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CARIBBEAN EXAMINATIONS COUNCIL

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. For Section A, write your answers in the spaces provided in this booklet.
3. For Section B, write your answers in the spaces 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 in this booklet.

1. Figure 1 shows the effect of temperature on the rate at which starch is broken down by the enzyme, amylase.

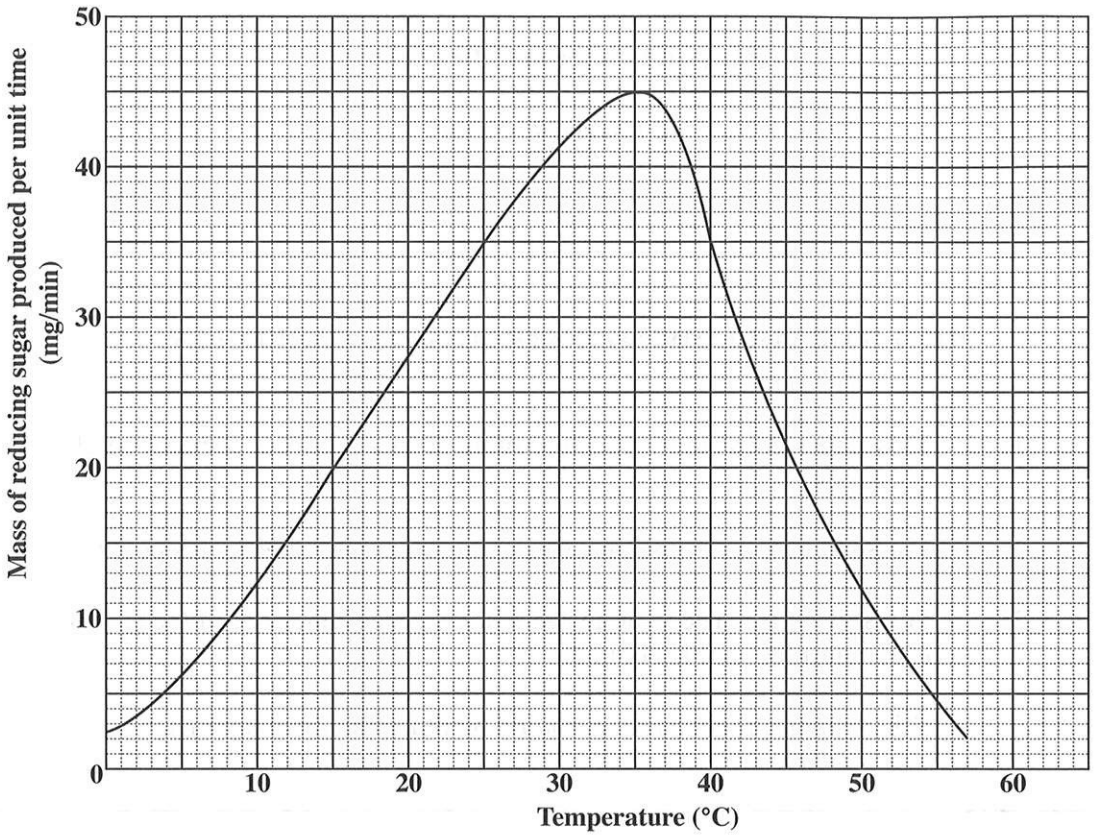

Figure 1. Effect of temperature on rate of amylase activity

(a) (i) Construct a table to represent the data shown on the graph in Figure 1, using FOUR temperature values from the graph.

(4 marks)

(ii) Describe the trend in enzyme activity as shown by the graph in Figure 1.

_____

_____

_____

_____

(3 marks)

(iii) Explain what happens to the enzyme at temperatures above 37 °C.

_____

_____

(2 marks)

(b) Design an experiment to determine the rate at which starch is broken down under different pH conditions.

(5 marks)

(c) (i) Name TWO parts of the human digestive system where amylase may be found.

(2 marks)

(ii) Explain why the digestion of starch stops when food reaches the stomach.

(2 marks)

(iii) Name an enzyme which works best in the stomach.

(1 mark)

(d) (i) Amylase is also found in plants. Suggest THREE plant structures in which amylase may be found.

(3 marks)

(ii) How is the starch produced in leaves converted to a substance which can be transported to other parts of the plant?

(2 marks)

(iii) Give ONE benefit of the storage of starch in plants.

_____

(1 mark)

Total 25 marks

2. Figure 2 is a diagram of a hinge joint found at the elbow in a human body.

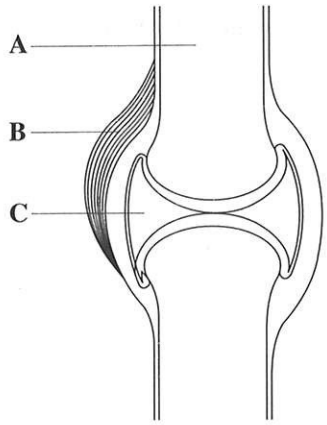

Figure 2. Diagram of a hinge joint

(a) (i) State the name of the structures labelled A, B and C in Figure 2, and give ONE function of EACH structure.

Name of A: _____

Function: _____

Name of B: _____

Function: _____

Name of C: _____

Function: _____

(6 marks)

(ii) Use a line and the letter D to show the cartilage in the joint in Figure 2.

(1 mark)

(b) Arthritis, a degenerative disease, may cause the wearing away of the cartilage of joints. Explain how this will affect joints.

(2 marks)

(c) Explain how the muscles of the upper arm bring about the raising and lowering of the lower arm.

(4 marks)

(d) Suggest why the treatment of some blood diseases may involve a bone marrow transplant.

(2 marks)

Total 15 marks

3. (a) The diagram shown in Figure 3 represents a typical plant cell.

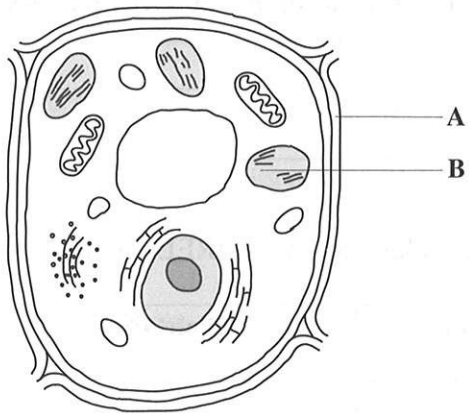

Figure 3. Diagram of a typical plant cell

Identify the parts labelled A and B and state the function of EACH part.

A: _____

Function of A: _____

B: _____

Function of B: _____

(4 marks)

(b) The cell in Figure 3 was left in a concentrated salt solution for one hour.
In the space below, draw an **annotated** diagram to show the appearance of this plant cell after one hour.

(6 marks)

(c) If all the cells in a plant appear like the one drawn in (b) on page 7, the plant's ability to photosynthesize will be reduced. Explain why photosynthesis will be reduced.

_____

_____

(2 marks)

(d) Complete the table below to show THREE differences between plant and animal cells.

	Feature	Plant Cell	Animal Cell
(i)	Vacuole		
(ii)	Chloroplast		
(iii)	Cell wall		

(3 marks)

Total 15 marks

SECTION B

Answer ALL questions.

Write your answers in the spaces provided at the end of each question.

4. (a) Distinguish between the following pairs of terms:

(i) Allele and gene

(ii) Phenotype and genotype

(iii) Dominant and recessive **(6 marks)**

(b) Black fur colour is controlled by a dominant allele, **B**, and brown fur colour by its recessive allele, **b**. This characteristic is NOT sex-linked. Give the genotypes of the parents and offspring of a cross between a black male and a brown female that produces ½ black offspring and ½ brown offspring. Show all the steps in the working of this problem. **(5 marks)**

(c) Haemophilia is caused by an X-linked recessive gene. Two parents with the normal phenotype have a haemophiliac child. Use a genetic diagram to show how this is possible. **(X^H = normal; X^h = gene for haemophilia)** **(4 marks)**

Total 15 marks

5. Insect vectors are involved in the spread of some pathogenic diseases.

(a) Describe the life cycle of a **named** insect vector. **(4 marks)**

(b) Distinguish between the transmission of a **named** pathogenic disease and a **named** physiological (lifestyle) disease. **(4 marks)**

(c) Explain how the treatment and control measures for a **named** pathogenic disease will differ from those of a **named** physiological disease. **(4 marks)**

(d) Evaluate the socio-economic impact of AIDS on the Caribbean population. **(3 marks)**

Total 15 marks

6. (a) With the aid of a **labelled** diagram, describe the structure of the human male reproductive system. Indicate on the diagram the structure that produces gametes, and the structures that transport the gametes to allow reproduction to take place. **(6 marks)**

(b) Name ONE method of contraception that works by preventing

(i) fertilization

(ii) ovulation.

Explain how EACH of the methods named above functions to prevent pregnancy. **(4 marks)**

(c) Compare the means by which the gametes are brought together in flowering plants with the means by which the gametes are brought together in humans. **(5 marks)**

Total 15 marks

Space for diagram

END OF TEST

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