B

CNEC CHRISTIAN COLLEGE
FORM SIX BIOLOGY
MOCK EXAMINATION (2020-2021)

PAPER 1

SECTION B: Question-Answer Book B

This paper must be answered in English.

INSTRUCTIONS

1 Write your Name, Class, Class number in the spaces provided on the right.

2 Refer to the general instructions on the cover of the Question Book for Section A.

3 The questions in this Question-Answer Book carry 84 marks . You should answer **ALL** questions.

4 Write your answers to Section B in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked.

5 Present your answers in paragraphs wherever appropriate.

6 The diagrams in this section are **NOT** necessarily drawn to scale.

Name	
Class	
Class number	

	Teacher's Use Only
Question No.	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total	

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SECTION B

You should answer ALL questions.

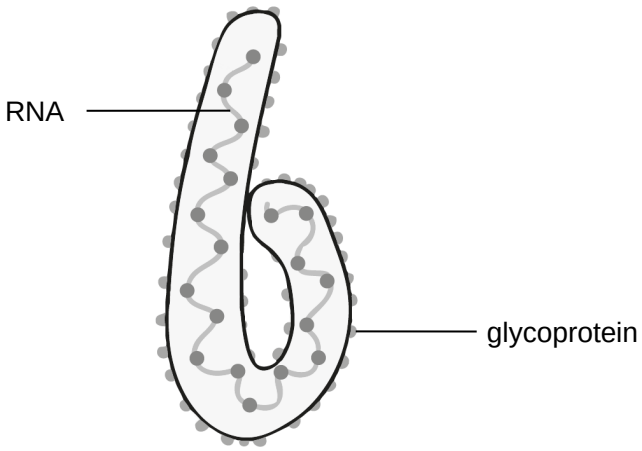
Put your anwsers in the spaces provided.

1.For each of the organs listed in ***Column 1***, select from ***Column 2*** one function in nutrition that matches it. Put the appropriate letter in the space provided. (3 marks)

Column 1			***Column 2***
Liver	(a)	_____	A. site of protein digestion
Pancreas	(b)	_____	B. site of bile production
Stomach	(c)	_____	C. site of lipid digestion
			D. site of absorption of amino acid
			E. site of production of hormone that helps decrease the blood glucose level

Total : 3 marks

2. The diagram below shows the structure of an Ebola virus.



(a) Using the evidence from the diagram, explain why scientists do not classify the Ebola virus into any of the three domains. (2 marks)

_____

_____

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(b) The glycoprotein of the Ebola virus can bind to a specific receptor protein in the membrane of human cells. When this happens, the virus can enter the cell. Some people do not produce this receptor protein. These people may become infected with the Ebola virus but do not develop the symptoms. Explain why. (2 marks)

(c) A blood test can be used to determine whether a person has Ebola. It is based on the fact that people with Ebola have large numbers of specific plasma cells and a specific antibody in their blood. Explain this phenomenon. (3 marks)

(d) Some scientists have suggested treating people suffering from Ebola by using transfusions of blood plasma from people who have recently recovered from the disease. What type of immunity does the blood plasma transfusion produce?

(1 mark)

Total : 8 marks

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3. The diagrams show transverse sections of two blood vessels

Photomicrograph of blood vessel A and B (20X)

(a) Identify blood vessel A and B and state ***two*** differences between them that can be seen in the diagrams. (3 marks)

_____

_____

_____

_____

_____

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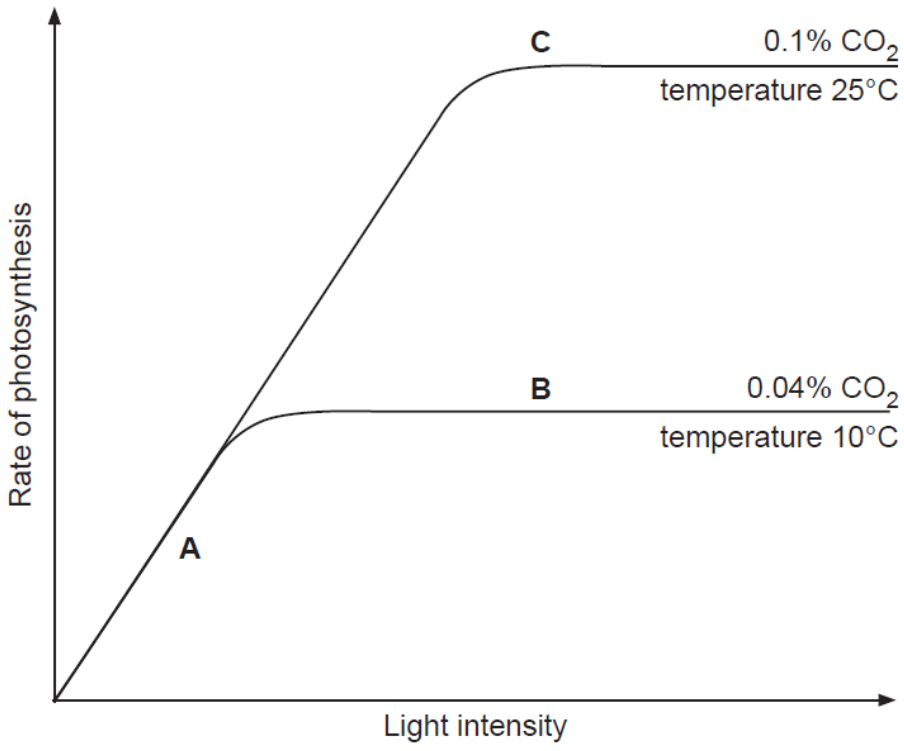
(b) Veins carry blood back to the heart. Explain how blood is forced towards the heart in veins found in the legs. (3 marks)

Total : 6 marks

4. The graph below summarizes the relationship between light intensity and rate of photosynthesis in different conditions of temperature and CO_2 availability.



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(a) Suggest how scientists investigating this relationship would have accurately measured the rate of photosynthesis. (2 marks)

(b Using your knowledge of the photochemical reactions, explain why the rate of photosynthesis is higher at B than at A. (2 marks)

(c) Using your knowledge of the dark reactions, explain why the rate of photosynthesis is higher at C than at B. (4 marks)

(d) Many British plant species grow fastest at a temperature of approximately 25 °C. Temperatures greater than this can cause a very high rate of transpiration. The plants' response to this can result in a reduction of growth rate. With reference to the response of plants to high transpiration rates, explain why growth is faster at 25 °C than at 30 °C. (2 marks)

Total : 10 marks

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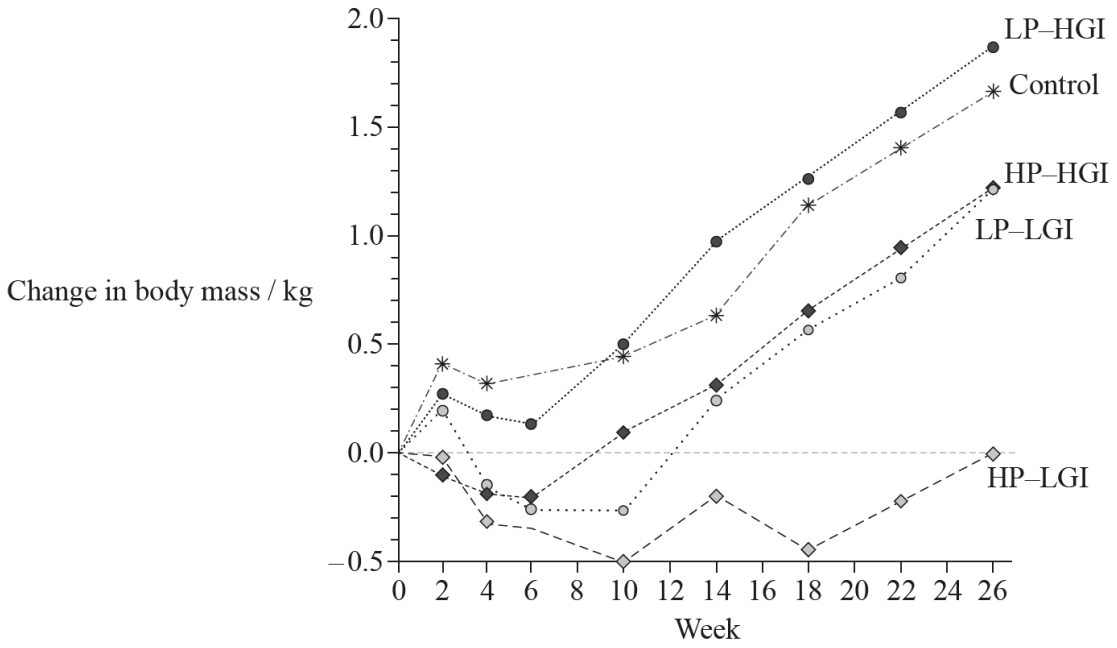
5. During an investigation, 773 participants who had lost body mass through a low-energy diet were randomly assigned a diet (with no energy restriction) for the next 26 weeks to maintain their mass. These maintenance diets were one of the four combinations of high or low protein with either high or low glycemic index. A control group followed the recommended daily intake. The glycemic index (GI) measures the effects of carbohydrates in foods on blood glucose levels. High glycemic index foods enable a quicker release of glucose into the bloodstream than foods with a low glycemic index.



Key:	HP – high protein	HGI – high glycemic index
	LP – low protein	LGI – low glycemic index

[Source: From *The New England Journal of Medicine*, Thomas Meinert Larsen, Stine-Mathilde Dalskov, Marleen van Baak et al., Diets with High or Low Protein Content and Glycemic Index for Weight-Loss Maintenance, vol. 363, pages 2102–2113. Copyright © 2010 Massachusetts Medical Society. Reprinted with permission from Massachusetts Medical Society.]

Do not write in this margin

(a) State the change in body mass 10 weeks after the start of the maintenance diet for the low protein and high glycemic index group, giving the units. (1 mark)

(b) State the trend in body mass during the 26 week period for the maintenance diets with high glycemic index. (1 mark)

(c) Evaluate the effectiveness of a high protein with low glycemic index diet in maintaining mass, after a mass-loss diet. (2 marks)

(d) Explain the possible health consequences of diets rich in carbohydrates. (2 marks)

(e) Sandra suffers from diabetes mellitus. Suggest why it may be beneficial for Sandra to be aware of the GI of foods. (1 mark)

Total : 7 marks

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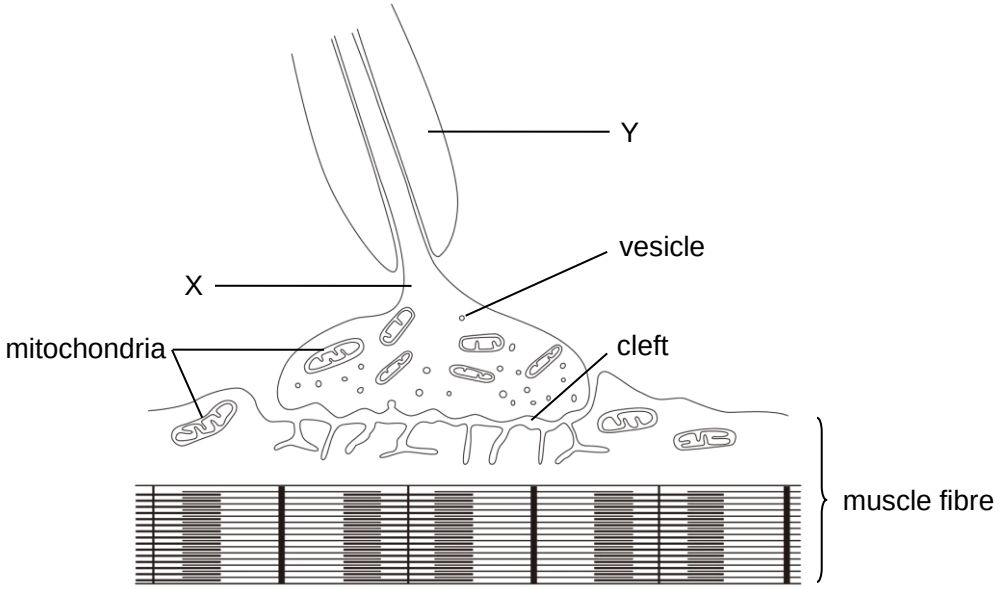
6. The diagram below shows a neuromuscular junction.



(a) Which type of nerve fibre is X? Explain your answer. (2 marks)

(b) Name the chemical inside the vesicles. (1 mark)

(c) Mitochondria are present on both sides of the cleft. Explain why mitochondria are essential for the transmission of nerve impulses across the cleft and for muscle contraction. (2 marks)

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(d) Myasthenia gravis is a disease of the neuromuscular junction. It develops because the receptor sites on the membrane of the muscle fibre that receive the chemical in (b) are blocked or destroyed by antibodies.

(i) Base on this information and your knowledge of transmission of nerve impulses across the neuromuscular junction, suggest how myasthenia gravis can cause muscle weakness. (3 marks)

(ii) Drugs that suppress the immune system can be used to treat myasthenia gravis. In some patients, the thymus gland is removed by surgery. Suggest how the removal of the thymus gland can relieve symptoms and reduce the medication needed to treat myasthenia gravis. (1 mark)

Total : 9 marks

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7. The following key can be used for identify birds of four different genera.

1a The beak is relatively long and thin. ..... *Certhidea*

1b The beak is relatively short and cone-shaped. ..... go to 2

2a The bottom surface of the lower beak is straight. ..... *Geospiza*

2b The bottom surface of the lower beak is curved. ..... go to 3

3a The lower edge of the upper beak is flat. ..... *Platyspiza*

3b The lower edge of the upper beak is bent. ..... *Camarhynchus*

(a) Use the above key to identify the genus of the four birds shown below. Write the genus name and the key sequence taken to make the identification in the table below. (4 marks)

P Q R S

Bird	**Genus**	**Key sequence for identification**
P		
Q		
R		
S		

(b) The beak of a bird is adapted for feeding on a particular type of food. Identify, with a reason, which bird is most likely to feed on insects that live in small cracks on tree trucks. (1 mark)

_____

_____

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(c) Suppose a drought has occurred in the environment where these four birds live. There are now fewer seeds but more insects available for food. Describe how natural selection in this case could lead to a change in bird populations.

(4 marks)

Total : 9 marks

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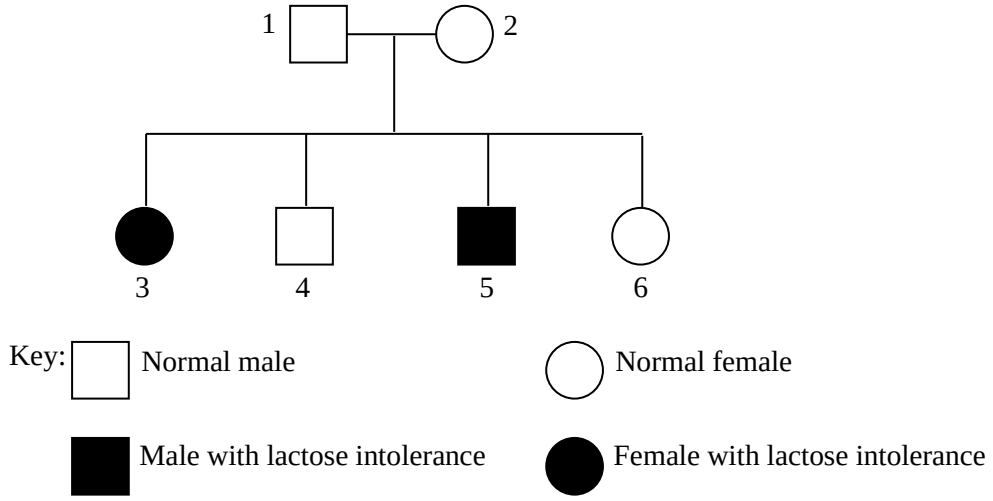
8. The following pedigree shows the inheritance of lactose intolerance in a family:



(a) Deduce whether the allele for the ability to produce lactase is dominant or recessive.
(Note: Marks will not be awarded for genetic diagrams.) (5 marks)

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(b) Individual 5 is going to marry a woman heterozygous for the ability to produce lactase. Draw a genetic diagram to show the possible genotypes and phenotypes of their offspring. (Use L to represent the dominant allele and l to represent the recessive allele.) (3 marks)

(c) Explain why adults who cannot produce lactase may experience diarrhoea after consuming milk. (3 marks)

Total : 11 marks

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9. Tommy wishes to set up an aquarium at house. He knows that setting up a home aquarium is not an easy task. It involves many procedures and most importantly, it involves a very important step called “cycling the tank”, which involves establishing a bacteria bed in the biological filter to remove toxins.

(a) (i) Unlike mammals, which produce urea as one of the metablolic wastes, fish produce toxic ammonium compound. Suggest how the bacteria bed in the biological filter can remove ammonium compound by means of a flow chart showing the bacteria and products involved.

(Hint: The final product is the less harmful nitrate.) (2 marks)

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(ii) Suggest ***one*** substance that is taken in by the fish that will eventually be metaboised and turned into ammonium compund? (1 mark)

_____

(iii) Suggest ***one*** way to decrease the level of ammonium compound in the aquarium (1 mark)

_____

(b) Excess nitrate present in the water of aquarium could lead to excessive growth of a kind of organism. Name this organism. (1 mark)

_____

(c) "Bio rings" are often introduced to the filter system.

Suggest the importance of "bio rings" to the filter system. (1 mark)

_____.

_____

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(d) Tommy found that his house was out of electricity supply in the morning. He was not afraid that his fish would die due to the stoppage of the air pump. However, he thought that his fish would die if the electricity supply stops at night. Comment on his ideas. (4 marks)

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Total : 10 marks

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For the following question, candidates are required to present their answer in essay form. Criteria for making will include relevant content, logical presentation and clarity of expression.

10. Both the roots of dicotyledons and the small intestine of humans serve to absorb nutrients. Compare the adaptive features of the roots and the small intestine for maximizing the absorption rate. (11 marks)

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Total : 11 marks

– END OF PAPER