

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®
EXAMINATION

10 MAY 2023 (a.m.)



FILL IN ALL THE INFORMATION REQUESTED CLEARLY IN CAPITAL LETTERS.

TEST CODE

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SUBJECT BIOLOGY – Paper 032

PROFICIENCY GENERAL

REGISTRATION NUMBER

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SCHOOL/CENTRE NUMBER

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NAME OF SCHOOL/CENTRE

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CANDIDATE'S FULL NAME (FIRST, MIDDLE, LAST)

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DATE OF BIRTH

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SIGNATURE _____



FORM TP 2023055



TEST CODE 01207032

MAY/JUNE 2023

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®
EXAMINATION

BIOLOGY

Paper 032 – General Proficiency

Alternative to School-Based Assessment

2 hours 10 minutes

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of **THREE** questions. Answer **ALL** questions.
2. Write your answers in the spaces provided in this booklet.
3. Do **NOT** write in the margins.
4. You are advised to take some time to read through the paper and plan your answers.
5. 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.**
6. **If you use the extra page(s), you MUST write the question number clearly in the box provided at the top of the extra page(s) and, where relevant, include the question part beside the answer.**

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

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0 1 2 0 7 0 3 2 0 3

Answer ALL questions.

1. Knowledge of the major classes of nutrients stored in plants is invaluable, especially in households where the resources allocated for food are inadequate.

You are required to investigate the major types of nutrients found in the following vegetables: black-eyed beans, onion and sweet potato.

You are provided with the following.

Equipment and Materials

- Black-eyed beans
- Onion
- Sweet potato
- 1 scalpel
- 3 watch glasses or Petri dishes
- 9 test tubes
- 1 test tube holder
- 8–10 ml of the test reagents: 1% sodium hydroxide solution; 1% copper (II) sulphate solution; ethanol; Benedict's solution
- Distilled water
- A water-bath
- Timer
- 1 dropping pipette/dropper

- (a) Suggest a suitable hypothesis for this experiment.

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(2 marks)

Using the test reagents provided and the procedures outlined in Table 1 on page 5, conduct the three food tests on the crushed or chopped vegetables.

- (b) Complete Table 1 by

- describing the observations for black-eyed beans in Column 2 **(3 marks)**
- describing the observations for onion in Column 3 **(3 marks)**
- describing the observations for sweet potato in Column 4 **(3 marks)**
- stating the deductions/inferences for the black-eyed beans, onion and sweet potato in Column 5. **(6 marks)**



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TABLE 1: RESULTS OF FOOD TESTS

Food Test	Observation			Deduction/ Inference
	Black-eyed Bean	Onion	Sweet Potato	
<p>(i) Food Test 1</p> <p>-Place 4 cm³ of ethanol in a dry test tube.</p> <p>-Add 1 drop of the test substance and shake.</p> <p>-Add an equal volume of water and shake.</p>				
<p>(ii) Food Test 2</p> <p>-Add an equal volume of sodium hydroxide solution and shake.</p> <p>-Add a few drops of dilute copper sulphate solution and shake.</p>				
<p>(iii) Food Test 3</p> <p>-Add an equal volume of Benedict's solution and shake.</p> <p>-Heat the mixture for 3–5 minutes using a boiling water-bath.</p>				

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(c) State which of Tests 1, 2 and 3 used above can sometimes yield a range of colours.

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(1 mark)

(d) List TWO precautions that should be taken when carrying out this investigation.

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(2 marks)

Total 20 marks

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0 1 2 0 7 0 3 2 0 6

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(6 marks)

(c) Write a suitable conclusion for the experiment.

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(2 marks)

(d) State TWO precautions that Jaya should take during the experiment.

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(2 marks)



(e) For a second experiment, Jaya planted ten seeds and observed the changes in dry mass over 60 days as the seeds grew into plants.

(i) Explain why Jaya measured the dry mass rather than the wet mass.

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(3 marks)

(ii) Suggest the two pieces of equipment that Jaya may have used to obtain the dry mass of the plants.

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(2 marks)

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- (f) Jaya recorded the dry mass of the plants over 40 days and plotted a graph of the results. The results are shown in Figure 1.

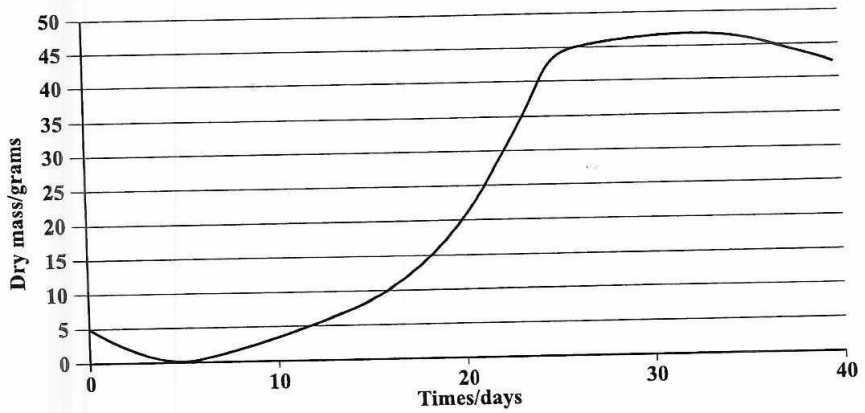


Figure 1. Dry mass of plants over 40 days

- (i) Based on the shape of the graph in Figure 1, describe how the dry mass of the plants changes over the 40 days.

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(3 marks)

- (ii) Account for the shape of the graph over the first ten days (Day 1 to Day 10).

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(2 marks)

Total 22 marks



3. Jack downloaded a heart rate monitoring application on his cell phone to obtain heart-rate readings. He then monitored his roommate's heart rate at rest and at intervals after his roommate had done jumping jacks continuously for two minutes. The readings obtained from the experiment are shown in Table 2.

TABLE 2: READINGS OBTAINED FROM EXPERIMENT

Time (seconds)	Heart Rate (beats per minute/bpm)
0 (at rest)	58
120	125
180	106
240	74
360	72
420	65

(a) Suggest a suitable aim for Jack's experiment.

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(1 mark)

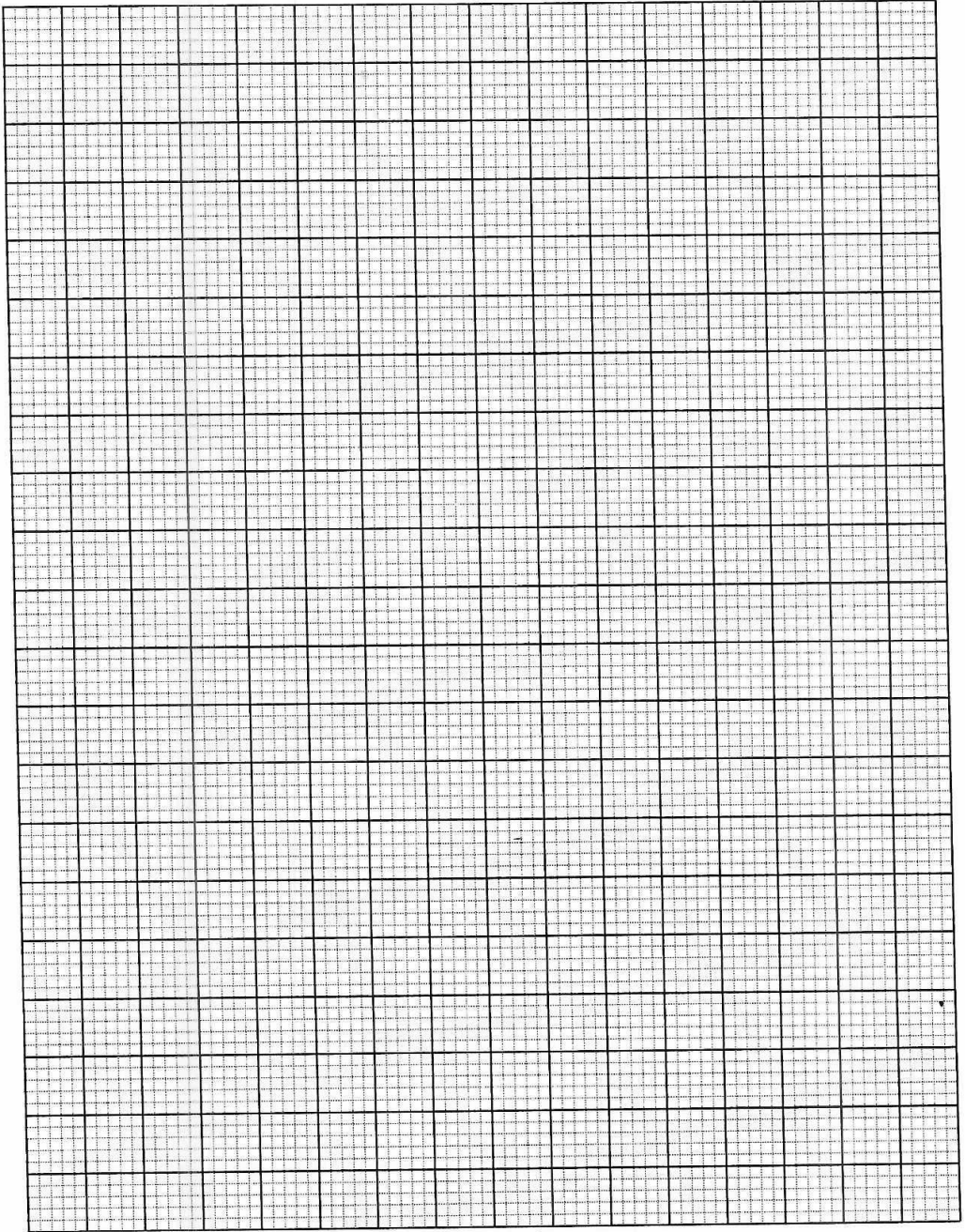
(b) Using the grid on page 12, plot a graph of the results shown in Table 2. Provide a suitable title for your graph. **(6 marks)**

(c) Based on your graph, describe the roommate's heart rate between 0 seconds and 240 seconds.

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(4 marks)



Title for graph



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- (d) Account for the shape of the graph between 0 seconds and 120 seconds.

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(2 marks)

- (e) Suggest TWO precautions that Jack should have taken during the experiment.

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(2 marks)

- (f) Suggest ONE way in which Jack could modify the experiment to increase the accuracy of the results obtained.

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(1 mark)



- (g) Jack measured his resting heart rate and realized that it was different from his roommate's. Suggest TWO reasons for this difference.

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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.

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