



TEST CODE **02207020**

**FORM TP 2009150**

MAY/JUNE 2009

**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. An experiment is conducted to determine the rate at which germinating peas at room temperature take up oxygen, using a respirometer. The apparatus is set up as shown in Figure 1.

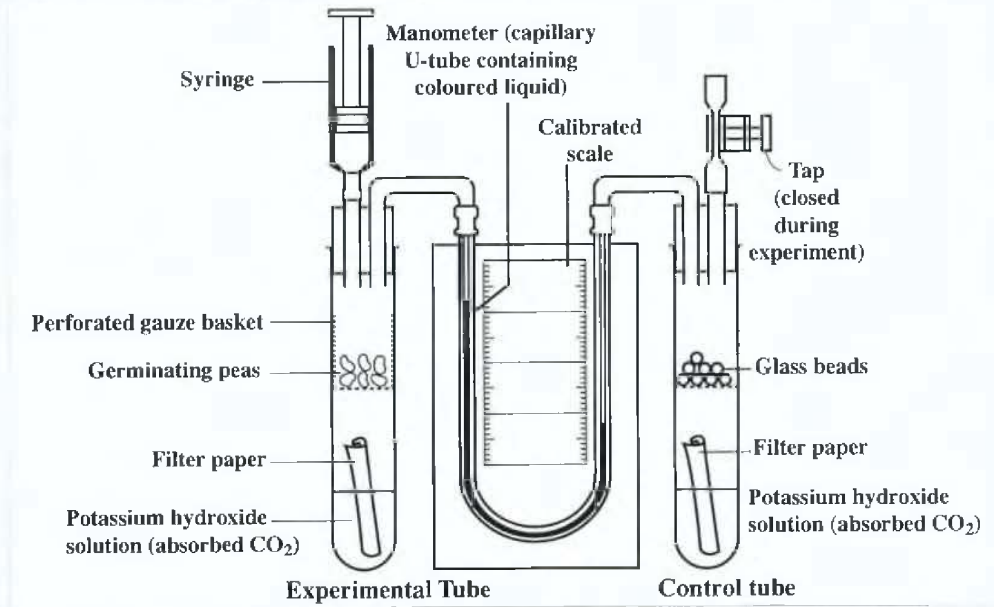


Figure 1. Apparatus used to investigate oxygen uptake in germinating peas

- (a) Explain how the apparatus is used to investigate the rate of oxygen uptake of the germinating peas in the respirometer.

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[ 6 marks]

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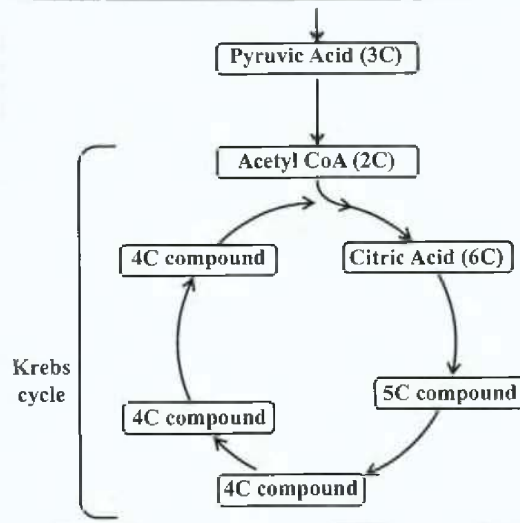
- (b) State ONE way in which the apparatus in Figure 1 on page 2 could be modified to determine the effect of temperature on the oxygen uptake by germinating peas.

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[ 1 mark ]

- (c) **Figure 2** below is a simplified diagram of the Krebs cycle and the preceding reactions.



**Figure 2. Krebs cycle**

- (i) On **Figure 2**, label EACH of the following stages with the letter
- C to indicate decarboxylation reactions
  - H to indicate dehydrogenation reactions. [ 5 marks]
- (ii) State EXACTLY where the Krebs cycle occurs in a cell.

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[ 1 mark ]

- (iii) Briefly explain the role of NAD in the Krebs cycle, in relation to energy production.

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[ 2 marks]

**Total 15 marks**

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2. (a) State FOUR structural features of xylem vessels.

- (i) \_\_\_\_\_
- (ii) \_\_\_\_\_
- (iii) \_\_\_\_\_
- (iv) \_\_\_\_\_

[ 4 marks]

(b) Xylem vessels play an important role in the conduction of water and mineral salts in plants. Using THREE of the features listed at (a), explain how EACH feature facilitates the conduction of water and mineral salts in plants.

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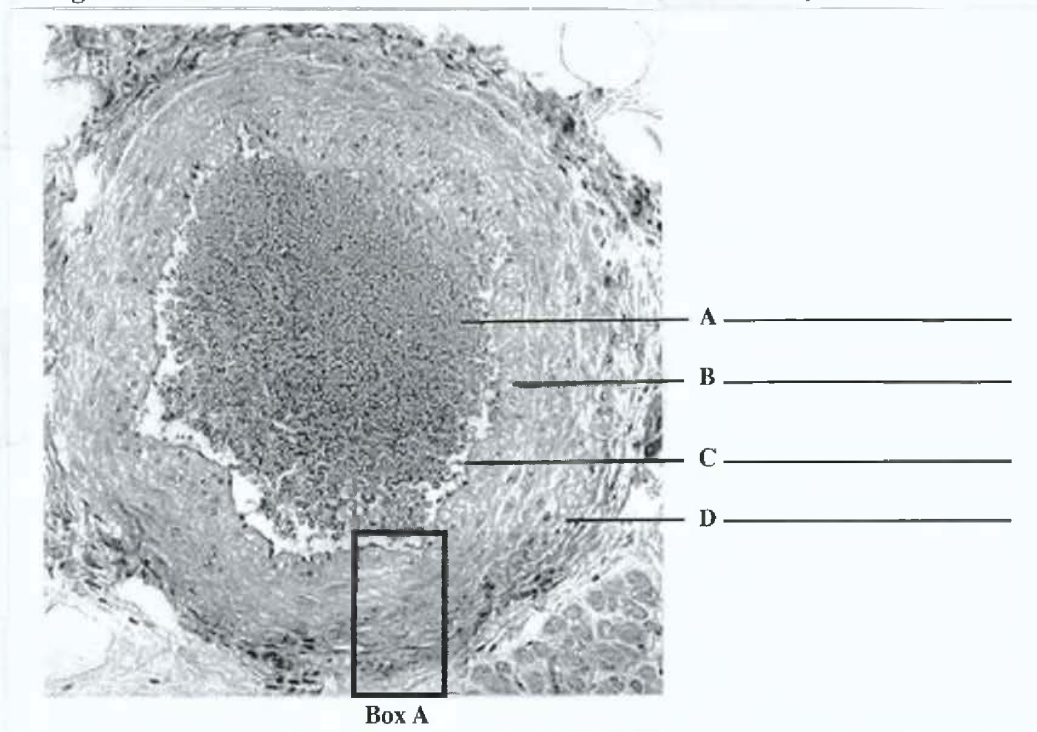
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[ 3 marks]

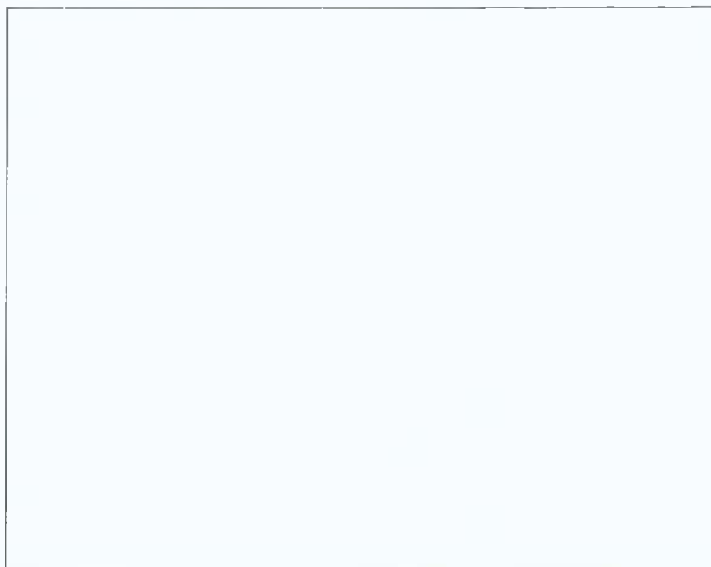
(c) **Figure 3** below is a cross-section of a mammalian muscular artery.



**Figure 3. Cross-section of a mammalian artery**

(i) Identify the tissues labelled A, B, C and D. Write your answers in **Figure 3**.  
[ 2 marks]

(ii) **In the box provided** below, draw a plan diagram to show the distribution of the **major** tissues of the artery wall in Box A in **Figure 3**. Make your drawing twice the size of Box A.



[ 5 marks]

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- (iii) The photograph in **Figure 3** on page 5 has been magnified 100 times. What is the **ACTUAL** width of the artery wall in the region of Box A?

[ 1 mark ]

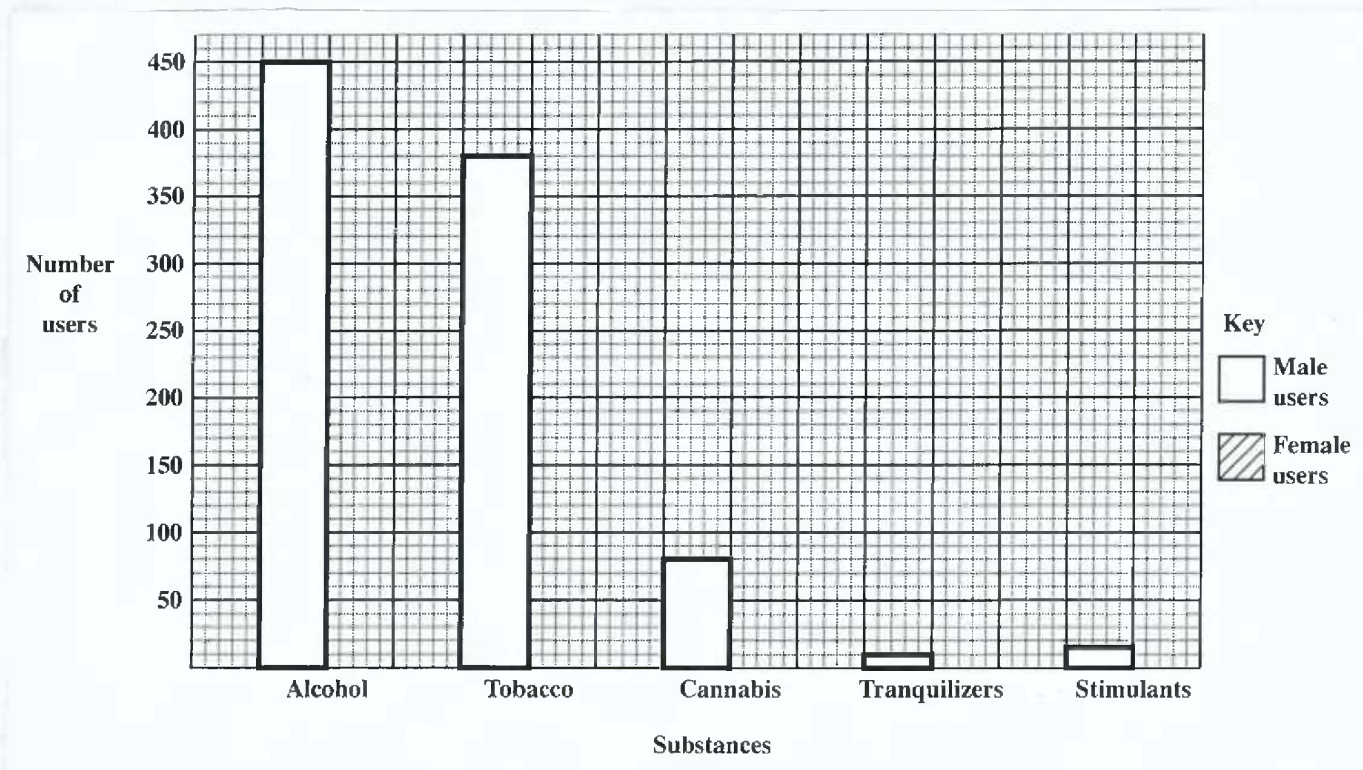
Total 15 marks

3. A survey was conducted among the residents of a large metropolitan city in order to assess the use of psychoactive substances. Twelve hundred persons responded. The data that was collected is presented in **Table 1**.

**TABLE 1. USE OF PSYCHOACTIVE SUBSTANCES**

Substance	Number of Users		
	Males	Females	Total
Alcohol	450	420	870
Tobacco	380	310	690
Cannabis	80	25	105
Tranquilizers	10	20	30
Stimulants	15	10	25
<b>Total</b>	<b>935</b>	<b>785</b>	<b>1720</b>

**Figure 4** below shows an incomplete bar chart of the data in **Table 1**.



**Figure 4. Bar chart**

GO ON TO THE NEXT PAGE

(a) (i) Complete the bar chart shown in **Figure 4** to show the data collected on the female users. [ 3 marks]

(ii) State **THREE** significant trends in relation to the use of psychoactive substances that are demonstrated by the data.

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[ 3 marks]

(b) (i) Explain how consistent use of alcohol affects the liver. Your answer should include **TWO** points.

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[ 4 marks]

(ii) State **ONE** way consistent use of alcohol during pregnancy can adversely affect the foetus.

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[ 1 mark ]

(c) Although a large number of persons reported using these psychoactive substances, it cannot be concluded that their use constitutes either a health or social risk. Suggest, with an explanation, **TWO** other kinds of data that could be collected and used to make this determination.

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[ 4 marks]

**Total 15 marks**

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### SECTION B

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

4. (a) Distinguish between the terms 'ecosystem' and 'ecological niche'. [ 4 marks]
- (b) Explain why energy is said to **flow through**, and not cycle, as it is transferred within an ecosystem. [ 4 marks]
- (c) (i) Using examples, explain the difference between the terms 'in situ' and 'ex situ' as they relate to biological conservation. [ 3 marks]
- (ii) The population of many species of large mammals can be preserved by the use of zoological parks. Discuss TWO challenges associated with the use of zoological parks for the maintenance of biodiversity. [ 4 marks]

**Total 15 marks**

5. (a) (i) The external environment of animals is constantly changing, while the internal environment remains fairly constant. Explain how hormones contribute to the maintenance of this fairly constant internal environment. [ 5 marks]
- (ii) Ethene gas speeds up the ripening of fruits. Suggest TWO other ways in which ethene plays a regulatory role in plants. [ 2 marks]
- (b) A nephron consists of distinct sections, each of which serves a different function. Collectively, these sections ensure that urine is formed by a process of ultra-filtration, selective re-absorption and secretion.
- (i) Distinguish between 'ultra-filtration' and 'selective re-absorption' in relation to urine formation. [ 2 marks]
- (ii) The proximal convoluted tubule is responsible for the process of selective re-absorption. With reference to THREE structural features, discuss how the proximal convoluted tubule is ideally suited to this function (selective re-absorption). [ 6 marks]

**Total 15 marks**

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6. (a) Diabetes has become a major contributor to morbidity, mortality and adult disability in the Caribbean.
- (i) State THREE key features of diabetes. [ 3 marks]
  - (ii) Suggest TWO factors which are thought to be responsible for the increase in diabetes in the Caribbean. [ 4 marks]
- (b) Distinguish between 'natural' and 'artificial immunity'. [ 4 marks]
- (c) Define the term 'monoclonal antibodies' and THREE benefits of the use of monoclonal antibodies in the diagnosis of diseases. [ 4 marks]

**Total 15 marks**

**END OF TEST**