

Genetic engineering: practice questions

6 questions · 15 marks · mark scheme at the back

For Edexcel GCSE Biology 1BI0 and Combined Science 1SC0. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Name

Total / 15

1 What is genetic engineering? [1 mark]

- A. ☐ Choosing parents with desired characteristics to breed together.
- B. ☐ Growing many identical plants from small pieces of tissue.
- C. ☐ Modifying the genome of an organism to introduce desirable characteristics.
- D. ☐ Using living organisms to control pests.

2 Bacteria can be genetically engineered to make human insulin. Describe what is done to the bacteria and the result. [2 marks]

3 **Higher tier** [3 marks]

Describe the roles of restriction enzymes and ligase in genetic engineering.

4 **Higher tier** [4 marks]

Describe the main stages in inserting a gene into a bacterial plasmid vector.

5

Triple only

[3 marks]

Crop plants can be genetically engineered with a gene from *Bacillus thuringiensis*. Explain how this benefits a farmer.

6

Triple only

[2 marks]

Give two disadvantages of growing GM crops.

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

C C (1)

2. [2]

- the human gene for insulin is inserted into the genome / DNA of the bacteria (1)
- the bacteria can make human insulin (1)

3. [3] **Higher tier**

- restriction enzyme cuts DNA at a specific base sequence (1)
- leaving sticky ends (1)
- ligase joins the DNA / gene into the vector (1)

4. [4] **Higher tier**

- cut the gene out using a restriction enzyme (1)
- cut the plasmid with the same restriction enzyme, so sticky ends match (1)
- mix the gene and plasmid, and use ligase to join them (1)
- insert the plasmid (vector) into the bacterium (1)

5. [3] **Triple only**

- the gene codes for a toxin that kills insect pests (1)
- so less of the crop is eaten / damaged, giving a higher yield (1)
- less insecticide needs to be used (1)

6. [2] **Triple only**

- possible risk to human health (1)
- genes may spread to wild plants / the toxin may harm other insects (1)
- seeds are expensive / farmers must buy new seeds (1)
- some people think it is wrong (1)
- Max 2