

FORM TP 2015148



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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) (i) You are required to conduct a simple experiment to investigate the effect of a solution on potato cells.

You are provided with the following:

- Potato strips
- Solution labelled S
- Distilled water
- Petri dishes labelled A, B and C
- Forceps
- Two measuring cylinders
- Centimetre ruler
- Paper towel
- Stop clock

Procedure

1. Place 20 ml of Solution S in the petri dish labelled A.
2. Place 10 ml of Solution S and 10 ml of distilled water in the petri dish labelled B.
3. Place 20 ml of distilled water in the petri dish labelled C.
4. Select two potato strips, and quickly and carefully blot them dry with the paper towel.
5. Measure the length of each strip to the nearest millimetre. Record your findings in Table 1.
6. Place both strips into the petri dish labelled A, noting the position of each strip.
7. Repeat the procedure for petri dishes B and C. *Ensure that the strips are completely covered by the solutions.*
8. Cover the petri dishes and leave for 30 minutes.
NOTE: Proceed to another question during this period.
9. After 30 minutes, remove the strips from Petri Dish A, quickly and carefully blot them dry with the paper towel and accurately measure their lengths. Record your findings in Table 1.
- 10 Repeat Procedure 9 for the potato strips in the other two petri dishes.

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TABLE 1: EFFECT OF SOLUTIONS ON POTATO STRIPS

Solution	Potato Strip	Initial Length (cm)	Final Length (cm)
Solution S (Petri Dish A)	Strip 1		
	Strip 2		
Solution S and distilled water (Petri Dish B)	Strip 1		
	Strip 2		
Distilled water (Petri Dish C)	Strip 1		
	Strip 2		

[3 marks]

- (ii) Describe the trend observed with increasing dilution of Solution S, as recorded in Table 1.

.....
.....
.....
.....

[2 marks]

- (iii) With reference to the key processes involved, account for the results obtained.

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.....
.....

[3 marks]

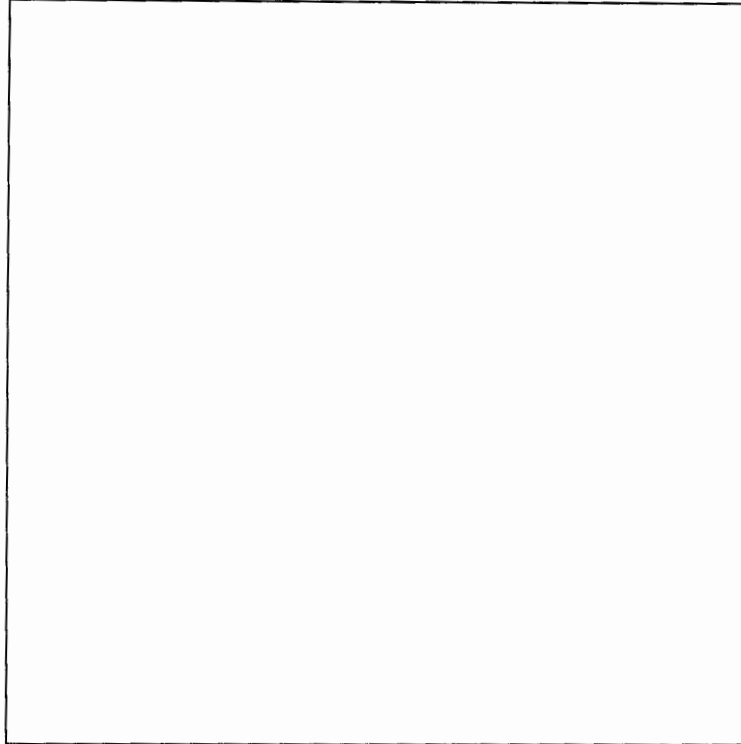
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(b) Specimen A is a slide of a stained, transverse section of a dicotyledonous root. Examine the specimen using the low power objective of a compound microscope.

(i) In Box A, make a labelled, plan drawing of the section.

Box A



[7 marks]

(ii) State the purpose of doing a plan drawing of a cross section of an organ compared to doing a detailed drawing.

.....
.....

[1 mark]

Total 16 marks

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2. (a) Figure 1 is a series of photomicrographs of onion root tip cells showing key stages of mitosis.

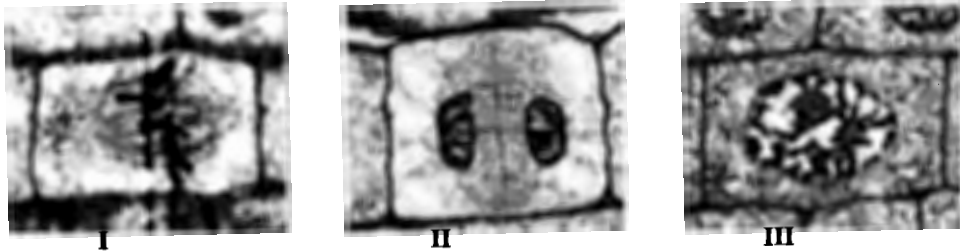


Figure 1. Stages of mitosis

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

- (i) Identify the stages of mitosis labelled I, II and III, and for EACH stage, state ONE observable feature which justifies your answer.

Stage I:

Feature:

Stage II:

Feature:

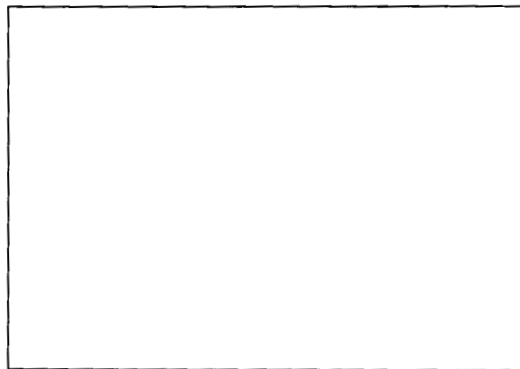
Stage III:

Feature:

[6 marks]

- (ii) In Box B, sketch the next stage of mitosis which develops after Stage I in Figure 1.

Box B



[2 marks]



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- (b) Red-green colour blindness is inherited as a sex-linked recessive trait. A colour-blind woman marries a man who has normal vision.
- (i) Demonstrate, using a genetic diagram, the expected genotypes of their children with respect to colour blindness. For EACH genotype, state the phenotypic condition.

[7 marks]

- (ii) If the couple has one child, what is the probability of this child having normal vision?

Probability: [1 mark]

Total 16 marks

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3. (a) Figure 2 is a photomicrograph of a transverse section of a lily anther.

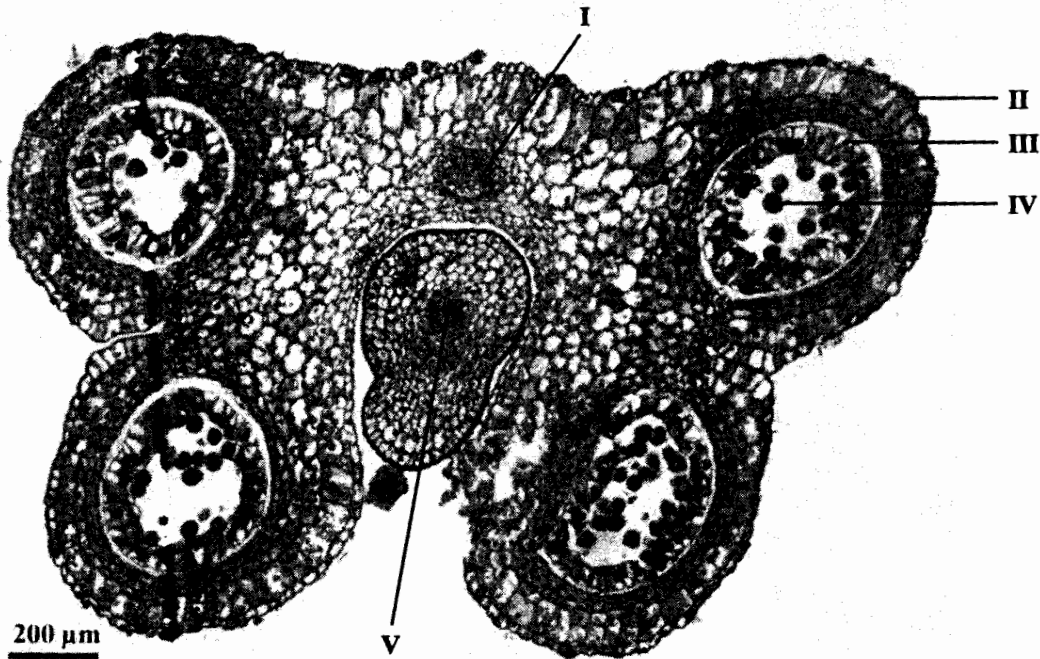


Figure 2. Transverse section of a lily anther

Source: <http://www.vcbio.science.ru.nl/en/image-gallery/>

- (i) Identify the structures labelled I, II, III, IV and V.

I:

II:

III:

IV:

V:

[5 marks]

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- (ii) Using the scale provided in Figure 2, calculate the actual size of the structure labelled IV. **Show your calculations.**

Actual size of IV
[2 marks]

- (iii) On Figure 2, use an arrow labelled Y to indicate a point on the anther wall where dehiscence will occur.
[1 mark]



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- (b) Table 2 presents data from a study on the effects of maternal smoking on human foetal growth. The birth weights of 417 infants, born to mothers who smoked during pregnancy, were recorded.

TABLE 2: BIRTH WEIGHTS AND NUMBER OF CIGARETTES SMOKED BY MOTHERS

Number of Cigarettes Smoked per day	Infant Birth Weight (kg)
0	3.22
1-4	3.19
5-9	3.11
10-19	3.02
20-39	3.02
40+	2.95

Adapted from: J PEDIATR 1994; 124:757-64

- (i) On the grid provided on page 11, construct a bar graph to illustrate the data in Table 2. **[4 marks]**
- (ii) Based on the data given, describe the relationship between maternal smoking and foetal growth.
-
-
-
- [2 marks]**
- (iii) Comment on one effect of nicotine, found in cigarette smoke, on the developing foetus.
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-
-
- [2 marks]**

Total 16 marks

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