CNEC CHRISTIAN COLLEGE

FORM SIX BIOLOGY

MOCK EXAMINATION (2020-2021)

PAPER 1

Suggested Answer

Paper 1 Section A (36 marks)

Question no.	Answer	Question no.	Answer	Question no.	Answer
1	A	**13**	A	**25**	D
2	C	**14**	D	**26**	B
3	A	**15**	C	**27**	C
4	D	**16**	D	**28**	A
5	B	**17**	A	**29**	D
6	A	**18**	B	**30**	B
7	D	**19**	C	**31**	D
8	C	**20**	C	**32**	B
9	D	**21**	B	**33**	D
10	A	**22**	B	**34**	C
11	C	**23**	A	**35**	A
12	B	**24**	D	**36**	C

Paper 1 Section B (84 marks)

1. (a) B (1)

(b) E (1)

(c) A (1)

Total: 3 marks

	Skill assessed	Mark(s)
(a) – (c)	Understanding basic concepts	3

2. (a) Ebola virus is not considered as an organism (1)

because it is non-cellular / is just an RNA enclosed in the viral envelope / has no cytoplasm.

Only contains RNA and no organism contains RNA only. All organisms contain DNA and RNA. (1)

(b) The virus cannot bind to and enter the cells. (1)

Therefore, the virus cannot reproduce / replicate / multiply within in the body. (1)

(c) B cells are activated when the antigen / glycoprotein of Ebola virus bind to their receptors. (1)

The activated B cells divide and differentiate to form a large number of plasma cells. (1)

Plasma cells produce and release antibodies into the blood to act against Ebola virus. (1)

(d) Passive immunity (1)

Total: 8 marks

3. (a) A is vein and B is artery (1)

B has a smaller lumen than A. (1) /

B has a thicker muscle layer than A. (1) /

B has a thicker elastic tissue than A. (1) /

B has a more regular shape than A. (any 2) Any Two (1 mark x 2)

(b) When the blood tries to flow back,valves are forced to close. / Valves are present to prevent the backflow of blood. (1)

Veins lie next to / surrounded by the skeletal muscle. (1)

Veins are squeezed when muscle contracts. / The contraction pushes / forces blood towards the heart. (1)

Any Three (1 mark x 3)

Total: 6 marks

4. (a) Use a water plant (or a named water plant) and an oxygen probe in a closed container (or other appropriate apparatus) (1)

to collect the oxygen produced over time in different environmental conditions. (1)

(b) At higher light intensity, the rate of photochemical reactions is higher, so **more electrons** are emitted from the electron transport chain. (1)

As a result, **more ATP and NADPH** are produced for the subsequent reactions (or carbon fixation / Calvin cycle). (1)

(c) Higher levels of carbon dioxide increase the rates of carbon fixation. (1)

More triose phosphate are produced. (1)

The dark reactions are controlled by many enzymes. (1)

An increased temperature increases enzyme activity and thereby increase the rates of the dark reactions. (1)

(d) At 30 °C, stomata are closed (as a consequence of water stress), so less carbon dioxide are taken in. (1)

Less glucose / carbohydrate / amino acid / protein can be synthesized for growth. (1)

Total: 10 marks

	Skills assessed	**Marks**
(a)(i)	Analysing data	1
	Applying concepts	1
(a)(ii)	Understanding basic concepts	1
(b)(i)	Applying concepts	2
(b)(ii)	Applying concepts	2
(b)(iii)	Applying concepts	4
(c)	Applying concepts	2

5. (a) +0.5 kg increase (1)

(b) Increase / positive trend / towards gain in body mass (1)

(c) The diet is effective at maintaining mass (1) as final mass is equal to initial mass. It is the only group not showing weight re-gain after 26 weeks. OR (1)

This group shows weight loss / maintenance (with fluctuations) in early weeks, while during last weeks (from week 18) show positive trend. (1)

(d) Any ***two***: (1 x 2)

- Excess carbohydrates are converted / stored as fat / lipids. This may lead to weight gain / obesity.
- The diets may increase the risk of diabetes / other related health risk factor.
- Other nutrients may be deficient

(e) Being aware of the GI of foods can help her choose low-GI foods which cause slow rise in her blood glucose level, so that great fluctuations in her blood glucose level can be avoided. (1)

Help to maintain a relatively constant blood glucose level. (1)

Total: 7 marks

	Skills assessed	**Marks**
(a)	Analysing data	1
(b)	Analysing data	1
(c)	Analysing data	2
(d)	Applying concepts	2

6. (a) Axon (1)

It contains vesicles. (1)

(b) Neurotransmitter (1)

(c) At the motor nerve ending, mitochondria generate ATP to supply energy for the synthesis and release of neurotransmitters into the cleft. (1)

In the muscle fibre, mitochondria supply energy for generating electrical impulses for muscle contraction. (1)

(d) (i) With fewer receptor sites available on the membrane of muscle fibres for binding with the neurotransmitter, (1)

the muscle fibres are less stimulated. (1)

Less electrical impulses are generated by the muscle fibres to trigger muscle contraction, (1)

resulting in muscle weakness.

(ii) The removal of the thymus gland can stop / reduce the production of antibodies that attack the receptor sites for the neurotransmitter. (1)

Total: 9 marks

7. (a)

Bird	Genus	Key sequence for identification
P	*Geospiza*	1b → 2a
Q	*Platyspiza*	1b → 2b → 3a
R	*Camarhynchus*	1b → 2b→ 3b
S	*Certhidea*	1a

(4)

(b) Bird S has a longer and thinner beak to pick out insects from cracks. (1)

(c) Birds show variation in their beaks. (1)

Birds that are better in finding insects for food have a greater chance to survive. (1)

They have a greater chance to reproduce and pass heritable variations to their offspring. (1)

As a result, the populations of birds that are better in finding insects for food will increase. (1)

Total: 9 marks

8. (a) Individuals 3 and 5 show lactose intolerance. They must have received at least one non-functional allele for lactase production from either of their parents (individual 1 or 2). (1)

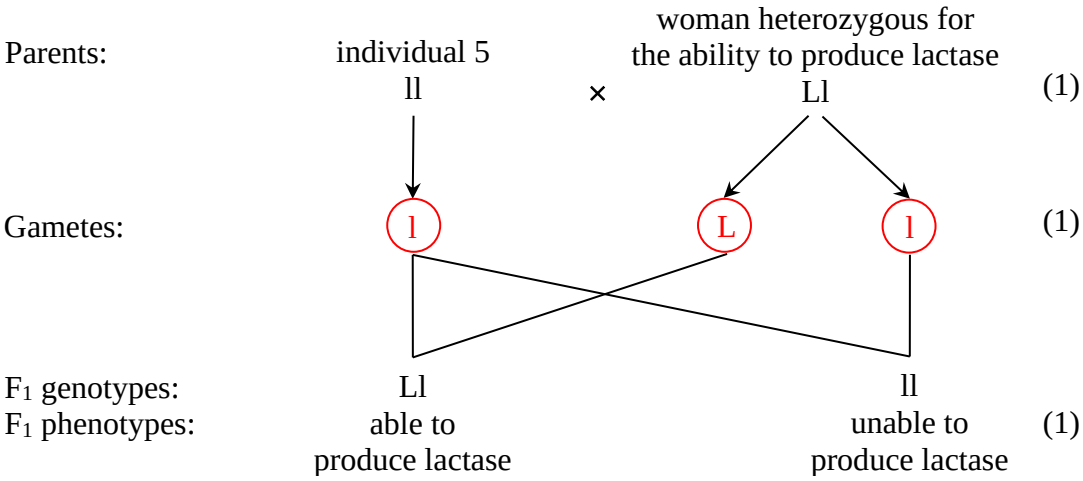
Individuals 1 and 2 can produce lactase. Each of them must carry at least one functional allele for lactase production. (1)

At least one of individuals 1 and 2 is heterozygous. (1)

In the heterozygous condition, the dominant allele will be expressed while the recessive allele will be masked. (1)

Thus, the allele for the ability to produce lactase in adulthood is dominant. (1)

(b)



(c) In the absence of lactase, lactose in milk cannot be digested and absorbed, and therefore remains in the intestines. (1)

The lactose will lower the water potential the intestines. (1)

This draws water into the intestines / prevents the absorption of water in the intestines by osmosis, resulting in diarrhoea. (1)

Total: 11 marks

	Skills assessed	**Marks**
(a)	Understanding basic concepts	1
(b)	Analysing data	2
	Applying concepts	3
(c)	Presenting information	3
(d)	Applying concepts	3

9 (a) (i) nitrifying bacteria → nitrifying bacteria (2)

Ammonium compound → nitrite (1) → nitrate (1)

(ii) Proteins (1) (1)

(iii) Decrease feeding activity (1) (1)

(b) Algae (1) (1)

(c) The "bio rings" provide a place for attachment / a habitat for bacteria to grow and reproduce. (1) (1)

(d) Tommy is correct. (1) (4)

The fish will not die if the air pump stops in the daytime because the plants in the aquarium can receive enough sunlight and undergo photosynthesis to produce oxygen. (1)

However, at night, the plants only undergo respiration, (1)

and will use up the oxygen in the aquarium. (1)

Therefore, the fish may die due to lack of oxygen.

Total: 10 marks

10. Comparison of adaptive features (max. 8)

Adaptation	Features of dicotyledonous roots	Features of human small intestine	
Large surface area for absorption (1)	- Numerous root branches (1) - Numerous root hairs (1) - Each root hair cell has a tubular extension (1)	- Very long (1) - With numerous villi (1) - Each villus has finger-like projection (with microvilli) (1)	(max. 3)
Increased contact with nutrients (1)	- Root hairs are long and fine to penetrate the space between soil particles (1)	-villi are in constant motion due to the peristalsis of the small intestine (1)	(max. 3)
Short diffusion distance (1)	- thin / one-cell thick epidermis (1)	- thin / one-cell thick epithelium of villi	(max. 2)
Maintenance of a steep diffusion gradient (1)	-the absorbed water and minerals pass into xylem vessels and are transported upwards by transpiration pull (1)	- the absorbed nutrients are transported away by dense netweoks of blood capillaries and lacteals (1)	(max. 3)

Absorption by active transport (1)	-root hair cells contain numerous mitochondria to provide energy (1)	- epithelial cells contain numerous mitochondria to provide energy

(max. 2)

(3)

Effective communication **Total: 11 marks**

Mark award for communication:

Mark	**Clarity of expression and relevance to the question**	**Logical and systematic presentation**
3	• Answers are easy to understand. They are fluent showing good command of language. • There is no or little irrelevant material.	• Answers are well structured showing coherence of thought and organisation of ideas.
2	• Language used is understandable but there is some inappropriate use of words. • A little relevant material is included, but does not mar the overall answer.	• Answers are organised, but there is some repetition of ideas.
1	• Markers have to spend some time and effort on understanding the answer(s). • Irrelevant material obscures some minor ideas.	• Answers are a bit disorganised, but paragraphing is evident. Repetition is noticeable.
0	• Language used is incomprehensible. • Irrelevant material buries the major ideas required by the question.	• Ideas are not coherent and systematic. Candidates show no attempt to organise thoughts.

CNEC CHRISTIAN COLLEGE
FORM SIX BIOLOGY
MOCK EXAMINATION (2020-2021)
PAPER 2
Suggested Answer

Paper 2 Section A

1. (a) (i) (1) Q (1)
(2) P (1)

(ii) After drinking water, the rate of urine production increased rapidly, and then decreased to the normal level. (1)
The increase in water content of blood / water potential after drinking water was detected by the hypothalamus. (1)
Less ADH was released by the pituitary gland. (1)
The wall of collecting duct became less permeable to water, thus smaller proportion of water was reabsorbed from the glomerular filtrate, producing a large volume of urine. (1)
Due to the excretion of the large amount of water in urine, the water content in blood returned to the normal level. (1)
Therefore, the rate of urine production decreased to the normal level. (1)

(iii) The rate of urine production will become higher than that after drinking water. (1)
As caffeine inhibits ADH secretion, the permeability of the wall of the collecting duct to water will decrease more than that in the case of drinking water. As a result, a larger volume of urine will be produced. (1)

Total: 10 marks

(b) (i) It is the volume of blood pumped by each ventricle per minute. (1)
Cardiac output = stroke volume x heart rate (1)

(ii) (1) When the rate of oxygen consumption increased, the cardiac output increase from 10L/min to 12.6L/min(1)
and the ventilation rate increased from (21 L/minto 31 L/min). (1)

(**2**) More intense exercise results in an increase in the rate of oxygen consumption.
A decrease in blood pH due to the production of lactic acid, together with a decrease in blood oxygen content stimulate the carotid and aortic bodies (1)

to send nerve impulses to the cardiovascular centre and respiratory centre in the medulla oblongata. (1)

These control centres then send impulses to the respiratory (intercostal and diaphragm) muscles to speed up ventilation (1)

and to the pacemaker, causing the cardiac muscles to contract faster and more strongly.(1)

(iii) Heart rate = cardiac output/stroke volume (1)

= 16/0.143 = 111.9 beats/min (1)

Total: 10 marks

2.(a) (i) (1)Any ***one*** of the following: (1)

- Vehicle exhausts
- Volcanic eruptions

(Or other acceptable answers)

(2) Any ***two*** of the following: (1 mark each) (2)

- Acid rain destroys the leaf cuticle and the leaves become more susceptible to bacterial and fungal infections.
- Acid rain lowers the soil fertility and inhibits the growth of trees.
- Acid rain enhances the release of heavy metal ions from the soil and high level of these ions can damage the roots of trees.

(Or other acceptable answers)

(ii) Any ***two*** of the following: (1 mark each) (2)

- Use renewable energy sources, e.g. wind power / tidal power / solar power instead of fossil fuels.
- Use fuels with low sulphur content
- Restrict the emisssion of acidic gases by law.
- Use more public transport instead of private car.
- Use electric cars

(Or other acceptable answers)

(iii) (1) Frogs and blackfly larvae (1)

(2) Clams (1)

(3) Enzymes do not function well / denature at low pH. (1)

Acid damages the shells / scales / skin (external tissues) of animals. (1)

(iv) Any ***one*** of the following: (1 mark each) (1)

- They irritate the eyes.
- They irritate the breathing system.

- They increase the risk of having chronic lung diseases.

(Or other acceptable answers)

(10 marks)

	Skill assessed	**Mark(s)**
(a)(i)	Understanding basic concepts	1
(a)(ii)	Understanding basic concepts	2
(b)	Understanding basic concepts	2
(c)(i)	Applying concepts	1
(c)(ii)	Applying concepts	1
(c)(iii)	Understanding basic concepts	2
(d)	Understanding basic concepts	2

(b) (i) $8.43 \times 10^6 - 51.91 \times 10^3$ (1)

$= 8.38 \times 10^6$ J / 8.38 MJ (1)

(ii) Fewer raw materials are / Less crude oil is used to produce plastics. /

Recycling plastics reduces the need for landfill. /

Recycling plastics reduces the need for incineration. /

Recycling plastics reduces the risk of ingestion of plastics by wildlife. (any 2)

(1) x 2

(iii) (1) Lipid is a source / store of energy. /

It can be used to produce ATP. /

Energy is needed in many biological processes, e.g. binary fission. /

Lipid can be used as a component of membranes. /

Lipid provides more energy per gram than glycogen / sugars. /

Storage of lipid does not affect the water potential of the fluid in the body. (any 2) (1) x 2

(2) It is cheap to produce plastics using bacteria. /

Bacteria take up little space / work at low temperature / can produce plastics anywhere. /

Bacteria can clone / reproduce quickly. /

The plastics produced by bacteria have unlimited supply / are renewable. /

Bacteria can be manipulated by genetic engineering. /

Using bacteria to produce plastics reduces the dependency on fossil fuels. (any 2) (1) x 2

(3) The decomposition process is faster in aerobic conditions. /

Oxygen is insufficient when PHB is buried in landfill sites. /

The anaerobic conditions of landfill sites slow down the decomposition of PHB. /

The pH of the soil in landfill sites may be unsuitable for the decomposition. (any 2) (1) x 2

(4) Fatty acids and glycerol (1)

End of Marking Scheme