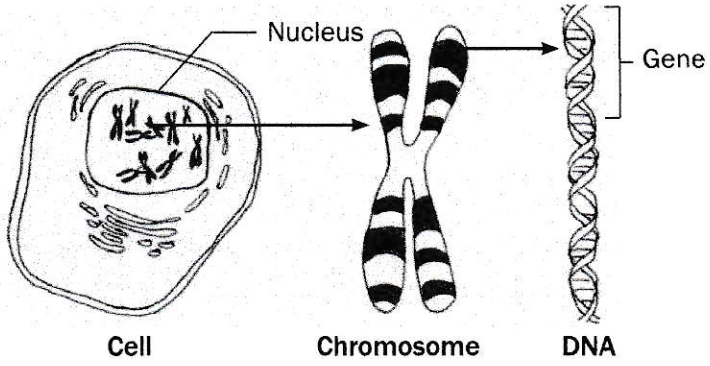
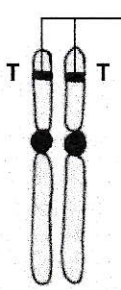
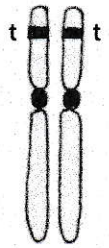
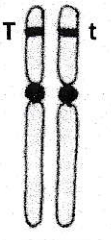
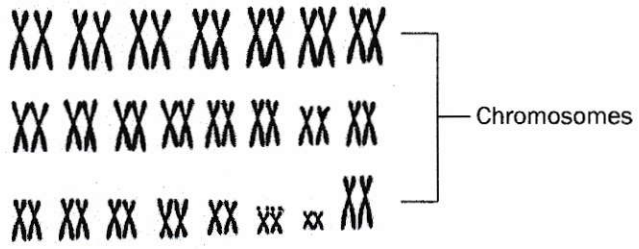
Chapter 5
Paper 2

Genetics

5.1 Key concepts

Make **mobile notes** (see instructions on page x) to learn these key concepts.

Term	Explanation	Diagram/Additional notes
Gene	A small portion of DNA coding for a particular characteristic.	
Alleles	Different forms of a gene which occur at the same locus (position) on homologous chromosomes.	**Dominant allele (T) – tall plant** **Recessive allele (t) – short plant**
Genotype	Genetic composition (make-up) of an organism.	
Phenotype	The physical appearance of an organism determined by the genotype, e.g. tall, short.	
Dominant allele	An allele that is expressed (shown) in the phenotype when found in the heterozygous (Tt) and homozygous (TT) condition.	 • Homozygous dominant (both alleles are dominant) • Genotype TT • Phenotype – tall
Recessive allele	An allele that is masked (not shown) in the phenotype when found in the heterozygous (Tt) condition. It is only expressed in the homozygous (tt) condition.	 • Homozygous recessive (both alleles are recessive) • Genotype tt • Phenotype – short
Heterozygous	Two different alleles for a particular characteristic, e.g. Tt.	 • Heterozygous (one dominant and one recessive allele) • Genotype Tt • Phenotype – tall
Homozygous	Two identical alleles for a particular characteristic, e.g. TT or tt.	

Term	Explanation	Diagram/Additional notes	
Monohybrid cross	Only one characteristic or trait is being shown in the genetic cross.	*Example*: Flower colour only, e.g. yellow flower or white flower **OR** shape of seeds only, e.g. round seeds or wrinkled seeds.	
Complete dominance	A genetic cross where the dominant allele masks (blocks) the expression of a recessive allele in the heterozygous condition.	In this type of cross the allele for tall (T) is dominant over the allele for short (t). The offspring will therefore **be tall** because the dominant allele (T) masks the expression of the recessive allele (t).	Tall (TT) × short (tt) Tall (Tt)
Incomplete dominance	A genetic cross between two phenotypically different parents produces offspring different from both parents but with an intermediate phenotype.	*Example:* If a red-flowered plant is crossed with a white-flowered plant and there is incomplete dominance – the offspring will have **pink flowers (intermediate colour).**	Red flower – White flower Pink flowers
Co-dominance	A genetic cross in which both alleles are expressed equally in the phenotype.	*Example:* If a red-flowered plant is crossed with a white-flowered plant and there is co-dominance the offspring has **flowers with red and white patches.**	Red flower × White flower Flowers with red and white patches
Multiple alleles	More than two alternative forms of a gene at the same locus.	*Example:* Blood groups are controlled by three alleles, namely I^A, I^B and i.	
Sex-linked characteristics	Characteristics or traits that are carried on the sex chromosomes.	*Examples:* Haemophilia and colour-blindness The alleles for haemophilia (or colour-blindness) are indicated as superscripts on the sex chromosomes, e.g. X^HX^H (normal female), X^HX^h (normal female), X^hX^h (female with haemophilia), X^HY (normal male), X^hY (male with haemophilia).	
Karyotype	The number, shape and arrangement of all the chromosomes in the nucleus of a somatic cell.		
Cloning	Process by which genetically identical organisms are formed using biotechnology.	*Example:* Dolly the sheep was cloned using a diploid cell from one parent; therefore it had the identical genetic material of that parent.	
Genetic modification	The manipulation of the genetic material of an organism to get desired changes.	*Example:* The insertion of human insulin gene in plasmid of bacteria so that the bacteria produce human insulin.	
Human genome	The mapping of the exact position of all the genes in all the chromosomes of a human.	*Example:* Gene number 3 on chromosome number 4 is responsible for a particular characteristic.	