

Multiple Choice Answers

Q1: D
Q6: C
Q13: B
Q15: B
Q20: C
Q23: B
Q26: B

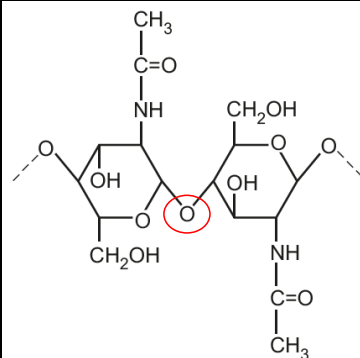
Multiple Choice Answers

Q3: C
Q4: C
Q5: B
Q6: B

Multiple Choice Answers

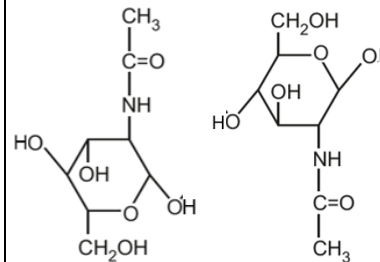
Q5: A

4(a)(i)



correct glycosidic bond circled ;

4(a)(ii)



—OH group shown on the monomer where the glycosidic bond connected the two monomers (C1) ;
—OH shown on C4 ;

4(b)

any four from:
ref. to filtering helps prevent / AW, cholera ;
filtering water removed copepods (with bacteria on surface) from water ;
some bacteria were able pass through fabric / bacteria were found living free in water / some copepods were small enough to pass through fabric ;
cholera transmission could be from, other sources / food ;
people who filter water may have better personal hygiene ; **A** examples e.g. washing hands
AVP ; e.g. differences in other water treatment methods e.g. boiling water

4(c)(i)

any one from:
wash hands, qualified ;
e.g. more frequently
after, urination / defecation / using the toilet **I** non-scientific terms
before preparing food
before handling utensils
thoroughly / with soap / antibacterial gel

avoid eating, crops / food, grown with faeces used as fertiliser ;
wash fruit / vegetable (in, uncontaminated / AW, water) ;
cover food to prevent flies landing / kill flies before they land on food ;
AVP ; e.g.
don't share hand towels
use disposable hand towels
keep fingernails short

4(c)(ii)

any two from:
ref. to active transport / *ref. to* efflux pumps ; *in correct context*
tetracycline transported out of the cell ;
AVP ; e.g. substance pumped out combined with tetracycline
(membrane) enzyme that breaks down tetracycline before entry to cell

4(c)(iii)

any two from:
vaccines may contain more than one antigen (so more than one type of antibody is present) ;
multiple mutations are needed to evolve, immune evasion / described ;
vaccines given to people before infection so secondary immunity acts quickly to kill pathogen before mutations arise ;
antibiotics used when person already infected so large population ; **ora**
more likely to be a mutation which causes resistance ; **ora**
antibiotics may target only one site in a bacterial cell ;
antibiotics more likely to be misused ;
AVP ; ;

6(a)(i)	gene ;
6(a)(ii)	transcribed / template, strand ;
6(a)(iii)	ribosome ; 1 70S / 80S
6(a)(iv)	weakens / AW, bacterial <u>cell wall</u> ; cell cannot maintain turgor / AW ; leads to (osmotic) lysis / AW ;
6(b)(i)	flattened cells / AW ; short diffusion distance, (for gas exchange / described) ;
6(b)(ii)	stretch / expand, on inhalation, to prevent alveoli bursting / rupturing / overstretching ; recoil on exhalation to help expel air from the lungs ; <i>if no marks gained, allow one mark for stretch and recoil</i>

1(a)	any two from: <i>allow oras</i> 1 cilium composed of microtubules or microvillus, composed of microfilaments / contains actin (filaments) ; 2 cilium 9+2 (microtubule) arrangement ; 3 cilium has basal body ; A has centrioles at the base 4 cilium shows synchronous, rhythm / movement ; A whip-like / rhythmic, movement 5 cilium, moves / wafts, mucus or microvillus increases, surface area / SA, for, absorption / uptake / secretion ; A increases SA to locate transport proteins AW 6 AVP ; e.g. cilium has dynein (arms) cilium is, longer (10 µm) / wider (0.2 µm) or microvillus is, shorter (1 µm) / narrower (90 nm)
1(b)	any one from: protects (intestinal), epithelium / cells / lining ; A examples of protection e.g. damage from stomach acid / digestion by enzymes A less likely for epithelial cells to be damaged / AW A traps, pathogens or (harmful), bacteria / microbes / microorganisms I dust A prevents, pathogens / AW, from reaching cells eases / reduces friction for, movement of, gut contents / substances (through digestive system) ; habitat / nutrient source, for gut, microorganisms / flora ; AW AVP ; e.g. location for immune system cells R if stated as being in the gas exchange system
1(c)(i)	arteriole ; A (small) artery

1(c)(ii)	any two from: (at arteriole end of capillary) high, <u>hydrostatic</u> / <u>blood</u>, pressure ; A ref. to hydrostatic pressure gradient (ultra)filtration / described ; e.g. fluid / plasma / water <u>and</u> solutes, forced / comes out of, capillaries / blood glucose / amino acids / ions, leave (blood) or (large / plasma) proteins remain (in blood) ; R if stated, red blood cells / platelets, leave through, fenestrations / fenestrae / endothelial pores or pores / gaps / spaces, in, capillary wall / endothelium / between cells ;
1(d)	any three from: <i>after, secreted / released, by enteroendocrine cells</i> transport of, peptide / GLP-1 / ligand, in, blood / circulation ; to, <u>target cells</u> (which are cells of the, stomach / pancreas) ; binding of, peptide / GLP-1 / ligand, to receptor ; <i>context can be cell surface membrane or intracellular</i> <i>ref. to, specificity / complementary ; must be in correct context of GLP-1 binding to receptor</i> (binding) triggers / sets off / AW, events within (target) cell (leading to the response) ; A examples e.g. signal transduction / triggers enzyme cascade
1(e)(i)	prophase metaphase anaphase telophase } ; R if interphase or cytokinesis stated

1(e)(ii)	any three from: <i>ref. to nucleus / nucleolus, is neutral</i> presence of, vesicles / vacuoles, qualified ; e.g. many / secretory / Golgi A storage vesicles correct <i>ref. to</i> exocytosis ; A fusion of, vesicle / vacuole, with <u>cell surface membrane</u> much / high proportion of / a lot of / AW, <u>rough endoplasmic reticulum</u> ; I ER / RER / rough ER A many ribosomes rough endoplasmic reticulum / ribosomes, site of, peptide / polypeptide / protein / enzyme, synthesis ; ecf for abbreviating rough endoplasmic reticulum previously AVP ; e.g. presence of mitochondria to provide, ATP / energy, for, protein synthesis / movement of vesicle to cell surface membrane / exocytosis <i>mp2 can also be awarded here</i> only if <i>ref. has been made within response to vesicles / vacuoles</i>
1(e)(iii)	Paneth cell is, <u>differentiated</u> / <u>specialised</u> (for, secretion / its function) or stem cells are, <u>undifferentiated</u> / <u>not differentiated</u> / not specialised ;

2(a)(i)	<i>any two from</i> each polypeptide is a (left-handed), helix / helical shape ; R alpha helix (three) polypeptides are tightly, coiled / wound (around each other) / AW ; (three polypeptides form a) <u>triple helix</u> ; I bonding
2(a)(ii)	<i>any three from</i> <i>collagen molecules arranged</i> 1 in parallel ; 2 staggered / ends are not aligned / AW ; <i>molecules held together by – max 2</i> 3 covalent, bonds / links ; I hydrogen bonds R if part of a list that includes other bonds in proteins 4 between R-groups of amino acids <u>on different molecules</u> ; A side chains 5 AVP ; e.g. covalent bonds between lysine / hydroxylysine (residues)
2(b)(i)	provides (high tensile) strength to, help keep trachea open / support trachea ; A provides strength to prevent trachea collapsing allows flexibility for, breathing / change of diameter of trachea / bending of trachea / AW ;
2(b)(ii)	<i>any one from:</i> (inhalation) allow, stretching / expansion, without, rupture / AW ; A prevent overstretching elastic fibres recoil to help, expel air / exhalation / expiration ; R to empty
2(c)(i)	(gly)-pro-met-gly-pro-arg-gly-pro-pro-gly ;
2(c)(ii)	<i>any three from:</i> <i>allow gly for glycine</i> 1 glycine is every third amino acid ; 2 glycine, allows tight folding for the polypeptides / makes it easy for polypeptides to fit closely together / AW ; A compactness A glycine allows the turning points (of the polypeptide) 3 glycine has <u>smallest</u> R-group ; A glycine is the <u>smallest</u> (amino acid) / glycine has H as R-group or side chain 4 NH in glycine can form hydrogen bonds (with carboxyl group on another amino acid residue) 5 (so) allows many hydrogen bonds between polypeptides ; 6 AVP ; ala / pro, also has a small R-group / AW
2(c)(iii)	P deletion of first nucleotide pair changes the, sequence / order, of amino acids (in primary structure) ; I shorter A (GTC CAA TGG GTC CCC GAG GTC CCC CAG GT_) val gln trp val pro glu val pro gln (val) Q substitution in first triplet (GGT to TGT in non-transcribed strand) cys (instead of gly) is first amino acid, <u>and</u> no change to the rest (of, sequence / order, of amino acids) ; A <u>only</u> first amino acid is different

4(a)	bronchus ;
4(b)(i)	alveolus ; A alveolar sac / alveolar duct
4(b)(ii)	<u>smooth muscle</u> (cell) ;
4(b)(iii)	<i>any three from:</i> no cartilage ; A no, cartilage rings / C-shaped cartilage A no, irregular cartilage / cartilage plates few / no, goblet cells ; ora trachea / bronchus, have (more) goblet cells thin layer / patches / areas, of smooth muscle ; ecf from (b)(ii) A idea of quantity of smooth muscle less (than in, trachea / bronchus) thin(ner) wall ; (more) convoluted / wavy, lumen lining ; AW e.g. folded / curvy A lumen lining not smooth less, elastic, tissue / fibres, (than, trachea / bronchus) ; AVP ; e.g. ciliated epithelium not, pseudostratified / layered appearance <i>in context of the trachea / larger bronchi</i> no mucous glands present
4(c)	<i>any two from:</i> <i>allow O₂ for oxygen and CO₂ for carbon dioxide</i> systemic circulation (needed) to bring, oxygen / glucose, <u>and</u> pulmonary circulation brings deoxygenated blood ; <i>idea that</i> lungs are location, of gas exchange (surface) / where absorption of oxygen occurs / where excretion of carbon dioxide occurs or pulmonary circulation for, oxygen uptake / carbon dioxide excretion ; cells need, oxygen / glucose, for (aerobic) respiration / for cell metabolism / AW ; R body cells

2(a)	<i>any two from:</i> 1 (initial) volume / population / number, of bacteria (in bacterial suspensions) or volume of (bacterial) suspension or (original) optical density of (bacterial) suspensions ; 2 volume of nitrite (ion solution) ; 3 concentration / volume, of nutrient broth ;
2(b)(i)	(<i>species of bacterium:</i>) nominal ; (<i>lowest nitrite concentration:</i>) continuous ;
2(b)(ii)	1 correct reading of values from Figure 2.1 (<i>Salmonella enteritidis</i> =) 0.7 <u>and</u> (<i>Salmonella typhimurium</i> =) 5 ; 2 correct working ; 3 correct value for percentage difference ; 614 (%) / 86 (%)
2(b)(iii)	(most affected =) <i>Yersinia enterocolitica</i> (least affected =) <i>Salmonella typhimurium</i> ;

2(c)	any four from: 1 <i>idea that</i> investigation, not carried out in a person / carried out in a laboratory ; 2 <i>idea that</i> investigation only carried out for 24 hours / no information about longer term effects ; 3 <i>idea that</i> experiment, only used 5 species of (pathogenic) bacteria / did not use other bacteria ; 4 pH in the, digestive system / stomach / intestines / AW, is not 4.8 / is different ; 5 <i>idea that</i> nitrites may, kill / reduce growth / AW, of / beneficial / AW, bacteria (in the digestive system) ; 6 nitrites could, cause side effects / be toxic / AW (in humans) ; 7 no evidence of control experiment ; 8 no statistical, test / analysis ; 9 <i>idea that</i> (bacterial) population sizes may not have decreased (as only measured when no bacterial population growth occurred) ;
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