TEST CODE **01230020**

FORM TP 2009087

MAY/JUNE 2009

CARIBBEAN EXAMINATIONS COUNCIL

SECONDARY EDUCATION CERTIFICATE EXAMINATION

INTEGRATED SCIENCE
(Single-Award)

General Proficiency

Paper 02

2 hours

READ THE FOLLOWING DIRECTIONS CAREFULLY

1. You MUST use this answer booklet when responding to the questions. For EACH question, write your answer in the space indicated and return the answer booklet at the end of the examination.

2. This test is divided into TWO sections. Each section contains THREE questions. You should answer ALL SIX questions.

3. You are advised to spend about one hour on each section.

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SECTION A

You should answer ALL THREE questions.
(Suggested time: 60 minutes)

You are advised to spend about 20 minutes on EACH question.

1. **Figure 1** shows a flowering plant with structures labelled A, B, C, D and E.

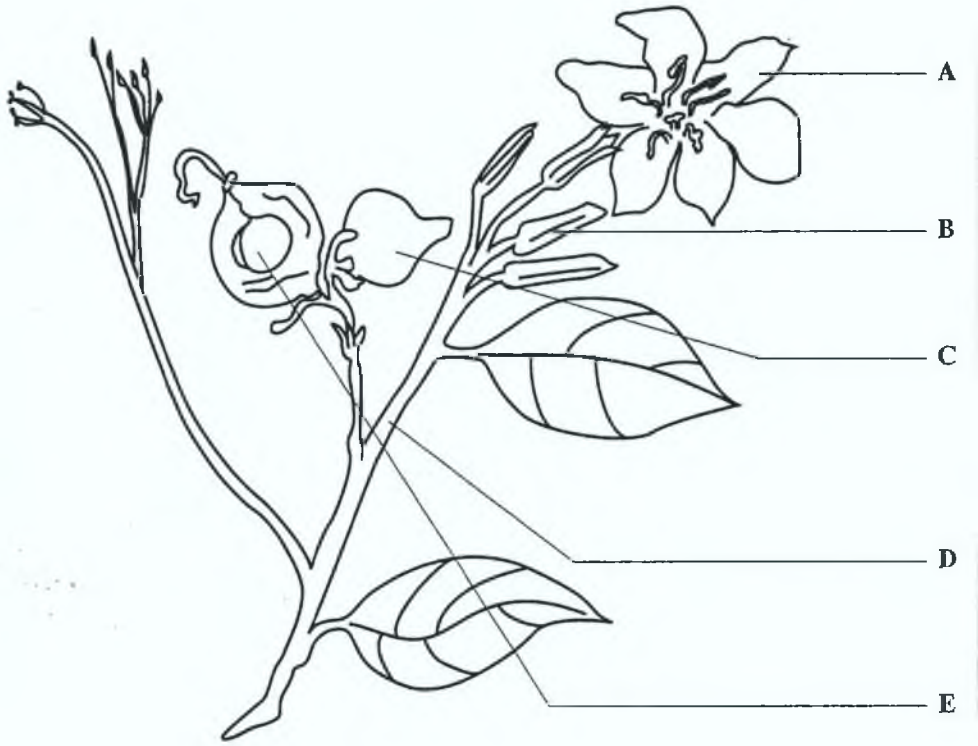


Figure 1. Part of a flowering plant

(a) Name EACH of the structures labelled, A, B, C and D.

A _____

B _____

C _____

D _____

(2 marks)

(b) **Figure 2** depicts a reproducing unicellular organism.

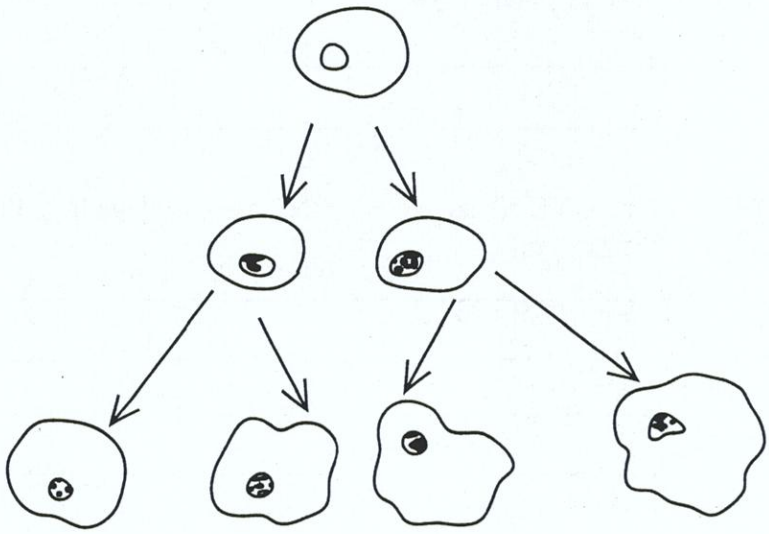


Figure 2. Reproducing unicellular organism

Outline TWO differences between the organisms shown in **Figures 1** and **2**.

_____

_____

_____

(2 marks)

(c) Identify in **Figure 1**

(i) TWO structures that are associated with **sexual** reproduction

_____

_____

(2 marks)

(ii) ONE structure that is associated with **asexual** reproduction.

_____

_____

(1 mark)

(d) A farmer wishes to cultivate genetically identical trees on his farm.

(i) Which of the labelled parts of the flowering plant should the farmer use?

_____

(1 mark)

(ii) Give a reason for your answer to (d)(i) above.

_____

_____

(1 mark)

(iii) State ONE advantage and ONE disadvantage of cultivating genetically identical trees.

_____

_____

_____

_____

(2 marks)

(e) The reproduction of the organism in **Figure 2** occurred in a flask containing water and glucose.

(i) Over a three-week period, the number of organisms in the flask increased then decreased.

Suggest TWO likely reasons for the decrease.

_____

_____

_____

(2 marks)

(ii) What is the LIKELY effect on the population of the organisms if the temperature of the contents of the flask was raised to 80 °C?

_____

_____

(1 mark)

(iii) Give ONE reason for your answer to (e)(ii) above.

_____

_____

(1 mark)

Total 15 marks

2. Ms Molly grows yams and potatoes, and raises cows and chickens on her farm.

(a) Name TWO **other** plants that Ms Molly could grow in order to increase the **variety** of nutrients available to her family.

Plant 1: _____

Plant 2: _____

(2 marks)

(b) Identify the **major** nutrient provided by ONE of the plants named at (a) above.

_____

(1 mark)

(c) **Figure 3** shows one of Ms Molly's cows.

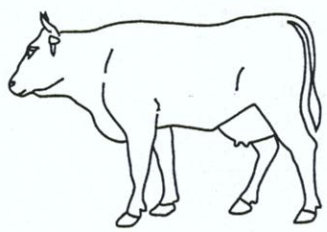


Figure 3. Ms Molly's cow

State TWO nutrients that cows may provide.

_____

(2 marks)

(d) Ms Molly has a five-year-old grandchild and a seventy-five-year-old brother. Table 1 shows the criteria for selecting food for these two members of her family.

TABLE 1: CRITERIA FOR FOOD SELECTION

Criteria for selecting food	Five-year-old child	Seventy-five-year-old adult
Colour of food		
Vitamin and mineral content		
Quality of food		
Energy content of food		
Softness of food		
Packaging of food		

(i) Complete Table 1 by placing a tick in the appropriate cell to select the TWO MOST important criteria for her

a) five-year-old grandchild

b) seventy-five-year-old brother. **(4 marks)**

(ii) Give TWO reasons for EACH of your answers to (d)(i) above.

Child:

_____

_____

(2 marks)

Adult:

_____

_____

(2 marks)

(e) Ms Molly sometimes works on the farm while she prepares meals.

(i) Suggest ONE precaution that she MUST take while she is preparing or serving meals to her family.

_____

_____

_____

(1 mark)

(ii) Give ONE reason for your answer to (e)(i) above.

_____

_____

(1 mark)

Total 15 marks

3. (a) Baby Mina has a very high temperature (fever). Her grandmother wipes her skin with rubbing alcohol and her temperature goes down. After a while, the baby's temperature starts to rise again.

(i) Baby Mina's temperature was measured with a clinical thermometer. State ONE difference between a clinical thermometer and a laboratory thermometer.

_____

_____

(1 mark)

(ii) State TWO main processes that occur when rubbing alcohol is used to lower the baby's temperature.

_____

_____

_____

(2 marks)

(iii) Suggest ONE reason for the baby's temperature rising again.

_____

_____

(1 mark)

(b) A bi-metallic strip is an essential part of some thermostats. Its function depends on metals expanding at different rates. **Figure 4** shows how four metals, labelled A, B, C and D, expanded when heated by the same quantity of heat. Study **Figure 4** and answer the questions which follow.

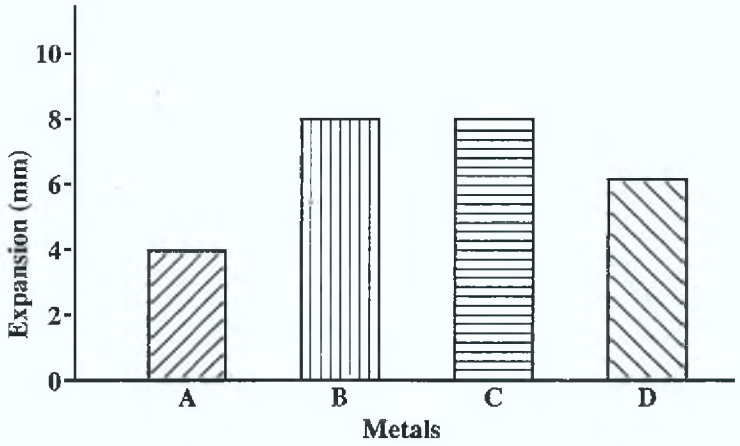


Figure 4. Expansion of some metals

(i) Which of the metals, A, B, C or D, expands the LEAST when heated?

_____

(1 mark)

(ii) Which combination of metals CANNOT be used in a bi-metallic strip?

_____

(1 mark)

(iii) Give the reason for your answer to (b)(ii).

_____

_____

(1 mark)

(iv) Which of the following combinations of metals will bend the MOST in a bi-metallic strip? (Circle only ONE combination.)

A and B A and D B and D

(1 mark)

(v) Give the reason for your answer to (b)(iv).

_____

_____

(1 mark)

(c) John's office is located in a warehouse. It has one entrance and a window which opens onto a garage.

(i) The visiting health inspector told John that his office was poorly ventilated. Give TWO reasons for the inspector's comment.

_____

_____

_____

(2 marks)

(ii) Suggest TWO likely effects of the poor ventilation.

_____

_____

_____

(2 marks)

(iii) Recommend TWO actions that could be taken to improve the ventilation and air quality in the office.

_____

_____

_____

(2 marks)

Total 15 marks

SECTION B

You should answer ALL THREE questions.
(Suggested time: 60 minutes)

You are advised to spend about 20 minutes on EACH question.

4. (a) Figure 5 shows the fractional distillation apparatus used to separate mixtures of liquids in the laboratory. Three sections are labelled A, B and C.

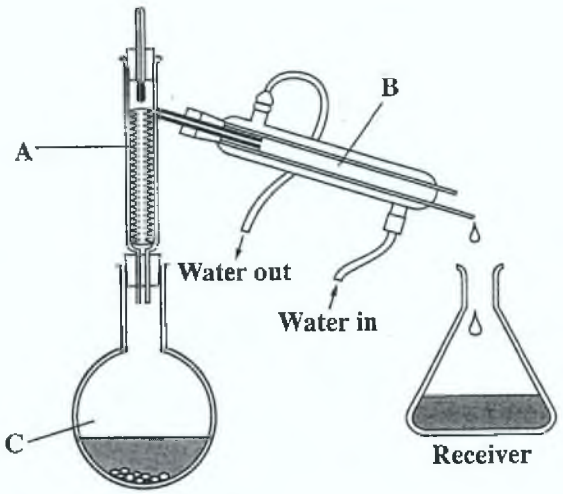


Figure 5. Fractional distillation apparatus

(i) List the physical states of the materials usually present in Section A.

_____

(1 mark)

(ii) Name the process occuring in EACH of the following labelled sections:

B _____

C _____

(2 marks)

(iii) The distillation flask contains a mixture of liquids W (boiling point 180 °C), X (boiling point 60 °C) and Y (boiling point 100 °C). Which of W, X or Y will be collected in the receiver **first**?

_____

(1 mark)

(b) Fossil fuels are gradually being supplemented by renewable energy sources such as solar energy.

(i) State ONE **major** environmental concern associated with using fossil fuels.

_____

(1 mark)

(ii) State ONE reason which may limit the use of solar energy in the Caribbean.

_____

(1 mark)

(c) Mr Wong decided to build a simple solar water heater. His design is shown in **Figure 6**. Study **Figure 6** and answer the questions which follow.

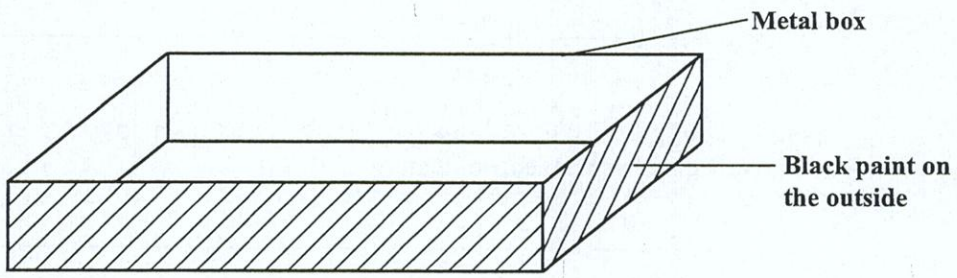


Figure 6. A simple solar water heater

(i) Which method of heat transfer is MOST important for this solar water heater to operate?

_____

(1 mark)

(ii) Why did Mr Wong paint the exterior of the water heater in black?

_____

_____

(1 mark)

(iii) Would you expect to find hotter water at the top or at the bottom of the heater?

_____

(1 mark)

(iv) Give ONE reason for your answer to (c)(iii) above.

_____

(1 mark)

(v) a) Mr Wong needs to cover the water heater. Should the covering be made from metal, transparent glass or plastic?

_____

(1 mark)

b) Give ONE reason for your answer in (v) a) above.

_____

(1 mark)

(vi) Suggest ONE appropriate use of the water from the solar water heater.

_____

(1 mark)

(vii) Suggest TWO reasons for Mr Wong using a solar water heater instead of a gas heater or an electric heater.

_____

_____

_____

(2 marks)

Total 15 marks

5. (a) **Figure 7** shows a ray of light (I) incident on a mirror and four angles a, b, c and d. Study **Figure 7** and answer the questions which follow.

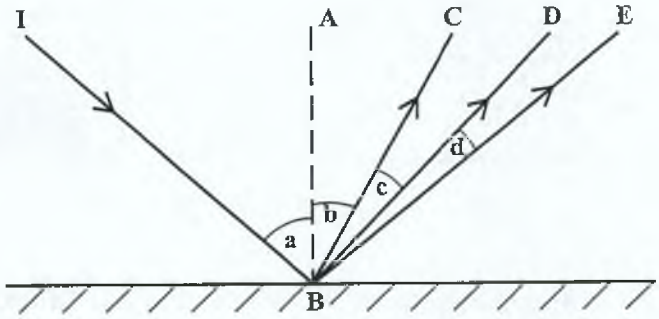


Figure 7. Rays of light incident on a mirror

(i) State the angle of incidence in the diagram.

_____

(1 mark)

(ii) Which of AB, BC, BD or BE represents

a) the normal?

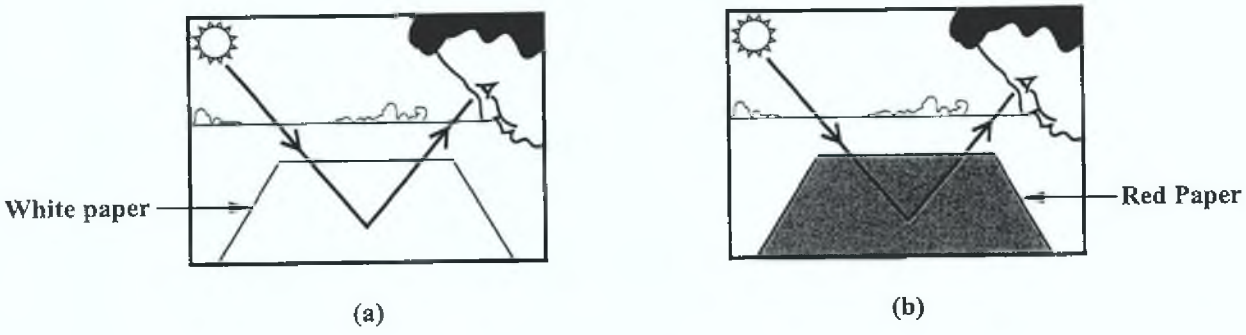
_____

b) the reflected ray?

_____

(2 marks)

(b) **Figures 8 (a)** and **(b)** show John observing white light on different coloured papers.



Figures 8(a) and (b). White light on different coloured papers

(i) What colour would John observe in **Figure 8 (a)**? Give a reason for your answer.

Colour observed: _____

_____

Reason for answer: _____

_____

(2 marks)

(ii) What colour would John observe in **Figure 8 (b)**? Give a reason for your answer.

Colour observed: _____

_____

Reason for answer: _____

_____

(2 marks)

(c) State ONE difference between light and sound.

_____

_____

(1 mark)

GO ON TO THE NEXT PAGE

(d) Plan an investigation to find out which material is BEST for reducing the loudness of the sound of a drum. You are provided with a drum, a sound meter, sheets of plastics, leather and cloth.

(i) State a suitable hypothesis for this investigation.

_____

_____

(1 mark)

(ii) Name TWO variables that may be controlled to make this a fair investigation.

_____

_____

(2 marks)

(iii) Construct a table to show how you would record your results.

(2 marks)

(iv) Outline the procedures that you would follow to carry out this test.

_____

_____

_____

_____

_____

(2 marks)

Total 15 marks

6. (a) Define the term 'centre of gravity'.

_____

_____

_____

(1 mark)

(b) **Figure 9** shows a diagram of an irregular-shaped piece of thin cardboard. You are provided with some pins, a piece of string, a retort stand, a small mass and a ruler.

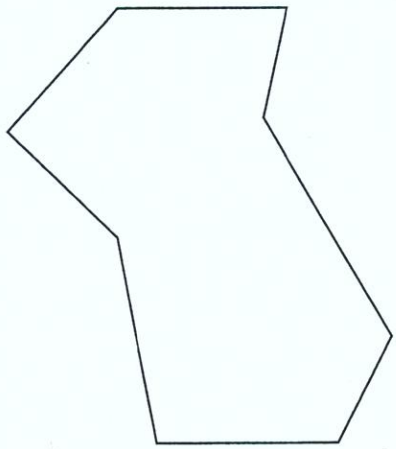


Figure 9. Diagram of an irregular-shaped piece of cardboard

Describe a method of finding the centre of gravity of the piece of cardboard shown in the figure above.

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4 marks)

(c) Label with an X the likely position of the centre of gravity of the piece of cardboard shown in **Figure 9**. **(1 mark)**

(d) A housewife found that it was **easier** to carry two market bags of equal mass than to carry one with the combined mass. Suggest a reason for this.

_____

_____

_____

_____

_____

_____

(2 marks)

(e) **Figure 10** shows a delivery truck with boxes containing tins packed on the left-hand side and the boxes with paper towels on the right-hand side.

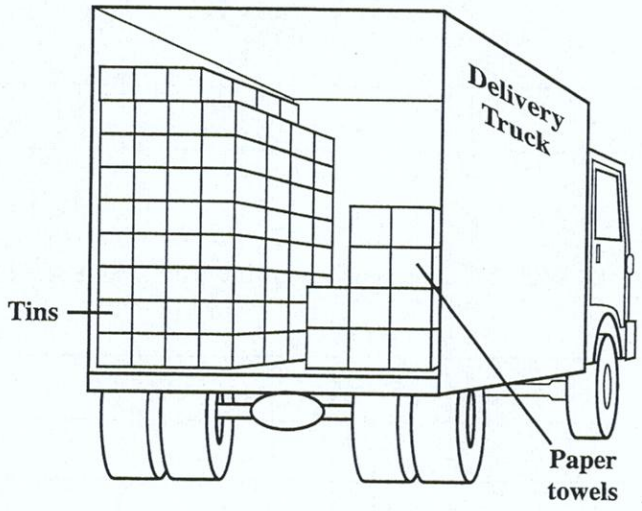


Figure 10. Delivery truck

(i) Distinguish between 'stable equilibrium' and 'unstable equilibrium'.

_____

_____

_____

_____

(2 marks)

(ii) What problems would the driver of the truck encounter when taking a left turn at a high speed?

_____

_____

_____

(1 mark)

(iii) Give a reason for your answer to b(ii) above.

_____

_____

_____

(1 mark)

(iv) The driver of the truck went to a supermarket where he offloaded all the paper towels from the right of the truck. What is the likely consequence of this action when the truck is moving?

_____

_____

(1 mark)

(v) Suggest TWO actions the driver of the truck can take to prevent these problems.

_____

_____

_____

_____

(2 marks)

Total 15 marks

END OF TEST