**FORM TP 2013090**

TEST CODE **01230032**

MAY/JUNE 2013

**CARIBBEAN EXAMINATIONS COUNCIL**

**CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION**

**INTEGRATED SCIENCE**
**(Single-Award)**

**Paper 032 – Alternative to School-Based Assessment**

**General Proficiency**

***2 hours and 10 minutes***

**READ THE FOLLOWING INSTRUCTIONS CAREFULLY.**

1. Answer ALL questions.
2. Use this answer booklet when responding to the questions. For EACH question, write your answers in the spaces provided and return the answer booklet at the end of the examination.
3. You may use a silent, non-programmable calculator to answer questions.
4. You are advised to take some time to read through the paper and plan your answers.

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

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**Answer ALL questions.**

**1.** In Caribbean countries, many householders use a variety of fruits and vegetables in their diet. Figure 1 shows a tray containing some fruits.

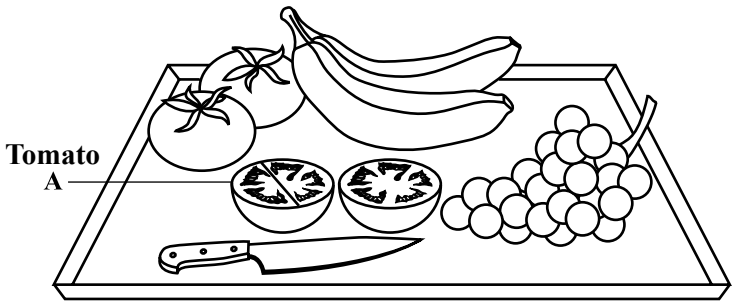



**Figure 1. Fruit tray**

(a) Measure the diameter of Tomato A along the line shown in the tomato.

_____

**(2 marks)**

(b) A cross-section of each fruit is placed in a petri dish. A few drops of iodine solution are placed on each fruit.

(i) Write a suitable aim for this experiment.

_____

_____

**(1 mark)**

(ii) Construct an appropriate table to record the results of the activity in (b) (i).

**(3 marks)**

(iii) The following observations are made with the iodine solution:

Banana – turned blue black
Tomato – no colour change
Grape – no colour change

What scientific conclusions can be made from these observations?

_____

_____

_____

**(3 marks)**

(c) (i) Plan and design an experiment to show which of two soil types is more suitable for growing large tomatoes.

Hypothesis

_____

_____

_____

**(2 marks)**

Variables

_____

_____

_____

**(3 marks)**

State ONE limitation of the investigation.

_____

_____

_____

**(1 mark)**

(ii) Table 1 shows the results of the investigation in (c) (i).

**TABLE 1: RESULTS OF INVESTIGATION**

| Reading | Mass of Tomato in Soil A (g) | Mass of Tomato in Soil B (g) |
|---|---|---|
| 1 | 50 | 140 |
| 2 | 70 | 150 |
| 3 | 60 | 160 |
| 4 | 55 | 145 |
| 5 | 65 | 155 |
| Average | 60 | |

Calculate the average mass of tomatoes grown in Soil B. **(2 marks)**

(iii) Write a suitable conclusion based on the results in Table 1.

_____

_____

**(1 mark)**

**Total 18 marks**

**2.** The following is a list of materials that can be used to conduct an experiment to verify Archimedes' principle:

- 250 $cm^3$ measuring cylinder
- Tap water
- Spring balance
- Block of wood
- Steel ball
- Lead weight
- Copper coin
- Aluminium bolt
- Stone
- String

(a) (i) Figure 2 shows a measuring cylinder before and after an object is submerged in the measuring cylinder containing some water.

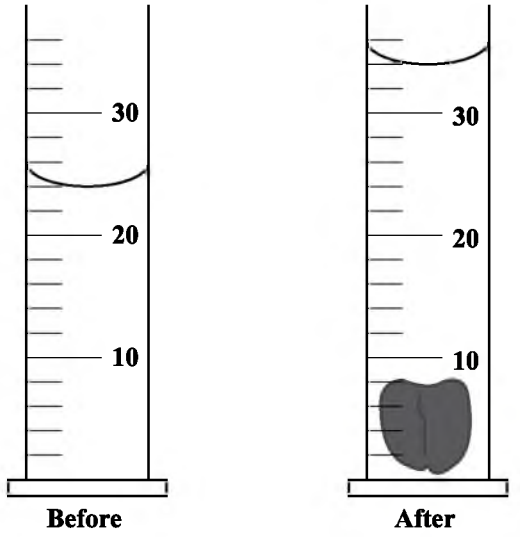



**Figure 2. Measuring cylinder before and after submerging object**

Read the value of the volume of water in EACH measuring cylinder in Figure 2 and record it below.

Before: _____

After: _____

**(2 marks)**

(ii) Describe in detail how the materials in the list could be used to conduct the experiment.

_____

_____

_____

_____

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_____

**(4 marks)**

(iii) In the space below, draw a labelled diagram of the apparatus, showing the arrangement of the materials and equipment used to conduct the experiment.

**(3 mark)**

(iv) State an appropriate title for this diagram.

_____

_____

**(1 mark)**

(b) Table 2 shows the expected results for the experiment described in (a) (ii) on page 7.

**TABLE 2: EXPECTED RESULTS OF EXPERIMENT TO VERIFY ARCHIMEDES' PRINCIPLE**

| Object | Mass (g) | Measuring Cylinder Reading Without Object ($cm^3$) | Measuring Cylinder Reading With Object ($cm^3$) | Displacement ($cm^3$) of water |
|---|---|---|---|---|
| Block of wood | 300 | 100 | 400 | |
| Steel ball | 550 | 110 | 650 | |
| Lead weight | 750 | 112 | 865 | |
| Copper coin | 50 | 95 | 150 | |
| Aluminum bolt | 150 | 125 | 280 | |
| Stone | 600 | 135 | 740 | |

(i) Calculate the displacement of water for EACH object and record your answer in Table 2. **(3 marks)**

(ii) **On the grid provided on page 9**, draw a graph of mass versus displacement, using the data in Table 2. Mass is plotted on the *y*-axis and displacement on the *x*-axis. **(4 marks)**

(iii) Label the axes of the graph. **(2 marks)**

(iv) Find the slope of the graph.

_____

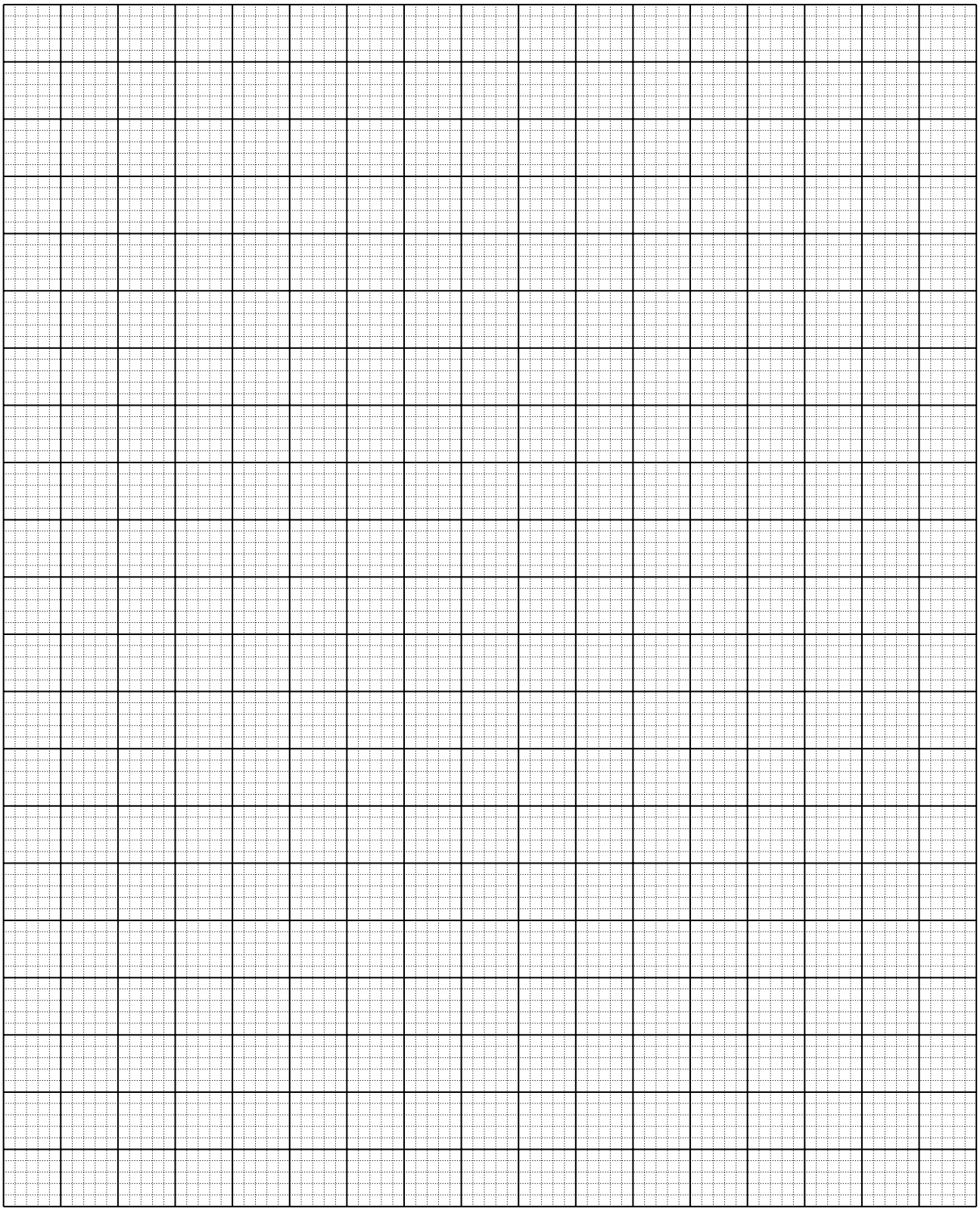
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**(4 marks)**



(v) From the slope calculated, write a statement on the relationship between the mass of an object and the volume of water displaced by that object.

_____

_____

**(1 mark)**

**Total 24 marks**

**3.** (a) Kwame is investigating the relationship between the load to effort ratio and the ratio of the distance A to the distance B in first-class levers. He uses a prism, ruler, wooden block, rubber bands, 100 g masses and two scale pans as shown in Figure 3. The 100 g masses can be added or removed from the scale pans.

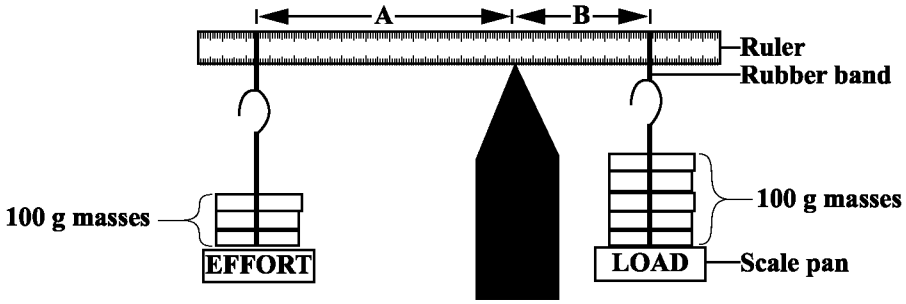



**Figure 3. Prism, ruler and various weights used in the investigation**

(i) Using your ruler, measure the distances, A and B. Include units in your answer.

A _____

B _____

**(3 marks)**

(ii) If EACH mass is 100 g, what is the TOTAL value of the masses in Figure 3?

Load: _____

Effort: _____

**(2 marks)**

(iii) Describe the procedure in which the apparatus in Figure 3 could be used to compare the A:B ratio to the load:effort ratio.

_____

_____

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**(5 marks)**

(iv) How will the weight of the ruler affect the results of the investigation? Explain your answer.

_____

_____

_____

**(2 marks)**

(v) State ONE source of error which can affect the accuracy of the investigation.

_____

**(1 mark)**

(vi) Suggest ONE modification to the experiment to improve the accuracy of the results.

_____

_____

_____

**(1 mark)**

(vii) In the space below, construct a table suitable for recording the results of the investigation.

**(3 marks)**

(b) Figure 4 represents a ruler.

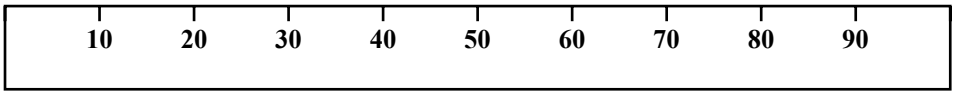



**Figure 4. Ruler**

Place an X on the ruler to indicate the position of the centre of gravity, assuming that the ruler is uniform. **(1 mark)**

**Total 18 marks**

**END OF TEST**

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