

FORM TP 2016153



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MAY/JUNE 2016

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN ADVANCED PROFICIENCY EXAMINATION®

BIOLOGY

UNIT 2 – Paper 02

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. You may use a silent, non-programmable calculator to answer questions.
5. You are advised to take some time to read through the paper and plan your answers.
6. 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.**
7. **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.

Write your answers in the spaces provided in this booklet.

1. (a) Figure 1 is an incomplete, detailed drawing of a section of a dicotyledonous leaf.

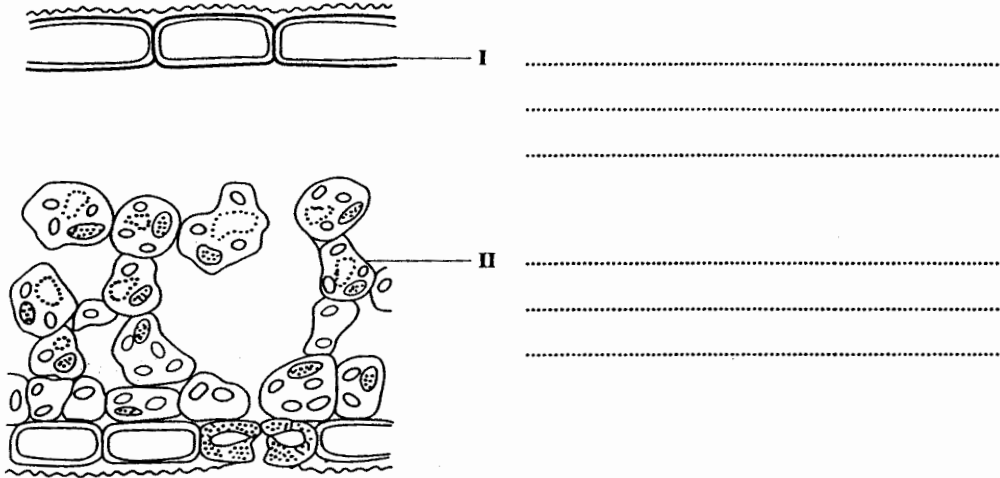


Figure 1. Section of a dicotyledonous leaf

Source: <http://www.tutornext.com/biology>

- (i) Complete the drawing in Figure 1 to accurately show palisade cells and a vascular bundle. [4 marks]
- (ii) Use annotated labels to identify and describe the cells labelled I and II. Write your answers in the space designated in Figure 1. [4 marks]

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(b) Figure 2 is a flowchart outlining how nitrogen is cycled in ecosystems.

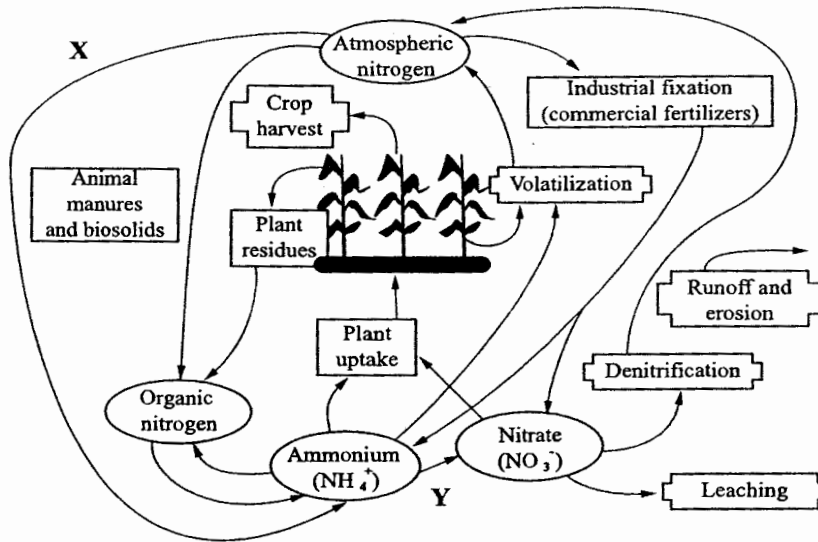


Figure 2. The nitrogen cycle

Source: <http://www.viriniacrops.com>

(i) Name the processes labelled X and Y, and for EACH process give a brief description.

Process X:

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Process Y:

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[4 marks]

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- (ii) With reference to Figure 2, comment on ONE major human activity which has had an impact on **global nitrogen cycling**.

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[3 marks]

Total 15 marks

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2. (a) Adult human haemoglobin samples are exposed to different concentrations (partial pressures) of oxygen. The amount of oxygen that combines with each sample is expressed as the percentage saturation of haemoglobin with oxygen, as shown in Table 1.

TABLE 1: SATURATION OF HAEMOGLOBIN WITH OXYGEN

Partial Pressure of Oxygen (kPa)	Saturation of Haemoglobin With Oxygen (%)
0	0
1	6
2	22
3	41
4	57
5	71
6	81
7	87
8	91
10	94
12	96
14	98

Data adapted from Biology Unit 2 for CAPE Examinations 2011, Ramesar et al, p. 127

- (i) On the grid provided on page 9, plot a line graph of saturation of haemoglobin at various partial pressures of oxygen. [4 marks]
- (ii) With reference to the shape of the graph, describe observed changes in the uptake of oxygen by haemoglobin as the oxygen concentration increases.

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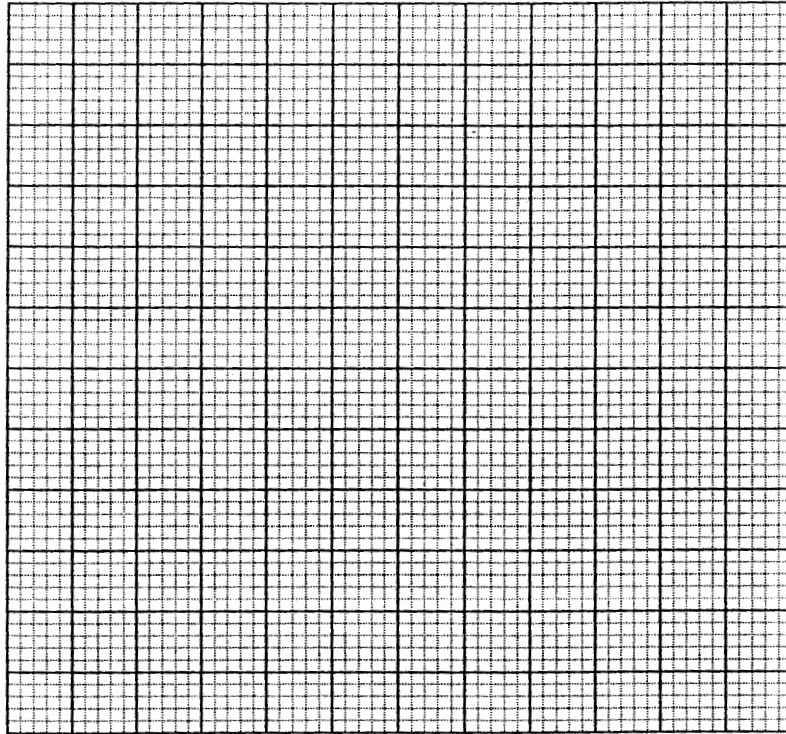
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[2 marks]

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(iii) Comment on the significance of this response for oxygen transport in the body.

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[2 marks]

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(b) Figure 3 is a photomicrograph of a section through the medulla of the kidney of a mammal.

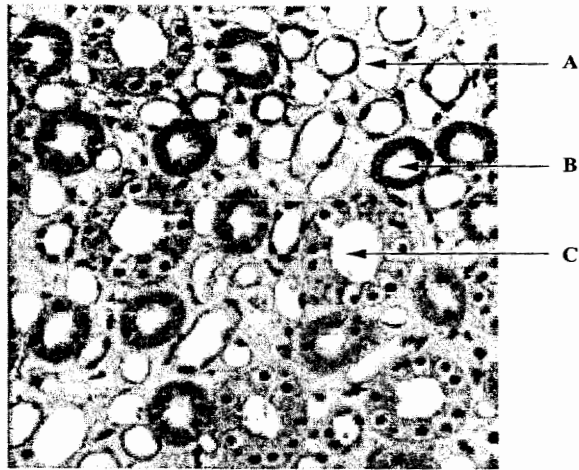


Figure 3. Section of a mammalian kidney

Source: <http://quizlet.com/5351362/urinary-and-reproductive-histology-flash-cards/>

(i) Identify the regions of the nephron labelled A, B and C.

A:

B:

C:

[3 marks]

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3. (a) (i) Table 2 is an incomplete comparison of humoral and cell-mediated immunity. Complete Table 2 by writing the answers in the relevant spaces.

TABLE 2: COMPARISON OF HUMORAL AND CELL-MEDIATED IMMUNITY

Characteristic	Humoral Immunity	Cell-mediated Immunity
Cell type	B lymphocytes	
Mode of action	Antibodies circulating in serum (blood)	
Purpose		Primary defense against intracellular pathogens, tumour cells, graft rejection
Onset		Delayed type hypersensitivity

[4 marks]

- (ii) Explain why after a first infection with measles a person is unlikely to be reinfected.

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[3 marks]

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- (b) Table 3 shows selected findings of a comparative analysis of student drug use in various Caribbean countries.

TABLE 3: AVERAGE AGE OF FIRST USE OF ALCOHOL BY GENDER

Country	Male	Female
Antigua and Barbuda	11.2	11.4
Barbados	10.9	10.9
Dominica	10.9	11.4
Haiti	13.2	12.8
Grenada	10.9	11.4
Guyana	11.9	12.3
Jamaica	11.2	12.2
Trinidad and Tobago	10.7	11.2

Source: <http://www.cicad.oas.org/Main/pubs/StudentDrugUse-Caribbean2011.pdf>

- (i) Compare the **overall** average age of first use of alcohol by males with **overall** average age of first use by females across the region. Quote overall **mean** values in your comparison.

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[marks]

- (ii) Giving a brief explanation, suggest TWO major social consequences of adolescent abuse of alcohol in the Caribbean.

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[4 marks]

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