WJEC (Eduqas) Biology A-level

Core Concept 5 - Nucleic acids

Definitions and Concepts

Adenosine triphosphate (ATP) - A nucleotide consisting of a molecule of ribose joined to the nitrogenous base adenine and three phosphate groups. It is known as the 'universal energy currency'.

Antiparallel - Describes the complementary strands of a DNA double helix which run parallel but in opposite directions (5' to 3' and 3' to 5').

Complementary base pairing - Describes how hydrogen bonds form between complementary purine and pyrimidine bases. Two bonds form between A and T in DNA or U in RNA. Three bonds form between G and C.

Degenerate - A feature of the genetic code; more than one triplet can code for a particular amino acid.

Deoxyribonucleic acid (DNA) - A double stranded polynucleotide that contains the genetic material of an organism and is made up of deoxyribonucleotide monomers joined together by phosphodiester bonds.

DNA nucleotide - The monomer that makes up DNA and consists of deoxyribose, a nitrogenous base (A, T, C or G) and a phosphate group.

DNA polymerase - An enzyme that catalyses the formation of phosphodiester bonds between nucleotides during the synthesis of a new DNA strand.

Endergonic reaction - A non-spontaneous reaction that requires an input of energy, e.g. ATP formation.

Exergonic reaction - A spontaneous reaction that overall releases energy, e.g. ATP hydrolysis.

Exons - Regions of DNA that code for amino acid sequences.

Genetic code - The rules by which triplets in a DNA base sequence code for the sequence of amino acids in a polypeptide chain. The genetic code is degenerate, universal and non-overlapping.

Helicase - An enzyme that catalyses the unzipping of double-stranded DNA into single strands during semi-conservative replication.

Introns - Non-coding sequences of DNA found between exons.

Messenger RNA (mRNA) - A type of RNA that carries genetic information from the nucleus to the ribosomes for protein synthesis. It is a single helix consisting of thousands of mononucleotides.

Non-overlapping - A feature of the genetic code; each base in a sequence is read once and is only part of one triplet.

Nucleotide - The monomer from which nucleic acids are made that consists of a pentose sugar, nitrogenous base and phosphate group.

'One gene-one polypeptide' theory - The theory that each gene encodes a single protein.

Phosphodiester bond - A type of bond that joins nucleotides together to create polynucleotides.

Polypeptide - A molecule formed by the condensation of many amino acids.

Protein synthesis - The formation of proteins from amino acids. It occurs in two stages; transcription and translation.

Purines - A class of nitrogenous bases which are made up of two rings that adenine and guanine are members of.

Pyrimidines - A class of nitrogenous bases which are made up of a single ring that cytosine, thymine and uracil are members of.

Ribonucleic acid (RNA) - A relatively short single stranded molecule made up of ribonucleotide monomers joined together by phosphodiester bonds.

Ribosomes - Organelles found either free in the cytoplasm or membrane bound that are involved in the synthesis of proteins.

RNA nucleotide - The monomer that makes up RNA and consists of ribose, a nitrogenous base (A, U, C or G) and a phosphate group.

Semi-conservative replication - The replication of DNA to produce two new DNA molecules which both contain one new strand and one old strand from the original DNA molecule.

Transcription - The formation of pre-mRNA in eukaryotes and mRNA in prokaryotes from a section of the template strand of DNA. It is the first stage of protein synthesis.

Transfer RNA (tRNA) - A form of RNA that carries specific amino acids to the ribosomes. It is single-stranded and takes a clover-leaf shape. One side is longer than the other enabling the attachment of an amino acid. At the opposite end is an anticodon specific to the amino acid.

Translation - The second phase of protein synthesis that takes place in the ribosomes. mRNA is used as a template for the attachment of tRNA molecules with complementary anticodons. The amino acids carried on adjacent tRNA molecules are joined to form a polypeptide chain.

Triplet code - A specific sequence of three nucleotides on a molecule of DNA or RNA codes for a particular amino acid in protein synthesis.

Universal - A feature of the genetic code; the same codons code for the same amino acids in almost all organisms.