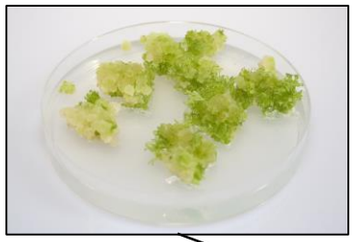
EDEXCEL GCSE NATURAL SELECTION AND GENETIC MODIFICATION PART 2

Agricultural solutions

(Biology only) Solutions to growing human populations		
	Fertilisers	**Advantages:** Increases the growth and yield of crop plants.
		Disadvantages: Excess fertiliser can run off into lakes and rivers and cause pollution leading to the death of other plants and animals.
	Biological control	**Advantages:** Insects can be used to control weed populations. No herbicides are necessary.
		Disadvantages: Introduced insects can complete for non weed plants and disrupt other species food chains.

Tissues cultures



Cloning techniques in plants/animals	
Tissue culture	Small groups of cells to grow new plants in nutrient solution or solid agar. **Advantage:** Important for preservation of rare plants and commercially in nurseries.
	Small groups of human cells used to grow new tissues. **Advantage:** matched tissues can be grown that are not rejected by the body's immune system.

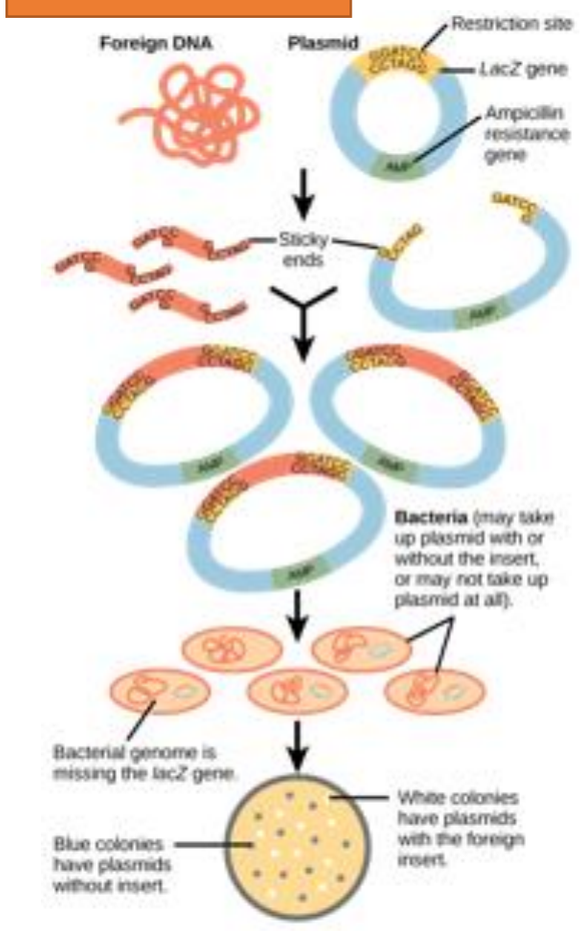
Risks and benefits

Risks and benefits (practical and ethical)	
Genetic engineering	**Risks:** Seeds from GM plants can be very expensive. Some people think eating GM plants is bad for health although there is no evidence to support this view.
	Benefits: decreased use of herbicide with increase in yield from food crops. Medicines tailored for individuals.
Selective breeding	**Risks:** alleles that may be useful in future may be bred out. Populations with low variation can be vulnerable to genetic diseases.
	Benefits: Increased growth and yield of plants and animals for food.

Advantages and disadvantages of genetic engineering	
Advantages	Modification of crop plants e.g. insect resistance from Bacillus thuringiensis. Modification of bacteria to produce human hormones e.g. human insulin made by bacteria.
Disadvantages	Resistant crops could pass on genes to wild plants affecting food chains. Insulin produced using GM bacteria is not identical to human insulin and not everyone can use it.

Genetic engineering

Modification of the genome of an organism to introduce desirable characteristics



Genetic engineering process (HT only)
1. Restriction enzymes are used to isolate and cut out the required gene.
2. If sticky ends of DNA on the isolated gene and the plasmid DNA match then they can be joined together.
3. DNA is joined in the plasmid DNA using the enzyme ligase – bacterial plasmid or virus.
4. Genes are transferred to plants/animals/microbes in a vector (bacteria or virus) at an early stage of development so they develop the required characteristics.

Genetically modified crops (GMO)		
	Crops that have genes from other organisms	To become more resistant to insect attack or herbicides.
		To increase the yield of the crop.