

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN ADVANCED PROFICIENCY EXAMINATION®

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Front Page Bar Code

18 MAY 2018 (p.m.)

FILL IN ALL THE INFORMATION REQUESTED CLEARLY IN CAPITAL LETTERS.

TEST CODE

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SUBJECT BIOLOGY – UNIT 1 – Paper 02

PROFICIENCY ADVANCED

REGISTRATION NUMBER

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SCHOOL/CENTRE NUMBER

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NAME OF SCHOOL/CENTRE

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CANDIDATE’S FULL NAME (FIRST, MIDDLE, LAST)

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“*”Barcode Area”
Current Bar Code

DATE OF BIRTH

	D		D		M		M		Y		Y		Y		Y
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SIGNATURE _____

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FORM TP 2018153



TEST CODE **02107020**

MAY/JUNE 2018

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

C A R I B B E A N A D V A N C E D P R O F I C I E N C Y E X A M I N A T I O N [®]

B I O L O G Y

UNIT 1 – 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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02107020/CAPE 2018

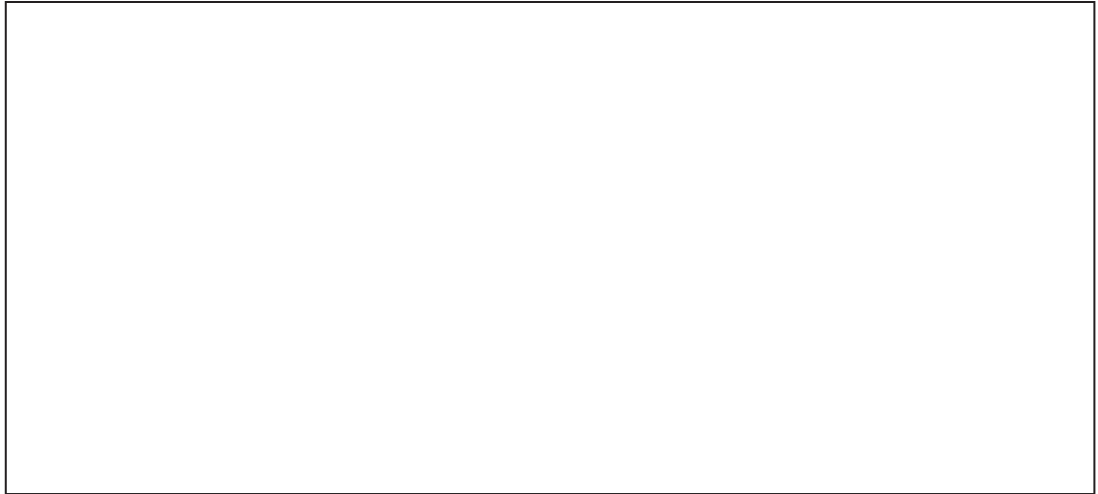
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SECTION A

Answer ALL questions.

Write your answers in the spaces provided in this booklet.

1. (a) In the space below, draw AND label the chemical structure of a typical phospholipid molecule, clearly indicating its THREE major components. Label the hydrophilic and hydrophobic parts of the molecule.



[4 marks]

- (b) Describe how phospholipids are oriented to form the lipid bilayer of cellular membranes.

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[3 marks]

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2. (a) Seed type in pea plants is determined by a single gene with round seed, R, dominant to wrinkled seed, r. Three pairs of homologous chromosomes are depicted in Figure 2, with the gene locus for seed type indicated by X.

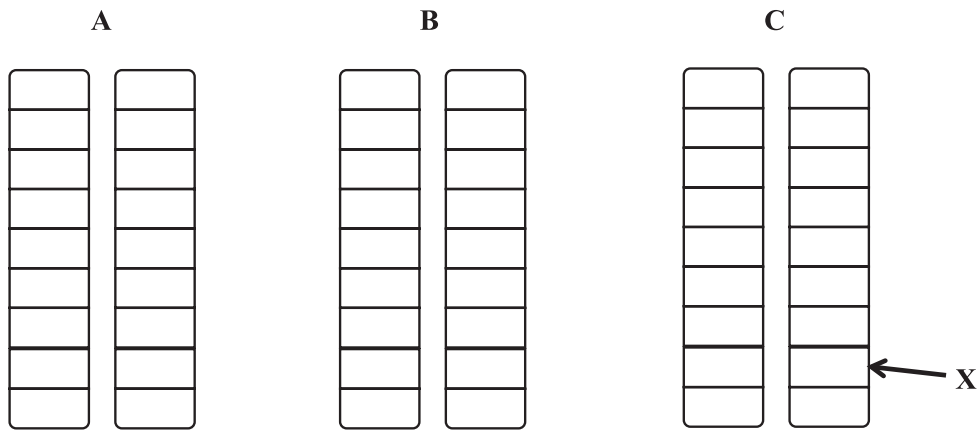


Figure 2. Diagram depicting three pairs of homologous chromosomes

- (i) In Figure 2, insert the appropriate alleles which correspond to the phenotypes of A, B and C given the following characteristics:

- A – homozygous round-seeded variety
- B – homozygous wrinkle-seeded variety
- C – heterozygous variety.

[3 marks]

- (ii) Draw a Punnett square in the following box to illustrate a test cross involving a pea variety which is heterozygous for seed type. State the ratio of the phenotypes for the offspring.

Ratio of phenotypes:	
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[3 marks]

- (iii) Distinguish between 'a gene' and 'an allele'.

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[2 marks]

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- (b) A micrograph of pressed onion root meristem cells is reproduced in Figure 3, with a scale bar of 10 μm given in the lower left corner.

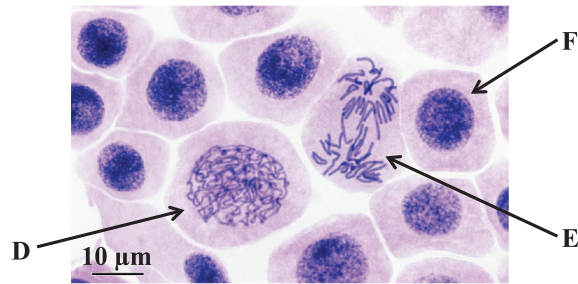


Figure 3. Micrograph of pressed onion root meristem cells

Source: Doc. RNDr. Josef Reischig, CSc. (Author's archive) [CC BY-SA 3.0 (<http://creativecommons.org/licenses/by-sa/3.0>)], via Wikimedia Commons

- (i) Make a scaled drawing of the cells labelled D, E and F in Figure 3. Show the magnification of the drawing.

Magnification

[4 marks]

(ii) Identify the cell cycle stages displayed in cells D, E and F in Figure 3.

D.....

E.....

F.....

[3 marks]

Total 15 marks

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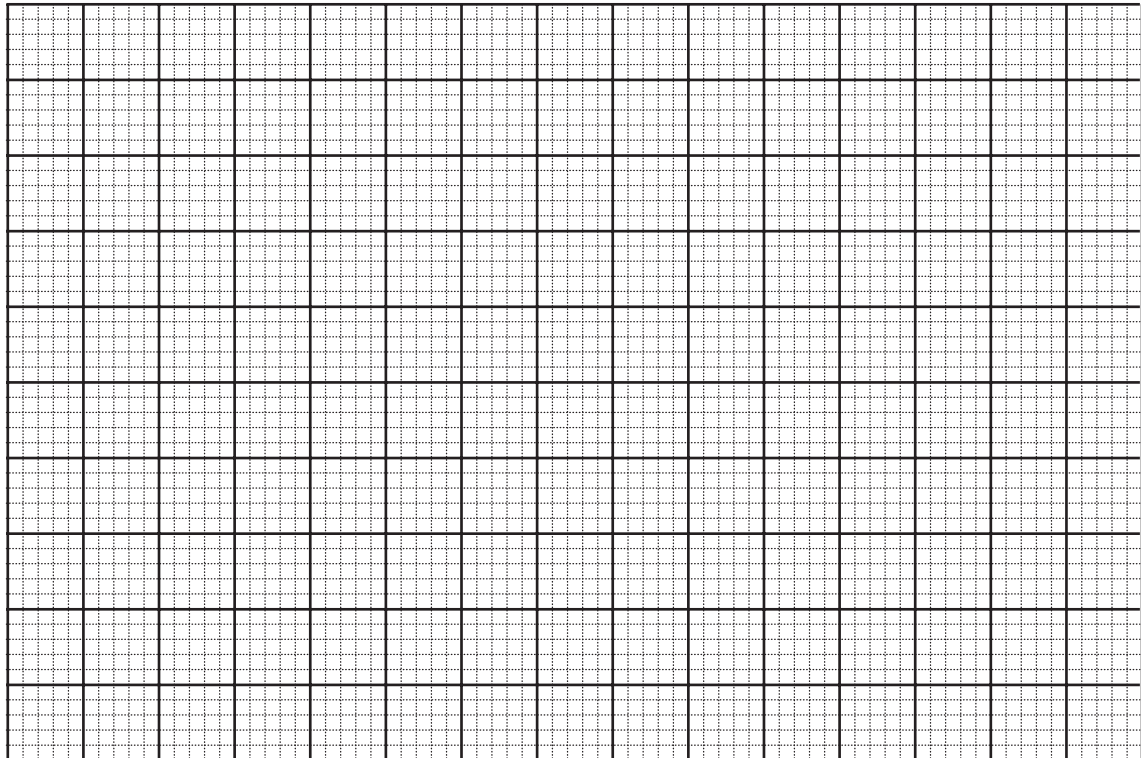
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3. (a) Dental amalgam fillings are composed of approximately 50% metallic mercury. Mercury is a toxin and has been linked to neurodevelopmental disorders in babies. Table 1 shows the relationship between mercury fillings and the concentration of mercury in the blood.

TABLE 1: NUMBER OF MATERNAL AMALGAM FILLINGS AND CONCENTRATION OF MERCURY IN MATERNAL AND FOETAL BLOOD

Number of Maternal Amalgam Fillings	Mercury Concentration (ug/L)	
	Maternal Blood	Foetal Blood
2	9	15
4	20	26
9	63	76

- (i) On the grid provided below, draw a bar chart to compare the concentration of mercury in maternal and foetal blood with the number of maternal amalgam fillings. **[3 marks]**



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- (c) (ii) State the significance of double fertilization to the human diet.

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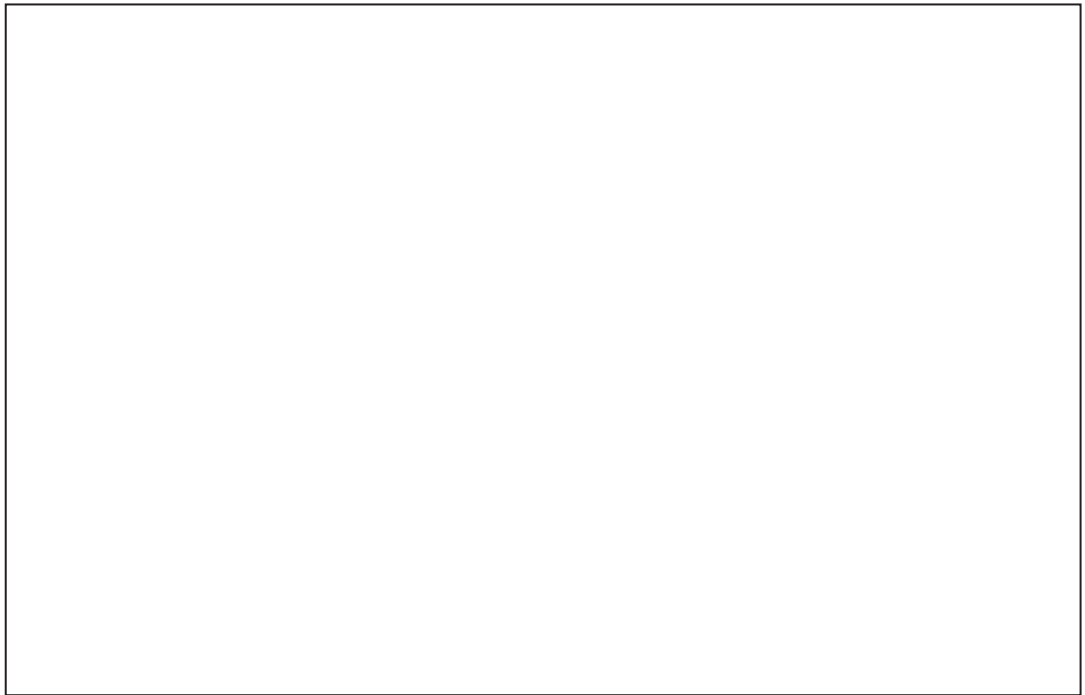
[2 marks]

Total 15 marks

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5. (a) With the aid of a diagram, explain how the information stored in a gene is used to synthesize RNA.



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- (b) Complete Table 2 by comparing the structure and function of the following FOUR features in a human sperm cell with those of a secondary oocyte.

TABLE 2: COMPARISON OF HUMAN SPERM CELL AND SECONDARY OOCYTE

Feature	Structure and Function of Human Sperm Cell	Structure and Function of Human Secondary Oocyte
Overall structure and size		
Nucleus		

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Cell membrane		
Mitochondria		

[8 marks]

Total 15 marks

END OF TEST

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

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CANDIDATE'S RECEIPT

INSTRUCTIONS TO CANDIDATE:

1. **Fill in all the information requested clearly in capital letters.**

TEST CODE:

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SUBJECT: BIOLOGY – UNIT 1 – Paper 02

PROFICIENCY: ADVANCED

REGISTRATION NUMBER:

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FULL NAME: _____
(BLOCK LETTERS)

Signature: _____

Date: _____

2. **Ensure that this slip is detached by the Supervisor or Invigilator and given to you when you hand in this booklet.**
3. **Keep it in a safe place until you have received your results.**
-

INSTRUCTION TO SUPERVISOR/INVIGILATOR:

Sign the declaration below, detach this slip and hand it to the candidate as his/her receipt for this booklet collected by you.

I hereby acknowledge receipt of the candidate's booklet for the examination stated above.

Signature: _____
Supervisor/Invigilator

Date: _____