FORM TP 2013089

TEST CODE **01230020**

MAY/JUNE 2013

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

INTEGRATED SCIENCE
(Single-Award)

Paper 02 – General Proficiency

2 hours and 30 minutes

READ THE FOLLOWING INSTRUCTIONS 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. You may use a silent, non-programmable calculator to answer questions.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

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SECTION A

Answer ALL FOUR questions.

1. In training for a marathon, Ricki uses a route which includes a small steep hill.

(a) (i) Describe how Ricki's chest (intercostal) muscles and ribcage operate to cause inhalation and exhalation of air.

_____

_____

_____

_____

(2 marks)

(ii) Suggest how his breathing rate changes as he runs up the hill.

_____

(1 mark)

(iii) Give a reason for your answer in (a) (ii).

_____

(1 mark)

(iv) Explain how the movement of Ricki's diaphragm allows him to breathe in, when he sings or engages in strenuous activity.

_____

_____

_____

_____

(3 marks)

(b) State TWO differences between the air that Ricki inhales and the air that he exhales.

(i) _____

(1 mark)

(ii) _____

(1 mark)

(c) In the uphill part of the route, Ricki's leg muscles begin to feel tired as they produce lactic acid during respiration.

(i) What is the term used to describe this type of respiration?

_____

(1 mark)

(ii) Write a word equation for the process of respiration that involves oxygen.

_____

(2 marks)

(iii) Name ONE nutrient Ricki can use to provide sufficient energy for his exercise.

_____

(1 mark)

(d) Table 1 is the data of a survey which compares the median age at which 1000 tobacco smokers and 1000 non-smokers died.

TABLE 1: MEDIAN AGE AT DEATH OF TOBACCO SMOKERS AND NON-SMOKERS

Category	Median Age (years)						
	40	**50**	**60**	**70**	**80**	**90**	**100**
Non-smokers	0	55	95	225	375	200	50
Tobacco Smokers	50	220	425	175	80	50	0

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

(ii) Label the axes on the graph. **(2 marks)**

(iii) State an appropriate title for the graph.

_____
(1 mark)

(iv) According to the trends presented in the graphs, at what age did the SAME number of smokers and non-smokers die?

_____
(1 mark)

(v) From the graph, at what age will 250 non-smokers die?

_____
(1 mark)

(vi) Based on the trends in the graphs, what can be concluded about the effect of smoking tobacco on life expectancy?

_____
(1 mark)

(vii) State ONE likely difference between the lungs of the smokers and the lungs of the non-smokers.

_____
(1 mark)

Total 25 marks

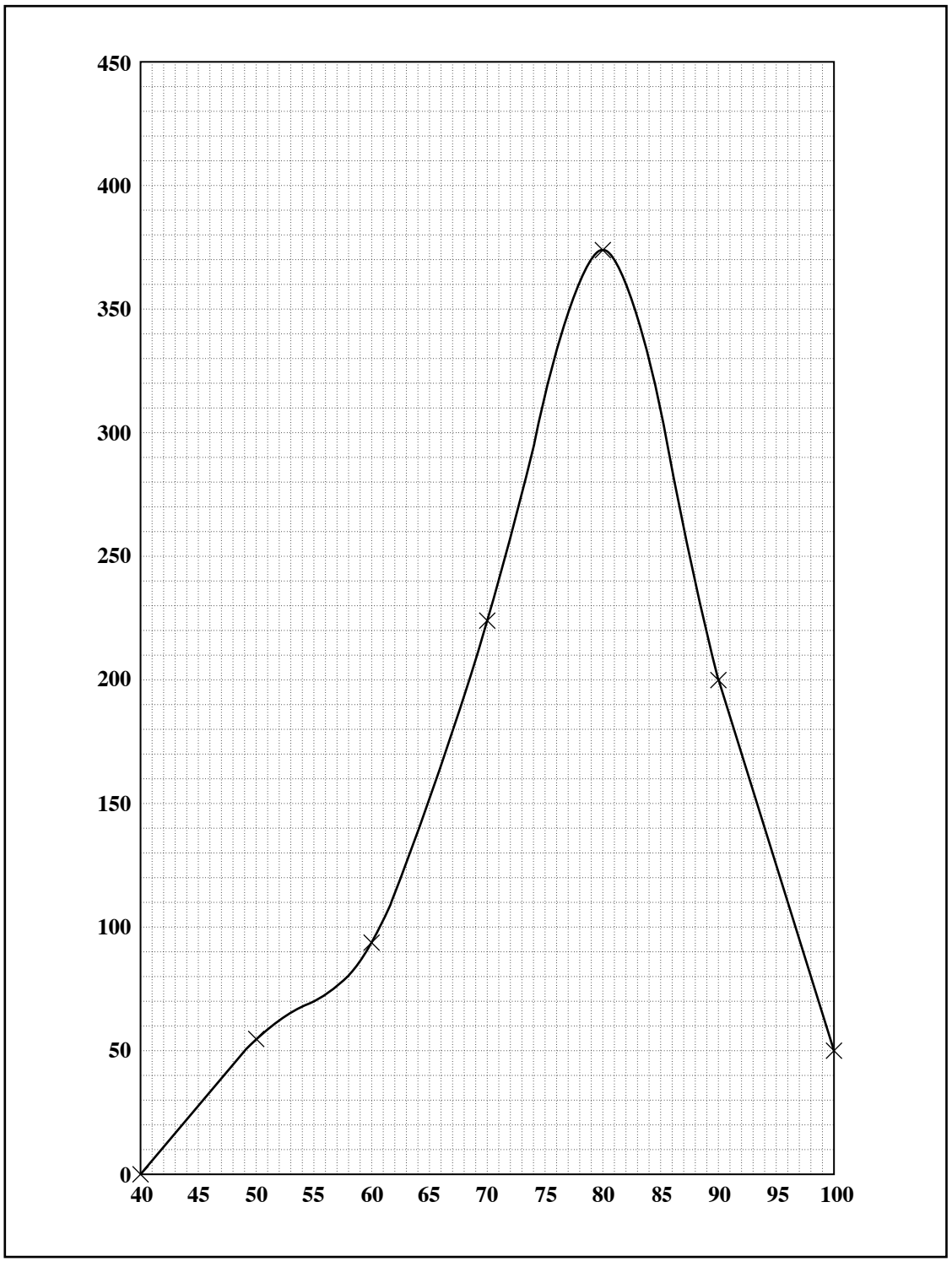


Figure 1. Age at death

2. (a) Distinguish between corrosion and rusting.

Corrosion _____

_____

(1 mark)

Rusting _____

_____

(1 mark)

(b) In an experiment to determine the conditions necessary for rusting, a student prepares three boiling tubes as shown in Figure 2.

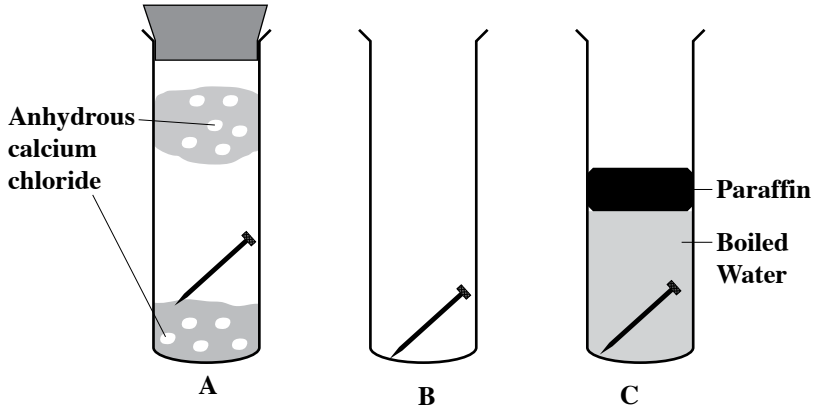


Figure 2. Boiling tubes

- Boiling Tube A contains an iron nail, is sealed with a stopper and has anhydrous calcium chloride.
- Boiling Tube B contains an iron nail exposed to air.
- Boiling Tube C contains an iron nail placed in boiled water and is sealed with paraffin.

After one month, the student observes the iron nails in the boiling tubes.

(i) In which boiling tube will the nail show the MOST rust?

_____

(1 mark)

(ii) Explain your answer in (b) (i) on page 6.

_____

_____

(2 marks)

(iii) What is the purpose of the anhydrous calcium chloride in Boiling Tube A?

_____

_____

(1 mark)

(iv) Which boiling tube is set up as a control?

_____

(1 mark)

(v) If stainless steel nails are used in the experiment instead of iron nails, would rusting take place? Give a reason for your answer.

_____

_____

(2 marks)

(vi) Based on your answer in (b) (v) above, suggest ONE use of stainless steel in the home.

_____

_____

(1 mark)

(vii) State ONE method that can be used to prevent rusting.

_____

(1 mark)

(c) John noticed that his father replaces his garden taps made from brass with plastic taps. Outline TWO advantages and TWO disadvantages of using the plastic taps.

Advantages

_____

_____

_____

(2 marks)

Disadvantages

_____

_____

_____

(2 marks)

Total 15 marks

3. (a) Figure 3 shows the reproductive system of a human female.

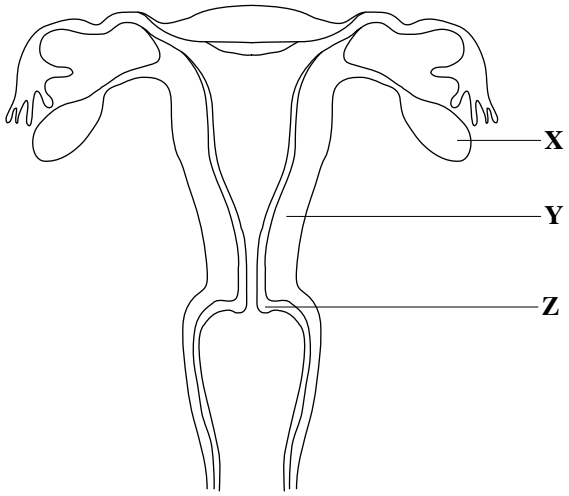


Figure 3. Diagram of human (female) reproductive system

(i) Label the parts X, Y and Z on Figure 3. **(3 marks)**

(ii) State TWO structures that are present in the reproductive system of human males but are not present in that of females.

_____

_____

(2 marks)

(b) Figure 4 shows the branch of a flowering plant.



Figure 4. Branch of a flowering plant

Explain how this plant may be reproduced by:

Asexual reproduction _____

_____

_____

(1 mark)

Sexual reproduction _____

_____

_____

(2 marks)

(c) Overpopulation is a problem encountered in some developing countries. Suggest TWO ways by which government or individuals can overcome this problem.

_____

_____

(2 marks)

(d) Figure 5 shows the growth curve for Seedlings A and B.

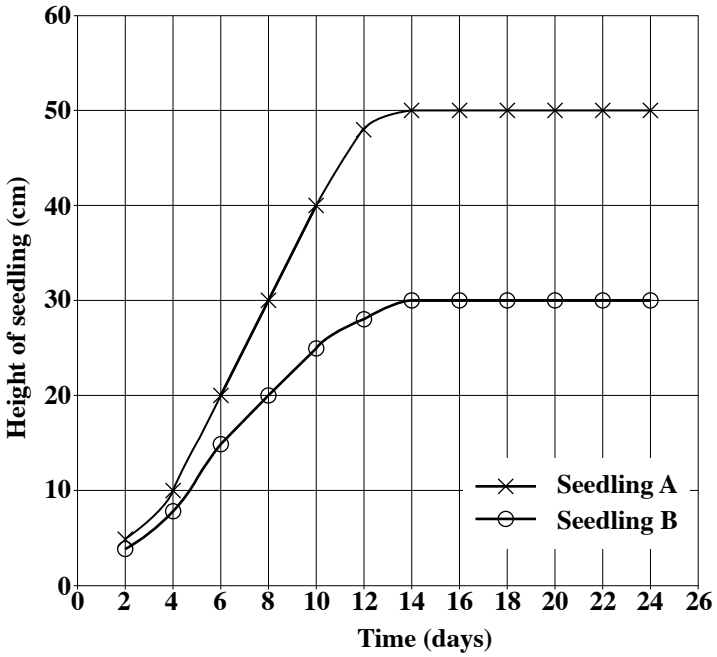


Figure 5. Growth curve for Seedlings A and B

(i) Which seedling, A or B has the HIGHEST growth rate?

_____

(1 mark)

(ii) What is the maximum height reached by Seedling A?

_____

(1 mark)

(iii) What is the maximum height reached by Seedling B?

_____

(1 mark)

(iv) Give TWO possible reasons for the difference in the maximum height reached by Seedlings A and B.

_____

_____

(2 marks)

Total 15 marks

NOTHING HAS BEEN OMITTED.

4. (a) (i) Distinguish among conduction, convection and radiation of heat energy.

Conduction _____

_____

(1 mark)

Convection_____

_____

(1 mark)

Radiation _____

_____

(1 mark)

(ii) Give ONE example of a conductor and ONE example of an insulator.

Conductor _____

(1 mark)

Insulator _____

(1 mark)

(b) Figure 6 shows a pot of water being heated on a flame.

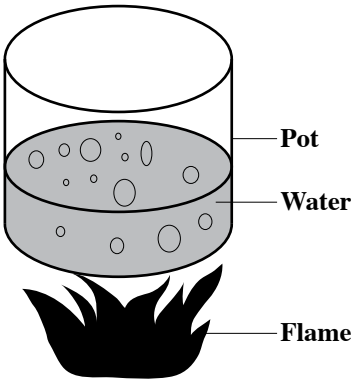


Figure 6. Diagram showing a pot of water being heated

By which method is heat energy transferred from the

(i) outside of the pot to the inside of the pot?

_____

(1 mark)

(ii) bottom of the water to the top of the water?

_____

(1 mark)

(c) Figure 7 shows the diagram of an experiment which a student carried out. Five rods made from different materials are used. Low melting point wax is used to attach a thumbtack to one end of each of the rods. The rods are then placed in the beaker of boiling water. As the temperature of the wax reaches its melting point the thumbtacks fall off the rod. The order in which the thumbtacks fall off is C, followed by A, followed by D, followed by B, and followed by E.

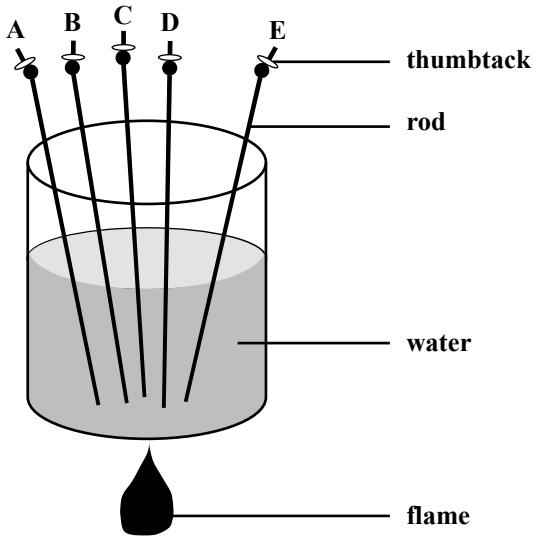


Figure 7. Metal rods in a beaker of boiling water

(i) Suggest an aim for this experiment.

_____

_____

(1 mark)

(ii) Which rod is the BEST **conductor**?

_____

_____

(1 mark)

(iii) Which rod is the BEST **insulator**?

_____

_____

(1 mark)

(iv) List TWO variables that must be held constant in this experiment.

_____

_____

(2 marks)

(v) Why is the water constantly heated throughout the experiment instead of placing the rods in a beaker of boiling water without using a flame?

_____

_____

(1 mark)

(d) Figure 8A shows a warehouse before renovation of its roof and Figure 8B shows the warehouse after renovation of its roof.

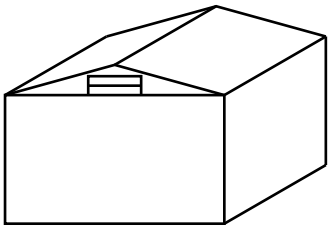


Figure 8A
Before renovation of the roof

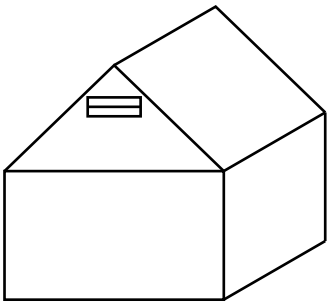


Figure 8B
After renovation of the roof

Workers find that the warehouse shown in Figure 8B is much cooler than the warehouse shown in Figure 8A. Give a scientific explanation for this observation.

_____

_____

(2 marks)

Total 15 marks

SECTION B

Answer BOTH questions.

5. (a) State THREE differences between the transport of nutrients in plants and the transport of nutrients in humans. **(3 marks)**

(b) Chandra is a cyclist who often rides on a rocky terrain and across a narrow bridge to her home daily. Explain how Chandra's circulatory and respiratory systems function in enabling her to make her daily rides. **(4 marks)**

(c) Describe the functioning of the nervous system in enabling Chandra to perform her daily rides. **(4 marks)**

(d) Identify TWO materials that can be used for making a bicycle frame and state the property of EACH material that makes it suitable for making the frame. **(4 marks)**

Total 15 marks

Write your answer to Question 5 here.

Write your answer to Question 5 here.

Write your answer to Question 5 here.

Write your answer to Question 5 here.

6. Anna notices a rainbow in the sky.

(a) Name the THREE primary colours of light in the rainbow. **(3 marks)**

(b) Describe how Anna could create secondary colours with spotlights on a white wall. **(3 marks)**

(c) Mr James builds a shed in his backyard and uses an electrical extension cord to power the 60W light bulb in the shed.

(i) If the voltage in his house is 120V, calculate the current in the extension cord when the bulb is turned on. **(4 marks)**

(ii) The James family moves the washing machine rated at 360W, 120V and 3A to the shed and plugs it into the same extension cord used in (c) (i) above. Explain the safety of this action by identifying TWO possible hazards from the electrical circuits. **(2 marks)**

(iii) The circuit is overloaded when a blow dryer and a clothes iron are plugged in on the same socket with the extension cord. What device in the house prevents the house wiring from burning? Describe how it works. **(3 marks)**

Total 15 marks

Write your answer to Question 6 here.

Write your answer to Question 6 here.

Write your answer to Question 6 here.

Write your answer to Question 6 here.

END OF TEST

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.