FORM TP 2019087

TEST CODE **01230020**

MAY/JUNE 2019

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

INTEGRATED SCIENCE

Paper 02 – General Proficiency

2 hours 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.
3. Section B consists of TWO questions. Answer ALL questions. Write your answers on the pages provided at the end of each question.
4. Do NOT write in the margins.
5. You may use a silent, non-programmable calculator to answer questions.
6. If you need to rewrite any answer and there is not enough space to do so on the original page, you must use the extra lined page(s) provided at the back of this booklet. **Remember to draw a line through your original answer.**
7. **If you use the extra page(s) you MUST write the question number clearly in the box provided at the top of the extra page(s) and, where relevant, include the question part beside the answer.**

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

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Sequential Bar Code

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SECTION A

Answer ALL FOUR questions.

1. Mr Singh has converted part of his farm into a forest by planting trees for lumber. After two years the trees have started to produce sweet smelling, brightly coloured flowers. Mr Singh notices the appearance of new plants growing in the area.

(a) (i) State ONE advantage of sexual reproduction.

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(1 mark)

(ii) Name the male part of the flower that produces pollen.

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(1 mark)

(iii) State TWO changes which take place in the flower after pollination.

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(2 marks)

(iv) Give ONE reason why plants produce sweet smelling, brightly coloured flowers.

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(1 mark)

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(v) Explain how the movement of water in plants keep the air in the forested area cool and damp.

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(3 marks)

(vi) Mr Singh notices that the plants grow faster during the wet season with periods of sunshine than in the dry season. Suggest ONE reason for his observation.

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(1 mark)

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(b) As the trees grow, they block the wind from several pig pens. The pig pens then become too warm and humid for the animals and workers.

(i) Suggest THREE effects that this warm and humid environment may have on the workers.

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(3 marks)

(ii) Recommend TWO modifications that could be made to the structure of the pig pens to make them cooler.

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(2 marks)

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(c) A farm worker measures and calculates the average circumference of four trees twice a year and records the results in Table 1.

(i) State an appropriate title for the table.

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(1 mark)

(ii) On the grid on **page 9**, plot a graph to represent the data in Table 1.

(4 marks)

(iii) Draw a straight line on the graph to show the trend. Extend this line to cut the *x*–axis. **(2 marks)**

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

TABLE 1:

Time (Years)	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Average Circumference (cm)	8	15	19	26	34	38	45

(v) Using the graph, determine the average circumference of the trees after five years.

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(1 mark)

(vi) Using the graph, determine the average circumference of the trees at planting.

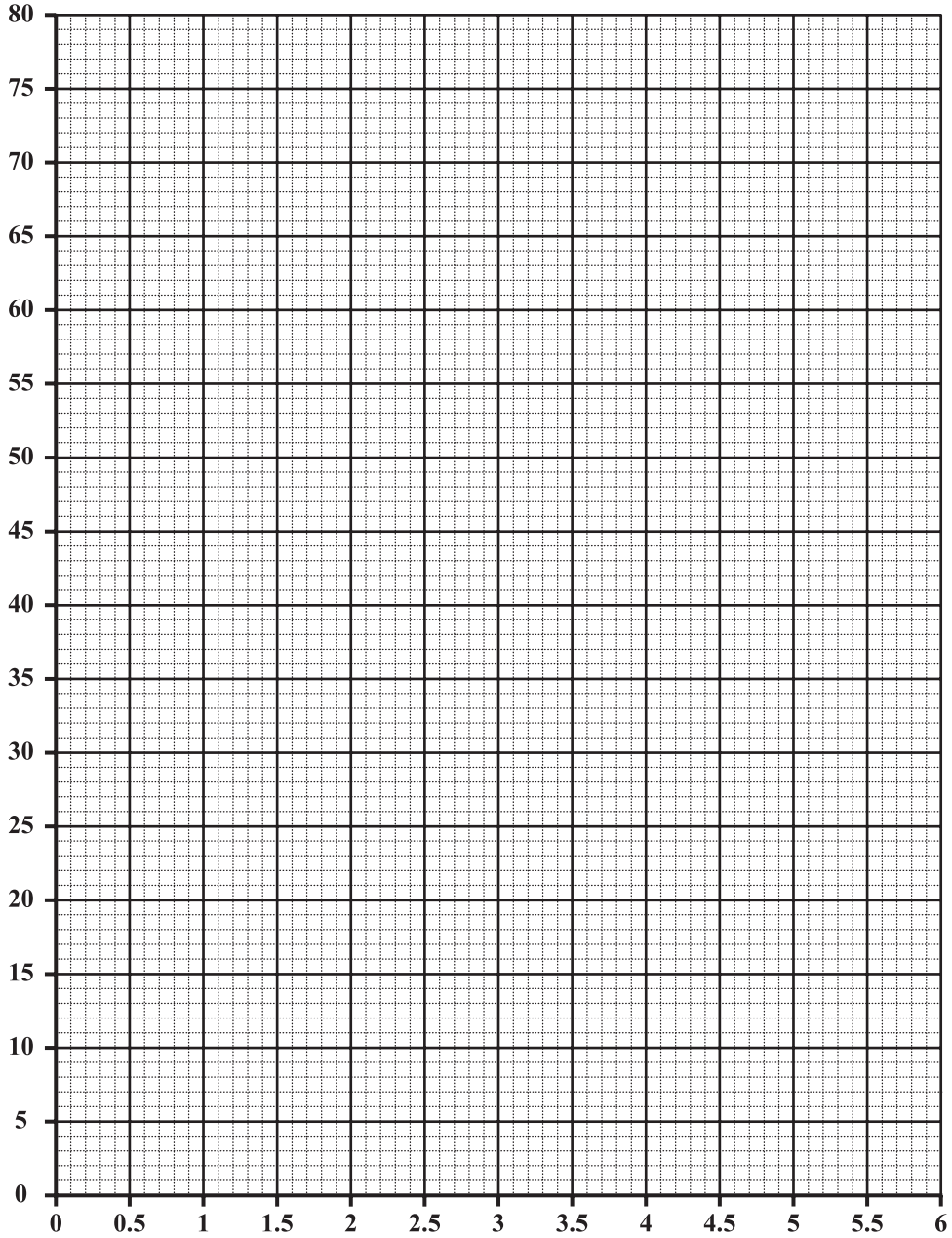
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(1 mark)

Total 25 marks

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2. (a) Identify the producer and the carnivore in the aquatic food chain below.

Sun ⟶ Seaweed ⟶ Snapper ⟶ Shark

Producer .....

Carnivore .....

(2 marks)

(b) Name a method that can be used to purify sea water for drinking and outline the process involved.

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(3 marks)

(c) (i) State Archimedes' principle.

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(1 mark)

(ii) Two blocks of wood of the same volume, but different masses, are afloat in the sea. Suggest ONE reason why one block will float higher than the other block.

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(1 mark)

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(d) Many communities depend on fishing as a source of income. Fishing, however, can be hazardous, especially in the ocean, because of changes in the weather and other natural occurrences.

(i) Identify ONE navigational device that could assist fishermen at sea.

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(1 mark)

(ii) Suggest THREE ways in which the habitat of fish may change after the eruption of an underwater volcano.

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(3 marks)

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(e) Line fishing, the setting of pots or traps and spears or harpoons are often used for catching fish.

(i) Suggest, giving ONE reason, which of these methods would be MOST suitable for catching fish for commercial purposes.

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(2 marks)

(ii) Suggest, giving ONE reason, which of the fishing methods in (e) (i) may be destructive.

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(2 marks)

Total 15 marks

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3. (a) (i) State whether the following organs of the digestive system have an acidic or alkaline environment.

Mouth .....

Stomach .....

Gall bladder .....

(3 marks)

(ii) Name ONE enzyme in the digestive system that functions best in an acidic environment.

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(1 mark)

(b) Mary adds five drops of liquid soap to a bottle half-filled with spring water, replaces the cover and shakes it vigorously for about one minute. She notices very little lather forms in the bottle. When the same activity is repeated with rainwater, the bottle becomes filled with lather.

(i) Explain TWO disadvantages of using spring water for domestic purposes.

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(4 marks)

(ii) Suggest THREE ways in which Mary could make the spring water create more lather when soap is added.

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(3 marks)

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(c) While checking a car battery, a mechanic accidentally spilled some acid on the floor.

(i) Define the term 'neutralization'.

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(1 mark)

(ii) Suggest ONE household chemical that would be suitable for neutralizing the acid.

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(1 mark)

(iii) Recommend TWO precautions that the mechanic should take when cleaning up the spill.

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(2 marks)

Total 15 marks

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4. (a) (i) State what is meant by the 'efficiency' of a machine.

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(1 mark)

(ii) State ONE factor that can affect the efficiency of a machine and ONE method that can be used to overcome the effect.

Factor .....

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Method .....

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(2 marks)

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(b) Figure 2 shows a car engine on the ground near the tray of a truck. The car engine has a mass of 2500 N and is resting on the ground 1.5 metres below the tray of the truck.

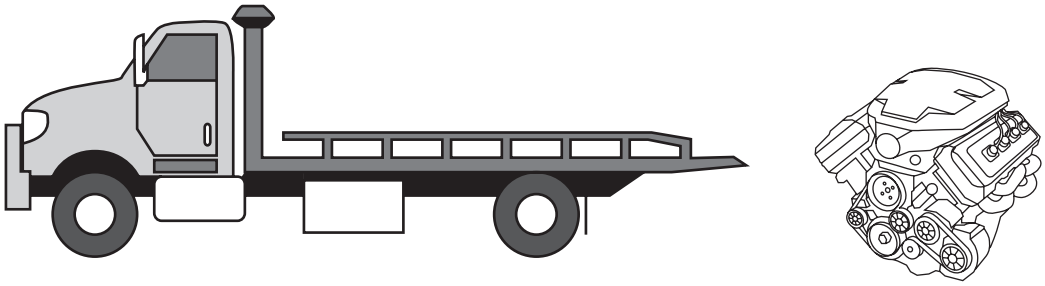


Figure 2. Diagram of a truck and an engine

(i) Recommend a simple machine that may be used to lift the car engine from the ground to the tray of the truck.

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(1 mark)

(ii) Outline how the machine named in (b) (i) works to move the engine from the ground to the tray.

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(1 mark)

(iii) A lever is also a simple machine. Suggest ONE reason why it is NOT the most suitable for lifting the engine from the ground to the tray of the truck.

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(1 mark)

(iv) In lifting the engine, potential energy is gained. State the formula which can be used to calculate the potential energy that is gained when the car engine is lifted.

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(2 marks)

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(v) Calculate the energy converted in lifting the engine onto the tray using a machine.

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(2 marks)

(vi) Explain why the potential energy gained by the engine when lifted by a simple machine is the same as when the engine is lifted manually.

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(2 marks)

(c) The owner of the tray truck is considering using solar cells instead of diesel to operate the truck.

Suggest THREE problems that may be encountered when implementing this idea.

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(3 marks)

Total 15 marks

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SECTION B

Answer BOTH questions.

5. (a) In order for the body to function properly, body systems must work together.

(i) Name the process that occurs in muscle tissues that requires oxygen.

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(1 mark)

(ii) Describe the role of the circulatory system in ensuring that oxygen reaches the muscles.

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(4 marks)

(b) In urban areas life can be very fast paced. Mr Sam does not exercise and his meals are high in saturated fats; Mr Sam is hypertensive (he has high blood pressure).

(i) Explain how Mr Sam's eating habits may have affected his circulatory system and contributed to him developing hypertension.

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(4 marks)

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(ii) Lack of exercise may have contributed to Mr Sam's hypertension. Discuss TWO **other** possible effects of the lack of exercise on Mr Sam's body.

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(4 marks)

(c) Mr Sam purchased a gym machine that works on a pulley system. While exercising he exerts a force of 500 N to raise a weight of 100 N. Calculate the mechanical advantage (MA) of the machine (using the formula MA = $\frac{\text{Load}}{\text{Effort}}$). **Show your working**.

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(2 marks)

Total 15 marks

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6. Kishan's home has been flooded overnight by a nearby river. Heavy rains caused the river to overflow its banks. His washing machine, television, refrigerator and food cupboards are now under muddy water one metre deep. Water has also entered the electrical outlets in the wall.

(a) Discuss TWO hazards which may result from the floodwater.

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(4 marks)

(b) For EACH hazard identified in (a), describe TWO safety procedures that must be adopted to avoid further accidents.

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(4 marks)

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(c) Kishan uses an iron (heater) which has a label that states VOLTAGE: 110V, CURRENT: 2A. Calculate the electrical resistance (R) of its heating element using the formula $R = \frac{V}{I}$. **Show your working**.

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(3 marks)

(d) Wires used in the electrical system of the home consist of an inner section made of one type of material. This inner section is covered by an outer section made of another material. Explain how the choice of materials for the inner and outer sections is determined.

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(4 marks)

Total 15 marks

END OF TEST

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

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