

# 6.2.4 Genetic engineering

## AQA GCSE Biology (Higher) Question and answer notes

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### How to use these notes

These notes cover everything you need to know for this part of the specification. They have been written in question-answer format to make them easier for you to study from.

In order to study successfully, I recommend you do the following for each question and answer:

- Read it carefully and make sure you **understand** it.
- **Memorise** the answer.
- **Practice** applying your understanding to past exam questions.

A good way to memorise information is to use **retrieval practice**. This is when you practise retrieving information from your memory. You could do this by making a flashcard for each question with the question on one side and the answer on the other. Or you could use a flashcard app. Alternatively, use a sheet of paper to cover up the answer so you can only see the question. Try to answer the question and then check how you did.

You should practise retrieving each answer from your memory until you can do it perfectly. Even once you can retrieve the answer perfectly, your ability to retrieve it will probably fade as time passes without practising. Therefore you will need to keep going back to the questions that you have previously mastered and practising them again. However, each time you re-learn the answer, the memory will be stronger and will last longer than the time before.

### What is an organism's genome?

An organism's genome is the full sequence of all of that organism's DNA molecules.

### What is genetic engineering?

Genetic engineering is a process in which humans modify an organism's genome by adding one or more genes from another organism. It is used to introduce desired characteristics into the organism that is being genetically engineered.

### What types of organisms can be genetically engineered?

All types of organisms can be genetically engineered. This includes bacteria, plants, animals and fungi.

**What is one way in which bacteria have been genetically engineered?**

Some bacteria have been genetically engineered to produce useful substances, such as human insulin which can be used to treat diabetes.

**What is a genetically modified (GM) crop?**

A genetically modified (GM) crop is a crop plant that has been genetically engineered.

**What are some examples of desired characteristics that crop plants have been genetically engineered to have?**

Examples of desired characteristics that crop plants have been genetically engineered to have include:

- Larger fruits
- Resistance to diseases
- Resistance to insect attack
- Resistance to herbicides

**What is the yield of a crop? How do the yields of GM crops tend to compare to those of crops that have not been genetically engineered?**

The yield of a crop is the amount of food that is produced per acre of land that the crop is grown on per year. GM crops tend to have higher yields than crops that have not been genetically engineered.

**What are herbicides?**

Herbicides are chemicals that are used to kill plants.

**Why is it useful to genetically engineered crop plants to be resistant to herbicides?**

Genetically engineering crop plants to be resistant to herbicides means that the herbicides can be sprayed on fields in which the crop plants are growing without harming the crop plants. The herbicides will kill other plants to prevent them from competing with the crops.

**What are some of the concerns that some people have about GM crops?**

Concerns that some people have about GM crops include the following:

- GM crops might have negative impacts on wild plants or insects
- Eating GM crops may have negative health impacts that have not been discovered

**In genetic engineering, what is a vector? What are some common types of vectors?**

In genetic engineering, a vector is something that is used to insert genes into an organism. Common types of vectors include viruses and bacterial plasmids.

**How might genetic engineering be used in medicine?**

In the future humans with inherited disorders could be genetically engineered to cure them of those disorders.

### **What are the main steps in the process of genetic engineering?**

The main steps in the process of genetic engineering are:

- First, the desired gene is identified in the organism that the gene is being taken from.
- Then, enzymes are used to cut this gene out
- Then, this gene is inserted into a vector, such as a bacterial plasmid or virus
- The vector is then used to insert the gene into the cells of the organism being genetically engineered. This is done at an early stage in the development of the organism so that it develops with the desired characteristic.