FORM TP 2021050

TEST CODE **01207020**

MAY/JUNE 2021

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 with 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.

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SECTION A

Answer ALL questions.

1. (a) Name the TWO raw materials and state the TWO conditions that are necessary for photosynthesis.

Raw materials .....

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Conditions .....

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(4 marks)

(b) (i) Figure 1 is a drawing of a leaf. On the grid provided **on page 5**, make a drawing of the leaf that is twice the size of Figure 1.

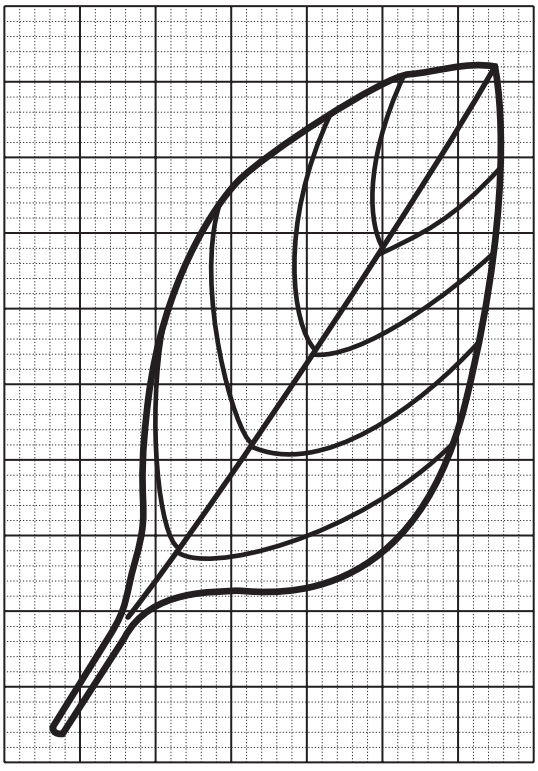


Figure 1. Drawing of a leaf

(3 marks)

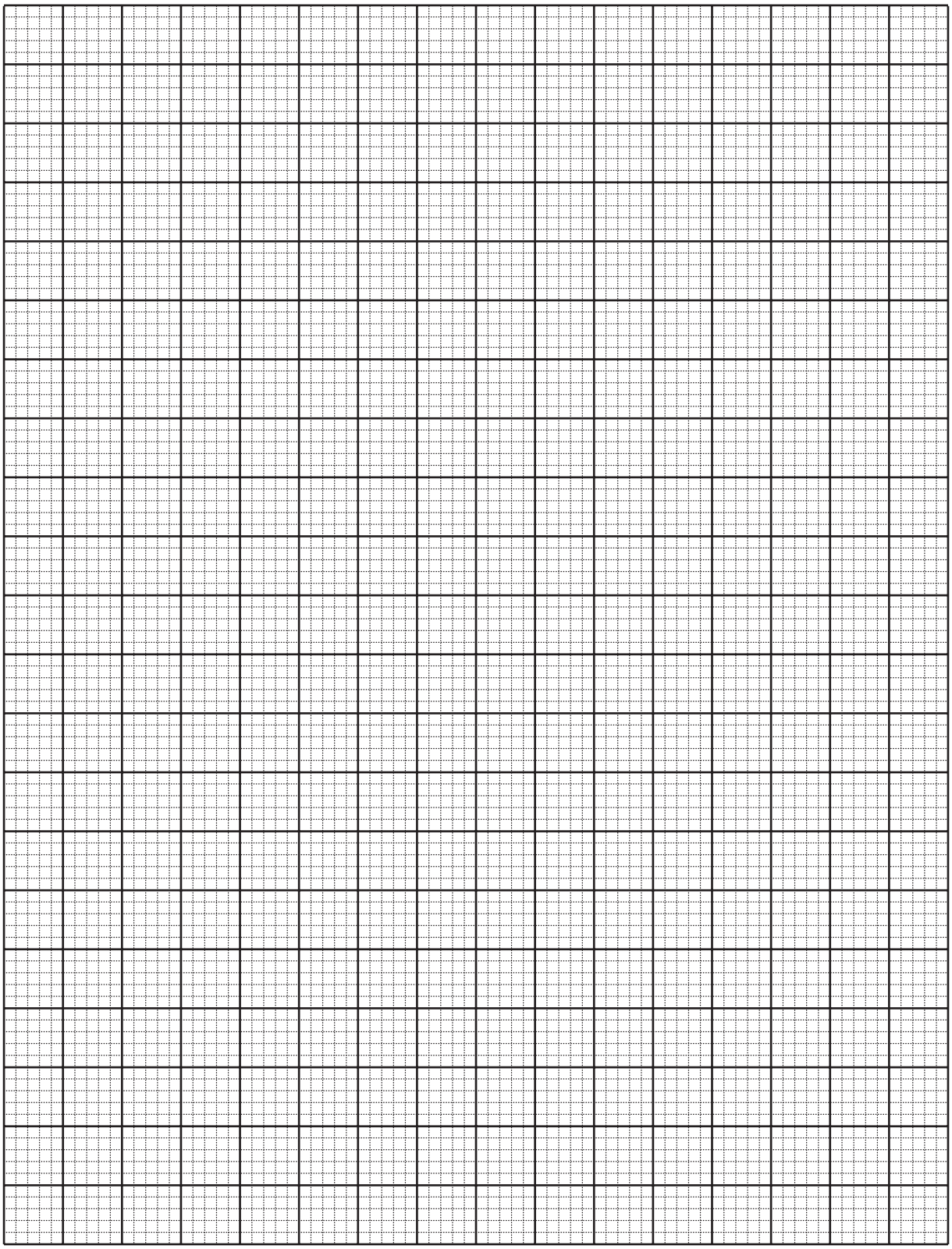
(ii) On the diagram drawn **on page 5**, label EACH of the following parts of the leaf: apex, lamina, midrib, petiole. **(3 marks)**

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(c) The leaf shown in Figure 1 **on page 4** is from a plant that grew in very windy conditions. Suggest ONE way in which the leaf is adapted for EACH of the following functions:

(i) Gaseous exchange

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(ii) Preventing excess water loss

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(2 marks)

(d) Green plants can produce food by photosynthesis. Suggest THREE reasons why there is still a need for them to store food.

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(3 marks)

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(e) Suggest THREE reasons why the initial carbohydrate product of photosynthesis (glucose) is not stored in green leaves.

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(3 marks)

(f) Describe the test that could be used to determine if a green leaf has stored starch.

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(3 marks)

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(g) Unlike plants, animals must ingest complex food substances then break these down by mechanical and chemical digestion. Explain TWO ways in which the human digestive system is adapted for the mechanical digestion of food.

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(4 marks)

Total 25 marks

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2. (a) Define the term 'pollination'.

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(2 marks)

(b) Describe how male gametes reach female gametes in humans.

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(2 marks)

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(c) Figure 2 shows the female part of a flower in which the petals, sepals and stamens have been removed. Label EACH of the following parts on the diagram: stigma, style, ovary and ovule.

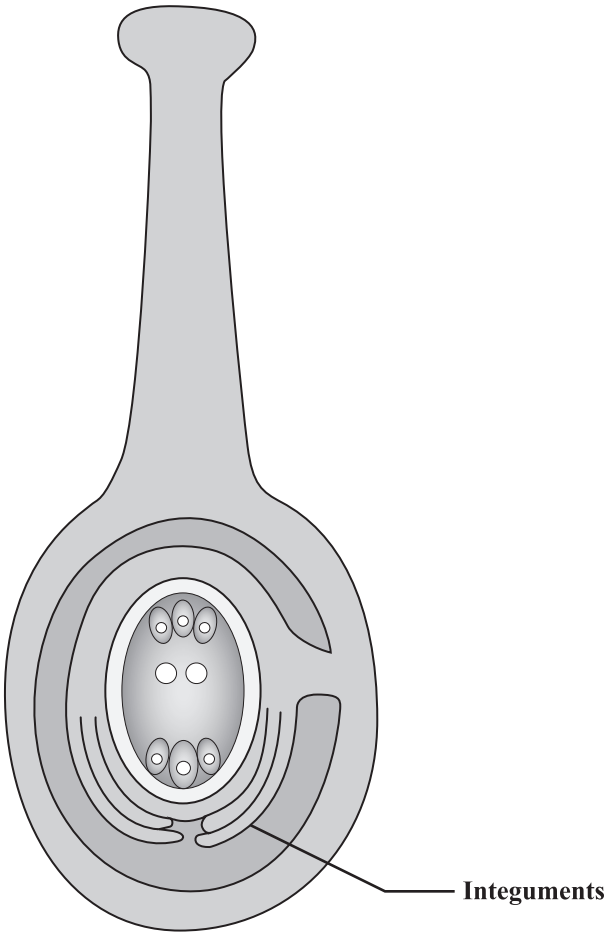


Figure 2. Female part of a flower

(3 marks)

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(d) Explain why a human embryo does NOT have large nutrient stores but a plant embryo does.

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(e) Suggest FOUR reasons why a couple would be advised to use the permanent method of birth control for the male rather than the permanent method of birth control for the female.

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(4 marks)

Total 15 marks

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3. Figure 3 is a diagram of a terrestrial food web.

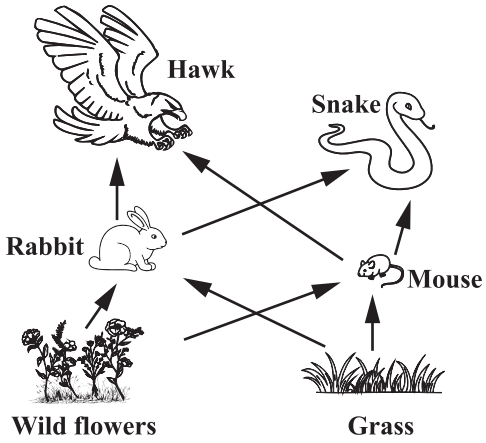


Figure 3. Terrestrial food web

(a) Using the food web illustrated in Figure 3, identify a

(i) producer

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(ii) predator

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(iii) primary consumer.

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(3 marks)

(b) State TWO roles of the producer in the food web.

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(2 marks)

(c) Identify ONE biotic factor and ONE abiotic factor that would affect the organisms shown in Figure 3.

(i) Biotic .....

(ii) Abiotic .....

(2 marks)

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(d) (i) Explain why there are fewer organisms at the top than at the bottom of the food web.

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(2 marks)

(ii) Discuss TWO possible consequences of the hawk becoming extinct in the ecosystem shown in Figure 3.

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(4 marks)

(e) Suggest TWO reasons why decomposers are important organisms in all food webs.

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(2 marks)

Total 15 marks

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SECTION B

Answer ALL questions.

4. (a) Figure 4 is a labelled diagram of a nephron.

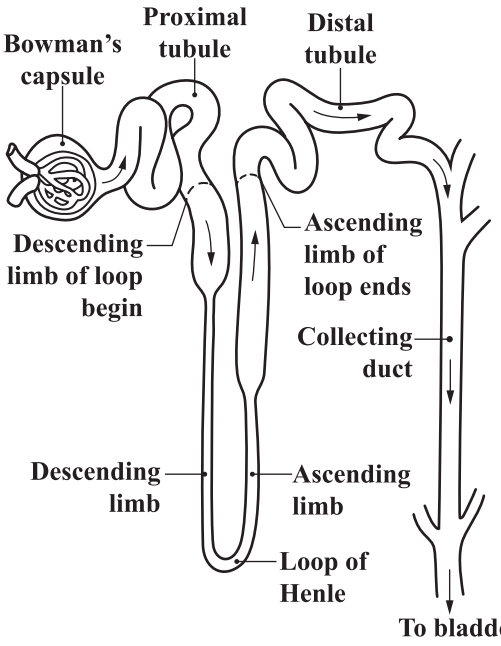


Figure 4. Diagram of a nephron

Use Figure 4 to describe how urine is formed.

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(6 marks)

(b) (i) Explain why there is a high concentration of glucose in the urine of a diabetic patient.

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(ii) State ONE similarity and TWO differences between the method by which the human body regulates blood sugar levels and the method by which the human body regulates the amount of water in the blood.

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(3 marks)

(c) Suggest TWO ways in which kidney damage can be prevented in diabetic and hypertensive patients.

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(2 marks)

Total 15 marks

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5. (a) Red and white blood cells are important components of human blood. Use clearly labelled diagrams to illustrate the structure of a red blood cell and the structure of a white blood cell.

Red blood cell

White blood cell

(6 marks)

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(b) Explain how any TWO features of a red blood cell ensures that it is suitable for its **major** function in the human body.

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(c) The ABO blood grouping system is determined by antigens on the surface of red blood cells. An individual who has one parent with the heterozygous genotype for blood group A and the other parent with the heterozygous genotype for blood group B may have a blood group (phenotype) that is different from either parent. With the aid of a genetic diagram, explain how an individual may have a blood type that is different from either parent.

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(5 marks)

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6. (a) Outline Darwin's theory of natural selection.

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(2 marks)

(b) Explain why the developing of antibiotic resistance by bacteria is considered to be an example of natural selection.

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(2 marks)

(c) A farmer wishes to use artificial selection to alter the characteristics of his crops. Suggest TWO ways in which artificial selection will benefit the farmer.

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(d) (i) A species of toad which carry a toxin was introduced on an island which was inhabited by iguanas. The iguanas ate mainly toads. Many, but not all, of the iguanas died when they ate the toads. Several years later biologists examined the iguanas for any changes and observed that the length of the tails of the adult iguanas increased by ten per cent.

Suggest THREE possible reasons for the increase in tail length observed in these iguanas.

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(3 marks)

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(ii) One of the biologists suggested that the iguanas with longer tails were a new species, but another biologist argued that a species is not determined by different physical features.

It was later concluded that the iguanas with longer tails were not a new species. Provide an explanantion to support this conclusion.

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(2 marks)

(e) Describe TWO situations which may lead to the evolution of a new species.

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(4 marks)

Total 15 marks

END OF TEST

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

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