



TEST CODE **22207020**

**FORM TP 2008162**

MAY/JUNE 2008

**C A R I B B E A N   E X A M I N A T I O N S   C O U N C I L**

**ADVANCED PROFICIENCY EXAMINATION**

**BIOLOGY**

**UNIT 2 – PAPER 02**

**$2 \frac{1}{2}$  hours**

**Candidates are advised to use the first 15 minutes for  
reading through this paper carefully.**

**READ THE FOLLOWING INSTRUCTIONS CAREFULLY.**

1. This paper consists of SIX questions.
2. Section A consists of THREE questions. Candidates must answer ALL questions in this section. Answers to this section MUST be written in this answer booklet.
3. Section B consists of THREE questions. Candidates must answer ALL questions in this section. Answers to this section MUST be written in the answer booklet provided.
4. The use of silent non-programmable calculators is allowed.

### SECTION A

Answer ALL questions in this section. You must write your answers in the spaces provided on the question paper.

1. Figure 1 below is a high power electron micrograph of a mitochondrion from a eukaryotic cell.

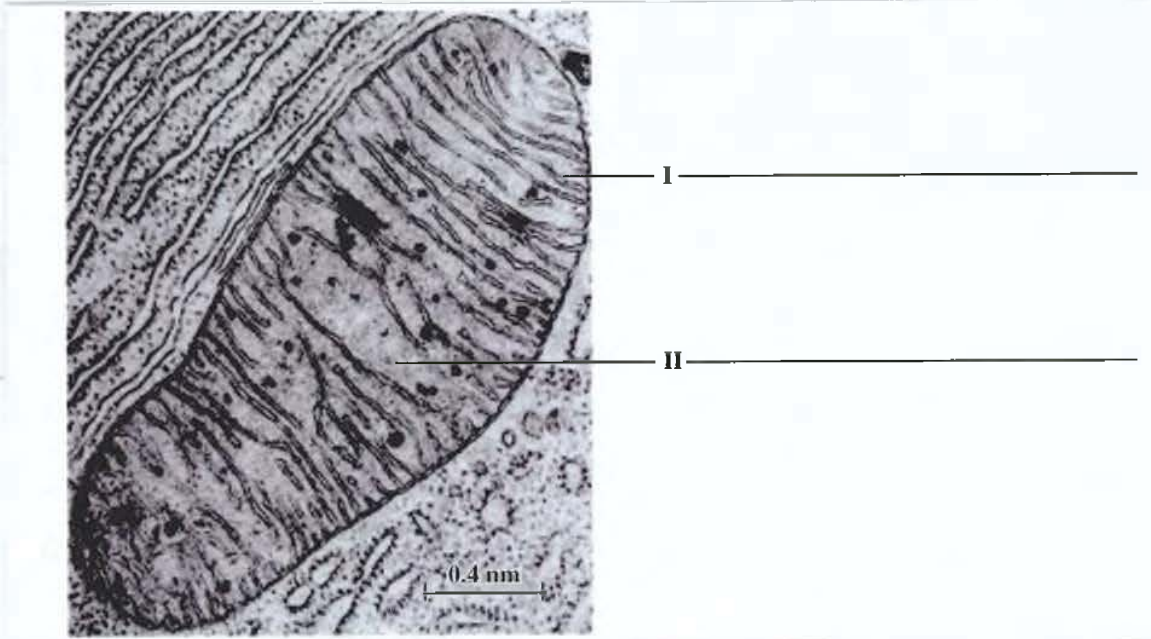


Figure 1. Electron micrograph of a mitochondrion

[\[http://content.answers.com/main/content/img/McGrawHill/Encyclopedia/images/CE428200FG0010.gif\]](http://content.answers.com/main/content/img/McGrawHill/Encyclopedia/images/CE428200FG0010.gif)

- (a) (i) On Figure 1, label the structures highlighted as **I** and **II**. [ 2 marks]  
(ii) For the structures labelled **I** and **II**, state their MAIN function in cellular respiration in the organelle.

**I** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**II** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[ 2 marks]

GO ON TO THE NEXT PAGE

(iii) Calculate the length of the mitochondrion shown in Figure 1. Show your steps.

Calculations:

Length: \_\_\_\_\_

[ 2 marks]

(b) Chloroplasts are involved in energy conversion in plants and share some features in common with mitochondria.

State TWO structural features which are **similar** and ONE structural feature which is **different** in chloroplasts and mitochondria.

Similarities

(i) \_\_\_\_\_

\_\_\_\_\_

(ii) \_\_\_\_\_

\_\_\_\_\_

[ 2 marks]

Difference

(i) \_\_\_\_\_

\_\_\_\_\_

[ 1 mark ]

- (c) Using an annotated diagram ONLY, explain how energy is generated in the respiratory chain reaction in mitochondria.

[ 6 marks]

**Total 15 marks**

2. (a) In plants, phloem plays an important role in the transport of substances. Figure 2 is a model of the mass pressure-flow hypothesis which has been proposed as a possible mechanism of phloem translocation.

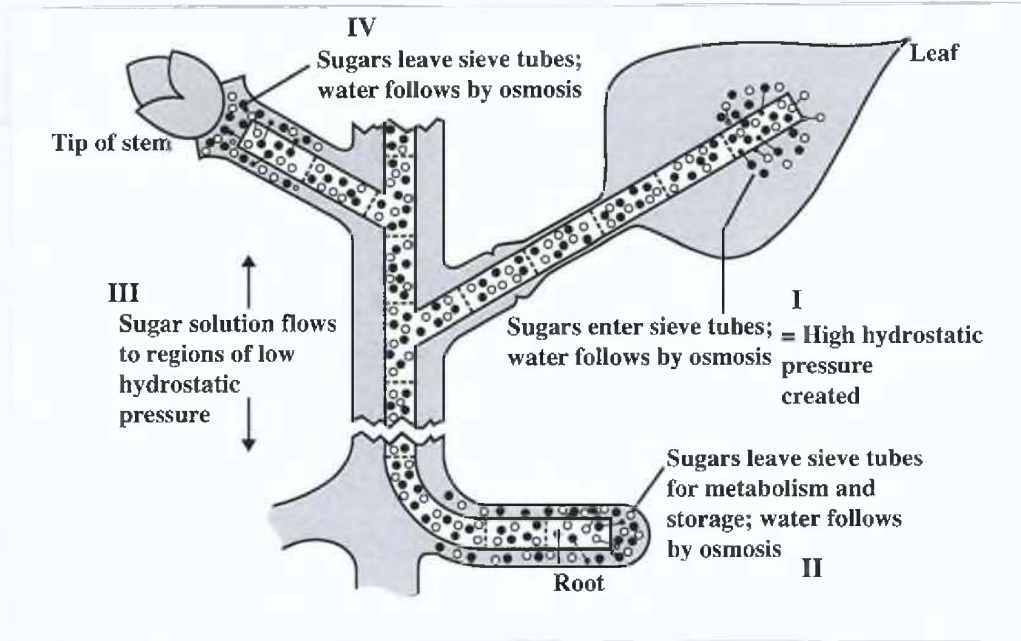


Figure 2. Model of mass pressure-flow

{<http://www.ualr.edu/botany/pressflow.gif>}

- (i) With reference to the activities occurring at the stages highlighted by the labels I – IV, discuss the SIX key features of this hypothesis.

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[ 6 marks]

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- (ii) Xylem is also involved in transport in plants but differs from phloem in how this is achieved. Describe ONE major difference in the transport process.

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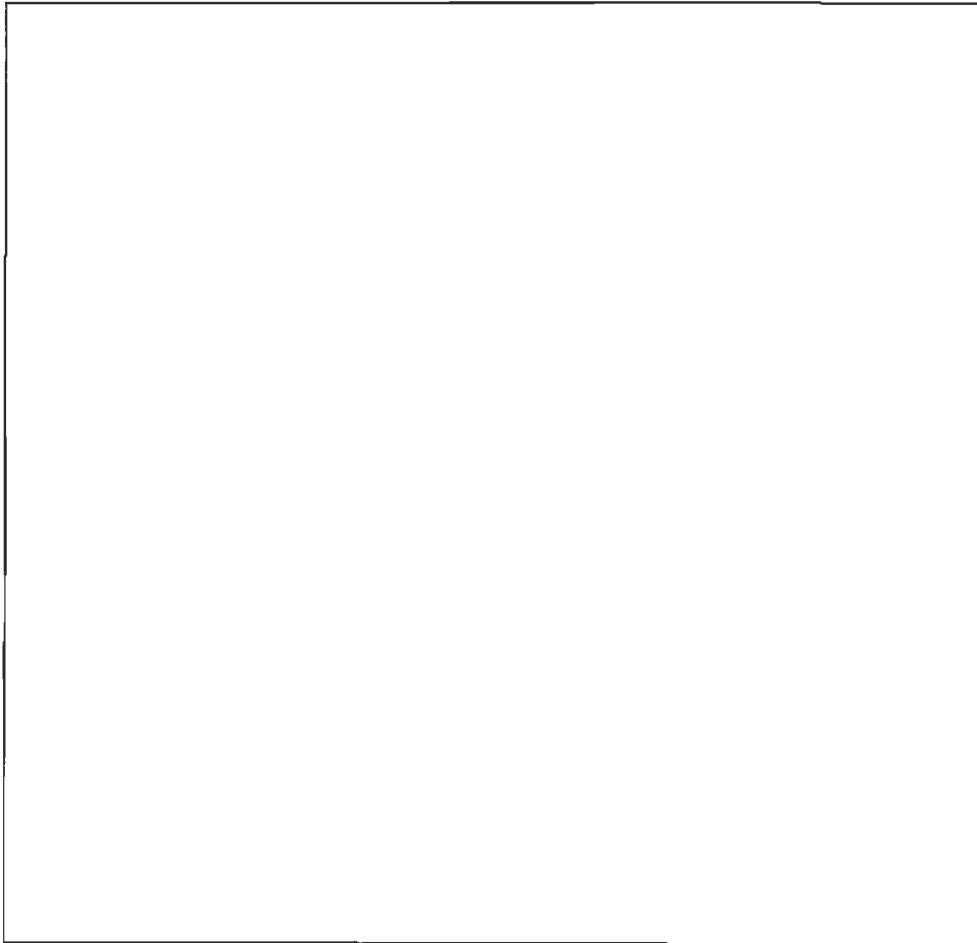
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[ 2 marks]

- (b) The mammalian heart is described as a double-circuit, chambered pump.

- (i) In the box provided below, illustrate and label the MAIN chambers of the heart as seen in a longitudinal section. [ 4 marks]

- (ii) On your drawing, use arrows to illustrate the circuit of blood flow through the various chambers. [ 1 mark ]



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- (iii) Identify which chamber of the heart plays the MOST important role in the pumping function and describe the MAIN feature of the chamber which contributes to this function.

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[ 2 marks]

**Total 15 marks**

3. (a) (i) Define the term 'health'.

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[ 2 marks]

- (ii) Using TWO examples, explain the difficulties involved in placing most diseases into one category.

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[ 4 marks]

- (b) As part of a routine medical test, a female measured her weight, height and blood cholesterol levels. Her weight was 75 kg, her height was 1.5 metres and her blood cholesterol level was 235 gm/dl.

- (i) Calculate her Body Mass Index (BMI). Show your calculations.

[ 2 marks]

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- (ii) Comment on this BMI value in relation to what is acceptable.

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[ 1 mark ]

- (iii) The acceptable range for blood cholesterol is 200–240 mg/dl. In light of the BMI and the cholesterol results, predict TWO medical conditions that this person may develop.

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[ 2 marks]

- (c) Table 1 below summarises mortality rates in a population for the period, 1990 to 2001.

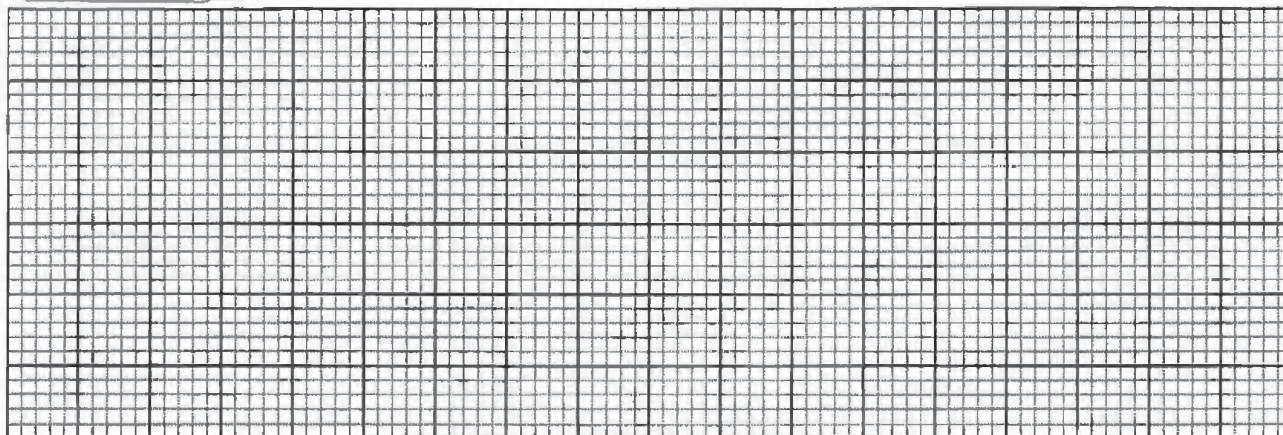
**TABLE 1. MORTALITY RATES**

Year	Mortality rate (100,000) population
1990	135
1991	140
1992	139
1993	143
1994	145
1995	137
1996	133
1997	135
1998	130
1999	125
2000	120
2001	119

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(i) In the space below, draw a graph to illustrate this data.



[ 3 marks]

(ii) Suggest ONE reason for the changes in the mortality rate after 1994.

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[ 1 mark ]

**Total 15 marks**

## SECTION B

Answer ALL questions in this section. You must write your answers in the answer booklet provided.

4. Conservation International has identified the Caribbean as a “hotspot” for biodiversity and as such conservation of biological resources has become a priority for several countries in the region.

(a) (i) Discuss the concept of ‘biodiversity’ in terms of genetic, species and ecosystem diversity. [ 4 marks]

(ii) Outline TWO reasons why it is important to conserve biodiversity. [ 4 marks]

(b) (i) Define the term ‘ecosystem’. [ 3 marks]

(ii) Discuss why ecosystems are considered to be dynamic in nature. [ 4 marks]

**Total 15 marks**

5. (a) Describe the basic structure of a myelinated motor neurone. [ 6 marks]

(b) Explain the basis of the electrical nature of a nerve impulse in relation to the structure of a neurone. [ 6 marks]

(c) Citing THREE main phases of activity, discuss how a neurone functions to transmit an impulse upon receiving a stimulus. [ 3 marks]

**Total 15 marks**

6. (a) HIV infections and dengue are viral diseases of regional importance. Compare these diseases in relation to mode of transmission of the virus, onset of the symptoms, and prevention of transmission of the virus. [ 6 marks]

(b) (i) Explain how HIV becomes a permanent part of the cell of infected persons. [ 4 marks]

(ii) Suggest ONE reason why this does NOT occur with dengue. [ 1 mark ]

(c) Cancer tumours develop as a result of uncontrolled cells, suggesting that cancer is associated with changes in cell DNA. Assess the validity of this statement with reference to TWO common causes of cancers. [ 4 marks]

**Total 15 marks**

**END OF TEST**