3.5 Transcription and translation – *summary of mark schemes*

3.5.1	Compare the structure of RNA and DNA. Mark Scheme A. deoxyribose versus ribose; B. thymine versus uracil; C. two strands versus one / double helix versus single strand;
3.5.2	Outline DNA transcription in terms of the formation of an RNA strand complementary to the DNA strand by RNA polymerase. Mark Scheme A. RNA polymerase controls transcription / is the enzyme used in transcription; B. DNA is unwound by RNA polymerase; C. DNA is split into two strands; D. mRNA is made by transcription; E. promoter region (by start of gene) causes RNA polymerase to bind; F. anti-sense / template strand of DNA is transcribed; G. direction of transcription is 5' → 3'; H. free nucleotide triphosphates used; I. complementary base pairing between template strand and RNA nucleotides / bases; J. RNA contains uracil instead of thymine; K. terminator (sequence) stops RNA polymerase / transcription; L. mRNA is released / RNA polymerase released;
3.5.3	Describe the genetic code in terms of codons composed of triplets of bases. Mark Scheme A. composed of mRNA base triplets; B. called codons; C. 64 different codons; D. each codes for the addition of an amino acid to a growing polypeptide chain; E. the genetic code is degenerate; F. meaning more than one codon can code for a particular amino acid; G. the genetic code is universal; H. meaning it is the same in almost all organisms; I. (AUG is the) start codon; J. some (nonsense) codons code for the end of translation;
3.5.4	Explain the process of translation, leading to polypeptide formation. Mark Scheme A. consists of initiation, elongation and termination; B. mRNA is used as a template / guide; C. mRNA translated in a 5' to 3' direction; D. binding of ribosome to mRNA; E. small sub-unit then large; F. first / initiator tRNA binds to start codon / to small subunit of ribosome; G. AUG is the start codon; H. second tRNA binds to ribosome; I. large subunit moves down mRNA after a second tRNA binds; J. mRNA "read" in base triplets / codon; K. each codon specifying addition of a particular amino acid to the growing polypeptide; L. tRNA bring amino acids (to mRNA-ribosome complex); M. amino acid / polypeptide on first tRNA is transferred / bonded to amino acid on second tRNA; N. peptide bonds between amino acids / peptidyl transferase; O. requires GTP; P. movement of ribosome / small subunit of ribosome down the mRNA; Q. loss of tRNA and new tRNA binds; R. reach a stop codon / termination;

	S. stop codon has no corresponding tRNA / amino acid / causes release of polypeptide; T. polypeptide released; U. tRNA activating enzymes link correct amino acid to each tRNA; V. (activated) tRNA has an anticodon and the corresponding amino acid attached; W. many ribosome / polyribosomes bind to same mRNA;