Explain how RNA polymerase recognises where transcription should begin
A specific nucleotide sequence called a promoter allows RNA polymerase to recognise the site of transcription.

Describe the role of the promoter and the TATA box
Eukaryotic promoters contain a sequence called a TATA box which is centred upstream from the transcriptional site. Transcription proteins bind to this promoter initiating transcription by forming a transcription initiating complex which causes the unwinding of the DNA.

What is the functional significance of introns?
Introns are the noncoding regions of the RNA that is spliced out by a spliceosome and left in the nucleus in mRNA modification. The splicing of different sections allows different proteins to be formed therefore controlling gene expression. If a gene is switched off it is spliced out and left in the nucleus so no translation can occur.

How is RNA modified after transcription in eukaryotic cells?
The mRNA is capped and tailed. This 5' cap allows recognition for translational machinery while the poly A tail prevents degradation.

What is a codon and describe its relation to the linear sequence of the peptide chain?
A codon is a sequence of 3 bases on an mRNA molecule that codes for a specific amino acid. Each amino acid on a peptide chain correlates to the codon sequence of the mRNA molecule.

What does it mean when it is said that the genetic code is redundant and unambiguous?
Unambiguous refers to the fact that each codon only code for one specific amino acids and no others. The idea of redundancy refers to the fact that more than one codon can code for the same amino acid since there are only 20 and many combinations of codons.

What is the significance of wobble?
Wobble allows the last base of the codon to match with another base that is not complementary if it yields the same amino acid.

Explain the process of translation including initiation, elongation and termination
Initiation: the mRNA binds to the small ribosomal subunit and tRNA carrying the start codon AUG attaches to the P site signalling the large ribosomal subunit to bind in order to form the initiation complex
Elongation: The aminoacyl tRNA binds to the A site and peptide bonds are formed between the amino acid in the P site and A site by peptidyl transferase and the amino acid it transferred to the tRNA in the A site and the tRNAs move through like a conveyer belt.
Translocation: when the A site meets a stop codon a release factor not carrying an amino acid is called to the site which lyses the bonding of the tRNA and peptide chain.

How is tRNA joined with an appropriate amino acid?
Aminoacyl synthase
Define a gene, components and role in gene expression

A gene has two parts, a promoter and coding sequence. The promotor initiates transcription and the coding sequence is the part of the gene that is transcribed. A gene is the entire nucleic acid sequence needed for the synthesis of an RNA sequence.

What are the two types of small scale DNA mutations?
1. Substitution – sickle cell anaemia
2. Insertion/Deletion

Define a silent, missense and nonsense mutation
Silent – has no effect on the amino acid produced because of the redundancy code
Missense – still codes for an amino acid but the wrong one
Nonsense – codes for a premature stop codon

Describe the genotypic and phenotypic effects of sickle cell
It is a substitution mutation which causes RBCs to become sickle shaped causing them to become lodged in capillaries. This is because the substituted AA caused a protein that codes for a mutation of the beta chain on haemoglobin

Why does genetic variation in drug metabolising genes impact on the effects of drug?
The ability to metabolise a drug dictates how long the drug remains in the body. If a drug has certain side effects people with genes that do no metabolise it soon, the side effects are prolonged and amplified since they remain in the body. If this is the case a smaller dosage of the drug should be administered.

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