

# Genetic engineering

4.6.2.4 · Inheritance, variation and evolution · revision notes

Genetic engineering modifies an organism's genome by introducing a gene from another organism to give a desired characteristic, for example bacteria that make human insulin and GM crops. Everyone needs the uses, benefits, risks and objections.

## Key facts

- Genetic engineering = introducing a gene from another organism to give a desired characteristic
- GM crops: resistant to insects, herbicides or disease; bigger fruits; increased yields
- Bacteria engineered to make human insulin (to treat diabetes)
- Concerns: effects on wild flowers and insects; effects of eating GM crops on health not fully explored

## Notes

### What genetic engineering is

- Genetic engineering** is modifying the **genome** of an organism by introducing a **gene from another organism** to give a desired characteristic.
- Bacterial cells** have been genetically engineered to produce useful substances such as **human insulin** to treat diabetes.
- Plant crops** have been genetically engineered to be resistant to diseases or to produce bigger, better fruits.
- Crops that have had their genes modified in this way are called **genetically modified (GM) crops**. They include crops resistant to **insect attack** or to **herbicides**. GM crops generally show **increased yields**.
- Medical research is exploring the possibility of genetic modification to overcome some **inherited disorders**.

### Benefits, risks and objections

- Benefits: bigger yields from the same land; less of the crop lost to pests or disease; medicines such as insulin made in large amounts; possible future treatments for inherited disorders.
- Concerns about GM crops include their effect on populations of **wild flowers and insects**.
- Some people feel the effects of **eating GM crops on human health** have not been fully explored.
- Other objections: genes could spread from GM crops to wild plants (e.g. producing herbicide-resistant weeds), and some people think it is wrong to change an organism's genes.

## Don't lose marks

- ✗ Confusing genetic engineering with selective breeding or cloning.
- ✗ Giving vague objections such as 'it's unnatural' without explaining a possible effect (on wild flowers, insects or health).

## More tips

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### Memory tricks

- GM crop concerns: wild flowers, insects, human health.

### Exam technique

- In 'evaluate' questions, give both sides and a conclusion supported by the information given.
- Say that the gene comes 'from another organism'.

## What each grade needs

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What you need to be able to do, from the first marks up to the top grade.

### Grade 4

#### Define genetic engineering

Modifying an organism's genome by introducing a gene from another organism to give a desired characteristic.

### Grade 4

#### Give examples of genetic engineering

Bacteria that make human insulin; crops resistant to disease, insects or herbicides; bigger, better fruits.

### Grade 5

#### State what GM crops are

Crops whose genes have been modified by genetic engineering; they generally give increased yields.

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