Name	Class				Index Number		

BROADRICK SECONDARY SCHOOL
SECONDARY 4 EXPRESS
PRELIMINARY EXAMINATION 2019

BIOLOGY **6093/02**

Paper 2 Theory Sep 2019

Candidates answer on the Question Paper
No Additional Materials are required. 1 hour 45 minutes

ANSWERS

Section A (50 marks)

Answer **all** the questions in the space provided.

Paper 1(mcq)

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

1 (a) Translocation is the **transport** of food, such as **sugars and amino acids**(1m), [2]
synthesised by plants

Food is transported from leaves to **all parts of the plant**, in the **phloem tubes**.

(1m)

(bi) Xylem [1]

(ii) 1. lack of cross walls - allows continuous flow of water and mineral salts [2]

2. empty with no cytoplasm - allows continuous flow of water and mineral salts

3. lignin deposited on inner walls of xylem walls - provides mechanical support /strengthens wall to prevent collapse

award one mark for each feature plus its adaptation. (max 2 points)

(c) -weedkiller dissolves in water found in soil solution. [4]
-The root hair cells of the plant absorb water and the dissolved weedkiller by osmosis and diffusion respectively.
-Water and dissolved weedkiller move into xylem vessels in the roots down a concentration gradient.
-Xylem vessels transport water and weedkiller to all parts of plant, including leaf.
-In the leaf cells, weedkiller move from cell to cell by diffusion and exerts its effect. Plant stops photosynthesising.

(maximum 4 points)

[Total:9m]

2 **(a)** The energy needed to start a chemical reaction [1]

bi In boiling tube 1, pH 2 is the optimum pH for protease to digest protease. (1m) [3]
This releases silver particles into suspension.(1m)
In boiling tubes 2 and 3,protease denatured at higher temperatures, pH 7 and pH 10,Protease does not digest gelatine (type of protein) (1m)

(c) Carbon dioxide produced by respiration diffuses into the blood. [4]
Carbonic anhydrase in red blood cells catalyse reaction between carbon dioxide and water to form carbonic acid.(1m)
The carbonic acid dissociates to form hydrogencarbonate ions which diffuse out of red blood cells into plasma.(1m)
In the lungs , hydrogencarbonate ions diffuse back into red blood cells.(1m)
They are converted to carbon dioxide and water by carbonic anhydrase.(1m)
Carbon dioxide produced diffuses into alveoli and is excreted.(1m)

Max 3 points.

[Total:7m]

3 **(a)** (40-16=24^{0}C) [1]

(b) 1 : When the air temperature increases, the body temperature of the insect [2]

increases linearly

2 :The insect is cold-blooded as the body temperature changes with the surrounding temperature/ Insect unable to maintain constant body temperature.

(c) To draw a straight horizontal line at 37 ^{0}C. [1]

(d) Increasing permeability of cell membranes to glucose thereby increasing the rate of glucose uptake by cells (1m) [3]

Increase tissue respiration so that glucose is broken down faster(1m)

Stimulating the liver and muscle cells to convert excess glucose into glycogen (1m)

Insulin thus helps to decrease blood glucose concentration back to normal.

[Total:7m]

4 **(a)** Processes by which metabolic waste products and toxic substances are removed from the body(1m) [2]

It prevents accumulation of waste products which can damage the body by interfering in important metabolic processes. (1m)

(b) **(i)** Efferent Arteriole [1]

(ii) -label collecting duct [2]

(ci) 0 [1]

(ii) [2]

Glucose is present in structure X (Bowman's capsule) Glucose is small enough(1m) to be forced out into the Bowman's capsule during ultrafiltration.

All glucose molecules are selectively reabsorbed (1m) at the proximal convulated tubule into the surrounding blood capillaries . Thus glucose is absent in structure W (distal convulated tubule).

(iii) [2]

Water has been selectively reabsorbed at the proximal convulsed tubule, loop of Henle, distal convoluted tubule and collecting duct. (1m)
Urea a waste product is not reabsorbed. Hence concentration of urea increase.(1m)

(d) When the pituitary gland secretes more ADH, [3]

Cells of the collecting duct (R) become more permeable to water.(1m)

More water is reabsorbed from the collecting duct into the blood capillaries. (1m)

The volume of urine passing through the collecting duct decreases.(1m)

Urine becomes more concentrated.(1m)

Max – 3m

[Total:12m]

5 (a) Photosynthesis [1]

(b) Total energy = 6400000kJ [2]
Total energy fixed by pond plants = 32000kJ

(32000/6400000) X 100% (1m)
= 0.5% (1m)

(c) [2]

(32000 – 6400 – 20480) [1]
= 5120kJ(1m)

(d) Any 3 of the following: [3]

-At each trophic level, 90% of energy is lost through heat in respiration, undigested food, uneaten body parts and excretory waste products.

-Energy is also used for growth and movement.

-Only 10% of energy is passed from one trophic level to the next.

-As a result, in a food chain with 5 trophic levels, the energy passed along from the third and fourth trophic levels will not be sufficient to sustain the last trophic level for survival.

Take note: students must make reference to 'trophic levels' and 'energy passed from one level to the next'.

Max 3 points

[Total: 8]

6 (ai) -same shape and size of chromosomes (1m) [2]

-same gene loci (1m)

(ii) chiasmata [1]

(iii) -increases variation / allows for new combinations of alleles to form [1]

(b) Pollen grain(1m) and egg(1m) [2]

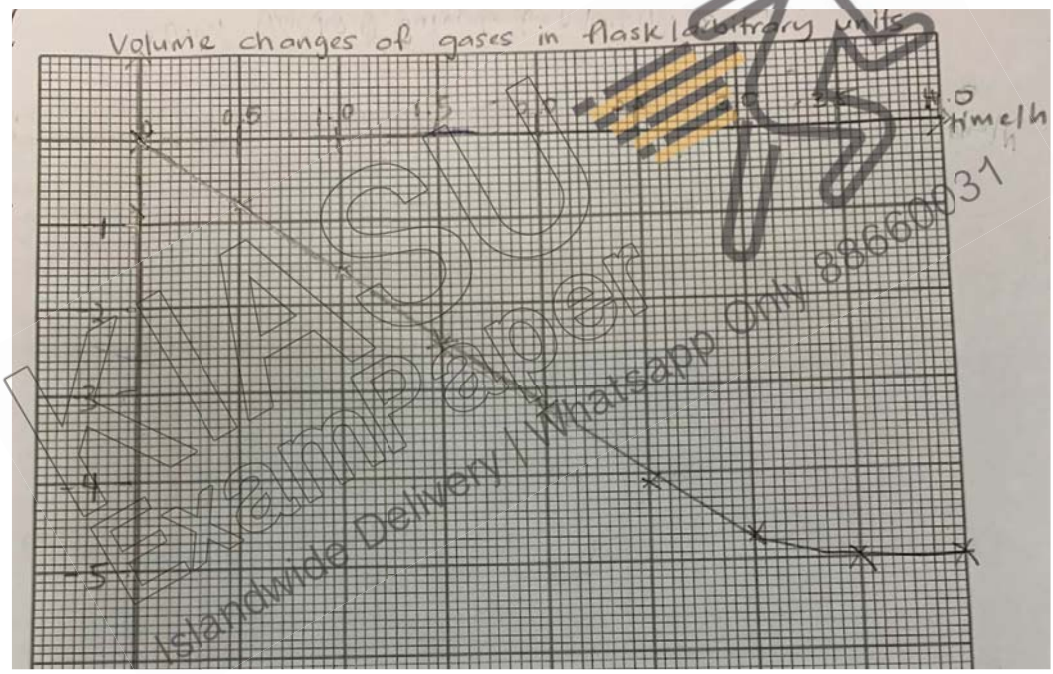
[Total:6m]

-End of Section A-

Section B (30 marks)

Question **7** and **8** are compulsory questions.
Question **9** is in the form of an **Either/Or** question.
Only one part should be answered.

7 **(a)**



[4]

axes labelled with correct units;(1m)

suitable linear scales using more than half the graph paper;(1m)

accurate plotting of points on a single set of axes;(1m)

best fit line connecting all points;(1m)

(b) As the reading on the scale increases, the volume changes of the gases in the flask also increases; [1]

(c) **Oxygen is used up** when the seeds undergo germination, carrying out **aerobic respiration;**(1m) [2]

Carbon dioxide released during respiration is absorbed by potassium hydroxide, thus lowering the volume of gases;(1m)

(d) The decrease in the volume of gases in the flask slows down and becomes constant; (1m) [2]

Aerobic respiration has stopped since oxygen is completely used up;(1m)

(e) Boiling, adding strong acid/ alkali (any 1) [1]

[Total:10m

8 **(a)** After a human egg cell is fertilised, it takes 5-7 days to reach the uterus.(1m) [5]
-The cilia on the oviduct helps to push the fertilised egg towards the oviduct.(1m)
-Peristalsis of oviduct walls also help to move the fertilised egg towards the uterus.(1m)
-The fertilised egg divides, by mitosis.(1m)
-It forms a ball of cells which implant into the uterine lining.(1m)
-Placenta provides oxygen and nutrients to the growing embryo and remove carbon dioxide and waste products from the embryo. (1m)

Any 5 points

(b) Mother and child unable to taste PTC are homozygous recessive ie. genotype 'tt' [5]

	Father	Mother
Parental phenotype	Taster	Non-taster (1m)
Parental genotype	Tt	tt (1m)
Gametes	T t	t t
F1 genotype	Tt Tt	tt tt
F1 phenotype	Tasters	Non-tasters (1m)
F1 phenotypic ratio	1 Taster : 1 Non-taster (1m)	

Thus, the father must be heterozygous for this case to occur. (1m)

9 Either

9 **(a)** -DNA molecule is a macromolecule that is made up of two polynucleotide strands t(1m)wisted together to form a double helix structure. (1m)] [6]

-A gene is a small segment of DNA (1m)which contains a specific sequence of

nucleotides (1m)that controls the production of a polypeptide. [1]

-Chromosome is made of DNA and proteins(1m). It is condensed and coiled tightly (1m)

(b) Independent arrangement and assortment of homologous chromosomes during metaphase I and anaphase I (1m) [4]

Pairing and Crossing over of non sister chromatids of homologous chromosomes during Prophase 1 of meiosis to form new combinations of alleles.(1m)

Independent arrangement and assortment of chromatids during metaphase II and anaphase II(1m)

Random fertilization (fusion of gametes) leads to new combinations of zygotes(1m)

- Any 4 points

[Total : 10m]

9 Or

9 **a(i)** A:vena cava B: pulmonary vein [2]

(ii) Prevent backflow of blood from left ventricle into left atrium, when the muscles of the left ventricle contract. [1]

(iii) -deoxygenated blood returns from the body organs through the vena cava into the right atrium. [5]

- as blood is returning, blood pressure within the right atrium increases.

-when pressure in right atrium is greater than right ventricle, tricuspid valve pushes open and blood flows into right ventricle

-muscles of right atrium contract and push blood into right ventricle

-muscles of right ventricle contract and push blood into pulmonary artery

-increase in pressure in right ventricle pushes the tricuspid valve closed

Pressure in right ventricle is greater than pulmonary artery, This causes semilunar valves to push open

-Semilunar valves push open and blood leaves right ventricle to the lungs.

(max 5 points)

[Total : 10m]

-End of Paper-