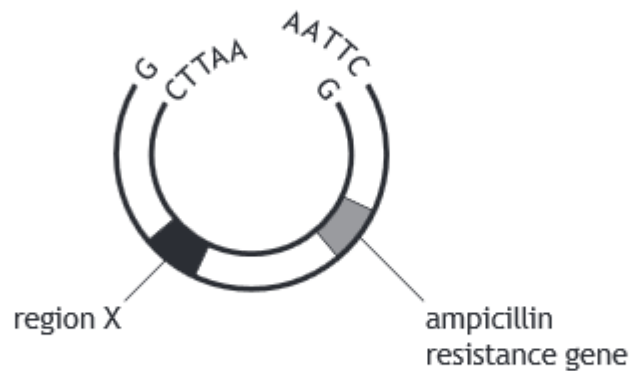


## Genetic Control of Metabolism

B Describe recombinant DNA technology.

4

5. The diagram shows some features of a plasmid which has been cut open by a restriction endonuclease to allow a gene from a donor chromosome to be inserted.



The DNA recognition sites for three restriction endonucleases, *E coR1*, *BamH1*, and *HindIII*, are shown in the table. The arrows indicate where each restriction endonuclease cuts the DNA sequence.

<i>Restriction endonuclease</i>	<i>DNA sequence recognised</i>
<i>E coR1</i>	↓ GAATTC CTTAAG ↑
<i>BamH1</i>	↓ GGATCC CCTAGG ↑
<i>HindIII</i>	↓ AAGCTT TTCGAA ↑

- (a) (i) A restriction endonuclease was used to remove a gene from a donor chromosome.

**Use information from the diagram and the table** to identify the restriction endonuclease which would be used to allow the gene to be inserted into the plasmid.

Give a reason for your answer.

2

Restriction endonuclease \_\_\_\_\_

Reason \_\_\_\_\_

- (ii) Name the enzyme which would be used to seal the gene into the plasmid.

1

\_\_\_\_\_

- (iii) A culture of bacterial cells, 20% of which had taken up this modified plasmid, were grown on a nutrient agar plate. The plate was incubated and 250 colonies of this bacteria grew.

Predict the number of colonies which would have been expected to grow if the nutrient agar plate had contained the antibiotic ampicillin.

1

*Space for calculation*

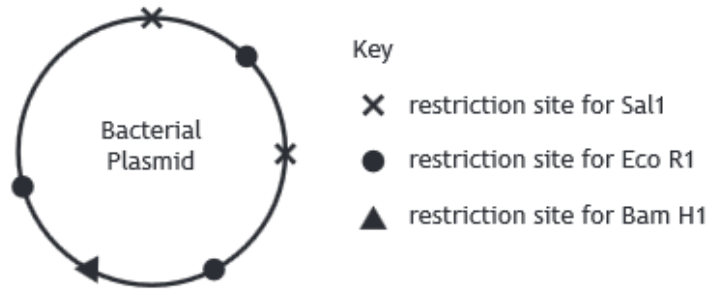
\_\_\_\_\_

- (b) Name region X, shown in the diagram, which ensured that the modified plasmid would be passed on to daughter cells.

1

\_\_\_\_\_

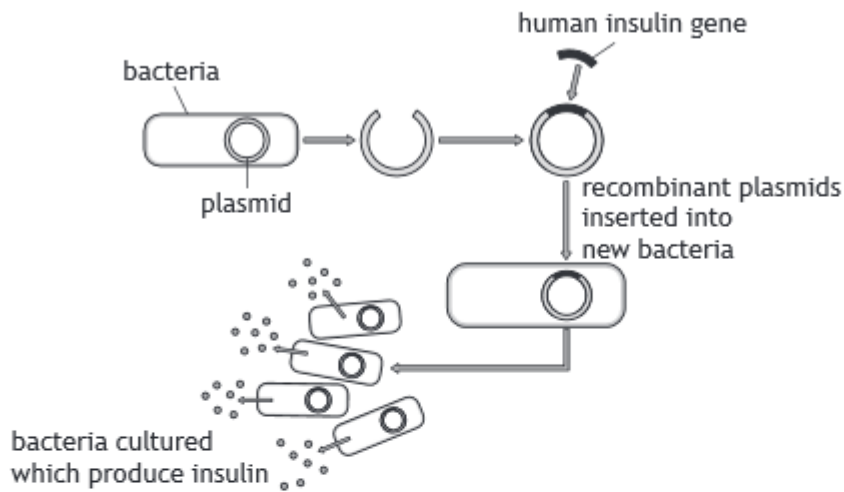
12. The diagram shows a bacterial plasmid with restriction sites for three different restriction endonucleases, Sal1, Eco R1 and Bam H1.



Which row in the table identifies the number of fragments produced if the plasmid was cut with the combinations of restriction endonucleases shown?

	<i>Combination</i>	
	<i>Sal1 and Bam H1</i>	<i>Sal1 and Eco R1</i>
A	3	4
B	3	5
C	4	4
D	4	5

9. The diagram below shows how a human gene can be inserted into bacteria to produce human insulin using recombinant DNA technology.



- (a) Name one enzyme used in this process and state its function.

2

Name \_\_\_\_\_

Function \_\_\_\_\_

- (b) (i) The recombinant plasmid also contains a gene for resistance to the antibiotic, ampicillin.

Describe a procedure which would allow only cells containing the recombinant plasmid to be selected.

2

\_\_\_\_\_  
\_\_\_\_\_