Question Number	Answer	Additional Guidance	Mark
1(a)(i)	1. (skin flora) {prevent growth of / kill} {pathogens / microorganisms / bacteria / eq} ; 2. competition for {space / nutrients / water / minerals / eq} ; 3. release of {chemicals / toxins / antimicrobials / lipids / enzymes /eq } ;	**1 ACCEPT** prevent colonisation **IGNORE** antigens / viruses / infections / diseases **2 IGNORE** food / resources **3 NOT** sebum / lysozymes	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	**B** they have antimicrobial properties that inhibit the growth of bacteria		**(1)**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	**C** keratin		**(1)**

uestion Number	Answer	Additional Guidance	Mark
1(b)(ii)	1. idea of little {tertiary / quaternary } structure / eq OR mainly secondary structure ; 2. made up of {long / linear / straight / eq} {molecules / (poly)peptides / polymers }; 3. idea of cross-linking (between one polypeptide chain and another) ; 4. idea of repeating amino acid sequences / eq ; 5. insoluble / eq ; 6. tough / strong / eq ;	 **3 NOT** peptide bonds **5 IGNORE** hydrophobic on outside	**(4)**

Question Number	Answer	Additional Guidance	Mark
1(b)(iii)	1. {DNA / (m)RNA} contains the {genetic code / triplet codons / base sequence coding for amino acids / eq};	**1 ACCEPT** (DNA) template	
	DNA :		
	2. idea that the DNA strand is used {in transcription / to make (m)RNA / eq} ;		
	mRNA :		
	3. (m)RNA is a copy of the DNA ;	**4 IGNORE** to cytoplasm	
	4. mRNA carries this {information / code /eq} {out of the nucleus / to the ribosomes / eq} ;		
	5. idea that amino acids {arranged in sequence / eq } ;		**(4)**

Question Number	Answer	Mark
2 (a)	1. idea of half the number of chromosomes found in a {normal body cell/somatic cell / eq} ; 2. idea of containing one chromosome from each homologous pair; 3. the type of nucleus found in {gametes / sex cells / eq} ; 4. a nucleus is (an organelle / (double) membrane-bound structure / eq) ;	**(2)**

Question Number	Answer	Mark
2 (b)	1. idea that pH increases then decreases; 2. correct manipulation of figures in an appropriate context e.g. overall 0.2 change / eq ;	**(2)**

Question Number	Answer	Mark
*** 2 (c QWC**	**Take into account quality of written communication when awarding the following points.** 1. idea of amino acids transported to rER e.g. tRNA {binding to/ transporting} amino acids (in cytoplasm) ; 2. reference to involvement of ribosomes ; 3. amino acids {being joined by peptide bonds / forming polypeptide chains / forming primary structure of protein / eq} ; 4. {folded into 3-D shape / secondary or tertiary structure} in rER ; 5. packaged into vesicles at the end of the rER / eq ; 6. vesicles {move to / transported to / fuse with / eq} the Golgi apparatus ; 7. idea that protein modified in Golgi apparatus ; 8. (modified protein / enzyme / eq) packaged into (secretory) vesicles (by Golgi apparatus) eq ; 9. vesicles {move towards / fuse with} cell surface membrane / correct reference to exocytosis / eq ;	**(5)**

Question Number	Answer	Mark
2 (d)	1. one (nucleus) fuses with the {egg nucleus / female gamete } / eq ; 2. one (nucleus) fuses with the (two) polar nuclei / eq ;	**(2)**

Question Number	Answer	Mark
3(a)	<table><tr><th>Statement</th><th>True</th><th>Fa</th></tr><tr><td>HIV infects b-lymphocytes in the human immune system</td><td></td><td>✓</td></tr><tr><td>The genetic material in HIV is a form of RNA</td><td>✓</td><td></td></tr><tr><td>The enzyme, reverse transcriptase, is used by HIV</td><td>✓</td><td></td></tr></table> 1 mark each correct row ;;;	**(3)**

Question Number	Answer	Mark
3(b)(i)	1. change in the {nucleotides / bases} / eq ; 2. in {RNA / DNA} / eq ; 3. which leads to change in the {sequence / eq} of amino acids in (primary structure of) a {polypeptide / protein} / eq ;	**(2)**

Question Number	Answer	Mark
3(b)(ii)	1. idea that HIV has {many / variety of / new / eq} {strains / types /antigens / protein coats / eq} (in infected person) ; 2. some strains {are / become} resistant to {an individual / a specific / a particular / eq} drug / eq ; 3. these would survive if (only one drug used) / eq ; 4. {mixture of drugs / eq } has more chance of getting rid of {all / more} (strains / types / eq) / eq ; 5. reference to drugs used together because of mutation ; 6. reference to rapid rate of mutation ; 7. reference to rapid rate of {multiplication / eq} of virus ;	**(4)**

Question Number	Answer	Mark
4(a)(i)	1. {sequence / order} of amino acids ; 2. joined by peptide bonds ;	**(2)**

Question Number	Answer	Mark
4(a)(ii)	1. idea that primary structure determines (three-dimensional) folding / eq ; 2. reference to types of amino acids determine {types of bonds / (other than peptide bonds) / named bond}; 3. reference to position of amino acids determines position of{bonds / correctly named bond} ; 4. correct reference to two cys (amino acids) form bonds ; 5. idea that {shape / position / eq} of active site is determined by position of amino acids ; 6. reference to shape of active site being correct to bind to substrate ; 7. reference to {amino acids / R groups} involved in {chemical reaction / eq} ; 8. reference to {globular/ soluble / enzyme }molecules being {relatively short /small / made up of relatively few amino acids} ; 9. reference to {globular / soluble proteins/ enzyme} having relatively high number of { polar / small{ { amino acids / R groups} ; 10. reference to {polar R groups / eq} facing outwards ;	**max (5)**

Question Number	Answer	Mark
4(b)(i)	1. reference to mRNA as a copy of the {genetic code / DNA} ; 2. of the protein (being synthesized) / eq ; 3. moves {out of the nucleus / to ribosomes } / eq ; 4. idea that it {acts as a template / has the instructions} for translation ;	**max (3)**

Question Number	Answer	Mark
4(b)(ii)	1. correct reference to translation ; 2. binds to an amino acid / takes the amino acid to the {ribosome / mRNA} ; 3. reference to tRNA being specific to amino acid ; 4. holds the amino acid in place / eq ;	**max (3)**

Question Number	Answer	Mark
5(a)(i)	1 glycerol molecule and 3 fatty acid molecules ;	**(1)**

Question Number	Answer	Mark
5(a)(ii)	ester bond ;	**(1)**

Question Number	Answer	Mark
5(a)(iii)	condensation ;	**(1)**

Question Number	Answer	Mark
5(a)(iv)	have double bonds between carbon atoms and between carbon and oxygen atoms ;	**(1)**

Question Number	Answer	Mark
5(a)(v)	more hydrogen atoms than unsaturated lipids ;	**(1)**

Question Number	Answer	Mark
5(b)(i)	1. phosphate and base joined to pentose sugar ; 2. base correctly joined to sugar ; 3. phosphate correctly joined to two pentose sugars ;	**(3)**

Question Number	Answer	Mark
5(b)(ii)	(DNA) polymerase / (DNA) ligase / (DNA) helicase ;	**(1)**