

Question 32 (Answer: **D**)

- Read the graph where the ventricle pressure curve crosses the aorta curve.
- The aortic semilunar valve opens when ventricular pressure rises *above* aortic pressure.
- While the ventricle is contracting the atrium is relaxed and filling with blood.

Question 35 (Answer: **D**)

- Wall thickness follows how far the chamber must pump blood.
- The left ventricle is much the thickest, pumping to the whole body.
- The right ventricle is thinner (lungs only) and both atria are thinnest of all.

Question 33 (Answer: **C**)

- During ventricular systole both ventricles contract at once.
- The left ventricle generates a much higher pressure than the right.
- So blood is pushed through the hole from left ventricle to right ventricle.

Question 34 (Answer: **B**)

- An atrium only pumps blood into the ventricle below it, so it needs little force and has a thin wall.
- The left ventricle pumps to the whole body, so it needs a thick muscular wall.
- The distance the blood must travel is what sets the wall thickness.

6(a)	<i>any two of these pairs, feature and explanation</i> 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
------	---

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)	<i>any three from:</i> 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 <i>any two from:</i> 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)	<i>max four if no correct ref. within response to, memory cells / immunological memory</i> <i>any five from:</i> <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
----------	--