Edexcel AS Biology B exam practice answers

4 Exchange and transport

**1 (a)** The continuous (bi)layer restricts the entry of large molecules; the phospholipid bilayer restricts the entry of water-soluble molecules/ions; protein channels allow the entry of ions/charged particles; protein carriers the allow entry of larger molecules/glucose/amino acids. [4]

 **(b) (i)** The steeper the concentration gradient, the faster the rate of diffusion. [1]

 **(ii)** Facilitated diffusion takes place through channel proteins; the rate of diffusion levels as the number of carrier proteins becomes limiting. [2]

**2 (a)** **A** = (anterior/posterior) vena cava; **B** = hepatic portal vein; **C** = renal artery. [3]

 **(b)** The thick layer of elastic tissue allows for expansion as blood flows into the artery from the heart/it allows recoil after the heart contracts that evens out the flow; squamous epithelium provides a friction-free inner surface. [2]

 **(c)** To prevent the backflow of blood; to fill with blood, closing the lumen of the vein. [2]

 **(d) (i)** The insect has an open system whereas mammals have a closed system. [1]

 **(ii)** A fish has a single system whereas mammals have a double system. [1]

**3 (a)** By osmosis; from a solution with a high/less negative water potential to one with a lower/more negative water potential. [2]

 **(b)** Water evaporates from the mesophyll cells and diffuses out of the leaves; water lost from the mesophyll cells is replaced by water from the xylem in leaves; cohesion between the water molecules pulls more water from the xylem; tension in the xylem pulls the water from root. [4]

 **(c)** 14CO2 is used to make sucrose, which is transported in the phloem; the radioactivity level is high/2.34 units in the leaf where sugar is made; radioactivity is 3.46 units in the bud and 0.92 in the roots, which shows these regions are sinks; so the movement (of sugars) must be both up and down the plant, but mass-flow hypothesis accounts for movement in one direction. [4]

**4 (a)** In both, the diaphragm muscle relaxes; at rest, the internal and external intercostals relax; when blowing up a balloon, the external intercostals relax and the internal intercostals contract. [3]

 **(b) (i)** Nitrogen does not diffuse between blood and alveolar air. [1]

 **(ii)** Alveolar air mixes with atmospheric air in the trachea and bronchi; (This air) has a lower carbon dioxide concentration and higher oxygen concentration. [2]

 **(iii)** Gas exchange is (relatively) inefficient; as only 34.4% of oxygen is removed from the air; but the concentration of carbon dioxide increases over 100-fold/by 132 times. [3]

**5 (a)** A potometer. [1]

 **(b)** Cut the end of the plant stem under water/assemble the apparatus under water/cover all joints with petroleum jelly. [1]

 **(c)** It allows the bubble to be moved back to the starting position. [1]

 **(d)** Measure the diameter of the capillary tube and halve it to get the radius; multiply the distance moved (d) by pi (π) and by the square of the radius/find dπr2; divide by the time over which the bubble moved. [3]

 **(e)** The increase in speed of the fan increases the rate of transpiration; because the faster fan/air speed creates a steeper diffusion gradient from the leaf; the rate increases rapidly at first but becomes less rapid after setting 1/from setting 2; because air humidity changes less as air/fan speed increases. [4]

**6 (a)** 80 beats per minute. (If answer is incorrect, allow 1 mark if the working shows the time of one heart beat as 0.8 s.) [2]

 **(b)** The pressure in the atrium became greater than the pressure in the ventricle; blood flow down the pressure gradient pushed the valve open. [2]

 **(c)** 0.34 s. [1]

 **(d)** The wave of impulses passes quickly across atria/over in 0.04 s; so the atria contract together; there is a delay of 0.12 s at the AV node; this allows the atria to empty before the ventricles contract. [4]