

FORM TP 2012002



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JANUARY 2012

CARIBBEAN EXAMINATIONS COUNCIL

SECONDARY EDUCATION CERTIFICATE  
EXAMINATION

BIOLOGY

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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. For Section A, write your answers in the spaces provided in this booklet.
3. For Section B, write your answers in the space provided at the end of each question, in this booklet.
4. Where appropriate, answers should be illustrated by diagrams.

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SECTION A

Answer ALL questions. Write your answers in the spaces provided.

1. A potato was cut into 20 strips (**each weighing approximately 2.0 g**) and used to carry out an experiment designed to investigate the effect of different concentrations of sugar solution on the weight of the potato tissue.

The investigators recorded the weight of the strips **after** immersion in pure water, as well as in four different concentrations of sugar solution (**0.5, 1.0, 1.5 and 2.0 M**) and plotted the results on the graph shown in Figure 1 on page 3.

- (a) List the apparatus and materials and describe the method of this investigation.

Apparatus and materials:

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Method:

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(4 marks)

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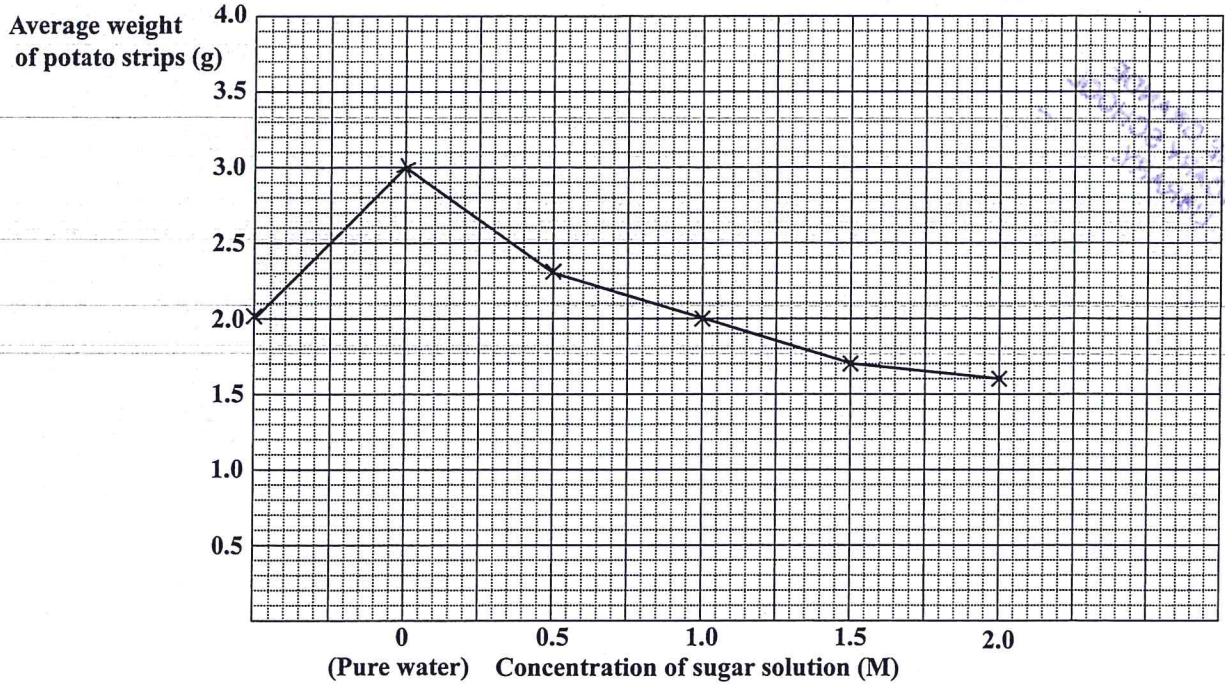


Figure 1. Graph showing average weight of potato strips after immersion in different concentrations of sugar solutions

(b) Construct a table to represent the data shown in Figure 1.

TABLE 1:

(4 marks)

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(c) Explain the results obtained when the potato strips were placed in

(i) pure water

(2 marks)

(ii) sugar solution less than 1.0 M and greater than 1.0 M.

Less than 1.0 M: \_\_\_\_\_

More than 1.0 M: \_\_\_\_\_

(4 marks)

(iii) Name the process responsible for the results obtained in this experiment.

(1 mark )

(iv) Suggest ONE possible source of error in this experiment.

(1 mark )

(d) Explain why the appearance of an animal cell would be different from that of a plant cell after immersion in

(i) pure water for 30 minutes

(3 marks)

(ii) concentrated sugar solution for 30 minutes.

(3 marks)

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- (e) Name another process by which substances can move in and out of cells.

\_\_\_\_\_ (1 mark)

- (f) Give TWO reasons why living organisms need to move substances in and out of their cells.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2 marks)

**Total 25 marks**

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Figure 2 shows the human digestive system.

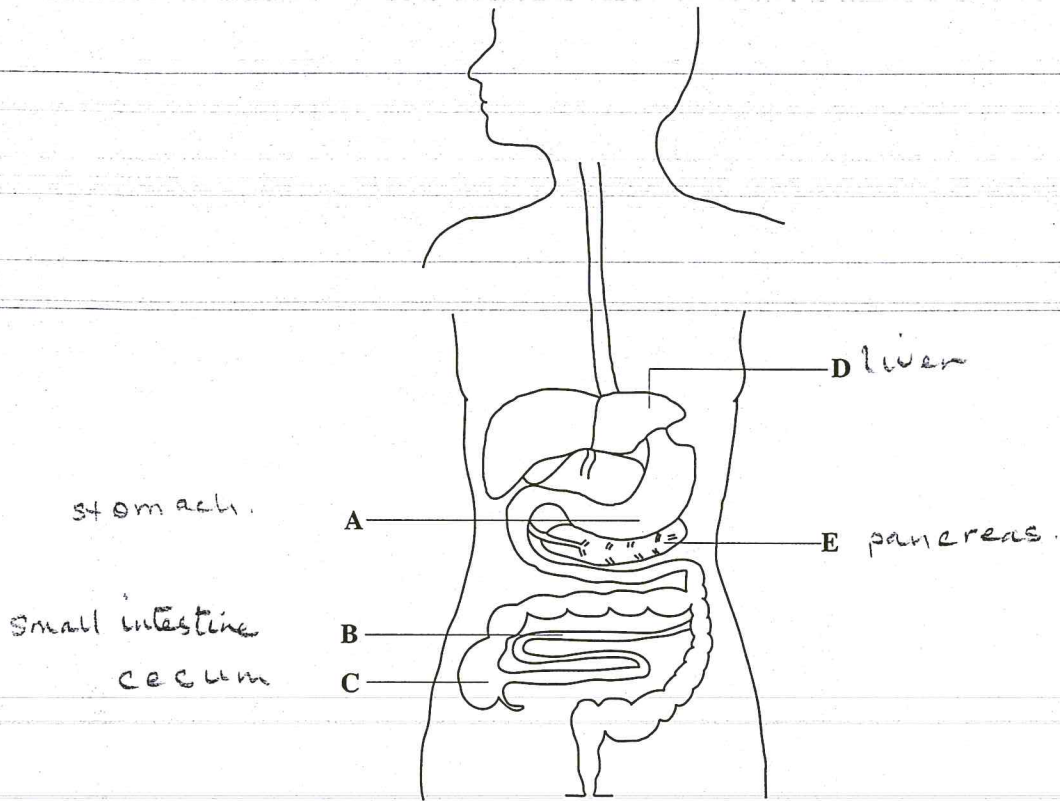


Figure 2. The human digestive system

(a) Name the parts labelled A, B, C, D and E in Figure 2.

- A: \_\_\_\_\_
- B: \_\_\_\_\_
- C: \_\_\_\_\_
- D: \_\_\_\_\_
- E: \_\_\_\_\_

(5 marks)

(b) Suggest THREE ways in which Part B in Figure 2 is adapted for its functions.

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

(3 marks)

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Humans have an omnivorous diet. Suggest how the human digestive system is adapted to break down the different types of food that humans eat.

(3 marks)

- (d) (i) State the digestive functions of the liver and the pancreas in a human.

Liver: \_\_\_\_\_

Pancreas: \_\_\_\_\_

(2 marks)

- (ii) Suggest TWO consequences of the malfunctioning of the pancreas.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(2 marks)

**Total 15 marks**

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(a) Table 2 is an incomplete table illustrating inheritance of sex in humans.

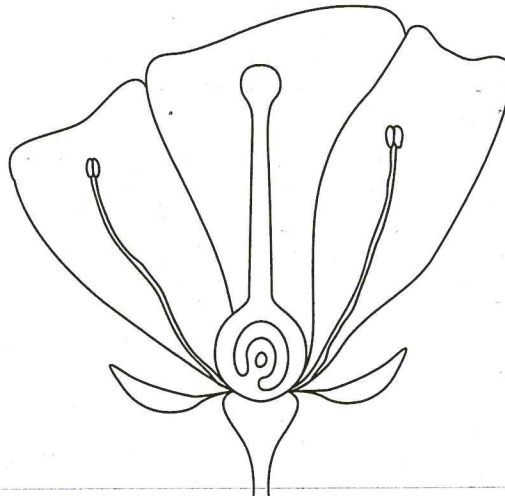
Complete Table 2 to show how sex is inherited in humans.

**TABLE 2: INHERITANCE OF SEX IN HUMANS**

Parental phenotypes	Male	Female
Parental genotypes	(i) _____	XX
Gametes genotypes	(ii) _____	(iii) _____
Offspring genotypes	(iv) _____	
Offspring phenotypes	Male and female	

(3 marks)

(b) Figure 3 is a diagram of a flower.



**Figure 3. Diagram of a flower**

(i) Label the parts in Figure 3 where sex cells/gametes are found.

(2 marks)



(ii) Outline the process by which gametes are formed.

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(2 marks)

(iii) If a plant has a diploid chromosome number of 8, how many chromosomes would be found in its gametes?

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(1 mark )

(c) Suggest TWO ways in which the process of meiosis may be useful to plants.

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(2 marks)

(d) A horticulturalist has a crop of plants that produces both red and white flowers. However, more red flowers are produced than white. A red-flowered plant is crossed with a white-flowered plant and the offspring produced are in the ratio 1 red to 1 white. Using the symbols **R** for red and **r** for white, draw a genetic diagram to illustrate this ratio.

(3 marks)

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- (e) John and Jake grew plants with the same genotype. Jake's plants produced smaller flowers than John's plants. Account for the difference in size of these flowers.

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(2 marks)

**Total 15 marks**

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**SECTION B**

**Answer ALL questions.**

**Write your answer in the space provided at the end of each question.**

4. (a) Describe photosynthesis in green plants. **(5 marks)**
- (b) With the aid of a fully annotated diagram, explain how the visible external features of a green dicotyledonous leaf aid the process of photosynthesis. **(3 marks)**
- (c) When leaves fall from plants, microorganisms feed on them.
- (i) What is the name given to these microorganisms?
- (ii) Explain how this type of nutrition differs from photosynthesis. **(3 marks)**
- (d) There are advantages and disadvantages when leaves fall from plants. Suggest TWO advantages and TWO disadvantages to a plant, when leaves fall from it. **(4 marks)**

**Total 15 marks**

**Space for diagram (b)**



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5.

- (a) With the aid of a fully labelled diagram of the heart, explain how blood is pumped to the rest of the body. (8 marks)
  
- (b)
  - (i) Suggest why vaccination is NOT effective in the prevention, treatment or control of most diseases of the heart and blood vessels.
  
  - (ii) Explain why there is an increase in the number of white blood cells in a patient following heart surgery. (7 marks)

**Total 15 marks**

Space for diagram (a)



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