

## Multiple Choice Answers

Q31: B

## Multiple Choice Answers

Q33: A

Q34: A

## Multiple Choice Answers

Q32: C

## Multiple Choice Answers

Q33: A

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

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| 2(c)(ii) | <p><i>allow, impulses / wave of excitation, for electrical impulses</i> <b>R</b> nerve impulses <i>once and allow ecf must attempt AVN <u>and</u> Purkyne tissue to gain max</i></p> <p>any <b>four</b> from:<br/>both involved in, co-ordination / control, of, systole / contraction, of, heart / heart muscle / cardiac muscle / ventricles ;</p> <p>AVN<br/>only pathway for impulses to travel from atria to ventricles ; AW<br/><b>A</b> impulses must pass through AVN for ventricular, contraction / systole</p> <p>allow, a delay / 0.1 s, for impulse to pass from atria to ventricles ;</p> <p>so, ventricles contract after atria contract / ventricular systole occurs after atrial systole ;</p> <p>allows atria to (fully) empty before, ventricles (begin to) contract / ventricular systole<br/><b>or</b><br/>allows blood to fill ventricles before ventricular, contraction / systole ;</p> <p><i>Purkyne tissue</i><br/>carries / transmits / AW, impulse(s), (down septum), to base of ventricles / through walls of the ventricles ;</p> <p>for ventricular systole / AW ;</p> <p>ventricular muscles contract / AW, together / at same time / simultaneously / from the base upwards / from apex of heart ;</p> |
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| 6(a) | <ul style="list-style-type: none"> <li>consider <u>all</u> mps to award if response clearly addresses events in the left side <ul style="list-style-type: none"> <li>mps 1,2,6,7,8 must be in the context of the left side of the heart</li> </ul> </li> <li>otherwise allow mp 3, 4, and 5 to max 3 – these mark points are inset to the right</li> </ul> <p>any <b>five</b> from:</p> <p><b>1</b> blood enters (heart) via / in, pulmonary vein(s) ;</p> <p><b>2</b> blood exits heart to aorta ; <b>R</b> aorta</p> <p><b>3</b> blood flows from atrium to ventricle ;</p> <p><b>4</b> atrial, systole / contraction, then, ventricular, systole / contraction ;<br/><b>A</b> atrium contracts then ventricle contracts</p> <p><b>5</b> pressure in ventricle, increases / gets higher ; <b>I</b> high pressure</p> <p><b>6</b> bicuspid / (left) atrioventricular valve closes ; <b>A</b> mitral valve<br/><b>R</b> if in context of events in the atrium</p> <p><b>7</b> semilunar / aortic, valve opens ; <b>ecf</b> from aorta in mp 2<br/><b>R</b> if in context of events in the atrium</p> <p><b>8</b> bicuspid / (left) atrioventricular, valve closes when (blood) pressure in ventricle higher than atrium<br/><b>or</b><br/>semilunar / aortic, valve opens when (blood) pressure in ventricle higher than aorta ; <b>A</b> aortic valve</p> <p>unclear attempts / mixed right and left sides</p> |
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| 6(b)(i)  | <p><i>if no marks gained allow one mark for four, polypeptides / polypeptide chains</i></p> <p>two, (identical) alpha / <math>\alpha</math>, chains / globins, <u>and</u> two, (identical) beta / <math>\beta</math>, chains / globins ;<br/> <b>A</b> subunits / polypeptides, for chains<br/> <b>R</b> beta-pleated sheets / globulin</p> <p><i>plus one from;</i><br/> each, chain / globin / polypeptide, incorporates / contains / AW, a <u>haem</u> (group) ;<br/> <b>A</b> four haem groups<br/> <b>A</b> molecule for polypeptide if mp1 gained<br/> <b>A</b> ferrous ion / <math>\text{Fe}^{2+}</math> / iron (ion / atom), within porphyrin (ring) for haem group<br/> <b>A</b> prosthetic group with, ferrous ion / <math>\text{Fe}^{2+}</math> / iron (ion / atom)</p> <p>hydrogen bonds / hydrophobic interactions / ionic bonds, between, chains / polypeptides / globins ;<br/> <i>context is interactions between chains</i> <b>R</b> if disulfide bond also stated</p> |
| 6(b)(ii) | <p>oxygen binds to, iron ion / ferrous ion / <math>\text{Fe}^{2+}</math> ;<br/> <b>A</b> oxygen bonds / oxygen forms a bond, <i>only if</i>, iron ion / ferrous ion / <math>\text{Fe}^{2+}</math> stated<br/> <b>A</b> oxygen binds to, iron / iron atom / haem (group)<br/> <b>R</b> if more than one oxygen molecule binds to one iron ion</p> <p>detail of saturated ; e.g.<br/> total of 4 oxygen molecules / 8 oxygen atoms (bind per haemoglobin molecule)<br/> each, chain / globin / polypeptide, binds one oxygen molecule <b>R</b> bonds<br/> <i>ref. to</i> cooperative binding / allostery <b>A</b> description<br/> <i>ref. to</i> (fully saturated molecule is) in, high partial pressures of oxygen / high concentration of oxygen ;<br/> <i>ref. to</i> T / tense, state to, R / relaxed, state</p>                                                                                                                                                                     |