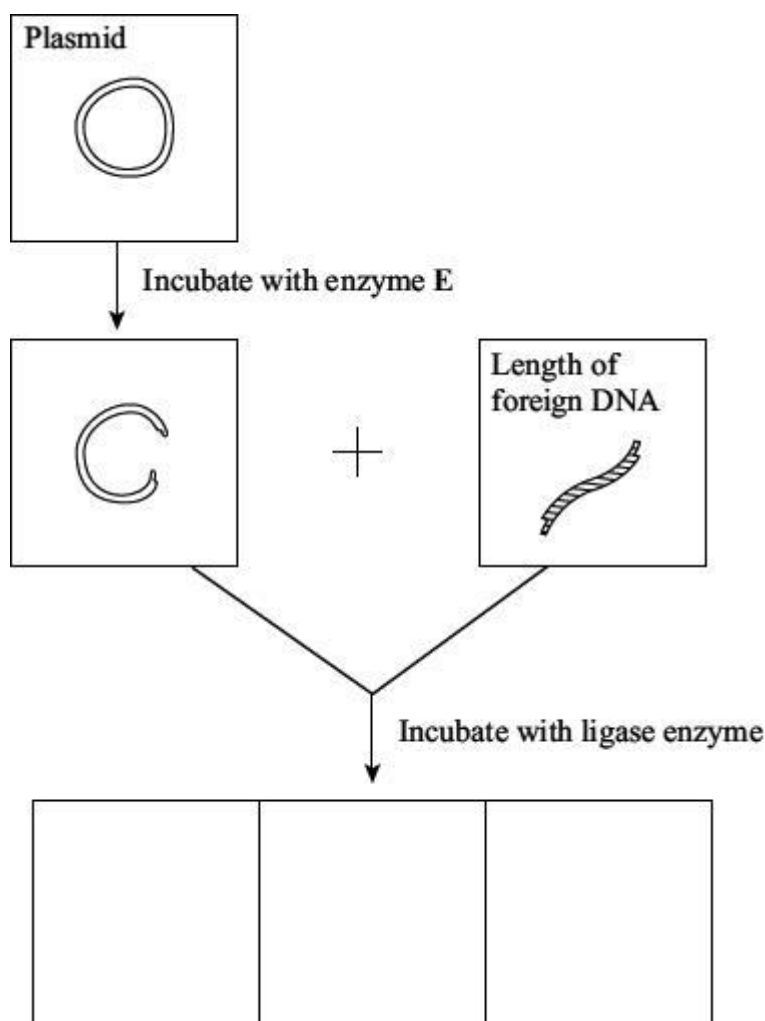
Name of the Student: _____

Max. Marks : 28 Marks

Time : 28 Minutes

Q1.

Plasmids can be used as vectors to insert lengths of foreign DNA into bacteria. The diagram shows how this is achieved.



(a) Name enzyme **E**.

(1)

(b) Cut plasmids and lengths of foreign DNA can join. What features of their ends allows them to join?

(2)

- (c) Draw **three** different structures that could be formed by incubating cut plasmids and lengths of foreign DNA with ligase. Use the spaces provided on the diagram.

(3)

(Total 6 marks)

Q2.

- (a) What is meant by a gene?

(2)

The polymerase chain reaction (PCR) can be used to obtain many copies of a particular gene.

- (b) Explain how the strands of DNA are separated during the PCR.

(2)

- (c) In a particular PCR, two different primers are added to the DNA.

- (i) Why are primers required?

(1)

- (ii) Suggest why two different primers are required.

(1)

- (d) Starting with a single molecule of DNA, the polymerase chain reaction was allowed to go through three complete cycles. How many molecules of DNA would be produced?

Answer _____

(1)

(Total 7 marks)

Q3.

Read the following passage.

The giant panda is one of the rarest animals in the world and is considered to be on the brink of extinction in the wild. Giant pandas have been kept and bred in zoos with the hope that they could be released into the wild. One worry is that small populations, like those in zoos, reduce the genetic variation needed to allow the species to adapt to changing conditions. Unfortunately, pandas find it difficult to reproduce in captivity. Fertilisation of the females is guaranteed only by insemination with semen from several males. With so many potential fathers, the true paternity of the cubs is not clear. It is important to identify the fathers to maintain genetic variation.

5

Panda faeces can be collected in the wild. The faeces contain DNA from the panda, from the bamboo on which they feed and from bacteria. The DNA is subjected to the polymerase chain reaction (PCR). The primers used attach only to the panda DNA. The resulting DNA is subjected to genetic fingerprinting. This can help us to count the number of individuals in the wild because it allows us to identify individual pandas.

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Use information in the passage and your own biological knowledge to answer the questions.

- (a) Describe how genetic fingerprinting may be carried out on a sample of panda DNA.

(6)

- (b) (i) Explain how genetic fingerprinting allows scientists to identify the father of a particular panda cub.

(2)

- (ii) When pandas are bred in zoos, it is important to ensure only unrelated pandas breed. Suggest how genetic fingerprints might be used to do this.

(1)

- (c) (i) Suggest why panda DNA is found in faeces. (line 10)

(1)

- (ii) Explain why the PCR is carried out on the DNA from the faeces. (line 12)

(1)

- (iii) Explain why the primers used in the PCR will bind to panda DNA, but not to DNA from bacteria or bamboo. (line 12)

(2)

- (d) DNA from wild pandas could also be obtained from blood samples. Suggest **two** advantages of using faeces, rather than blood samples, to obtain DNA from pandas.

1. _____

2. _____

(2)

(Total 15 marks)