

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®  
EXAMINATION

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12 JANUARY 2024 (a.m.)

FILL IN ALL THE INFORMATION REQUESTED CLEARLY IN CAPITAL LETTERS.

TEST CODE 

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SUBJECT BIOLOGY – Paper 02

PROFICIENCY GENERAL

REGISTRATION NUMBER 

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SCHOOL/CENTRE NUMBER					

NAME OF SCHOOL/CENTRE	

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

DATE OF BIRTH 

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SIGNATURE \_\_\_\_\_

“\*”Barcode Area”\*”  
Current Bar Code

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Sequential Bar Code

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CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®

EXAMINATION

BIOLOGY

Paper 02 – General Proficiency

*2 hours 30 minutes*

**READ THE FOLLOWING INSTRUCTIONS CAREFULLY.**

1. This paper consists of SIX questions in two sections. Answer ALL questions.
2. Write your answers in the spaces provided in this booklet.
3. DO NOT write in the margins.
4. Where appropriate, answers should be illustrated by diagrams.
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.**

## SECTION A

**Answer ALL questions.**

**Write your answers in the spaces provided in this booklet.**

1. Roy and his friends visited a new roti shop in their neighbourhood and purchased roti (round flatbread made of wheat flour, water and oil) and chicken curry. Dining was not permitted on the premises, so they went to Roy's home and ate the roti and chicken curry there.

(a) Name TWO substances that are produced when EACH of the following foods is digested.

(i) Roti

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**(2 marks)**

(ii) Chicken

.....

.....

**(2 marks)**

**GO ON TO THE NEXT PAGE**

- (b) Roy is a diabetic who enjoys eating roti and chicken curry, so he eats TWO portions daily.

In Table 1 below,

- (i) suggest TWO dietary changes that Roy should make to manage his diabetes  
**(2 marks)**
- (ii) state ONE consequence that may occur if EACH dietary change suggested in (b)  
(i) is **not** followed.  
**(2 marks)**

**TABLE 1: DIETARY CHANGES AND CONSEQUENCES**

Dietary Change	Consequence
1.	
2.	

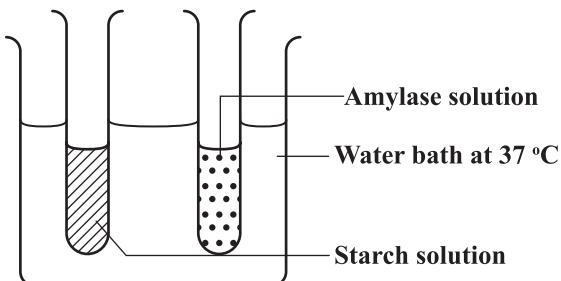
- (c) Excess glucose in the blood of a healthy person can be converted to glycogen and stored. Explain why this process is NOT efficient in diabetic patients.

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**(2 marks)**

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- (d) An experiment to investigate digestion was set up, as shown in Figure 1 below, and left for 15 minutes.



**Figure 1. Investigation of digestion**

The procedure outlined below was used to carry out the investigation.

Procedure

- One drop of iodine was placed into each cavity of a spotting tile similar to the one shown in Figure 2 below.
- After 15 minutes, the starch and amylase solution were mixed.
- Every two minutes, one drop of mixture was placed into a different cavity of the spotting tile containing iodine, as shown in Figure 2 below.



**Figure 2. Spotting tile used in experiment**

- (i) Suggest ONE reason why the starch/amylase mixture was kept in the water bath.

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**(1 mark)**

- (ii) State ONE reason why the experiment requires the solutions to be kept at the same temperature.

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**(1 mark)**

- (iii) Suggest ONE reason why the starch and amylase solutions were not immediately mixed at the beginning of the experiment.

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**(1 mark)**

- (iv) Suggest a suitable aim of the experiment.

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**(1 mark)**

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The results of the investigation are shown in Table 2.

**TABLE 2: RESULTS OF EXPERIMENT**

Time (minutes)	Observation of Starch–Amylase Mixture (when placed in cavity on spotting tile)
0	Blue-black colour
2	Blue-black colour
4	Blue-black colour
6	Dark brown colour
8	Brown colour
10	Light brown colour
12	Very pale brown colour
14	Light orange-brown colour
16	Light orange-brown colour
18	Light orange-brown colour
20	Light orange-brown colour

- (v) Using the results in Table 2, determine how many minutes it took for the digestion of starch by amylase to be completed.

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**(1 mark)**

- (vi) Explain your answer to (d) (v).

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**(2 marks)**

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- (vii) State what you would expect to observe in the cavity if another drop of the mixture is added to the drop of iodine after 22 minutes.

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**(1 mark)**

- (viii) List THREE precautions that should be taken when setting up and carrying out the experiment.

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**(3 marks)**

- (ix) Name a reagent that may be used to identify the substance ('mixture') remaining in the test tube after 20 minutes.

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**(1 mark)**

- (x) Suggest a suitable conclusion for the experiment.

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**(1 mark)**

- (xi) State if results similar to those in Table 1 would be expected, if the starch solution in the experiment is replaced by roti.

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**(1 mark)**

- (xii) Suggest ONE reason for your answer in (d) (xi).

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**(1 mark)**

**Total 25 marks**

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2. (a) (i) Define the term ‘photosynthesis’.

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(2 marks)

- (ii) Write a balanced chemical equation for the process of photosynthesis.

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(2 marks)

- (b) Describe the movement of water from the soil to the photosynthetic cells of the plant.

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(2 marks)

- (c) Distinguish between the role of the intercellular air space and that of the stomatal pore of the leaf in the process of photosynthesis.

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(2 marks)

GO ON TO THE NEXT PAGE

- (d) Explain why the rate of photosynthesis decreases on a very hot day.

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**(2 marks)**

- (e) State ONE role of chlorophyll in photosynthesis.

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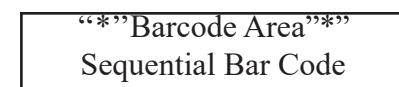
**(1 mark)**

- (f) Outline TWO ways in which photosynthesis is important to living things.

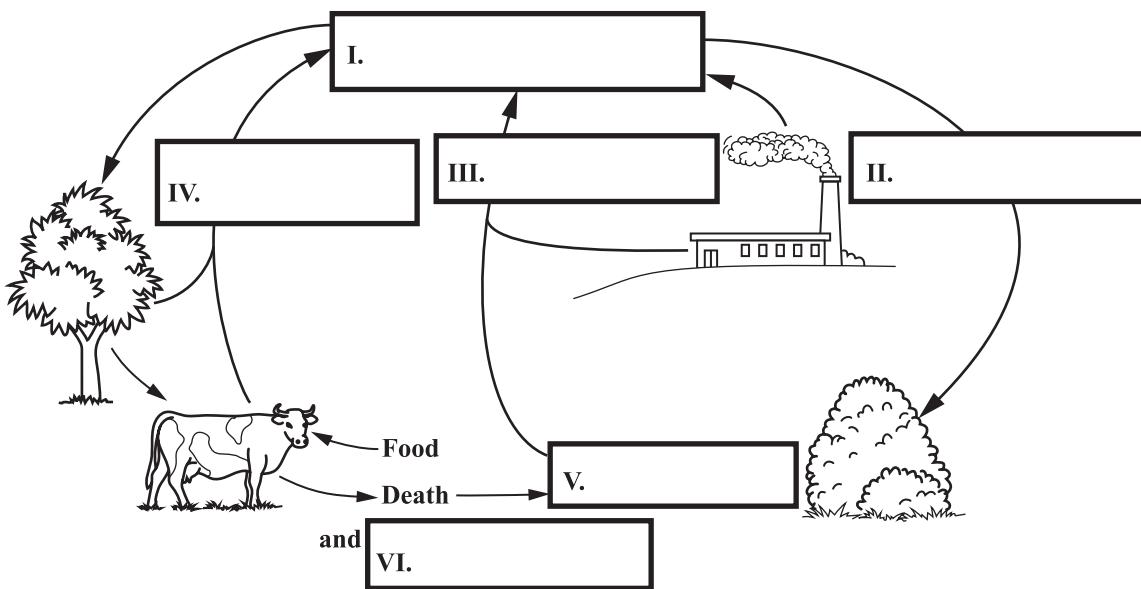
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**(4 marks)**

**Total 15 marks**



3. (a) (i) Figure 3 below is a diagram of the carbon cycle. Complete Figure 3 by inserting the names of the processes or substances in the numbered spaces provided.



**Figure 3. Carbon cycle**

**(3 marks)**

- (ii) State ONE reason why carbon is important to living things.

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**(1 mark)**

- (b) Define the following terms as they relate to the preservation and conservation of the environment.

(i) Reuse

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(ii) Reduce

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(iii) Recycle

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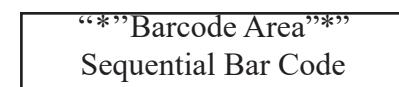
**(3 marks)**

- (c) (i) Daisy, the latest disassembly robot from Apple, is able to recover aluminum, gold, silver, copper and other metals from iPhone devices.

Suggest TWO advantages of recycling metals from iPhones.

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**(2 marks)**



- (ii) Complete Table 3 below by explaining TWO ways in which the recycling of cellphones differs from the recycling of leftover food.

**TABLE 3: DIFFERENCE BETWEEN RECYCLING OF CELLPHONES  
AND RECYCLING OF LEFTOVER FOOD**

Recycling of Cellphones	Recycling of Leftover Food
1.	
2.	

**(4 marks)**

- (d) Suggest TWO ways in which the recycling of a tree, after it is cut down, can be beneficial to a community.

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**(2 marks)**

**Total 15 marks**

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## SECTION B

**Answer ALL questions.**

**Write your answers in the spaces provided in this booklet.**

4. (a) Define the term ‘transpiration’.

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**(1 mark)**

- (b) State TWO reasons why transpiration is important to plants.

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**(2 marks)**

- (c) List THREE factors, **other** than temperature, which may affect the rate of transpiration.

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**(3 marks)**

GO ON TO THE NEXT PAGE

- (d) For EACH of the THREE factors listed in (c), explain how it affects the rate of transpiration.

(6 marks)

(e) (i) Explain ONE way in which climate change can **negatively** impact the agriculture sector in the Caribbean region.

(2 marks)

(2 marks)

- (ii) Suggest ONE way in which countries can reduce or slow down the occurrence of climate change.

(1 mark)

(1 mark)

**Total 15 marks**

5. (a) Define EACH of the following terms.

(i) Gene

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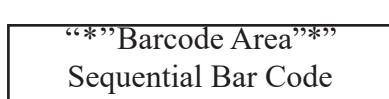
(ii) Allele

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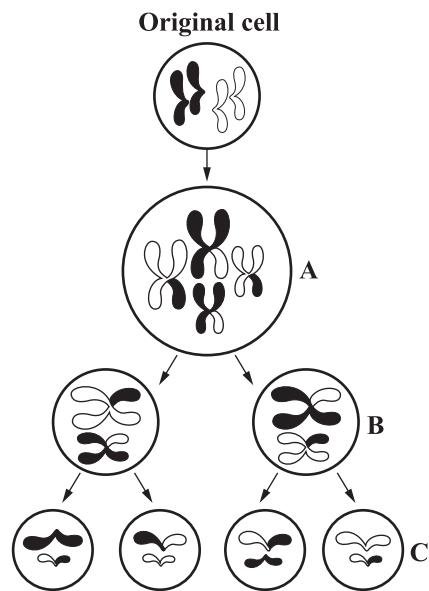
(iii) Chromosome

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(3 marks)



- (b) Figure 4 shows the process of meiosis. In the figure, two homologous pairs of chromosomes are shown in the original cell.



**Figure 4. Process of meiosis**

With reference to Figure 4, describe the events occurring at the areas marked A, B and C.

A .....

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B .....

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C .....

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**(3 marks)**

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- (c) Suggest ONE consequence that may occur if meiosis does not occur as illustrated in Figure 4.

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**(1 mark)**

- (d) Meiosis is important because it causes genetic variation. Suggest ONE reason why genetic variation is important to speciation.

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**(1 mark)**



- (e) The height of pea plants is controlled by a single gene which has two alleles. A tall purebred pea plant is crossed with **another** pea plant and all of the offspring have the same phenotype. With the use of a genetic diagram, state the phenotype of the offspring.

Define the alleles .....

.....  
Parents' phenotype.....

Parents' genotype.....  
.....

Cross.

(7 marks)

**Total 15 marks**

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6. (a) The human skin is responsible for temperature regulation. State ONE **other** function of the human skin.

(1 mark)

(1 mark)

- (b) John took his temperature in the morning and it was normal. At midday, while gardening, he took his temperature again and it was also normal. John is surprised that his temperature remained normal despite being in the sun all afternoon.

Explain TWO ways in which **two different** structures in John's skin functioned to regulate his body temperature while he was gardening.

(4 marks)

- (c) Jan is Caucasian and her husband, Anthony, is African-American. They recently returned from a vacation in the Caribbean. While they both applied sunscreen daily, Jan was a bit more cautious and, unlike her husband, frequently reapplied her sunscreen during the day.

Explain ONE reason why Jan needed to be more cautious than her husband and why she frequently reapplied her sunscreen.

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**(2 marks)**

- (d) (i) Define the term ‘homeostasis’.

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**(1 mark)**

- (ii) The kidney is responsible for maintaining homeostasis. Describe, with reference to a named hormone, how the kidney achieves homeostasis on a hot day.

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**(4 marks)**

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(e) James has had hypertension for the last ten years. Recently, he developed kidney failure.

(i) Suggest TWO consequences that James could experience due to his kidney failure.

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**(2 marks)**

(ii) Suggest ONE way in which James could have avoided developing kidney failure.

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**(1 mark)**

**Total 15 marks**

**END OF TEST**

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

## EXTRA SPACE

**If you use this extra page, you MUST write the question number clearly in the box provided.**

### **Question No.**

## **EXTRA SPACE**

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### **Question No.**

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## CANDIDATE'S RECEIPT

### INSTRUCTIONS TO CANDIDATE

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

TEST CODE 

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SUBJECT BIOLOGY – Paper 02

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 \_\_\_\_\_