Multiple Choice Answers

Q30: A

Q31: B

Q32: D

Q33: B

Multiple Choice Answers

Q32: D

2(a)	*any **two** from:* (each haem contains) an, iron ion / ferrous ion / Fe^{2+} ; **A** iron / iron atom (each haem) binds to / AW, an oxygen molecule / two oxygen atoms ; **A** forms a bond *only if*, iron ion / ferrous ion / Fe^{2+}, stated
2(b)	*any **three** from:* less carbon dioxide diffuses into red blood cells ; less carbon dioxide reacts with water ; less carbonic acid is formed ; less, dissociation of carbonic acid / formation of hydrogen ions and hydrogen carbonate ions ; less haemoglobinic acid is formed ; **A** description e.g. H^+ binds to haemoglobin less oxygen (released from haem) diffuses out of red blood cells (to respiring tissues) ; *ref. to* carbaminohaemoglobin ; AVP ; e.g. *ref. to* change in shape of haemoglobin when H^+ binds
2(c)(i)	*idea that* blood vessel **X** carries (oxygenated blood) at high pressure (to body tissues) ; **A** *ref. to* systemic circulation *any **two** from:* *difference* high proportion of elastic fibres (and low proportion of smooth muscle) ; *explanation* (elastic fibres allow **X** to) expand / stretch, qualified ; e.g. to accommodate / AW, blood from ventricular, systole / contraction with, surges / pulses, of blood leaving heart to prevent, bursting / rupture recoil of elastic fibres, detail ; e.g.to allow surges / pulses, to continue *idea of* allowing continued flow of blood to tissues maintains, onward pressure / high pressure of blood *if no marks gained in this section allow one mark for:* *stretch and recoil with one detail* ***or*** *ref. to two correct details but stretch and recoil not stated*

2(c)(ii)	*allow, impulses / wave of excitation, for electrical impulses* **R** nerve impulses *once and allow **ecf*** *must attempt AVN <u>and</u> Purkyne tissue to gain max* *any **four** from:* both involved in, co-ordination / control, of, systole / contraction, of, heart / heart muscle / cardiac muscle / ventricles ; *AVN* only pathway for impulses to travel from atria to ventricles ; AW **A** impulses must pass through AVN for ventricular, contraction / systole allow, a delay **/** 0.1 s, for impulse to pass from atria to ventricles ; so, ventricles contract after atria contract / ventricular systole occurs after atrial systole ; allows atria to (fully) empty before, ventricles (begin to) contract / ventricular systole **or** allows blood to fill ventricles before ventricular, contraction / systole ; *Purkyne tissue* carries / transmits / AW, impulse(s), (down septum), to base of ventricles / through walls of the ventricles ; for ventricular systole / AW ; ventricular muscles contract / AW, together / at same time / simultaneously / from the base upwards / from apex of heart ;

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 ;

6(a)	• *consider all mps to award if response clearly addresses events in the left side* ○ *mps 1,2,6,7,8 must be in the context of the left side of the heart* • *otherwise allow mp 3, 4, and 5 to max 3 – these mark points are inset to the right* *any **five** from:* **1** blood enters (heart) via / in, pulmonary vein(s) ; **2** blood exits heart to aorta ; **R** arota **3** blood flows from atrium to ventricle ; **4** atrial, systole / contraction, then, ventricular, systole / contraction ; **A** atrium contracts then ventricle contracts **5** pressure in ventricle, increases / gets higher ; **I** high pressure unclear attempts / mixed right and left sides **6** bicuspid / (left) atrioventricular valve closes ; **A** mitral valve **R** *if in context of events in the atrium* **7** semilunar / aortic, valve opens ; **ecf** *from arota in mp 2* **R** *if in context of events in the atrium* **8** bicuspid / (left) atrioventricular, valve closes when (blood) pressure in ventricle higher than atrium **or** semilunar / aortic, valve opens when (blood) pressure in ventricle higher than aorta ; **A** aortic valve
6(b)(i)	*if no marks gained allow one mark for four, polypeptides / polypeptide chains* two, (identical) alpha / α, chains / globins, and two, (identical) beta / β, chains / globins ; **A** subunits / polypeptides, for chains **R** beta-pleated sheets / globulin *plus **one** from;* each, chain / globin / polypeptide, incorporates / contains / AW, a haem (group) ; **A** four haem groups **A** molecule for polypeptide if mp1 gained **A** ferrous ion / Fe^{2+} / iron (ion / atom), within porphyrin (ring) for haem group **A** prosthetic group with, ferrous ion / Fe^{2+} / iron (ion / atom) hydrogen bonds / hydrophobic interactions / ionic bonds, between, chains / polypeptides / globins ; *context is interactions between chains* **R** if disulfide bond also stated
6(b)(ii)	oxygen binds to, iron ion / ferrous ion / Fe^{2+} ; **A** oxygen bonds / oxygen forms a bond, *only if*, iron ion / ferrous ion / Fe^{2+} stated **A** oxygen binds to, iron / iron atom / haem (group) **R** if more than one oxygen molecule binds to one iron ion detail of saturated ; e.g. total of 4 oxygen molecules / 8 oxygen atoms (bind per haemoglobin molecule) each, chain / globin / polypeptide, binds one oxygen molecule **R** bonds *ref. to* cooperative binding / allostery **A** description *ref. to* (fully saturated molecule is) in, high partial pressures of oxygen / high concentration of oxygen ; *ref. to* T / tense, state to, R / relaxed, state