

FORM TP 2016151



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MAY/JUNE 2016

CARIBBEAN EXAMINATIONS COUNCIL  
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION®

BIOLOGY

UNIT 1 – Paper 032

ALTERNATIVE TO SCHOOL-BASED ASSESSMENT

*2 hours*

**READ THE FOLLOWING INSTRUCTIONS CAREFULLY.**

1. This paper consists of THREE questions. 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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Answer ALL questions.

Write your answers in the spaces provided in this booklet.

Please begin Question 1 FIRST.

1. (a) You are provided with three unknown products labelled X, Y and Z, and the following materials:

- A. Iodine in potassium iodide solution (with dropper)
- B. Distilled water
- C. 3 white tiles
- D. 3 small plastic teaspoons labelled X, Y and Z
- E. Marker

- (i) You are required to carry out a qualitative food test on the unknown products.

**Procedure**

Step 1: Label the 3 tiles: X, Y and Z.

Step 2: Using the small plastic teaspoon labelled X, add approximately half of a teaspoon of Product X to the centre of the tile labelled X.

Step 3: Using the plastic spoon, add a small amount of distilled water to moisten the product on the tile.

Step 4: Use the plastic spoon to mix the product with the water into a paste.

Step 5: Record the colour of the paste in Table 1.

Step 6: Add 1–2 drops of the iodine in potassium iodide solution to the paste and note any colour changes. Write your observations in Table 1.

Step 7: Repeat Steps 2–6 using Product Y. Record your observations in Table 1.

Step 8: Repeat Steps 2–6 using Product Z. Record your observations in Table 1.

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TABLE 1: OBSERVATIONS OF FOOD TESTS

Product	Paste Colour	Colour Change
X		
Y		
Z		

[4 marks]

(ii) Based on your results, what deductions could be made about Products X, Y and Z?

X .....

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Y .....

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Z .....

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[3 marks]

(iii) Account for the colour change or changes observed.

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[1 mark]

(b) Figure 1 is a cross section of a root from a dicotyledonous plant.

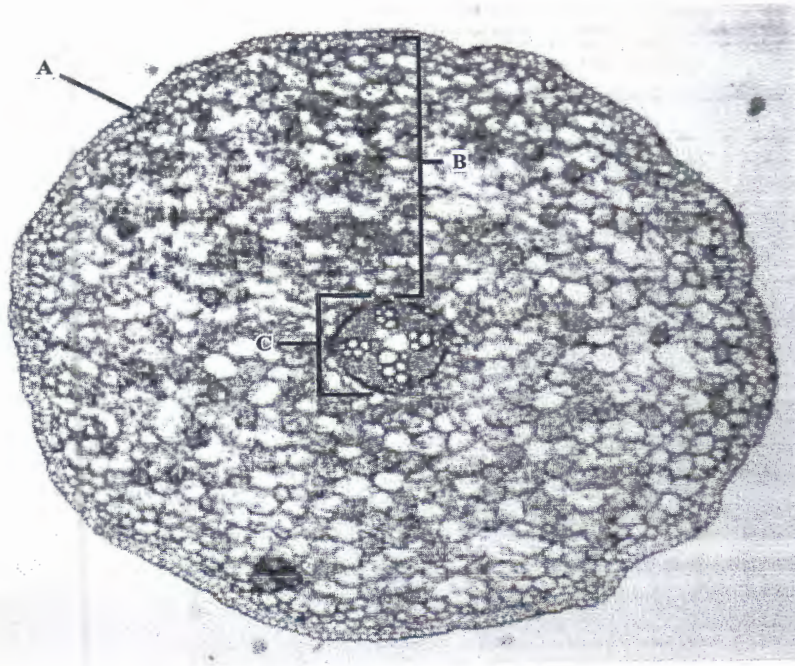


Figure 1. Cross section of a dicotyledonous root

Source: [http://biobook.nerinxhs.org/bb/special\\_topics/microscopy/plant anatomy/dicot\\_root\\_labeled.jpg](http://biobook.nerinxhs.org/bb/special_topics/microscopy/plant anatomy/dicot_root_labeled.jpg)

(i) Identify the tissues labelled A, B and C in Figure 1.

A: .....

B: .....

C: .....

[3 marks]

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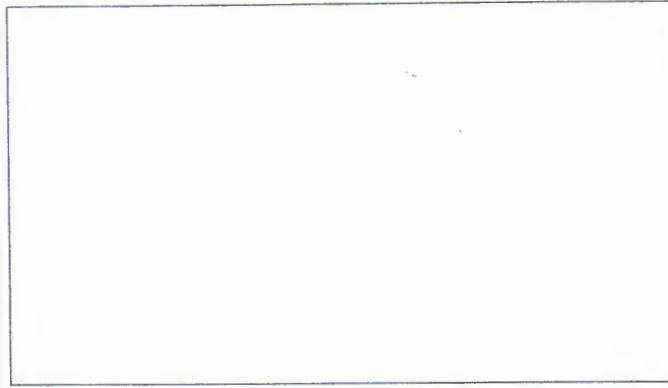
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(ii) In the box below, make a plan drawing of the structure labelled C in Figure 1.



**[5 marks]**

**Total 16 marks**

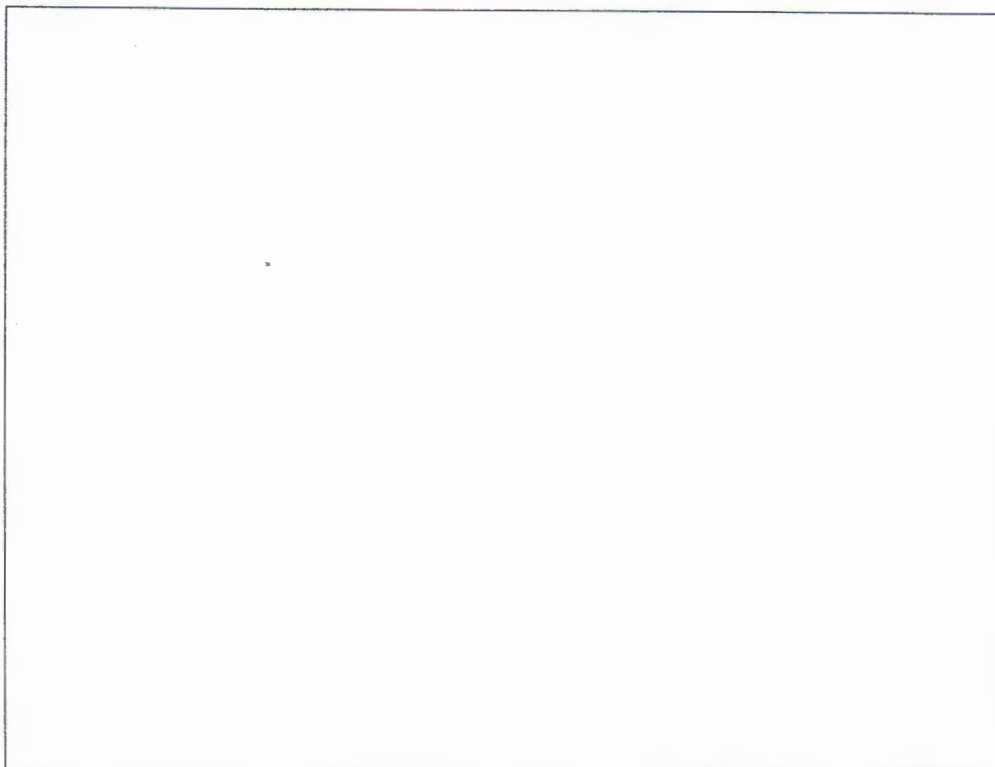
2. (a) You have been provided with plastic ties of three different colours and three different lengths.

(i) Use the plastic ties to construct a model which shows the structure of **bivalents for two chromosomes** of different lengths at the metaphase stage of **Meiosis I**.

For EACH chromosome, use TWO different colours of the same lengths to represent the parts of the bivalent from each member of a pair of homologous chromosomes. Use the third colour to represent centromeres. **[4 marks]**

(ii) In the box below, **arrange your bivalents as you would expect to see them at the metaphase stage of Meiosis I**.

Draw an outline of the arrangement in the box below. Label the colours of the bivalents. Remove the plastic ties.



**[2 marks]**

(iii) **In the box above**, draw the spindle fibres in relation to your bivalents, as they would be seen at Metaphase I. **[1 mark]**

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- (b) Table 2 provides data on percentage of antibiotic-resistant bacterium isolates from patients in relation to their history of antibiotics use. *Note: An isolate is a pure culture of a bacterial species.*

**TABLE 2: PERCENTAGE OF ANTIBIOTIC-RESISTANT BACTERIUM ISOLATES FROM PATIENTS**

Antibiotic	% Antibiotic-resistant Bacterium Isolates	
	Patients with no Prior Antibiotic Use	Patients with Prior Use of Same Type of Antibiotic
#1	9.5	21.7
#2	0.7	1.6
#3	5.7	22.4
#4	8.5	34.4
#5	0.6	8.7

*Data adapted from: <http://microbiology.mtsinai.on.ca/tibdn/data/relativerisk.asp>*

- (i) Study the data for patients with **no prior antibiotics use**, and compare resistance among bacterial isolates to the FIVE antibiotics (#1, #2, #3, #4, and #5). State your findings.

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[2 marks]

- (ii) Describe the effects of **prior use of an antibiotic** on the development of antibiotic resistance in the bacterium.

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[3 marks]

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(iii) Applying the theory of natural selection, explain why changes in antibiotic resistance can occur over time in the patient's bacterial population.

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[4 marks]

**Total 16 marks**

3. (a) Pollen tube length is measured in TWO cotton varieties after a 24-hour incubation period in petri dishes at different temperatures and the data is presented in Table 3.

TABLE 3: POLLEN TUBE LENGTH ( $\mu\text{m}$ ) FOR TWO COTTON VARIETIES

Temperature ( $^{\circ}\text{C}$ )	Pollen Tube Length ( $\mu\text{m}$ )	
	Variety #1	Variety #2
15	190	190
20	500	350
25	825	525
30	900	600
35	600	575
40	150	125

Adapted from: *Annals of Botany* 96: 59–67, 2005, doi:10.1093/aob/mci149

- (i) On the grid provided on page 13, plot the data in Table 3 as a line graph for each variety. [5 marks]
- (ii) Outline the changes in pollen tube growth as temperature increases for Variety #1.

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[2 marks]

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(iii) Comment on possible effects of temperature on fertilization in this species.

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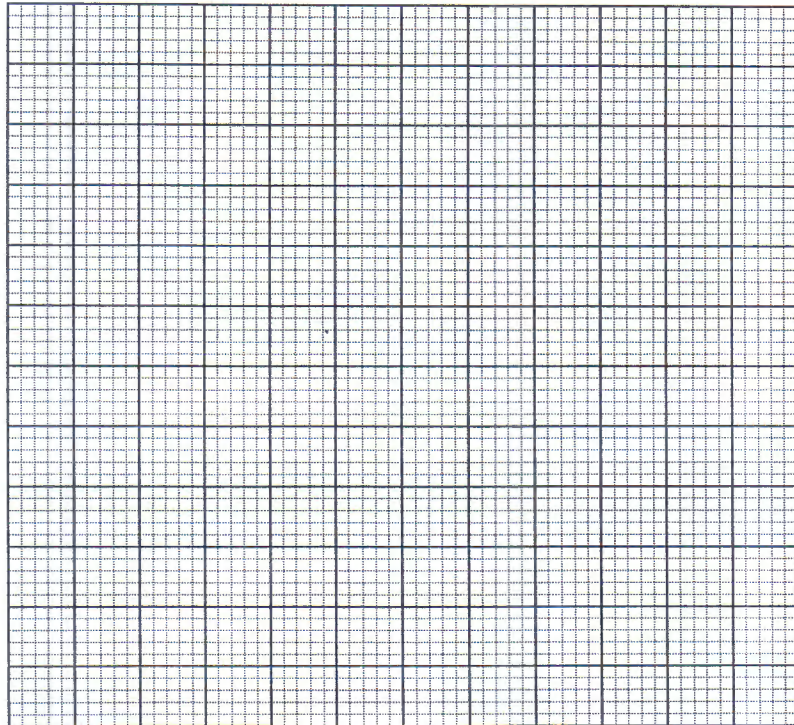
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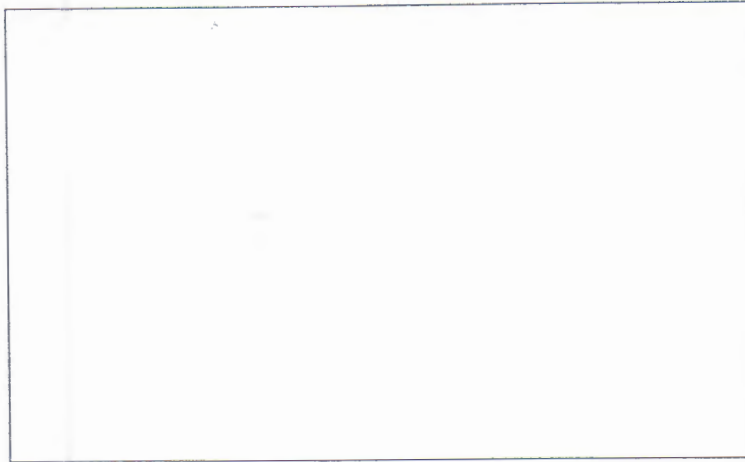
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[2 marks]



(b) Specimen A is a prepared slide of a cross section of a mammalian ovary.

(i) In the box below, make a detailed drawing of a section of Specimen A to show a Graafian follicle. On the drawing, label TWO features of this structure.



[5 marks]

(ii) Give a brief explanation of the mode of action of the contraceptive pill in relation to the function of the ovary.

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[2 marks]

Total 16 marks

END OF TEST

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

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