Multiple Choice Answers

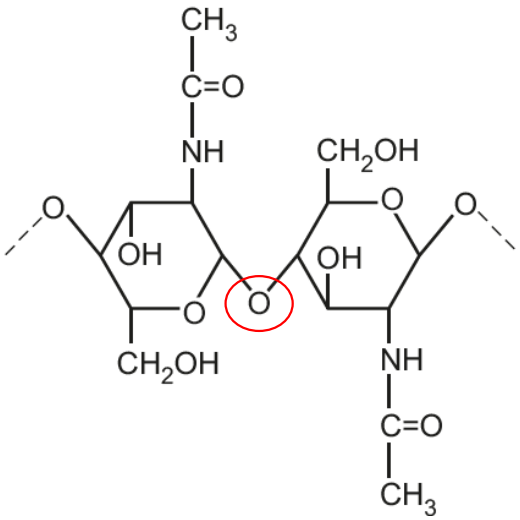
Q1: D
Q6: C
Q13: B
Q15: B
Q20: C
Q23: B
Q26: B

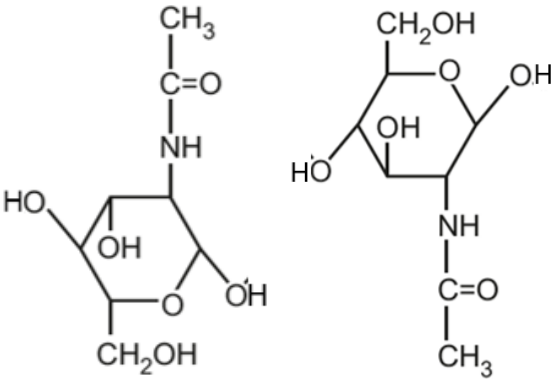
Multiple Choice Answers

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 **;** **I** 70S / 80S
6(a)(iv)	weakens / AW, bacterial cell wall **;** 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 **;** *if no marks gained, allow one mark for stretch and recoil*

1(a)	*any **two** from:* *allow **oras*** **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, hydrostatic / blood, pressure **;** **A** *ref. to* hydrostatic pressure gradient (ultra)filtration / described **;** e.g. fluid / plasma / water and 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*: *after, secreted / released, by enteroendocrine cells* transport of, peptide / GLP-1 / ligand, in, blood / circulation **;** to, target cells (which are cells of the, stomach / pancreas) **;** binding of, peptide / GLP-1 / ligand, to receptor **;** *context can be cell surface membrane or intracellular* *ref. to*, specificity / complementary **;** *must be in correct context of GLP-1 binding to receptor* (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*: *ref. to nucleus / nucleolus, is neutral* presence of, vesicles / vacuoles, qualified **;** e.g. many / secretory / Golgi **A** storage vesicles correct *ref. to* exocytosis **;** **A** fusion of, vesicle / vacuole, with cell surface membrane much / high proportion of / a lot of / AW, rough endoplasmic reticulum **;** **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 *mp2 can also be awarded here **only** if ref. has been made within response to vesicles / vacuoles*
1(e)(iii)	Paneth cell is, differentiated / specialised (for, secretion / its function) **or** stem cells are, undifferentiated / not differentiation / not specialised **;**

2(a)(i)	*any **two** from* 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) triple helix **;** **I** bonding
2(a)(ii)	*any **three** from* *collagen molecules arranged* **1** in parallel **;** **2** staggered / ends are not aligned / AW **;** *molecules held together by – max 2* **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 on different molecules **; 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)	*any **one** from:* (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)	*any **three** from:* *allow gly for glycine* **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 smallest R-group **;** **A** glycine is the smallest (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 polypeptide**s ;** **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, and no change to the rest (of, sequence / order, of amino acids) **;** **A** only first amino acid is different

4(a)	bronchus **;**
4(b)(i)	alveolus **;** **A** alveolar sac / alveolar duct
4(b)(ii)	smooth muscle (cell) **;**
4(b)(iii)	*any **three** from:* 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 *in context of the trachea / larger bronchi* no mucous glands present
4(c)	*any **two** from:* *allow O_2 for oxygen and CO_2 for carbon dioxide* systemic circulation (needed) to bring, oxygen / glucose, and pulmonary circulation brings deoxygenated blood **;** *idea that* 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)	*any **two** from*: **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)	(*species of bacterium:*) nominal **;** (*lowest nitrite concentration:*) continuous **;**
2(b)(ii)	**1** correct reading of values from Figure 2.1 (*Salmonella enteritidis* =) **0.7** and (*Salmonella typhimurium* =) **5 ;** **2** correct working **;** **3** correct value for percentage difference **;** 614 (%) / 86 (%)
2(b)(iii)	(most affected =) *Yersinia enterocolitica* (least affected =) *Salmonella typhimurium* **;**

2(c)	*any **four** from*: **1** *idea that* investigation, not carried out in a person / carried out in a laboratory **;** **2** *idea that* investigation only carried out for 24 hours / no information about longer term effects **;** **3** *idea that* 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** *idea that* 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** *idea that* (bacterial) population sizes may not have decreased (as only measured when no bacterial population growth occurred) **;**