				Рар	er 1	Questions to note: 6, 7, 14, 23, 31, 39			
1	2	3	4	5	<mark>6</mark>	<mark>7</mark>	<mark>8</mark>	9	10
А	В	С	С	D	В	В	В	В	С
11	12	13	<mark>14</mark>	15	16	17	18	19	20
D	С	D	С	D	С	А	С	А	С
21	22	<mark>23</mark>	24	25	26	27	28	29	30
С	С	С	D	С	D	В	А	С	А
<mark>31</mark>	32	33	34	35	36	37	38	<mark>39</mark>	40
С	D	С	С	В	А	А	С	А	В

2014 GCE O Level Biology Suggested Answer

Paper 2 (Section A)

Question to note: 1a, 3, 5a, 5b, 6bii, 8bii, 9, 10, 110

- 1 (a) Excretion is the process by which metabolic waste products and toxic substances are removed from the body of an organism [1]. It helps to prevent metabolic waste products from accumulating in the body, which can be toxic and can cause death [1].
 - (b) (i) 183 [1]
 - (ii) Carbon dioxide / bile pigments / creatinine / uric acid [1]
 - (c) When LESS ADH is secreted, it decreases the permeability of cells at the collecting ducts to water [1]. LESS water is then reabsorbed from the collecting duct into the blood capillaries [1]. This results in a larger volume of urine to be excreted that is also less concentrated [1].
- 2 (a) Liver [1]
 - (b) (i) Total volume of drinks = $3 \times 175 = 525 \text{ cm}^3$ Total alcohol consumed = $(12 / 100) \times 525 = 63 \text{ cm}^3$ Number of units of alcohol consumed = 63 / 10= 6.3 units
 - (ii) 6.3 hours

- (c) Short term:
 - 1. Slower reaction time [1]
 - 2. Headache / reckless behaviour [1]

Long term:

- 1. Liver cirrhosis [1]
- 2. Stomach cancer / addiction to alcohol [1]
- 3 (a) (i) vein
 - (ii) Xylem [1]; has an <u>empty lumen without any protoplasm</u> to <u>reduce resistance of water</u> <u>flowing through the xylem</u> [1].
 Xylem [1]; Walls are <u>thickened with lignin</u> to provide <u>structural support</u> for the plant and to prevent the vessel from collapsing [1].
 - (b) (i) Transpiration [1]
 - (ii) 8.8 hours [1] (17-8.2)
 - (iii) 6 and 20 hours [1]
 - (iv) Humidity / light intensity [1]
- 4 (a) It is an area that stores carbon compounds for an indefinite period [1]. It stores more carbon than it releases. [1]
 - (b) (i) Cellular respiration [1]
 - (ii) It helps to reduce the amount of carbon dioxide in the atmosphere [1]. (1 gigaton:10⁹)
 - (iii) Total change in carbon dioxide = (119 + 18 + 88 + 6) (120 + 19 + 90)= 2 gigatons
 - (iv) The oceans act as carbon sinks due to the process of photosynthesis and the solubility of carbon dioxide in water [1]. Carbon dioxide from the atmosphere can <u>dissolve in the ocean water</u> [1] and is used by phytoplankton and algae for photosynthesis [1]. After photosynthesis, <u>carbon compounds is trapped</u> in marine plants and organisms that feed on the plants [1]. When marine plants and animals die and <u>form fossil fuels</u> that are buried in the seabed, <u>carbon compounds</u> are also <u>stored</u> in them [1].
- 5 (a) Carbon monoxide competes with oxygen and binds with haemoglobin to form carboxyhaemoglobin in red blood cells. [1]
 This reduces the ability of blood to transport oxygen to all parts of the body, causing the person to feel tired easily. / Carbon monoxide also narrows the lumen of arteries and leads to increase in blood pressure / Carbon monoxide increases the rate of fatty deposits on the inner arterial wall, which increases the risk of coronary heart disease [1].

- (b) (i) Ratio of deaths between smokers and non-smokers for lung cancer = 324:36 = 9:1
 - (ii) Cigarette smoke contains many harmful carcinogenic substances like tar which increases the risk of lung cancer [1].
- 6 (a) Asexual reproduction is the process resulting in the production of genetically identical offspring from one parent [1], without the fusion of gametes [1].
 - (b) A: prophase [1] B: telophase [1] C: anaphase [1] D: metaphase [1]
- 7 (a) I^A , I^B and I^O

(b)	genotype of parents		father I ^A I ^O	X X	mother I ^B I ^O	
	gametes	I ^A	Io	I ^B	IO	(circled)
	genotype of offspring	I ^A I ^B	I ^A I ^O	I ^B IO	IoIo	
	phenotype of offspring	Blood group AB	Blood group A	Blood group B	Blood group O	

- 8 (a) 1. Arteries have thick muscular walls while veins have relatively thin walls [1].
 2. Arteries have a small lumen while veins have relatively large lumen [1].
 3. Arteries do not have valves while veins have valves [1].
 - (b) (i) The speed of blood flow decreases from 48 cm per second to 4 cm per second as it passes from the aorta to the capillaries [1]. The speed of blood flow then increases from 4 cm per second to 28 cm per second as it passes from the capillaries to the vena cava [1].

(1 mark for correct speed identified)

- (ii) 1m correct axes (with units)
 - 1m correct plots
 - 1m point to point line
 - 1m no extrapolation (labelled plots in the middle)
- (iii) The contraction of heart muscles in the left ventricle [1]

- (iv) The decrease in muscular walls from the aorta to the vena cava reduces the force exerted on blood passing through. / The increase in distance from the heart from the aorta to the vena cava also results in decreasing blood pressure.
- 9 (a) Light energy is absorbed by chlorophyll present in chloroplasts of plant cells [1]. The light energy is then converted to chemical energy [1]. The chemical energy is used to synthesize glucose from water and carbon dioxide via photosynthesis [1]. The glucose is translocated through the phloem to storage organs of the plant as sucrose [1]. The sucrose is then converted and stored as starch [1].
 - (b) The temperature in the greenhouse can be controlled and maintained at the optimum temperature for growth of plant throughout the day [1]. The plant can also be watered with an appropriate amount of water at regular intervals [1]. Fertilisers that promote plant growth can also be supplied at regular intervals to provide appropriate nutrients essential for plant growth [1]. Artificial light can be supplied at even throughout the night to allow plants to absorb light energy for photosynthesis and growth [1]. In this way, the glasshouse can be controlled to provide the different conditions appropriate to maximise growth of plants [1].

Paper 2 (Section B)

- 10 (a) During inhalation, the diaphragm muscle contracts and the diaphragm flattens [1]. The external intercostal muscles contract while the internal intercostal muscles relax [0.5], causing the ribs to move upwards and outwards. The sternum also moves up and forward [0.5]. These causes the volume of the thoracic cavity to increase. The lungs then expand, causing air pressure inside the lungs to decrease [1]. Atmospheric pressure is now higher than the pressure within the lungs, thus forcing air to rush into the lungs and fill the lungs [1].
 - (b) Air breathed in enters the alveolar air sacs of the lungs. The oxygen molecule present in the air then diffuses across the alveolar wall and capillary wall into a red blood cell [1]. It binds reversibly with haemoglobin in the red blood cell to form oxyhaemoglobin. Thus, oxygen is transported in the red blood cell and returns to the left atrium through the pulmonary vein [1]. The red blood cell is then pumped into the left ventricle and then into the aorta [1]. The red blood cell then passes into the coronary arteries and the oxygen molecule can be released from haemoglobin, diffusing out of the blood capillaries and into the muscle cells of the left atrium [1].

- 10 (a) Enzymes are protein that function as biological catalysts. They speed up the rate of 0 chemical reactions by lowering the activation energy needed to start a chemical reaction [1]. As enzymes remain chemically unchanged at the end of chemical reactions, they can be reused again and are therefore only required in minute amounts [1]. Enzymes are specific in action and can only catalyse specific reactions [1]. This is because each enzyme has a specific 3D configuration and active site that can only fit substrates with the complementary shape [1]. When the substrate binds to the enzyme, an enzyme-substrate complex is formed and a chemical reaction can then occur. Enzymes are affected by changes in temperature and pH [1]. Enzymes have optimum temperature and pH conditions where they work best and catalyse chemical reactions at the fastest rate. Extreme changes in pH or high temperature denatures enzymes, causing them to lose their 3D shape while low temperatures cause enzymes to be inactive [1].
 - Enzymes can help to digest stains caused by organic molecules [1]. For example, washing (b) powders with lipase can help to digest fat stains. Thus, it will take shorter soaking time required when using biological washing powders [1]. It also reduces the need for scrubbing the clothing [1]. Using biological washing powders can also be energy saving as there is no need to use high temperatures to remove stubborn stains [1].