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

Time allowed: 1 hour Total mark: 40

This paper must be answered in English

INSTRUCTIONS

1 There are **TWO** sections, A and B in this Paper. Attempt **ALL** questions .

2 **You are provided with two answer books. Use a separate answer book for each section. Put the question number on the front cover of each answer book.**

3 Each section carries 20 marks.

4 Present your answers in paragraphs wherever appropriate.

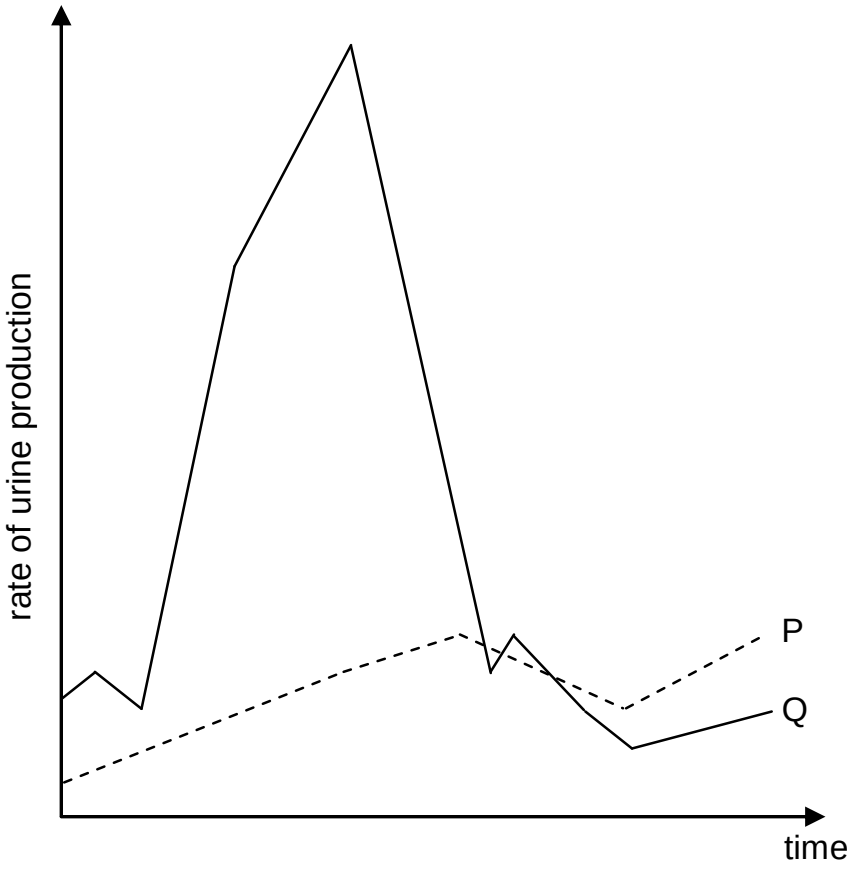
5 Illustrate your answers with diagrams wherever appropriate.

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

SECTION A Human Physiology: Regulation and Control

Answer ALL parts of the question. Put your answers in ONE of the answer books.

1. (a) The graph below shows the rate of urine production of two healthy persons after they have had a drink. One of them drank 500 mL of water and another drank 500 mL of isotonic salt solution.



(i) Which of the above lines, P or Q, represents the change in the rate of urine production

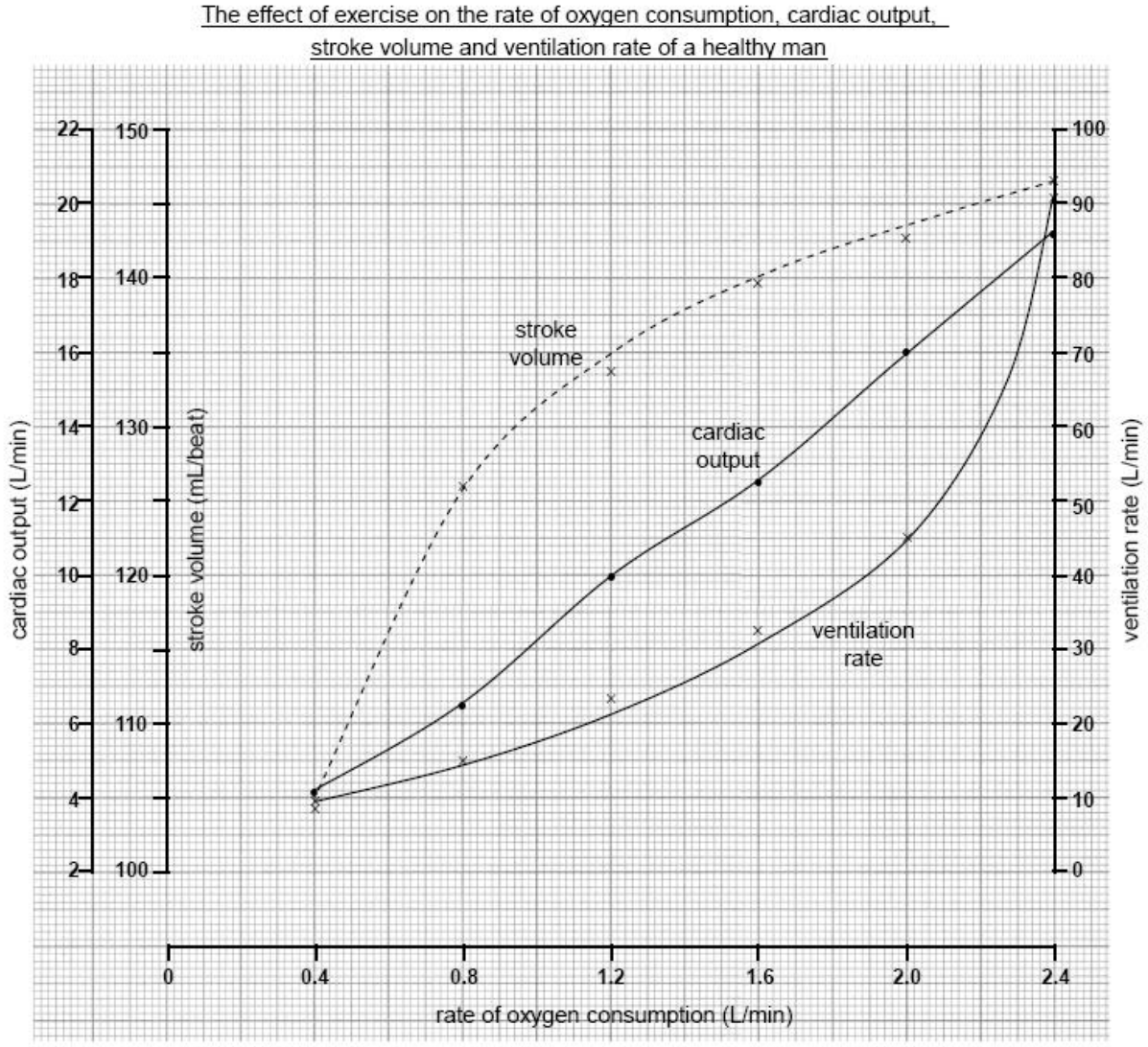
(1) after drinking water? (1 mark)

(2) after drinking a dilute salt solution? (1 mark)

(ii) Describe the change in the rate of urine production after drinking water.
Explain the change with reference to the secretion of antidiuretic hormone (ADH).
(6 marks

(iii) Coffee contains caffeine which inhibits ADH secretion. If the person drinks coffee instead of water, how will the rate of urine production change? Explain briefly.
(2 marks)

(b) An investigation was carried out to study the effect of exercise on the rate of oxygen consumption, cardiac output, stroke volume and ventilation rate of a man. Exercise of varying intensity was performed by the man using an exercise bicycle. The results are shown in the graph below.



(i) Cardiac output is one measure of the performance of the heart in circulating the blood. Explain what is meant by cardiac output. (2 marks)

(ii) (1) With reference to the graph, describe the changes in cardiac output and ventilation rate when the oxygen consumption rate changed from 1.2 to 1.6 L/min. (2 marks)

(2) Explain how the changes in (ii) (1) were brought about. (4 marks)

(iii) Calculate the heart rate of the man when the rate of oxygen consumption is 2 L/min. Show your working. (2 marks)

End of Section A

SECTION B Applied Ecology

Answer ALL parts of the question. Put your answers in ONE of the answer books.

2. (a) Acid rain causes serious environmental problems in some parts of the world. As acid rain enters a lake, the lake becomes acidic.

Figure 1 shows how acid rain is formed and how it affects the pH of a lake.

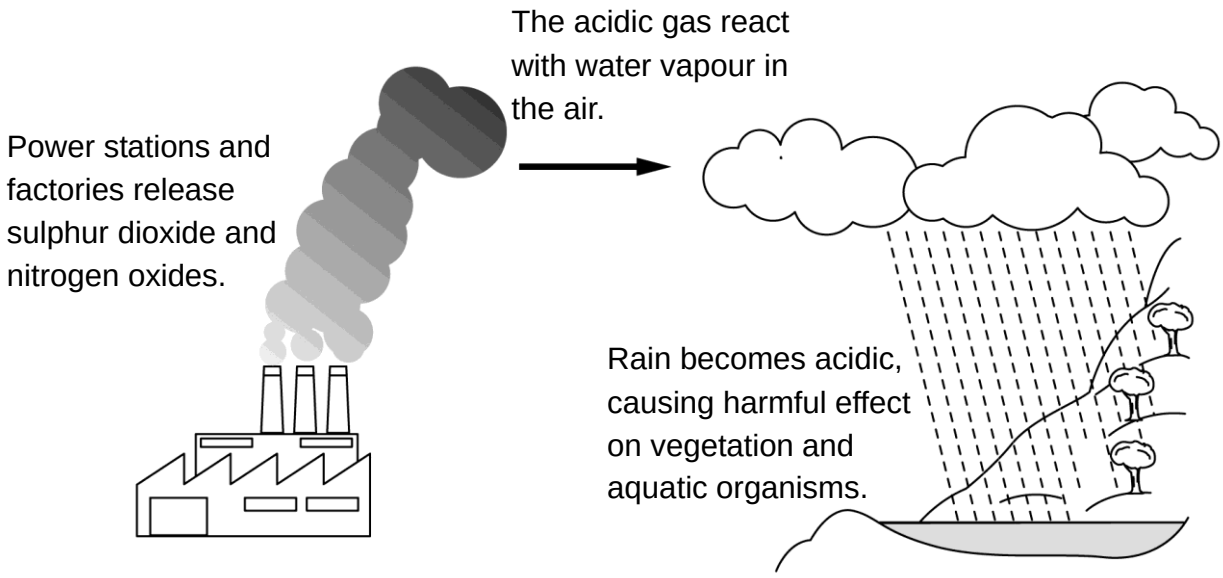


Figure 1

(i) (1)Besides the source of acidic gas as shown in ***Figure 1***, state another source of acidic gas. (1 mark)

(2) State ***two*** harmful effects of acid rain on the forest. (2 marks)

(ii) With reference to the source of acidic gas, suggest ***two*** ways to reduce acid rain. (2 marks)

Figure 2 shows the pH range in which some animals living in lakes can tolerate. The shaded boxes represent the pH value at which the animals can survive.

Animals	**pH 6.5**	**pH 6.0**	**pH 5.5**	**pH 5.0**	**pH 4.5**	**pH 4.0**	**pH 3.5**
Blackfly larvae	■	■	■	■	■	■	■
Mayfly larvae	■	■	■				
Clams	■	■					
Trouts	■	■	■	■			
Basses	■	■	■				
Frogs	■	■	■	■	■	■	
Salamanders	■	■	■	■			

Figure 2

(iii) Use the information provided in ***Figure 2*** to answer the following questions.

(1) Which animals can survive in the lake with pH as low as 4.0? (1 mark)

(2)Which animals are the most sensitive to a drop in pH? (1 mark)

(3) Explain why some aquatic animals cannot tolerate at a pH lower than 4.0. (2 marks)

(iv) State ***one*** harmful effects of sulphur dioxide and nitrogen oxides on human health. (1 mark)

(b) (i) Two types of plastic that can be successfully recycled are PET and HDPE. These types of plastic are used to make drinking bottles.

The total energy required to recycle 1 tonne of these bottles into pellets is 51.91 kJ. To create pellets from raw materials requires 8.43 MJ per tonne of raw materials.

Calculate how much energy is saved per tonne of starting material by using recycled plastic compared to using raw materials.

Show your working and give your answer to two decimal places. (2 marks)

(ii) State ***two*** environmental benefits of recycling plastics. (2 marks)

(iii) Bacteria can synthesize and store different types of lipid granules.

Polyhydroxybutyrate (PHB) is one such lipid that can be synthesized by bacteria. PHB is stored as granules, which can be extracted from the bacteria and used to produce biodegradable plastic.

(1) Suggest why bacteria synthesize and store lipid granules. (1 mark)

(2) Suggest ***two*** advantages of using bacteria to manufacture biodegradable plastics. (2 marks)

(3) Although PHB is biodegradable, it breaks down slowly when buried in landfill sites. Suggest why this might be the case. (2 marks)

(4) For PHB to be decomposed it has to be digested by microorganisms. State ***two*** products of PHB digestion. (1 mark)

– END OF PAPER 2 –