

Genetic modification: practice questions

6 questions • 16 marks • mark scheme at the back

For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

Name

Total / 16

1 Define the term genetic modification. [2 marks]

2 Which is an example of genetic modification? [1 mark]

- A. ☐ Crossing two different varieties of wheat
- B. ☐ Inserting a human gene into bacteria so they make insulin
- C. ☐ Treating diabetes with insulin injections
- D. ☐ Growing yeast in a fermenter

3 Outline three ways in which genes have been inserted into crop plants to improve them. [3 marks]

4 **Supplement** [5 marks]

Bacteria can be genetically modified to make human insulin. Outline the process, starting from the human insulin gene.

Which enzyme is used to join a human gene into a bacterial plasmid?

- A. ☐ Restriction enzyme
- B. ☐ DNA ligase
- C. ☐ Amylase
- D. ☐ Protease

Maize can be genetically modified to be resistant to insect pests. Discuss the advantages and disadvantages of growing this GM maize.

Mark scheme

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

1. [2]

- changing the genetic material of an organism (1)
- by removing, changing or inserting individual genes (1)

2. [1]

B B (1)

3. [3]

- gene for resistance to herbicides (1)
- gene for resistance to insect pests (1)
- gene to improve nutritional quality (1) allow golden rice / more vitamin A

4. [5] Supplement

- gene cut out of human DNA using restriction enzymes (1)
- leaving sticky ends (1)
- plasmid cut with the same restriction enzyme, giving complementary sticky ends (1)
- gene joined into plasmid using DNA ligase, forming a recombinant plasmid (1) reject ligase cuts
- recombinant plasmid inserted into bacteria (1)
- bacteria multiply (1)
- bacteria express the gene / make insulin (1)
- Max 5

5. [1] Supplement

B B (1)

6. [4] Supplement

- advantage: higher yield as fewer plants are damaged by insects (1)
- advantage: less insecticide needed, saving money / less harm to other insects (1)
- disadvantage: gene could spread to wild plants (1)
- disadvantage: may harm non-pest insects / reduce biodiversity (1)
- disadvantage: insect pests may become resistant (1)
- disadvantage: seeds expensive / long-term effects on health not known (1)
- Max 4; Max 3 if only advantages or only disadvantages