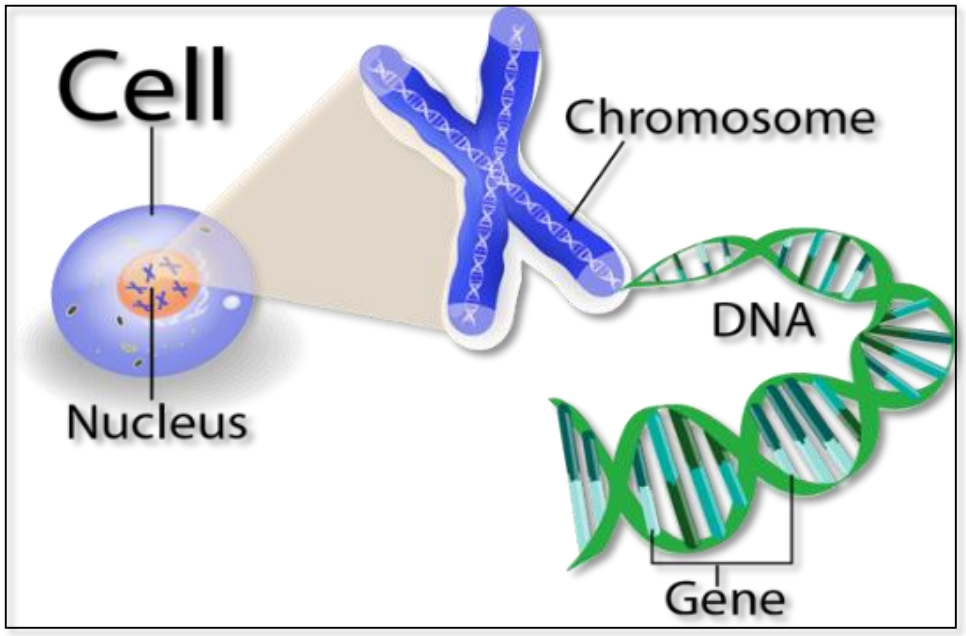
AQA B6a Reproduction
Combined Foundation (page 1 of 2)

sexual reproduction	involves the joining (fusion) of male and female gametes. There is a mixing of genetic information which leads to variety in the offspring
asexual reproduction	Involves only one parent and no fusion of gametes. There is no mixing of genetic information. This leads to genetically identical offspring (clones).
gamete	A gamete is a sex cell: Sperm and egg cell in animals Pollen and egg cells in flowering plants
mitosis	Involved in asexual reproduction. Identical cells are formed
meiosis	Involved in sexual reproduction. Non-identical cells are formed. Cells in the reproductive organs divide by meiosis to produce gametes (sex cells)



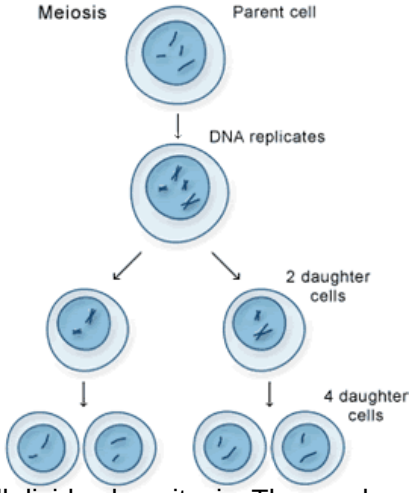
Meiosis

Meiosis halves the number of chromosomes in gametes.

Gametes join during fertilisation to restore the full number of chromosomes

The process:

- Copies of the genetic information are made
- The cell divides twice to form 4 gametes each with a single set of chromosomes
- All gametes are genetically different to each other.



Once fertilisation has taken place the new cell divides by mitosis. The number of cells increases. As the embryo develops cells differentiate.

DNA and the genome key words
The genetic material in the nucleus of a cell is made of a chemical called DNA

DNA	A polymer made up of two strands forming a double helix.
chromosome	A thread like structure containing coiled DNA found in the nucleus of eukaryotic cells.
gene	A section of DNA on a chromosome that codes for a specific protein or characteristic.
genome	the entire genetic material of that organism. The whole human genome has now been studied and this will have great importance for medicine in the future.

understanding the human genome will help us:
search for genes linked to different types of disease

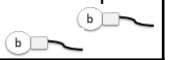
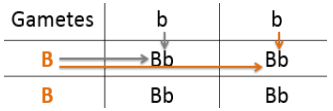
understanding and treatment of inherited disorders

use in tracing human migration patterns from the past.

Genetics keywords	
Allele	Alternate forms of the same gene.
dominant	A type of allele – always expressed if only one copy present and when paired with a recessive allele. It is shown by a capital letter and 'takes over'.
recessive	A type of allele – only expressed when paired with another recessive allele. It is shown by a lower case letter.
homozygous	Pair of the same alleles, dominant or recessive. Example: BB or bb
heterozygous	Two different alleles are present 1 dominant and 1 recessive. Example: Bb
genotype	Alleles that are present for a particular feature for example BB, Bb or bb
phenotype	Physical expression of an allele combination for example black fur, blonde hair, blue eyes.

Genetic inheritance

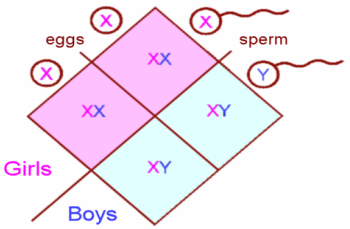
Some characteristics are controlled by a single gene, such as: fur colour in mice; and red-green colour blindness in humans. Each gene may have different forms called alleles.
The alleles present, or genotype, operate at a molecular level to develop characteristics that can be expressed as a phenotype.
A dominant allele is always expressed, even if only one copy is present.
A recessive allele is only expressed if two copies are present (therefore no dominant allele present).
If the two alleles present are the same the organism is homozygous for that trait, but if the alleles are different they are heterozygous.
Most characteristics are a result of multiple genes interacting, rather than a single gene.

Using a punnet square (using mouse fur colour as an example)		
Parent phenotype	black fur 	white fur 
Parent genotype	**BB**	**Bb**
Gametes present	In each egg B B	In each sperm 
Genetic cross (Punnett square – these are diagrams used to predict the inheritance of characteristics)	 The probability of black fur offspring phenotype is 100%. All offspring genotypes are heterozygous (Bb).	

Sex determination

Ordinary human body cells contain 23 pairs of chromosomes.
22 pairs control characteristics only, but one of the pairs carries the genes that determine sex.

In females the sex chromosomes are the same (XX).
In males the chromosomes are different (XY).



Inherited disorders
Some disorders are inherited. These disorders are caused by the inheritance of certain alleles.

Inherited disorder	Cause	Symptoms
polydactyly	Inheritance of one dominant allele	Extra fingers and toes
cystic fibrosis	Inheritance of two recessive alleles (both parents must be carriers or have CF themselves)	A disorder of cell membranes. Makes mucus too thick; causes breathing difficulties, problems in digestive and reproductive systems

Screening for inherited disorders
Pregnancy tests can check for inherited disorders:

Type of screening	What happens and when	Disadvantages
chorionic villus screening	A sample of the placenta tested at 10-12 weeks of pregnancy	Increased risk of miscarriage, parents may choose abortion if baby affected
amniocentesis	A sample of fluid tested at 15-16 weeks of pregnancy	Increased risk of miscarriage, parents may choose abortion if baby affected
IVF	Embryos produced by IVF, tested and only healthy embryos implanted	Expensive and IVF has low success rate