2015 GCE O Level Biology Suggested Answer

Paper 1

Questions to note:

1	2	3	4	5	6	7	8	9	10
B	C	B	B	B	B	D	B	D	C
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
B	C	C	B	B	A	D	C	C	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	D	B	A	D	A	C	B	A	D
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
C	B	B	A	A	D	A	A	A	B

Paper 2 (Section A)

Question to note: 1a, 3, 5a, 5b, 6bii, 8bii, 9, 10, 11O

1 (a) A: starch [1]
B: maltose [1]
C: salivary amylase [1]

(b) (i) Temperature [1]

(ii) pH [1]

(c) When gallstones block the bile duct, bile cannot be secreted from the gall bladder into the duodenum [1].
This prevents the emulsification of fats and there is reduced surface area to volume ratio available for digestion of fats by lipases [1].
This would slow down the digestion of fats in fatty acid and glycerol [1].

2 (a) Sexual reproduction is a process involving the fusion of a male and female haploid gamete to form a diploid zygote [1].
Meiosis is involved in the production of haploid gametes [1].
Sexual reproduction produces genetically dissimilar offspring [1].

(b) The pollen are large with spiky, rough surfaces [1] so that they can readily cling onto the body of insects [1].

(c) (i) A: pollen tube [1]

(ii) The pollen tube secretes enzymes that will digest the tissue in the style and allow the pollen tube to grow through the style and into the ovary [1].
It enters the ovule through the micropyle [1].
Within the ovule, the tip of the pollen tube absorbs sap and bursts, releasing two male gametes into the ovule [1].

3 (a) 24 °C

(b) 1. As air temperature increases, the body temperature of the insect also increases [1].
2. The insect was not able to maintain a constant internal body temperature through homeostasis [1].

(c) 1m – constant temperature of 36.5 °C to 37.4 °C
1m – not extrapolation; graph spans only between air temperatures of 20 °C and 36 °C.

(d) When body temperature increases beyond the set point, thermoreceptors detect the increase and stimulate the sweat glands to become more active [1].
More sweat is being produced and when sweat evaporates from the skin, more heat is loss as latent heat of vaporisation [1],
hence cooling the body and bringing down body temperature back to the normal set point [1].

4 (a) A: aorta [1]
B:pulmonary vein [1]

(b) The semi-lunar valves prevent the backflow of blood from the pulmonary artery into the right ventricle [1], ensuring blood only travels in one direction.

(c) Deoxygenated blood is returned to the right atrium from the body organs via the vena cava [1].
The muscles of the right atrium contract during atrial systole. When pressure in the right atrium is higher than right ventricle, tricuspid valves open and blood is forced into the right ventricle [1].
The muscles of the right ventricle then contract during ventricular systole, pushing open the semi-lunar valves and forcing blood out of the heart into the pulmonary artery towards the lungs [1].
During ventricular systole, the pressure in the right ventricles become higher than that in the right atrium, causing the tricuspid valves to close to prevent the backflow of blood into the right atrium [1].

5 (a) It decreased 90 arbitrary units from 100 arbitrary units to 10 arbitrary units [1].

(b) During fasting, the blood glucose level decreases below the normal range [1].
As a result, levels of insulin decreases to prevent more glucose from being converted to glycogen for storage. Instead, the levels of glucagon increases to increase blood glucose levels to normal set point during homeostasis [1].

(c) During exercise, the body cells require greater amounts of oxygen and glucose for respiration to release energy to meet the demands of the physical activity [1].
Hence, adrenaline concentration increases in order to convert stored glycogen to glucose [1].
Adrenaline also increases the heart rate and blood flow to ensure that oxygen and glucose are transported to respiring cells at a faster rate [1].

6 (a) (i) I^AI^O [1]

(ii) I^BI^O [1]

(iii) Child 2: blood group AB [1]
Child 4: blood group O [1]

(b) I^A and I^B [1]

7 (a) (i) Consumer is an organism that cannot make its own food and obtains energy by feeding on other organisms [1].

(ii) Trophic level refers to the feeding position of an organism in a food chain.

(b) (i) Plankton → small fish → large fish → fishermen

(ii) Bioaccumulation occurs when toxins such as mercury accumulate in the bodies of consumers that feed on contaminated organisms. [1]
This is because mercury cannot be broken down in the bodies of consumers and are stored in the organisms and passed along the food chain.[1]
For example, when plankton takes in 2 ppb of mercury from contaminated seawater, small fish feed on more than one plankton for survival and accumulates to 200 ppb of mercury in their bodies. [1]
This causes the concentration of the toxic mercury to increase along the trophic levels.

Paper 2 (Section B)

8 (a) 1m – y-axis: concentration of carbon dioxide and x-axis: time of day
1m – best fit line, no extrapolation
1m – correct plots
1m – appropriate scales

(b) (i) 0.32 – 0.014 = 0.306 percentage by volume

(ii) From 4am to 6 am, the concentration of carbon dioxide in the air above the field of rice increases from 0.04% to 0.320%.[1]
Plants cells respire all day and this produces carbon dioxide that can diffuse out of the leaf into the atmosphere. There is also no sunlight and plants do not photosynthesis and remove carbon dioxide from the atmosphere. This results in the increase carbon dioxide concentration in the air.[1]
From 6am to 2pm, the concentration of carbon dioxide in the air above the field of rice decreases from 0.320% to 0.014%.[1]
This is because as light intensity increases, the rate of photosynthesis increases. Since carbon dioxide is a raw material of photosynthesis, it is taken in from the atmosphere into the leaves, decreasing the carbon dioxide concentration in the air above the rice field [1].

(iii) With increasing sunlight between 0600 and 1200, rate of photosynthesis increases. As oxygen is produced during photosynthesis, oxygen is released from the leaves into the atmosphere [1].

9 (a) Any two:
1. Carbon monoxide [1] It competes with oxygen and binds to haemoglobin to form carboxyhaemoglobin, thus reducing the oxygen carrying capacity of red blood cell, causing the person to be breathless and easily tired [1]. It also increases the rate of fatty deposits on the walls of the arteries, which increase blood pressure and damages arteries, increasing the risk of coronary heart disease [1].
2. Nicotine [1] It causes addiction to smoking [1] and causes the release of adrenaline. This increases the heart rate and blood pressure and also increases the risk of blood clotting and coronary heart disease [1].
3. Tar [1] causes uncontrolled cell division and increases the risk of cancer in the lungs [1]. It also paralyses cilia lining the air passages, preventing dust particles trapped in the mucus lining the air passages not to be able to be removed, increasing the risk of chronic bronchitis and emphysema [1].

(b) As the blood alcohol concentration increases, the reaction time of a person also increases [1]. Thus drinking increases the reaction time of a person and the person should not drive after drinking as he would have slower reaction and increase the likelihood of mobile accidents [1].

10 E (a) Similarities:

1. Both xylem and phloem tissue help to transport substances in plants.[1]
2. Both the xylem and phloem make up the vascular bundle.[1]

Differences

1. Xylem transports water and dissolved mineral salts from roots to the leaves[1]
2. while the phloem translocates food substances such as sucrose and amino acids to all parts of the plant.[1]
3. The xylem also provides mechanical support and prevent the collapse of the plant but the phloem does not provide any mechanical support.[1]

(b) Increasing temperature increases rate of evaporation of moisture lining the mesophyll cells into water vapour in the intercellular air spaces. This increases the rate of diffusion of water vapour out of the leaf and hence increasing transpiration rate [1].

Increasing humidity reduces the difference in concentration of water vapour between the intercellular air spaces and the atmosphere, hence decrease rate of transpiration [1].

Amount of sunlight affects the size of the stomata. When there is increase in sunlight, the stomata opens and this increases rate of transpiration [1].

Wind movement in the atmosphere blows away water vapour accumulated in the atmosphere surrounding the stomata of leaves, this increases the rate of transpiration [1].

10 O (a) The circular muscles of the iris contract [1] and the radial muscles relax. [1]

This constricts the pupil,[1]

reducing the amount of light that enters the eye thus preventing excessive light from entering the eye and damaging it.[1]

(b) When looking at objects, light rays reflected from the object enters the eye and is refracted to focus the light rays on the retina. When viewing a distant object, the ciliary muscles relax, pulling the suspensory ligament taut and pulling on the edge of the lens. This causes the lens to become thinner and less convex, increasing the focal length. Thus, the light rays are sharply focused on the retina to produce a sharp and clear image.

When viewing a nearby object, the ciliary muscles contract, causing the suspensory ligament to slacken, relaxing the pull on the lens. This causes the lens to become thicker and more convex, decreasing the focal length. Thus, the light rays are sharply focused on the retina to produce a sharp and clear image.