FORM TP 2023095

TEST CODE 01230020

MAY/JUNE 2023

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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SECTION A

Answer ALL FOUR questions.

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1. (a) Using the formula energy consumption = Power (Kw) × Time (hours), calculate the energy used by a 100 W fan if it runs for 24 hours daily. **You must show all working.**

(3 marks)

(b) (i) Caribbean cuisine is an integral part of the culture of the region. Complete the table below by providing information on nutrients and their functions.

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Nutrient	**Function**
	Growth and repair of cells
Carbohydrates	
	Used for insulation or as an energy store
Vitamins	

(4 marks)

(ii) A construction worker who works long hours has a four-year old daughter who spends long hours watching television and playing games on the computer. Explain how the diet of the construction worker should differ from that of his daughter based on their daily activities.

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(3 marks)

(iii) Suggest TWO changes that the daughter in (b) (ii) above, could make to have a healthier lifestyle. Give ONE reason for your suggestion.

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(4 marks)

131

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(c) Governments across the Caribbean are concerned about incidences of overweight and obese citizens. Table 1 below shows the annual statistics for obese adult females in a Caribbean territory.

TABLE 1: PERCENTAGE OF OBESE ADULT FEMALES IN A CARIBBEAN TERRITORY, 2007–2017

Year	Percentage (%) of obese adult females
2007	25
2009	26
2011	28
2013	29
2015	33
2017	38

(i) Define the term 'obese'.

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(1 mark)

(ii) On the grid provided **on page 7**, plot a graph to represent the data in Table 1. Draw a line of best fit through the points. **(8 marks)**

(iii) Using the graph plotted in (c) (ii) **on page 7**, determine the percentage of obese adult females in 2014.

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(1 mark)

(iv) Use the graph plotted in (c) (ii) **on page 7** to predict the percentage of obese adult females in 2019.

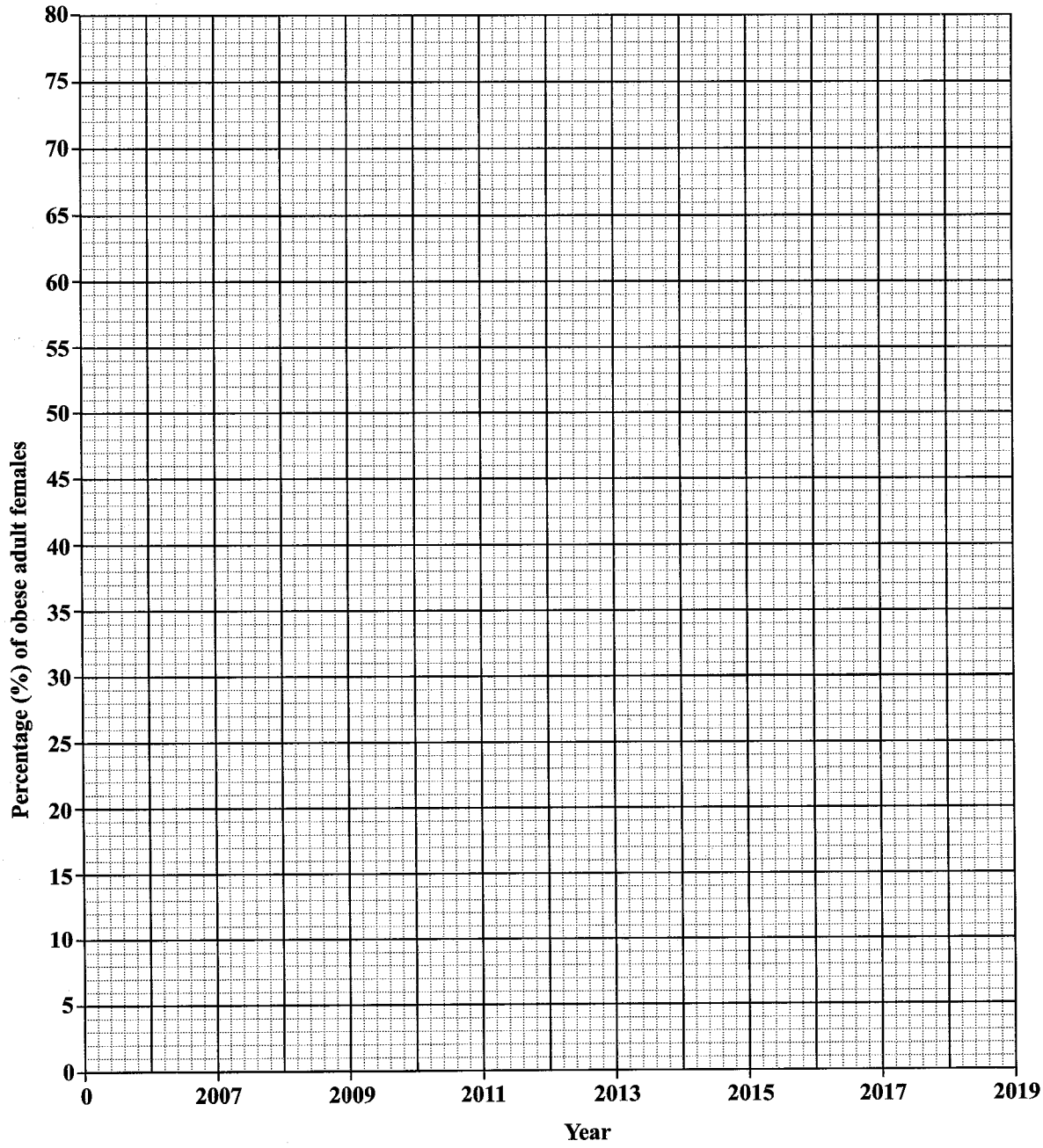
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(1 mark)

Total 25 marks

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80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Percentage (%) of obese adult females
0
2007
2009
2011
2013
2015
2017
2019
Year

2. (a) (i) Define the term 'neutralization'.

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(1 mark)

(ii) State the pH ranges for EACH of the following.

Acids .....

Bases .....

(2 marks)

(iii) Classify EACH of the following as either an acid or a base.

Bleach .....

Toothpaste .....

Vinegar .....

(3 marks)

(iv) Give ONE example of a household item that is considered neutral.

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(1 mark)

(v) Typically, there is a build-up of a white substance in a kettle. Explain how the properties of vinegar make it suitable for cleaning the build-up of the white substance usually seen in kettles.

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(3 marks)

(b) (i) A person concludes that the water in his apartment complex is hard water because when washing clothes the detergent does not lather very well, even when using a soapy detergent. Explain ONE reason why this assumption is accurate.

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(3 marks)

(ii) Suggest TWO things that can be done to correct the problem being experienced with the water in (b) (i) above.

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(2 marks)

Total 15 marks

3. (a) Two stages in the breathing process of humans are shown in Figure 1 below.

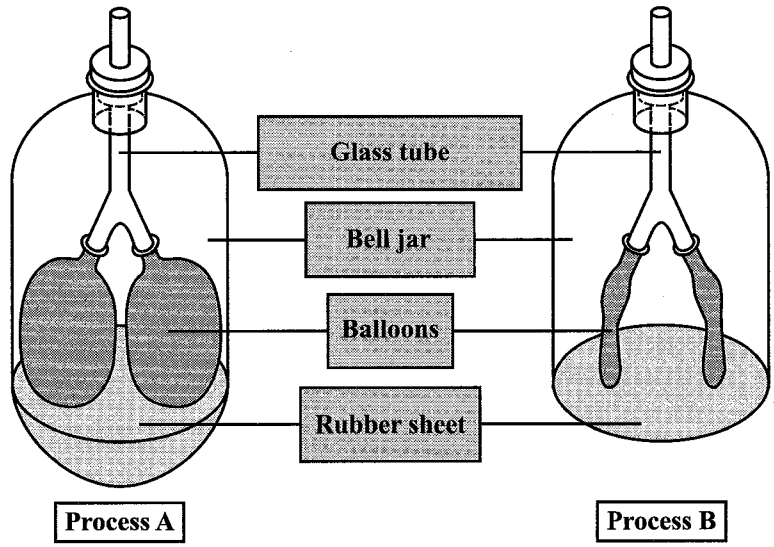


Figure 1. Bell jars representing the breathing process in humans

Source: https://www.bbc.co.uk/bitesize/guides/zsry39q/revision/4#:~:text=The%20process%20of%20ventilation%20as,using%20the%20bell%20jar%20model.&text=As%20the%20rubber%20sheet%20is,balloons%2C%20which%20represent%20the%20lungs.

(i) Identify the parts of the respiratory system that are represented by the balloons and the rubber sheet in Figure 1.

Balloons .....

Rubber sheet .....

(2 marks)

(ii) Identify the processes in breathing that are MOST likely represented as Process A and Process B in Figure 1.

Process A .....

Process B .....

(2 marks)

(iii) Suggest ONE similarity between the bell jar and the actual chest cavity of humans.

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(1 mark)

(b) The following equation is the chemical equation of a vital process that occurs in most living organisms.

$$C_6H_{12}O_6 + O_2 \rightarrow 6CO_2 + 6H_2O + ATP$$

(i) State the name of EACH compound shown in the chemical equation.

$C_6H_{12}O_6$ .....

O_2 .....

$6CO_2$ .....

$6H_2O$ .....

(4 marks)

(ii) Name the process represented in the equation above.

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(1 mark)

(iii) A stay-at-home parent of a two-year-old smokes a pack of cigarettes a day. Name TWO health conditions that children exposed to secondhand smoke may develop.

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(2 marks)

(iv) Suggest THREE things that can be done to reduce the amount of secondhand smoke to which a child is exposed.

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(3 marks)

Total 15 marks

4. (a) The Caribbean region is taking a greater interest in the numerous environmental issues which have occurred as a result of the use of fossil fuels.

(i) Fossil fuels are classified as nonrenewable fuels. Define the term 'non-renewable fuel'.

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(1 mark)

(ii) List THREE types of fossil fuels.

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(3 marks)

(iii) Explain how the burning of fossil fuels is contributing to the increasing temperatures being experienced on earth.

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(3 marks)

(b) (i) Identify the term that is used to describe the increasing atmospheric temperatures being experienced on earth.

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(1 mark)

(ii) Recommend ONE solution for controlling the increasing surface temperatures of the earth.

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(1 mark)

(iii) Discuss whether the recommendation mentioned in (b) (ii) is suitable for use in the Caribbean region.

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(3 marks)

(iv) Explain why Caribbean islands should be concerned about the increasing atmospheric temperatures being experienced on earth.

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(3 marks)

Total 15 marks

SECTION B

Answer BOTH questions.

5. (a) Figure 2 shows a diagram of the human skeleton.

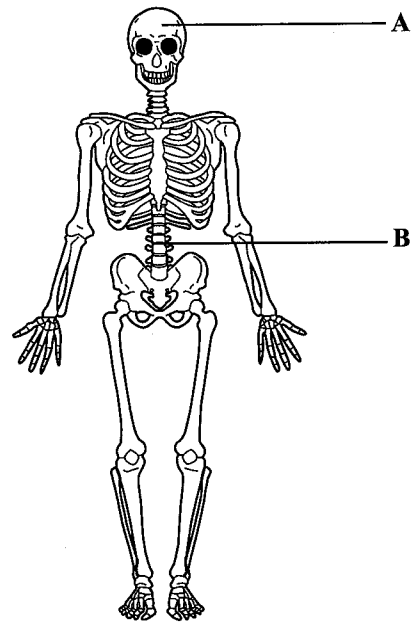


Figure 2. Diagram of the human skeleton

Source: https://www.pinterest.com/pin/973904106781210 52/?lp=true

(i) Name the parts of the skeleton labelled A and B in Figure 3 and state ONE function of EACH part.

A .....

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B .....

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(4 marks)

(ii) State ONE function of the long bones in humans.

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(1 mark)

GO ON TO THE NEXT PAGE

(b) Explain how skeletal muscles in the arm work together to allow humans to flex their arm. You **must** include the names of the muscles in your answer.

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(5 marks)

(c) Figure 3 shows a diagram of the human arm holding a dumbbell.

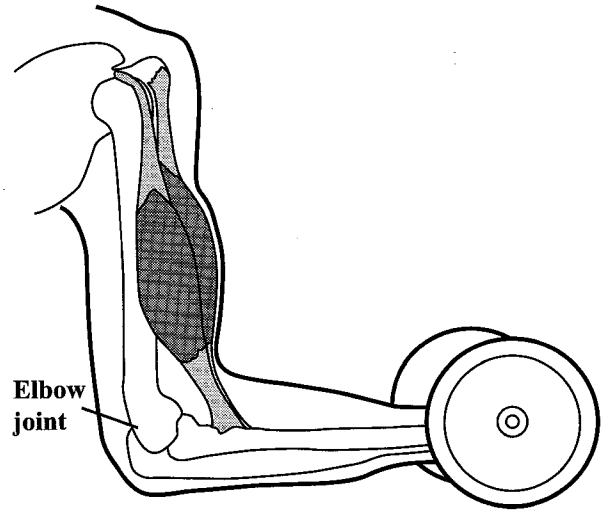


Figure 3. Diagram of the human arm holding a dumbbell

Source: https://www.chegg.com/homework-help/questions-and-answers/figure-weightlifter-holds-dumbbell-place-biceps-muscle-exerts-force-forearm-upper-arm-exer-q27886172

Explain how the arm acts like a lever to pick up the weight.

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(5 marks)

Total 15 marks

6. (a) Explain the differences between an object which demonstrates stable equilibrium and one which demonstrates unstable equilibrium. Your response **must** include an example of EACH type of equilibrium.

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(4 marks)

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(b) Thermostats require the use of bimetallic strips to regulate temperature.

(i) Identify TWO combinations of metals, other than brass and iron, which can be used in a bimetallic strip.

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(2 marks)

(ii) Identify ONE device, other than a thermostat, that uses bimetallic strips.

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(1 mark)

(iii) Figure 4 below shows a bimetallic strip made of brass and iron in different conditions.

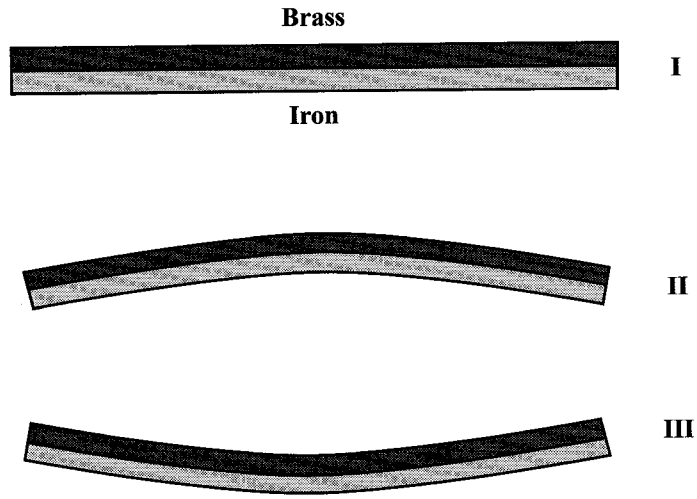


Figure 4. Diagram of a bimetallic strip

Identify the strips (I, II and III) that represent the thermostat at cold temperatures, hot temperatures and room temperatures.

Cold temperatures .....

Hot temperatures .....

Room temperatures .....

(3 marks)

GO ON TO THE NEXT PAGE

(iv) Explain how the bimetallic strip in thermostats is used to control the temperature.

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(5 marks)

Total 15 marks

END OF TEST

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