



CARIBBEAN EXAMINATIONS COUNCIL

Integrated Science



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CSEC® Integrated Science Past Papers

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CARIBBEAN EXAMINATIONS COUNCIL

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

**INTEGRATED SCIENCE
(Single-Award)**

General Proficiency

Paper 02

2 hours

READ THE FOLLOWING DIRECTIONS CAREFULLY

1. Candidates **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 contains **THREE** questions. You should attempt **ALL SIX** questions.
3. You are advised to spend about one hour on each section.

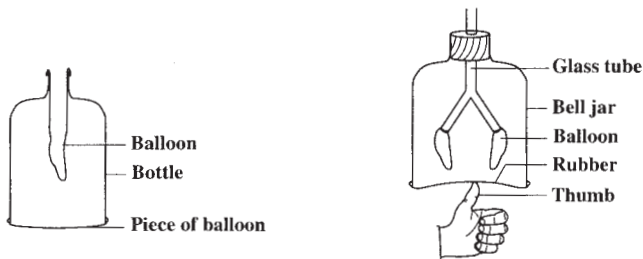
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SECTION A

You should attempt ALL THREE questions.

1. (a) Figure 1 below shows two models A and B that may be used to represent the respiratory system of humans.



A: Bottle and balloon model

B: Bell jar model

Figure 1

- (i) Which of the models, A or B, BETTER represents the respiratory system of humans?
- _____
- (1 mark)
- (ii) Give ONE reason for your answer in (a) (i).
- _____
- _____
- _____
- (2 marks)
- (iii) In Model B, which part of the human respiratory system is represented by the
- a) balloons _____
- b) rubber? _____
- (2 marks)
- (iv) When the thumb in Model B is removed, the rubber flattens. Would this change the volume of air in the bell jar? Explain your answer.
- _____
- _____
- (2 marks)

GO ON TO THE NEXT PAGE

- (v) Which of the processes (inhalation or exhalation) is exemplified by the bell jar model in Figure 1? Give ONE reason for your answer.

(3 marks)

- (b) Bronchitis is a disease of the respiratory system that is made worse by environmental pollutants. The graph in Figure 2 shows the percentage of populations at various locations that have severe cases of bronchitis.

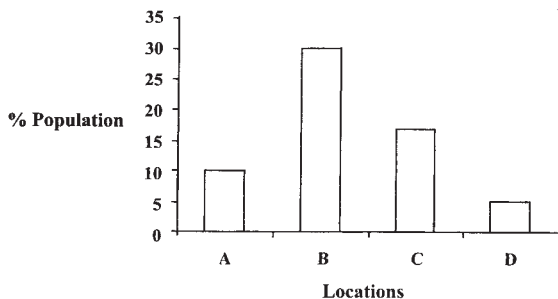


Figure 2. Graph of percentage population affected by bronchitis

- (i) What percentage of the population at location A in Figure 2 has severe bronchitis?
_____ (1 mark)
- (ii) In which location (A, B, C or D) is the population least affected by severe bronchitis?
_____ (1 mark)
- (iii) Suggest which location (A, B, C or D) is MOST likely to be near to a large cement plant.
_____ (1 mark)
- (iv) Give TWO reasons for your answer in (b) (iii).

(2 marks)

Total 15 marks

GO ON TO THE NEXT PAGE

2. (a) A manufacturer of tennis rackets is given three different samples of a new line of strings (P, Q, and R) which are to be used in his rackets. In order to investigate the strength and elasticity of the strings, he performs tests in which he measures the extension of EACH string when different loads are hung on them. His results are summarised in the graphs in Figure 3.

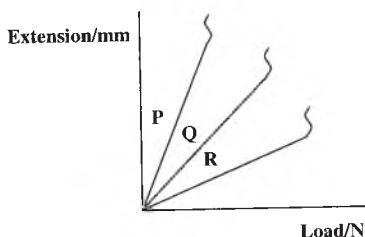


Figure 3

- (i) In setting up the tests mentioned above, what feature of the strings must be controlled?
- _____
- (1 mark)
- (ii) What should the experimenter do after removing EACH load during the tests and before reloading?
- _____
- (1 mark)
- (iii) Give TWO reasons for the shape of the graph lines in Figure 3.
- _____
- _____
- (2 marks)
- (iv) Which string (P, Q or R) is able to withstand the GREATEST load and still remain elastic? Explain your answer.

(3 marks)

(v) The manufacturer used two of the strings to make rackets. State, giving ONE reason in EACH case, which string he selected for rackets for players in professional tournaments and rackets for school children.

a) String for professional tournaments: _____

Reason: _____

(2 marks)

b) String for school children: _____

Reason: _____

(2 marks)

(b) Figure 4 shows a batsman in protective gear: head gear, leather shoes, gloves and pads.



Figure 4. A batsman in protective gear

(i) The protective headgear worn by the batsman is made from aluminium coated with fabric.

Give TWO properties of aluminium which make it suitable for this purpose.

(2 marks)

The stored leather shoes and gloves of the batsman were covered with mildew (a fungus).

(ii) Suggest ONE factor which might promote the growth of the mildew.

(1 mark)

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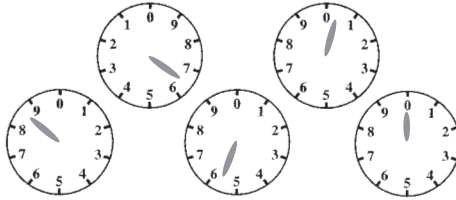
- (iii) How could the batsman have protected his gear to prevent the growth of the mildew?

(1 mark)

Total 15 marks

3. Figure 5 shows metre readings for the month of December 2002.

Reading: 1st December, 2002



Reading: 31st December, 2002

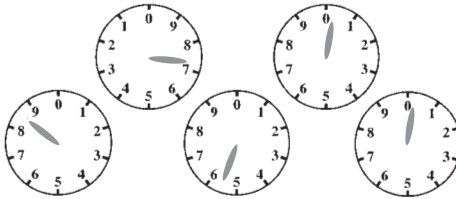


Figure 5. Meter readings

- (a) Read the metres and calculate the amount of electricity used during the month of December 2002.

Reading 1: _____ Reading 2: _____

Electricity used: _____

_____ kWh

(2 marks)

GO ON TO THE NEXT PAGE

- (b) The electric company has a fixed fuel charge of \$20.00 and an energy charge of 25 cents per kWh.

Calculate the cost of the electricity used during the month of December.

(2 marks)

- (c) Table 1 shows a list of electrical appliances which are regularly used in a home.

TABLE 1. ENERGY CONSUMPTION IN A HOME

Appliance	Wattage (W)	Time used per day in hours	Energy consumption kWh per day
Air conditioner	1500	20	
Refrigerator	900	24	
Television	200	8	
Washing machine	900	3	

- (i) Calculate the daily energy consumption of the appliances in Table 1.

(2 marks)

- (ii) State TWO measures the family, living in the home to which Table 1 refers, can take to consume less electricity.

(2 marks)

GO ON TO THE NEXT PAGE

- (d) (i) What is a fuse?

(1 mark)

- (ii) How does a fuse protect an appliance such as a hairdryer?

(2 marks)

If fuses are not installed in the electrical wiring of houses, a fire can occur.

- (iii) Explain why water should NOT be used to put out an electrical fire.

(2 marks)

- (iv) State TWO ways in which an electrical fire may be put out.

(2 marks)

Total 15 marks

SECTION B

You should attempt ALL THREE questions.

4. (a) (i) In a particular area, the water supply has become contaminated. Why should all drinking water from this area be boiled before use?
- _____
- _____
- (1 mark)
- (ii) Is it necessary to boil water which is being used to make ice? Give ONE reason for your answer.
- _____
- _____
- (2 marks)
- (iii) State ONE way in which pure water leaving a water treatment plant could become contaminated before reaching the faucet in a home.
- _____
- _____
- (1 mark)
- (iv) Name ONE disease to which individuals may be exposed if they drink contaminated water.
- _____
- _____
- (1 mark)

- (b) Figure 6 shows information taken from labels of different brands of mouthwash.

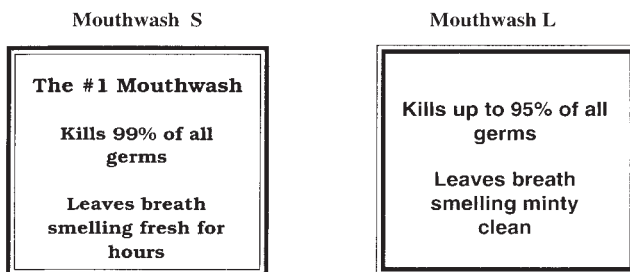


Figure 6. Labels on two brands of mouthwash

The teacher gives a student three agar plates, an incubator and some sterile swabs. He is asked to design and carry out an experiment to compare the effectiveness of the two brands of mouthwash in Figure 6. Agar plates contain nutrients that allow bacteria to grow.

The steps taken to carry out the experiment are recorded in the left column of Table 2 below.

- (i) Read all steps in Table 2, then answer the questions in the column on the right.

TABLE 2. STEPS OF THE EXPERIMENT

Steps taken to carry out the experiment	Reasons for the steps
Step one: The student uses a sterile swab to collect bacteria from his mouth.	a) Why was a STERILE swab used in step one? _____ _____ b) Why were bacteria taken from the mouth? _____ _____ <p style="text-align: right;">(2 marks)</p>
Step two: Swab used to transfer bacteria to three sterile agar plates.	
Step three: <ul style="list-style-type: none">• Plate 1, is swabbed with mouthwash S• Plate 2, is swabbed with mouthwash L• Plate 3, no mouthwash	c) Why was the third agar plate left without mouthwash? _____ _____ <p style="text-align: right;">(1 mark)</p>
Step four: The agar plates are placed in an incubator and kept at 37° C for 48 hours.	d) Why were the plates incubated at 37° C? _____ _____ <p style="text-align: right;">(2 marks)</p>

GO ON TO THE NEXT PAGE

The agar plates are removed from the incubator and the bacterial growth in each plate recorded on a scale of 0 to 4 (no growth represented by 0). The graph below shows the results obtained for bacterial growth in the plates 1, 2 and 3.

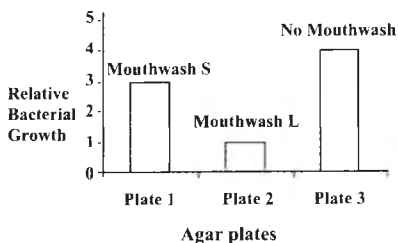


Figure 7. Comparison of bacterial growth in three agar plates

- (ii) By referring to the graph in Figure 7, determine in which agar plate there was the most bacterial growth.

(1 mark)

- (iii) Suggest what accounted for the high growth rate in the agar plate you selected in (b) (ii).

(1 mark)

- (iv) Which mouthwash is likely to be the most effective? Give ONE reason for your answer.

(2 marks)

- (v) Suggest which mouthwash label in Figure 6 on page 9 presents the MORE accurate claim.

(1 mark)

Total 15 marks

GO ON TO THE NEXT PAGE

5. Figure 8 is a diagram of a section through Peter's kidney.

(a) Label structures (i), (ii) and (iii) in Figure 8.

(3 marks)

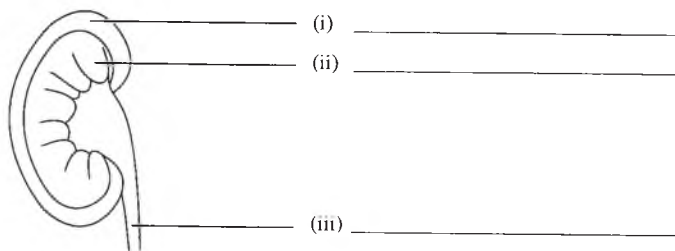


Figure 8. Peter's kidney

Figure 9 is a diagram of a nephron from the kidney in Figure 8.

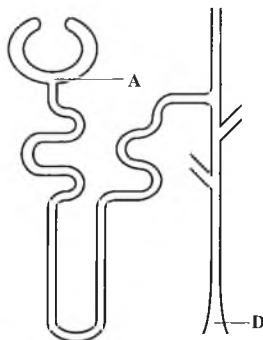


Figure 9. A kidney nephron

(b) (i) a) After the intake of a meal that is high in protein, would the amount of urea that passes point D in Figure 9 increase or decrease?

(1 mark)

b) Explain your answer to (b) (i) a).

(2 marks)

(ii) Suggest ONE possible reason for the presence of glucose at D in Figure 9.

(2 marks)

(iii) Explain why glucose will also be found in Peter's bladder if it is found to be present at point D in Figure 9.

(1 mark)

(iv) If glucose is detected in Peter's bladder, what effect might this loss of glucose have on his ability to carry out his daily activities? Explain your answer.

(3 marks)

(v) Suggest why Peter drinks a glass of glucose and water after jogging around the football field.

(2 marks)

(vi) Name the hormone which is responsible for lowering the glucose level in the blood.

(1 mark)

Total 15 marks

GO ON TO THE NEXT PAGE

6. (a) (i) Detecting and analysing the paths of 'fronts' is important for predicting the weather.

What is a 'front'?

(1 mark)

- (ii) Four types of fronts are described in Table 3 (occluded, stationary, warm and cold fronts). Complete the table by writing the correct type of front in the empty cell, next to its proper description.

TABLE 3. FOUR TYPES OF FRONTS

FRONT	DESCRIPTION
	When cold air comes into a region of warm air and displaces it.
	When warm air comes into a region of cold air and displaces it.
	When a cold front overtakes a warm front.
	When a cold front warms up so that there is no temperature difference between the cold and warm air.

(4 marks)

- (iii) A cold front is passing through the Caribbean and a warm front is passing over the U.S.A. Predict the weather in these two areas.

The Caribbean: _____

The U.S.A.: _____

(4 marks)

GO ON TO THE NEXT PAGE

(b) What is the difference between high tide and low tide?

(2 marks)

(c) Figure 10 is a picture of a rocky sea shore. Shelled organisms, for example snails, are found in regions A and B, while mainly sea weeds are found in region C.

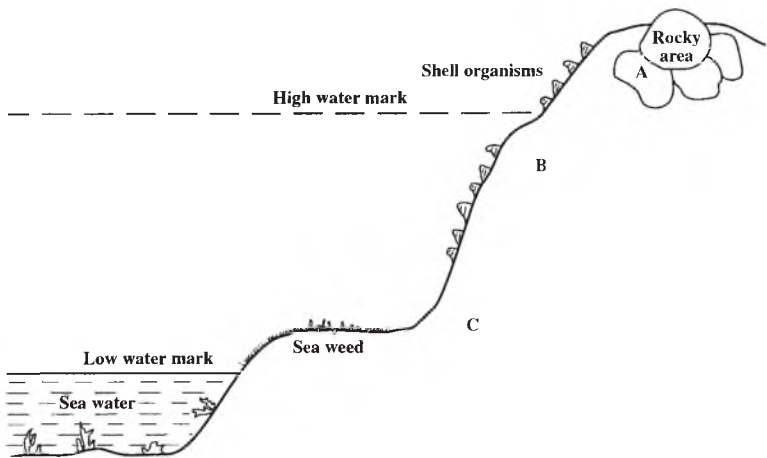


Figure 10. A rocky shore

- (i) Explain why the shelled animals are more likely to be found in areas A and B of the seashore shown in Figure 10.

(2 marks)

- (ii) Organisms living in region B, in Figure 10, usually have features which allow them to cling to the rocks.

Why are these features necessary?

(1 mark)

- (iii) Name ONE organism, other than snails, that is likely to be found in region B in Figure 10.

(1 mark)

Total 15 marks

END OF TEST

CARIBBEAN EXAMINATIONS COUNCIL**SECONDARY EDUCATION CERTIFICATE
EXAMINATION****INTEGRATED SCIENCE
(Single-award)****Paper 03/2****General Proficiency****PRACTICAL PAPER***2 $\frac{1}{2}$ hours***READ THE FOLLOWING DIRECTIONS CAREFULLY**

1. Candidates **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 consists of **THREE** questions. You should attempt **ALL** questions.
3. Each question is divided into parts. Each part measures a particular skill. The allocation of marks to the skill within each part is given at the end of that part.
4. **Be sure to read ALL instructions completely and carefully before you begin the questions.**

N.B. Candidates are allowed to have practical notebooks and/or any materials relevant to the practical examination.

Candidates may be given additional materials without penalty.

If candidates lose time during the examination through no fault of their own, they must be awarded the equivalent time.

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1. You are provided with the following apparatus:

1 metre rule with a hole in the middle

1 long metal rod or a sturdy knitting needle

1 piece of plasticine

1 retort stand

Weights of the following masses with attached string: 100 g, 80 g, 60 g, 50 g

Carry out the instructions below:

- (a) Securely clamp the metal rod/knitting needle to the retort stand.
- (b) Balance the metre rule on the metal rod/knitting needle as shown in the diagram in Figure 1. Use plasticine to balance the weights.

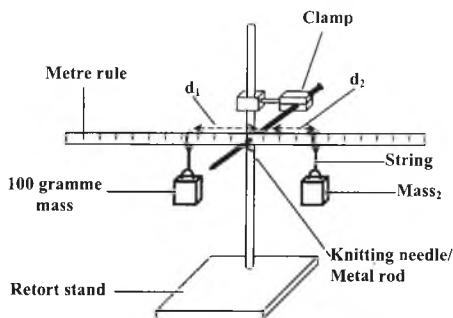


Figure 1. Apparatus for investigation in Question 1

- (c) Place the 100 g mass (Mass_1) 10 cm (d_1) away from the hole on the metre rule.
- (d) Place the 80 g mass (Mass_2) on the other side and move it along the rule until it is balanced.
- (e) In Table 1, record the distance (d_2) between the rod and Mass_2 .
- (f) Repeat steps (c) to (e), placing the 100 g mass 20 cm away from the hole in the center.
- (g) Repeat steps (c) to (f), using the 60 g mass in place of the 80 g mass.
- (h) Repeat steps (c) to (f), using the 50 g mass. (6 marks)

GO ON TO THE NEXT PAGE

- (i) Using your results after following instructions (c) to (e), complete Table 1 below.

TABLE 1. RESULTS OF INVESTIGATION 1

Mass ₁ (g)	Distance from center d ₁ (cm)	Mass ₂ (g)	Distance from center d ₂ (cm)	m ₁ x d ₁	m ₂ x d ₂
100	10	80			
100	20	80			
100	10	60			
100	20	60			
100	10	50			
100	20	50			

(12 marks)

- (j) The procedures (a) to (i) are used to investigate the principle of moments.

Suggest an alternative term for

- a) Mass₁ _____
b) Mass₂ _____
c) the hole at the center of the metre rule. _____

(3 marks)

- (k) Name ONE machine which operates by the principle of moments.

(1 mark)

Total 22 marks

2. Plan and design an experiment which uses the principle of moments to determine the mass of an unknown object. Draw and label a diagram of the apparatus which you would use.

Diagram of apparatus to determine the mass of an unknown object

(12 marks)

Total 12 marks

GO ON TO THE NEXT PAGE

3. (a) Using the bulb, batteries, wire, and electrodes, set up an electrical circuit as shown in Figure 2 below to be placed in EACH of the EIGHT solutions provided.

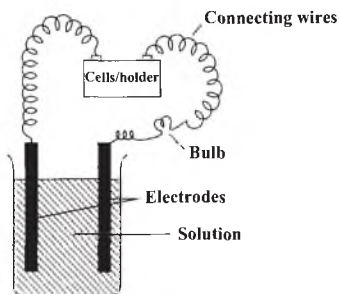


Figure 2

Place the electrodes into each of the solutions provided and observe the brightness of the bulb. (5 marks)

- (b) Record the relative brightness of the bulb in EACH solution in Table 2 below.

TABLE 2. OBSERVATIONS

Solution	Observations
Sodium chloride	
Sulphuric acid	
Water	
Ethanoic acid	
Sugar solution	
Starch solution	
Orange juice	
Rubbing alcohol	

(8 marks)

- (c) In Table 3 below, classify the solutions as conductors and non-conductors.

TABLE 3

Solutions that are conductors	Solutions that are non-conductors

(4 marks)

- (d) (i) Which solution in Table 3 is the best conductor?

_____ (1 mark)

- (ii) Give ONE reason for your selection in (d) (i).

_____ (1 mark)

- (e) State another name for a non-conductor.

_____ (1 mark)

Total 20 marks

END OF TEST

CARIBBEAN EXAMINATIONS COUNCIL

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

**INTEGRATED SCIENCE
(Single-Award)**

General Proficiency

Paper 02

2 hours

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SECTION A

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

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

1. (a) Complete the word equation for EACH of the reactions below:
- (i) Aluminium + hydrochloric acid → _____
 - (ii) Iron + water → _____ (2 marks)
- (b) The Ramsingh family moves into their new home by the beach. Within two months the hinges of their metal gate begin to rust.
- (i) Name the chemical process by which rusting takes place.

(1 mark)
 - (ii) Write a word equation for the formation of rust.

(1 mark)
 - (iii) Explain why rusting of the gate has occurred so rapidly.

(2 marks)
- (c) The kitchen windows of the Ramsingh's home have also begun to rust. The windows of the bedroom, however, show no signs of rusting. Aluminium, steel and plastic are three materials used to make windows.
- Which of the three materials is likely to have been used in the windows
- (i) of the bedroom? _____ (1 mark)
 - (ii) of the kitchen? _____ (1 mark)
 - (iii) Give reasons for your answers in (i) and (ii) above.

(2 marks)

GO ON TO THE NEXT PAGE

- (d) The Ramsingh's previous home is located close to several factories. While they lived there, their children were repeatedly affected by various respiratory ailments. At their new home by the beach, there has been a marked decline in the frequency of respiratory ailments.

Suggest what might have been responsible for the

- (i) respiratory ailments

(1 mark)

- (ii) decline in frequency of the respiratory ailments.

(1 mark)

- (e) The following experiment is carried out by students in the laboratory. One gram of each metal, X, Y and Z, is placed in a test tube. Five cm³ of dilute hydrochloric acid is added to each test tube and the reaction observed. The results are shown in Table 1 below.

TABLE 1: EXPERIMENTAL RESULTS

Metal	Observation
X	Effervescence (fizzing / bubbling)
Y	No reaction observed
Z	Slight effervescence

- (i) Using the experimental results in Table 1, write the metals in order of increasing activity.

(1 mark)

- (ii) Y is non-reactive in hydrochloric acid.

Suggest the name of ONE metal which is non-reactive in hydrochloric acid.

(1 mark)

- (iii) Why was the same volume (5 cm³) of hydrochloric acid added to EACH of the three metals?

(1 mark)

Total 15 marks

GO ON TO THE NEXT PAGE

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

_____ (1 mark)

- (ii) Name TWO forms of energy.

_____ (2 marks)

- (b) Figure 1 shows three diagrams, A, B and C, of activities in which energy is being converted from one form to another.

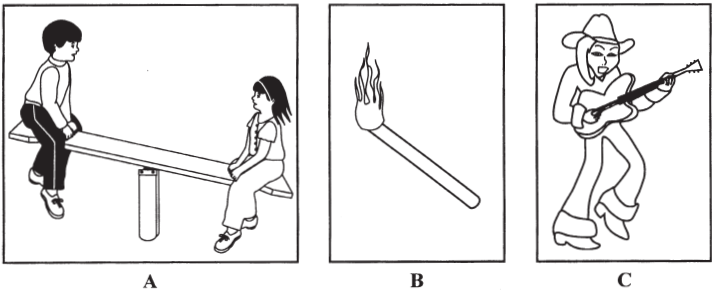


Figure 1. Energy conversions

- (i) Examine Figure 1 and state the energy conversion taking place in EACH of the diagrams, A, B and C.

A: _____

B: _____

C: _____

(3 marks)

- (ii) In Diagram A of Figure 1, the girl weighs 40 kilograms and is seated 3 metres away from the centre of the see-saw. If the boy weighs 30 kilograms, at what distance from the centre should he sit, for them to balance each other?

(3 marks)

- (iii) State the class of lever represented in Diagram A of Figure 1.

(1 mark)

- (c) In Figure 2, a drink is being opened with a bottle opener.

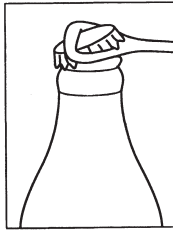


Figure 2. A bottle opener

If the force applied (load) is 8 Newtons and the effort is 2 Newtons, calculate the mechanical advantage of the bottle opener.

(2 marks)

- (d) The machine in Figure 3 is a car jack.

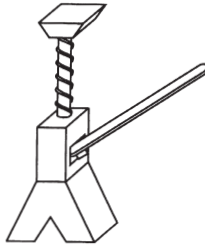


Figure 3. A car jack

- (i) State ONE factor which may contribute to the inefficiency of the car jack shown in Figure 3.

(2 marks)

- (ii) Suggest ONE method that may be used to overcome the inefficiency of the car jack in (i) above.

(1 mark)

Total 15 marks

3. (a) (i) State FOUR functions of the circulatory system in humans.

(2 marks)

(ii) The heart of a small mammal is pierced by the spear of a hunter.
Suggest ONE way in which this wound would lead to the death of the animal.

(1 mark)

(b) Figure 4 shows two types of blood vessels labelled A and B.

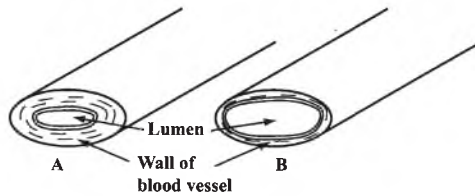


Figure 4. Two types of blood vessels

(i) State the MAIN difference between the blood vessels in Figure 4.

(1 mark)

(ii) Identify the type of blood vessel that is labelled A in Figure 4.

(1 mark)

(c) Ben is the managing director of a large company. He spends long hours during the day and night trying to meet deadlines. His daily diet includes bread, salted fish, beef, chicken and fried potato chips. Ben suffers from hypertension (high blood pressure).

(i) Identify TWO of Ben's dietary habits that could contribute to his hypertension.

(2 marks)

(ii) Suggest TWO other factors that could have contributed to Ben's hypertension.

(2 marks)

(iii) Suggest THREE ways in which moderate exercise can affect Ben's body.

(3 marks)

(iv) Ben develops a disease that weakens the muscular tissues of his body.

Suggest, giving ONE reason, the effect the disease could have on his blood pressure.

Effect: _____

(1 mark)

Reason: _____

(2 marks)

Total 15 marks

GO ON TO THE NEXT PAGE

SECTION B

You should attempt ALL THREE questions.

(Suggested time: 60 minutes)

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

4. (a) Explain the meaning of the term 'balanced diet'.

(2 marks)

- (b) Identify the nutrients in a ham-and-cheese sandwich.

(3 marks)

- (c) Figure 5 shows three lunch options, A, B and C, posted on a cafeteria notice-board.

A
Yam pie
Rice
Potatoes
Banana
Buttered bread-rolls
Cake

B
Milk
Rice
Fish
Liver
Oranges
Lettuce

C
Chicken
Buttered bread-rolls
Yam
Rice
Apples
Oranges

Figure 5. Three lunch options

Giving an appropriate reason in EACH case, indicate which of the options in Figure 5 would BEST support the dietary requirements of an athlete and a pregnant woman respectively.

- (i) Lunch option for an athlete: _____ (1 mark)

Reason: _____

(3 marks)

GO ON TO THE NEXT PAGE

(ii) Lunch option for a pregnant woman: _____ (1 mark)

Reason: _____

_____ (3 marks)

(d) Describe how ONE nutrient in cheese is chemically digested before absorption.

_____ (2 marks)

Total 15 marks

5. (a) Some characteristics of pests and parasites are described in Table 2.

(i) Complete Table 2 by writing the description for parasites.

TABLE 2: CHARACTERISTICS OF PESTS AND PARASITES

Characteristic	Pests	Parasites
Type of habitat	Pests live near to other organisms.	
How they obtain food	Pests do not depend directly on the other organisms for food.	

(2 marks)

(ii) Name TWO common household pests.

(2 marks)

GO ON TO THE NEXT PAGE

- (b) The members of a rural community, situated near a small river, practise kitchen gardening, livestock rearing and fishing. After experiencing an increase in the number of flies, ants and other insects in their environment, they spray both inside and outside of their homes with the new insecticide advertised in Figure 6.

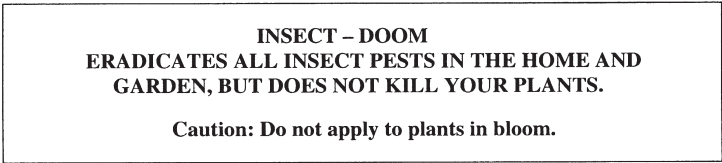


Figure 6. Advertisement for new insecticide

- (i) Suggest TWO factors that might be responsible for the increase in the number of flies in the rural community.

(2 marks)

- (ii) In addition to using insecticides, suggest ONE **other** method which the residents could use to control the number of flies.

(1 mark)

- (c) The gardeners in the community observe that there is a decrease in the number of okras, tomatoes and peppers produced in their gardens, despite the formation of large numbers of blossoms by the plants. There is also a decrease in the fish population in the river.

How could spraying of the new insecticide be responsible for

- (i) the decrease in produce from the gardens?

(2 marks)

- (ii) the decrease in the number of fish?

(2 marks)

GO ON TO THE NEXT PAGE

(d) Figure 7 shows a food web from a habitat in the rural community.

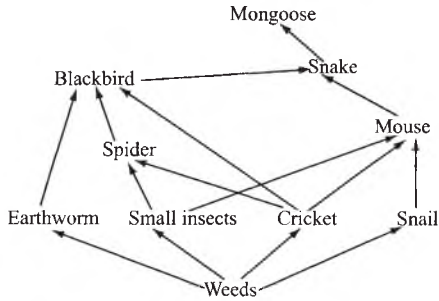


Figure 7. A food web from a habitat in the rural community

Study the food web from the habitat shown in Figure 7 and answer the questions below.

(i) What effect would reducing the insect population have on the weed and the spider populations?

a) Effect on the weed population: _____

_____ (1 mark)

b) Effect on the spider population: _____

_____ (1 mark)

(ii) Select ONE food chain from the food web in Figure 7 and write it in the space provided below.

_____ (2 marks)

Total 15 marks

6. (a) Figure 8 shows the path of two rays of light formed during reflection from a mirror and during refraction at the surface of water.

Distinguish between 'reflection of light' and 'refraction of light' by showing on the diagrams below what happens to the ray of light when it hits EACH surface.

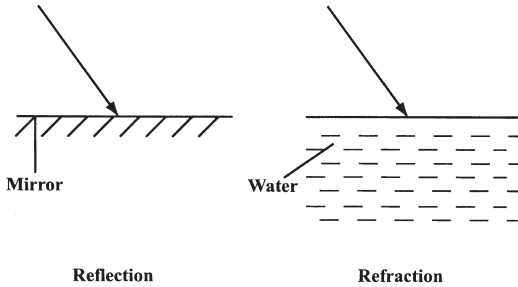


Figure 8. Path of rays of light during reflection and refraction

(2 marks)

- (b) In some cultures, fish are caught by spearing. The fisherman stands on the rocks and aims the spear at the fish under the water as shown in Figure 9.

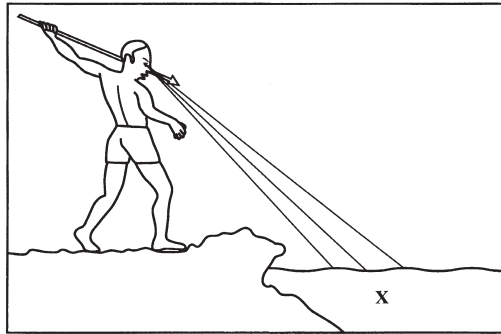


Figure 9. Spear fishing

When the man looks at the fish through the water, the fish appears to be at point X.

- (i) Is the actual position of the fish below or above X?

(1 mark)

GO ON TO THE NEXT PAGE

(ii) Explain your answer to (b) (i) above.

(1 mark)

(iii) Where should the fisherman aim his spear in order to strike the fish?

(1 mark)

(c) Name ONE method used to catch deep sea fish.

(1 mark)

(d) When white light passes through a clear glass prism, it is split up into several colours.

What is the term used to describe this splitting up of the light?

(1 mark)

(e) Red, green and blue light can be combined to form white light. These are the primary colours of light.

Explain what is meant by the term 'primary colour'.

(1 mark)

- (f) In Figure 10, lights of the primary colours, red, green and blue, are projected on a screen.

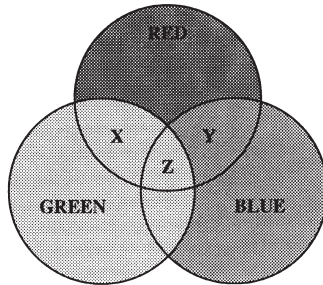


Figure 10. Primary colours projected on a screen

What colours would you expect to see in areas X, Y and Z?

- (i) X _____ (1 mark)
- (ii) Y _____ (1 mark)
- (iii) Z _____ (1 mark)
- (g) The pattern on a piece of cloth consists of RED triangles on a BLUE background.

What colours would appear on the cloth in red light and in green light?

- (i) Red light: _____
_____ (2 marks)
- (ii) Green light: _____
_____ (2 marks)

Total 15 marks

END OF TEST

C A R I B B E A N E X A M I N A T I O N S C O U N C I L**SECONDARY EDUCATION CERTIFICATE
EXAMINATION****INTEGRATED SCIENCE
(Single-award)****Paper 03/2****General Proficiency****PRACTICAL PAPER***2 $\frac{1}{2}$ hours***READ THE FOLLOWING DIRECTIONS CAREFULLY**

1. Candidates **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 consists of **THREE** questions. You should attempt **ALL** questions.
 3. Each question is divided into parts. Each part measures a particular skill. The allocation of marks to the skill within each part is given at the end of that part.
 4. **Be sure to read ALL instructions completely and carefully before you begin the questions.**
- N.B.** Candidates are allowed to have practical notebooks and/or any materials relevant to the practical examination.

Candidates may be given additional materials without penalty.

If candidates lose time during the examination through no fault of their own, they must be awarded the equivalent time.

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1. Candidates are required to answer ALL questions.

FIVE solutions, A, B, C, D and E, are provided.

- (a) Use Universal Indicator and the colour chart to investigate the pH of EACH of the five solutions. Record your observations in Table 1 below.

TABLE 1: pH VALUES OF SOLUTIONS

Solution	Indicator Colour	pH
A		
B		
C		
D		
E		

(12 marks)

- (b) In Table 2, classify Solutions A, B, C, D and E as acidic, basic or neutral by writing the solution in the appropriate column.

TABLE 2: CLASSIFICATION OF SOLUTIONS A – E

Acidic	Basic	Neutral

(5 marks)

GO ON TO THE NEXT PAGE

2. (a) Describe how you would investigate the reactivity of metals using a dilute acid.

(4 marks)

- (b) You are provided with four metals, W, X, Y and Z.

- (i) Using the method you described in Question 2 (a) above, compare the reactivity of these four metals. (2 marks)
- (ii) Record your observations in Table 3.

TABLE 3: REACTIVITY OF METALS

Metal	Observations
W	
X	
Y	
Z	

(4 marks)

- (c) Using your results in (b) above, write the metals in increasing order of reactivity from the **least to the most reactive**.

(4 marks)

GO ON TO THE NEXT PAGE

3. You are provided with the following materials / substances:

- Benedict's solution
- Filter paper
- 6 test tubes
- Biuret reagent
- Half of an English apple
- 10 cm³ of cream of wheat
- A piece of egg white

(a) In the space provided below, make an accurate drawing of the cut half of the English apple provided. Neatly label your drawing and state its title and magnification.

(10 marks)

GO ON TO THE NEXT PAGE

- (b) Perform food tests on the apple, cream of wheat and egg white provided. Record your observations in Table 4.

TABLE 4: FOOD TESTS ON ENGLISH APPLE, CREAM OF WHEAT AND EGG WHITE

Food Test	Observations		
	Apple	Cream of Wheat	Egg White
Add Benedict's solution to a small quantity of the food in a test tube and heat.			
Rub a small quantity of the food on a piece of filter paper.			
Add Biuret reagent to a small quantity of the food in a test tube.			

(9 marks)

- (c) Based on your results in (b) above, state the nutrients that are contained in EACH of the three foods.

Apple: _____

Cream of wheat: _____

Egg white: _____

(4 marks)

END OF TEST

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 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. (a) Table 1 shows the increase in height over a twelve-week period of the stems of two bean plants, A and B, that grew from dry seeds. The seeds were planted in two different locations.

TABLE 1: HEIGHT OF STEMS

Week	Height (cm)	
	Plant A	Plant B
0	0	0
2	10	5
4	30	15
6	50	21
8	80	32
10	90	45
12	90	45

- (i) Using the data in Table 1 and **the same axes** on the grid provided in Figure 1, plot **TWO** graphs to compare the increase in height of the two bean plants over the twelve-week period. **(5 marks)**

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TITLE: _____

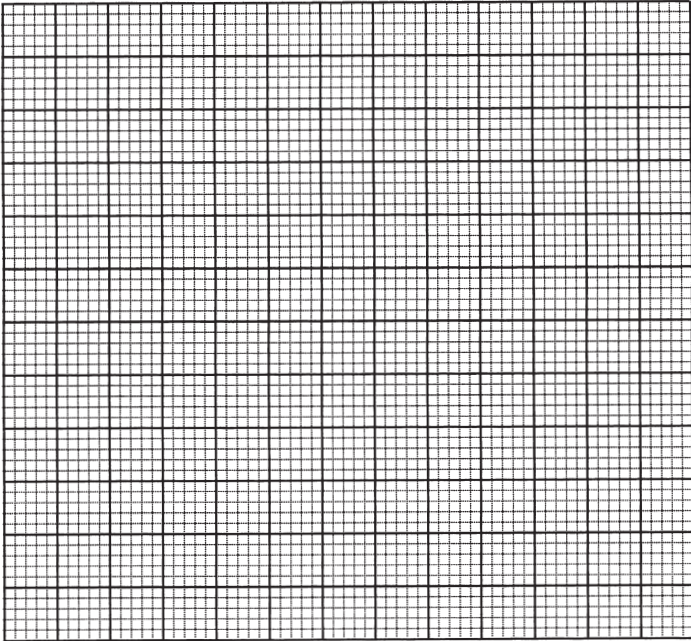


Figure 1.

- (ii) Write an appropriate title above your graph in Figure 1. **(1 mark)**

GO ON TO THE NEXT PAGE

- (b) (i) After how many weeks did Plant B stop increasing in height?

(1 mark)

- (ii) Which of the two plants shows the faster rate of growth?

(1 mark)

- (iii) State TWO conditions that might cause the faster rate of growth in the plant selected in (b) (ii) above.

(2 marks)

- (iv) How would ONE of the conditions you mentioned in (b) (iii) above cause an increase in the rate of growth?

(1 mark)

GO ON TO THE NEXT PAGE

(c) Figure 2 is a diagram of a bean seedling.

(i) Label Parts A and B on the diagram.

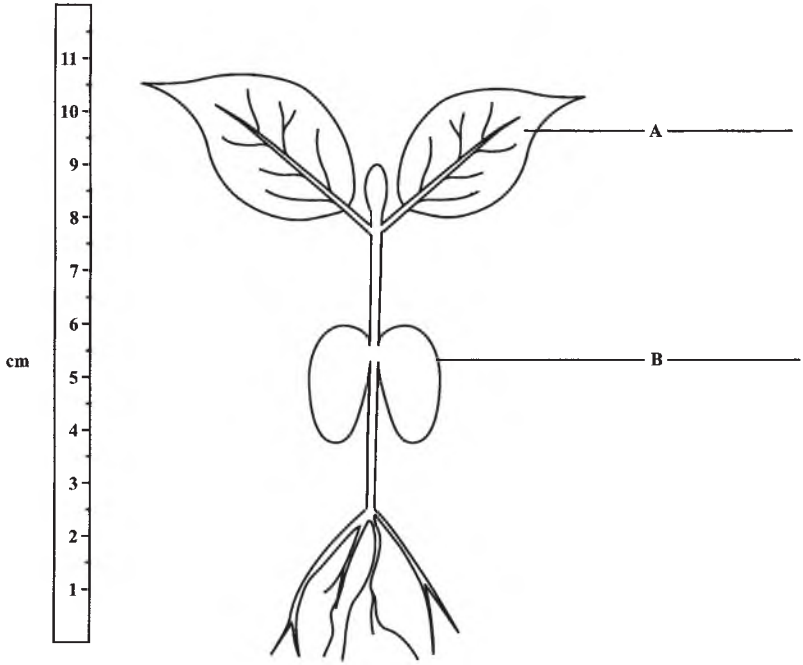


Figure 2. A bean seedling

(2 marks)

(ii) Using the ruler at the left side of the diagram in Figure 2, measure and record the length of the stem.

Length of stem: _____ (2 marks)

Total 15 marks

GO ON TO THE NEXT PAGE

2. (a) Name the TWO water-safety devices which make it easier for a person to float in the sea or in the pool.

(2 marks)

- (b) The pictures, A and B, in Figure 3 show a learner floating in two different types of water.

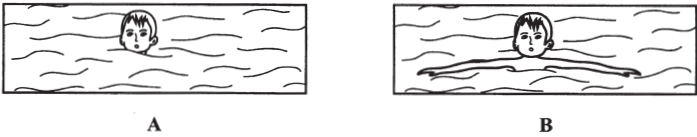


Figure 3. Learner floating

- (i) In which picture, A or B, in Figure 3, is the learner floating in sea water?

(1 mark)

- (ii) Give ONE reason for your answer in (b) (i) above.

(1 mark)

- (c) Swimming is an aerobic activity. What does 'aerobic' mean?

(1 mark)

- (d) During a competition meet, two swimmers were disqualified for using unethical performance enhancement techniques. One of these techniques was blood boosting.

- (i) Name ONE other technique used for performance enhancement.

(1 mark)

GO ON TO THE NEXT PAGE

- (ii) Explain how ANY ONE of the techniques in (d) above could increase the performance of the swimmers.

(2 marks)

- (iii) Why are the techniques considered to be unethical?

(1 mark)

- (iv) Suggest to the swimmers TWO ways in which they can improve their performance without using unethical techniques.

(2 marks)

- (v) Name ONE food nutrient which should be part of the swimmer's diet.

(1 mark)

- (vi) Give ONE reason for your answer in (d) (v) above.

(1 mark)

GO ON TO THE NEXT PAGE

- (e) The swimmers are advised not to eat a heavy meal before a race.

Explain why this advice is given.

(2 marks)

Total 15 marks

3. (a) (i) What is a 'hormone'?

(1 mark)

- (ii) Give TWO examples of hormones.

(2 marks)

- (b) Joseph, a male patient, and Karen, a female patient, are consulting a doctor for problems which they are having with their endocrine systems. Joseph's urine is tested for the presence of glucose. The result is positive. Karen is 18 years old but has not yet developed breasts and has not yet had a menstrual period.

- (i) For EACH patient, state which secretory/endocrine organ has malfunctioned and is causing the symptom(s). Explain why each patient is experiencing the particular symptom(s).

Joseph's malfunctioning organ is his _____.

Reason for symptoms: _____

(3 marks)

GO ON TO THE NEXT PAGE

Karen's malfunctioning organ is her _____.

Reason for symptoms: _____

(3 marks)

(ii) To control his symptoms, Joseph must decrease the intake of ONE food nutrient.

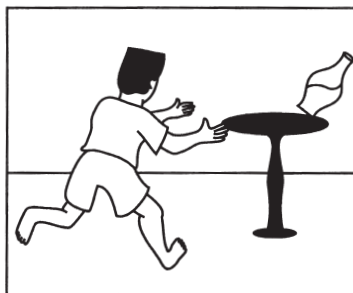
Suggest which food nutrient must be decreased.

_____ (1 mark)

(c) Figure 4 shows two responses of the nervous system.



A



B

Figure 4. Two responses of the nervous system

(i) What is a 'reflex action'?

(1 mark)

(ii) In which of the pictures, A or B, in Figure 4 is a reflex action MOST likely occurring?

_____ (1 mark)

GO ON TO THE NEXT PAGE

- (iii) Give ONE reason for your choice in (c) (ii).

(2 marks)

- (iv) Name the sense organ being used in the response at B in Figure 4.

(1 mark)

Total 15 marks

GO ON TO THE NEXT PAGE

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) State TWO chemical and TWO physical properties of water.

Chemical properties:

(2 marks)

Physical properties:

(2 marks)

- (b) (i) Name TWO processes which the local water company uses to purify the water to ensure that clean water reaches the homes.

Process 1: _____

Process 2: _____

(2 marks)

- (ii) How does EACH process mentioned in (b) (i) help to purify the water?

Process 1: _____

Process 2: _____

(2 marks)

GO ON TO THE NEXT PAGE

- (c) Figure 5 shows a section of a riverside. Beside it is a small farming area and a factory. The farmers often find dead fish near the river bank.

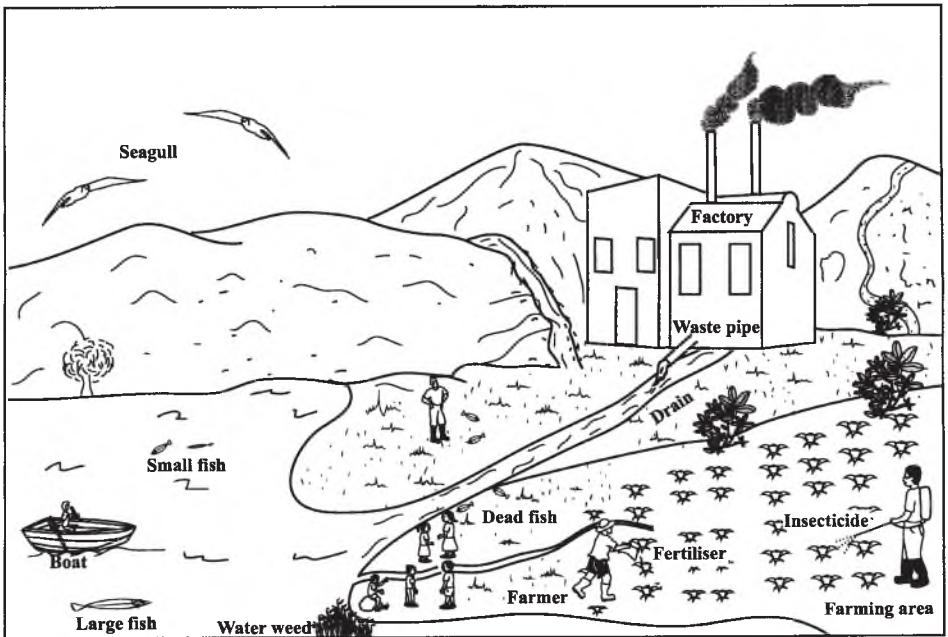


Figure 5. Riverside

- (i) Use FOUR of the organisms shown in Figure 5 to draw a food chain.

(2 marks)

GO ON TO THE NEXT PAGE

- (ii) Identify ONE activity on the farm shown in Figure 5 that could have a negative effect on the river.

(1 mark)

- (iii) How does the activity mentioned in (c) (ii) above result in the negative effect?

(1 mark)

- (iv) Identify ONE activity of the factory shown in Figure 5 that could have a negative effect on the river.

(1 mark)

- (v) How does the activity mentioned in (c) (iv) above result in the negative effect?

(1 mark)

- (d) Why should the dead fish NOT be collected and sold?

(1 mark)

Total 15 marks

GO ON TO THE NEXT PAGE

5. (a) A bimetallic strip and a frame are presented in Figure 6.

The bimetallic strip is made of two different metals, A and B, riveted together. When the bimetallic strip is heated, A expands more than B.

In the frame provided in Figure 6, draw what the strip would look like when heated. Label A and B on your diagram.

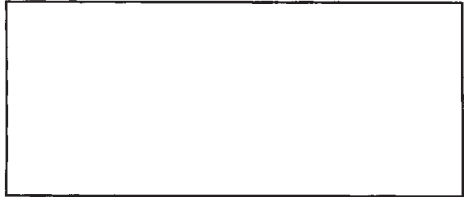
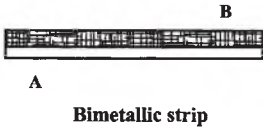


Diagram of the heated bimetallic strip

Figure 6.

(2 marks)

- (b) A bi-metallic strip is used in the thermostat of an electric iron as shown in Figure 7. Metal A expands more than Metal B for the same change in temperature.

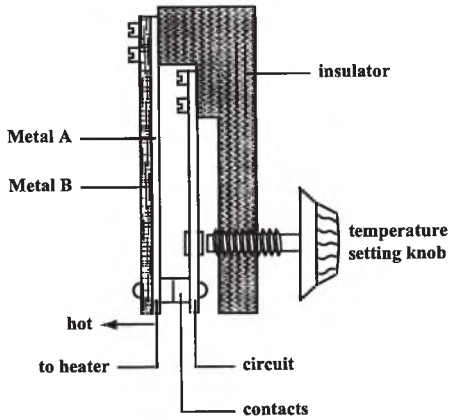


Figure 7. Thermostat of an electric iron

GO ON TO THE NEXT PAGE

- (i) What is a 'thermostat'?

_____ (1 mark)

- (ii) Table 2 presents two stages explaining how the thermostat shown in Figure 7 works.

Complete Table 2 by writing the effect of EACH action indicated on the flow of electric current through the iron.

TABLE 2: HOW THE THERMOSTAT WORKS

Action	Effect
As current flows through the iron, the bimetallic strip is heated.	
The iron and strip cool down.	

(4 marks)

- (c) (i) The hot iron is placed on a metal rest at one end of the ironing board and the metal becomes hot.

Suggest the method by which heat is transferred from the iron to the metal rest.

Method of transfer: _____ (1 mark)

- (ii) The wax of an unlit candle standing near, but not touching the hot iron or metal rest, becomes soft.

Suggest the method by which heat is transferred from the iron to the candle wax.

Method of transfer: _____ (1 mark)

- (d) What is meant by 'ventilation'?

(2 marks)

GO ON TO THE NEXT PAGE

- (e) During the rainy season, a family keeps all of their windows and doors closed for several days, resulting in poor ventilation of the house. The inside of the house has been recently painted.

Some of the negative effects they experienced are indicated in Table 3.

- (i) Complete Table 3 to show the **specific** cause of EACH effect of poor ventilation.

TABLE 3: EFFECT AND CAUSE OF EFFECT

Effects Noticed	Possible Cause
Increased levels of mould and mildew	
Headaches	
Allergies/Respiratory problems	

(3 marks)

- (ii) State ONE way in which the ventilation in the room might be improved.

(1 mark)

Total 15 marks

6. (a) What is a 'force'?

(1 mark)

GO ON TO THE NEXT PAGE

(b) Define EACH of the following:

(i) Gravitational force _____

(1 mark)

(ii) Frictional force _____

(1 mark)

(c) A student wishes to find the mass of a mango but there is no balance available. Her friend tells her that she could use the pieces of apparatus listed below to find its mass.

Metre rule
200g mass

String
Large, strong nail

(i) Explain how the student might use the pieces of apparatus as set up in Figure 8 to find the mass of the mango.

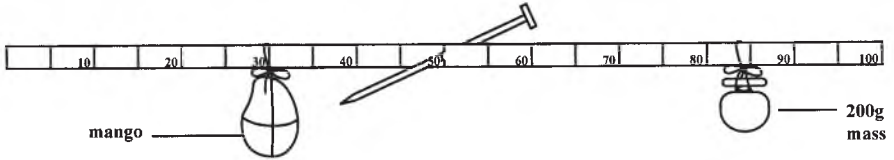


Figure 8. Finding mass of mango

(4 marks)

- (ii) How could the student use the results from (c) (i) above to find the mass of the mango?

(2 marks)

- (d) What is a 'machine'?

(1 mark)

- (e) The bottle opener in Figure 9 is a machine used in everyday life.

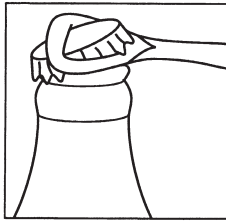


Figure 9. A simple machine

- (i) Label Figure 9 to show the effort force (E), the fulcrum (F), and the load (L).
(3 marks)
- (ii) Why is the bottle opener, used as shown in Figure 9, considered to be a machine?

(2 marks)

Total 15 marks

END OF TEST

FORM TP 2007101**CARIBBEAN EXAMINATIONS COUNCIL****SECONDARY EDUCATION CERTIFICATE
EXAMINATION****INTEGRATED SCIENCE
(Single-Award)****Paper 03/2****General Proficiency****PRACTICAL PAPER***2½ 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.
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Answer ALL questions.

1. You are provided with the following:

- Four different types of soil samples labelled A, B, C and D
- Four boiling tubes
- Four spatulas
- Four rubber bungs
- Universal indicator paper
- Universal indicator colour chart
- Dropper
- Four test tubes
- One test tube rack
- Distilled water

Proceed as indicated below.

- (a) Half-fill EACH of the four boiling tubes with one of the soil samples: A, B, C and D. Place EACH tube in the test tube rack. **(1 mark)**
- (b) Add distilled water to EACH boiling tube until it is almost full and observe the appearance of the contents in the tube. **(1 mark)**
- (c) Record your observations in the space provided below.

A: _____

B: _____

C: _____

D: _____

(2 marks)

- (d) Cover EACH boiling tube with a rubber bung and shake for a few minutes. **(1 mark)**

GO ON TO THE NEXT PAGE

- (e) Allow the tubes to settle for 5 minutes and observe the appearance of the contents in the tubes. Record your observations in the space provided below.

A: _____

B: _____

C: _____

D: _____

(4 marks)

- (f) In the space provided below, draw a diagram of one of the boiling tubes to show the appearance of the soil.

(4 marks)

GO ON TO THE NEXT PAGE

- (g) Using a dropper, transfer a small quantity of EACH soil suspension to separate test tubes. (1 mark)
- (h) Use the universal indicator paper to check the pH of EACH of the soil samples, A, B, C and D. (1 mark)
- (i) Insert an appropriate table below and record your results in it.

(3 marks)

- (j) Using your universal indicator colour chart, estimate the pH of EACH of the soil samples and complete the table below.

Soil Sample	Estimated pH of Sample
A	
B	
C	
D	

(4 marks)

GO ON TO THE NEXT PAGE

- (k) Plan and design an experiment to confirm that of the four soil samples, A, B, C and D, the **most** suitable one for growing carrots is Sample C. **(7 marks)**

Total 29 marks

GO ON TO THE NEXT PAGE

2. You are provided with the following materials and pieces of apparatus:

- 50 cm³ 1M sodium hydroxide (NaOH) solution
- 50 cm³ 1M hydrochloric acid (HCl) solution
- 1 styrofoam cup
- 1 thermometer
- 1 measuring cylinder
- 1 stirring rod

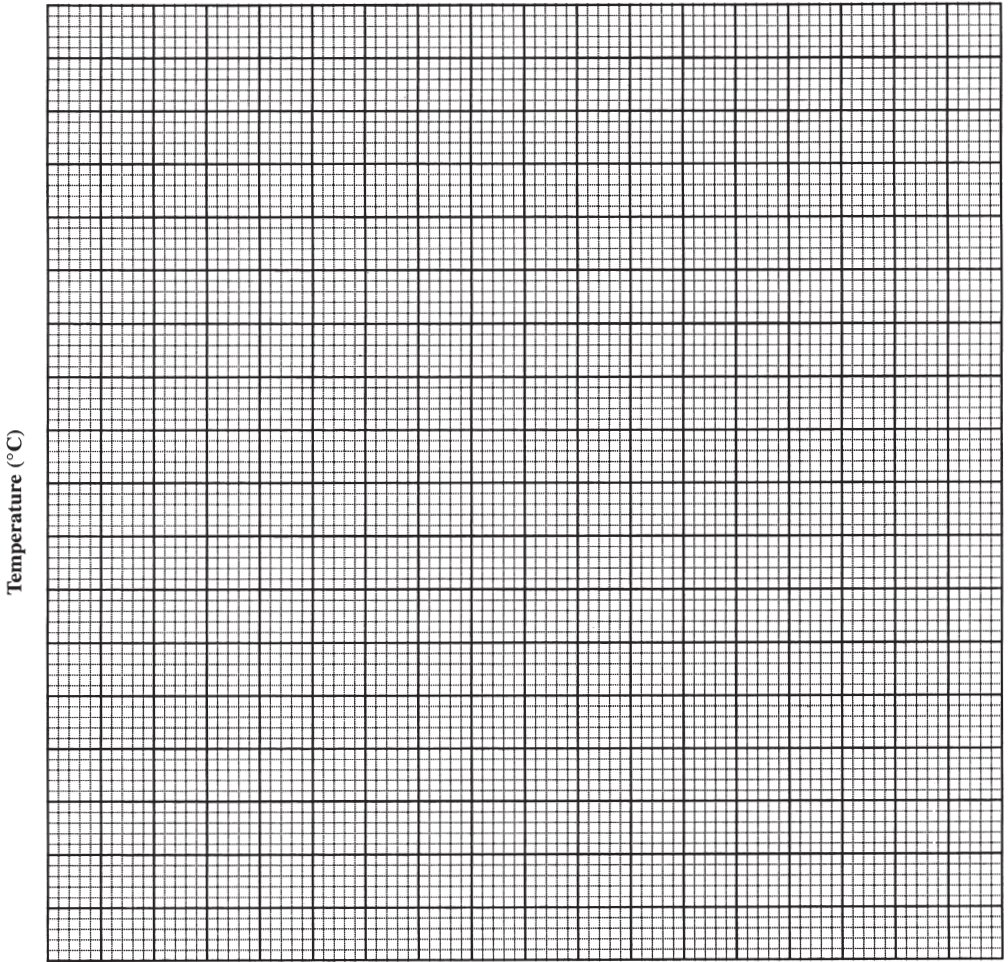
Proceed as indicated below.

- (a) Using your measuring cylinder, place 25 cm³ of NaOH solution into the styrofoam cup. **(1 mark)**
- (b) Leave the sodium hydroxide solution for 5 minutes and then record the temperature. **(1 mark)**
- (c) Measure 5 cm³ of HCl and add to the styrofoam cup. Stir the mixture and record the temperature in degrees Celsius or Centigrade (°C). **(2 marks)**
- (d) Repeat (c) above ten times. **(1 mark)**
- (e) Insert an appropriate table below and record your observations in it.

(8 marks)

GO ON TO THE NEXT PAGE

- (f) On the axes provided below, draw a graph of volume of acid added against temperature in degrees Celsius ($^{\circ}\text{C}$).



Volume of acid added (cm^3)

(6 marks)

GO ON TO THE NEXT PAGE

- (g) Write a word equation for the reaction which is occurring.

(2 marks)

- (h) What type of reaction is this?

(1 mark)

- (i) For what volume of acid is the maximum quantity of heat energy evolved?

(2 marks)

- (j) Why was a styrofoam cup used in performing this experiment?

(1 mark)

Total 25 marks

END OF TEST

CARIBBEAN EXAMINATIONS COUNCIL

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

**INTEGRATED SCIENCE
(Single-Award)**

General Proficiency

Paper 02

2 hours

READ THE FOLLOWING DIRECTIONS CAREFULLY

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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. Three individuals, Samantha, Susan and Sharon, often carry out the activities depicted in Figure 1. Study Figure 1 and answer the questions which follow.



Figure 1. Working and sporting activities

- (a) In the space provided below, sequence the individuals in order of the energy required by the individual's body when performing the activity depicted in Figure 1 for the same duration.

Most energy required —————> Least energy required

Individuals: _____ (2 marks)

- (b) In which activity in Figure 1 would the individual have the **highest** breathing rate?

_____ (1 mark)

- (c) Describe the chest movement expected during the activity to indicate the difference in breathing rate of EACH individual in Figure 1. Refer to the structures of the respiratory system in your response.

Samantha:

Breathing rate – _____

Chest movement – _____

(2 marks)

GO ON TO THE NEXT PAGE

Susan:

Breathing rate – _____

Chest movement – _____
(2 marks)

Sharon:

Breathing rate – _____

Chest movement – _____
(2 marks)

- (d) (i) State ONE difference between 'aerobic' and 'anaerobic' respiration.

(1 mark)

- (ii) In which activity in Figure 1 does anaerobic respiration play a significant role?

(1 mark)

- (iii) Why might anaerobic respiration be necessary for this activity?

(1 mark)

- (iv) In Table 1, insert TWO likely differences between the air inhaled and exhaled by Susan during her activity shown in Figure 1.

TABLE 1. DIFFERENCES BETWEEN SUSAN'S INHALED AND EXHALED AIR

Inhaled air	Exhaled air

(2 marks)

GO ON TO THE NEXT PAGE

- (e) With reference to Susan's activity, give a reason for ONE difference in the inhaled and exhaled air.

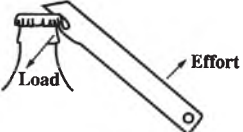
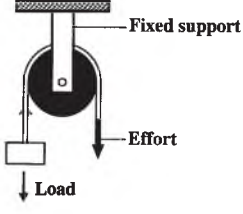
Reason: _____

(1 mark)

Total 15 marks

2. (a) Table 2 refers to simple machines. Complete Table 2 by describing the machine as a **pulley, lever or inclined plane** and state how the machine makes work easier.

TABLE 2: SIMPLE MACHINES

Machine	Type of Simple Machine	Ease in Work
		
		

(4 marks)

- (b) Figure 2 shows four different classes of levers labelled A, B, C and D. Study Figure 2 and answer the questions which follow:

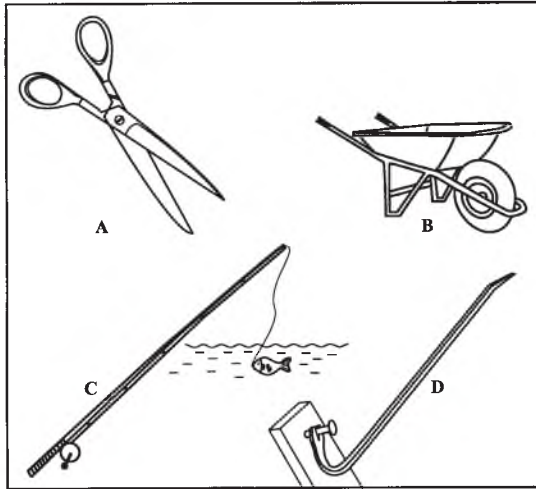


Figure 2. Different classes of levers

- (i) Which lever is
- a) second order? _____ (1 mark)
- b) third order? _____ (1 mark)
- (ii) Label lever D in Figure 2 to show the positions of the fulcrum (F), effort (E) and load (L). (1 mark)

GO ON TO THE NEXT PAGE

- (c) Figure 3 is a graph showing the performance of a simple machine. The mechanical advantage of the machine was measured for different loads. Study Figure 3 and answer the questions which follow.

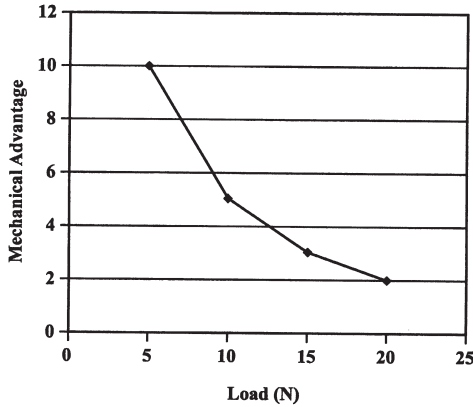


Figure 3. Graph showing mechanical advantage versus different loads

- (i) From Figure 3, estimate the mechanical advantage for a load of 5N.
_____ (1 mark)
- (ii) Calculate the effort applied for the load of 5N.

_____ (2 marks)
- (iii) Describe the trend shown by the graph in Figure 3.

_____ (2 marks)
- (iv) Suggest a reason for this trend.

_____ (1 mark)

GO ON TO THE NEXT PAGE

- (d) Poor maintenance practices may cause damage to machines and affect their efficiency. For the situation described below, suggest the effect on the machine and on its function.

Maya used a pair of scissors and forgot them by the sink in the kitchen.

- (i) Effect on scissors:

- (ii) Effect on function of scissors:

(2 marks)

Total 15 marks

3. People in a Caribbean country awoke to loud rumblings and saw red hot lava being emitted into the air.

(a) What natural disaster could have caused this?

_____ (1 mark)

(b) What is lava?

_____ (2 marks)

(c) Many persons migrated from the area where the lava was emitted.

Suggest TWO possible reasons for this migration.

(i) _____

(ii) _____
_____ (2 marks)

(d) State TWO precautions that the residents may adopt to protect themselves.

(i) _____

(ii) _____
_____ (2 marks)

- (e) Meteorologists in surrounding Caribbean islands have indicated that the dust present in the air of their countries came from the nearby natural disaster. Describe how this could have happened.

(2 marks)

- (f) Suggest TWO ways in which the natural disaster can economically benefit the country in the long term.

(i) _____

(ii) _____

(2 marks)

- (g) List TWO other natural disasters that have affected the Caribbean.

(2 marks)

- (h) List TWO features or environmental impacts of ONE of the natural disasters listed in (g) above.

(2 marks)

Total 15 marks

GO ON TO THE NEXT PAGE

SECTION B

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

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

4. Figure 4 shows Jerry playing a hop-scotch game. This game requires Jerry to place only one foot in a box where there is one box and one foot in each of two boxes when there are two boxes at the same level.

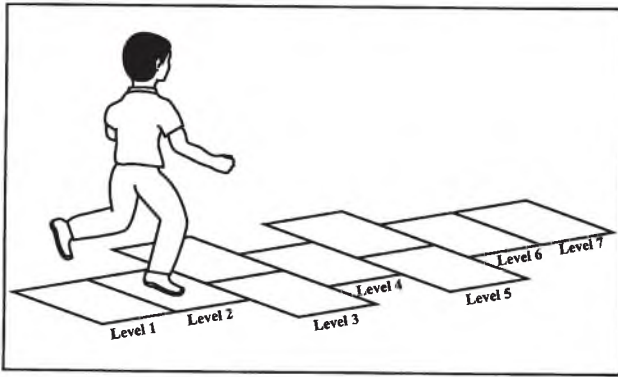


Figure 4. Hop scotch game

- (a) Describe the role of EACH of the structures below in assisting Jerry to successfully jump from Levels 1 to 7 indicated in Figure 4.

(i) Brain: _____

(2 marks)

(ii) Eyes: _____

(2 marks)

(iii) Muscles: _____

(2 marks)

(iv) Semi-circular canals: _____

(2 marks)

- (b) (i) At which level(s) of the game is Jerry likely to be MOST stable?
- _____
- (1 mark)**
- (ii) Give a reason for your answer in (b)(i) above.
- _____
- _____
- (1 mark)**
- (c) When Jerry heard the barking of dogs he ran from Level 3 to Level 7 and away from the game.
- (i) Which hormone was likely to have enabled this response?
- _____
- (1 mark)**
- (ii) Describe TWO possible effects of the hormone in (c)(i) above on Jerry's body.
- _____
- _____
- (2 marks)**
- (d) Which hormone
- (i) will promote the development of facial hair as Jerry matures?
- _____
- (1 mark)**
- (ii) is necessary to control the amount of glucose in Jerry's blood?
- _____
- _____
- (1 mark)**

Total 15 marks

GO ON TO THE NEXT PAGE

5. A marine biologist identified the following organisms in a river flowing through a village: large fish, small animals and larvae, algae and small plants, and small fish.

(a) Draw a food chain showing the feeding relationships among all of the organisms identified above.

(2 marks)

(b) Which of the organisms listed in (a) above can be identified as producers?

(1 mark)

(c) Some chemicals from a nearby factory accidentally entered the river and killed the small animals and larvae. State TWO effects this would have on the organisms in the river.

(2 marks)

(d) What are TWO methods that can be used by the villagers to catch fish in the river?

(2 marks)

GO ON TO THE NEXT PAGE

- (e) (i) Could the same method of fishing used by the villagers in the river, be used by fishermen in the deep sea?

(1 mark)

- (ii) Provide TWO reasons for your answer in (e)(i) above.

(2 marks)

- (f) John, a young villager, caught two live, small fishes and placed them in a bottle and covered it.

- (i) What will happen to the fish after a while?

(1 mark)

- (ii) Suggest a reason for your response in (f)(i) above.

(1 mark)

- (g) The villagers living near a polluted river have to use its water for domestic purposes. Describe how the sun can be used for making the water safe.

(3 marks)

Total 15 marks

GO ON TO THE NEXT PAGE

6. (a) In relation to playing surfaces, define 'friction' and 'bounce'.

(i) Friction: _____

(1 mark)

(ii) Bounce: _____

(1 mark)

(b) The graph in Figure 5 shows a comparison of the bounce and friction of four playing surfaces, A, B, C and D. Study Figure 5 carefully and answer the questions which follow.

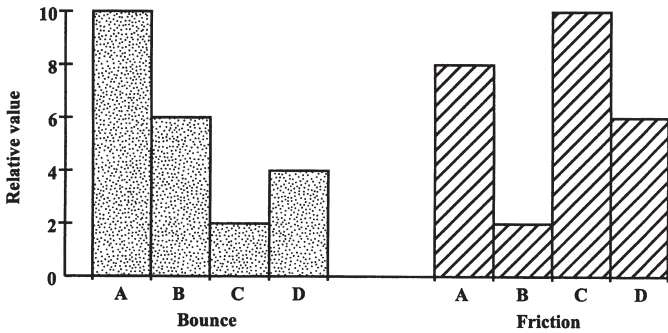


Figure 5. Properties of some playing surfaces

(i) Which of the surfaces, A, B, C or D, is the HARDEST?

(1 mark)

(ii) Write a reason for your response in (i) above.

(2 marks)

GO ON TO THE NEXT PAGE

(iii) Which of the surfaces, A, B, C or D, is the SMOOTHEST?

_____ (1 mark)

(iv) State a reason for your answer in (iii) above.

_____ (2 marks)

(v) The materials used to make the four playing surfaces are wood, concrete, rubber and grass. From Figure 5, which of the surfaces, A, B, C or D, is likely to be rubber?

_____ (1 mark)

(vi) Provide a reason for your answer in (v) above.

_____ (2 marks)

GO ON TO THE NEXT PAGE

- (c) Figure 6 shows a footwear usually used for athletic sports. The materials used to make this shoe include cloth, plastic, leather and rubber.



Figure 6. Sport footwear

Study Figure 6 and complete Table 3 by inserting in the appropriate spaces the name of the shoe part (from Figure 6), the function of the shoe part and a suitable material for the shoe part.

TABLE 3: FEATURES OF A SPORT FOOTWEAR

Function of Shoe Part	Name of Shoe Part	Suitable Material for Shoe Part
Prevents skid		
	Midsole	

(4 marks)

Total 15 marks

END OF TEST

FORM TP 2008096**CARIBBEAN EXAMINATIONS COUNCIL****SECONDARY EDUCATION CERTIFICATE
EXAMINATION****INTEGRATED SCIENCE
(Single-Award)****Paper 03/2****General Proficiency****PRACTICAL PAPER** **$2\frac{1}{2}$ 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 consists of **TWO** questions. You should answer **BOTH** questions.
 3. Each question is divided into parts. Each part measures a particular skill. The allocation of marks to the skill within each part is given at the end of that part.
 4. You **MUST** read **ALL** instructions completely and carefully before you begin the questions.
- N.B.** Candidates are allowed to have practical notebooks and/or any materials relevant to the practical examination.

Candidates may be given additional materials without penalty.

If candidates lose time during the examination through no fault of their own, they must be awarded the equivalent time.

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

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Candidates are required to answer ALL questions.

1. Two pieces of apparatus are provided, one as shown in Figure 1 and the second is similar with a rubber band instead of the spring. You will also be provided with a series of masses (weights): 10 g, 20 g, 30 g ... to 100 g. The elasticity of two materials, a spring and a rubber band are to be compared.
- (a) Complete Table 1 by measuring the original length of EACH material, that is, the length without any load attached.
- (i) The spring
 - (ii) The rubber band
- (b) Assume that the mass of each material without any load is zero grams (0 g). Complete Table 2 by performing the steps below.
- (i) Record the original length of the spring.
 - (ii) Attach a 10 g mass (weight) to (or place it in) the hanger that is attached to the spring.
 - (iii) Measure the new length of the spring and record this.
 - (iv) Calculate the extension of the spring for this 10 g mass (weight) (new length – previous length) and record this.
 - (v) Remove this mass (weight). Attach the next mass (weight) in the series to (or place it in) the hanger.
 - (vi) Repeat steps from (ii) to (iv) until all the masses (weights) in the series have been used.
 - (vii) **Repeat the steps from (i) to (vi) for the hanger attached to the rubber band.**

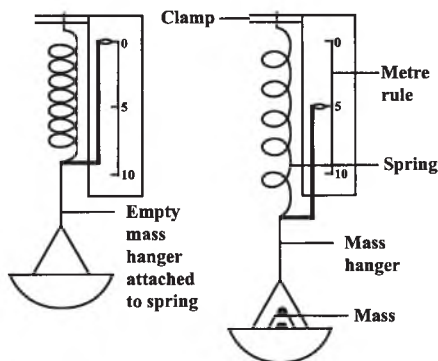


Figure 1. Extension of spring

GO ON TO THE NEXT PAGE

NOTHING HAS BEEN OMITTED.

GO ON TO THE NEXT PAGE

TABLE 1: ORIGINAL LENGTHS OF MATERIALS

Material	Original length/cm
Spring	
Rubber band	

(2 marks)

TABLE 2: EXTENSION DATA

Attached Mass or Load (g)	Spring		Rubber Band	
	Length of Spring (cm)	Extension of Spring (new length – original length of spring) (cm)	Length of Rubber Band (cm)	Extension of Rubber band (new length of rubber band – original length of rubber band) (cm)
0				
10				
20				
30				
40				
50				
60				
70				
80				
90				
100				

(8 marks)

(c) In Figure 2 on page 5, plot, on the **same** axes a line graph of extension against mass/load for

(i) the spring (5 marks)

(ii) the rubber band. (5 marks)

Note: The mass/load is on the horizontal (x) axis.
Use an appropriate scale for the vertical (y) axis.

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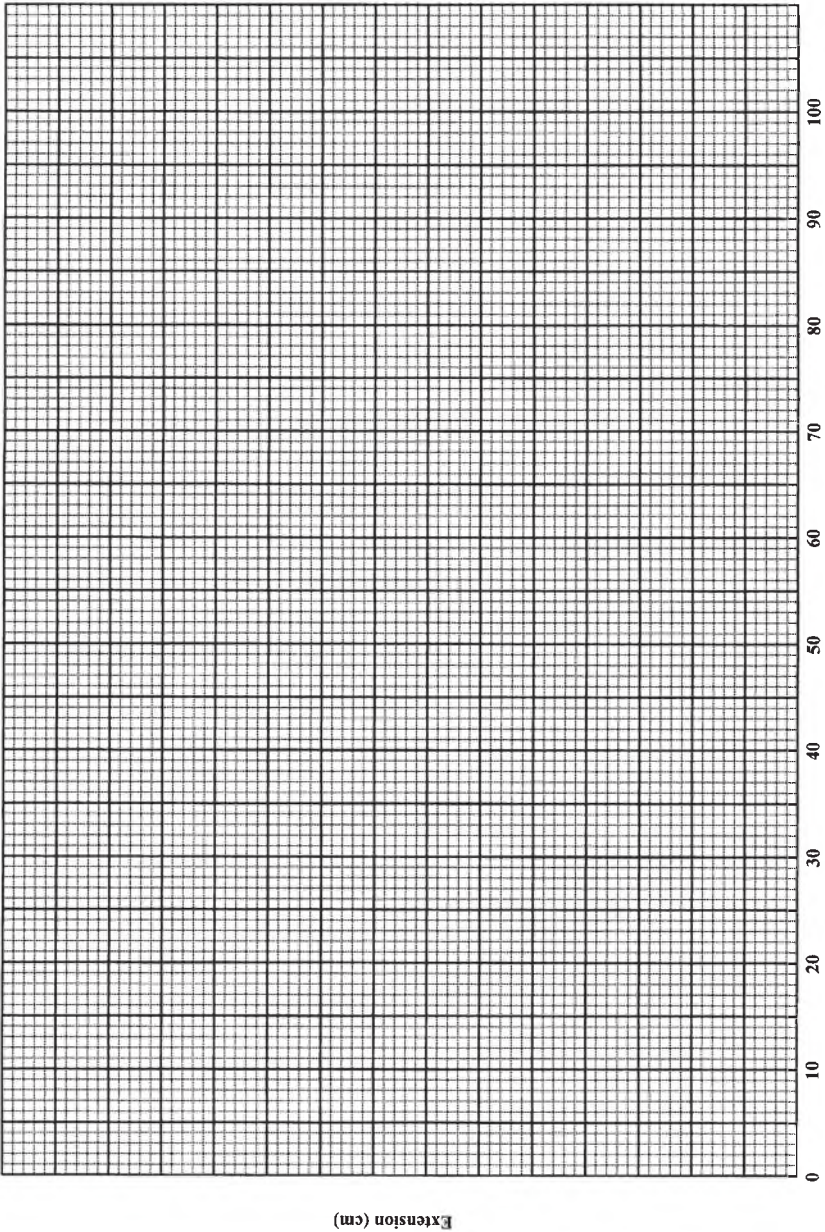


Figure 2.

GO ON TO THE NEXT PAGE

(d) Label your line graphs and Figure 2 appropriately. **(1 mark)**

(e) Extension per gram = greatest extension \div greatest load

Calculate the extension per gram for

(i) the spring

(1 mark)

(ii) the rubber band.

(1 mark)

(f) Deduce which material is more elastic.

(1 mark)

- (g) Refer to Table 2 and identify ONE dependent variable.

(1 mark)

- (h) State the step(s) you would take in order to compare the elasticity of a third material.

(2 marks)

Total 27 marks

GO ON TO THE NEXT PAGE

2. You are provided with a whole Irish potato (white potato), six strips of Irish potato of different lengths, tap water, brine and a ruler.
- (a) (i) Make a large drawing of a whole potato in the space provided in Figure 3.

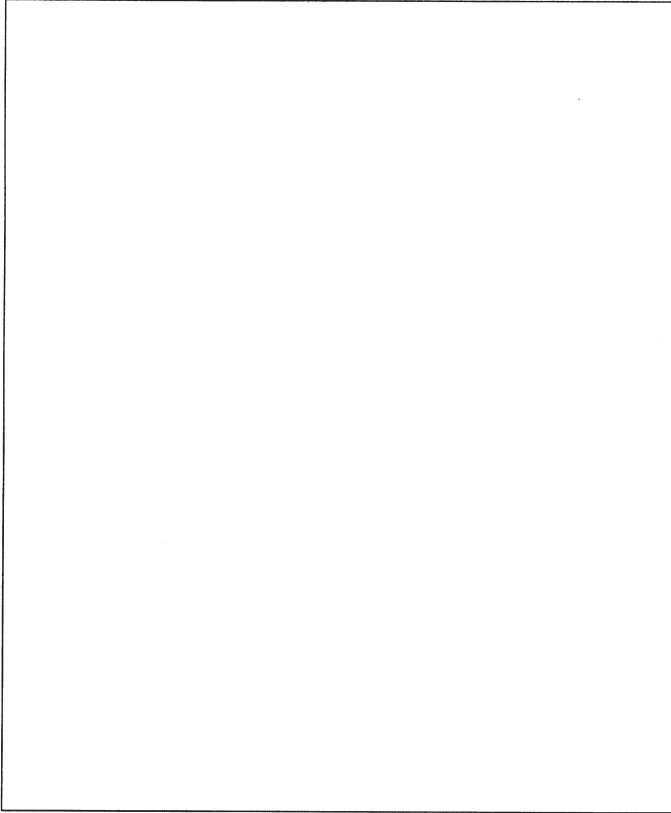


Figure 3

(3 marks)

- (ii) Write a title for this drawing.

Title _____ **(1 mark)**

- (iii) State the magnification.

Magnification: _____ **(1 mark)**

GO ON TO THE NEXT PAGE

- (b) (i) Measure the strips of potato and record your answers in Table 3.
- (ii) Place THREE strips of potato (at the same time) in brine for 20 minutes.
- (iii) Measure the length of EACH strip after 20 minutes and record the length in Table 3.
- (iv) Calculate the change in length after 20 minutes for EACH strip.
- (v) Repeat the steps from (ii) to (iv) with tap water.

TABLE 3: COMPARISON OF POTATO STRIPS

Strips	Type of Medium	Length at Start (cm)	Length after 20 Minutes (cm)	Change in Length (cm)
1	Brine			
2	Brine			
3	Brine			
4	Tap water			
5	Tap water			
6	Tap water			

(11 marks)

- (c) In the space provided in Figure 4, make a drawing of the actual size of strips 2 and 3 of the potato after 20 minutes.

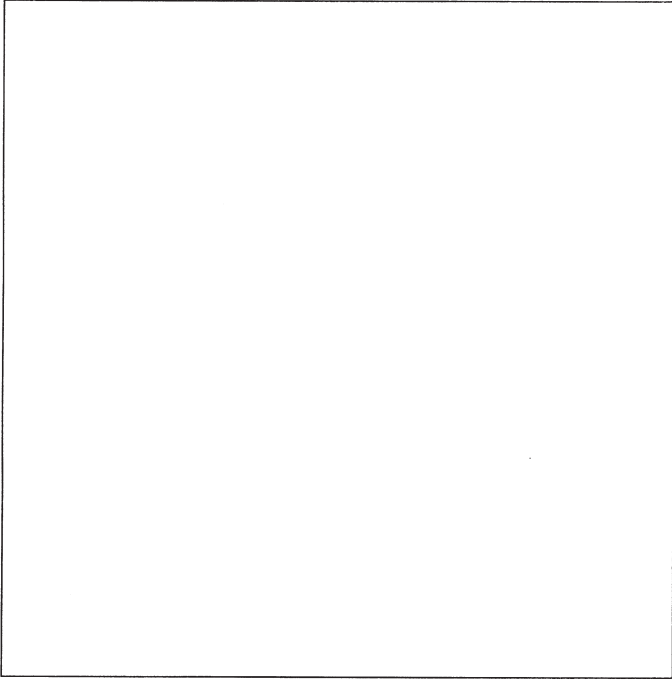


Figure 4

- (d) What patterns were observed with changes in length and type of medium? **(2 marks)**

(3 marks)

- (e) Explain any observed change(s) in the lengths of the potato strips.

(3 marks)

GO ON TO THE NEXT PAGE

- (f) Which variable was controlled for Strips 1, 2, 3, 4, 5 and 6?

_____ (1 mark)

- (g) Identify ONE manipulated variable.

_____ (1 mark)

- (h) Suggest ONE reason for using three strips in the same type of medium.

_____ (1 mark)

Total 27 marks

END OF TEST

CARIBBEAN EXAMINATIONS COUNCIL

SECONDARY EDUCATION CERTIFICATE
EXAMINATION

SPECIMEN
MULTIPLE CHOICE QUESTIONS
FOR

INTEGRATED SCIENCE

READ THE FOLLOWING DIRECTIONS CAREFULLY

Each item in this test has four suggested answers lettered (A), (B), (C), (D). Read each item you are about to answer and decide which choice is best.

Sample Item

Benzene dissolves stains caused by

- (A) fruit
- (B) paint
- (C) starch
- (D) tar

Sample Answer



The best answer to this item is “tar”, so answer space (D) has been shaded.

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1. Which of the gases below is a raw material for photosynthesis?
- (A) Oxygen
 - (B) Nitrogen
 - (C) Carbon monoxide
 - (D) Carbon dioxide
2. Which of the following blood groups has no antigen and, as a result, can be used in a blood transfusion to any person?
- (A) A
 - (B) B
 - (C) AB
 - (D) O
3. In the male reproductive system sperm is stored in the
- (A) prostate gland
 - (B) seminal vesicle
 - (C) testes
 - (D) vas deferens
4. Which of the following is NOT a structure of the seed?
- (A) Hypocotyl
 - (B) Plumule
 - (C) Pith
 - (D) Radicle
5. In the stem there is an upward movement of water in the
- (A) cambium
 - (B) epidermis
 - (C) phloem
 - (D) xylem
6. Iodine in potassium iodide solution, a watch glass and a dropper were used to carry out a food test. The food group being tested for was
- (A) fat
 - (B) protein
 - (C) starch
 - (D) sugar
7. Genetic information is contained in the
- (A) cell-membrane
 - (B) chromosome
 - (C) cytoplasm
 - (D) vacuole
8. During digestion, hydrochloric acid is secreted in the
- (A) intestine
 - (B) mouth
 - (C) oesophagus
 - (D) stomach
9. Which of the following processes eliminates the waste products of respiration?
- (A) Egestion
 - (B) Excretion
 - (C) Nutrition
 - (D) Osmoregulation
10. Which of the following is MOST likely to happen to a sunbather, with unprotected eyes, if he faces the sun for a long time?
- (A) Change in colour of the iris
 - (B) Damage to retina
 - (C) Double vision
 - (D) Drying out the aqueous humor

11. The pH of gastric juice produced in the stomach is

- (A) 1
- (B) 5
- (C) 7
- (D) 11

12. Liquids and gases normally expand when heated and contract when cooled. This behaviour explains the working of a

- (A) water pump
- (B) vacuum cleaner
- (C) tyre-pressure gauge
- (D) mercury thermometer

13. The gas which is produced by fish and used by aquatic plants is

- (A) carbon dioxide
- (B) hydrogen
- (C) nitrogen dioxide
- (D) oxygen

14. Electricity bills are worked out according to the number of units of electricity used.

1 unit = 1 kilowatt (kW) x 1 hour (h) = 1 kWh.

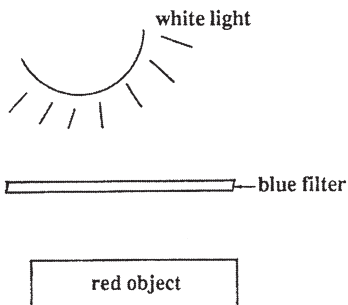
Five 100 W lamps are used in a home for three hours each day. How many units of electricity are used in 10 days?

- (A) $\frac{100 \times 5 \times 1000}{10}$
- (B) $\frac{3 \times 5 \times 1000}{100}$
- (C) $\frac{100 \times 5 \times 10}{1000}$
- (D) $\frac{100 \times 5 \times 3 \times 10}{1000}$

15. Which of the following is NOT a conductor of electricity?

- (A) Copper
- (B) Iron
- (C) Plastic
- (D) Tap water

16. The diagram below shows a blue filter held between a source of white light and a red coloured object.



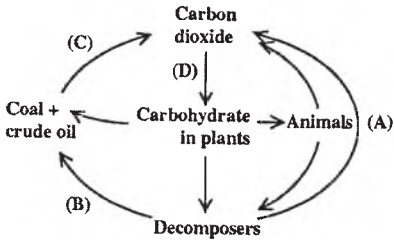
The object will appear to be

- (A) red
- (B) blue
- (C) purple
- (D) black

17. Brass is an alloy of

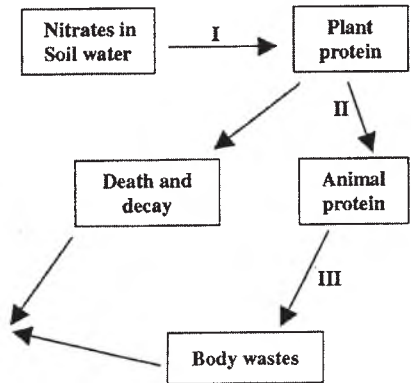
- (A) iron and carbon
- (B) copper and zinc
- (C) copper and tin
- (D) lead and nickel

Item 18 refers to the following diagram which illustrates the carbon cycle, with some parts labelled (A), (B), (C) and (D).



18. Where does the process of fossilization occur?
19. Which of the following would NOT contribute to the maintenance of a machine?
- (A) Greasing
 (B) Painting
 (C) Oiling
 (D) Rusting

Item 20 refers to the diagram below which shows part of a nitrogen cycle.



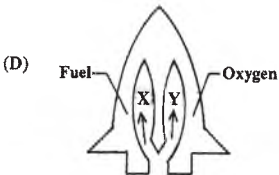
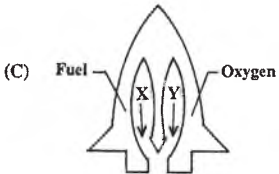
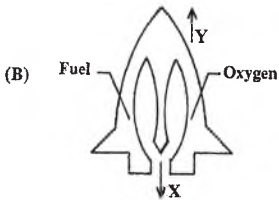
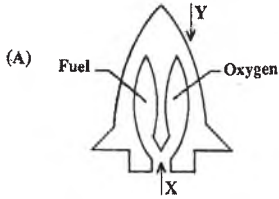
20. Excretion occurs at
- (A) I only
 (B) II only
 (C) III only
 (D) I and III only

21. One of the MAIN causes of soil erosion is
- (A) the ploughing of lands during the rainy season
 (B) allowing sheep to graze a pasture after the cattle are removed
 (C) heavy water run-off on unprotected soil
 (D) the failure to provide barriers to prevent landslips
22. The MINIMUM recommended time lapse between the eating of a full meal and the undertaking of vigorous activity is
- (A) 15 minutes
 (B) 30 minutes
 (C) 1 to 2 hours
 (D) 3 to 4 hours

23. The handle of a cricket bat is usually elastic. This property
- (A) enables the batsman to apply large forces
 (B) makes the bat sturdy
 (C) protects the batsman's fingers
 (D) reduces the shock to the batsman's hands
24. During an earthquake, the sea withdrew for several kilometres along the coast and returned as immense waves. What kind of waves are these?
- (A) Ground
 (B) Billow
 (C) Seismic
 (D) Tsunami

GO ON TO THE NEXT PAGE

Item 25 refers to the drawings below which indicate events taking place within a rocket engine. X indicates action force, and Y, reaction force.



25. Which diagram correctly indicates the action/reaction forces necessary to propel the rocket?

26. If an object displays unstable equilibrium, this means that its centre of gravity

- (A) is high
- (B) is low
- (C) can be shifted
- (D) lies outside the body

27. The eye of the hurricane is the

- (A) path along which it is moving
- (B) point at the front where the winds just about reach the speed of a standard hurricane
- (C) region in which the hurricane is located
- (D) central path of the hurricane

28. The force of gravity experienced by astronauts in a space ship in circular orbit around the Earth

- (A) is greater than on the Earth
- (B) is less than on the Earth
- (C) is the same as on the Earth
- (D) fluctuates

29. Blood boosting increases the number of red cells in the blood. An athlete whose blood has been boosted can perform better in a race because he

- (A) can absorb more oxygen
- (B) can breathe faster
- (C) is more immune to disease
- (D) is stronger

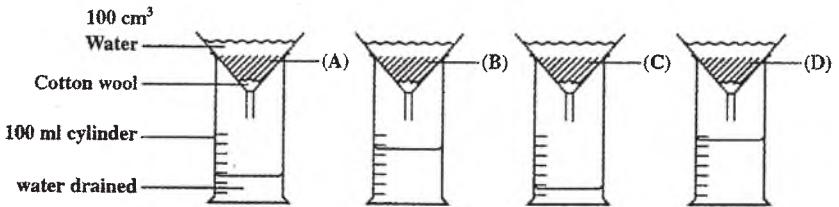
30. Which energy conversion sequence **BEST** summarises how electrical energy is generated by a diesel-powered generator?

- (A) Heat → chemical → mechanical → electrical
- (B) Chemical → heat → mechanical → electrical
- (C) Chemical → mechanical → heat → electrical
- (D) Heat → mechanical → chemical → electrical

GO ON TO THE NEXT PAGE

31. By which process does water pass from the ocean to the atmosphere?
- (A) Condensation
 - (B) Evaporation
 - (C) Precipitation
 - (D) Respiration
32. Which of the following processes can transfer heat in a vacuum?
- (A) Conduction
 - (B) Convection
 - (C) Evaporation
 - (D) Radiation
33. The jawbone is one example of a type of lever found in the human skeleton. This type of lever, when used together with the incisors in cutting, is an example of a
- (A) first class lever
 - (B) second class lever
 - (C) third class lever
 - (D) combination of first, second and third class levers

-
34. In order to determine which type of soil, (A), (B), (C), or (D), retained the most water, Kim carried out an experiment using apparatus shown below.

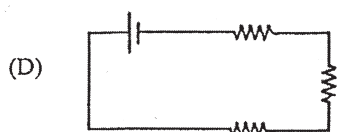
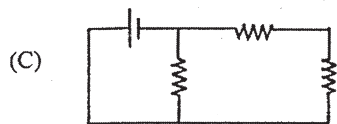
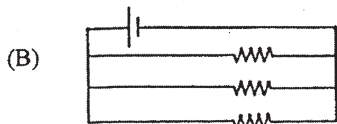
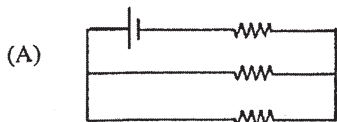


Which of the soils retained the MOST water?

-
35. Which of the following helps our sense of balance?
- (A) Cochlea
 - (B) Eardrum
 - (C) Ossicles
 - (D) Semi-circular canals
36. Which of the following types of tides occurs when the tide is highest?
- (A) High tide
 - (B) Neap tide
 - (C) Spring tide
 - (D) Tidal bulge

37. Which of the following shapes BEST describes incisor teeth?
- (A) Chisel-shaped
 - (B) Flat-topped
 - (C) Pointed
 - (D) Rounded
38. Which of the following is NOT normally excreted by the kidney?
- (A) Glucose
 - (B) Sweat
 - (C) Urea
 - (D) Water
39. Which of the following is NOT necessary to start a fire?
- (A) Fuel
 - (B) Nitrogen
 - (C) Oxygen
 - (D) Heat
40. Which of the following chemical is BEST for removing nail polish?
- (A) Acetone
 - (B) Methylated spirit
 - (C) Borax
 - (D) Washing soda
41. Which of the following household chemicals can be used to neutralize hydrochloric acid?
- (A) Sodium chloride
 - (B) Caustic soda
 - (C) Milk of magnesia
 - (D) Washing soda
42. The diagram below shows the range of wavelengths in the electromagnetic spectrum. In which region would radio waves be found?
- | | | | |
|-------------|----------|----------|----------|
| I | II | III | IV |
| 10^{14} m | 10^7 m | 10^3 m | 10^4 m |
- (A) I
 - (B) II
 - (C) III
 - (D) IV
43. Which of the following processes is likely to produce a significant cooling effect in a plant?
- (A) Transpiration
 - (B) Respiration
 - (C) Osmosis
 - (D) Diffusion
44. Which of the following systems are involved in the co-ordination of body functions?
- I. Endocrine
 - II. Nervous
 - III. Skeletal
- (A) I and II only
 - (B) I and III only
 - (C) II and III only
 - (D) I, II and III
45. Nerves carry messages using
- (A) electrical energy only
 - (B) heat energy only
 - (C) chemical and electrical energy
 - (D) chemical and heat energy

46. Which of the following circuit diagrams shows three resistors in series with a power source?



47. The pitch of a note from a vibrating body may NOT be altered by changing its

- (A) colour
- (B) density
- (C) length
- (D) tension

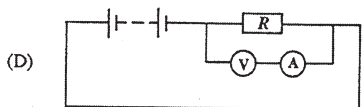
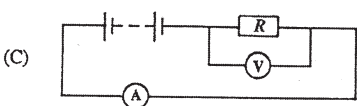
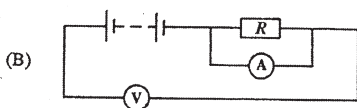
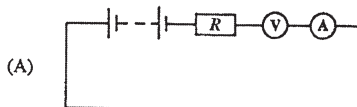
48. A land breeze is caused by

- (A) cool air rising and hot air taking its place
- (B) hot air rising and cool air taking its place
- (C) hot air falling and cool air taking its place
- (D) cool air rising with the hot air

49. Which of the following is found in clinical thermometers, but NOT in other thermometers?

- (A) Constriction
- (B) Glass index
- (C) Magnified scale
- (D) Mercury

50. Which of the following circuits shows the correct arrangement of an ammeter, A, voltmeter, V, resistor, R, and battery?



51. Which of the drugs below are sometimes used by athletes to improve their performance?

- (A) Depressants
- (B) Hallucinogens
- (C) Narcotics
- (D) Steroids

52. Which of the following processes usually takes about 280 days in human beings?

- (A) Fertilization
- (B) Menstruation
- (C) Conception
- (D) Gestation

53. Which of the following enzymes is responsible for the breaking down of starch?

- (A) Pepsin
- (B) Amylase
- (C) Renin
- (D) Trypsin

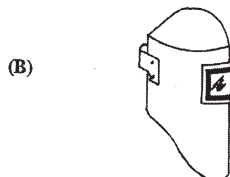
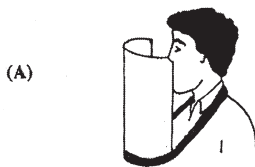
54. Food molecules that are absorbed through the walls of the small intestine are transported by

- (A) plasma
- (B) platelets
- (C) red blood cells
- (D) white blood cells

55. A substance X has a pH of 2. This means that X is a/an

- (A) acid
- (B) base
- (C) salt
- (D) alkali

Item 56 refers to four types of protective gear (A), (B), (C), and (D), represented in the diagrams below.



56. Which protective gear is MOST suitable for the welder?

57. The force which acts on all bodies in water causing them to appear to have less weight is called

- (A) upthrust
- (B) lift
- (C) gravity
- (D) thrust

58. Which of the following is emitted from a volcano?
- (A) Carbon sulphide
 - (B) Hydrogen sulphide
 - (C) Hyrdogen
 - (D) Oxygen
59. Which of the following is NOT associated with a cold front?
- (A) Slow fall in pressure
 - (B) Deep dense clouds
 - (C) Heavy thunderstorms
 - (D) Decrease in temperature
60. A raw material used to produce electrical energy in a nuclear reactor is
- (A) petroleum
 - (B) uranium
 - (C) biogas
 - (D) coal

CARIBBEAN EXAMINATIONS COUNCIL

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

INTEGRATED SCIENCE

SPECIMEN PAPER 2008

Item No.	Key
1	D
2	D
3	C
4	C
5	D
6	C
7	B
8	D
9	B
10	B
11	A
12	D
13	A
14	D
15	C
16	C
17	B
18	B
19	D
20	C
21	C
22	C
23	D
24	D
25	A
26	B
27	D
28	B
29	A
30	B

Item No.	Key
31	B
32	D
33	B
34	C
35	D
36	B
37	A
38	B
39	B
40	A
41	B
42	D
43	A
44	A
45	A
46	D
47	A
48	B
49	A
50	C
51	D
52	D
53	B
54	A
55	A
56	B
57	A
58	B
59	A
60	B

FORM TP 2009087

TEST CODE **01230020**

MAY/JUNE 2009

C A R I B B E A N E X A M I N A T I O N S C O U N C I L

**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)

GO ON TO THE NEXT PAGE

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

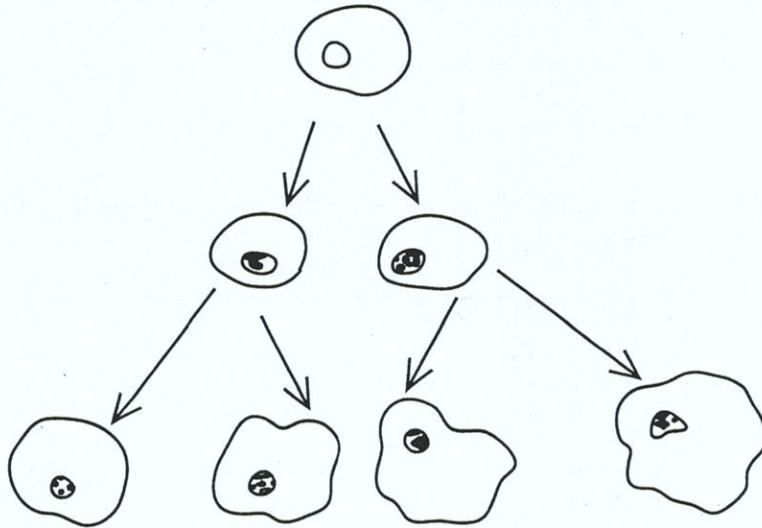


Figure 2. Reproducing unicellular organism

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

GO ON TO THE NEXT PAGE

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.

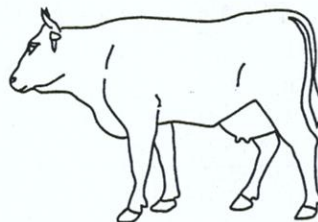


Figure 3. Ms Molly's cow

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)

GO ON TO THE NEXT PAGE

- (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.

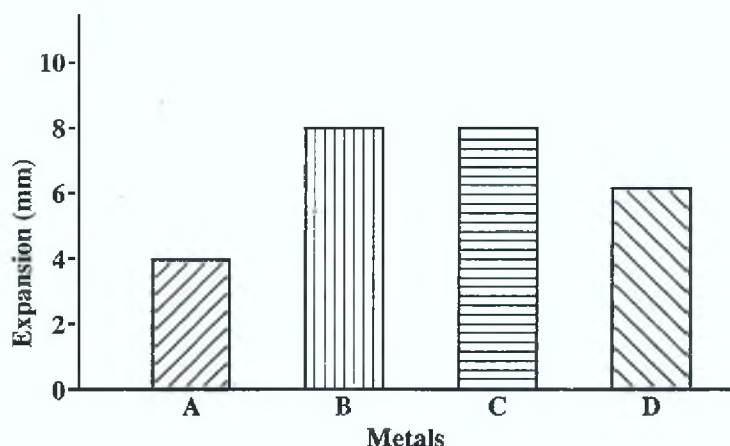


Figure 4. Expansion of some metals

- (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)

GO ON TO THE NEXT PAGE

(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.

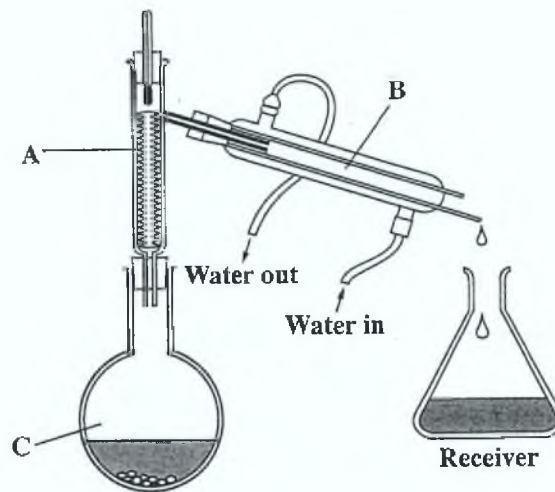


Figure 5. Fractional distillation apparatus

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

_____ (1 mark)

- (ii) Name the process occurring 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)

GO ON TO THE NEXT PAGE

(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.

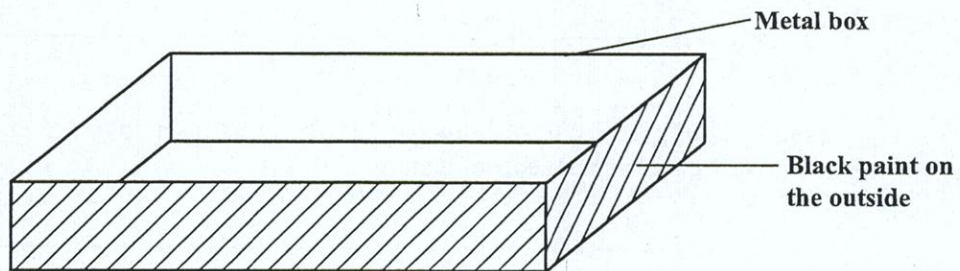


Figure 6. A simple solar water heater

(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.

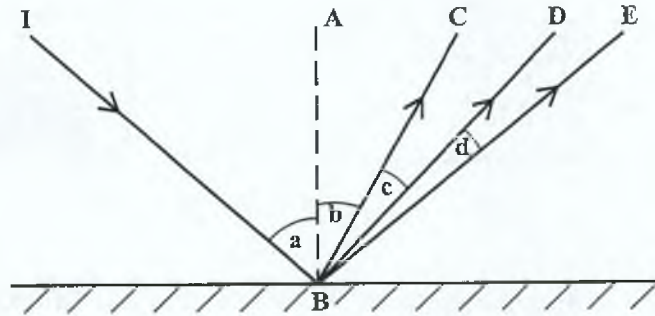


Figure 7. Rays of light incident on a mirror

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

_____ (1 mark)

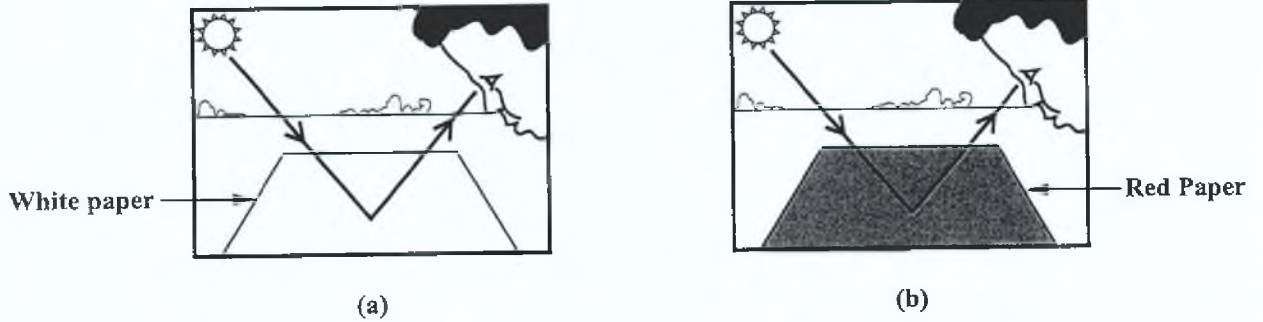
- (ii) Which of AB, BC, BD or BE represents

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.

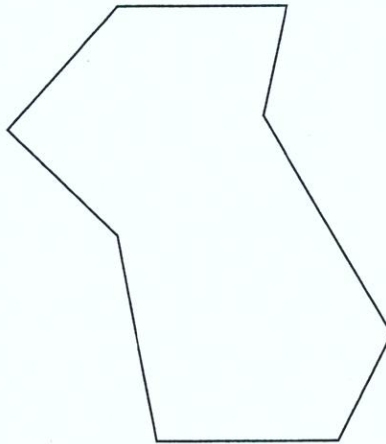


Figure 9. Diagram of an irregular-shaped piece of cardboard

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

(4 marks)

GO ON TO THE NEXT PAGE

- (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.

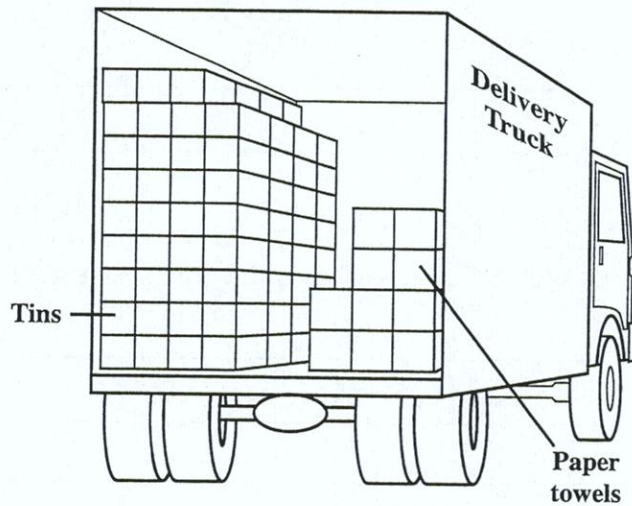


Figure 10. Delivery truck

- (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

C A R I B B E A N E X A M I N A T I O N S C O U N C I L**SECONDARY EDUCATION CERTIFICATE
EXAMINATION****INTEGRATED SCIENCE
(Single-Award)****Paper 03/2****General Proficiency****PRACTICAL PAPER***2 $\frac{1}{2}$ 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 consists of **TWO** questions. You should answer **BOTH** questions.
 3. Each question is divided into parts. Each part measures a particular skill. The allocation of marks to the skill within each part is given at the end of that part.
 4. You **MUST** read **ALL** instructions completely and carefully before you begin the questions.
- N.B.** Candidates are allowed to have practical notebooks and/or any materials relevant to the practical examination.

Candidates may be given additional materials without penalty.

If candidates lose time during the examination through no fault of their own, they must be awarded the equivalent time.

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Candidates are required to answer ALL questions.

1. You are provided with a beaker, a black ink pen, a filter paper, a pipette, a clock, ethanol, and some paper tape.
- (a) Using the black ink pen, mark a spot of 1 mm in diameter in the centre of the filter paper.
 - (b) Place the filter paper on the upright beaker.
 - (c) Using the pipette, gently place a drop of ethanol on the spot on the filter paper.
 - (d) Repeat every five minutes, for 30 minutes.
 - (e) Describe the colours observed on the filter paper in Table 1.

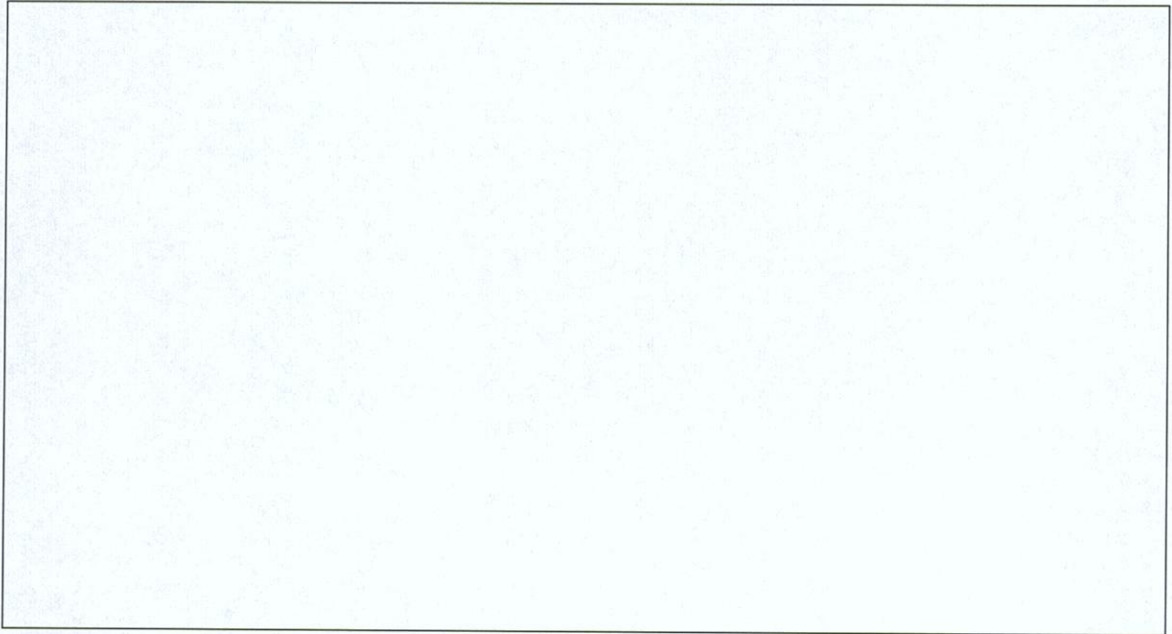
TABLE 1. COLOURS OBSERVED ON FILTER PAPER

Time	Colours observed

(11 marks)

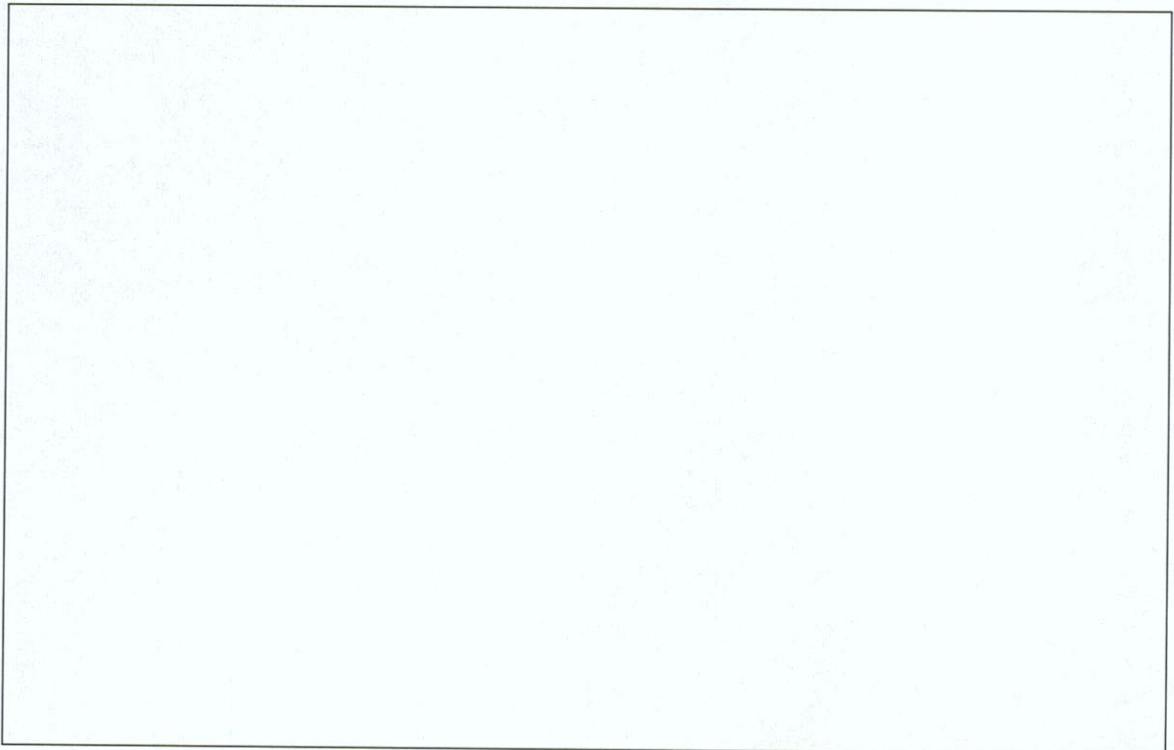
- (f) Using the tape provided attach your filter paper in Box 1.

BOX 1. FILTER PAPER



(1 mark)

- (g) In the space provided below, draw a diagram indicating how you used the beaker, filter paper and pipette.



(6 marks)

(h) Write an aim for this activity.

(1 mark)

(i) Write a corresponding conclusion for this activity.

(4 marks)

(j) In comparing two brands of ink, a manufacturer needed to determine, through an experiment, whether his red or black ink had the greater rate of movement across filter paper.

Write a possible hypothesis for the experiment.

(2 marks)

(k) Identify ONE variable that would be controlled in this experiment.

(1 mark)

Total 26 marks

2. You are provided with an ammeter, a voltmeter, a bulb, some wire, two 1.5 V dry cells, a pair of clips, four materials labelled W, X, Y and Z, and some paper tape.

Part A

- (a) Connect the circuit as shown in Figure 1 below. **(5 marks)**

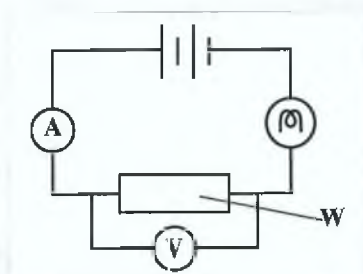


Figure 1. A series circuit

- (b) Connect material W to the circuit as shown in Figure 1.
- (c) Observe if the bulb lights, and read off the voltage from the voltmeter and the current from the ammeter. Record these observations and measurements in Table 2 below.
- (d) Repeat steps (b) and (c) using materials X, Y and Z.

TABLE 2. RESULTS TABLE

Materials	Does the bulb light? Yes/No	Voltage (V)	Current (A)
W			
X			
Y			
Z			

Part B

Use the results in Table 2 to answer the questions which follow.

- (a) Classify the materials W, X, Y and Z as either conductors or insulators:

W X

Y Z

(4 marks)

- (b) Using your results in Table 2 and the formula $V = I \times R$, calculate the resistance of any conductor, giving the correct units for your answer.

(4 marks)

- (c) Give a suitable hypothesis for this experiment.

(2 marks)

- (d) How would you use your results to calculate the wattage of the bulb?

(1 mark)

Total 28 marks

END OF TEST



TEST CODE **01230020**

MAY/JUNE 2010

FORM TP 2010084

C A R I B B E A N E X A M I N A T I O N S C O U N C I L

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

**INTEGRATED SCIENCE
(Single-Award)**

General Proficiency

Paper 02

2 hours

READ THE FOLLOWING DIRECTIONS CAREFULLY.

- 1.** This test is divided into TWO sections. Each section contains THREE questions. You should answer ALL SIX questions.
- 2.** You **MUST** use this answer booklet when responding to the questions. For EACH question, write your answer in the space provided and return the answer booklet at the end of the examination.
- 3.** You are advised to spend about one hour on each section.

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01230020/F 2010

SECTION A

**Answer ALL THREE questions.
(Suggested time: 60 minutes)**

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

1. In the diagram below, Figure 1A shows a sleeping child and Figure 1B a growing plant.

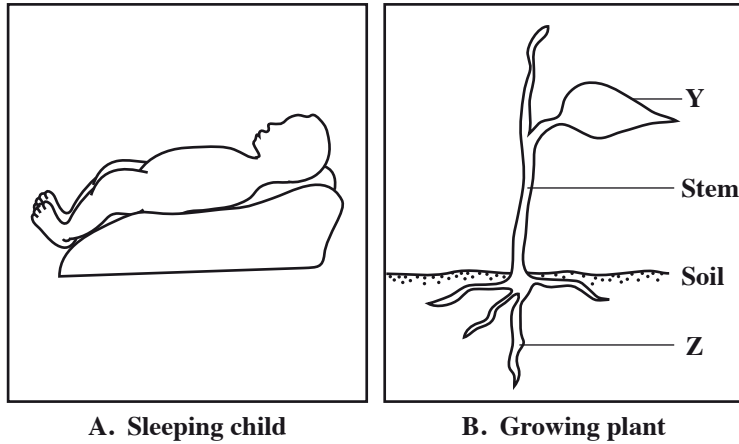


Figure 1. Two organisms

- (a) State ONE reason for the transport system in the
- (i) child _____ (1 mark)
- (ii) plant. _____ (1 mark)
- (b) Name TWO processes that are responsible for the movement of water at Y and Z in Figure 1B.
- _____
- _____ (2 marks)
- (c) On the diagram above, use THREE arrows in EACH case to show how
- (i) blood is circulated through the child's body in Figure 1A (3 marks)
- (ii) water moves into and out of the plant in Figure 1B. (3 marks)

GO ON TO THE NEXT PAGE

(d) Name the organ that pumps blood through the human body.

_____ (1 mark)

(e) On Figure 1A, place a point G at the possible centre of gravity of the sleeping child. (1 mark)

(f) Draw an arrow at G to show the direction of gravity on the body. (1 mark)

(g) State TWO features of the circulatory system that allow the blood to move from the child's leg to the heart.

_____ (2 marks)

Total 15 marks

2. Figures 2 and 3 show a dining room before and after dinner.



Figure 2. Before dinner



Figure 3. After dinner

(a) Name TWO household pests that may be present in the dining room if it is habitually left overnight as in Figure 3 and give a reason for the presence of these pests.

Pest 1: _____

Pest 2: _____

Reason: _____

(3 marks)

(b) Describe ONE way in which the pests named in (a) affect humans.

(2 marks)

(c) Give TWO methods for controlling household pests.

(2 marks)

- (d) Mosquitoes are carriers of dengue fever in many Caribbean Countries. Figure 4 shows the Smiths' backyard. Identify ONE object which may encourage the breeding of mosquitoes.

(1 mark)



Figure 4. The Smiths' backyard

- (e) There is no medicine to treat the virus that causes dengue fever. Suggest ONE way that the Smiths may assist in reducing the incidence of dengue fever.

(1 mark)

- (f) Name TWO **other** diseases spread by mosquitoes.

(2 marks)

- (g) Water from rainfall is collected from the roof in containers. Name TWO impurities that may be present in this water.

(2 marks)

- (h) Suggest TWO ways by which Mrs. Smith can make the water collected in the containers safe for drinking.

(2 marks)

Total 15 marks

3. Sophia hopes to become a member of the national swimming team. Her coach encourages her to do weightlifting, aerobics and running.

(a) (i) What is the effect of weightlifting on the muscles of the body?

(1 mark)

(ii) Suggest ONE benefit of aerobics and running that CANNOT be gained from weightlifting.

(1 mark)

(b) (i) The coach has recommended that Sophia eats more lean meats, peas, rice and sweet potatoes. What are the TWO food groups in her new diet?

(2 marks)

(ii) State ONE function of EACH of the food groups named in (b) (i) above.

(2 marks)

(c) Give ONE reason for EACH of the following:

(i) Sophia breathes faster when she is running.

(1 mark)

(ii) Sophia's heart beats faster when she exercises.

(1 mark)

GO ON TO THE NEXT PAGE

- (d) (i) Sophia's father, Mr. Pierre, decides to support her by joining in her exercises. Name ONE physical factor, other than fitness, which he must consider. Give ONE reason for your answer.

(2 marks)

- (ii) After one month, the amount of fat around Mr. Pierre's waist decreased. Explain how this fat was used by his body.

(2 marks)

- (e) Some athletes take performance enhancement drugs such as steroids which may result in their disqualification and ban from competition. What are THREE possible negative effects on Sophia's body if she uses steroids?

(3 marks)

Total 15 marks

SECTION B

Answer ALL THREE questions.
(Suggested time: 60 minutes)

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

4. Figure 5 shows FOUR members of a group, Jeany, Sueling, Sammy and Fred, on a stage rehearsing for a concert.

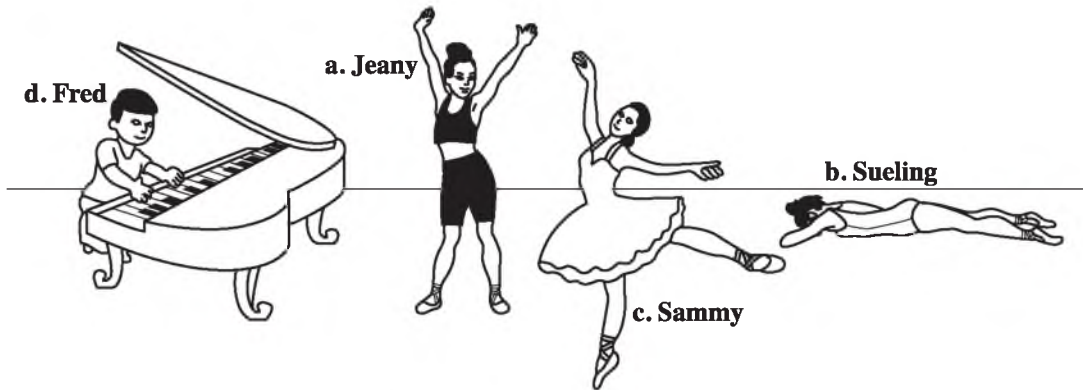


Figure 5. Members on stage

- (a) Identify the group member with the MOST stable equilibrium and state TWO reasons for your answer.

Group member: _____ (1 mark)

Reasons: _____

 _____ (2 marks)

- (b) Complete rows (i), (ii) and (iii) in Table 1 to show the correct stimulus, sense organ or major coordinating role during the rehearsal.

TABLE 1: STIMULUS, SENSE ORGAN AND COORDINATING ROLE

	Stimulus	Sense Organ	Major Coordinating Role
(i)	_____	Eye	Seeing others and objects to avoid collisions.
(ii)	Sound	Ear	_____
(iii)	Movement	_____	_____

(4 marks)

GO ON TO THE NEXT PAGE

- (c) Energy occurs in different forms and is used in different ways. To carry out their activities, each group member requires energy. Explain how energy is obtained and used in producing their movements.

(2 marks)

- (d) Label parts L and M on Figure 6, the internal structure of the eye shown below.

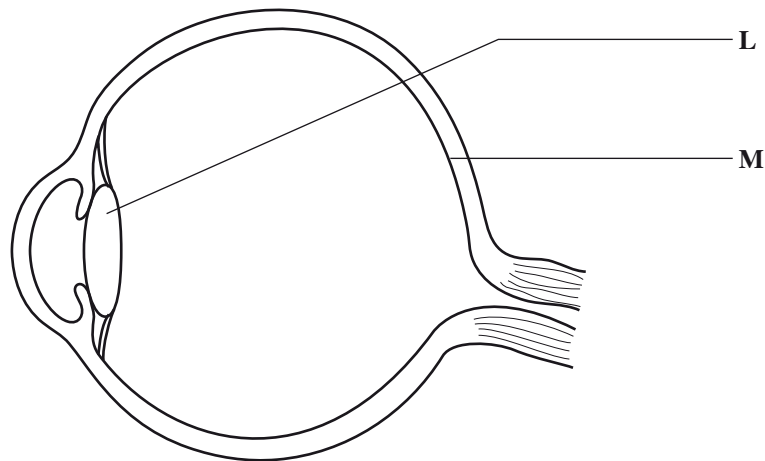


Figure 6. The internal structure of the eye

(2 marks)

- (e) Jenny's grandmother holds the newspaper at arm's length when reading it.

- (i) What is the most likely cause of this condition?

(1 mark)

- (ii) State TWO ways of correcting this defect.

(2 marks)

- (f) While preparing for her examinations, Jenny has been reading late into the night. What is ONE precaution that she can take to prevent damage to her eyes?

(1 mark)

Total 15 marks

5. Figure 7 shows the analog electricity meter of a household on 30 June 2008.

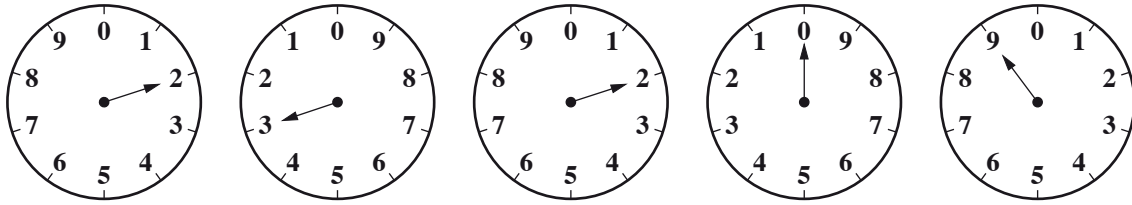


Figure 7. Diagram of an analog electricity meter

(a) (i) What is the function of an electricity meter?

(1 mark)

(ii) What is the reading on the meter shown in Figure 7?

(1 mark)

(iii) The reading of the meter on 01 June 2008 was 22 943 kWh. Calculate the amount of electricity used during the month of June.

(1 mark)

(iv) The power company determines that the cost of electricity is 70 cents for every kWh of electricity used. Calculate the cost of electricity for the month of June.

(2 marks)

(b) Table 2 below lists the wattage of some household items.

TABLE 2: WATTAGE OF HOUSEHOLD ITEMS

Item	Wattage	Time Used per Day (hours)	Energy Consumption/ (kWh per day)
Toaster	800	2	1.6
Refrigerator	900	24	(a) _____
Light bulb	75	12	0.9
Fan	100	6	0.6
Computer	250	4	1.0
Electric kettle	1300	(b) _____	3.9

(i) Complete Table 2 to show the missing values at (a) and (b).

(2 marks)

(ii) State THREE measures which the family of this household can implement to reduce energy consumption.

(3 marks)

- (iii) Which of the following is the most cost effective: using the fan for twelve hours instead of six hours OR using the toaster oven for two hours? Explain your answer.

(2 marks)

- (c) Distinguish between a 'switch' and a 'fuse'.

(1 mark)

- (d) Some homes in the Caribbean are powered by solar energy. State the energy changes that take place in these homes when an electric toaster oven is used.

(2 marks)

Total 15 marks

6. (a) Explain the concept of the conservation of linear momentum.

(2 marks)

- (b) Figure 8 shows a trolley of mass 20 kg, moving at a speed of 2 metres per second (2m/s). The trolley collides with a stationary toy truck of mass 10 kg.

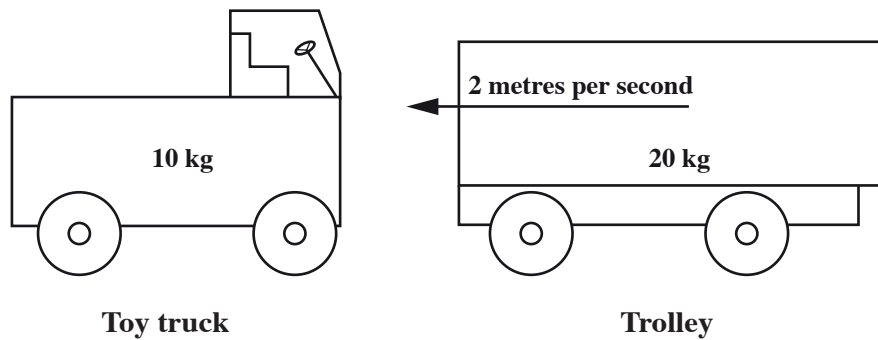


Figure 8. Diagram to show collision of a trolley with a truck

- (i) State TWO possible results of this collision.

(2 marks)

- (ii) Calculate the momentum of the truck if it was moving at a speed of four metres per second (4 m/s) towards the trolley.

(1 mark)

- (iii) State TWO possible results of the collision between the truck moving at the speed in (b) (ii) and the trolley.

(2 marks)

- (c) (i) Define the term 'energy' and state the unit of energy.

Energy is

The unit of energy is

(2 marks)

- (ii) What is the symbol for the unit of energy?

(1 mark)

(d) State the forms of energy present (i) before, (ii) during and (iii) after the trolley collides with the stationary toy truck.

(i) Before

(ii) During

(iii) After

(3 marks)

(e) The toy truck possesses gravitational potential energy. Explain where this energy comes from.

(2 marks)

Total 15 marks

END OF TEST

FORM TP 2010085



TEST CODE **01230032**

MAY/JUNE 2010

C A R I B B E A N E X A M I N A T I O N S C O U N C I L

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

**INTEGRATED SCIENCE
(Single-Award)**

Paper 03/2

General Proficiency

PRACTICAL PAPER

$2\frac{1}{2}$ hours

READ THE FOLLOWING DIRECTIONS CAREFULLY.

- 1.** This test consists of TWO questions. You should answer **BOTH** questions.
- 2.** 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.
- 3.** Each question is divided into parts. Each part measures a particular skill. The allocation of marks to the skill within each part is given at the end of that part.
- 4.** You **MUST** read **ALL** instructions completely and carefully before you begin the questions.

N.B. You are allowed to have practical notebooks and/or any materials relevant to the practical examination.

You may be given additional materials without penalty.

If you lose time during the examination through no fault of your own, you will be awarded the equivalent time.

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Answer ALL questions

1. You are provided with the following:

- Half of an okra/ochro (longitudinally cut)
- One soaked red bean
- One ruler
- Three petri dishes
- One scalpel
- 25 cm³ of iodine
- One pipette

Proceed as indicated below.

- (a) In the space provided, draw and label a diagram of the
- (i) cut okra/ochro
 - (ii) soaked red bean.

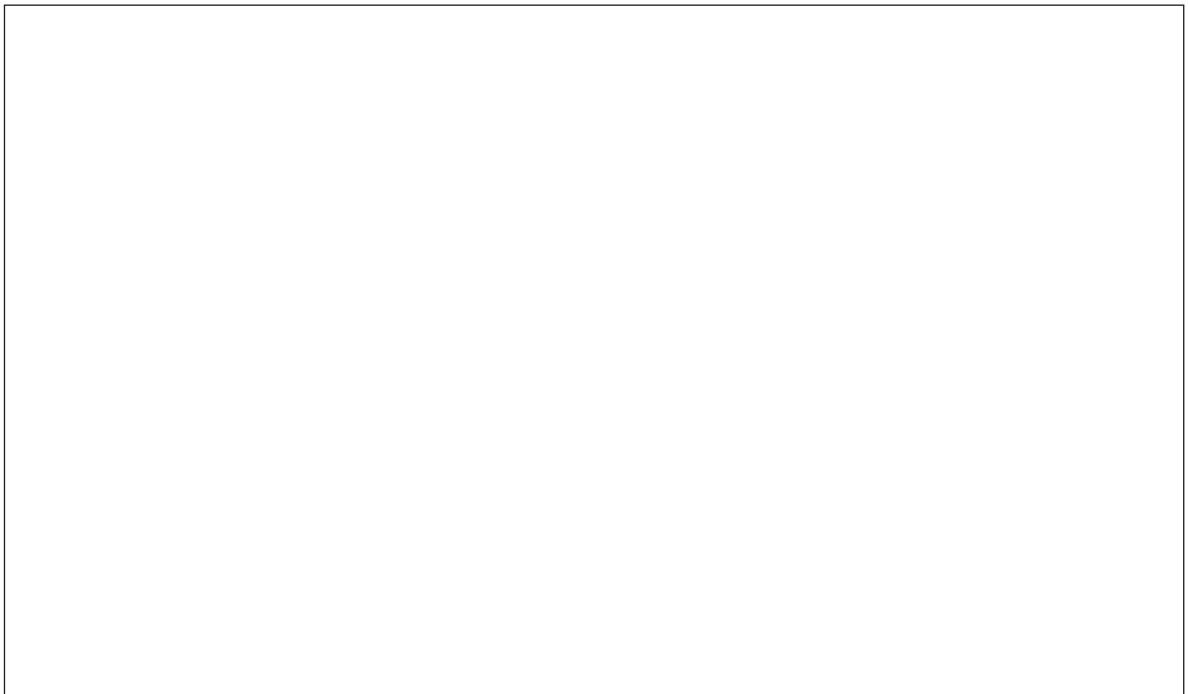


Diagram of an okra/ochro

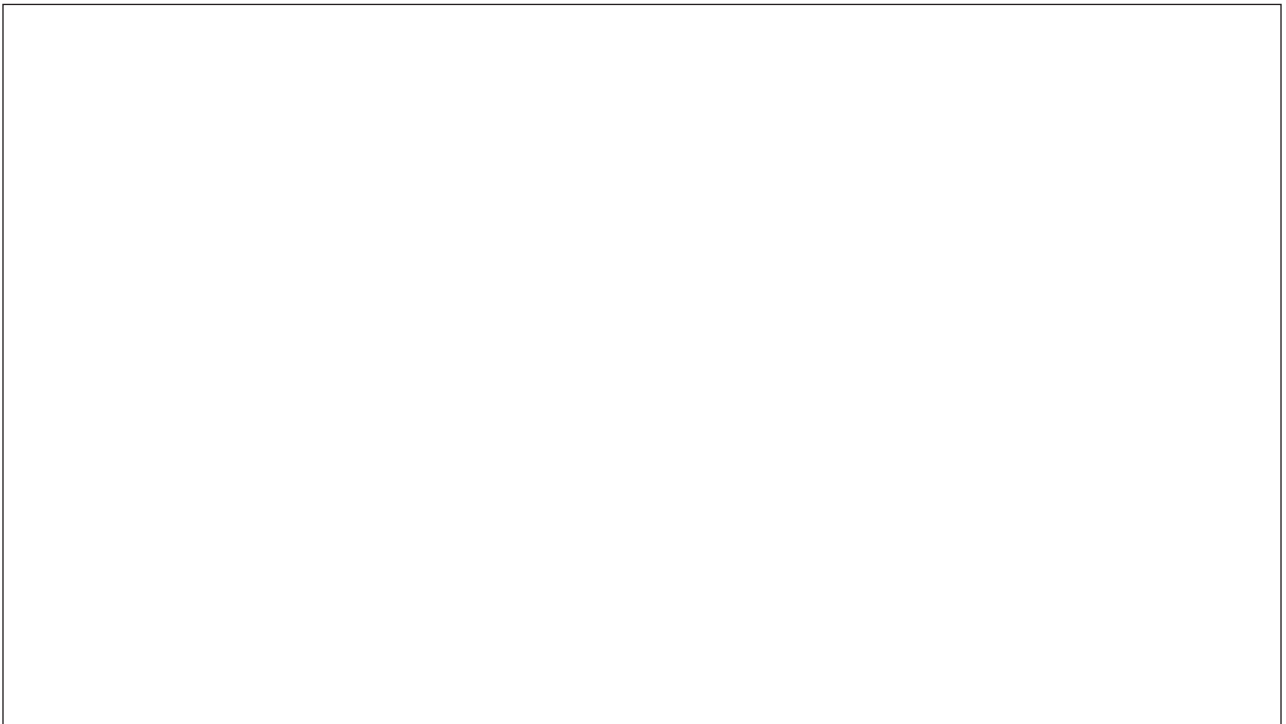


Diagram of a soaked red bean

(5 marks)

- (b) (i) Measure the length and diameter of the okra and record these measurements in Table 1.
- (ii) Measure the length of the bean and the width across its centre and record these measurements in Table 1.

TABLE 1: MEASUREMENTS RECORDED

Plant Material	Length (cm)	Diameter (cm)	Width (cm)
Okra			
Bean			

(8 marks)

- (c) Write a suitable title for Table 1.

(2 marks)

(d) Procedure

- I. Carefully remove ONE okra seed and crush it in a petri dish or saucer provided.
- II. Repeat Step I for a second okra seed in another petri dish or saucer provided.
- III. To EACH seed add THREE drops of iodine and record any colour change you observe.
- IV. Record your observations and inferences in Table 2 below.
- V. Carefully open the bean and crush one cotyledon in a petri dish or saucer.
- VI. To the crushed cotyledon, add three drops of iodine and note any colour change.
- VII. Record your observations and inferences in Table 2. (4 marks)

TABLE 2: FOOD TESTS

Plant Material	Observation	Inference
Okra seed 1		
Okra seed 2		
Bean cotyledon		

(e) Classify EACH of the plant materials as fruit or seed, giving ONE reason in EACH case.

Okra: _____

Reason: _____

Bean: _____

Reason: _____

(4 marks)

- (f) Suggest ONE reason why two okra seeds were used to perform the food test, instead of one seed.

(1 mark)

- (g) Suggest a suitable hypothesis for this investigation.

(2 marks)

Total 26 marks

2. You are provided with the following materials:

- A piece of wood, labelled A, of length 30 cm covered with **rough sand paper**. The piece of wood has a groove at one end.
- A piece of wood, labelled B, of length 30 cm covered with **grease proof/wax paper**. The piece of wood has a groove at one end.
- A mounted piece of wood, labelled C, with nails 2 cm apart attached at the side
- A small box of mass 100g

(a) Procedure

- I. Place the piece of wood labelled B on the mounted piece of wood labelled C such that the groove rests on the lowest nail. The nails are 2 cm apart.
- II. Place the small box approximately halfway up the piece of wood labelled B and observe what happens.
- III. Repeat Step II with a different slope using the nails on the mounted piece of wood labelled C to adjust the height, until the weight on the piece of wood labelled B just starts to slide.
- IV. Record, in Table 3, the height at which the weight just starts to move.
- V. Repeat Steps I to IV using the piece of wood labelled A instead of the piece of wood labelled B.

TABLE 3: RESULTS OF EXPERIMENT

Material	Height (cm)	Frictional force (_____) units
A		
B		

Frictional force = height in cm × 0.01 N/cm

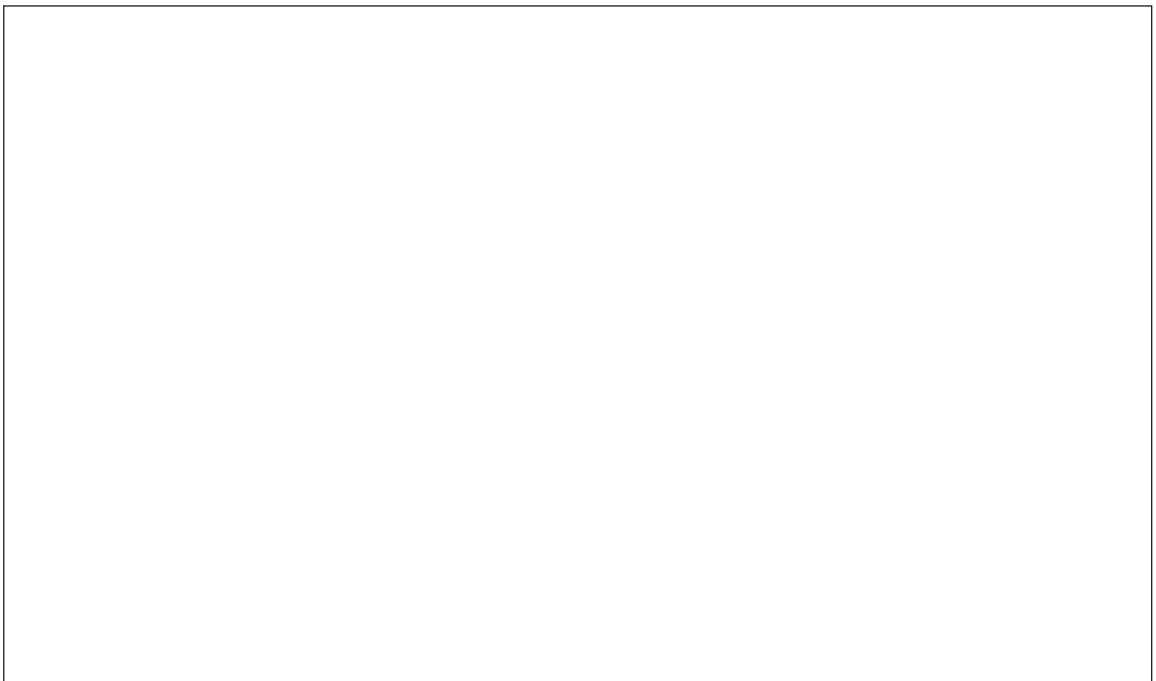
(6 marks)

- (b) (i) Use your results and the formula above to calculate the frictional force and record your results in Table 3. **(2 marks)**
- (ii) In the heading of Table 3, write the unit in which the frictional force is measured. **(1 mark)**

- (iii) From your results, state, **with an explanation**, which surface had the HIGHEST frictional force.

(2 marks)

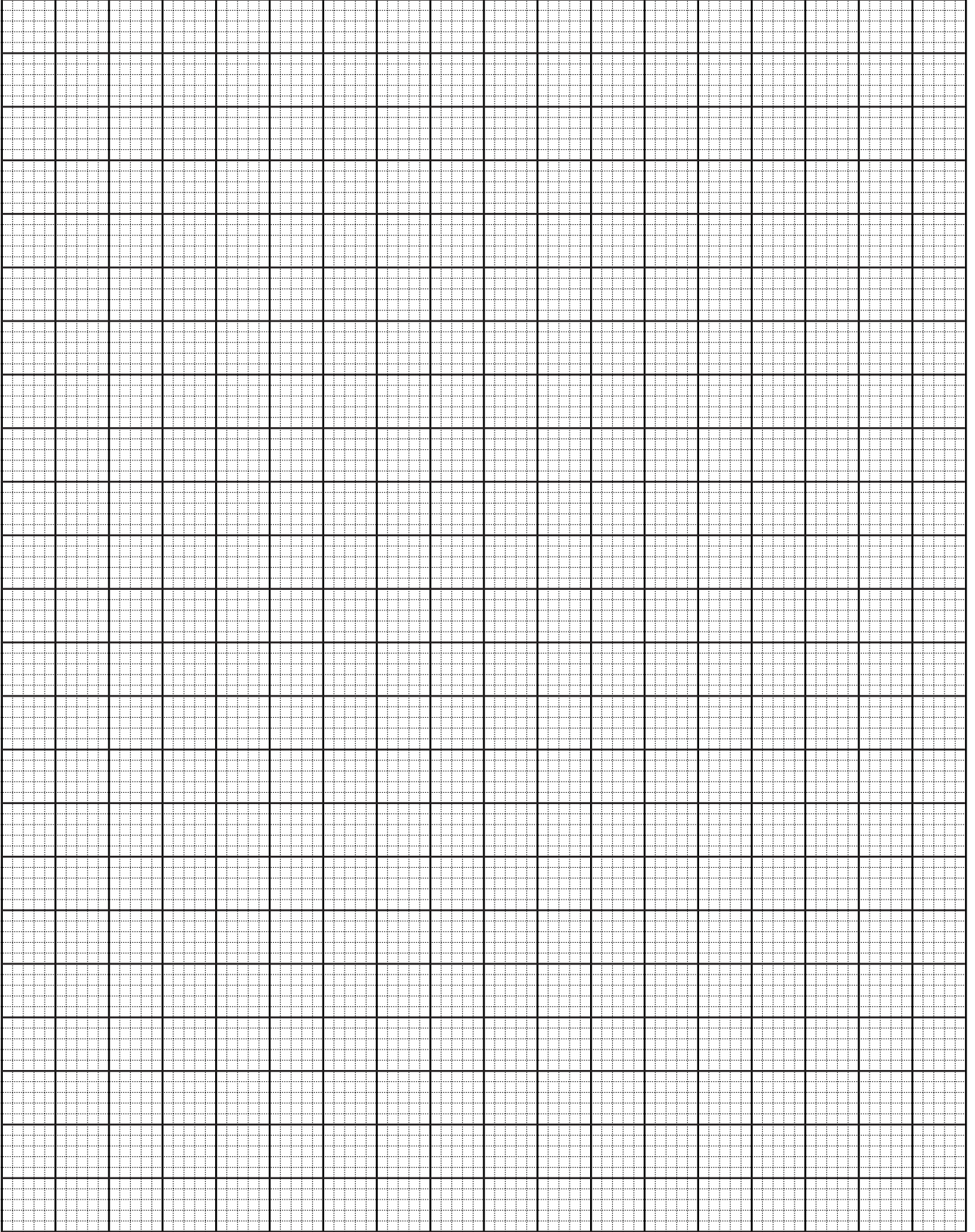
- (c) (i) In the space below, draw a labelled diagram of the apparatus as it was used.



(2 marks)

- (ii) Write a suitable title for this drawing.

(1 mark)



- (d) (i) Table 4 gives varying heights in centimetres. For EACH height, calculate the corresponding frictional force.

TABLE 4. FRICTIONAL FORCE

Height (cm)	Frictional force
0	
4	
8	
12	
16	
20	
24	
28	

(3 marks)

- (ii) Using the data in Table 4, plot a graph of the frictional force against height on the graph paper provided on page 8. **(6 marks)**
- (iii) Indicate on the graph the **MAXIMUM** frictional force for the box on the piece of wood labelled A. **(1 mark)**
- (iv) What is the frictional force on the box when the height is 15 cm?

(1 mark)

- (e) List **THREE** variables that were controlled in this experiment.

(3 marks)

Total 28 marks

END OF TEST



C A R I B B E A N E X A M I N A T I O N S C O U N C I L

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

**INTEGRATED SCIENCE
(Single-Award)**

General Proficiency

INSTRUCTIONS FOR SETTING UP THE PRACTICAL EXAMINATION

The attention of Supervisors is drawn to the *Supervisor's Report on the Practical Examination* which accompanies these instructions. The report **MUST** be filled in, placed on top of the completed scripts for the Practical Examination and sent to the appropriate marking centre.

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NOTES TO SUPERVISORS

A. On the day of the examination, the person responsible for preparing the practical **MUST** carry out the experiments as described on the question paper and **SEND** in a report using the attached form entitled “Supervisor’s Report on the Practical Examination”. If this is not done, candidates may be at a disadvantage.

N.B. The report should include any special conditions that might have affected candidates’ performances. Supervisors should specify whether all candidates were affected or if not, give the registration numbers of those candidates who were affected.

B. The experiments must be carried out using similar apparatus to, and the same materials as, those supplied to the candidates. They should also be performed at the same time as the examination or immediately before or after.

*The Supervisor’s work should **NOT** be seen by, nor should his/her results be communicated to the candidates.*

C. Candidates are allowed to have practical notebooks and/or materials relevant to the practical examination. Candidates may be given additional materials without penalty.

If candidates lose time during the examination through no fault of their own, they must be awarded the equivalent time.

GO ON TO THE NEXT PAGE

Each candidate should be provided with the following materials and apparatus:

Question 1.

- Half an okra/ochro cut in longitudinal section
- One red bean soaked in water overnight
- One ruler
- Three petri dishes (if these are not available glass or porcelain saucers may be used)
- One scalpel (if this is not available a razor blade may be used)
- 25 cm³ iodine solution
- One pipette/medicine dropper



Question 2.

- A retort stand. (If retort stand is not available a sturdy support for the wood strip C may be used as a replacement)
- A 100 g weight enclosed in a matchbox sized box which is totally covered with white bond paper
- Strip A – one piece of wood 30 cm long, 3 cm wide and 1 cm thick covered with rough sand paper. The piece of wood should have a groove 1 cm from the end which can accommodate the nail.

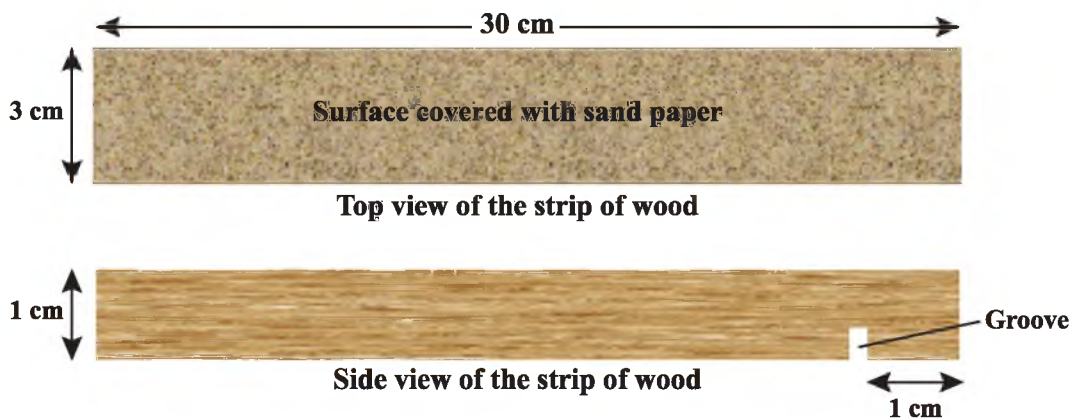


Figure 1 – Strip A

- Strip B – one piece of wood 30 cm long, 3 cm wide and 1 cm thick covered with grease proof paper. The piece of wood should have a groove 1 cm from the end which can accommodate the nail.

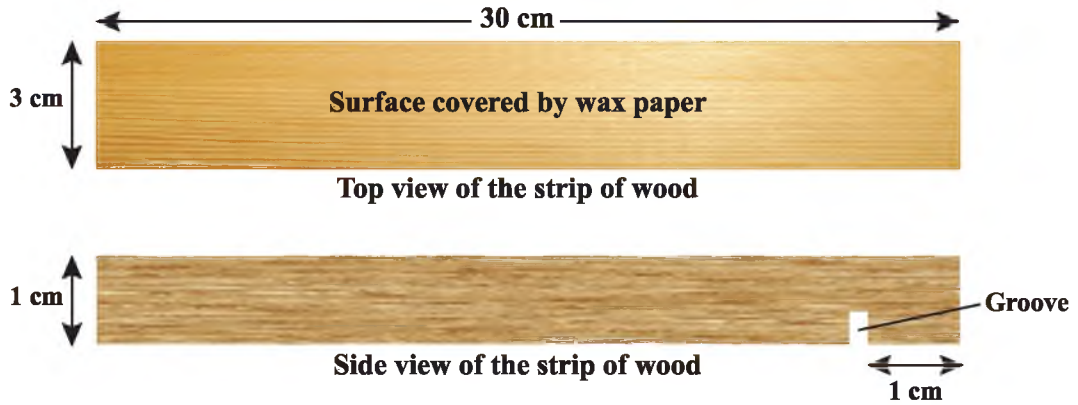


Figure 2 – Strip B

- Strip C – one piece of wood 30 cm long, 3 cm wide and 1 cm thick covered with headless nails (at least 3 inches or 7.5 cm) stuck at exactly 2 cm intervals in the side of the strip.

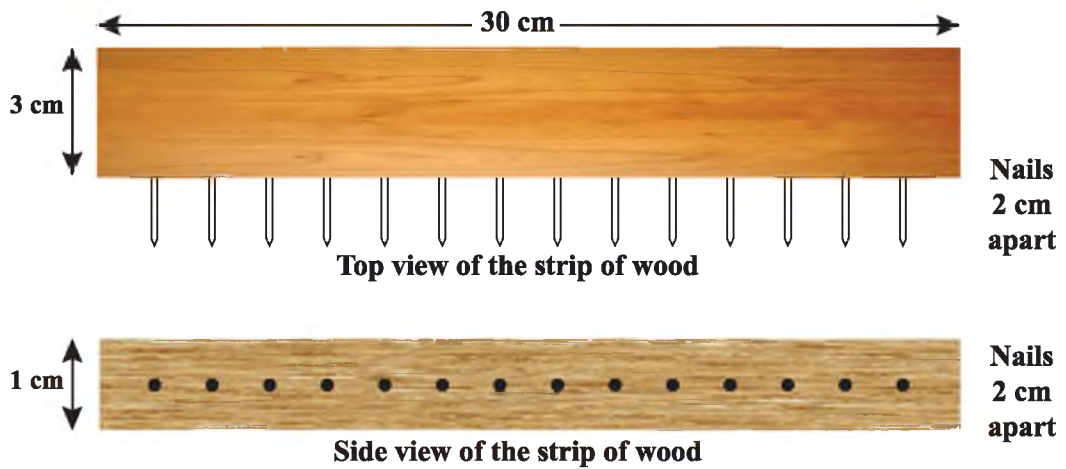


Figure 3 – Strip C

The apparatus must be assembled prior to the start of the examination as in Figure 4.

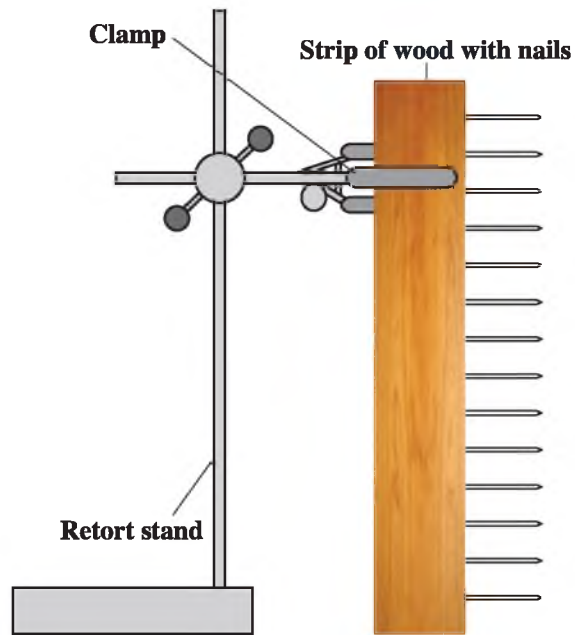


Figure 4



C A R I B B E A N E X A M I N A T I O N S C O U N C I L

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

**INTEGRATED SCIENCE
(Single-Award)**

General Proficiency

SUPERVISOR'S REPORT ON THE PRACTICAL EXAMINATION

**SCHOOL
CODE:**

**SCHOOL
NAME:** _____

**SUPERVISOR'S
NAME:**

The person responsible for setting up the examination MUST complete the back page of this report, which MUST accompany candidates' answer booklets for the Practical Examination and be sent to the appropriate marking centre.

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NOTES TO SUPERVISORS

A. On the day of the examination, the person responsible for preparing the practical **MUST** carry out the experiments as described on the question paper and **SEND** in a report using the attached form entitled “Supervisor’s Report on the Practical Examination”. If this is not done, candidates may be at a disadvantage.

N.B. The report should include any special conditions that might have affected candidates’ performances. Supervisors should specify whether all candidates were affected or if not, give the registration numbers of those candidates who were affected.

B. The experiments must be carried out using similar apparatus to, and the same materials as, those supplied to the candidates. They should also be performed at the same time as the examination or immediately before or after.

*The Supervisor’s work should **NOT** be seen by, nor should his/her results be communicated to the candidates.*

C. Candidates are allowed to have practical notebooks and/or materials relevant to the practical examination. Candidates may be given additional materials without penalty.

If candidates lose time during the examination through no fault of their own, they must be awarded the equivalent time.

The supervisor must carry out the instructions given to the candidates in Questions 1 and 2 and record the observations or measurements in Table 1, Table 2 and Table 3 respectively.

TABLE 1. MEASUREMENTS RECORDED

Plant Material	Length	Diameter	Width
Okra			
Bean			

TABLE 2. FOOD TESTS

Plant Material	Observation	Inference
Okra 1		
Okra 2		
Bean cotyledon		

TABLE 3.

Material	Height (cm)
A	
B	



TEST CODE **01230020**

FORM TP 2011089

MAY/JUNE 2011

C A R I B B E A N E X A M I N A T I O N S C O U N C I L

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

INTEGRATED SCIENCE

Paper 02

2 hours

READ THE FOLLOWING DIRECTIONS 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. The use of a silent non-programmable calculator is permitted.

SECTION A

Answer ALL FOUR questions.

1. (a) Light energy is converted to another type of energy when green plants make food.

(i) What kind of energy is stored in this food?

_____ (1 mark)

(ii) What substance is combined with carbon dioxide during photosynthesis?

_____ (1 mark)

(b) Describe how plants and animals may become fossil fuels.

_____ (2 marks)

(c) Country X is a flat, tropical island. The electricity generating company in Country X uses a petroleum-based fuel. Name TWO alternative sources of energy that can be used for electricity generation in this country.

(i) _____ (1 mark)

(ii) _____ (1 mark)

(d) For EACH alternative source named in (c) above, give ONE disadvantage which may cause the electricity generating company to resist using the alternative source of energy identified.

(i) _____
_____ (1 mark)

(ii) _____
_____ (1 mark)

GO ON TO THE NEXT PAGE

(e) Recently, many used (pre-owned) vehicles have been imported from Japan and the United States into the Caribbean. This has resulted in an increase in the number of vehicles on the roads and increased amounts of carbon dioxide in the air.

(i) Name TWO other pollutants which are being added to the atmosphere because of the increase in the number of vehicles.

(2 marks)

(ii) State ONE negative effect of ONE of the pollutants named in (e) (i) above, on the environment.

(1 mark)

(iii) Suggest TWO negative effects of increased levels of carbon dioxide on the Caribbean environment.

(2 marks)

(iv) What are TWO possible effects of increased levels of air pollution on the health of Caribbean people?

(2 marks)

GO ON TO THE NEXT PAGE

- (f) There have been serious concerns about the build-up of carbon dioxide in the atmosphere in recent years. Table 1 provides data about carbon dioxide emissions by China and the United States.

TABLE 1: AMOUNT OF CARBON DIOXIDE EMITTED BY CHINA AND THE UNITED STATES FROM 1968 TO 2008

	Carbon Dioxide Emission (in billion tonnes) by Year								
	1968	1973	1978	1983	1988	1993	1998	2003	2008
China	0.7	1.1	1.5	1.6	2.4	2.9	3.3	4.3	6.9
USA	4.3	5.2	5.3	4.8	5.4	5.7	6.2	6.4	6.4

(Data modified from BP p.l.c.)

- (i) Figure 1 on page 5 shows the data for USA. On the **same** grid, using the scales provided, plot a graph to represent the data for China. **(5 marks)**
- (ii) Label the axes on the graph. **(1 mark)**
- (iii) State an appropriate title for the graph.
- _____ **(1 mark)**
- (iv) During which period was there a DECREASE in the amount of carbon dioxide emitted by the USA?
- _____ **(1 mark)**
- (v) In which year did China emit the same amount of carbon dioxide as the United States?
- _____ **(1 mark)**
- (vi) Based on the trends in the graphs, which country would produce more carbon dioxide in 2010?
- _____ **(1 mark)**

Total 25 marks

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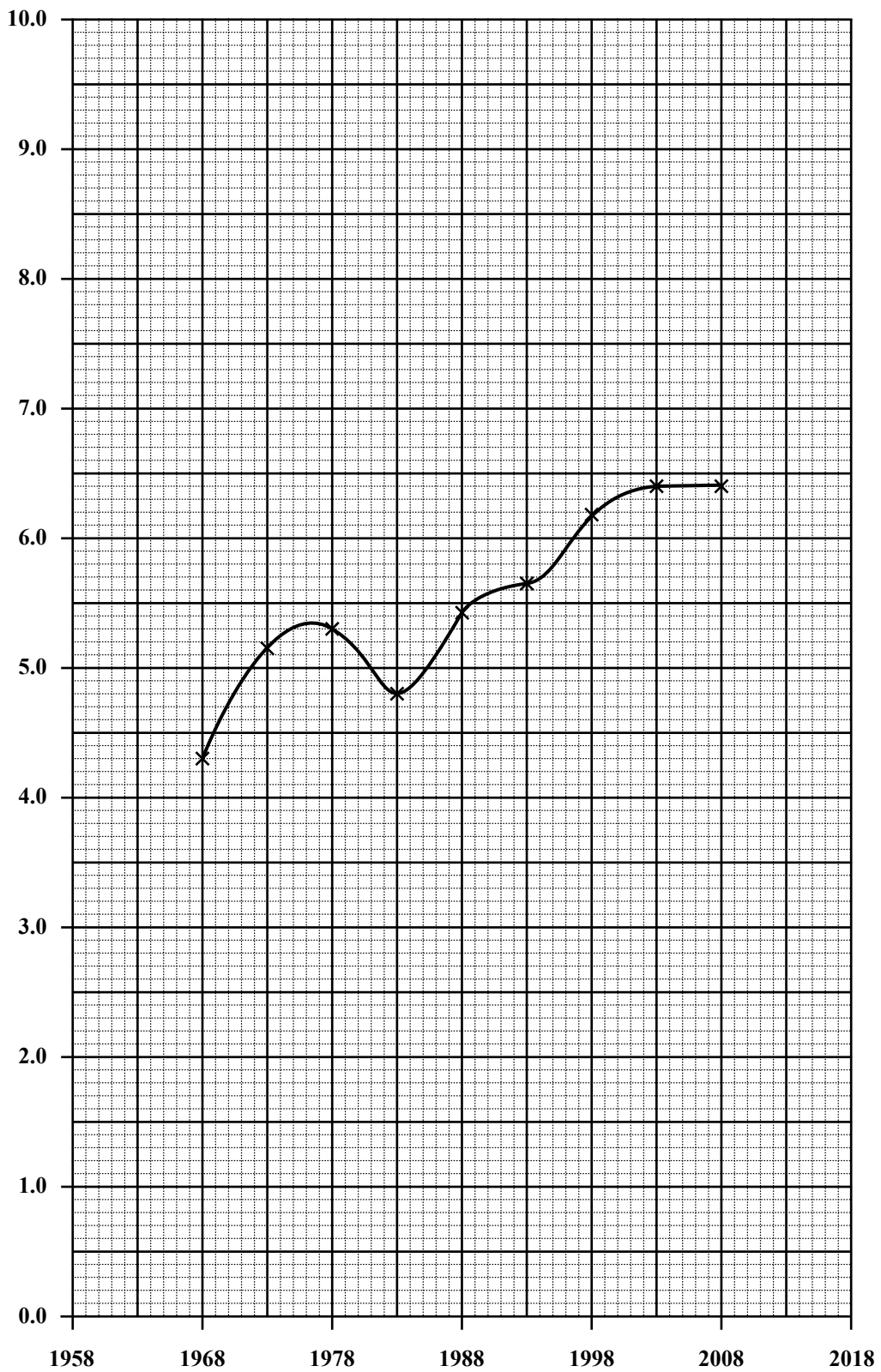


Figure 1. Carbon dioxide emission

GO ON TO THE NEXT PAGE

2. Figure 2 shows a terrestrial food chain.

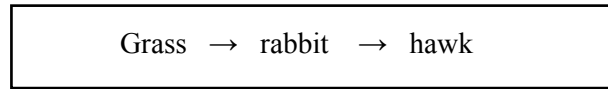


Figure 2. A terrestrial food chain

(a) (i) State TWO similarities in structure between a typical cell in the grass and a typical cell in the rabbit.

(2 marks)

(ii) State TWO differences in structure between a typical cell in the grass and a typical cell in the rabbit.

(2 marks)

(b) (i) Identify a producer in Figure 2.

(1 mark)

(ii) Give a reason for your answer in (b) (i).

(1 mark)

(iii) What is a likely effect on the food chain if a drought kills all the grass in that area?

(1 mark)

GO ON TO THE NEXT PAGE

(c) Figure 3 shows a vertical section of a tooth.

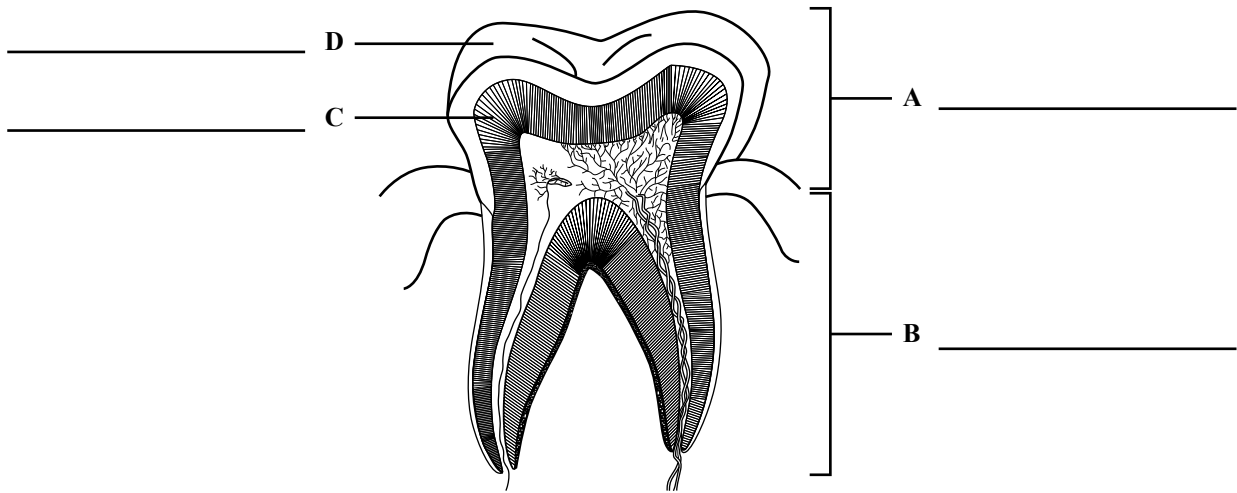


Figure 3. Vertical section of a tooth

(i) Identify the parts labelled A, B, C and D. Write your answer in Figure 3. **(4 marks)**

(ii) Name the type of tooth shown in Figure 3.

_____ **(1 mark)**

(iii) Name ONE other type of tooth.

_____ **(1 mark)**

(iv) Suggest TWO features of a rabbit's teeth that make them suitable for its diet.

_____ **(2 marks)**

Total 15 marks

GO ON TO THE NEXT PAGE

3. (a) A carpenter working outdoors decided to take a break. He left all his tools in the sun. When he returned, he picked up a nail and the hammer by its wooden handle to finish the job. He observed that the handle of the hammer was warm and the nail was hot.

(i) Suggest how heat energy is transferred.

(2 marks)

(ii) Explain why the handle of the hammer and the nail had different temperatures.

(2 marks)

(iii) The carpenter automatically drops the hot nail as he picks it up. Explain how the nervous systems causes the carpenter to respond in this manner.

(4 marks)

(iv) Name the process by which the heat is transferred from the nail to the carpenter's hand.

(1 mark)

GO ON TO THE NEXT PAGE

- (v) On very hot days the carpenter prefers to hold the nails with a glove made of thick cloth. How does the glove prevent his hand from being burnt by the nail?

(1 mark)

- (b) Figure 4 is an incomplete diagram showing the formation of a sea breeze.

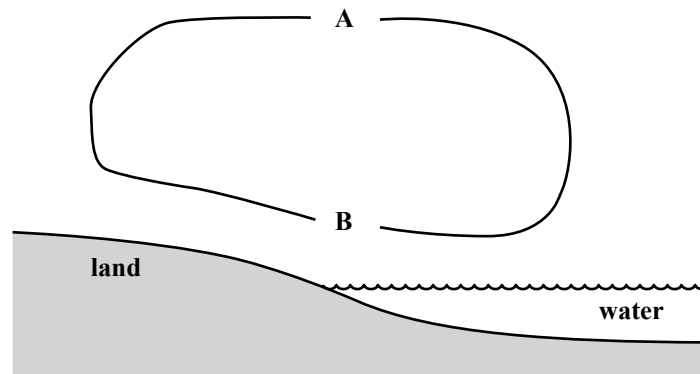


Figure 4. Diagrammatic representation of a sea breeze

- (i) What is meant by convection as it relates to heat?

(1 mark)

- (ii) Indicate on Figure 4 the MOST likely direction of the airflow by placing arrows at A and B. (1 mark)

- (iii) Explain why the air flows in the direction that you indicated on Figure 4.

(3 marks)

Total 15 marks

GO ON TO THE NEXT PAGE

4. Figure 5a represents a circuit that Cherise constructed to test the conductivity of various objects in her home. Figure 5b shows how she connected the objects to be tested across terminals X and Y with the switch closed.

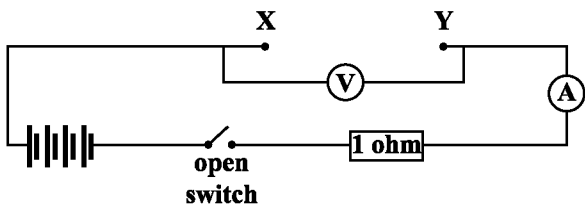


Figure 5a. Open circuit

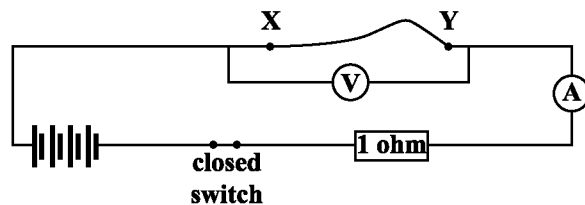


Figure 5b. Closed circuit

- (a) Consider the following list of materials: aluminium, carbon, copper, plastic, rubber and wood.

- (i) Choose TWO very good conductors from the list above.

_____ (2 marks)

- (ii) Choose ONE very good insulator from the list above.

_____ (1 mark)

- (b) (i) If ONE dry cell provides a voltage of 1.5 volts, what is the voltage of the battery made up of four dry cells as shown in Figure 5a?

_____ (1 mark)

- (ii) What is the reading of the ammeter in Figure 5a when the switch is open?

_____ (1 mark)

- (iii) How will the value of the ammeter reading change when Cherise places a piece of conducting wire between X and Y as shown in Figure 5b?

_____ (1 mark)

- (iv) When Cherise places a 2 ohm resistor between X and Y in Figure 5a and closes the switch, the voltmeter reads 4V. What formula can she use to calculate the current?

_____ (1 mark)

GO ON TO THE NEXT PAGE

(v) From (iv) calculate the current in the circuit. Include the correct unit in your answer.

(2 marks)

(vi) Give ONE reason why it is beneficial to use a fuse in this circuit.

(1 mark)

(c) Cherise has a radio which can be powered either by batteries or electricity from the mains. State TWO precautions that Cherise can take to prevent electrical shock or fire when this radio is connected to the electrical outlets.

(i) _____

(1 mark)

(ii) _____

(1 mark)

(d) Identify the MOST appropriate fire extinguisher to put out an electrical fire.

(1 mark)

(e) Name TWO items of protective gear that firemen wear when fighting fires.

(i) _____

(1 mark)

(ii) _____

(1 mark)

Total 15 marks

SECTION B

Answer BOTH questions.

Write your answers on the pages provided at the end of each question.

5. Figure 6a shows a diagram of a vertical section through the human eye.

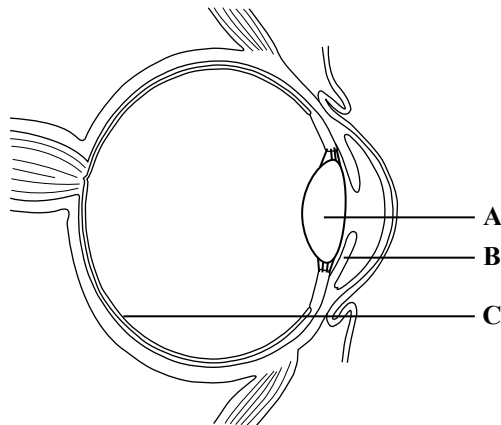


Figure 6a. Vertical section through a human eye

- (a) Name the structures labelled A, B and C in Figure 6a. **(3 marks)**
- (b) State the functions of the structures labelled A and B. **(2 marks)**
- (c) Figure 6b shows the journey that Fred needs to take to reach his home.

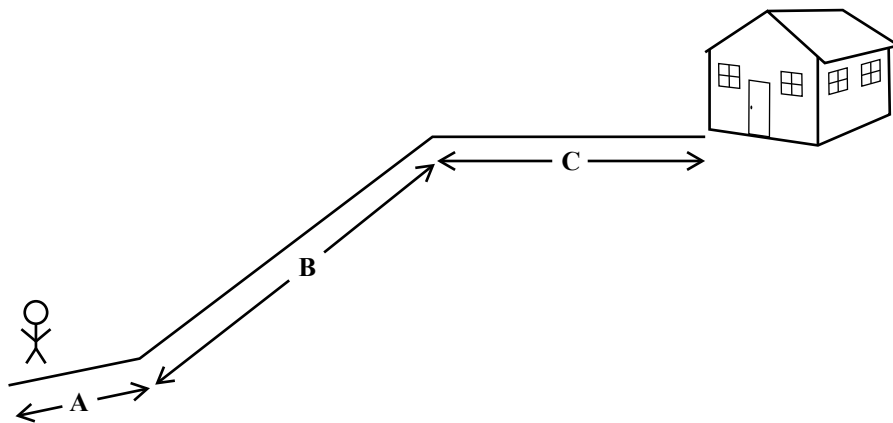


Figure 6b. Fred's journey to his home

- (i) Sometimes Fred runs up the slope. Explain how his breathing and heart rate change as he runs up the slope. **(5 marks)**
- (ii) Which TWO **sense** organs enable Fred to run up the slope? Explain your answer. **(5 marks)**

GO ON TO THE NEXT PAGE



TEST CODE **01230032**

FORM TP 2011090

MAY/JUNE 2011

C A R I B B E A N E X A M I N A T I O N S C O U N C I L

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

INTEGRATED SCIENCE

Paper 03/2 – Alternative to SBA

2 hours

In addition to the 2 hours, candidates are allowed 10 minutes to read through the entire paper. Writing may begin during the 10-minute period.

READ THE FOLLOWING DIRECTIONS 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. The use of a silent non-programmable calculator is permitted.

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01230032/F 2011

Answer ALL questions

1. Jerome used the information in Table 1a to prepare the materials depicted in Figure 1a. He then assembled the parts to make a homemade balance.

TABLE 1a. MATERIALS USED TO MAKE THE BALANCE

Parts of the Balance	Materials Used
Equal arms	Notched 100 cm long rod with two small holes at the end.
Base of balance	A 50 cm x 20 cm long block which is 5 cm high with a 1 cm diameter hole drilled to accommodate the fulcrum rod.
Pivot rod	A 50 cm long rod which has a diameter of 1 cm.
Scale pans	Two cups with a base of diameter 5 cm. Three holes are drilled at the top. The reel of string is used to attach the scale pans to the equal arms.

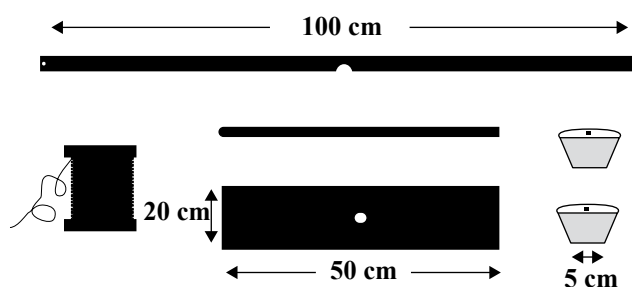


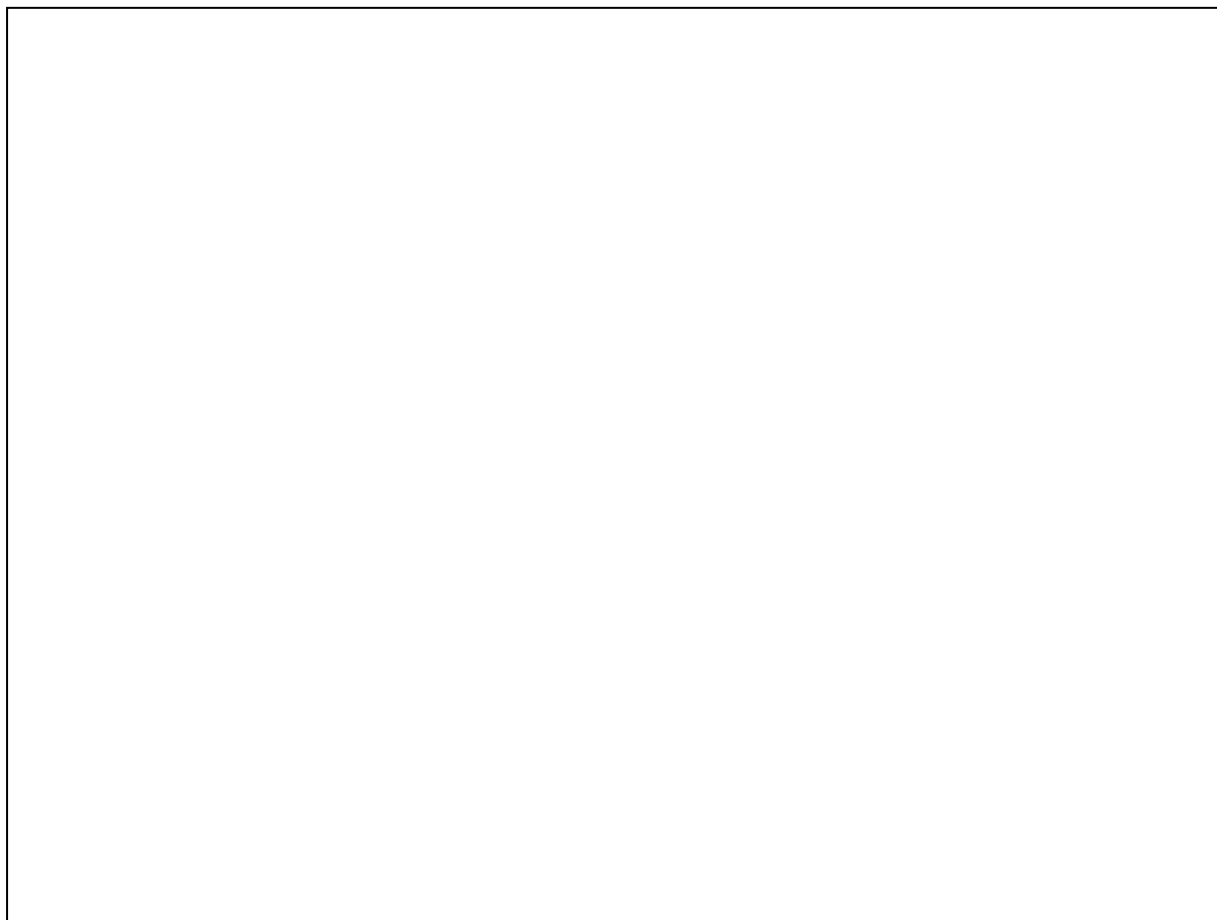
Figure 1a

- (a) Make a large labelled drawing of the assembled balance in the space provided on page 3. Your drawing should be two dimensional and include:

- Correct labelling
- Clear lines
- The title of the drawing

(5 marks)

GO ON TO THE NEXT PAGE



- (b) The centre of gravity of the block and pivot rod for two designs of the base block is marked by a dot in Figure 1b. Draw an arrow to represent the weight of each block and pivot rod in Figure 1b.

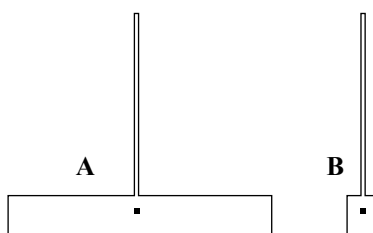


Figure 1b

(1 mark)

(c) Pivot rod and block A and pivot rod and block B have been tilted through the same angle in Figure 1c below.

(i) On which side will A fall when it is released?

_____ (1 mark)

(ii) Give a reason for your answer in (c) (i) above.

_____ (1 mark)

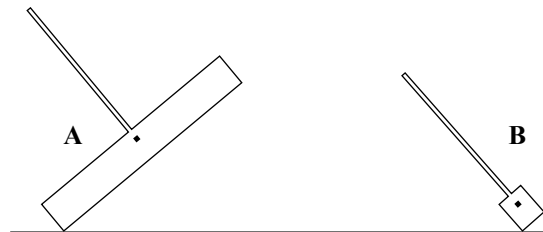


Figure 1c

(iii) On which side will B fall when it is released?

_____ (1 mark)

(iv) Give a reason for your answer in (c) (iii).

_____ (1 mark)

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- (d) Jerome uses the spring balance in Figure 1d to find the mass of the coins he intends to use with his equal arm balance. He is curious about the effect of adding more of the same kind of coins on the spring balance, so he adds more coins to the spring and records the total mass in Table 1b.

TABLE 1b. MASS OF COINS

No. of Coins	Mass (g)
0	
1	4.5
2	7.0
3	7.5
4	
5	11.5
6	14.0
7	16.5

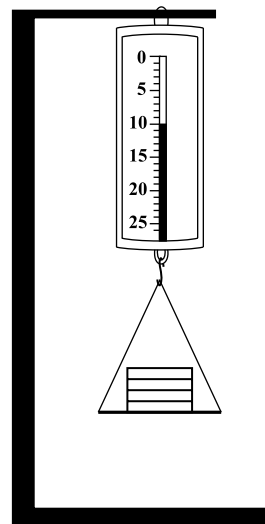
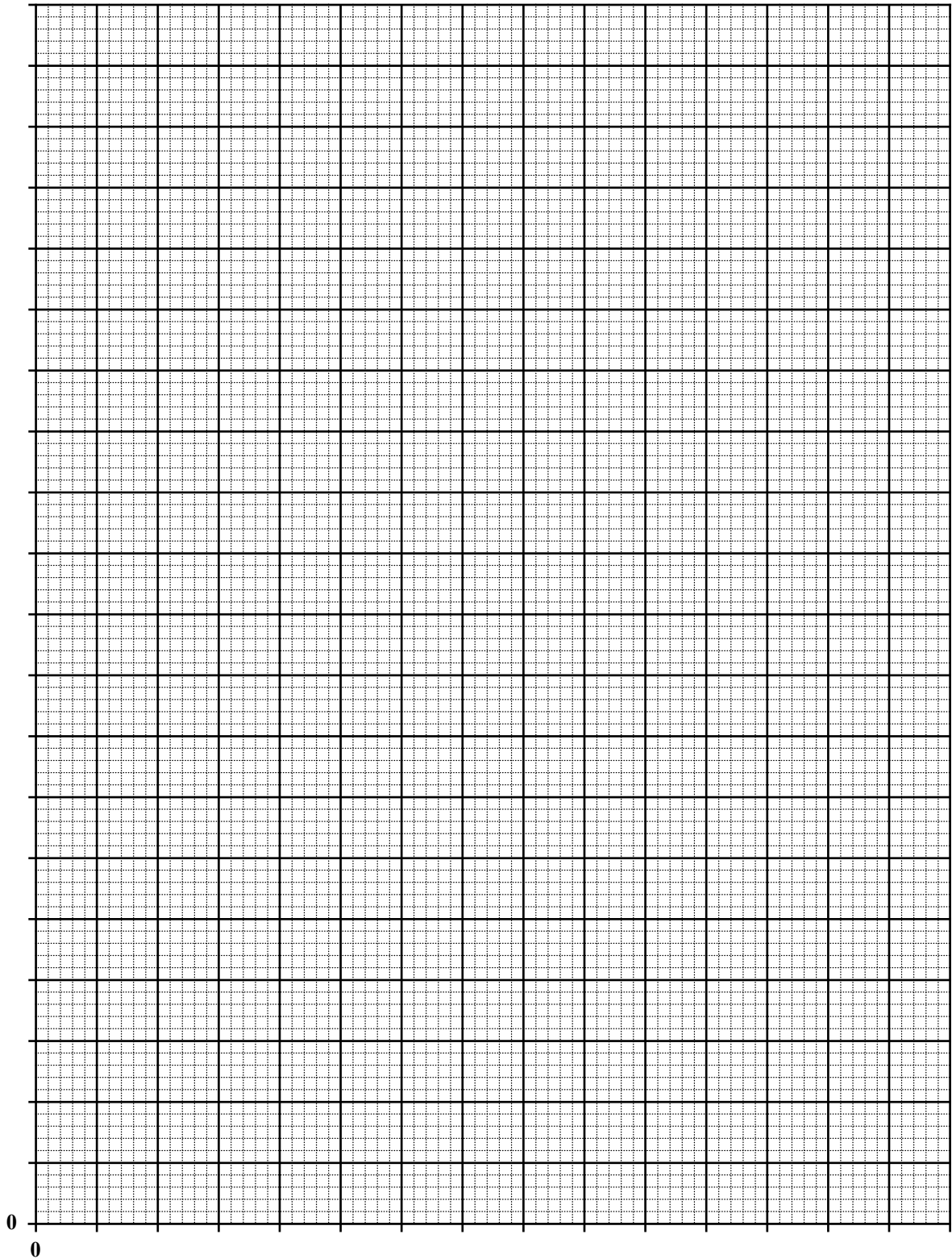


Figure 1d

- (i) What is the reading on the scale in Figure 1d when FOUR coins are placed on the pan?
- _____
- (2 marks)**
- (ii) On the graph paper provided on page 6, plot a line graph of Jerome's results for the mass against the number of coins. Start both scales at 0 and include your reading for four coins in the plot. Draw the best-fit straight line. Extend the line to cut the vertical axis.
- (6 marks)**
- (iii) Label the axes on the graph.
- (1 mark)**
- (iv) State an appropriate title for the graph.
- _____
- (1 mark)**
- (v) Use your graph to determine the reading when there are no coins on the scale pan.
- _____
- (2 marks)**
- (vi) Write a hypothesis relating the effect of adding additional coins on the mass recorded by the spring balance.
- _____
- _____
- (2 marks)**

GO ON TO THE NEXT PAGE



Total 24 marks

GO ON TO THE NEXT PAGE

NOTHING HAS BEEN OMITTED

2. An experiment was set up to demonstrate the movement of solvent into cells. Four strips of potato were placed in a petri dish containing 50 cm³ of water. The dimensions of the strips at the start of the experiment are indicated in Figure 2a. The actual dimensions of the potato strips 4 hours after the start of the experiment are indicated in Figure 2b.

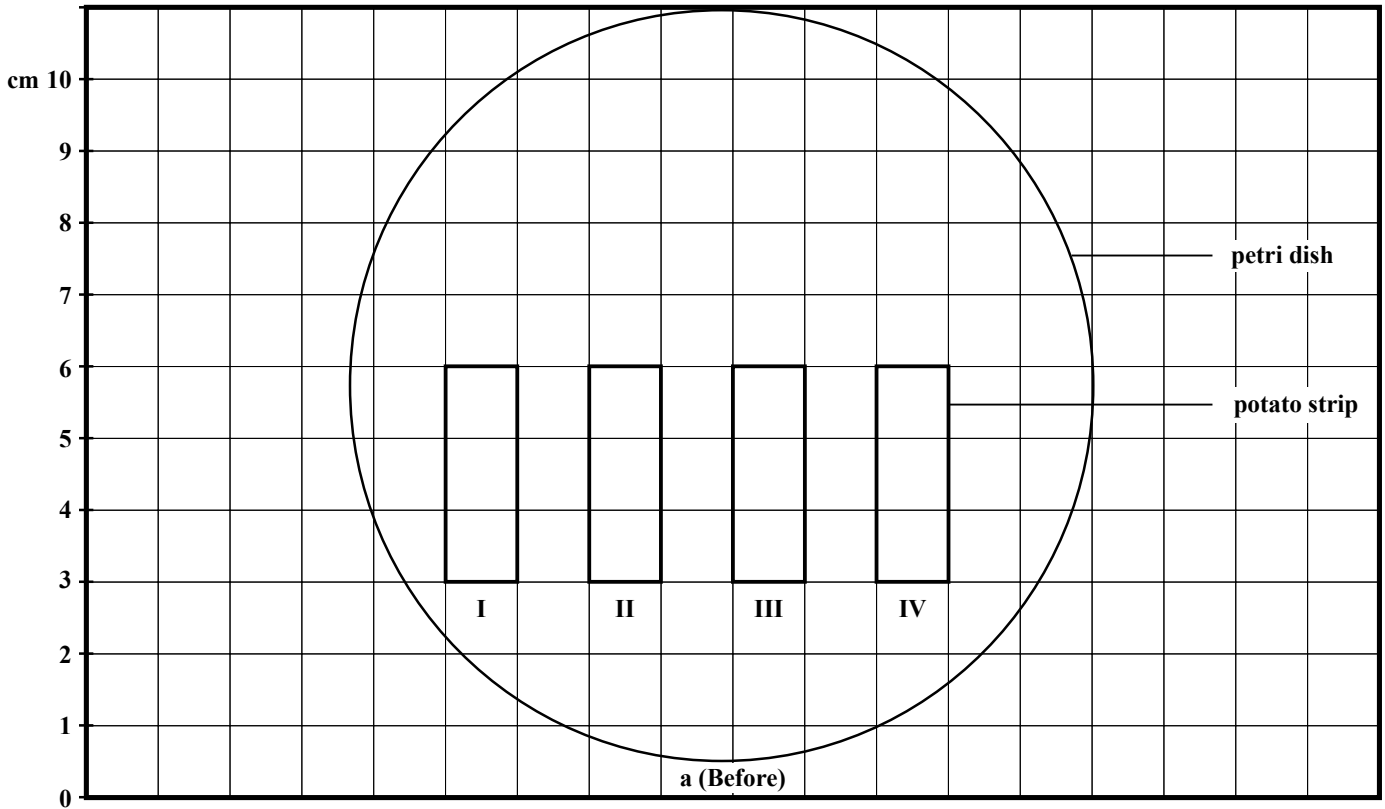


Figure 2a. Diagram showing the potato strips in water before the experiment

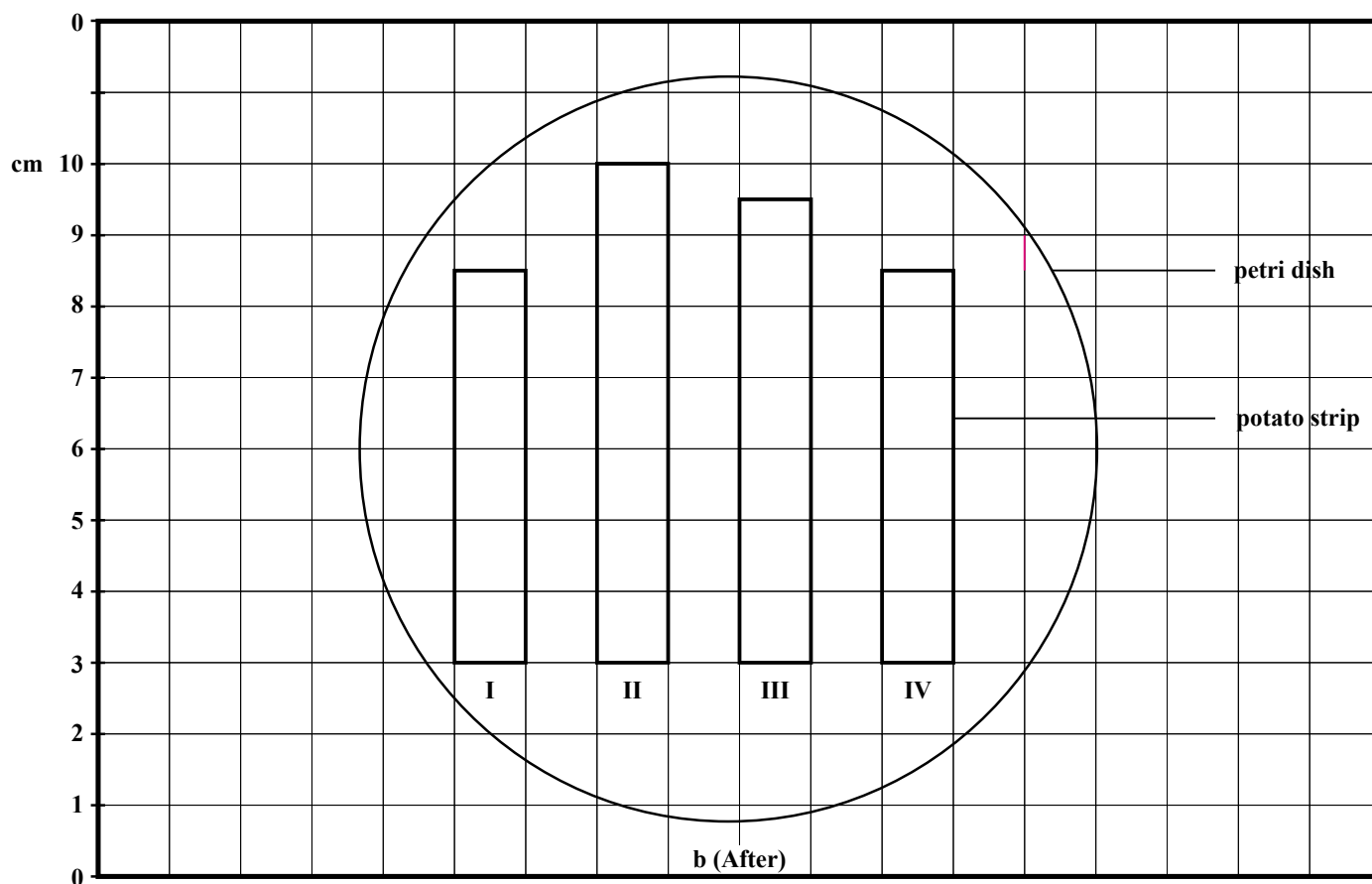


Figure 2b. Diagram showing the potato strips in water after the experiment

- (a) (i) Examine the diagrams of the potato strips at the beginning of the experiment as shown in Figure 2a. Measure the length of the strips and record your measurements in Table 2. **(1 mark)**
- (ii) Examine the diagrams of the potato strips at the end of the experiment as shown in Figure 2b. Measure the length of the strips and record your measurements in Table 2. **(5 marks)**

GO ON TO THE NEXT PAGE

(iii) Calculate the change in length for EACH strip and write your answers in Table 2.

(3 marks)

TABLE 2: _____

Structure	Lengths of Strips (cm)		Change in length
	Before	After	
I			
II			
III			
IV			

(b) (i) Which potato strip had the GREATEST increase in length?

(1 mark)

(ii) Suggest a reason why the length of all the potato strips did NOT increase by the same amount.

(1 mark)

(iii) What is the name of the process that is responsible for the change in length of the potato strips?

(1 mark)

GO ON TO THE NEXT PAGE

(c) Suggest a suitable title for your table in the space provided at the top of the table.
(1 mark)

(d) (i) State ONE variable that was controlled in the experiment.

(1 mark)

(ii) Why were four strips of potato used in the experiment?

(1 mark)

(e) (i) How can the experiment be modified to investigate the effect of a solute on the direction of movement of a solvent?

(1 mark)

(ii) Identify ONE variable that would be controlled in the experiment in (e) (i) above.

(1 mark)

(iii) Write a hypothesis for the modified experiment.

(1 mark)

Total 18 marks

3. John, a Form 4 student, washed and dried four 50 cm^3 measuring cylinders which he labelled A, B, C and D. He obtained water from four different sources, 25 cm^3 of which was poured into A, B, C and D respectively. He then added 5 cm^3 of soap solution to each cylinder. He covered each cylinder with a plastic cap and shook it until a permanent lather was formed.

John made the following observations:

- Cylinder A had a lather of 5 cm^3 .
- Cylinder B had a lather of 7 cm^3 .
- Cylinder C had a lather of 3 cm^3 .
- Cylinder D had a lather of 1 cm^3 .

- (a) Draw and label a large diagram of ONE of the measuring cylinders and its contents used in the experiment.



(2 marks)

GO ON TO THE NEXT PAGE

- (b) (i) Why was it more appropriate to use measuring cylinders than boiling tubes in the experiment?

(1 mark)

- (ii) What THREE precautions should John take when using the measuring cylinders to ensure the most accurate results?

(3 marks)

- (iii) Why did John wash the measuring cylinders before performing the experiment?

(1 mark)

- (c) (i) State an appropriate aim for the experiment that John performed.

(1 mark)

- (ii) List ALL the apparatus and materials that John used to perform this experiment.

(2 marks)

- (iii) Record the results of the experiment in Table 3 below.

(4 marks)

TABLE 3

- (iv) Write a suitable title for Table 3 above.

(1 mark)

- (d) (i) From the results that John obtained indicate which of the samples of water, A, B, C, or D, was the HARDEST.

(1 mark)

- (ii) Give a scientific explanation for your answer in (d) (i) above.

(2 marks)

Total 18 marks

END OF TEST



CARIBBEAN EXAMINATIONS COUNCIL

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

**INTEGRATED SCIENCE
(Single Award)**

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. 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.

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

SECTION A

Answer ALL FOUR questions.

1. (a) The Allens live in a house which overlooks the sea.
- (i) Suggest ONE method that can be used to protect the steel windows from rusting.
- _____
- (1 mark)**
- (ii) Give a reason for your answer in a (i).
- _____
- (1 mark)**
- (iii) Name TWO factors which may affect the rate of rusting.
- _____
- (2 marks)**
- (b) Mr Allen buys two common cleaners for use on the outdoor concrete floor: muriatic acid and lye. The labels reveal that the acid is hydrochloric acid and the lye is sodium hydroxide.
- (i) Suggest TWO possible dangers to Mr Allen when he uses these cleaners.
- _____
- _____
- (2 marks)**
- (ii) Name ONE piece of safety equipment which Mr Allen should wear when using these cleaners.
- _____
- (1 mark)**
- (iii) Which of the two common cleaners has a HIGHER pH?
- _____
- (1 mark)**

GO ON TO THE NEXT PAGE

(c) The label for a popular brand of antacid indicates that the active ingredient is calcium carbonate.

(i) Name the chemical process by which the base, calcium carbonate, reacts with excess stomach acid.

_____ **(1 mark)**

(ii) Write a simple word equation to express the chemical reaction in (c) (i).

_____ **(1 mark)**

(iii) How is the calcium obtained from the antacid used by the body?

_____ **(1 mark)**

- (d) Myra produces very hard water in the laboratory by making a concentrated solution of magnesium sulphate. She places 5 cm³ of this solution in test tube A. Using distilled water and the concentrated solution, she makes solutions of 20%, 40%, 60% and 80% strength. She places 5 cm³ of these solutions in test tubes B, C, D and E respectively. She adds 5 cm³ distilled water to Tube F. She adds four drops of liquid soap to each test tube and shakes each test tube ten times. The results are presented in Figure 1.

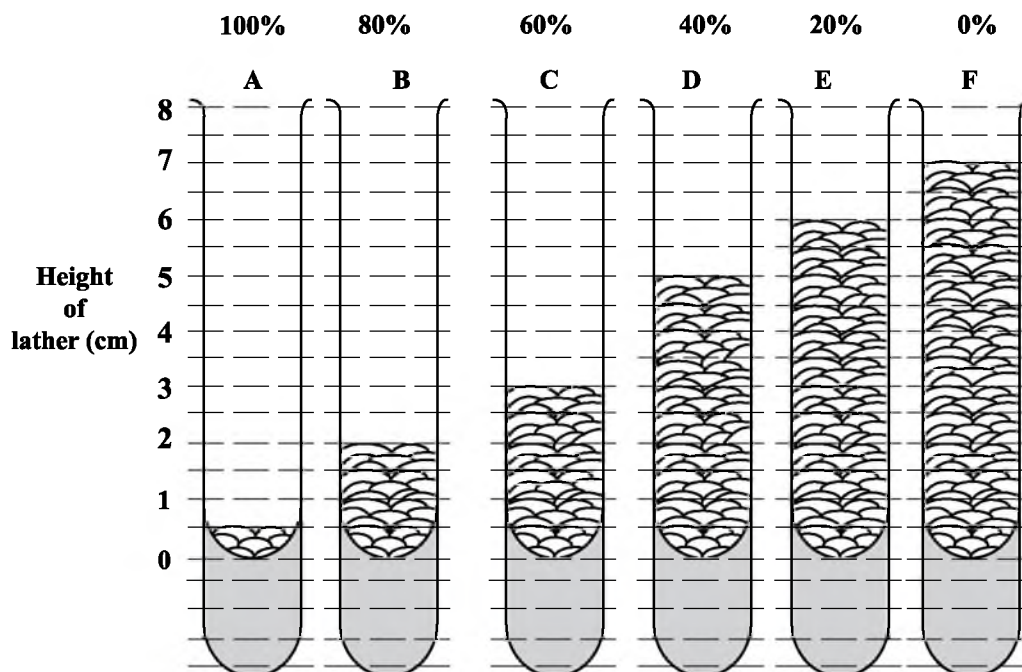


Figure 1. Lather columns produced by samples

- (i) Read the height of EACH lather column from Figure 1 and record it in the appropriate section of Table 1. **(3 marks)**

TABLE 1: HEIGHT OF LATHER COLUMN PRODUCED BY VARIOUS WATER SAMPLES

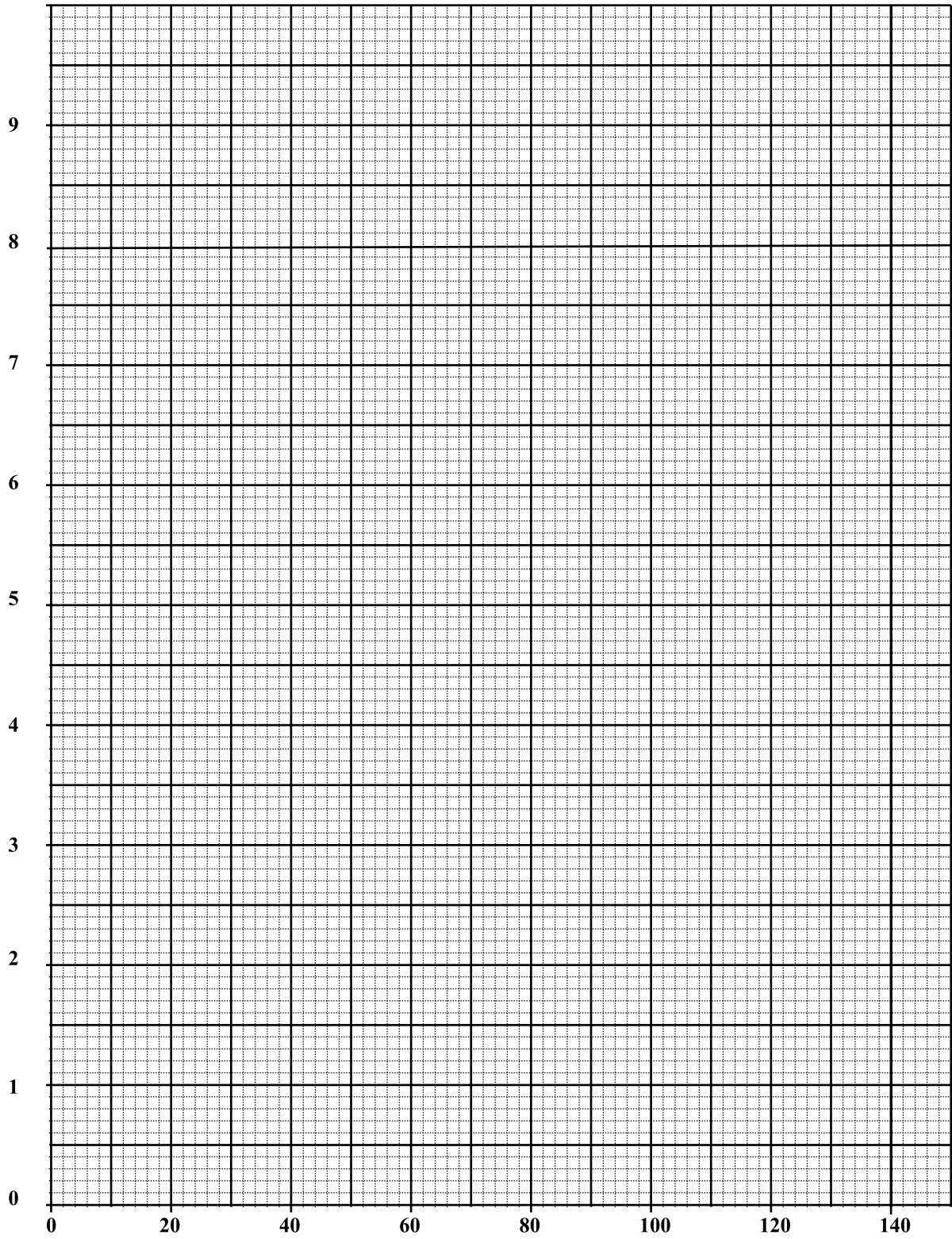
Sample Strength (%)	100	80	60	40	20	0
Height of Lather (cm)						

- (ii) On the grid provided on page 5, plot the data from the table completed in (i) above. **(4 marks)**
- (iii) Label the axes on the graph. **(1 mark)**
- (iv) State an appropriate title for the graph.

(1 mark)
- (v) Write a statement about the relationship between the height of lather obtained and the hardness of the water.

(1 mark)

GO ON TO THE NEXT PAGE



GO ON TO THE NEXT PAGE

(e) Mr Singh is farming on very sandy soil in the Caribbean.

- (i) Why does water in puddles quickly disappear into the ground on the farm after a shower of rain?

(1 mark)

- (ii) Mr Singh has a pond which he lines with clay so that it can retain water in the dry season. Explain how the clay reduces the amount of water that seeps into the soil in the dry season.

(1 mark)

- (iii) Describe TWO methods that Mr Singh may use to **preserve** the fertility of the soil on his farm.

(2 marks)

Total 25 marks

2. (a) Figure 2 shows a diagram of the human digestive system.

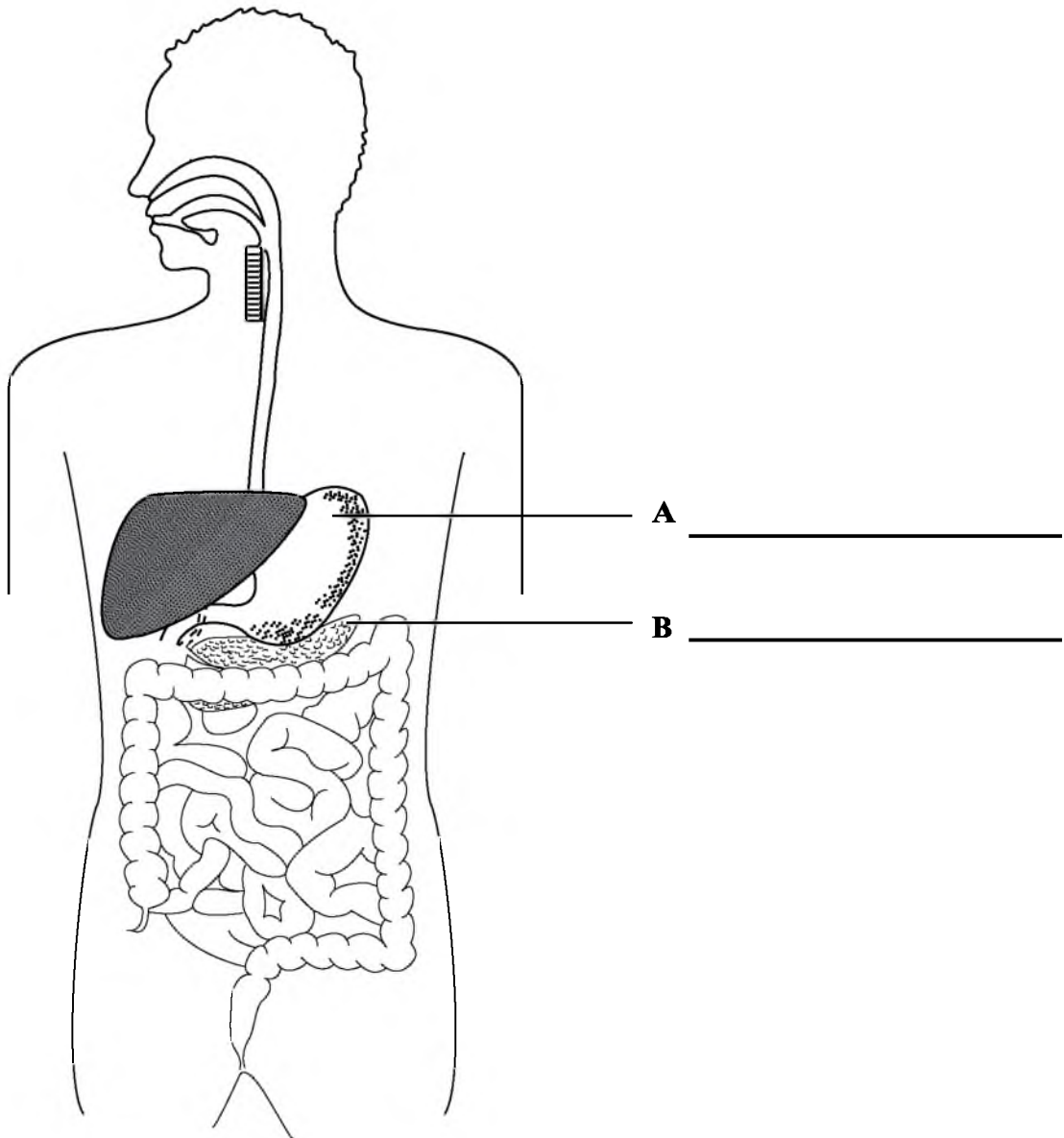


Figure 2. Diagram of the human digestive system

(i) Identify the structures labelled A and B. Write your answers in the spaces provided. **(2 marks)**

(ii) On the diagram, draw a line and label it C to represent the area where **MOST** nutrients are absorbed. **(1 mark)**

(b) Complete the dental formula below to represent the number of teeth in an adult man who has all of his teeth in place. **(2 marks)**

Incisors	Canines	Premolars	Molars
2		2	
2		2	

GO ON TO THE NEXT PAGE

- (c) In a science laboratory, Josh and Sue carried out experiments to measure the composition of 10 g of samples of Foods X and Y. Table 2 shows the composition and the energy values of each sample of food.

TABLE 2: ENERGY VALUE OF FOODS

	Nutrients in 10 g of Food Sample X (g)	Energy provided by 1 gm of Nutrient (kJ)	Energy from Nutrients in Food Sample X (kJ)	Nutrients in 10 g of Food Sample Y (g)	Energy provided by 1 gm of Nutrient (kJ)	Energy from Nutrients in Food Sample Y (kJ)
Fats	3	39		1	39	
Proteins	2	17		4	17	
Carbohydrates	5	17		5	17	
Total Energy in Food X				Total Energy in Food Y		

- (i) Using the information in Table 2 determine which food sample provides MORE energy.

(3 marks)

- (ii) Which food sample, X or Y, would be more suitable for an athlete, a growing child and a person with his gall bladder removed? Give ONE reason for EACH answer.

An athlete _____

Reason _____

A growing child _____

Reason _____

A person with his gall bladder removed _____

Reason _____

(6 marks)

GO ON TO THE NEXT PAGE

- (d) The children want to swim immediately after having lunch but their mother insists that they wait for at least two hours to allow their food to digest.

Give a reason why they should NOT swim so soon after eating.

(1 mark)

Total 15 marks

3. Figure 3 shows a diagram of the human heart.

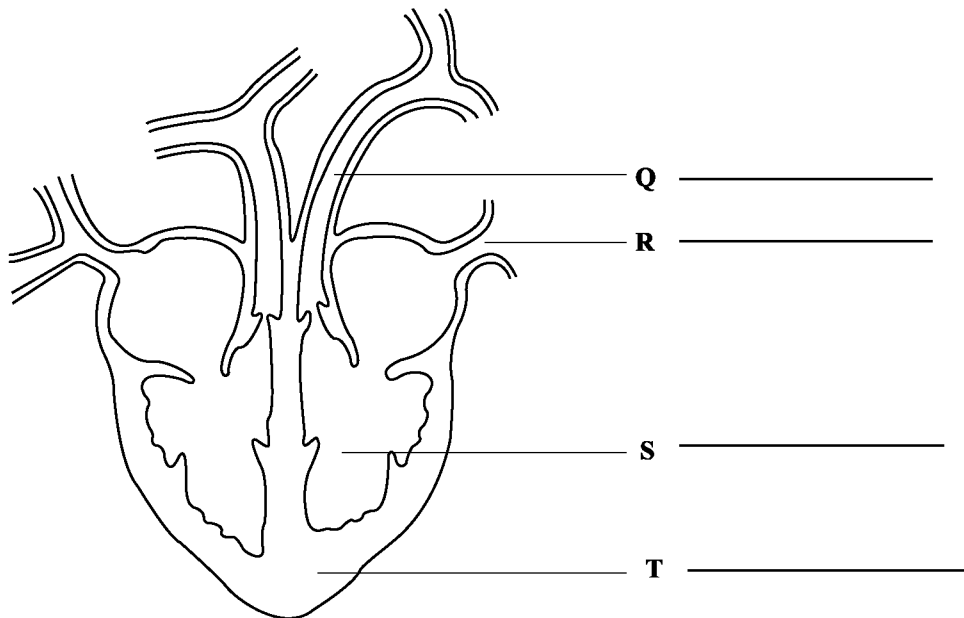


Figure 3. Longitudinal section of the heart

- (a) (i) Identify the structures labelled Q, R, S, and T. Write your answers in the spaces provided. **(4 marks)**
- (ii) State the MAJOR function of the heart.

(1 mark)

- (b) Sammy and James rested for a while, then started running back and forth across a playing field. The graph in Figure 4 shows the heart rate (number of heart beats per minute) for Sammy and James. The data for the graph were collected just after the boys started running.

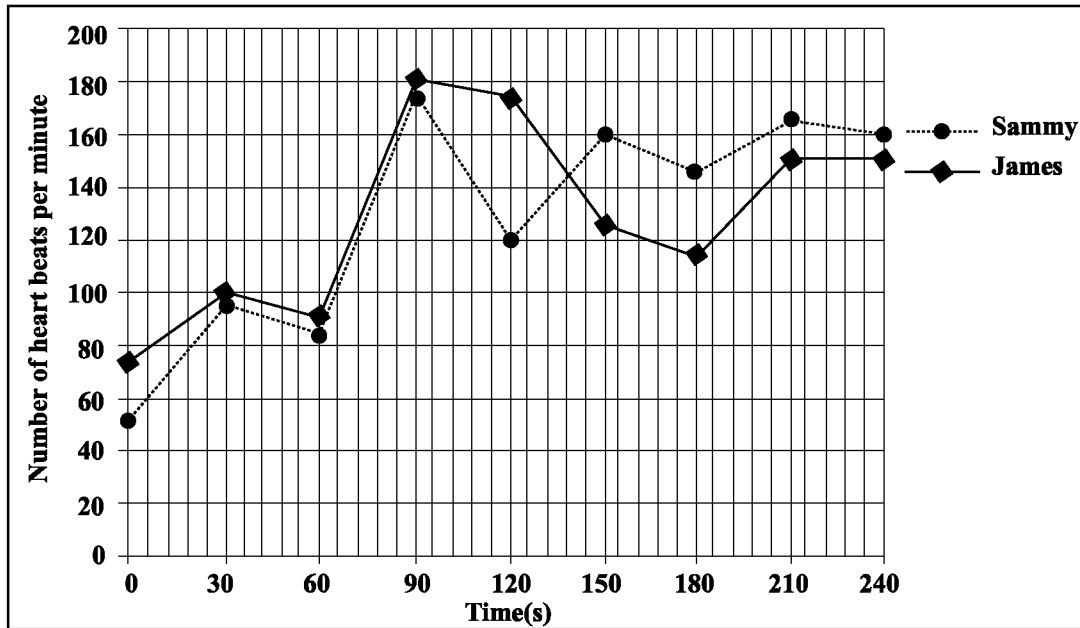


Figure 4. Graph showing the heart rate for Sammy and James

- (i) Using the graph in Figure 4, describe the general trend in the heart rate of the boys with time.

(1 mark)

- (ii) Determine Sammy's heart rate at 150 seconds.

Sammy: _____

(1 mark)

- (iii) What is the **maximum** heart rate experienced by James?

James: _____

(1 mark)

- (iv) Suggest **TWO** reasons for the change in heart rate of the boys between 0 and 30 seconds.

(2 marks)

GO ON TO THE NEXT PAGE

(c) The rate of breathing may also be investigated while the heart rate is being monitored.

(i) How would Sammy's rib cage move, as he runs back and forth?

(1 mark)

(ii) How would Sammy's body benefit from the movement described in (c) (i) above?

(1 mark)

(d) A gardener lights a heap of grass clippings, which started to produce smoke, next to the playing field where James and Sammy are running.

(i) Describe TWO possible side effects that the smoke may have on their respiratory system.

(2 marks)

(ii) State ONE **negative** effect of the gardener's action on the physical environment.

(1 mark)

Total 15 marks

4. (a) (i) What is the function of a simple machine?

_____ (1 mark)

(ii) Name ONE simple machine other than the lever and pulley.

_____ (1 mark)

(iii) State the formula for the 'mechanical advantage of a simple machine'.

_____ (1 mark)

(iv) A mechanic uses a pulley to apply an effort of 100 N to lift a car engine of weight 1000 N. Calculate the mechanical advantage of the pulley.

_____ (2 marks)

(v) The pulley made a squeaking sound when it was being used, so the mechanic lubricated the pulley. Explain why he now uses less effort to lift the load.

_____ (2 marks)

- (b) Figure 5 shows an arm on the completion of lifting an object.

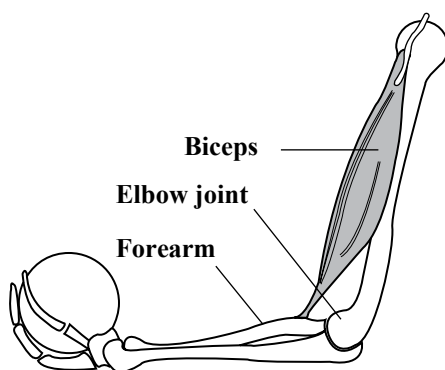


Figure 5. The biceps, elbow joint and forearm after lifting an object

- (i) Explain why the action of the biceps, elbow joint and forearm during the lifting of the object can be referred to as a distance multiplier.

(4 marks)

- (ii) Name the class of lever presented in Figure 5.

(1 mark)

- (c) Figure 6 shows a see-saw where Tracey has lifted Ricaldo. Label on the diagram the effort, load and fulcrum. **(3 marks)**

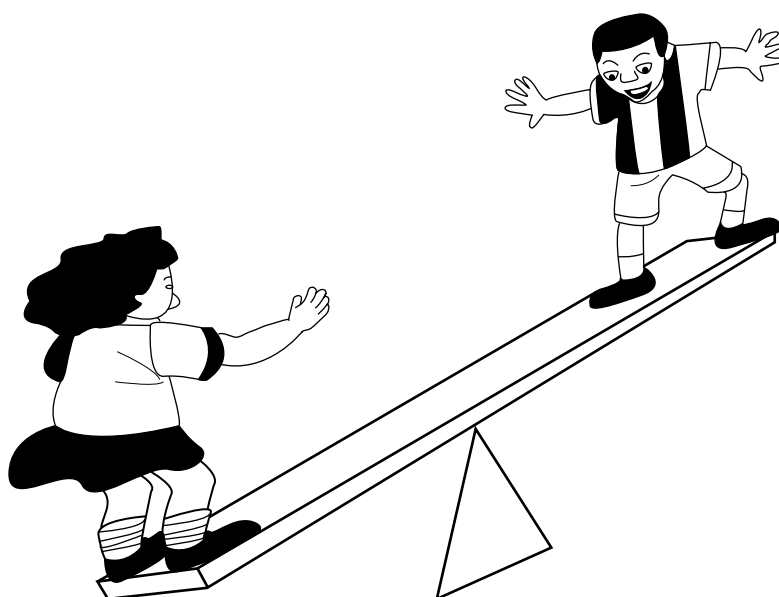


Figure 6. Ricaldo and Tracey on a see-saw

Total 15 marks

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SECTION B

Answer BOTH questions.

5. (a) Safety is very important in any science laboratory. In the following illustration, identify **THREE** safety hazards and suggest **ONE** safety practice for **EACH** hazard identified. **(6 marks)**



Figure 7. A science laboratory

- (b) State **ONE** method that can be used to extinguish **EACH** of the following fires:
- Bush fire
 - Electrical fire
- (2 marks)**
- (c) A pot of oil accidentally catches fire in a restaurant. The chef quickly grabs a water hose to extinguish it. Is this an appropriate method to extinguish the fire? Explain your answer. **(2 marks)**
- (d) State **TWO** possible causes of electrical shocks and identify appropriate methods to prevent them. **(4 marks)**
- (e) Identify the hazard represented by the safety symbol in the illustration below.



(1 mark)

Total 15 marks

GO ON TO THE NEXT PAGE

CARIBBEAN EXAMINATIONS COUNCIL

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

**INTEGRATED SCIENCE
(Single Award)**

Paper 032 – Alternative to SBA

General Proficiency

2 hours 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.
4. You are advised to take some time to read through the paper and plan your answer.

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

1. Two uncooked pieces of potato strips 4 cm long, with the same dimensions, were placed in 100 cm³ of distilled water and 100 cm³ of saturated sugar solution respectively for 24 hours at room temperature. The results are shown in the diagram below.

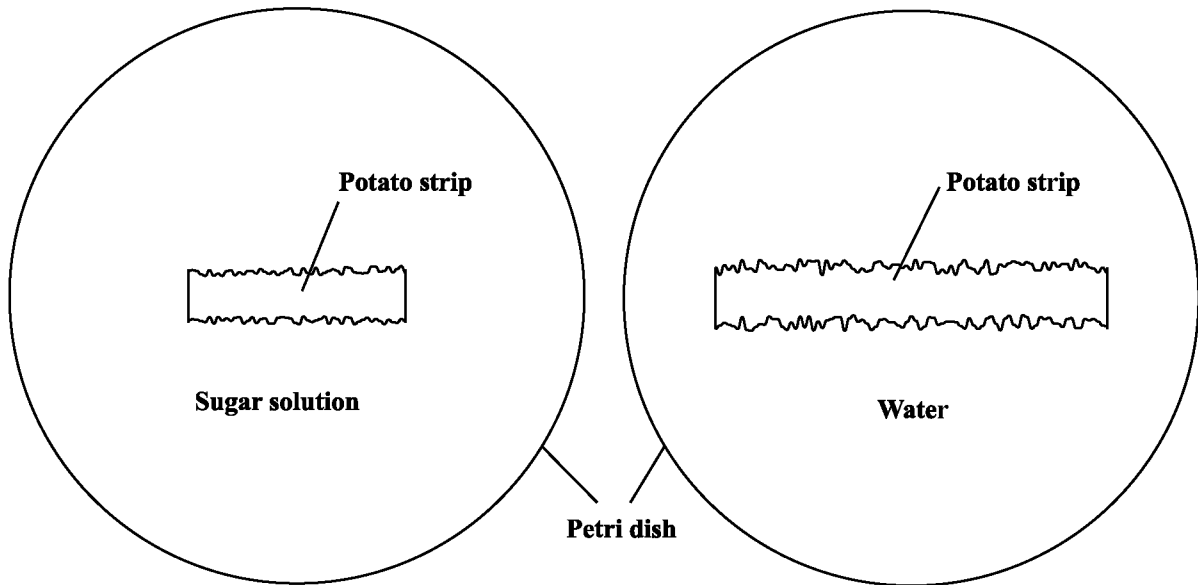


Figure 1. Potato strips in sugar solution and water after 24 hours

- (a) (i) Write an appropriate heading for the last column in the table below. (1 mark)
(ii) Write an appropriate title for the table in the space provided. (1 mark)

TABLE 1: _____

Observation	Strip in Water	
Original length of potato strip (cm)	4.0	4.0
Length of potato strip after 24 hours (cm)		
External appearance of strips		

- (iii) Measure the length of the potato strips in Figure 1. Record your answers in the appropriate sections of Table 1. (2 marks)
(iv) Describe the appearance of EACH strip after being in the liquid for 24 hours. Record your answer in the appropriate section of Table 1. (2 marks)
(v) Write an appropriate aim for this experiment.

(1 mark)

GO ON TO THE NEXT PAGE

(vi) Explain the differences observed in the two strips.

(4 marks)

(vii) Explain how the results of the experiment would differ if the same experiment was repeated with strips of cooked potatoes.

(2 marks)

(viii) Explain how the results of the potato strip **in water** would differ if the same experiment was carried out at a lower temperature.

(1 mark)

(b) (i) Describe a simple experiment that can be performed to demonstrate diffusion.

(3 marks)

(ii) State ONE difference between osmosis and diffusion.

(1 mark)

Total 18 marks

GO ON TO THE NEXT PAGE

2. (a) A student performed the experiment shown in Figure 2 to investigate the reaction between zinc and dilute hydrochloric acid. The initial temperature of the reactants of the test tube was noted as 30 °C.

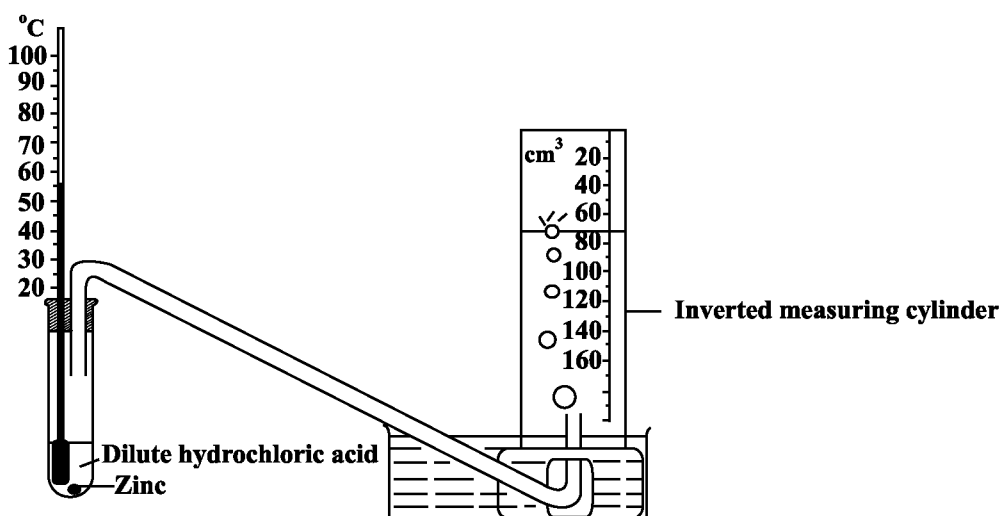


Figure 2. Experiment to show reaction between zinc and dilute hydrochloric acid

- (i) Name the gas given off during the reaction.
- _____ (1 mark)
- (ii) Write a simple word equation for the reaction in (a) (i) above.
- _____ (2 marks)
- (iii) Read the thermometer in Figure 2 and record the value in the space below.
- _____ (1 mark)
- (iv) Calculate the change in temperature of the reactants.
- _____ (1 mark)
- (v) Read the inverted measuring cylinder in Figure 2, and determine the volume of gas produced by the reactants. Record your answer in the space below.
- _____ (1 mark)

- (b) Three students were each given an activity by their science teacher as shown in Table 2.

TABLE 2: SCIENCE ACTIVITIES PERFORMED BY STUDENTS

Name	Science Activity Performed
Vikash	Add copper turnings to dilute hydrochloric acid
Sandy	Add iron filings to dilute hydrochloric acid
Rohan	Heat copper in the presence of oxygen

- (i) In which activity will NO reaction be observed?

_____ **(1 mark)**

- (ii) Write a simple word equation to represent the reaction which takes place in Rohan's activity.

_____ **(2 marks)**

- (c) A student constructs a hypothesis which states that a painted iron nail will rust faster than an iron nail covered with oil.

Plan and design a laboratory activity to test the hypothesis.

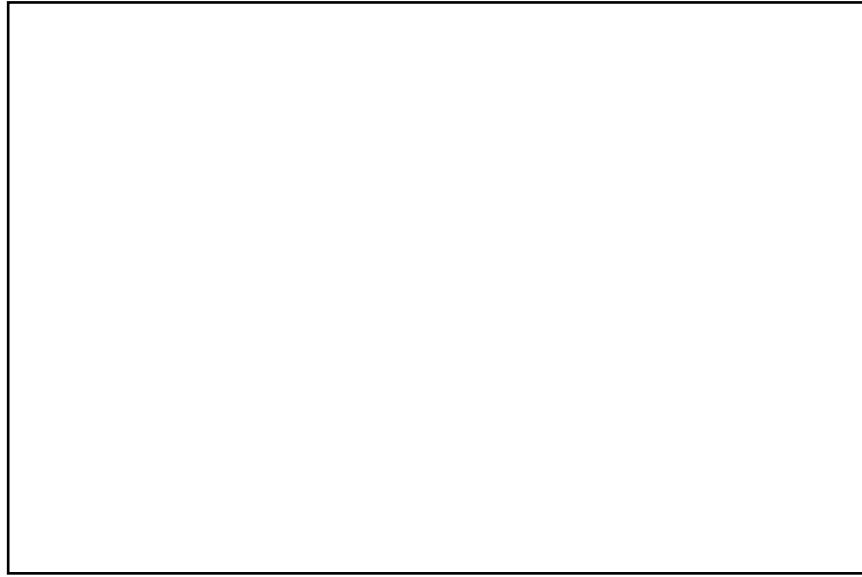
- (i) List the materials required for the laboratory activity.

_____ **(3 marks)**

- (ii) Describe a suitable method to test the hypothesis.

_____ **(4 marks)**

- (iii) In the space below, draw a diagram of the apparatus to be used in the activity.



(2 marks)

Total 18 marks

3. Jameel constructs a lever which has a fulcrum at C and a load of 100 g at B as shown in Figure 3. He tried to balance the lever by applying an effort at A with a 10 g block, but he found that 15 g of additional mass was required.

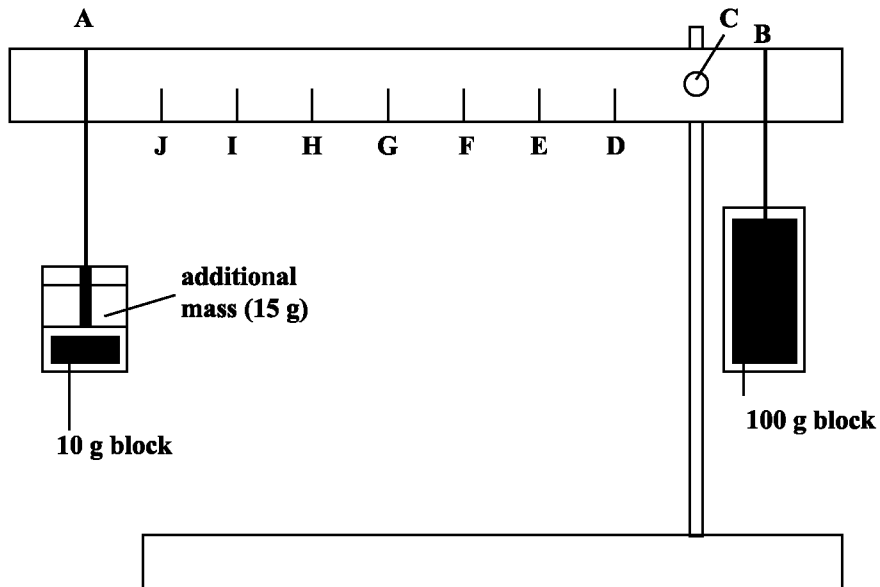


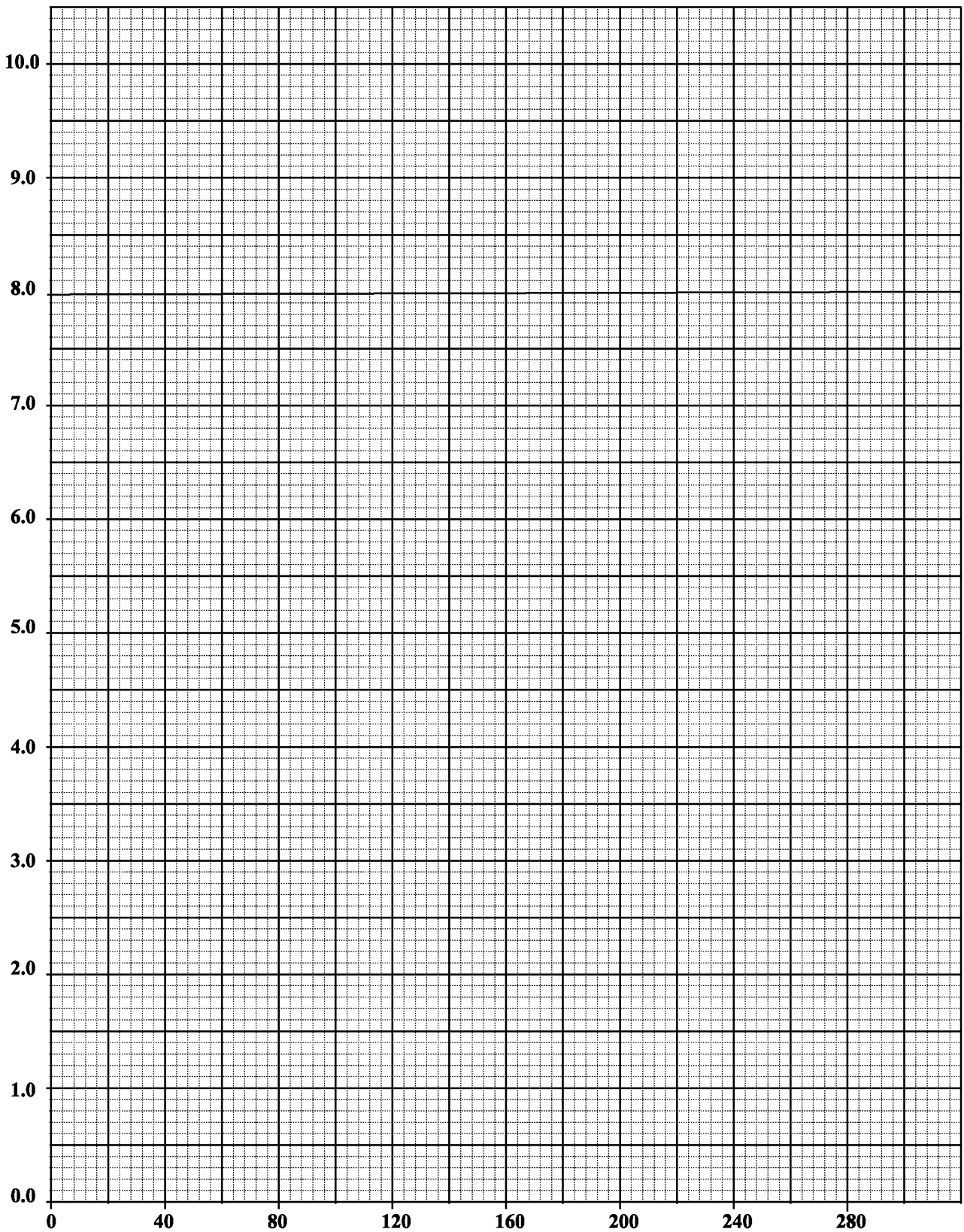
Figure 3. Diagram of lever

- (a) Jameel is interested in finding the values of masses which will balance the lever when they are hung at points D – J so he creates Table 3. Complete the table by using your ruler to measure the distance from the fulcrum, C, to the points D, E, F, G, H, I and J in Figure 3. (5 marks)

TABLE 3: MASS REQUIRED TO BALANCE LEVER AND DISTANCE OF EFFORT FROM FULCRUM

Position of Effort	Distance of Effort from fulcrum (cm)	Mass required to balance lever (g)
A	8.1	25
J		29
I		33
H		40
G		50
F		67
E		100
D		200

GO ON TO THE NEXT PAGE



GO ON TO THE NEXT PAGE

- (b) Write a hypothesis relating the distance of the effort from the fulcrum and the mass required to balance the lever.

(2 marks)

- (c) (i) On the grid provided on page 8, plot a line graph of Jameel's results for the distance of the effort from the fulcrum against the mass required to balance the lever.

(4 marks)

- (ii) Label the axes on the graph.

(2 marks)

- (d) (i) Extend your graph to read the point where the load is 250 g. Mark this point with an X.

(2 marks)

- (ii) Using the graph, determine the value of the distance from the fulcrum for a load of 250 g. Draw TWO dotted lines in the appropriate places on the graph to assist you with your reading.

(4 marks)

- (e) From your graph, state how the effort changes as the distance from the fulcrum increases.

(2 marks)

(f) Figure 4 is a picture of one of the masses used by Jameel. In the box provided, draw a two-dimensional diagram of the mass. Include the following in your drawing:

- The magnification
- Clear lines
- A title for the drawing

(3 marks)



Figure 4. One of the masses used by Jameel

Total 24 marks

END OF TEST

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

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.

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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

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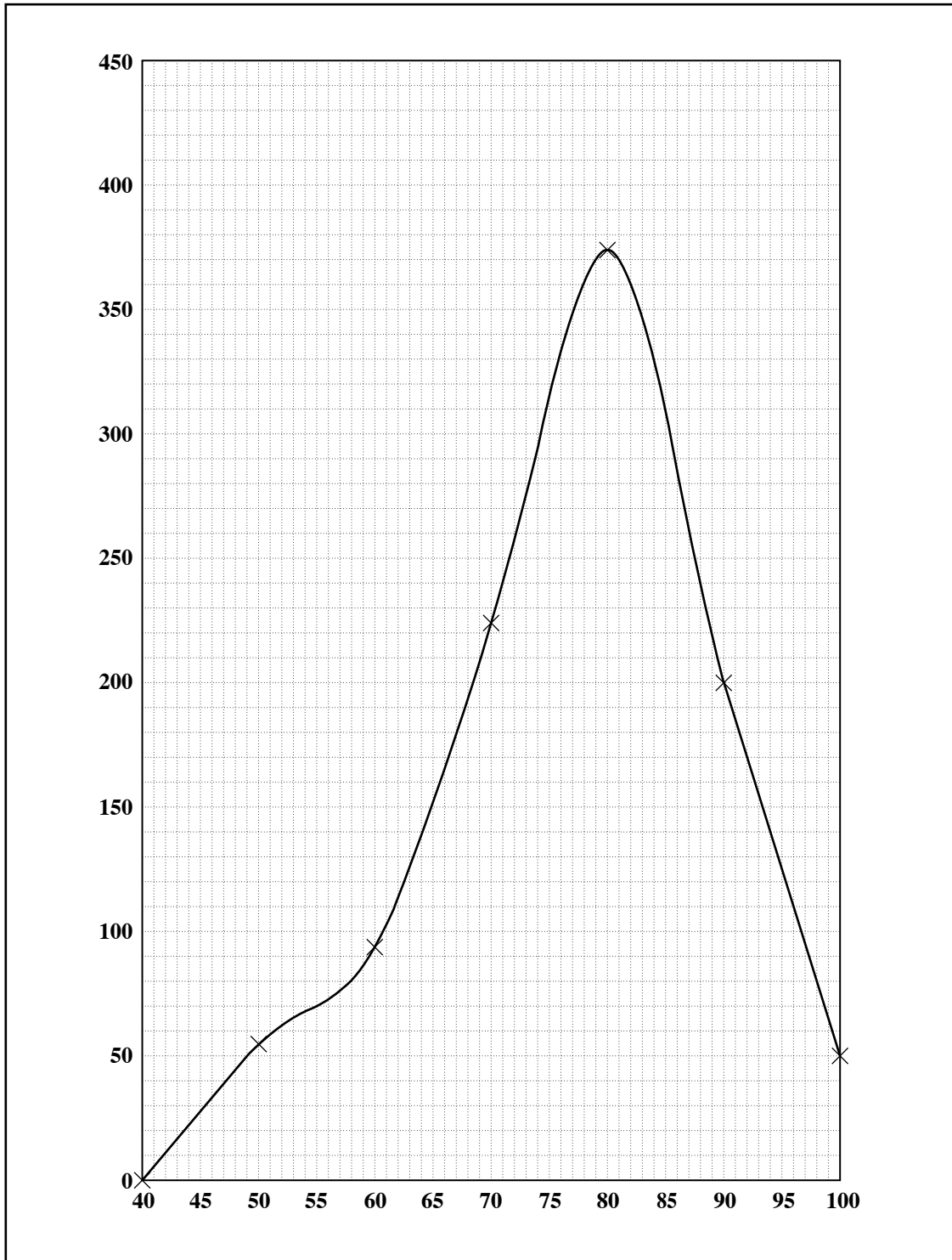


Figure 1. Age at death

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.

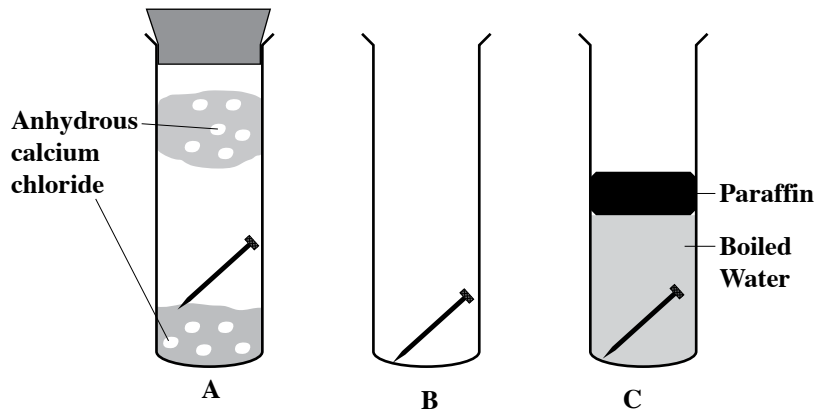


Figure 2. Boiling tubes

- 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.

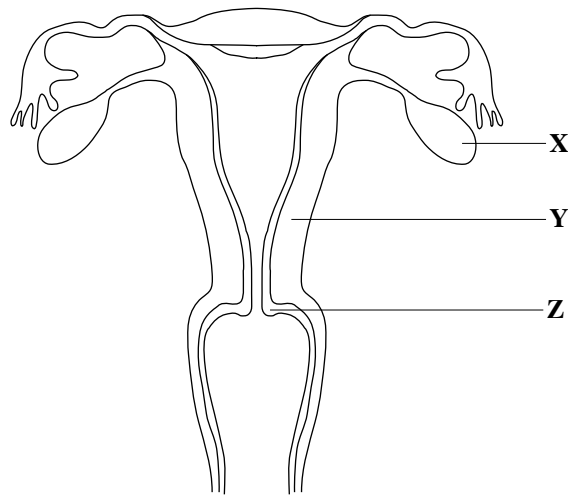


Figure 3. Diagram of human (female) reproductive system

- (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.

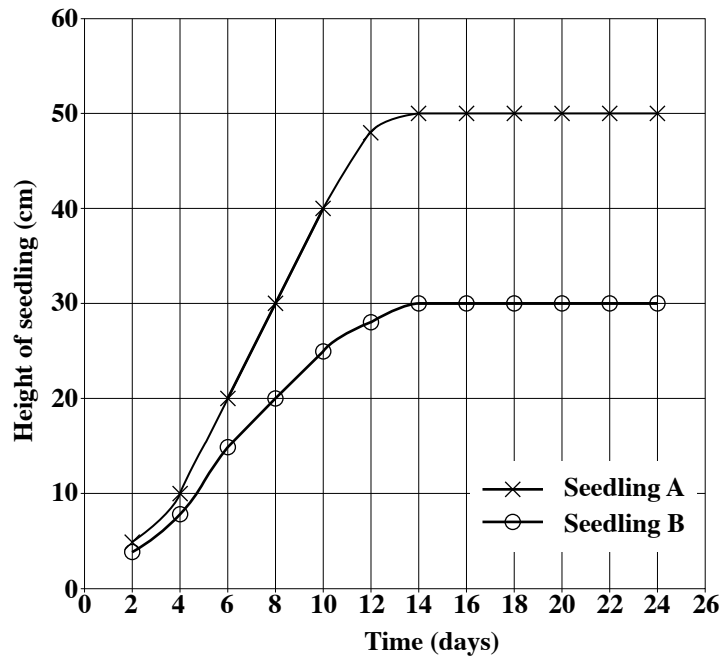


Figure 5. Growth curve for Seedlings A and B

(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

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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.

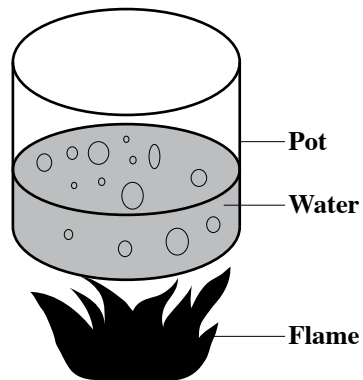


Figure 6. Diagram showing a pot of water being heated

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.

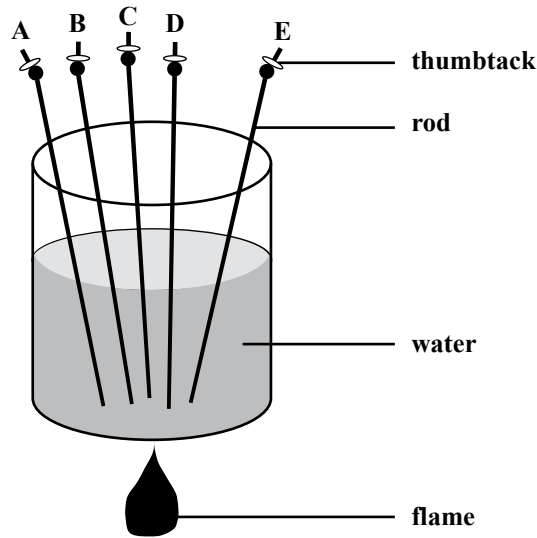


Figure 7. Metal rods in a beaker of boiling water

- (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.

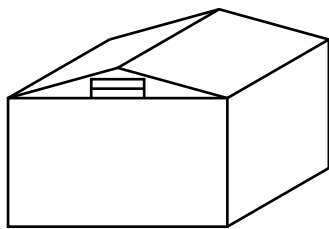


Figure 8A

Before renovation of the roof

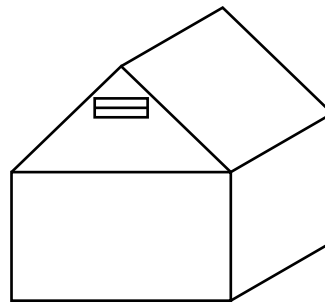


Figure 8B

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

FORM TP 2013090



TEST CODE **01230032**

MAY/JUNE 2013

C A R I B B E A N E X A M I N A T I O N S C O U N C I L

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E X A M I N A T I O N**

**I N T E G R A T E D S C I E N C E
(S i n g l e - A w a r d)**

P a p e r 0 3 2 – A l t e r n a t i v e t o S c h o o l - B a s e d A s s e s s m e n t

G e n e r a l P r o f i c i e n c y

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.

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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.

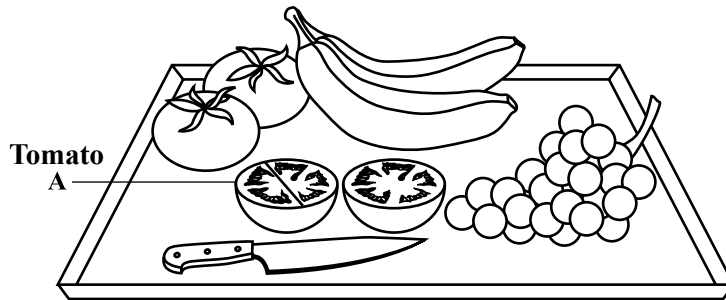


Figure 1. Fruit tray

- (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 cm³ 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.

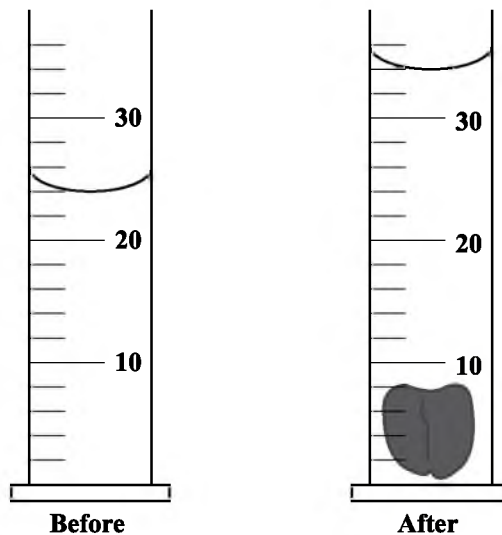


Figure 2. Measuring cylinder before and after submerging object

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

Before: _____

After: _____

(2 marks)

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

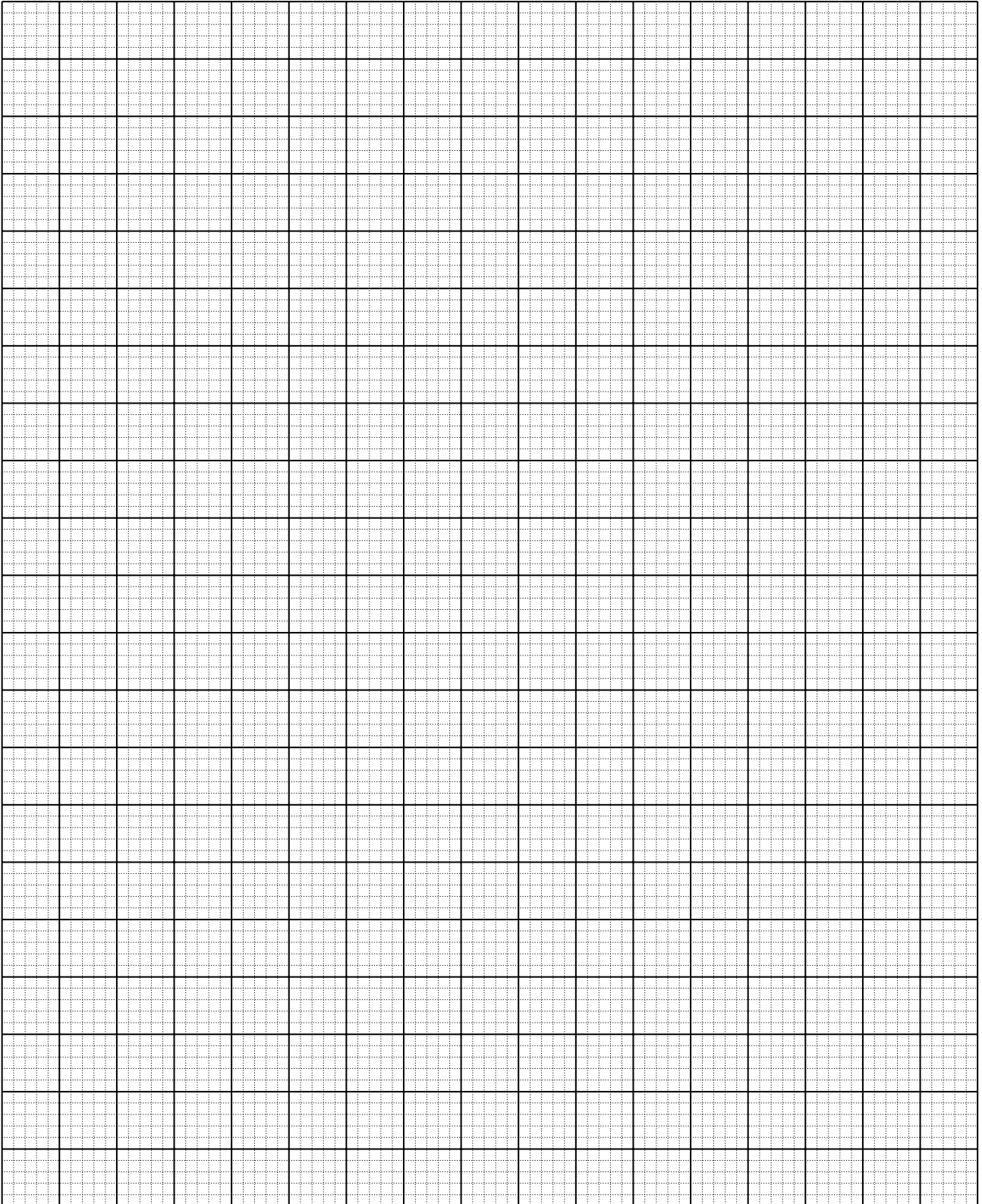
**TABLE 2: EXPECTED RESULTS OF EXPERIMENT
TO VERIFY ARCHIMEDES' PRINCIPLE**

Object	Mass (g)	Measuring Cylinder Reading Without Object (cm³)	Measuring Cylinder Reading With Object (cm³)	Displacement (cm³) 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.

(4 marks)

GO ON TO THE NEXT PAGE



- (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.

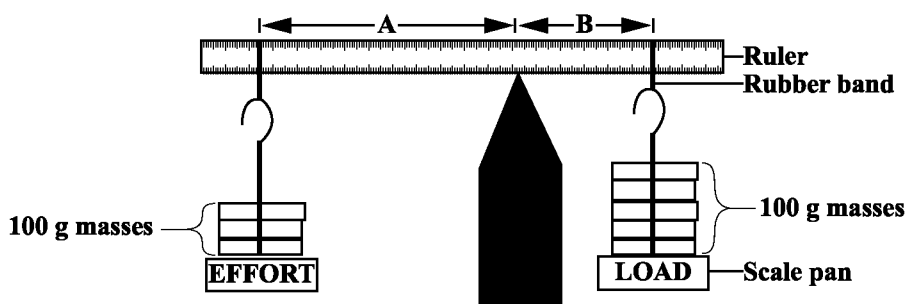


Figure 3. Prism, ruler and various weights used in the investigation

- (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.

(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.

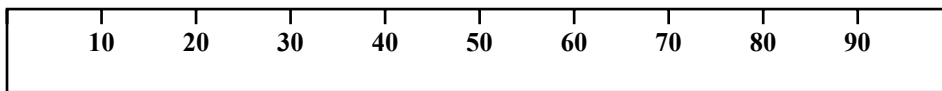


Figure 4. Ruler

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.



TEST CODE **01230020**

FORM TP 2014086

CARIBBEAN EXAMINATIONS COUNCIL

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EXAMINATION**

**INTEGRATED SCIENCE
(Single-Award)**

Paper 02 – General Proficiency

2 hours 30 minutes

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of SIX questions in TWO sections: A and B.
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.
5. Do NOT write in the margins.
6. You are advised to take some time to read through the paper and plan your answers.
7. If you need to rewrite any answer and there is not enough space to do so on the original page, you must request extra lined pages from the invigilator.
Remember to draw a line through your original answer and correctly number your new answer in the box provided.
8. **If you use extra pages you MUST write your registration number and question number clearly in the boxes provided at the top of EVERY extra page.**

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01230020/F 2014

SECTION A

Answer ALL FOUR questions.

1. Amelia is studying the water cycle and she draws the following diagram.

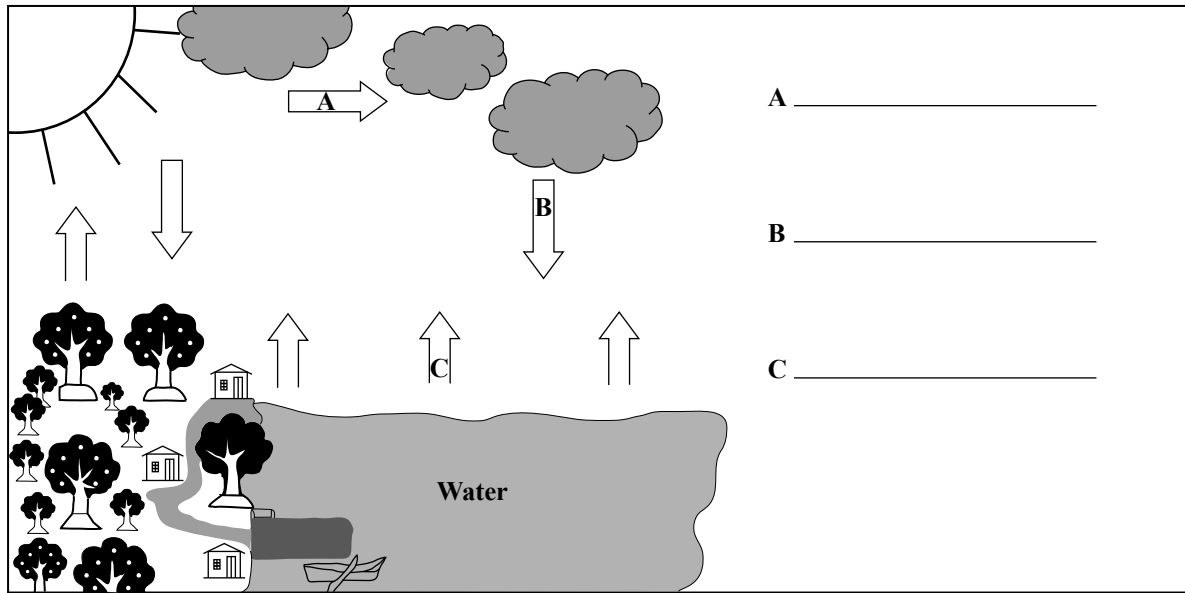


Figure 1. Diagram of the water cycle

(a) (i) Identify the processes represented by the arrows A, B and C. Write your answers in the spaces provided in Figure 1. **(3 marks)**

(ii) State TWO uses that Amelia may have for water **other** than for drinking.

.....
.....
(2 marks)

(iii) Suggest ONE reason why after drinking untreated river water Amelia's cousin became very sick.

.....
(1 mark)

(iv) Name TWO methods that Amelia's community can use to treat the river water to make it suitable for drinking.

.....
.....
(2 marks)

GO ON TO THE NEXT PAGE

(b) Amelia's community is surrounded by a very large forest. The residents are very concerned about rumours that a logging company plans to cut the forest for lumber and to build factories.

(i) State ONE effect the cutting of the forest will have on the water cycle.

.....
.....

(1 mark)

(ii) The logging company plans to plant trees which are poisonous to many of the local herbivores, to replace those which were cut down. State ONE way in which this would affect the food webs in the forest.

.....
.....

(1 mark)

(c) In order to control flooding in the lowlands, the government built a large lake (dam) near Amelia's home. A considerable amount of hydroelectric power is now produced by this dam to replace several diesel-burning power stations.

(i) State ONE benefit to the environment of using hydroelectric power.

.....
.....

(1 mark)

(ii) Identify ONE **negative** effect on the local environment of building the dam.

.....
.....

(1 mark)

(iii) State ONE way the large lake (dam) may affect the water cycle.

.....
.....

(1 mark)

- (iv) To transmit electricity efficiently to communities far away from the dam very high voltages are used. Name ONE material which would be most suitable for making the uninsulated electrical lines that are used to transmit the electricity.

.....
(1 mark)

- (v) Identify ONE hazard which can result from these electrical lines.

.....
(1 mark)

- (d) A concerned group of people from the capital city spoke at a meeting in Amelia's community about the carbon dioxide that the proposed factories will release into the atmosphere. They presented some data on the amount of carbon dioxide dissolved in the oceans for the period 1850–2000 in Table 1.

TABLE 1: CARBON DIOXIDE DISSOLVED IN THE OCEANS

Year	1850	1875	1900	1925	1950	1975	2000
Dissolved carbon dioxide (ppm)	290	292	295	300	310	330	365

- (i) On the grid in Figure 2 on page 5, plot the points to represent the data in Table 1. (4 marks)

- (ii) Draw on the graph the best smooth curve to show the trend. (2 marks)

- (iii) Label the axes on the graph. (1 mark)

- (iv) State an appropriate title for the graph.

.....
(1 mark)

- (v) Use the trend shown in the graph to predict the level of carbon dioxide in the ocean in 2025.

.....
(1 mark)

- (vi) Using the trend in the graph, state a conclusion about the level of carbon dioxide in the ocean over the period 1850–2000.

.....
(1 mark)

Total 25 marks

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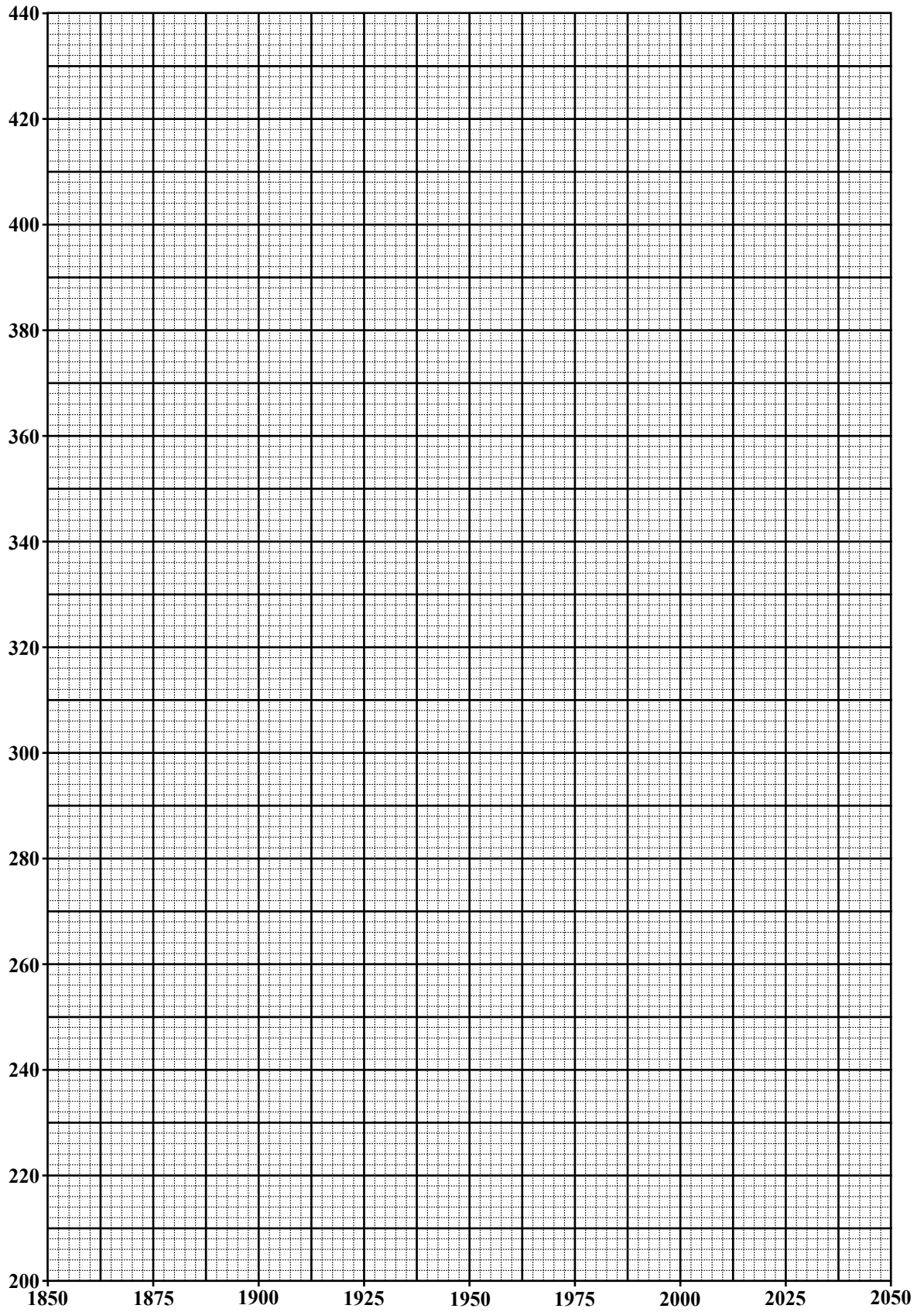


Figure 2. _____

GO ON TO THE NEXT PAGE

2. (a) State TWO properties of acids and TWO properties of bases.
- (i) Acids
.....
(2 marks)
- (ii) Bases
.....
(2 marks)
- (b) Give ONE example of an acid and ONE example of a base that is used in the digestive system.
- (i) Acid
(1 mark)
- (ii) Base
(1 mark)
- (c) A student carried out an experiment to determine the pH of various substances and obtained the following information.

TABLE 2: pH OF SUBSTANCES

Substance	pH
Grapefruit juice	5
Club soda	6
Baking soda	8

- (i) What does the term pH mean?
.....
.....
(1 mark)
- (ii) Which substance in Table 2 is NOT an acid?
.....
(1 mark)
- (iii) Which of the two acids shown in Table 2 is stronger?
.....
(1 mark)

GO ON TO THE NEXT PAGE

(d) While painting the inside of her home, Ms Jones got her favourite red dress soiled with paint. Her son, Sam, suggested that she uses bleach to remove the paint from her dress.

(i) Give TWO reasons why bleach is NOT the most appropriate substance for Ms Jones to use.

.....
.....
.....
.....

(2 marks)

(ii) Suggest a suitable method that Ms Jones could use to remove the paint from her dress and explain how this method works.

.....
.....
.....
.....
.....

(2 marks)

(e) State TWO safety precautions that can be taken when using the method stated in (d) (ii) above.

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.....
.....

(2 marks)

Total 15 marks

3. (a) Figures 3 and 4 show diagrams of two cells, A and B.

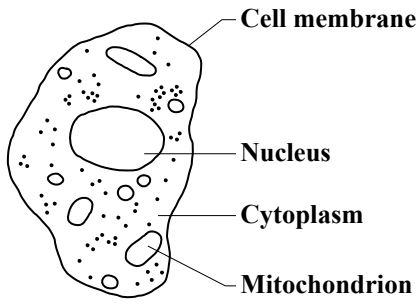


Figure 3: Cell A

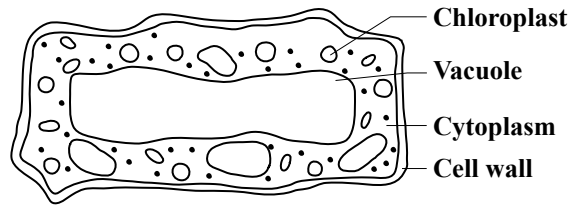


Figure 4: Cell B

(i) State which cell represents a plant cell.

.....
(1 mark)

(ii) Give TWO reasons for your answer in (a) (i) above.

.....
.....
(2 mark)

(iii) Name the cell structure that is responsible for storing genetic information.

.....
(1 mark)

(iv) Name the type of cell that transports oxygen around the human body.

.....
(1 mark)

(b) On a sunny day at an open market a vendor, Ms Milly, occasionally sprinkles water on her wilting lettuce. During the day Ms Milly's lettuce are firm and ready for sale.

(i) Distinguish between 'diffusion' and 'osmosis'.

.....
.....
(1 mark)

(ii) Identify the process that resulted in Ms Milly's wilting lettuce becoming firm.

.....
(1 mark)

GO ON TO THE NEXT PAGE

(iii) Explain how the process identified in (b) (ii) kept the lettuce firm.

.....
.....
.....
.....

(2 marks)

(iv) Suggest a suitable method, **other** than sprinkling, that a consumer could use to keep the lettuce firm.

.....

(1 mark)

(c) The digestive and circulatory systems consist of organs with muscles which are necessary for them to carry out their normal functions. Table 3 shows two organs and the possible effects of muscle damage on the structure and functioning of the organ and the overall effects on the body. Complete the table. **(5 marks)**

TABLE 3: EFFECT OF MUSCLE DAMAGE ON HEART AND STOMACH

Affected Organ	Effect on the Structure of the Organ	Effect on the Function of the Organ	Overall Effect on the Body
Heart	Inability to contract and relax
Stomach

Total 15 marks

GO ON TO THE NEXT PAGE

4. (a) Distinguish between a conductor and an insulator.

Conductor

.....

Insulator

.....

(2 marks)

- (b) State ONE example of how a conductor is used in the kitchen and ONE example of how an insulator is used in the kitchen.

Use of a conductor in the kitchen

.....

.....

Use of an insulator in the kitchen

.....

.....

(2 marks)

- (c) In a practical activity, Ryan was asked to connect three wires to the Live (L), Earth (E) and Neutral (N) contacts, in a three-pin plug. Complete Table 4 to show the colour of the wire that should be connected to EACH contact. **(3 marks)**

TABLE 4: COLOUR OF WIRE TO BE CONNECTED TO EACH CONTACT

Contact	Colour of Wire to be Connected
Live (L)	
Earth (E)	
Neutral (N)	

- (d) A housewife wants to determine the weekly cost of using three appliances in her home. If one unit of electricity (kWh) costs 25 cents, calculate the cost when she uses the appliances. **(All calculations are to be shown below.)**

TABLE 5: APPLIANCES AND DAILY QUANTITY OF ELECTRICITY USED

Appliance	Rating (watts)	Rating (kW)	Hours used per day	Units of Electricity Consumed (kWh) per day
Stove	1500		5	
Washing machine	1000		2	
Fan	250		10	
Total				

Total energy for one week (7 days).....

Total weekly cost **(6 marks)**

- (e) State TWO ways in which energy can be conserved in the home.

.....

.....

.....

.....

(2 marks)

Total 15 marks

SECTION B

Answer BOTH questions.

5. Community A is an agricultural community in a rural area surrounded by sea and mountains, and Community B is near an industrial town with large factories, restaurants and stores.

- (a) List THREE components of air. **(3 marks)**
- (b)
 - (i) Identify TWO likely pollutants that would be present in EACH of the TWO communities. **(4 marks)**
 - (ii) For ONE of the pollutants identified in EACH community, describe the source of the pollutant and how it may be distributed in the environment. **(4 marks)**
 - (iii) Outline TWO effects that the pollutants identified for EACH community would have on organisms in the community. **(4 marks)**

Total 15 marks

Write your answer to Question 5 here.

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6. (a) Identify and describe briefly the THREE methods by which heat energy is transferred from one point to another. **(6 marks)**
- (b) Ravi wants to know which colour absorbs sunlight best so he uses five containers, each filled with a different coloured solution and a thermometer. He records the results in Table 6.

TABLE 6: TEMPERATURE CHANGE OF DIFFERENT COLOURED SOLUTIONS

Colour of Solution	Initial Temperature (°C)	Final Temperature (°C)	Temperature Change (°C)
White	30	35	5
Dark red	30	42	12
Silver	30	36	6
Black	30	50	20
Dark green	30	40	10

- (c) Outline a procedure that Ravi may have used to get the results in Table 6. **(5 marks)**
- (d) Describe TWO problems that may be faced by people who want to use solar energy in the Caribbean. **(4 marks)**

Total 15 marks

Write your answer to Question 6 here.

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Write your answer to Question 6 here.

A series of horizontal dotted lines for writing the answer to Question 6.

END OF TEST

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



TEST CODE **01230032**

FORM TP 2014087

CARIBBEAN EXAMINATIONS COUNCIL

**CARIBBEAN SECONDARY EDUCATION CERTIFICATE®
EXAMINATION**

**INTEGRATED SCIENCE
(Single-Award)**

Paper 032 – Alternative to School-Based Assessment

General Proficiency

2 hours 10 minutes

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. Answer ALL questions.
2. Write your answers in the spaces provided in this answer booklet.
3. Do NOT write in the margins.
4. You may use a silent, non-programmable calculator to answer questions.
5. You are advised to take some time to read through the paper and plan your answers.
6. EACH question is worth 18 marks.
7. If you need to rewrite any answer and there is not enough space to do so on the original page, you must request extra lined pages from the invigilator. **Remember to draw a line through your original answer and correctly number your new answer in the box provided.**
8. **If you use extra pages you MUST write your registration number and question number clearly in the boxes provided at the top of EVERY extra page.**

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01230032/F 2014

Answer ALL questions.

1. (a) Figure 1 shows a cross section of a fruit.

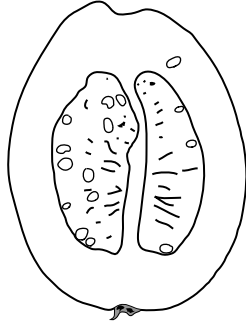


Figure 1. Cross section of a fruit

- (i) Measure the height and width of the cross section of the fruit in Figure 1. Include units in your answer.

Height

Width

(3 marks)

- (ii) In the box provided below, draw a cross section of the fruit shown in Figure 1.

(3 marks)

GO ON TO THE NEXT PAGE

- (b) A student performs food tests to determine the nutrient content of the fruit in Figure 1. Complete Table 1 to show the nutrients that are MOST likely present or absent.

(3 marks)

TABLE 1: OBSERVATIONS AND CONCLUSIONS FOR FOOD TESTS

Food Test	Observation	Nutrient Present/Absent
1. A drop of iodine solution is placed on the cut surface of the fruit.	Colour changes from reddish brown to blue-black.	
2. A small portion of the ripe fruit is squashed and the juice collected. 2 cm ³ of Benedict's solution is added to 1 cm ³ of the fruit juice in a test tube. The mixture is heated to boiling over a Bunsen burner for five minutes.	An orange-red precipitate is formed in the test tube.	
3. 2 cm ³ of potassium hydroxide and two drops of copper sulphate solution are added to 2 cm ³ of fruit juice.	No change in colour is observed.	

- (c) (i) Name the process by which the nutrient identified in Food Test 1 is produced in the plant.

.....
(1 mark)

- (ii) Name TWO nutrients, **other** than those identified in Table 1, that are often present in fruits.

.....
.....
(2 marks)

GO ON TO THE NEXT PAGE

- (d) (i) Write a suitable hypothesis to investigate whether the fruit in Figure 1 will ripen faster when placed in **dark** conditions than when placed in **light** conditions.

.....
.....
.....
.....

(2 marks)

- (ii) State TWO variables that should be held constant during the investigation in (d) (i) above.

.....
.....

(2 marks)

- (iii) State TWO precautions that should be taken during the investigation in (d) (i) above.

.....
.....

(2 marks)

Total 18 marks

2. (a) In a practical activity, a student uses the following apparatus and materials to find out which of four unknown metals labelled A, B, C and D is the best conductor of heat:

- Paraffin wax
- A beaker filled halfway with tap water
- A Bunsen burner, tripod and wire gauze
- Four thumbtacks
- A thermometer

(i) Write an appropriate aim for the practical activity being carried out by the student.

.....
.....

(1 mark)

(ii) Outline a suitable procedure that could be used by the student to carry out this practical activity.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

(4 marks)

- (iii) State THREE variables that must be kept constant in the practical activity outlined in (a) (ii) on page 5.

.....

.....

.....

.....

.....

(3 marks)

- (iv) State the responding variable in the practical activity outlined in (a) (ii) on page 5.

.....

.....

(1 mark)

- (v) Why is hot water used to provide the heat energy for this practical activity instead of heating directly with a Bunsen burner?

.....

.....

.....

(1 mark)

- (vi) How will the student identify which rod is the BEST conductor of heat?

.....

.....

.....

(1 mark)

(vii) State TWO precautions that should be taken when carrying out this practical activity.

a)

.....

b)

.....

(2 marks)

- (b) Figure 2 shows a beaker of water with a thermometer.

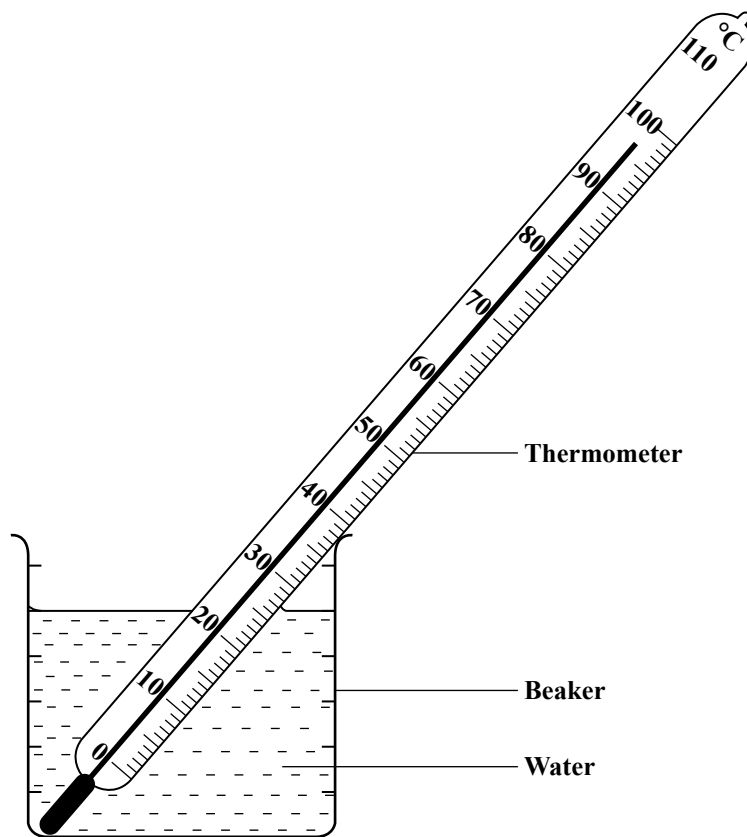


Figure 2 . Diagram showing beaker of water with a thermometer

- (i) Read the temperature shown on the thermometer in Figure 2 and write your answer in the space below. State the units.

.....
(3 marks)

- (ii) State TWO precautions to be taken when using the thermometer.

.....
.....
(2 marks)

Total 18 marks



3. Kamla constructs the device shown in Figure 3 to find the weight of unknown masses. The device is attached firmly to a stand in the laboratory and has pulleys at A and B with a hook at E to attach a load. She applies an effort at D which is measured on the spring balance at C. Kamla is surprised to find that the spring balance records 25 N when a load of 50 N is attached to the hook. She therefore attempts to check the device by recording the readings for some known weights (50 N, 40 N, 30 N, 20 N, 10 N,) so that she can determine the accurate weights for X and Y.

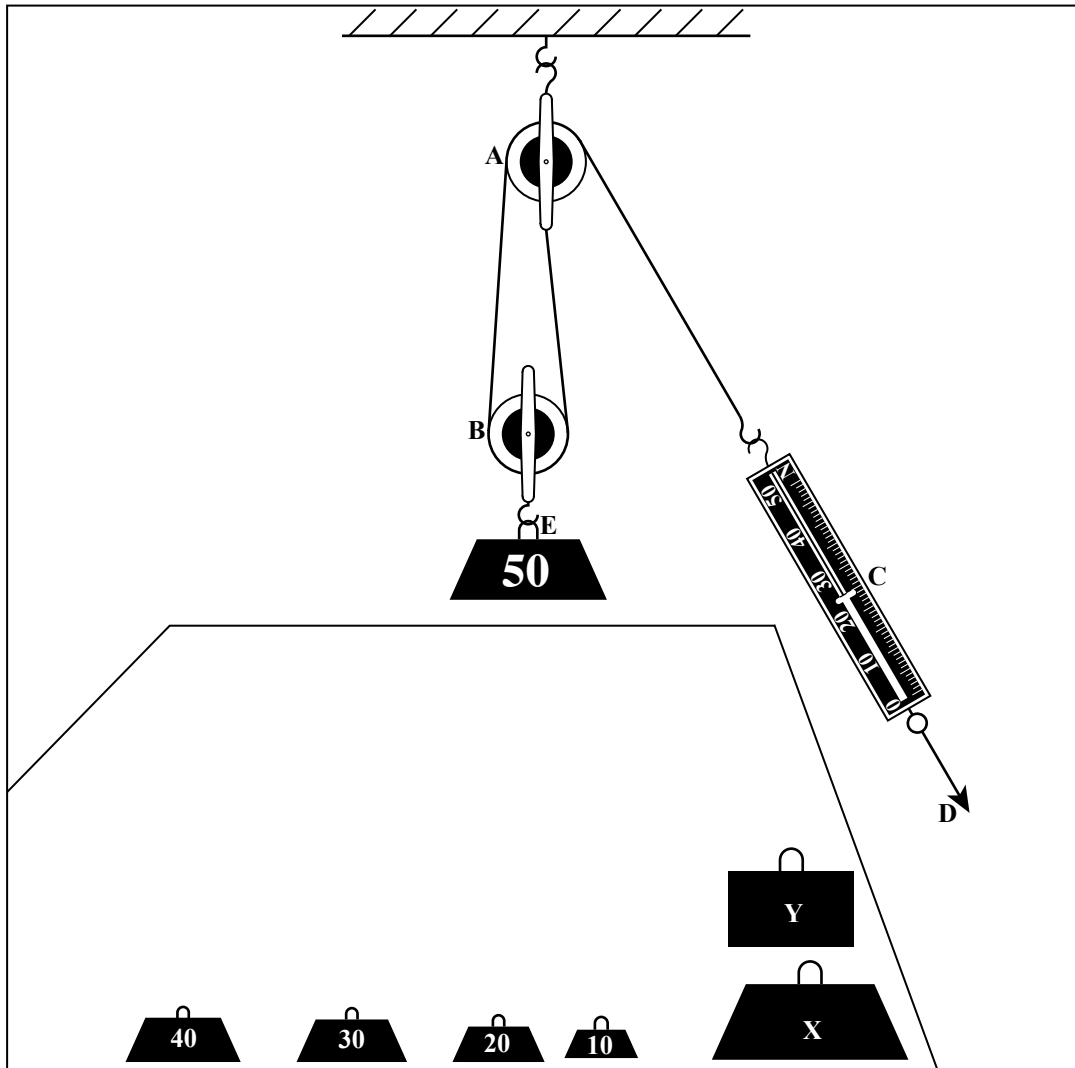
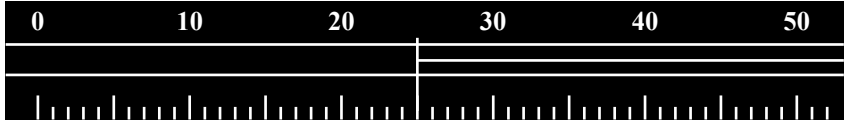
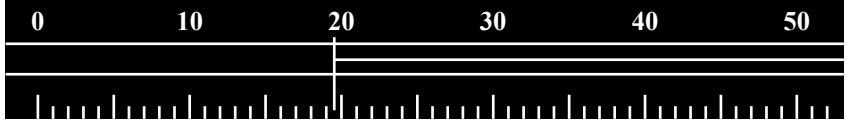
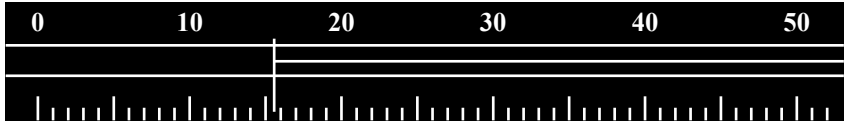
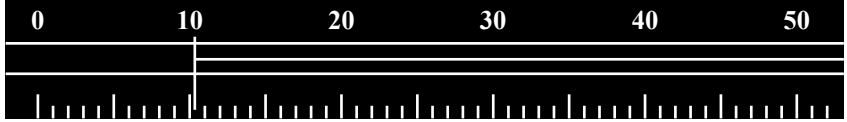

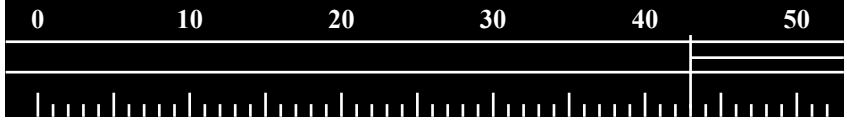
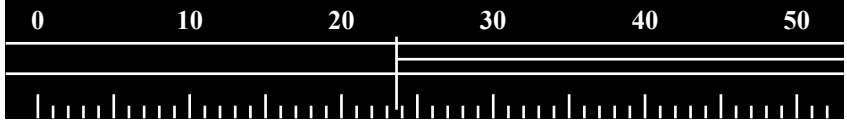


Figure 3. Diagram of device used to find weight

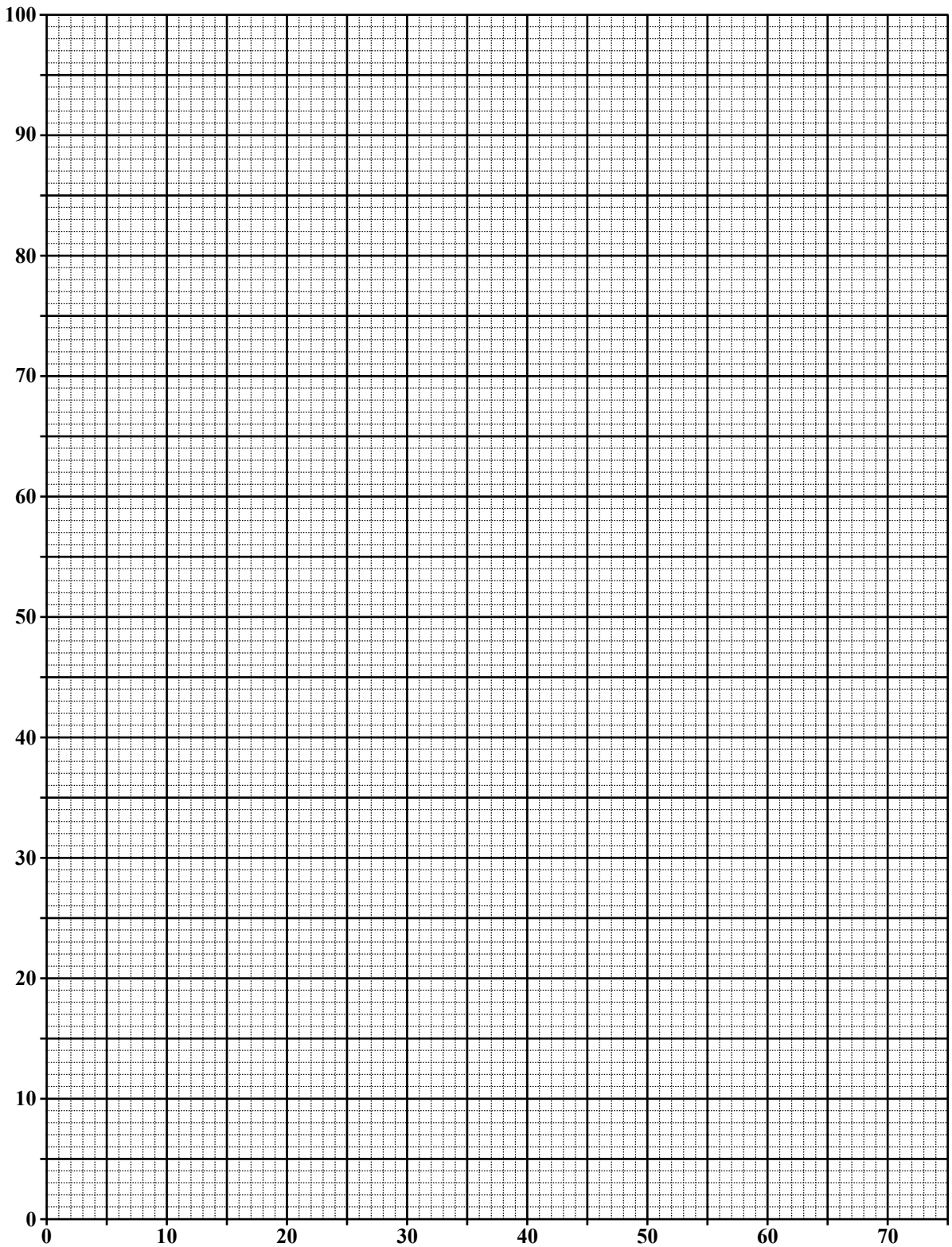
- (a) Read the spring balances presented in the right column of Table 2 and record the results in the spaces provided in Table 2. **(5 marks)**

TABLE 2: READING ON SPRING BALANCE FOR WEIGHTS

Weight at E (N)	Reading on Spring Balance (N)	Picture of Reading on Spring Balance (N)
50		
40		
30		
20		
10		
X		
Y		

- (b) (i) Using the grid paper provided on page 11, plot the points of Kamla's results for the readings on the spring balance versus known weights at E. **(5 marks)**
- (ii) Draw the best-fit line to represent the information. **(1 mark)**
- (iii) Label the axes on the graph. Include the units on EACH axis. **(2 marks)**

GO ON TO THE NEXT PAGE



GO ON TO THE NEXT PAGE

- (iv) Extend your line upwards on the graph. Draw TWO dotted lines in the appropriate places on the graph to assist you with reading and recording the weight of X.

Weight of X **(3 marks)**

- (c) Figure 4 is a picture of the pulley system used by Kamla. In the box provided, draw a two-dimensional diagram of the pulley system in Figure 4. Include the magnification in your drawing. **(2 marks)**

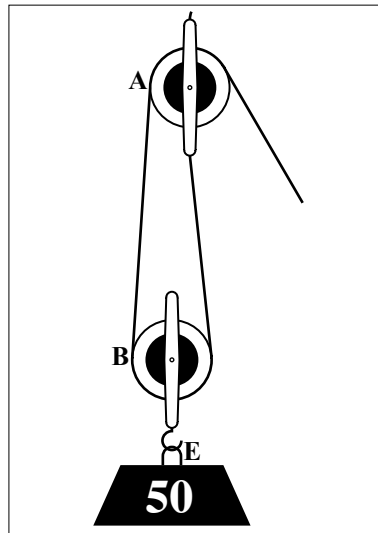


Figure 4. Pulley system used by Kamla



Total 18 marks

END OF TEST

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



C A R I B B E A N E X A M I N A T I O N S C O U N C I L

**C A R I B B E A N S E C O N D A R Y E D U C A T I O N C E R T I F I C A T E[®]
E X A M I N A T I O N**

**I N T E G R A T E D S C I E N C E
(Single Award)**

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. Section A is worth 70 marks.
3. Do NOT write in the margins.
4. 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.
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.**

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SECTION A

Answer ALL FOUR questions.

1. Daniella and her family live on a very large farm. When Salisha visits the farm they go exploring to collect the smooth round pebbles found in the small stream running down the forested hillside. They notice that the water in the small ponds on the flat sandy fields dry up before similar ponds on the clayey hillside.

(a) (i) Give ONE reason why the ponds on the hillside dry up slower than those on the flat fields.

.....
.....

(1 mark)

(ii) State TWO possible effects on the farm of cutting down the forest on the hillside.

.....
.....
.....

(2 marks)

(iii) Daniella recorded the following table in her journal.

TABLE 1: PREDATOR – PREY RELATIONSHIPS

Predator	Prey
Small birds	Insects, spiders and fruits
Hawks	Mice, small birds and seed-eating birds
Snakes	Mice, frogs and seed-eating birds
Insects	Leaves
Spiders	Insects
Mice	Seeds and fruits
Seed-eating birds	Grass seeds
Frogs	Insects

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Use the data from Table 1 to complete the food web in Figure 1 by drawing a **MAXIMUM of 14** arrows in the appropriate places. **(4 marks)**

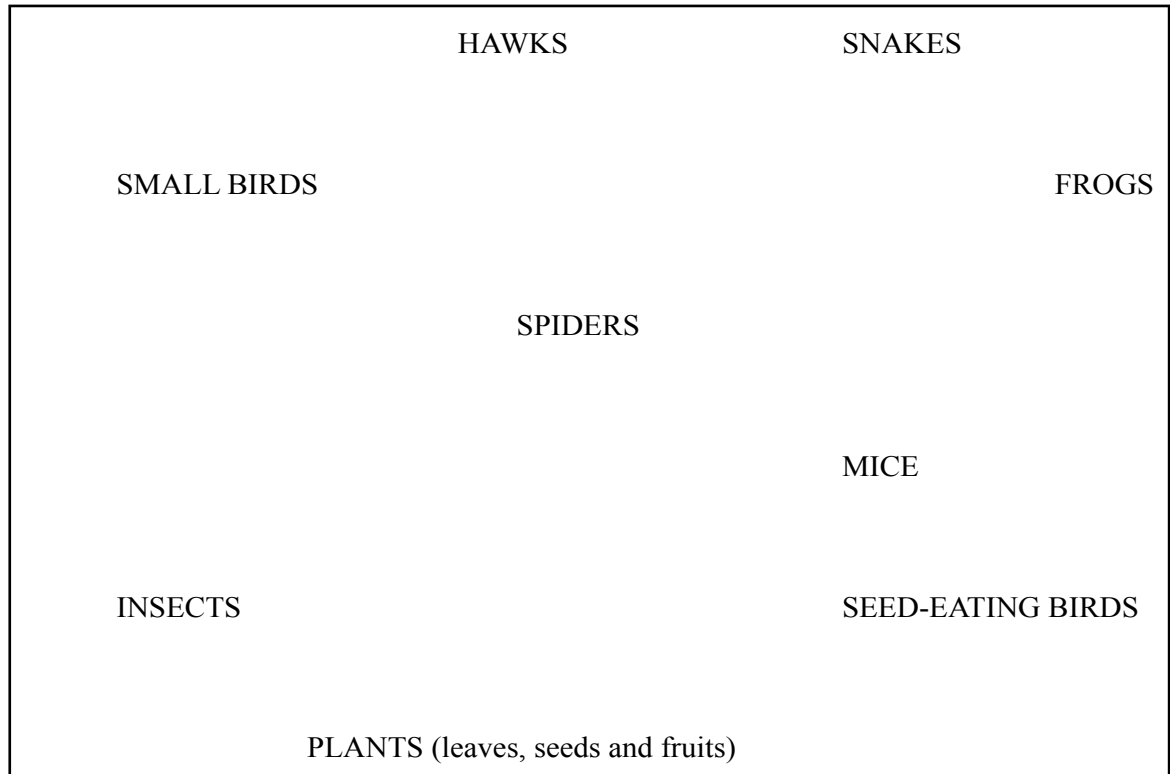


Figure 1. Food web

(iv) Name ONE herbivore, ONE carnivore and ONE omnivore in Table 1.

Herbivore

Carnivore

Omnivore

(3 marks)

(b) Plants make their own food and all living things use food to meet their energy needs.

(i) Name the process used by living things to obtain energy.

.....
(1 mark)

(ii) Name the process by which plants make food.

.....
(1 mark)

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- (iii) Write a word equation for the process by which plants make food.

.....
.....
(2 marks)

- (iv) Name ONE form in which plants use nitrogen present in the soil.

.....
(1 mark)

- (c) Samples of soil are taken at intervals in a straight line, across the fields 1–7 of the farm, from the lower limestone areas to the clay hill. The following is a table of the pH of the soil samples.

TABLE 2: pH OF SOIL SAMPLES ACROSS THE FARM

Field	1	2	3	4	5	6	7
pH of Soil Sample	8.2	7.6	7.0	6.5	6.0	5.4	5.0

- (i) On the grid in Figure 2 on **page 5**, using the scales provided, plot a graph to represent the data in Table 2. **(4 marks)**

- (ii) Draw on the graph the best straight line to show the trend. **(2 marks)**

- (iii) Label the axes on the graph. **(1 mark)**

- (iv) Suggest an appropriate title for the graph.
.....
(1 mark)

- (v) If corn grows best in a neutral pH, use the graph to determine which is the most suitable field to be used as a corn field.
.....
(1 mark)

- (vi) Use the graph to determine which field would be best for growing citrus plants which flourish in acidic soils.
.....
(1 mark)

Total 25 marks

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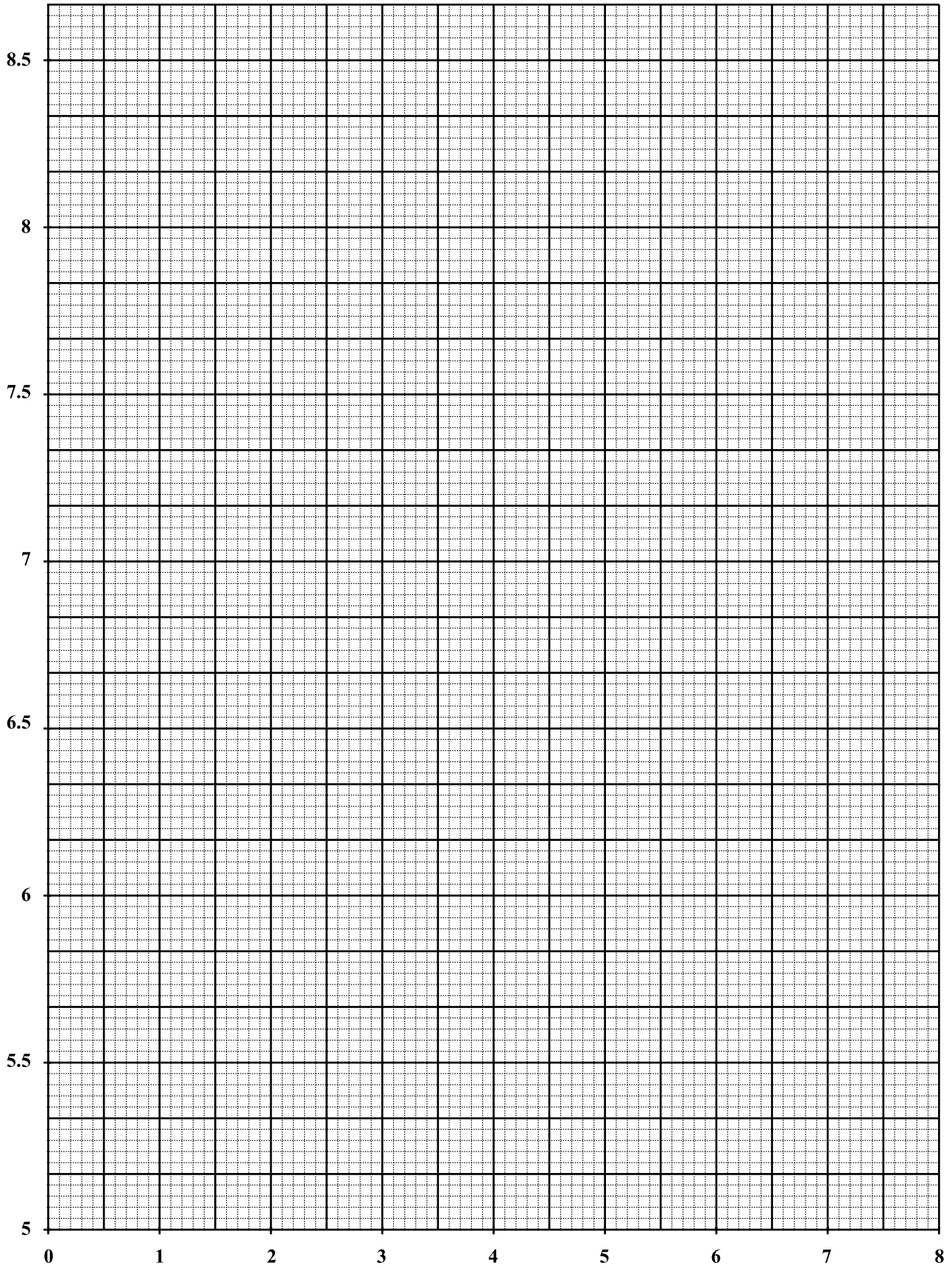


Figure 2.

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2. (a) Distinguish between 'excretion' and 'egestion'.

.....
.....
.....

(2 marks)

- (b) Figure 3 is a diagram showing excretory structures of the human body.

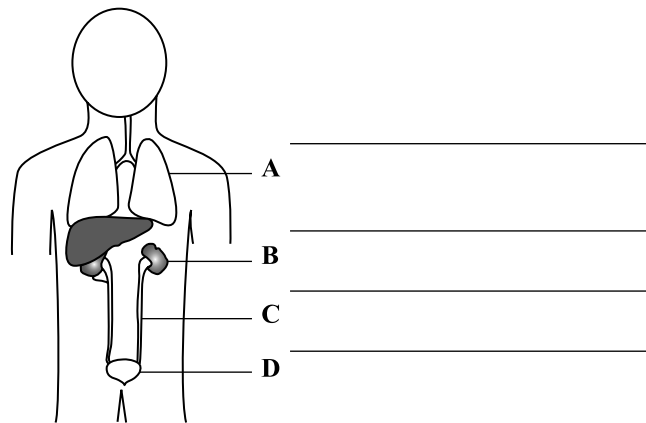


Figure 3. Excretory structures of the human body

- (i) Identify the structures labelled **A**, **B**, **C** and **D** in Figure 3. Write your answers in the spaces provided. (4 marks)
- (ii) State the function of the part labelled **D** in Figure 3.

.....
.....

(1 mark)



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- (c) Figure 4 shows Mr Boodoo at work in his backyard. The arrows show the direction of water flow in a stream that passes through his property.

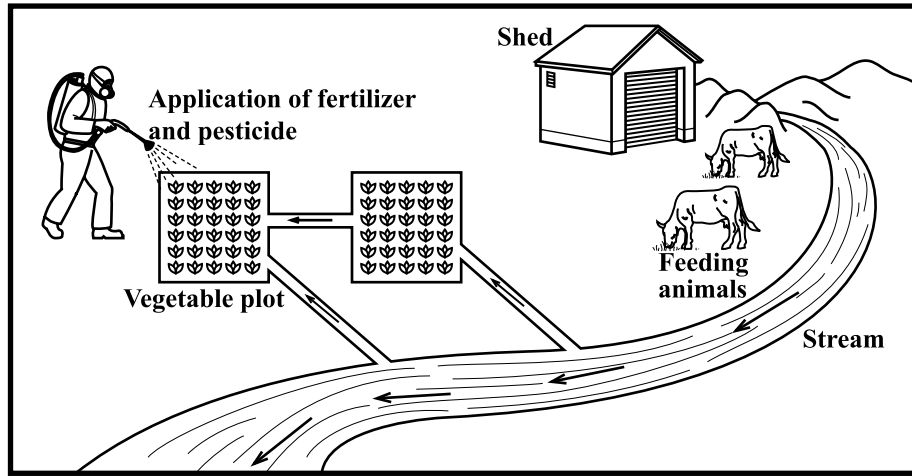


Figure 4. Mr Boodoo at work in his backyard

- (i) Identify ONE excretory product that is likely to be present in the atmosphere of Mr Boodoo's backyard.

.....
(1 mark)

- (ii) Identify ONE excretory product that is likely to be present in the soil of Mr Boodoo's backyard.

.....
(1 mark)

- (iii) State ONE disadvantage and ONE advantage of the excretory product named in (ii) above.

Advantage

(1 mark)

Disadvantage

(1 mark)

- (iv) Explain how the water from the stream may be made safe for drinking.

.....
.....
.....

(4 marks)

Total 15 marks

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3. (a) (i) Define the term 'force'.

.....
.....
.....

(1 mark)

(ii) State TWO effects of a force on a body.

.....
.....
.....

(2 marks)

(iii) What is the unit of force?

.....

(1 mark)

(b) Friction is an example of a force. Explain what is meant by a 'frictional force'.

.....
.....
.....

(1 mark)

DO NOT WRITE IN THIS AREA



- (c) Frank decides to investigate the effects of friction on a toy car. First he applied a force of 100 N to a toy car on a horizontal surface, and observed how far it travelled. Then he oiled the axles as shown in Figure 5. He then applied a force of 100 N to the same car on the same horizontal surface, and observed how far the car travelled.

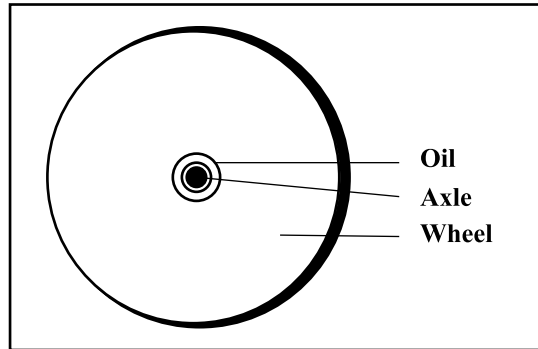


Figure 5. Diagram to show the axle after oiling

The following data was obtained.

TABLE 3: RESULTS TO SHOW DISTANCE TRAVELLED

State of Axle	Distance Travelled (m)
Without oil	20
With oil	50

- (i) State ONE variable that is held constant during the experiment.

.....
.....
.....

(1 mark)

- (ii) Explain why the car was able to travel further when the axle was oiled.

.....
.....
.....
.....

(2 marks)



- (iii) From the experiment on **page 9**, state ONE advantage of friction and ONE disadvantage of friction.

Advantage

.....
.....
.....

(1 mark)

Disadvantage

.....
.....
.....

(1 mark)

DO NOT WRITE IN THIS AREA



- (d) Frank normally parks his car on a slope. He replaces his car tyres with taller ones and the car topples over when he parks as shown in Figure 6.

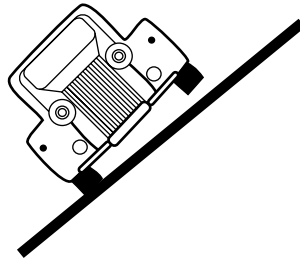


Figure 6. Car parked on slope

Explain the effect of changing the car tyres on:

- (i) The centre of gravity of the body of the car

.....
.....
(1 mark)

- (ii) The stability of the body of the car

.....
.....
(1 mark)

- (e) (i) Frank's father was driving his new racing car at a fast speed on a wet and slippery track. He applied the brakes suddenly. Explain the role of the endocrine system as he performed this activity.

.....
.....
.....
(2 marks)

- (ii) Name ONE system in the body, **other** than the endocrine system, that plays an important role in the situation in (e) (i).

.....
.....
.....
(1 mark)

Total 15 marks

GO ON TO THE NEXT PAGE



DO NOT WRITE IN THIS AREA

4. (a) (i) What is a microorganism?

.....

(1 mark)

(ii) State ONE way by which the growth of mould on bread may be reduced.

.....

(1 mark)

(b) Terrance wants to investigate the growth of mould on multigrain bread under different conditions. Figure 7 shows how the experiment was setup.

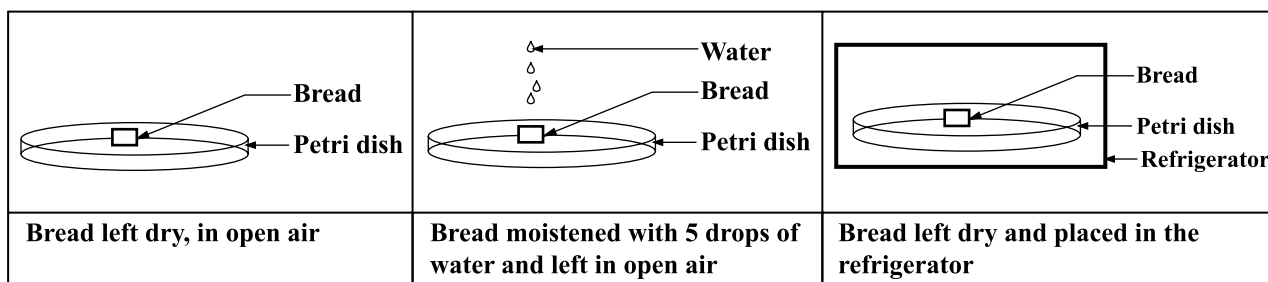


Figure 7. Experiment to investigate the growth of mould on bread

After one week the three pieces of bread were observed. Terrance noticed that the second piece of bread had the most mould followed by the first and finally the third.

(i) Name ONE microorganism that is used to make bread in the commercial industry.

.....

(1 mark)

(ii) Using the observations in the experiment, determine THREE conditions that are necessary for mould growth.

.....

(3 marks)

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DO NOT WRITE IN THIS AREA

(iii) What is the effect of refrigeration on mould growth?

.....
.....
.....

(2 marks)

(iv) State whether there will be any mould growth if Terrance conducts the experiment in a vacuum (no air). Explain your answer.

.....
.....
.....

(2 marks)

(c) Explain why it is not advisable for Terrance to eat bread that has mould growing on it.

.....
.....
.....

(1 mark)

(d) Name TWO methods that can be used to preserve foods.

.....
.....
.....

(2 marks)

(e) Bread is baked at temperatures that do not support mould growth. Explain why mould is MOST likely to grow on bread when it is exposed to the atmosphere.

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(2 marks)

Total 15 marks

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SECTION B

Answer BOTH questions.

5. (a) Mr Brown is a carpenter who plays cricket on weekends. He consumes a large quantity of ground provisions (yam, dasheen, potato) in his diet. Discuss the importance of this food choice to Mr Brown's work and weekend activity. **(3 marks)**

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- (b) Keshorn's father would like to install a system where the sun's energy would be used to charge the batteries in the electric car. Describe TWO advantages and TWO disadvantages of using the solar energy. **(4 marks)**

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- (c) Outline TWO negative effects on the local environment if the family uses a gasoline powered car. **(2 marks)**

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- (d) State TWO alternative sources of energy, **other** than solar energy, that are easily available to Keshorn's father in the Caribbean and explain why these sources are considered readily available. **(4 marks)**

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Total 15 marks

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MAY/JUNE 2015

C A R I B B E A N E X A M I N A T I O N S C O U N C I L

**C A R I B B E A N S E C O N D A R Y E D U C A T I O N C E R T I F I C A T E
E X A M I N A T I O N**

**I N T E G R A T E D S C I E N C E
(Single Award)**

Paper 032 – Alternative to School-Based Assessment

General Proficiency

2 hours 10 minutes

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of THREE questions. 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. Do NOT write in the margins.
4. You may use a silent, non-programmable calculator to answer questions.
5. You are advised to take some time to read through the paper and plan your answers.
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.**
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01230032/F 2015



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Answer ALL questions.

1. Figure 1 shows the results of an experiment to monitor the growth of a seedling.

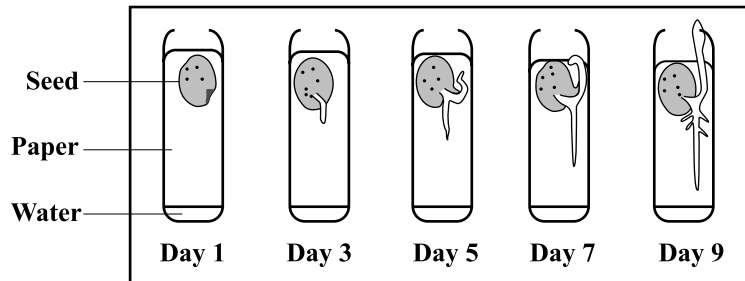


Figure 1. Diagram to show the growth of a seedling

(a) Explain the purpose of using the following in the experiment:

(i) Water

.....
.....

(ii) Paper

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(2 marks)

(b) On the diagram for the tube representing **Day 9**, label the root and the shoot. (2 marks)

(c) State TWO observable differences between the shoot and the root.

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(2 marks)



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- (d) Design a table for recording the length of the roots and shoots over the 9 days.

(2 marks)

- (e) Write a suitable title for the table.

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(1 mark)

- (f) Measure the lengths of the root and shoot in the tube representing **Day 9**. State the units.

Root

Shoot

(4 marks)

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NOTHING HAS BEEN OMITTED.



2. A student was provided with the following apparatus/materials and asked to carry out an experiment to compare the reactivity of some metals with hydrochloric acid.

Metals (5 metals labelled A–E)
5 test tubes
Dilute hydrochloric acid
Test tube holder
Bunsen burner
Splint
Stopwatch
Glass rod

- (a) (i) Outline a suitable procedure the student could use to carry out this experiment.

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(4 marks)

- (ii) Write a suitable aim for this experiment.

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(1 mark)



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- (iii) Table 2 is used by the student to record the results. Place suitable headings in the table.

TABLE 2: RESULTS OF EXPERIMENT

A	
B	
C	
D	
E	

(2 marks)

- (iv) Name ONE variable that must be kept constant in the experiment.

.....
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.....

(1 mark)

- (v) Name the responding variable in the experiment.

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(1 mark)

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(b) Figure 2 is a bar chart showing the results of the experiment.

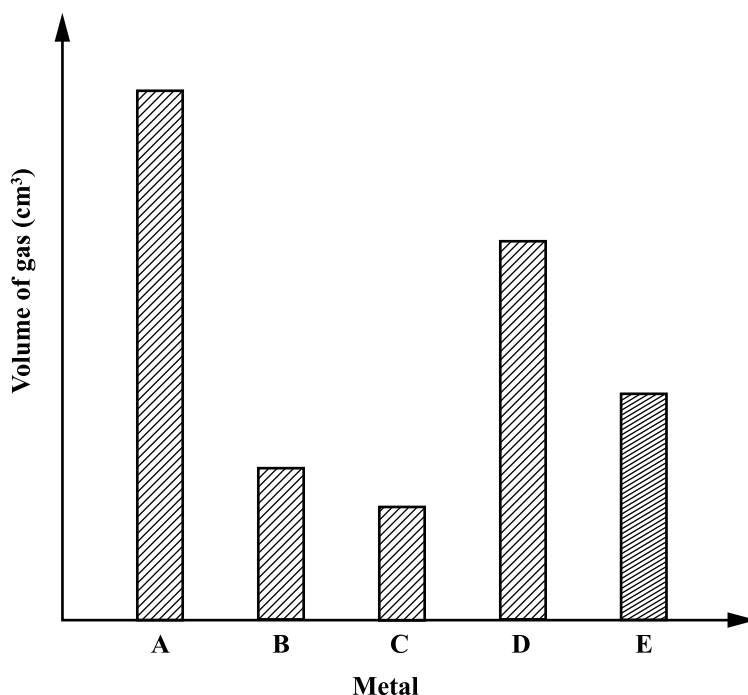


Figure 2. Bar chart showing metals and volume of gas produced

(i) Use Figure 2 to place the metals in order of reactivity from **highest** to **lowest**.

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(3 marks)



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- (ii) Use Figure 2 to determine which TWO of the five metals would be MOST suitable for making cooking utensils.

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(2 marks)

- (iii) State ONE precaution to be taken when carrying out this experiment.

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(1 mark)

- (iv) In the space below, draw and label ONE test tube containing the acid and ONE of the metals used in the experiment described in (a) (i).

(5 marks)

- (v) Name the gas that is produced during the experiment.

.....
.....

(1 mark)

GO ON TO THE NEXT PAGE



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- (vi) Use Figure 2 to determine which metal is MOST suited for making cans for orange juice.

.....
.....

(1 mark)

- (c) Figure 3 shows the apparatus used to measure the volume of the gas given off during the experiment. Use Figure 3 to determine the volume of gas given off during the experiment and state ONE precaution that should be taken when reading the value for the volume.

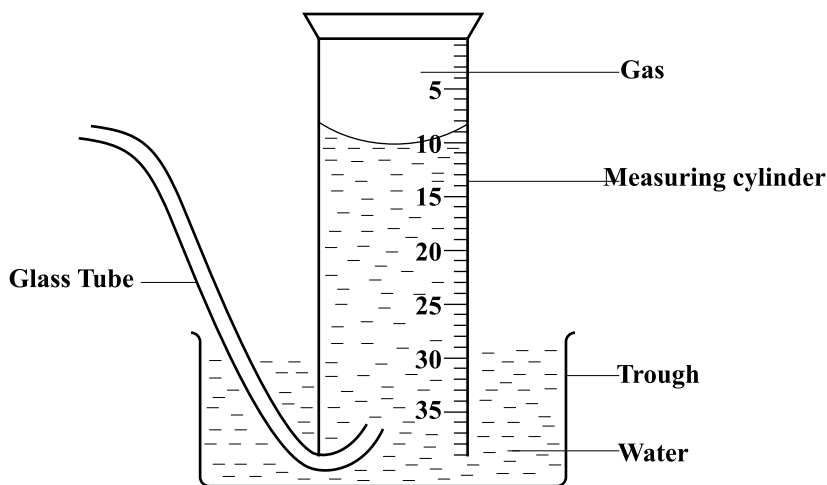


Figure 3. Apparatus to determine volume of gas collected

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(2 marks)

Total 24 marks



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3. Vikash constructs a circuit to find the resistance of a bulb. He records the readings for the ammeter and voltmeter so that he can determine the accurate resistance of the bulb.

(a) Read the ammeters presented in Figure 5 and record the ammeter readings in Table 3 below.

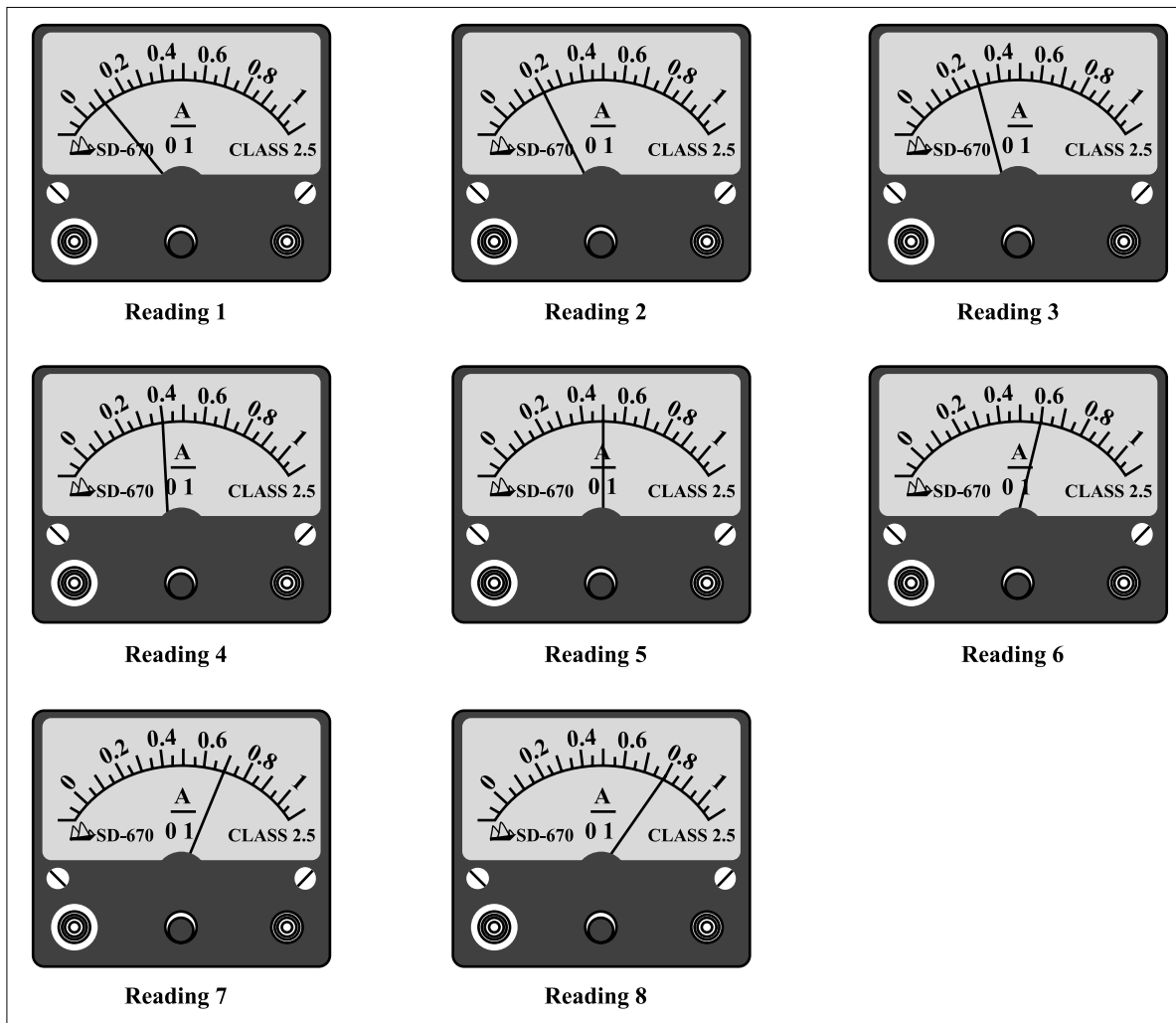


Figure 5. Ammeter readings for different voltages

TABLE 3: CURRENT AND VOLTAGE IN THE CIRCUIT

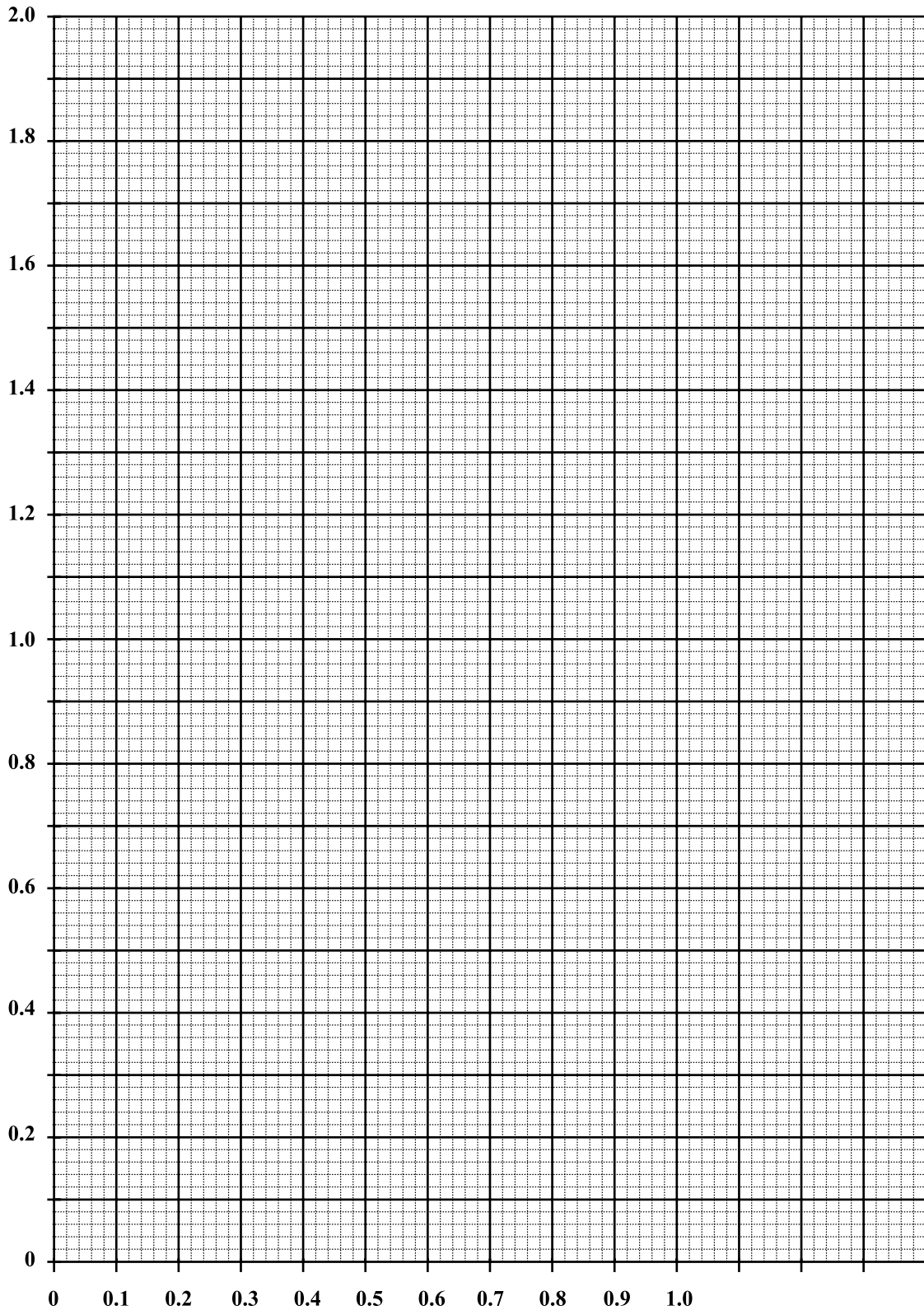
Reading	1	2	3	4	5	6	7	8
Current (A)								
Voltage (V)	0.2	0.4	0.6	0.8	1.0	1.2	1.4	

(b) (i) Using the grid provided on page 13, plot a line graph of Vikash's results for the current vs voltage. (5 marks)

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- (ii) Draw the line of best-fit to represent the information. **(1 mark)**
- (iii) Label the axes on the graph. **(1 mark)**
- (iv) Extend your line upwards on the graph. Draw TWO dotted lines in the appropriate places on the graph to assist you with reading and recording the voltage for Reading 8.

Voltage for Reading 8 **(4 marks)**

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(c)

Figure 6 is a picture of a variable resistor used by Vikash in the circuit. In the box provided, draw a two dimensional diagram of the variable resistor. **(2 marks)**

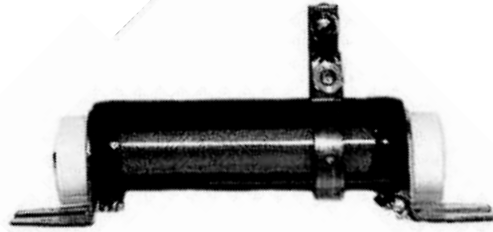


Figure 6. Variable Resistor

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Total 18 marks

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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. Section A is worth 70 marks.
3. Section B consists of TWO questions. Answer ALL questions. Write your answers in the spaces provided in this answer booklet. Section B is worth 30 marks.
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.**

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SECTION A

Answer ALL FOUR questions.

1. Vanessa has a farm with orange and mango orchards. She plants corn and beans several times a year on this farm.

(a) (i) State ONE asexual method of reproduction in plants.

.....
(1 mark)

(ii) Name ONE male part of the flower.

.....
(1 mark)

(iii) Name ONE female part of the flower.

.....
(1 mark)

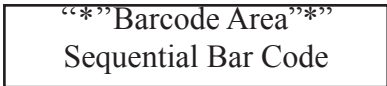
(iv) State TWO advantages of asexual reproduction.

.....
.....
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.....
(2 marks)

(v) Vanessa has been advised not to use pesticides that will harm the bees in the orchards. Suggest ONE reason why it is important for the bees to visit the flowers.

.....
.....
(1 mark)

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- (b) (i) When Vanessa was pregnant, the scents from the flowers in the orchards made her nauseous, even when she was in the house. Give a scientific explanation of how the scents travel from the flowers to the house.

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(2 marks)

- (ii) Vanessa does not want to have another baby and, after discussion with her husband, she has decided to use a surgical method.

State TWO advantages of the surgical method of contraception.

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(2 marks)

State ONE disadvantage of this method compared with other methods.

.....

.....

(1 mark)

- (iii) Explain the importance of the following significant changes that occur in Vanessa's reproductive organs when she is NOT pregnant:

The lining of the uterus (womb) grows and thickens

.....

.....

Menstruation (the thickened lining of the uterus is shed during the menstrual period)

.....

.....

(3 marks)

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- (c) A farm worker measures and calculates the average height of three corn plants over a period of two weeks and records the results in Table 1.

TABLE 1: AVERAGE HEIGHT OF CORN PLANTS OVER A PERIOD OF TWO WEEKS

Time (days)	2	4	6	8	10	12	14
Average Height (cm)	1	1.9	4.0	5.5	7.2	8.6	9.8

- (i) Use the grid and scales in Figure 1 **on page 7** to represent the data in Table 1. **(4 marks)**
- (ii) On Figure 1, draw the best straight line to show the trend. Extend this line to cut the x -axis. **(2 marks)**
- (iii) Label the axes on the graph. **(2 marks)**
- (iv) State an appropriate title for the graph.
..... **(1 mark)**
- (v) Using the graph, determine the average height of the corn on the 11th day.
..... **(1 mark)**
- (vi) How long after planting did the corn plants emerge from the soil?
..... **(1 mark)**

Total 25 marks

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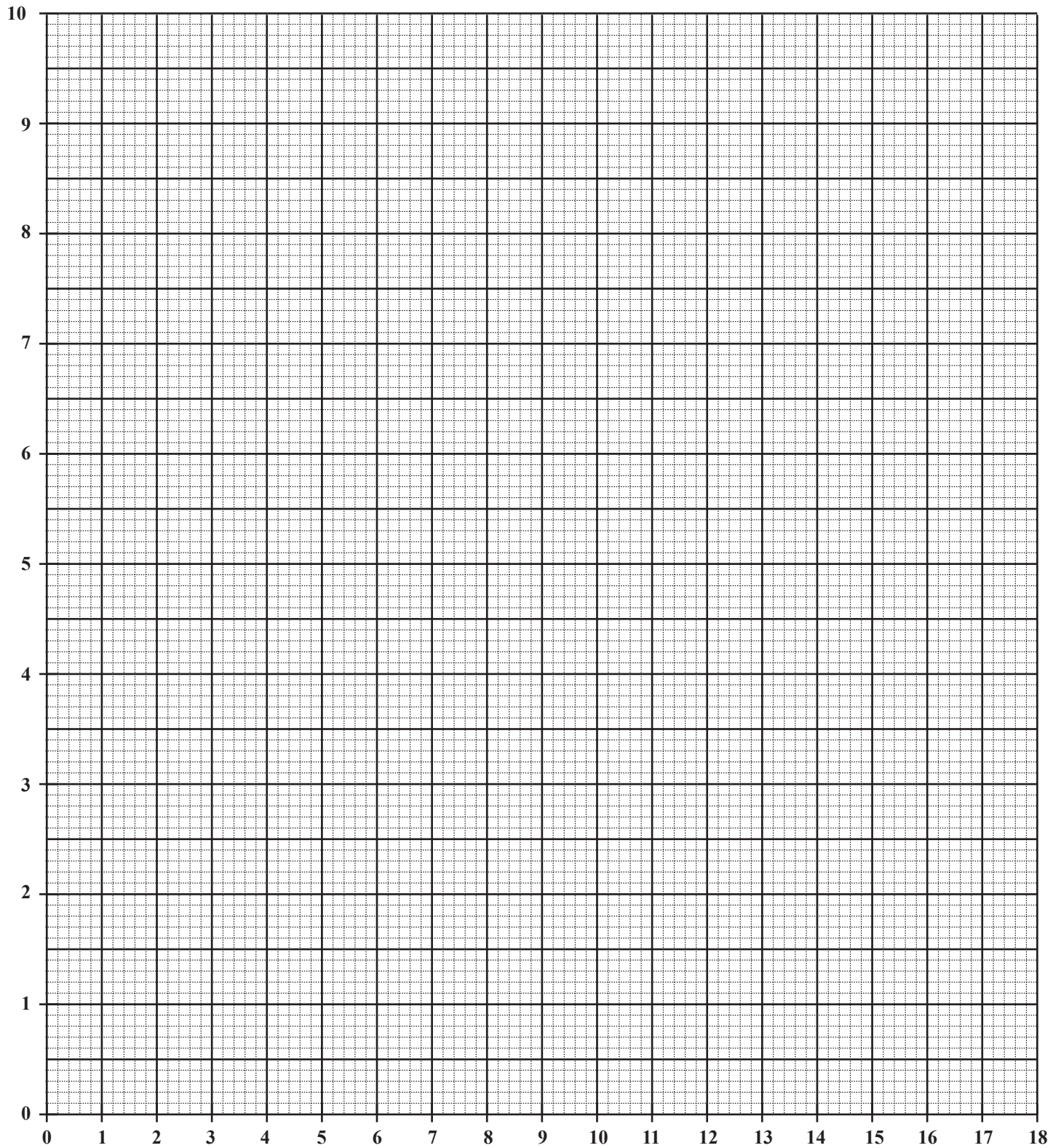


Figure 1.

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01230020/F 2016

“*”Barcode Area”*
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2. Tropical islands experience alternating periods of sunshine and rain. Figure 2 shows a tourist at a recreational poolside. The arrows at I, II and III represent processes in the water cycle, while the box at IV represents a state of water.

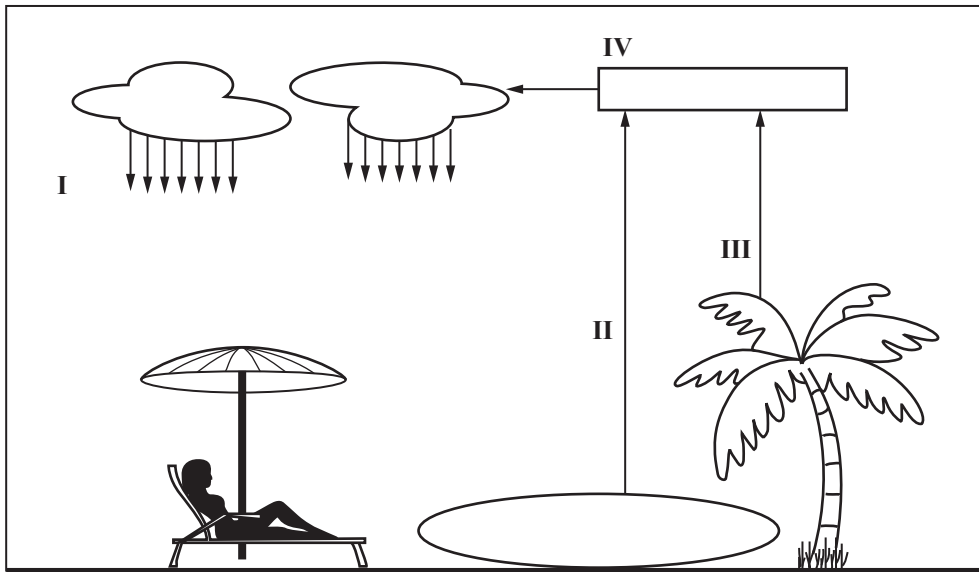


Figure 2. Recreational poolside facility

- (a) (i) Identify the processes at I, II and III.

I

II

III

(3 marks)

- (ii) Name the state of water at IV.

.....

(1 mark)

- (b) During sunny periods, the owner of the poolside facility notices that his plants look wilted especially at noon. Suggest ONE way by which he could prevent his potted plants from wilting throughout the day. Give a reason for your answer.

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(3 marks)

- (c) (i) State TWO reasons for adding chlorine to the water in the pool.

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(2 marks)

- (ii) Suggest TWO ways in which the owner of the facility can use the water when he empties his pool.

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(2 marks)

- (iii) State ONE safety precaution that must be taken when the pool is being chlorinated.

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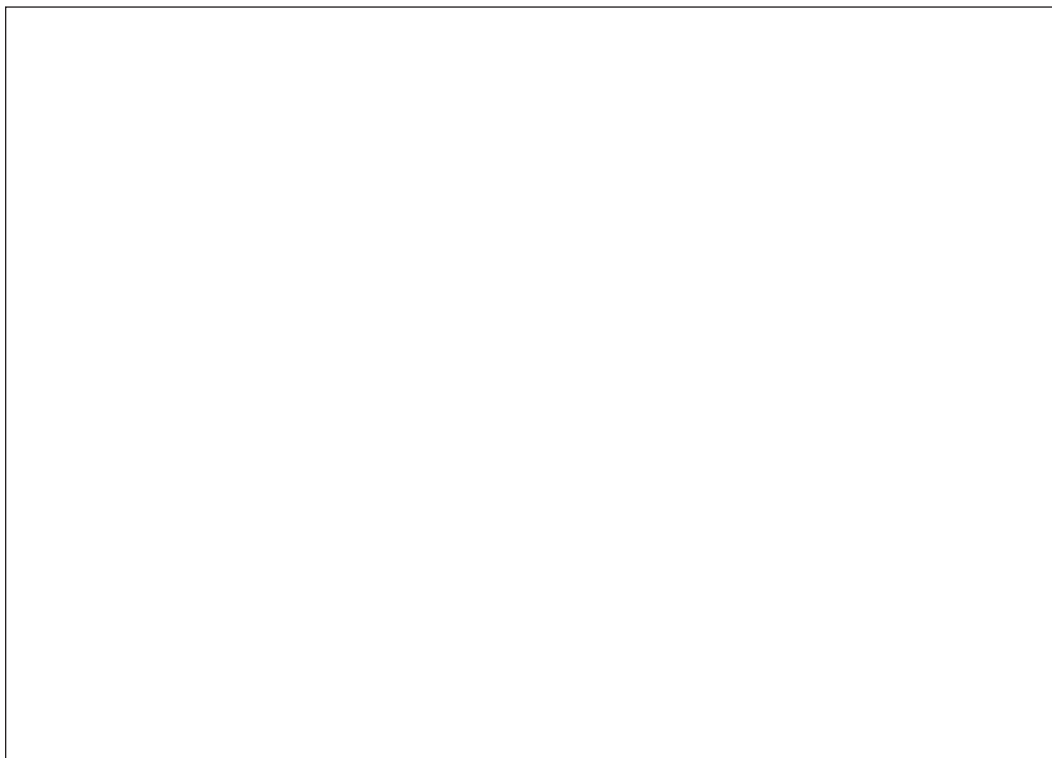
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(1 mark)

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(d) The poolside facility is located close to the sea. The following organisms were observed in the sea: seaweeds, kingfish, herring, aquatic insects.

(i) In the box provided below, draw a food chain to show the feeding relationships among these organisms.



(2 marks)

(ii) Name the source of energy in the food chain.

.....

(1 mark)

Total 15 marks

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01230020/F 2016

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Sequential Bar Code

3. (a) It is necessary to brush your teeth with toothpaste after meals. If this is not done, the pH level in the mouth may fall below 5.5, and this may damage the enamel in your teeth resulting in cavities.

Joan and Cindy are identical twins. The dentist finds that Cindy has fewer cavities than Joan. Suggest THREE habits, **other** than brushing regularly, that may have resulted in Cindy having fewer cavities.

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(3 marks)

- (b) Frank performs pH tests on four different brands of toothpaste, A, B, C, D, and obtains the following results as indicated in Table 2.

TABLE 2: pH OF FOUR BRANDS OF TOOTHPASTE

Brand	A	B	C	D
pH	8.5	9.0	8.0	5.0

- (i) Name a substance that can be used to measure the pH of the toothpaste.

.....

(1 mark)

- (ii) Arrange the four brands of toothpaste in **descending** order of acidity (most acidic first) using the letters of the brand.

.....

(2 marks)

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(iii) Frank's teacher suggested that one of his results in Table 2 is incorrect. Identify the brand of toothpaste with the incorrect pH and give a reason for your answer.

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.....
.....

(2 marks)

(iv) State a possible reason that may have caused Frank to get the incorrect result.

.....
.....

(1 mark)

(v) State ONE component of toothpaste which helps to strengthen teeth.

.....

(1 mark)

(c) (i) Name ONE acidic and ONE alkaline substance present in the digestive system of humans.

Acidic

Alkaline

(2 marks)

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

.....
.....

(1 mark)

(iii) Antacids are substances normally used to treat digestion problems. Explain the scientific principle by which the antacids treat these problems.

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(2 marks)

Total 15 marks

GO ON TO THE NEXT PAGE



4. (a) Advances in technology have led to the manufacture of solar powered vehicles.

(i) State ONE advantage and ONE disadvantage of using solar powered vehicles.

Advantage

.....

Disadvantage

.....

(2 marks)

(ii) Suggest TWO energy conversions that may occur in a moving solar powered car.

.....

.....

(2 marks)

(b) Carson performs an experiment to determine the effect of friction on the distance travelled by a toy car. He first places a toy car on a smooth surface, applies a force of 10 N, and records the distance travelled. He then places the toy car on a rough surface, again applies a force of 10 N, and observes the distance travelled. The results are shown in Table 3.

TABLE 3: RESULTS OF EXPERIMENT TO DETERMINE THE EFFECTS OF FRICTION ON THE DISTANCE TRAVELLED BY A TOY CAR

Type of Surface	Force Applied (N)	Distance Travelled (m)
Smooth	10	10
Rough	10	5

(i) Identify the following variables:

The manipulated variable

The responding variable

Two variables held constant

.....

(4 marks)

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(ii) State the formula used to calculate the energy that is converted when cars move.

.....
(1 mark)

(iii) Calculate the energy conversion of the car on the smooth surface

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.....
rough surface.
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(2 marks)

(c) (i) State what is meant by the term 'inefficiencies of machines'.

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.....
(1 mark)

(ii) Use your calculations in (b) (iii) to determine on which of the two surfaces the toy car is more efficient. Give a reason for your answer.

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(2 marks)

(iii) State ONE factor, **other than** friction, that contributes to the inefficiencies of machines.

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(1 mark)

Total 15 marks

GO ON TO THE NEXT PAGE

SECTION B

Answer BOTH questions.

5. (a) Name TWO structures in the respiratory system and THREE structures in the circulatory system.

Respiratory system:

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.....

Circulatory system:

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(5 marks)

- (b) Mr Lan is a heavy cigarette smoker. He has been smoking cigarettes for the past 20 years. Explain THREE effects of this long-term smoking on his respiratory system.

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(6 marks)

6. Abiola is using a portable pump to inflate her car tyre. After she plugs it in, it makes an attempt to start but immediately stops working. She looks at the label and reads the following information: Voltage: 12 V, Current 18 A.

(a) The fuses in her car come with ratings of 10 A, 15 A and 20 A. On checking, she notices that the 15 A fuse in the car burned out. State the function of the fuse and give ONE reason why Abiola should not attempt to replace it with aluminium foil.

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(2 marks)

(b) Calculate the power of the pump. Include the unit of power in the answer.

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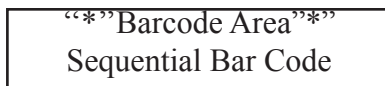
(4 marks)

(c) Name TWO suitable materials from which the conducting wire can be made.

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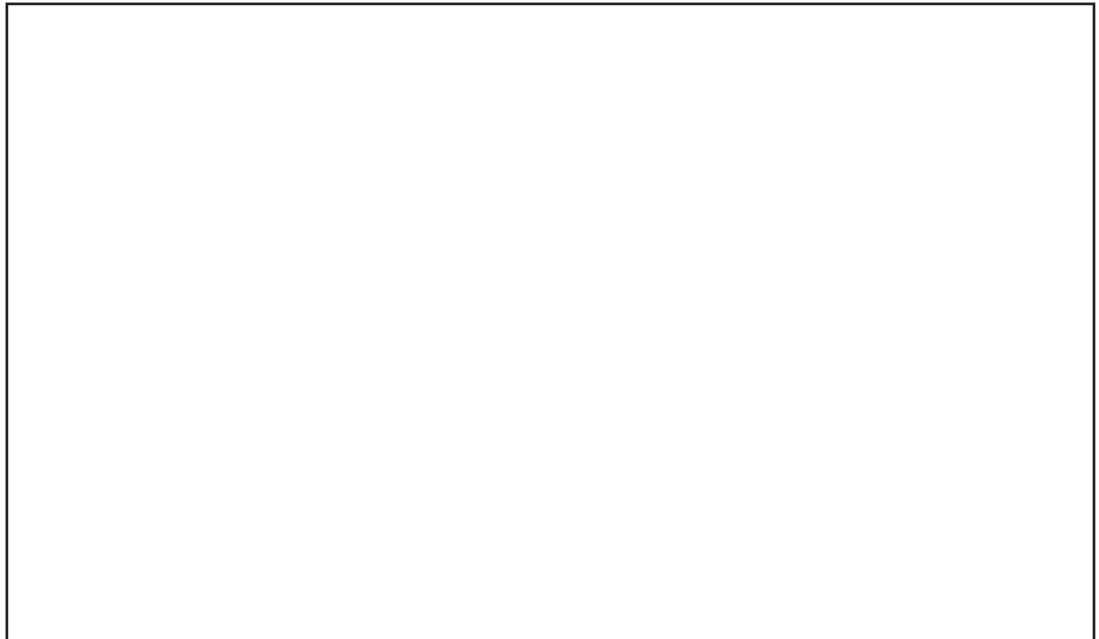
(2 marks)

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- (d) Abiola notices that the headlamps of her car give off a white light. With the aid of a diagram, describe how she can break up this white light from her headlamps into its component colours.



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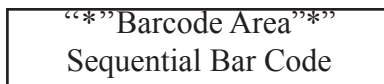
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(7 marks)

Total 15 marks

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MAY/JUNE 2016

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INTEGRATED SCIENCE

Paper 032 – Alternative to School-Based Assessment

General Proficiency

2 hours 10 minutes

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of THREE questions. 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. Do NOT write in the margins.
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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.**

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Answer ALL questions.

1. (a) Figure 1 is a diagram of plant tissue as seen through a light microscope. On the diagram, label the nucleus and the cell wall. (2 marks)

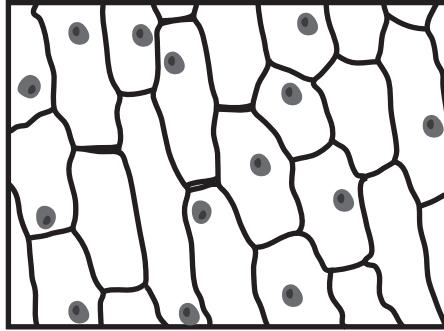


Figure 1. Plant tissue viewed through a light microscope

(b) Figures 2 and 3 show parts of two different plants, A and B.

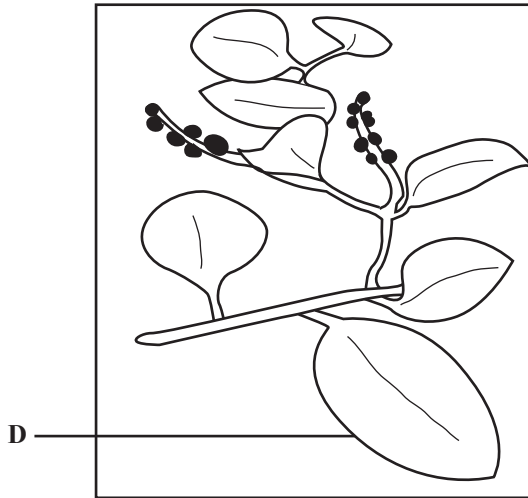


Figure 2. Plant Specimen A



Figure 3. Plant Specimen B

(i) Identify TWO plant structures that are found in both plants.

.....
.....
(2 marks)

(ii) On Figure 2, use a label line, X, to show the structure responsible for sexual reproduction, and a label line, Y, to show the structure responsible for asexual reproduction. **(2 marks)**

(iii) Use your ruler to measure the length of the leaf labelled D in Figure 3. State the unit.

Length of leaf D:
(2 marks)

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- (c) Figure 4 shows some of the apparatus used to carry out a food test on the following parts of the plants: leaves, stem and seeds.

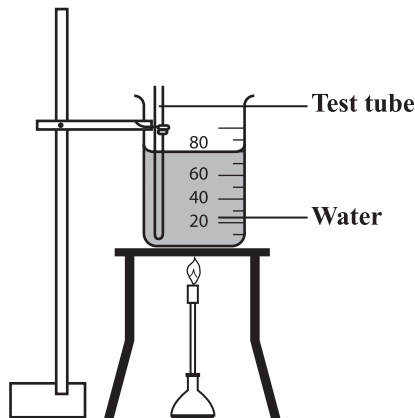


Figure 4. Apparatus used for food test

- (i) Record the volume of water in the beaker in Figure 4. State the units.

.....
(2 marks)

- (ii) Draw a suitable table for recording the results of the food test.

(3 marks)

- (iii) State the name of the food test that the apparatus in Figure 4 is most likely being used for.

.....
(1 mark)

GO ON TO THE NEXT PAGE

- (d) Four students conducted food tests on four substances as shown in Table 1. Complete the table by stating the observations.

TABLE 1: FOOD TESTS

Substance	Food Test	Observation	Conclusion
Potato	Iodide test		Starch present
Milk	Biuret test (Sodium hydroxide and copper sulphate)		Protein present
Bread	Fat test (with white blank paper)		No fat present
Mango	Benedict's solution		Sugar present

(4 marks)

Total 18 marks

- (iii) State a precaution that must be taken to ensure that the volume is measured accurately.

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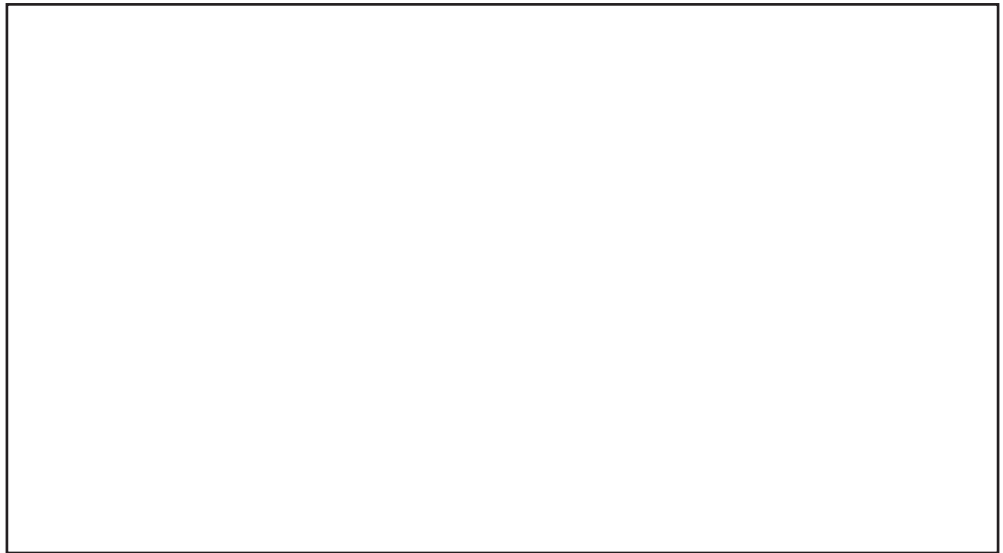
(1 mark)

- (iv) State TWO variables that must be kept constant in the experiment.

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.....

(2 marks)

- (v) In the box below, draw and label a diagram of the apparatus that should be set up for the experiment outlined in (i) on page 8.



(4 marks)

- (vi) Write a suitable title for the diagram.

.....
.....

(1 mark)

GO ON TO THE NEXT PAGE

- (b) (i) Table 2 shows the results of a drainage experiment using Soils A and B. Complete the table by inserting the unit, (i), and the missing volumes, (ii) and (iii).

TABLE 2: RESULTS

Soil Sample	A	B
Volume of water used (i) ()	100	(ii)
Volume of water collected after drainage	(iii)	60
Volume of water retained	20	40

(3 marks)

- (ii) Write an appropriate heading for the table.

.....
.....

(1 mark)

- (iii) Use the results from the completed table to write a conclusion for the experiment.

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(1 mark)

- (iv) From your results, indicate which soil sample MOST likely has more clay.

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.....
.....

(1 mark)

- (v) Give a reason for your answer in (iv) above.

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(2 marks)

GO ON TO THE NEXT PAGE

- (vi) Explain how poor soil drainage may affect the plants and animals that live in the soil.

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(2 marks)

- (vii) State ONE possible source of error in the experiment.

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(1 mark)

Total 24 marks

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NOTHING HAS BEEN OMITTED.

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3. Steffie swings her handbag freely by its strap like a simple pendulum. She notices that the bag swings slower when she holds the strap at its full length.

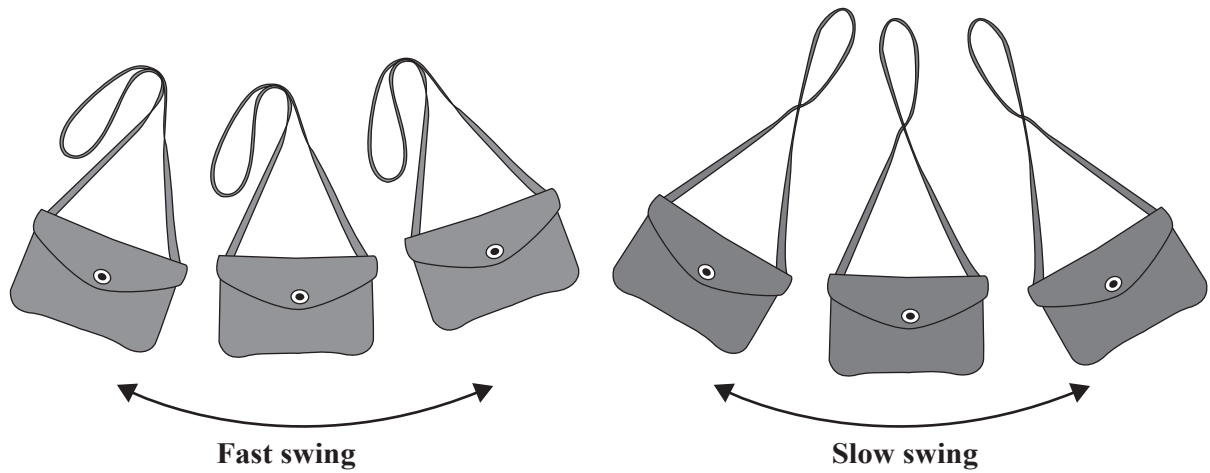


Figure 5. Swinging handbag

- (a) Develop a hypothesis using Steffie’s observation.

Hypothesis

.....
.....
.....

(2 marks)

- (b) Identify the variables involved in testing the hypothesis in (a) above.

Manipulated

.....

Responding

.....

TWO variables held constant

.....

(4 marks)

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(c) Using a simple pendulum in Figure 6, readings can be taken to test the hypothesis. Table 3 shows the results of one such investigation where the length of the pendulum was varied and the time taken for one oscillation (complete swing) was calculated from the results taken.

- (i) Fill in the units for Column 2 (Length of String) in Table 3 on page 15. **(1 mark)**
- (ii) Read the rulers in Figure 6 and record the values in Column 2 in Table 3 on page 15. **(6 marks)**
- (iii) Complete the calculations in Columns 6 and 7. The first three have already been done. **(3 marks)**

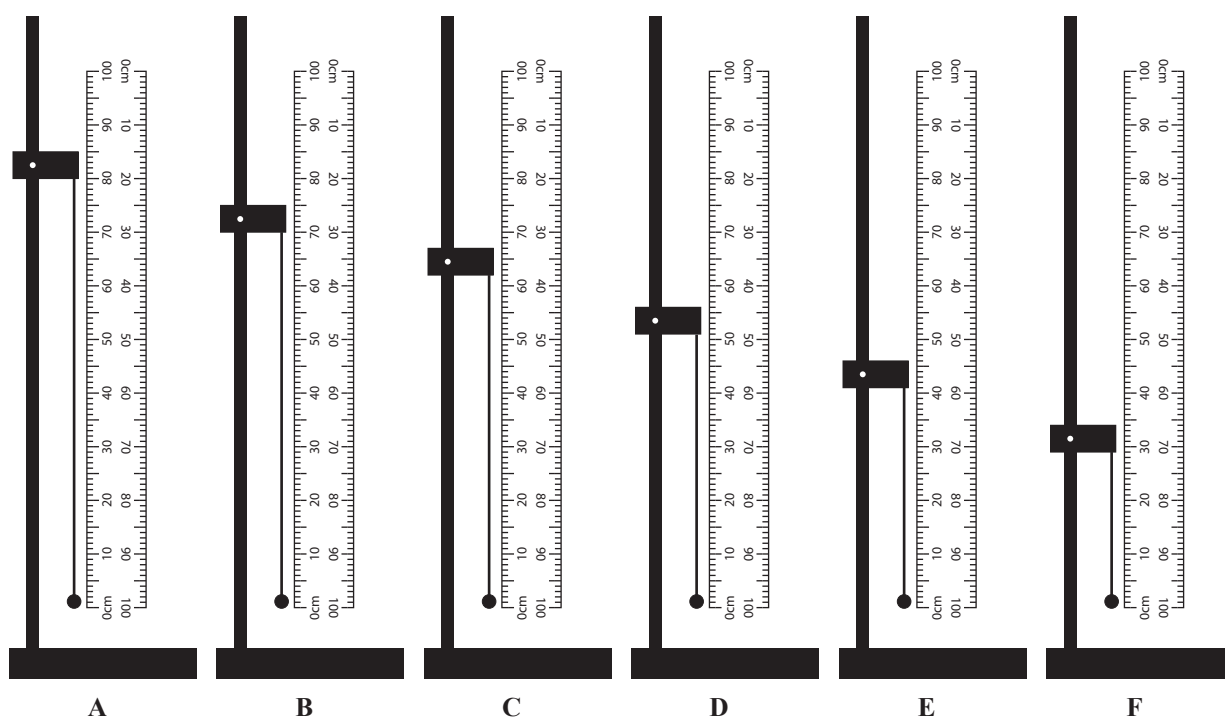


Figure 6. Length of pendulum

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TABLE 3: PERIOD OF A PENDULUM VS LENGTH OF STRING

Pendulum	Length of String ()	Time for 10 oscillations (s)			Average Time for 10 Oscillations (s)	T = Period (s) (Average Time for 10 Oscillations)/10
		1st Reading	2nd Reading	3rd Reading		
F		185	180	175	180	18
E		250	255	245	250	25
D		315	320	325	320	32
C		380	385	375		
B		440	440	440		
A		510	505	515		

- (d) Discuss how the data in Table 3 may be used to make a conclusion about your hypothesis in (a) on page 13.

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(2 marks)

Total 18 marks

END OF TEST

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

