Question Number	Answer	Mark
1	1. (double) helix ; 2. deoxyribose ; 3. phosphate / phosphate group; 4. phosphodiester / phospho(di)ester / covalent ; 5. thymine ; 6. guanine ; 7. hydrogen ; 8. sixteen / 16 ;	**(8)**

Question Number	Answer	Mark
2(a)(i)	C ;	**(1)**

Question Number	Answer	Mark
2(a)(ii)	B ;	**(1)**

Question Number	Answer	Mark
2(a) (iii)	A ;	**(1)**

Question Number	Answer	Mark
2(b)	1. idea of sequence of {bases / nucleotides} on DNA determines sequence on (pre-) mRNA ; 2. reference to complementary base pairing / stated example e.g. AU / CG / GC / TA (DNA: mRNA) ; 3. reference to formation of bonds by condensation reaction ; 4. phosphodiester {bonds / links} ; 5. reference to RNA-polymerase ;	**max (3)**

Question Number	Answer	Mark
2(c)(i)	1. reference to {start / stop / nonsense} (codon) ; 2. start (codon) needed to begin {polypeptide synthesis / eq} / {stop / nonsense} (codon) needed to end {polypeptide synthesis /eq } / eq ;	**(2)**

Question Number	Answer	Mark
2(c)(ii)	1. reference to {difference / variations / eq } of {exons / mRNA} ; 2. reference to different {primary structure / sequence of amino acids} ; 3. reference to {secondary / tertiary } structure of proteins depends on primary {structure / sequence} / eq ; 4. due to {change in / different} bonds ; 5. {hydrogen / ionic / disulphide} bonds ; 6. reference to different 3D shape / eq ;	**max (3)**

Question Number	Answer	Mark
3(a)	1. rhodopsin / iodopsin ; Any one from: 2. broken down by light / / generates {action potentials / nerve impulses} / / appropriate reference to {black and white / monochromatic / colour / trichromatic} vision ;	**max (2)**

Question Number	Answer	Mark
3(b)	1. sequencing of human DNA / eq ; 2. {provides knowledge / eq} of human genetics / eq ;	**(2)**

Question Number	Answer	Mark
3(c)	1. lifestyle / environmental factors / eq ; 2. such as {carcinogens / eq} ; 3. such as {diet / obesity / inactivity} / eq ; 4. such as infections / eq ; 5. genes may make it more likely / eq ;	**max (3)**

Question Number	Answer	Mark
3(d)	1. gene {needs to be switched on / expressed / eq} ; 2. by transcription factors / eq ; 3. in order to produce {mRNA / protein / CFTR} ; 4. (transcription factors) might not be present / eq ;	**max (3)**

Question Number	Answer	Mark
***3(e) QWC**	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence) 1. triplet code / eq ; 2. represents amino acid (sequence) / eq ; 3. (mRNA) binds to ribosome / eq ; 4. reference to {anticodon / codon} ; 5. tRNA decodes mRNA / provides correct amino acid / eq ; 6. idea of two tRNA sites in the ribosome ; 7. two amino acids brought together / eq ; 8. joined with peptide bond / eq ; 9. reference to peptidyl transferase ; 10. idea that sections of DNA are {templates for / transcribed into} RNA ;	**max (6)**

Question Number	Answer	Mark
3(f)	1. bonds to DNA / eq ; 2. idea of sequence of bases recognised ; 3. (sequence of bases) has unique shape / eq ; 4. idea of bonding in DNA recognised ;	**max (2)**

Question Number	Answer	Mark
3(g)	1. accumulation of small mutations / eq ; 2. changes existing genes / eq ; 3. idea of gene duplication and one mutates ; 4. which allows mutation without losing function ; 5. (subfunctionalism) separates functions into separate genes / eq ; 6. (retroposition) produces DNA {without introns / from mRNA} / eq ; 7. idea of (frameshift) reads genetic code from new starting point ; 8. idea that junk DNA can become an active gene ;	**max (5)**

Question Number	Answer	Mark
3(h)	1. causes inflammation / eq ; 2. atheroma can lead to atherosclerosis / eq ;	**max (2)**

Question Number	Answer	Mark
3(i)	1. idea of non-overlapping code ; 2. reference to {start codon / there is a frame / RNA polymerase binding site} / eq ; 3. only one {template / eq} strand / eq ; 4. reference to direction of reading of strand e.g. 5'-3' ;	**max (2)**

Question Number	Answer	Mark
3(j)	1. selective advantage / eq ; 2. (characteristic) passed to more offspring / eq ; 3. increased frequency of allele in population / eq ; 4. reference to speciation ;	**max (3)**