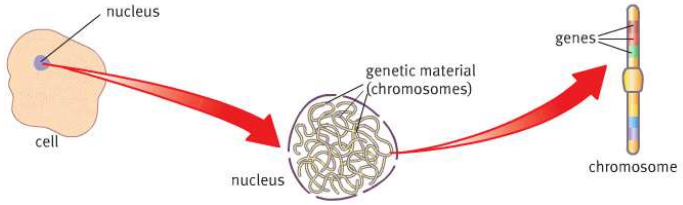
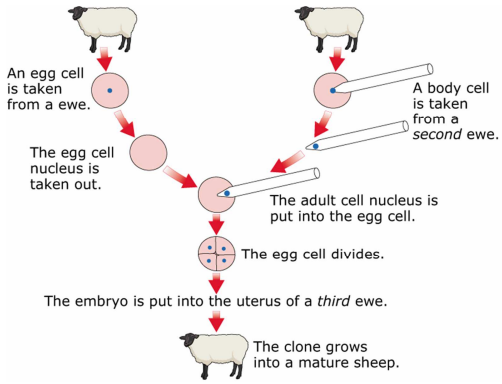
Science Knowledge Organiser – B1 You and your genes

B1.1 What are genes and how do they affect the way that organisms develop?	
	
Nucleus	The part of the cell that contains DNA.
DNA	The chemical that makes up chromosomes.
Gene	A section of DNA that carries the instructions for making a protein.
Structural protein	Proteins that build the body e.g. collagen.
Functional protein	Proteins that take part in chemical reactions e.g. enzymes.
Genetic variation	Characteristics that are controlled by genes e.g. dimples.
Environmental variation	Characteristics that are not determined by genes e.g. scars.
Genes and environment	Some characteristics are determined by a combination of genes and environment e.g. weight.

B1.2 Why can people look like their parents and siblings but not be identical to them?	
Chromosomes	How DNA is packaged in the cell. Body cells contain pairs of chromosomes; sex cells contain only one copy from each pair.
Alleles	Different versions of the same gene.
Homozygous	**Both alleles are the same.**
Heterozygous	**Both alleles are different.**
Dominant	A characteristic that is always expressed even if only one allele is present.
Recessive	A characteristic that will only show if both alleles are recessive.
Sex chromosomes	The chromosomes that determine inheritance of sex. XX in females, XY in males.
Sex-determining gene	**A gene on the Y chromosome that triggers the development of testes.**
Genotype	**All of the alleles (genes) that an organism has.**
Phenotype	**The observable characteristics that an organism has.**
Punnett square	A diagram used to show genetic crosses.

B1.3 How can and should genetic information be used? How can we use our knowledge of genetics to prevent disease?	
Huntington's disease (HD)	An inherited disorder caused by a dominant allele.
Cystic fibrosis (CF)	An inherited disorder caused by a recessive allele.
Symptoms of HD	Late onset, tremor, clumsiness, memory loss, inability to concentrate, mood changes.
Symptoms of CF	Thick mucus, difficulty breathing, chest infections, difficulty in digesting food.
Carrier	An individual with one copy of the recessive allele who does not have the disease but can pass the allele to their children.
Genetic test (GT)	A test to find out whether an individual has a particular allele.
Pre-implantation genetic diagnosis (PGD)	**Technical term for embryo selection. Embryos fertilised outside the body are tested for genetic disorders. Only healthy embryos are implanted.**
Use of GT (adults)	To test for alleles for genetic disorders and before prescribing drugs.
Use of GT (children)	To test for genetic disorders after birth so that early treatment can begin.
Use of GT (embryos)	For embryo selection – see PGD.
Implications of GT	• Risk of miscarriage (if during pregnancy). • Results might not be accurate (false positives/negatives). • Whether or not to have children. • Whether or not to have a pregnancy terminated. • Whether other family members should be informed. • Some people think that this goes against nature or God. • Who else might have access to the information? (Employers and insurance companies).

B1.4 How is a clone made?	
Asexual reproduction	When a new individual is produced by only one parent.
Clone	Individuals with identical genes.
Natural clones (plants)	Occur when plants produce bulbs or runners.
Natural clones (animals)	Identical twins.
Artificial clone	**Produced when the nucleus from an adult body cell is transferred to an empty unfertilised egg cell.** 
Adult stem cell	Unspecialised cells that can develop into many, but not all, types of cell.
Embryonic stem cell	Unspecialised cells that can develop into any type of cell.