Definitions and Concepts for Edexcel Biology GCSE

Topic 3: Genetics

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*Definitions in **bold** are for higher tier only*

Definitions marked by '' are for separate sciences only*

Allele - A version of a gene.

Amino acids - Small molecules from which proteins are assembled.

Anticodon** - **A triplet sequence of bases on a tRNA molecule that is complementary to a specific codon in mRNA.

***Asexual reproduction** - A form of reproduction involving a single parent that creates genetically identical offspring.

Base triplet** - **A sequence of three bases in a gene that code for a particular amino acid. Also known as a codon.

***Blood group** - Classification of blood type as A, B or O based on surface antigens on red blood cells and the presence of certain antibodies in the plasma.

Chromosome - A long, coiled molecule of DNA that carries genetic information in the form of genes.

Coding DNA** - **A sequence of DNA that codes for the production of a protein.

***Codominance** - When both alleles for a gene in a heterozygous organism equally contribute to the phenotype.

Codon** - **See 'Base triplet'.

Complementary base pairing - Describes how weak hydrogen bonds form between complementary base pairs. A pairs with T and C pairs with G.

Detergent - A chemical that is used to disrupt cell membranes in the extraction of DNA.

Diploid cell - A cell that contains two copies of each chromosome (i.e. a full set of chromosomes).

DNA - A double-stranded polymer, wound to form a double helix, that carries the genetic code.

Dominant - Describes an allele that is always expressed. Represented by a capital letter.

Environmental variation - Differences in phenotype acquired during the lifespan of an organism due to environmental factors such as diet, lifestyle, climate, exposure to light etc.

Family pedigree - A chart used to show the inheritance of genetic disorders in a family.

Fertilisation - The fusion of the nucleus of male and female gametes. Restores the full chromosome number.

Gametes - Sex cells (sperm and egg cells) with half the usual number of chromosomes.

Gene - A length of DNA on a chromosome that codes for the production of a specific protein.

Genetic variation - Differences in the genotypes of organisms of the same species due to the presence of different alleles, arising through mutations and sexual reproduction. It creates variation in phenotypes.

Genome - The complete genetic material of an organism.

Genotype - An organism's genetic composition. Describes all alleles.

Haploid cell - A cell that contains a single copy of each chromosome (i.e. half the number of chromosomes).

Heterozygous - When someone has two different alleles of a gene, e.g. Ff.

Homozygous - When someone has two identical alleles of a gene, e.g. ff.

Human genome project - An international research project involving thousands of scientists which successfully mapped the entire human genome.

Meiosis - A form of cell division that produces four genetically different daughter cells (gametes) with a haploid number of chromosomes. It involves two divisions.

Monohybrid inheritance - The inheritance of a single gene.

***mRNA** **- A polymer of nucleotides that carries genetic information from the nucleus to the ribosomes during protein synthesis. It is a single helix and uses U instead of T.**

***Multiple alleles** - The existence of more than two alleles of a gene, e.g. ABO blood groups are controlled by three alleles, I^A, I^B and I^O.

Mutation - A random change in the base sequence of DNA which may result in genetic variants. Mutations may be beneficial, damaging, or neutral.

***Non-coding DNA** **- DNA which does not code for a protein but instead controls gene expression by influencing the binding of RNA polymerase to DNA.**

Nucleotides - The monomers of DNA consisting of a common sugar, a phosphate group and one of four chemical bases (A, T, C, G) attached to the sugar.

Phenotype - An organism's observable characteristics due to interactions of the genotype and the environment.

Protein - A large molecule that is synthesised from amino acids.

***Protein synthesis** - **The formation of a protein from a gene.**

Punnett square - A grid used to predict the potential outcomes of a genetic cross.

Recessive - Describes an allele that is only expressed in the absence of a dominant allele. Represented by a small letter.

***Reproductive cycle** - The time required to produce independent offspring.

Ribosomes - Sub-cellular structures that are the site of protein synthesis.

***RNA polymerase** - **An enzyme involved in transcription that binds to a region of non-coding DNA, unzips the DNA strands and joins free RNA nucleotides to complementary bases on the coding DNA strand.**

Sex chromosomes - A pair of chromosomes responsible for the determination of gender. XY in males, XX in females.

***Sex-linked characteristic** - **A characteristic that is coded for by an allele found on a sex chromosome.**

***Sex-linked genetic disorder** - **A disorder caused by a faulty allele located on a sex chromosome.**

***Sexual reproduction** - A form of reproduction that creates genetic variation, involving the fusion of male and female gametes.

***Transcription** - **The first stage of protein synthesis in which mRNA is formed from a DNA template.**

***Translation** - **The second stage of protein synthesis that takes place in the ribosomes. Amino acids are joined in a specific order dictated by mRNA to form a protein.**

***tRNA** - **An RNA molecule that carries specific amino acids to the ribosomes during protein synthesis.**

Variation - The differences between individuals due to genes, the environment or a combination of both.

Zygote - A diploid cell formed by the fusion of the nucleus of a male gamete with the nucleus of a female gamete.