

Multiple Choice Answers

Q39: C

Q40: C

Multiple Choice Answers

Q39: D

Q40: C

Multiple Choice Answers

Q39: A

6(a)	any two of these pairs, feature and explanation 1 thick wall of (left) ventricle ; R if right 2 pumps blood at high pressure to, reach (all of) systemic circulation / overcome resistance in systemic circulation / over a long distance / AW ; A if thick wall unqualified A generate high force R 'withstands high pressure' 3 thin wall of (left) atrium ; 4 pumps blood at low pressure, into ventricle / over a short distance ; either 5 (named) valves ; R tricuspid / pulmonary 6 prevent, backflow of blood / maintains one-way flow of blood (through heart) ; ecf if right atrioventricular / tricuspid or 5 (left) atrioventricular / mitral / bicuspid, valve ; R right 6 prevents, backflow of blood / blood flowing from ventricle to atrium ; A maintains one-way flow of blood (through heart) or 5 (left) semi-lunar, valve ; 6 prevents, backflow of blood / blood flowing from, aorta / artery, to ventricle ; A maintains one-way flow of blood (through heart) 7 chordae tendinae / tendons / tendinous cords / AW ; I ligaments 8 hold the valve in position, during systole / when ventricle contracts / AW ; A prevents blowback / turning inside out I high tensile strength unqualified 9,10 AVP ;; e.g papillary muscle ; contracts to hold, tendons / valve, when heart contracts / during systole ; ora
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6(b)	<i>any four from: if AVN used penalise once and then use ECF</i> 1 <u>sinoatrial node</u> releases, waves of excitation / waves of depolarisation / (electrical) impulses / action potential(s) ; AW 2 impulses / AW, stimulate, (both) atria to contract / atrial systole ; 3 impulses / AW, prevented from reaching ventricles by, fibrous ring / non-conducting tissue / insulating tissue / (between atria and ventricles) ; A annulus fibrosus 4 <u>atrioventricular node</u>, delays impulse (by 0.1 s) ; 5 atrioventricular node, sends impulse to, Purkyne tissue (in septum) ; A bundle of His <i>allow ecf for abbreviating AVN</i> 6 Purkyne tissue conducts impulse to, base of ventricles / apex of heart, so they contract ;
6(c)(i)	<i>any two from: if transport is used in MP2 to MP8, penalise once and mark to a max of 1 for those MPs</i> <i>provides, aqueous / watery, (external) environment / surroundings, for cells</i> 1 to maintain correct water potential to prevent, cell dehydration / excessive water loss from cells ; <i>idea that provides medium for exchange of substances</i> 2 supply of oxygen / oxygen diffuses from blood into tissue fluid ; 3 removal of carbon dioxide / carbon dioxide diffuses from tissue fluid into blood ; A exchange of (respiratory) gases as alternative to MP2 and MP3 4 supply of named nutrient e.g. glucose, amino acids, (named) ion(s) ; 5 removal of, metabolic / toxic, waste or urea ; 6 location / movement, of (tissue) macrophages / neutrophils / phagocytes (for defence) ; I white blood cell 7 allows movement of / medium for passage of, (named) cell signalling molecules / hormones / ligands ; A ref. to cells signalling nearby cells / paracrine signalling 8 AVP ; e.g. contributes to formation of lymph / contains antibodies e.g. allows movement of lymphocytes into lymph

6(c)(ii)	any three from: 1 (at arteriole end of capillary) high, hydrostatic / blood, pressure ; 2 (ultra)filtration / described ; e.g. fluid / plasma / water <u>and</u> solutes, forced / comes, out of, capillaries / blood 3 glucose / amino acids / ions, leave blood R if stated, red blood cells / platelets, leave or (large) plasma proteins remain in blood ; 4 through, fenestrations / fenestrae / endothelial pores or through, pores / gaps / spaces, in, capillary wall / endothelium / between cells ; 5 AVP ; e.g. <i>ref. to</i> hydrostatic pressure gradient hydrostatic pressure of blood is greater than hydrostatic pressure of tissue fluid
6(d)(i)	I pathogen A epitope for antigen any two from: some (T-lymphocyte) have (T-cell) receptors, specific / complementary, to a particular antigen ; ora antigen (in vaccine) binds to these T-lymphocytes ; <i>idea that</i> only these T-lymphocytes are, activated / stimulated / selected ; I respond AVP ; e.g. some T-lymphocytes do not become exposed to limited quantity of antigen in vaccine

6(d)(ii)	max four if no correct <i>ref. within response to, memory cells / immunological memory</i> any five from: <i>context of primary immune response</i> 1 antigen presentation by macrophages ; 2 (T- / B-) lymphocyte, binding / recognition / clonal selection / activation / described in terms of receptor ; 3 clonal expansion / cell divides by mitosis many times (to produce a clone) / AW ; 4 cytokines released by T-helper, cells / lymphocytes ; 5 (stimulate) formation of memory, (T- / B-) lymphocytes / cells ; 6 (memory cells) remain in, circulation / body, for a long time / AW ; A remain in lymph nodes or memory cells are long-lived ; <i>context of secondary immune response</i> 7 large numbers of (specific), memory cells / lymphocytes ; I more memory cells A memory cells have a higher chance of encountering antigen
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2(a)	cholera = prokaryotic <u>and</u> malaria = eukaryotic <u>and</u> TB = prokaryotic ;
2(b)	pathogen ;

2(c)(i)	magnification (x) 12 000 ;; for line X-Y measuring 24 mm A calculated values for line X-Y measured between 23 to 25 mm for one mark: • correct calculation for 23.5 or 24.5 but not to 3 sig. figs = 1 mark • incorrect answer e.g. conversion factor incorrect, but – shows correct measurement for image – uses correct formula for calculation – answer to 3 sig. figs • measurement 22 mm or 26 mm – correct answer for their measurement – uses correct formula for calculation – answer to 3 sig. figs
2(c)(ii)	any three from: 1 by a vector / carrier / mosquito / insect / (female) <i>Anopheles</i> ; 2 takes, blood meal / sucks blood / feeds on blood ; context is transmission from infected to uninfected 3 <i>Plasmodium</i> / pathogen / parasite, is in blood ; in correct context 4 injects <i>Plasmodium</i> / AW, together with, anticoagulant / saliva ; 5 AVP ; e.g. <i>Plasmodium</i> / AW, migrates, after ingestion / from insect gut / AW, to salivary glands if another mode of transmission stated, e.g. transfusion, allow mp1 and mp3 and a relevant AVP

2(d)(i)	any two from: (phagocyte) has (specific) <u>receptors</u> (for PS) ; R antigens A named e.g. macrophage / monocyte / Kupffer cell / neutrophil PS binds to (phagocyte / cell surface) receptor (to stimulates a response) ; A phagocyte has a binding site for PS / PS binds to a binding site <i>ref. to (PS presence / change in membrane) causes chemotaxis / attracts phagocyte (to red blood cell)</i> <i>treat as neutral suggested chemicals that trigger chemotaxis</i> AVP ; e.g. PS acts as an antigen
2(d)(ii)	any one from: <i>why uninfected red blood cells are destroyed</i> (some) PS is present in outer layer so can be, recognised / detected ; AW <i>why only some red blood cells are destroyed</i> only a few PS in outer layer so lower chance of being recognised ; parts of, parasite / pathogen / <i>Plasmodium</i> (in circulation), may become attached to, surface / cell surface membrane ; (cell) displays, a foreign antigen / a non-self, antigen ; displays an antibody (attached to antigen) ; damaged (by other means) / at end of life-span / non-functioning, (so need destroying) ;
2(e)(i)	R if context is, red blood cell / entry into red blood cell by pathogen any one from: <i>context is Plasmodium</i> for, cell membrane(s) / cell surface membrane ; maintain / regulate, stability / fluidity, of membrane ; I affects / changes, <i>if not qualified</i> A phospholipid bilayer <i>for membrane</i> to, convert / AW, to other products needed ; to (breakdown and) use as an energy source ; cannot / does not have gene to, synthesise cholesterol ; AVP ; e.g. to form, vesicle / vacuole (to contain replicated cells)

2(e)(ii)	I <i>ref. to temperature</i> <i>any two from:</i> 1 make more fluid / increase fluidity ; 2 decrease / reduces, membrane stability ; 3 increases, entry / exit, of, polar molecules / ions / water ; A increases, permeability / described 4 allow increased (lateral) movement of cell components within bilayer ; 5 reduced interaction with fatty acid tails ; 6 AVP ; e.g. decreased interaction with proteins, so affecting their function may affect ability to distort shape when passing through capillaries <i>if no marks gained, allow one compensation mark for</i> - changes two of: fluidity / stability / permeability ecf from 'decreases fluidity'
2(f)(i)	<i>any one from:</i> active / energy-requiring, process ; A need energy, for the process / to move phospholipids moving, phospholipids / named, against the concentration gradient / to area with higher quantity / AW ; to allow conformational change (of enzyme) ; I active transport but R if described as movement across the membrane
2(f)(ii)	<i>any one from:</i> actively transport / pump, Ca^{2+} / calcium ions, out of cell (once entered) ; transports Ca^{2+} / calcium ions, (out) against the concentration gradient ; cell surface membrane impermeable to, Ca^{2+} / calcium ions ; no / very few, transport / pump / carrier / channel, (membrane) proteins ; <i>context is for entry of calcium ions</i>

2(f)(iii)	<i>any three from:</i> 1 scramblase, activated / becomes active / begins functioning / AW ; <i>context is, increase in Ca^{2+} / when Ca^{2+} binds</i> A Ca^{2+} increases, more scramblase binds to Ca^{2+} ora scramblase, suppressed / inactive (only), in low Ca^{2+} concentration 2 scramblase moves, PC from outer to inner layer or PE / PS, from inner to outer layer ; I scramblase randomly moves, PC / PE / PS 3 described effect on, distribution / organisation / asymmetry / AW (of phospholipids in cell surface membrane) ; e.g. becomes, disrupted / disorganised / more random is uncontrolled / not regulated becomes more, symmetrical / even / evenly balanced higher proportion of, PC in inner layer higher proportion of, PE / PS, in outer layer (than normal) <i>(idea that the phospholipids are in the incorrect location)</i> 4 scramblase activity higher than activity of, flippase / floppase or <i>idea that, flippase / floppase, action cannot counteract effect of scramblase ;</i> 5 ATP runs out, qualified ; e.g. to maintain asymmetry for (increased), flippase / floppase, activity to move phospholipids (against their gradient) 6 AVP ; e.g. Ca^{2+} is, a cofactor / needed for scramblase function
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