TEST CODE **01230020**

FORM TP 2011089

MAY/JUNE 2011

CARIBBEAN EXAMINATIONS COUNCIL

SECONDARY EDUCATION CERTIFICATE EXAMINATION

INTEGRATED SCIENCE

Paper 02

2 hours

READ THE FOLLOWING DIRECTIONS CAREFULLY.

1. This paper consists of **SIX** questions in **TWO** sections.

2. **SECTION A** consists of **FOUR** questions. Answer **ALL** questions. Write your answers in the spaces provided in this answer booklet. Section A is worth **70 marks**.

3. **SECTION B** consists of **TWO** questions. Answer **ALL** questions. Write your answers on the pages provided at the end of each question. Section B is worth **30 marks**.

4. The use of a silent non-programmable calculator is permitted.

Copyright © 2010 Caribbean Examinations Council.
All rights reserved.

SECTION A

Answer ALL FOUR questions.

1. (a) Light energy is converted to another type of energy when green plants make food.

(i) What kind of energy is stored in this food?

_____

(1 mark)

(ii) What substance is combined with carbon dioxide during photosynthesis?

_____

(1 mark)

(b) Describe how plants and animals may become fossil fuels.

_____

_____

_____

_____

(2 marks)

(c) Country X is a flat, tropical island. The electricity generating company in Country X uses a petroleum-based fuel. Name TWO alternative sources of energy that can be used for electricity generation in this country.

(i) _____

(1 mark)

(ii) _____

(1 mark)

(d) For EACH alternative source named in (c) above, give ONE disadvantage which may cause the electricity generating company to resist using the alternative source of energy identified.

(i) _____

_____

(1 mark)

(ii) _____

_____

(1 mark)

GO ON TO THE NEXT PAGE

(e) Recently, many used (pre-owned) vehicles have been imported from Japan and the United States into the Caribbean. This has resulted in an increase in the number of vehicles on the roads and increased amounts of carbon dioxide in the air.

(i) Name TWO other pollutants which are being added to the atmosphere because of the increase in the number of vehicles.

_____

_____

(2 marks)

(ii) State ONE negative effect of ONE of the pollutants named in (e) (i) above, on the environment.

_____

_____

(1 mark)

(iii) Suggest TWO negative effects of increased levels of carbon dioxide on the Caribbean environment.

_____

_____

_____

_____

(2 marks)

(iv) What are TWO possible effects of increased levels of air pollution on the health of Caribbean people?

_____

_____

_____

_____

(2 marks)

(f) There have been serious concerns about the build-up of carbon dioxide in the atmosphere in recent years. Table 1 provides data about carbon dioxide emissions by China and the United States.

TABLE 1: AMOUNT OF CARBON DIOXIDE EMITTED BY CHINA AND THE UNITED STATES FROM 1968 TO 2008

	Carbon Dioxide Emission (in billion tonnes) by Year								
	1968	**1973**	**1978**	**1983**	**1988**	**1993**	**1998**	**2003**	**2008**
China	0.7	1.1	1.5	1.6	2.4	2.9	3.3	4.3	6.9
USA	4.3	5.2	5.3	4.8	5.4	5.7	6.2	6.4	6.4

(Data modified from BP p.l.c.)

(i) Figure 1 on page 5 shows the data for USA. On the **same** grid, using the scales provided, plot a graph to represent the data for China. **(5 marks)**

(ii) Label the axes on the graph. **(1 mark)**

(iii) State an appropriate title for the graph.

_____

(1 mark)

(iv) During which period was there a DECREASE in the amount of carbon dioxide emitted by the USA?

_____

(1 mark)

(v) In which year did China emit the same amount of carbon dioxide as the United States?

_____

(1 mark)

(vi) Based on the trends in the graphs, which country would produce more carbon dioxide in 2010?

_____

(1 mark)

Total 25 marks

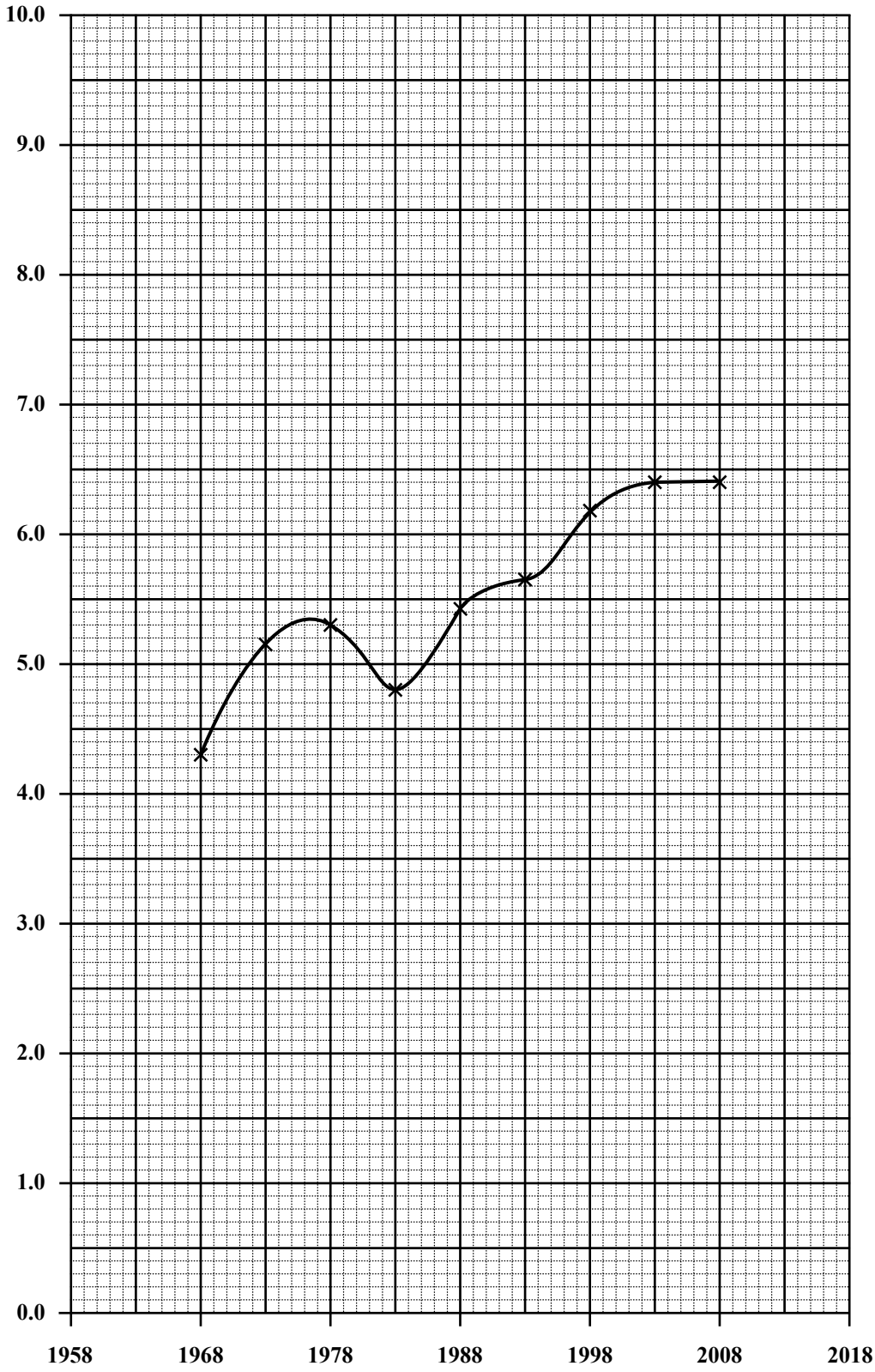


Figure 1. Carbon dioxide emission

GO ON TO THE NEXT PAGE

2. Figure 2 shows a terrestrial food chain.

Grass → rabbit → hawk

Figure 2. A terrestrial food chain

(a) (i) State TWO similarities in structure between a typical cell in the grass and a typical cell in the rabbit.

_____

_____

(2 marks)

(ii) State TWO differences in structure between a typical cell in the grass and a typical cell in the rabbit.

_____

_____

(2 marks)

(b) (i) Identify a producer in Figure 2.

_____

(1 mark)

(ii) Give a reason for your answer in (b) (i).

_____

(1 mark)

(iii) What is a likely effect on the food chain if a drought kills all the grass in that area?

_____

_____

(1 mark)

(c) Figure 3 shows a vertical section of a tooth.

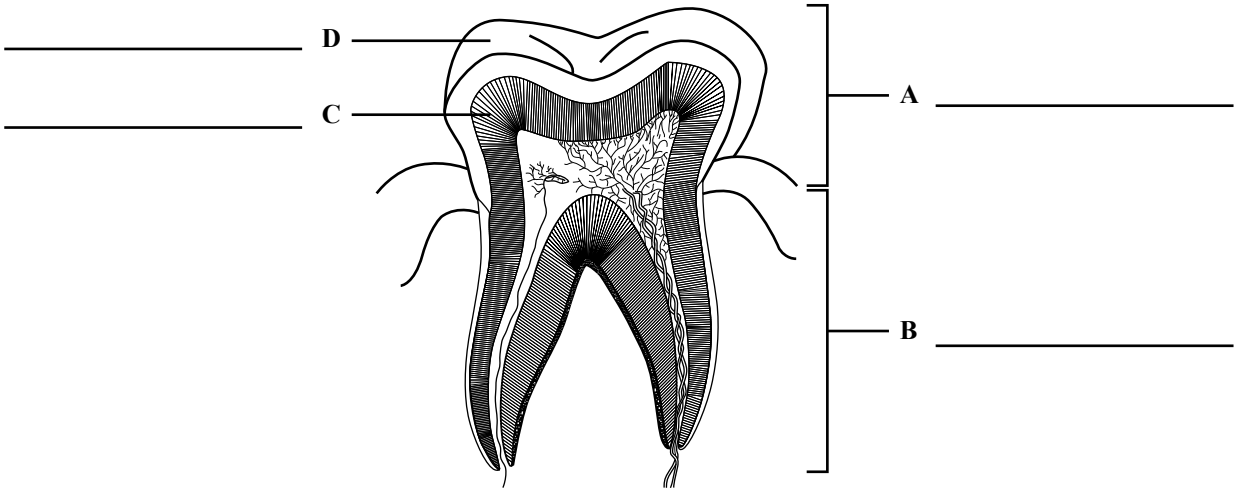


Figure 3. Vertical section of a tooth

(i) Identify the parts labelled A, B, C and D. Write your answer in Figure 3.

(4 marks)

(ii) Name the type of tooth shown in Figure 3.

_____

(1 mark)

(iii) Name ONE other type of tooth.

_____

(1 mark)

(iv) Suggest TWO features of a rabbit's teeth that make them suitable for its diet.

_____

_____

(2 marks)

Total 15 marks

3. (a) A carpenter working outdoors decided to take a break. He left all his tools in the sun. When he returned, he picked up a nail and the hammer by its wooden handle to finish the job. He observed that the handle of the hammer was warm and the nail was hot.

(i) Suggest how heat energy is transferred.

_____

_____

_____

(2 marks)

(ii) Explain why the handle of the hammer and the nail had different temperatures.

_____

_____

_____

(2 marks)

(iii) The carpenter automatically drops the hot nail as he picks it up. Explain how the nervous systems causes the carpenter to respond in this manner.

_____

_____

_____

_____

_____

_____

_____

_____

(4 marks)

(iv) Name the process by which the heat is transferred from the nail to the carpenter's hand.

_____

(1 mark)

(v) On very hot days the carpenter prefers to hold the nails with a glove made of thick cloth. How does the glove prevent his hand from being burnt by the nail?

_____

_____

(1 mark)

(b) Figure 4 is an incomplete diagram showing the formation of a sea breeze.

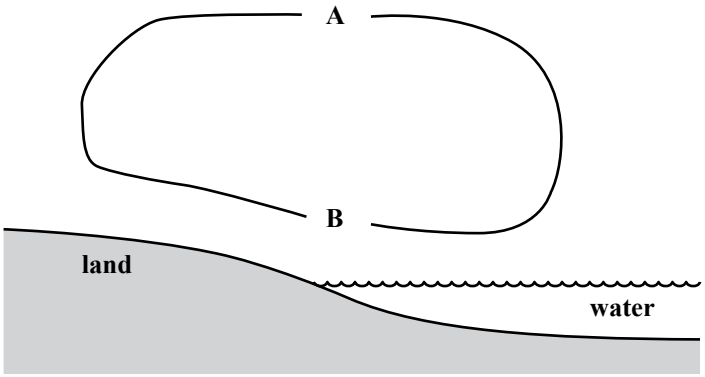


Figure 4. Diagrammatic representation of a sea breeze

(i) What is meant by convection as it relates to heat?

_____

(1 mark)

(ii) Indicate on Figure 4 the MOST likely direction of the airflow by placing arrows at A and B. **(1 mark)**

(iii) Explain why the air flows in the direction that you indicated on Figure 4.

_____

_____

_____

_____

(3 marks)

Total 15 marks

4. Figure 5a represents a circuit that Cherise constructed to test the conductivity of various objects in her home. Figure 5b shows how she connected the objects to be tested across terminals X and Y with the switch closed.

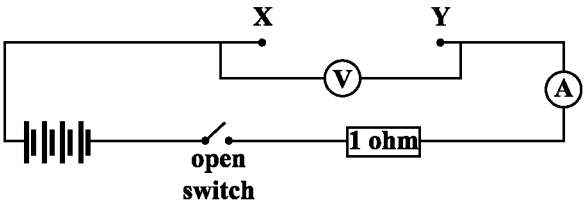


Figure 5a. Open circuit

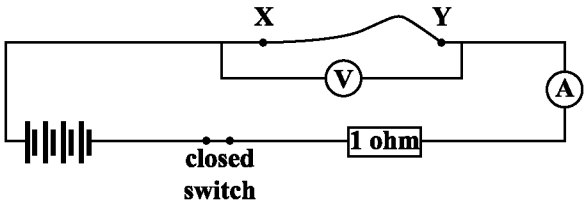


Figure 5b. Closed circuit

(a) Consider the following list of materials: aluminium, carbon, copper, plastic, rubber and wood.

(i) Choose TWO very good conductors from the list above.

_____

(2 marks)

(ii) Choose ONE very good insulator from the list above.

_____

(1 mark)

(b) (i) If ONE dry cell provides a voltage of 1.5 volts, what is the voltage of the battery made up of four dry cells as shown in Figure 5a?

_____

(1 mark)

(ii) What is the reading of the ammeter in Figure 5a when the switch is open?

_____

(1 mark)

(iii) How will the value of the ammeter reading change when Cherise places a piece of conducting wire between X and Y as shown in Figure 5b?

_____

(1 mark)

(iv) When Cherise places a 2 ohm resistor between X and Y in Figure 5a and closes the switch, the voltmeter reads 4V. What formula can she use to calculate the current?

_____

(1 mark)

(v) From (iv) calculate the current in the circuit. Include the correct unit in your answer.

(2 marks)

(vi) Give ONE reason why it is beneficial to use a fuse in this circuit.

_____

_____

(1 mark)

(c) Cherise has a radio which can be powered either by batteries or electricity from the mains. State TWO precautions that Cherise can take to prevent electrical shock or fire when this radio is connected to the electrical outlets.

(i) _____

_____

(1 mark)

(ii) _____

_____

(1 mark)

(d) Identify the MOST appropriate fire extinguisher to put out an electrical fire.

_____

(1 mark)

(e) Name TWO items of protective gear that firemen wear when fighting fires.

(i) _____

(1 mark)

(ii) _____

(1 mark)

Total 15 marks

SECTION B

Answer BOTH questions.

Write your answers on the pages provided at the end of each question.

5. Figure 6a shows a diagram of a vertical section through the human eye.

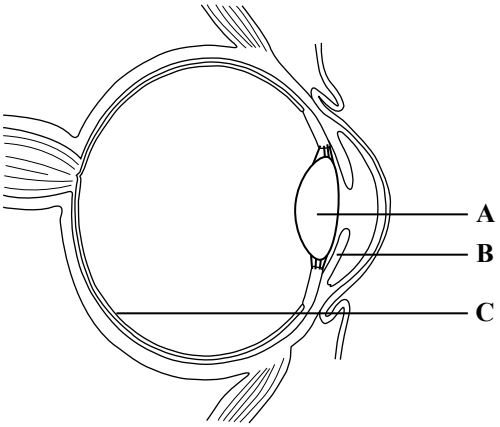


Figure 6a. Vertical section through a human eye

(a) Name the structures labelled A, B and C in Figure 6a. **(3 marks)**

(b) State the functions of the structures labelled A and B. **(2 marks)**

(c) Figure 6b shows the journey that Fred needs to take to reach his home.

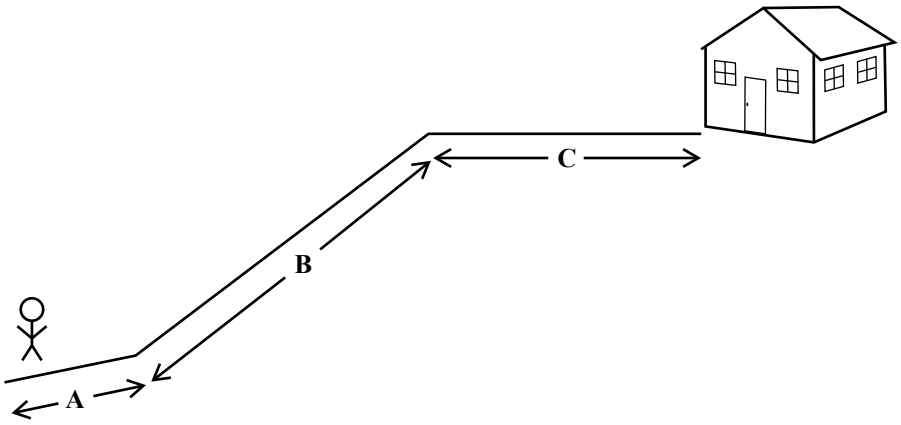


Figure 6b. Fred's journey to his home

(i) Sometimes Fred runs up the slope. Explain how his breathing and heart rate change as he runs up the slope. **(5 marks)**

(ii) Which TWO **sense** organs enable Fred to run up the slope? Explain your answer. **(5 marks)**

GO ON TO THE NEXT PAGE

Write your answer to Question 5 here.

6. (a) Compare the reaction of the following metals with dilute sulphuric acid:

(i) Aluminium **(2 marks)**

(ii) Iron **(2 marks)**

(iii) Copper **(1 mark)**

(b) Suggest TWO precautions that should be taken when carrying out the reaction of aluminium with sulphuric acid. Give a reason for EACH precaution. **(4 marks)**

(c) Why is it dangerous to react sodium and potassium with dilute sulphuic acid? **(2 marks)**

(d) The Smith family moved into a new house which is very close to the beach. The contractor advised that in order to protect the iron windows, Mr Smith should paint them as soon as possible. Why did the contractor give this advice to the Smith family? **(4 marks)**

Write your answer to Question 6 here.

END OF TEST