2016 GCE O Level Biology Suggested Answer

Paper 1

Questions to note:

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

Paper 2 (Section A)

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

1 (a) A: fibrin threads [1]
B: red blood cell [1]

(b) When blood vessels are damaged, damaged tissues and blood platelets release thrombokinase. Thrombokinase enzyme converts prothrombin protein present in blood plasma to thrombin in the presence of calcium ions [1]. Thrombin then catalyses the conversion of soluble fibrinogen to insoluble threads of fibrin [1]. The fibrin threads then entangle blood cells to form a blood clot that prevents the entry of microorganisms [1].

(c) When arteries in the brain become blocked by the blood clot, oxygen and glucose cannot be supplied by blood to the brain cells [1]. Brain cells cannot respire to release energy for cellular activities without oxygen and glucose [1]. This can lead to the death of brain cells, affect the function of part of the brain and a stroke may occur [1].

2 (a) Salivary amylase [1]; polypeptides [1]; small intestine and pancreas [1]

(b) Enzyme in mouth: B [1]. The saliva in the mouth is neutral and this makes the mouth neutral too. Hence the enzyme salivary amylase works best at pH 7. [1]

Enzyme in stomach: A [1]. The stomach contains HCl making it acidic. Thus, the enzyme pepsin works best at pH2 [1].

3 (a) A mutation is a sudden random change in the structure of a gene or in the chromosome number [1].

(b) (i) Individual 1: dd [1]

Individual 2: Dd [1]

(ii) Individual 3: Pp [1]
Individual 4: pp [1]

(iii) 50 %

4 (a) (i) Root hairs [1]

(ii) The root hairs help to absorb water [1] and dissolved mineral salts [1] from the soil.

(iii) The root hairs are long and narrow protrusions of root hair cells that help to increase the surface area to volume ratio [1] so that absorption of substances can be done at a faster rate [1].

(b) Xylem [1] helps to transport water and dissolved mineral salts from the roots to the leaves. It also contains deposits of lignin that provide mechanical support for the plant [1].

5 (a) (i) A: mitochondrion [1]
B: smooth endoplasmic reticulum [1]

(ii) It is the site of cellular respiration to release energy for cellular activities.

(b) 1. The plant cell has a cell wall but an animal cell does not have a cell wall [1].
2. A plant cell has chloroplasts but an animal cell does not have chloroplasts [1].
3. A plant cell has one central, large, permanent vacuole but an animal cell has many small, temporary vacuoles [1].

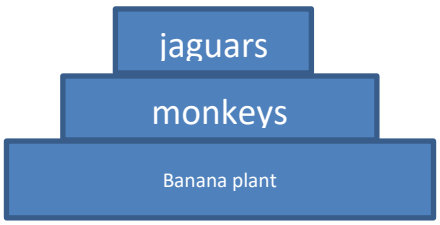
6 (a) 1: fruit bats [1]
2: banana plants [1]
One arrow from banana plants to monkeys [1]
One arrow from macaws to pythons [1]

(b) Trophic level is the feeding position of an organism in the food chain [1]. The producers, such as the banana plants make up the first trophic level while the primary consumers such as the fruit bats make up the second trophic level as they feed on the banana plants [1]

and the secondary consumers such as the pythons make up the third trophic level as they feed on the fruit bats.

(c) 1. Heat energy released during cellular respiration is lost to the environment and not transferred between trophic levels.
2. Waste products like urine and faeces contain trapped chemical energy and is also not passed on to consumers.

(d)



7 (a) (i) As the concentration of ADH in the blood plasma increases, the concentration of urine also increases [1]. An increase in ADH concentration results in increased reabsorption of water into bloodstream [1]. Hence, there is decreased volume of water in urine, causing the urine to be more concentrated [1].

(ii) As the concentration of ADH in the blood plasma increases, the rate of flow of urine through the ureter decreases [1].

(b) During vigorous exercise, more sweat is produced to help the body to lose heat. This results in greater water loss from the body [1]. The body responds by increasing the ADH secreted into the blood so that more water can be reabsorbed into the bloodstream to prevent excessive loss of water in urine and prevent dehydration [1].

Paper 2 (Section B)

8 (a) Hackberry – 0.8 cm/year
Red oak – 16.0 cm/year
[2]

(b) 1m – correct axes (with units)
1m – correct growth rate plotted
1m – bar chart drawn, with gaps between the bars
1m – labelled trees in the middle of bar chart

(c) Measure the rate of increase in the height of the tree per year.

(d) Light is required for photosynthesis to occur to produce the food substances for the growth and development of the tree [1]. Hence, the greater the amount of sunlight, the faster the rate of growth possible for the tree [1].

(e) 1. temperature of surrounding
2. carbon dioxide concentration

9 (a) Excess amino acids are deaminated in the liver to form urea [1].
The urea is transported in blood to the right atrium [1].
From the right atrium, blood containing urea is pumped into the right ventricle and into the pulmonary circulation [1].

The blood then returns to the left atrium from the lungs and is pumped into the left ventricle [1].
The blood is then pushed out of the heart into systemic circulation and reaches the site of removal, which is the kidneys where urea is filtered and excreted out in urine [1].

(b) The carbon dioxide produced during respiration diffuses from cells into the nearby blood capillaries and enter the red blood cells [1].
Carbonic anhydrase, an enzyme present in red blood cells, then catalyses the reaction of carbon dioxide and water to form carbonic acid [1].
Carbonic acid then dissociates to form hydrogencarbonate ions which are carried in blood plasma to the lungs. In the lungs, the hydrogencarbonate ions diffuse back into the red blood cells and are converted back to carbonic acid [1].
Carbonic anhydrase then catalyses the reverse reaction to convert carbonic acid to carbon dioxide and water. The carbon dioxide then diffuses from the blood capillaries to the alveoli for excretion during exhalation [1].

10 E (a) Both anaerobic respiration and aerobic respiration require glucose as a raw material [1]. Both aerobic and anaerobic respiration releases energy [1]. Aerobic respiration produces carbon dioxide and water while anaerobic respiration produces lactic acid [1]. Aerobic respiration releases a larger amount of energy while anaerobic respiration releases less energy [1]. Aerobic respiration requires the presence of oxygen while anaerobic respiration does not require the presence of oxygen [1].

(b) During vigorous exercise, muscle cells first obtain energy through aerobic respiration [1]. When maximum aerobic respiration is not enough to meet energy demand [1] due to insufficient supply of oxygen to the muscles, anaerobic respiration occurs to release energy [1]. As muscle cells carry out anaerobic respiration, lactic acid is formed [1]. As lactic acid accumulates in muscle cells, it can cause muscle aches and fatigue [1].

10 O (a) Endocrine glands are ductless glands that secrete their hormones directly into the bloodstream [1]. The hormone is then transported in blood around the body to target organs where it exerts its effects [1]. An example is the adrenal glands [1] that secrete adrenaline into the bloodstream to prepare the body for a flight or fight response [1].

(b) Insulin and glucagon are hormones secreted by the Islets of Langerhans in the pancreas to help to regulate blood glucose levels in the human body [1]. When blood glucose level rises above the normal, insulin is secreted by the pancreas into the bloodstream [1]. Insulin increases the permeability of cells to glucose to increase the rate of glucose uptake by cells [1] and stimulates the conversion of excess glucose to glycogen in muscle and liver cells [1]. These corrective mechanisms result in the reduction of blood glucose levels to the normal levels. When blood glucose level falls below the normal, glucagon is secreted by the pancreas into the bloodstream [1]. This stimulates the conversion of stored glycogen back to glucose and conversion of fats and amino acids into glucose [1], which then enter the bloodstream, causing blood glucose levels to rise back to the normal level.