

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®
EXAMINATION

“*”Barcode Area”*”
Front Page Bar Code

06 JANUARY 2023 (p.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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FORM TP 2023003



TEST CODE **01207032**

JANUARY 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. Answer ALL questions.
2. 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. 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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Answer ALL questions.

Write your answers in the spaces provided in this booklet.

1. You will use a potato in the following experiment to determine how it reacts to certain common substances.
- (a) You are provided with the following equipment and materials:
- 2 large covered Petri dishes
 - Self-adhesive labels
 - 4 sheets of paper towels
 - 1 scalpel
 - 1 short transparent ruler (approx. 6" or 15 cm long)
 - Beaker with 100 mL of Solution A
 - Beaker with 100 mL of Solution B
 - 1 large potato
 - 4 filter paper circles (each 4 cm in diameter)
 - A timer
 - Square tiles (to rest the potato slices on)

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Procedure

1. Label the two Petri dishes A and B.
2. Peel the potato and cut six slices of potato, each between **0.50 cm – 0.75 cm thick**. **(Please ensure that no skin remains on the potato slices.)**
3. Choose four suitable slices for the experiment and blot them dry using a paper towel.
4. Place one filter paper circle on each ‘dried’ slice of potato and trim the potato slice carefully **to the size of the filter paper circle**.

You should end up with 4 slices of potato, each with a diameter of approximately 4 cm.

5. Measure the **diameter and thickness** of two slices of potato. Record the **average** measurement in Table 1. Place the two slices of potato, side by side, into the Petri dish labelled A.
6. Measure the **diameter and thickness** of two additional slices of potato and record the **average** measurement in Table 1. Place the two additional slices of potato, side by side, into the Petri dish labelled B
7. In Table 1, record your observations of the texture of the slices.
8. Pour enough of Solution A to completely cover the slices in Petri dish A.
9. Pour enough of Solution B to completely cover the slices in Petri dish B.
10. Cover Petri dishes A and B and leave both of them undisturbed for **30 mins**.

You may go on to another question during this time.

11. After 30 minutes, remove the potato slices from each Petri dish. **Remember to keep the slices in Petri dish A separate from the slices in Petri dish B.**
12. In Table 1, record your observations of the texture of the slices after removal from the solutions.
13. Blot the slices dry with **separate** sheets of paper towels and measure the diameter and thickness of each slice. In Table 1, record the **average** measurements of the potato slices in Petri dishes A and B.
14. Complete Table 1 to show your observations.

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**TABLE 1: RESULTS AND OBSERVATIONS
FROM EXPERIMENT ON POTATO SLICES**

	Potato slices in Petri dish A	Potato slices in Petri dish B
Texture of potato slices before soaking in solution		
Texture of potato slices after soaking in solution		
Average diameter (cm) of potato slices before soaking in solution		
Average diameter (cm) of potato slices after soaking in solution		
Average thickness (cm) of potato slices before soaking in solution		
Average thickness (cm) of potato slices after soaking in solution		
Was there an increase or decrease in the average size of the slices?		

(14 marks)

(b) Write a suitable aim for the experiment.

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(1 mark)

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- (c) Explain how the response of animal cells to Solution A and Solution B would differ from the response of the potato cells in the experiment.

Solution A

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Solution B

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(2 marks)

- (d) Describe the processes responsible for the movement of

- (i) mineral ions from the soil to the potato plant

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(2 marks)

- (ii) carbon dioxide from the atmosphere into the leaves of the potato plant.

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(2 marks)

Total 21 marks

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2. (a) Table 2 shows the percentage of the world’s population aged 65 years or older, in 2019, with projections made for 2030, 2050 and 2100.

TABLE 2: PERCENTAGE OF THE WORLD’S POPULATION AGED 65 YEARS OR OVER FOR THE WORLD, IN 2019, WITH PROJECTIONS FOR 2030, 2050 AND 2100

REGION OF THE WORLD	Year			
	2019	2030	2050	2100
Sub-Saharan Africa	3.0	3.3	4.8	13.0
Northern Africa and Western Asia	5.7	7.6	12.7	22.4
Central and Southern Asia	6.0	8.0	13.1	25.7
Eastern and South-Eastern Asia	11.2	15.8	23.7	30.4
Latin America and the Caribbean	8.7	12.0	19.0	31.3
Australia /New Zealand	15.9	19.5	22.9	28.6
Europe and Northern America	18.0	22.1	26.1	29.3
Small Island Developing States	8.7	11.9	16.1	23.7

[Data source: United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019]

- (i) On the grid provided **on page 9**, plot a bar graph of the population aged 65 years or over for the regions of the world **in 2100**. Provide a suitable title for this graph. **(8 marks)**
- (ii) State the region of the world that shows the **greatest** projected change over the 50-year period (2050–2100) and give the change in percentage of the population aged 65 years and over.

(2 marks)
- (iii) Consider the years 2019 and 2100. Which region shows the **greatest** increase in the percentage of the population aged 65 years and over?

(1 mark)
- (iv) State TWO factors that may have influenced the increase seen in (a) (iii).

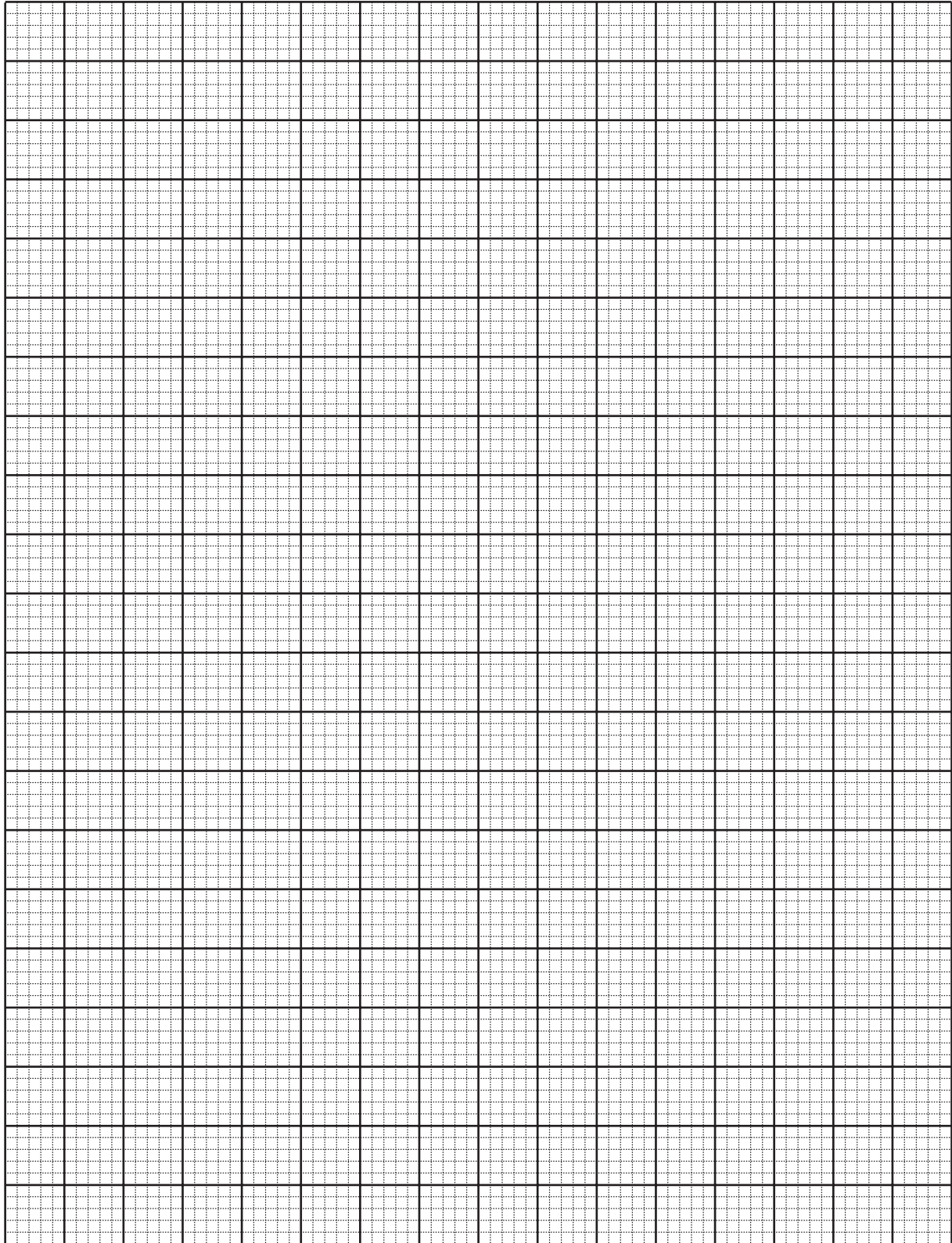
(2 marks)

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- (b) Using the data in Table 2, calculate and describe the change in the percentage of the population, aged under 65 in Latin America and the Caribbean region, for EACH period between 2019 and 2100.

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(3 marks)

- (c) The population aged 65 years or over in sub-Saharan Africa was 3% in 2019. The increase projected for 2030 is much lower than what is shown for the rest of the world. Suggest THREE possible reasons for this low projection.

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(3 marks)

Total 19 marks

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3. Thomas conducted an experiment in the science laboratory to investigate the activity of the enzyme catalase. The procedure Thomas used is provided below.

Procedure

- Two test tubes were labelled A and B.
- Each test tube was filled with 1 cm³ of fresh/raw potato extract.
- 10 drops of hydrogen peroxide were added to test tube A.
- 10 drops of distilled water were added to test tube B.
- After one minute, observations were noted.

(a) Suggest a suitable hypothesis for this experiment.

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(2 marks)

(b) Record the expected observations for this experiment in Table 3.

TABLE 3: EXPECTED RESULTS

Test tube	Observations
A	
B	

(2 marks)

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(c) Suggest TWO reasons for the expected results recorded in (b).

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(2 marks)

(d) State the purpose of the distilled water placed in test tube B.

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(1 mark)

(e) State TWO precautions that Thomas should have taken when he conducted the experiment.

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(2 marks)

(f) Suggest the observation that Thomas would make if fresh boiled potato extract was used?

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(1 mark)

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- (g) Thomas conducted a second experiment in which he investigated the effect of temperature on the activity of amylase. The results are shown in Table 4.

TABLE 4: RESULTS

Temperature (°C)	Amylase activity
30	1
35	1.5
40	4
45	12
50	5
55	1.5
65	0

- (i) On the grid provided **on page 15** plot a graph of the results shown in Table 4. Provide a suitable title for your graph. **(7 marks)**
- (ii) From your graph, suggest the optimum temperature for amylase activity.
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(1 mark)

- (iii) Explain the shape of the graph.
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(2 marks)

Total 20 marks

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CANDIDATE'S RECEIPT

INSTRUCTIONS TO CANDIDATE

1. Fill in all the information requested clearly in capital letters.

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SUBJECT BIOLOGY – Paper 032

PROFICIENCY GENERAL

REGISTRATION NUMBER

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FULL NAME _____
(BLOCK LETTERS)

SIGNATURE _____

DATE _____

2. Ensure that this slip is detached by the Supervisor or Invigilator and given to you when you hand in this booklet.
3. Keep it in a safe place until you have received your results.

INSTRUCTION TO SUPERVISOR/INVIGILATOR

Sign the declaration below, detach this slip and hand it to the candidate as his/her receipt for this booklet collected by you.

I hereby acknowledge receipt of the candidate's booklet for the examination stated above.

Signature _____
Supervisor/Invigilator

Date _____

