# Combined Science (TRILOGY) GCSE Biology
# Success Criteria: Manipulating genes

# Selective breeding

| I can… | |
|---|---|
| ***Describe*** selective breeding or artificial selection as the process by which humans breed plants and animals for particular genetic characteristics. | |
| ***State*** that humans have been doing artificial selection for thousands of year since they first bred food crops from wild plats and domesticated animals. | |
| ***Describe*** the steps of selective breeding<br>• Humans select 'parents' that have the desired characteristic from a mixed population<br>• Breed them together<br>• Then from the offspring produced, select the ones with the most desired characteristic and breed these together<br>• Repeat these steps over many generations until all the offspring show the desired characteristic | |
| ***Explain*** the impact of selective breeding of food plants and domesticated animals | |
| ***Understand*** that characteristic can be chosen for usefulness or appearance:<br>• Disease resistance in food crop<br>• Animals which produce more meat or milk<br>• Domestic dogs with a gentle nature<br>• Large or unusual flowers | |
| ***Explain*** the impact of selective breeding of food plants and domesticated animals | |
| ***Understand*** that selective breeding can lead to 'inbreeding' where some breeds are particularly prone to disease or inherited defects due to increased inheritance of faulty genes. | |
| ***Explain*** the benefits and risks of selective breeding given appropriate information and consider related ethical issues. | |

# Genetic engineering

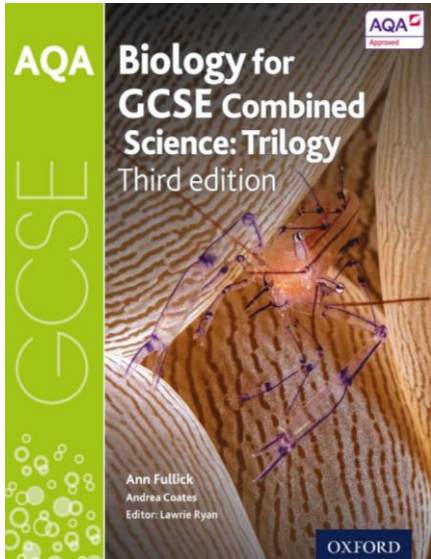| I can… | |
|---|---|
| **Describe** genetic engineering as a process which involves modifying the genome of an organism by introducing a gene from another organism to give a desired characteristic. | |
| **Describe** how genes from the chromosomes of one organism's cell can be 'cut out' and transferred to cells of another organisms using the following steps:<br>• Enzymes are used to isolate (cut out) the required gene<br>• This gene is inserted (pasted) into a vector, usually a bacterial plasmid or a virus<br>• The vector is used to 'carry' the gene into required cells | |
| **Explain** that in order to genetically engineer a multicellular organism (animal or plant) the genes must be transferred at an early stage in development so that they develop with desired characteristic | |
| **State** that 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 | |
| **Explain** that GM crops (such as those that are resistant to insect attack or to herbicides) generally show increased yields. | |
| **Understand** that concerns about GM crops include<br>• the effect on populations of wild flowers and insect<br>• cross pollination of GM with non GM could produce 'super weeds'<br>• feeling that the effects of eating GM crops on human health have not been fully explored (potential risks/side effects) | |
| **Describe** the example of genetically engineered bacterial cells that produce useful substances such as human insulin to treat diabetes. | |
| **State** that modern medical research is exploring the possibility of genetic modification to overcome some inherited disorders. | |
| **Evaluate** the potential benefits and risks of genetic engineering in agriculture and in medicine and that some people have objections. | |

**Additional support:**

**kerboodle**

Access the appropriate textbook on kerboodle.com, create your own revision notes of the key points of the topic and attempt the summary questions.

**AQA Biology for GCSE Combined Science: Trilogy**
Third edition

GCSE

Ann Fullick
Andrea Coates
Editor: Lawrie Ryan

OXFORD

Combined science GCSE textbook

**Selective breeding**
Pages 182-183
**Genetic Engineering**
pages 184-187

Utilise online revision resources to support your class notes, such as…

**BBC Bitesize**

**SENECA** Learn better, faster, free.

**gcsepod** education on demand

**YouTube**

Attempt past paper questions using www.physicsandmathstutor.com and self-mark your answers using the official exam mark schemes.

PMT
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**Extension work/extra challenge:**
Ask your teacher for extension tasks:
- Selective Breeding: A Canine Catastrophe?
- Genetic Engineering