

CARIBBEAN EXAMINATIONS COUNCIL

**SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

HUMAN AND SOCIAL BIOLOGY

Paper 02 – General Proficiency

2 hours

READ THE FOLLOWING DIRECTIONS CAREFULLY

- 1.** This paper consists of **FOURTEEN** questions in **TWO** sections.
- 2.** **SECTION A** consists of **TEN** questions. Answer **ALL TEN** questions. Write your answer in the space provided in this answer booklet. Each question is worth **10 marks**.
- 3.** **SECTION B** consists of **FOUR** questions. Answer **ONLY TWO** questions. Write your answer on the pages provided at the end of this booklet. Each question is worth **20 marks**.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

SECTION A

Answer ALL questions in this section.

1. The movement of ions and other materials across membranes is extremely important in biological systems. Materials can normally be moved by osmosis, simple diffusion and active transport.

- (a) Complete the following statement:

In simple diffusion, the higher the _____, the
_____ the rate of movement. (2 marks)

- (b) (i) Briefly explain the term 'active transport'.

(2 marks)

- (ii) Give an example of active transport.

(1 mark)

- (c) Define the term 'osmosis'.

(2 marks)

- (d) Complete the following statements:

When a peeled potato is placed in distilled water it will _____
as a result of osmosis. (1 mark)

If some salt is added to the water the potato will _____
(1 mark)

- (e) A drop of ink is placed in a glass of pure, clear water, and after a while all the water turns blue. This spread is as a result of _____
(1 mark)

Total 10 marks

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2. Figure 1 shows a section through the head of a femur.

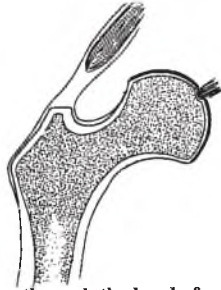


Figure 1. Section through the head of a femur

- (a) (i) By means of a line and a label, show on the diagram EACH of the following parts:
- a) Cartilage
 - b) Cancellous (spongy) bone
 - c) Compact bone
 - d) Fatty marrow
- (4 marks)**

- (ii) Describe the function of EACH of the parts labelled in (a) (i) above.

Cartilage:

Cancellous bone:

Compact bone:

Fatty marrow:

(4 marks)

- (b) Give TWO reasons for the elasticity of cartilage.

(2 marks)

Total 10 marks

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3. Figure 2 represents a horizontal section through the eye.

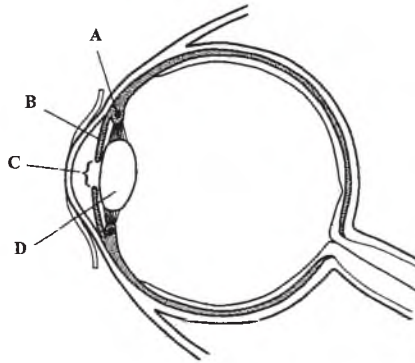


Figure 2. Horizontal section through the eye

- (a) Name the parts labelled A, B, C and D.

A: _____

B: _____

C: _____

D: _____

(4 marks)

- (b) Name the part of the eye which decreases in size when a bright light is shone into the eye.

(1 mark)

- (c) Explain why objects in dim light are seen more clearly from the corner of the eye.

(1 mark)

- (d) Explain how the eye is nourished.

(2 marks)

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- (e) Describe how images are formed on the retina.

(2 marks)

Total 10 marks

4. Figure 3 shows drawings of blood cells.

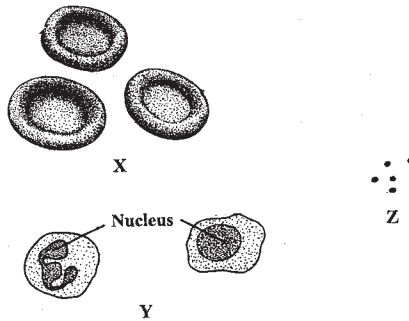


Figure 3. Blood cells

- (a) Identify the blood cells, X, Y and Z in Figure 3.

X: _____

Y: _____

Z: _____

(3 marks)

- (b) Describe oxygen transport in the red blood cell.

(3 marks)

- (c) (i) What is the liquid part of the blood called?

(1 mark)

- (ii) Distinguish between the part named in (c) (i) and serum.

(1 mark)

- (d) Distinguish between the functions of the blood and the circulation of the blood.

(2 marks)

Total 10 marks

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5. (a) Glucose \rightarrow lactic acid \rightarrow carbon dioxide and water

With reference to the above equation, identify EACH of the following processes:

- (i) Anaerobic respiration:

_____ (1 mark)

- (ii) Aerobic respiration:

_____ (1 mark)

- (b) Explain EACH of the following processes:

- (i) Anaerobic respiration

_____ (3 marks)

- (ii) Aerobic respiration

_____ (3 marks)

- (c) Explain the concept of oxygen debt.

_____ (2 marks)

Total 10 marks

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6. Figure 4 shows parts of the alimentary canal.

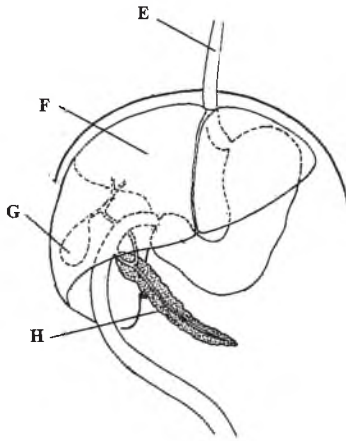


Figure 4. Parts of the alimentary canal

- (a) Name EACH of the parts labelled E, F and G.

E: _____

F: _____

G: _____

(3 marks)

- (b) (i) Name the substance that is stored in G.

(1 mark)

- (ii) State TWO functions of the substance named in (b) (i).

(2 marks)

- (c) Name TWO enzymes produced by the part labelled H in Figure 4, and the substrate on which EACH of these enzymes act.

Name of enzyme: _____

Substrate: _____

Name of enzyme: _____

Substrate: _____

(4 marks)

Total 10 marks

7. (a) Choose the word from the brackets at the end of the statement, to complete the statement correctly.

The rhythm method is an example of a/an _____ method of birth control, while contraceptive pills are an example of a/an _____ method of birth control. (artificial, natural, surgical) (2 marks)

- (b) What is meant by the 'safe period' in reproduction?

(1 mark)

- (c) Which days of the menstrual cycle are considered NOT safe?

(1 mark)

- (d) Explain TWO ways in which contraceptive pills prevent pregnancy.

(2 marks)

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- (e) In pregnancy, explain how the structure of the placenta is related to its function.

(4 marks)

Total 10 marks

8. (a) Briefly describe DNA and explain its function.

(3 marks)

- (b) Explain what is meant by EACH of the following terms:

- (i) Homozygous

(1 mark)

- (ii) Dominance

(1 mark)

- (c) (i) With the aid of a diagram, determine the inheritance of eye-colour for a homozygous male with brown eyes mating with a homozygous female with blue eyes. Brown eye-colour is dominant over blue eye-colour.

(3 marks)

- (ii) What is the phenotype of the F1 generation in (c) (i)?

(1 mark)

- (iii) What proportion of the F1 generation will be homozygous recessive?

(1 mark)

Total 10 marks

9. (a) Drug abuse is a common societal problem. Name THREE drugs which are commonly abused.

(3 marks)

- (b) (i) What is the effective ingredient in alcoholic drinks?

(1 mark)

- (ii) Describe ONE social impact of alcohol abuse on the family.

(1 mark)

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- (c) Explain how alcohol acts on the human body.

(5 marks)

Total 10 marks

10. (a) One of the problems created by modern man is the greenhouse effect.

- (i) What causes the greenhouse effect?

(2 marks)

- (ii) What is the initial consequence of the greenhouse effect?

(2 marks)

- (iii) State ONE health consequence of the thinning of the ozone layer.

(1 mark)

- (b) (i) Name TWO sources of atmospheric (air) pollution.

(2 marks)

- (ii) Which THREE dilute acids are produced by water in the atmosphere combining with the pollutants named in (b) (i)?

(3 marks)

Total 10 marks

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SECTION B

Answer ANY TWO questions in this section.

11. (a) Define the term 'hormone'. (2 marks)
- (b) Describe the role of hormones in the regulation of the menstrual cycle. (9 marks)
- (c) Which is faster, nervous control or hormonal action? Explain your answer. (9 marks)

Total 20 marks

12. Figure 5 shows a simplified drawing of a human heart.

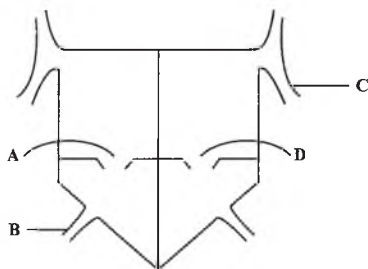


Figure 5. Simplified drawing of a human heart

- (a) Copy Figure 5 on your answer page. On your drawing:
- (i) Label EACH of the structures, A, B, C and D in Figure 5. (4 marks)
- (ii) Shade the part of the heart which is associated with oxygenated blood. (1 mark)
- (iii) Label the atria and ventricles. (2 marks)
- (b) Compare the relative thickness of the walls of the atria and ventricles. (3 marks)
- (c) Describe the role played by the different parts of the heart in the circulation of blood. (10 marks)

Total 20 marks

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- 13.** (a) With the aid of diagrams, describe cell division by the process of mitosis. (15 marks)
- (b) State TWO main differences between mitosis and meiosis. (2 marks)
- (c) Explain how gender is determined in humans. (3 marks)

Total 20 marks

- 14.** (a) Define the term 'obesity'. (2 marks)
- (b) State FOUR main causes of obesity. (4 marks)
- (c) Explain how hypertension can become a complication of obesity. (4 marks)
- (d) Explain what is meant by lifestyle changes, and discuss how lifestyle changes can be used in treating obesity. (10 marks)

Total 20 marks

END OF TEST