Partners in excellence (Biology only) Solutions (Biology only)	itions to oulations		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.		Risks and benefits (practical and ethical)			PIXUscience		
		Fertilisers				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				
	y) Solu an poț				Genetic			Advantages and disadvantages of genetic engineering		
	gy onl g hum	Biological control	Advantages: Insects can be used to control weed populations. No herbicides are necessary.		engineering	this view.			-	Modification of crop
	(Biolo growin		Disadvantages: Introduced insects can complete f non weed plants and disrupt other species food chains.	or		Benefits: decreased use of herbicide with increase in yiel from food crops. Medicines tailored for individuals.	d		res	plants e.g. insect resistance from Bacillus thuringiensis.
		Agricultural solutions	EDEXCEL GCSE NATURAL		Selective breeding	Risks: alleles that may be useful in future may be bred out. Populations with low variation can be vulnerable to genetic diseases.	1	Adv	antages	Modification of bacteria to produce human hormones e.g. human insulin made by bacteria.
		Tissues	SELECTION AND GENETIC MODIFICATION PART 2			Benefits: Increased growth ar yield of plants and animals for food.				Resistant crops could pass on genes to wild plants affecting food chains.
Cloning techniques in plants/animals			Foreign DNA Plasmid Plasmid Plasmid Plasmid Plasmid Lac2 gene Ampiolin resistance gene		Modification of the genome of an organism to introduce desirable characteristics			Disadvantages		Insulin produced using GM bacteria is not identical to human insulin and not everyone can
Tissue culture	Small groups of cells to		ends	Г	Genetic engineering process (HT only)			use it.		
	so	new plants in nutrient lution or solid agar. Intage: Important for	Ť		1. Restriction enz	. Restriction enzymes are used to isolate and cut out the required gene.				
	prese ar	ervation of rare plants nd commercially in nurseries.	Bacteria (may take up plasmid with or without the insert,		and the plasmid	of DNA on the isolated gene DNA match then they can be ined together.				
	Small	groups of human cells to grow new tissues.	Bacterial genome is missing the tac2 gene. Blue colonies have plasmids without insert.		3. DNA is joined in the plasmid DNA using the enzyme ligase – bacterial plasmid or virus.		lified crops	Crops that	To become more resistant to insect	
	can b	tage: matched tissues be grown that are not ected by the body's mmune system.			plants/animals/n	nes are transferred to microbes in a vector (bacteria early stage of development so the required characteristics.		Genetically modified (GMO)	genes from other organisms	attack or herbicides. To increase
	-							Genet		the yield of the crop.

PiXL			Advantages: Increases the grow	th and yield of crop		I		
artners in excellence		Fertilisers	plants. Disadvantages: Excess fertiliser can run off into lakes and rivers and cause pollution leading to the death of other plants and animals. Advantages: Insects can be used to control weed populations. No herbicides are necessary.			Risks: Seeds from GM plants can be very expensive. Some		
					Genetic engineering	people think eating GM plants is bad for health although there is no evidence to suppor		
		Biological control				this view.		Modification of crop
			Disadvantages: Introduced insernon weed plants and disrupt oth chains.	cts can complete for		Benefits: decreased use of herbicide with increase in yield from food crops. Medicines tailored for individuals.		plants e.g. insect resistance from Bacillus thuringiensis.
		Agricultural solutions	EDEXCEL GCSE NATURAL	Risks and benefits	Selective breeding	Risks: alleles that may be useful in future may be bred out. Populations with low variation can be vulnerable to genetic diseases.	Advantages	Modification of bacteria to produce human hormones e.g. human insulin made by bacteria.
		Tissues	SELECTION AND GENETIC MODIFICATION PART 2	Genetic engineering		Benefits: Increased growth an yield of plants and animals for food.		Resistant crops could pass on genes to wild plants affecting food chains.
		cultures	Foreign DNA Plasmid	Restriction site LacZ gene Ampicillin resistance gene	an org	tion of the genome of anism to introduce able characteristics	Disadvantages	Insulin produced using GM bacteria is not identical to human insulin and not everyone can
		groups of cells to	ange gene Sticky ends					use it.
Tissue culture	grow new plants in nutrient solution or solid agar. Advantage: Important for		T and the second s			nzymes are used to isolate and It the required gene.		
	preserva and o	ation of rare plants commercially in nurseries.	Bacterial genome is missing the tac2 gene	and the plasmic	s of DNA on the isolated gene I DNA match then they can be oined together.			
	Small gro	oups of human cells grow new tissues.			3. DNA is joined in the plasmid DNA using the enzyme ligase – bacterial plasmid or virus.		Crops th	at To become more resistant to insect
	can be g	ntage: matched tissues be grown that are not jected by the body's immune system.		have plasmids	plants/animals/	es are transferred to microbes in a vector (bacteria arly stage of development so	genes fro other organisi	herbicides.
			Blue colonies have plasmids without insert.	with the foreign insert.		the required characteristics.		the yield of the crop.





better hope – brighter future