

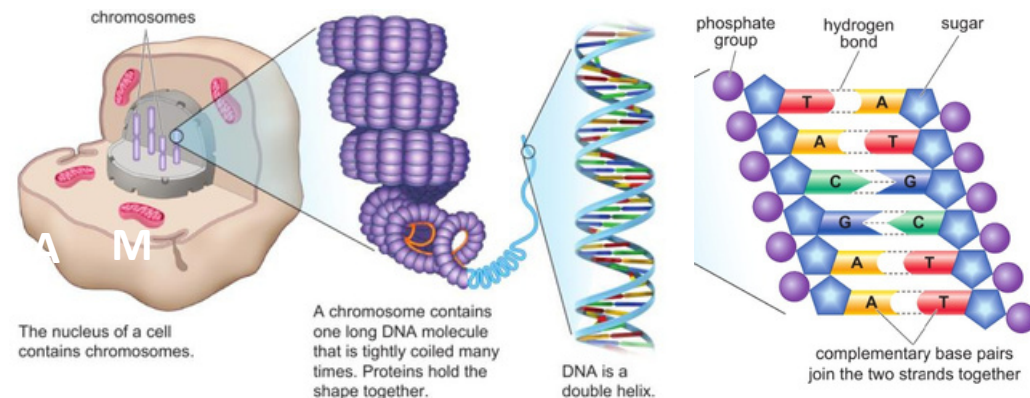
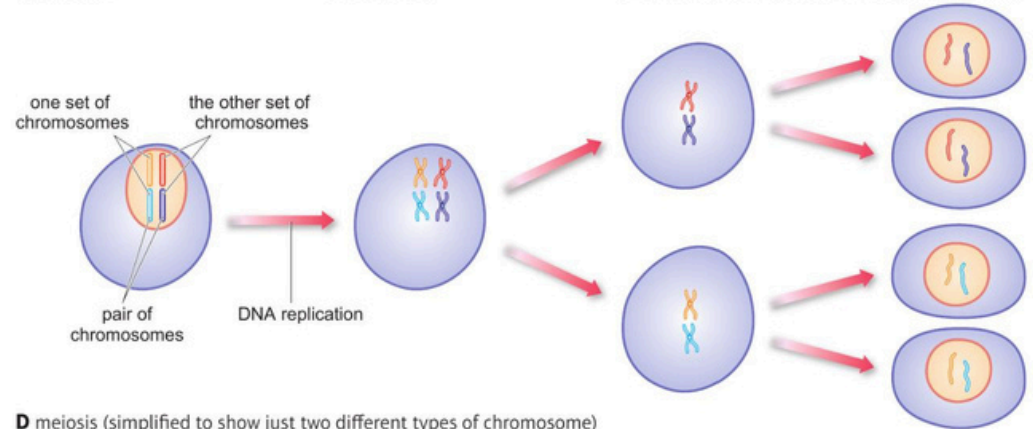
Knowledge Organiser: Biology, SB3a

- 1 **Gametes** are made in reproductive organs (in animals ovaries and testes)
- 2 Cells divide by **meiosis** to form gametes
- 3 In meiosis: Copies of genetic information are made, the cells **divide twice** to form daughter cells each with **half** the number of chromosomes
- 4 **Haploid** gametes are **genetically different** from each other
- 5 Gametes join at **fertilisation** to restore the number of chromosomes
Genetic material in the **nucleus** is composed of **DNA**
- 6
- 7 DNA is a **polymer** made up of **two strands** forming a **double helix**
- 8 DNA is a polymer made from **four different nucleotides**.
Each nucleotide consists of a **common sugar, phosphate group and one of four different bases; A, C, T & G**
- 9 A **gene** is a small section on a **chromosome**.
- 10 A gene codes for a **sequence of amino acids** to make a **specific protein**
- 11 A sequence of **3 bases** is the code for a particular amino acid, The order of bases controls the **order** in which amino acids combine and fold to produce a specific protein

The gamete-making cell has two sets of chromosomes. It is diploid ($2n$).

The chromosomes replicate (and the copies stay stuck to one another).

The cell divides into two and then into two again. Each of the final four daughter cells has a copy of one chromosome from each pair. They are haploid ($1n$).



Crush fruit with a buffer solution containing detergent

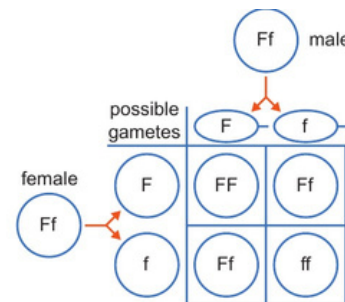
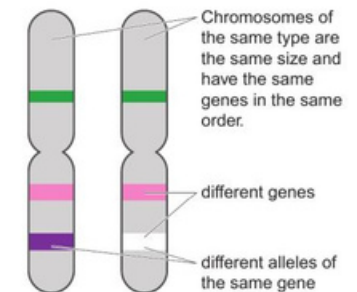
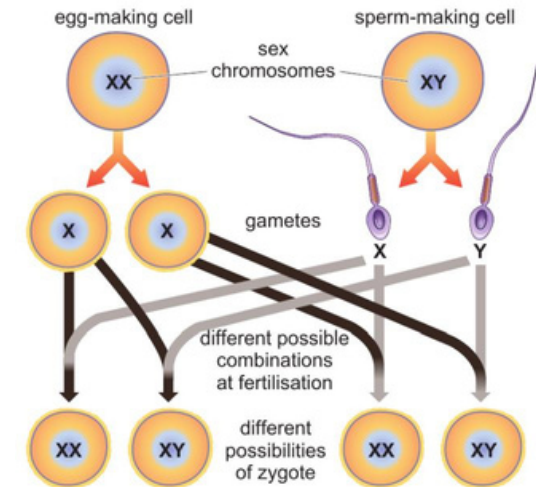
Filter the mixture

Add ethanol and remove the DNA

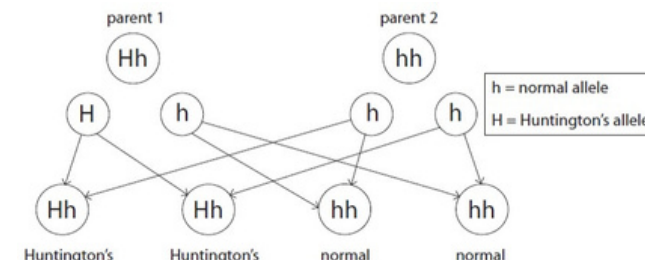
Knowledge Organiser: Biology, SB3b

- 12 **Variation** is the difference in the characteristics of individuals in a population.
- 13 There is extensive variation within the **population of a species** e.g. hair colour, skin colour, height.
- 14 Variation may be due to **genetic cause (inheritance)**, **environmental causes** or a **combination of genes and environment**
- 15 **Gregor Mendel** carried out breeding experiments on plants and showed that **inheritance** of each characteristic is determined by units that are passed on to descendants unchanged.
- 16 **Zygote**-A single cell that results from fusion of egg and sperm cells.
- 17 **Allele**-Alternate forms of the same gene
- 18 **Dominant**-A type of allele-always expressed if one copy present
- 19 **Recessive**-A type of allele-only expressed when paired with another recessive allele
- 20 **Homozygous**-Pair of the same alleles, dominant or recessive
- 21 **Heterozygous**-Two different alleles are present 1 dominant and 1 recessive.
- 22 **Genotype**-Alleles that are present for a particular feature e.g. BB, Bb, bb
- 23 **Phenotype**-Physical expression of an allele combination e.g. black fur, blonde hair, blue eyes.
- 24 The **whole human genome** has now been sequenced which allows us to search for genes linked to different types of disease, understand and treat inherited disorders, trace migration patterns from the past, study evolution

Reproduction advantages/disadvantages	
Sexual	Asexual
Needs two parents.	Only one parent needed (quicker).
Produces variation in the offspring.	Identical offspring (no variation).
If the environment changes variation gives a survival advantage by natural selection.	Vulnerable to rapidly changing conditions due to lack of variation.
Negative mutations are not always inherited.	Negative mutation can affect all offspring.
Natural selection can be speeded up using selective breeding to increase food production.	Food/medicine production can be extremely quick.



© Punnett square for parents that are heterozygous for the CF gene



Knowledge Organiser: Biology, SB3

- 12 Some disorders are inherited on the chromosomes that determine sex (**sex linked genetic disorders**)
- 13 **Colour blindness**-the X chromosome carries one normal or one faulty allele (the normal one is dominant) **The shorter Y chromosome does not carry the allele and so the X chromosome allele is always expressed in males.**
- 14 **Blood groups** are determined by multiple alleles (A,B,O) and codominance.
- 15 **Protein synthesis** is the making of new protein by **transcription and translation.**
- 16 **Proteins** are **polypeptides** composed of chains of **amino acids.**
- 17 A sequence of **3 bases (codon)** codes for a particular amino acid

Transcription

- DNA → mRNA
- Synthesis of mRNA from DNA

Translation

- Converting genetic information into proteins
- mRNA is code for proteins synthesized at ribosome

