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BIOLOGY

PAPER 3 3009/3

Wednesday **20 MAY 2020** 12:30 P.M.–2:00 P.M.

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS AND INFORMATION FOR CANDIDATES

Do not open this booklet until you are told to do so.

Write your school number, candidate number, surname and initials in the spaces provided above.

Answer **ALL** questions in Section A in the space provided.

Answer **TWO** out of **THREE** questions in **Section B** in the spaces in this question booklet. Candidates are advised to spend no more than **35** minutes on **Section A**.

The mark for each part question is given in brackets [].

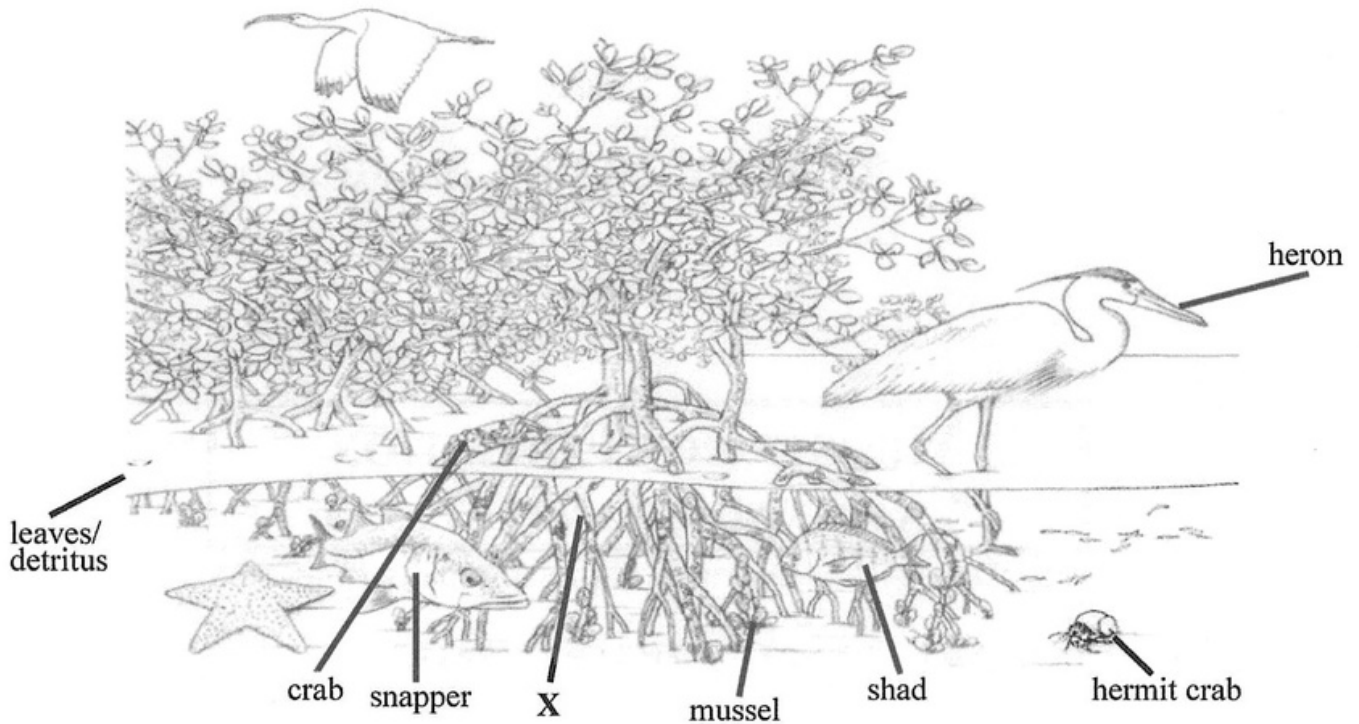
Calculators are permitted however **NO** graphing calculators are allowed.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
TOTAL	

This question paper consists of 20 printed pages.

SECTION A

1. The diagram shows a mangrove ecosystem found in The Bahamas. Diagram not drawn to scale.



- (a) (i) Name the type of mangrove shown in the picture.
_____ [1]
- (ii) State the name of structure X. _____ [1]
- (iii) State **ONE** way in which structure X aids in the survival of mangroves.

_____ [1]
- (b) From the diagram write a food chain with **FOUR trophic** levels.

- (c) Hurricanes and diseases are two natural threats to this ecosystem. Describe the effects of **ONE** of these threats on this ecosystem.

[3]

- (d) Describe **TWO** actions taken by The Bahamian government in an attempt to conserve this ecosystem.

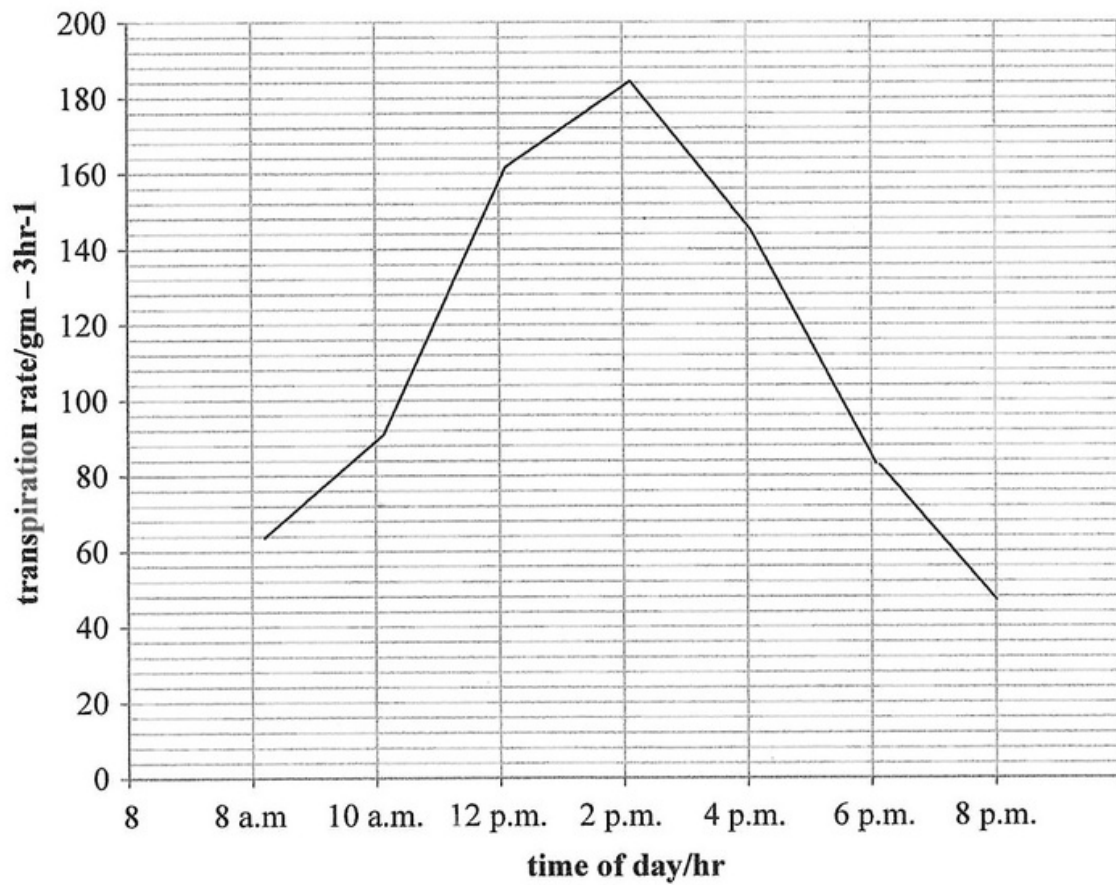
[2]

TOTAL MARKS [10]



2. A student set up an experiment to measure the rate of transpiration in a green plant.

The graph below shows the data obtained from the experiment.



- (a) State the definition of transpiration.

_____ [1]

- (b) Name **ONE** instrument used to measure transpiration rate.

_____ [1]

- (c) Name the structure in the leaf that allows transpiration to occur.

_____ [1]

- (d) Calculate the change in transpiration rate between 8 a.m. and 2 p.m.



- (e) The student measured the humidity of the air during the experiment. She found that the humidity increased between 4 p.m. and 8 p.m. Describe how this could help to explain the results shown on the graph.

[2]

- (f) State **ONE** environmental factor, other than humidity, that could be responsible for the change in transpiration rate from 8 a.m. to 2 p.m.

Explain your choice.

environmental factor _____

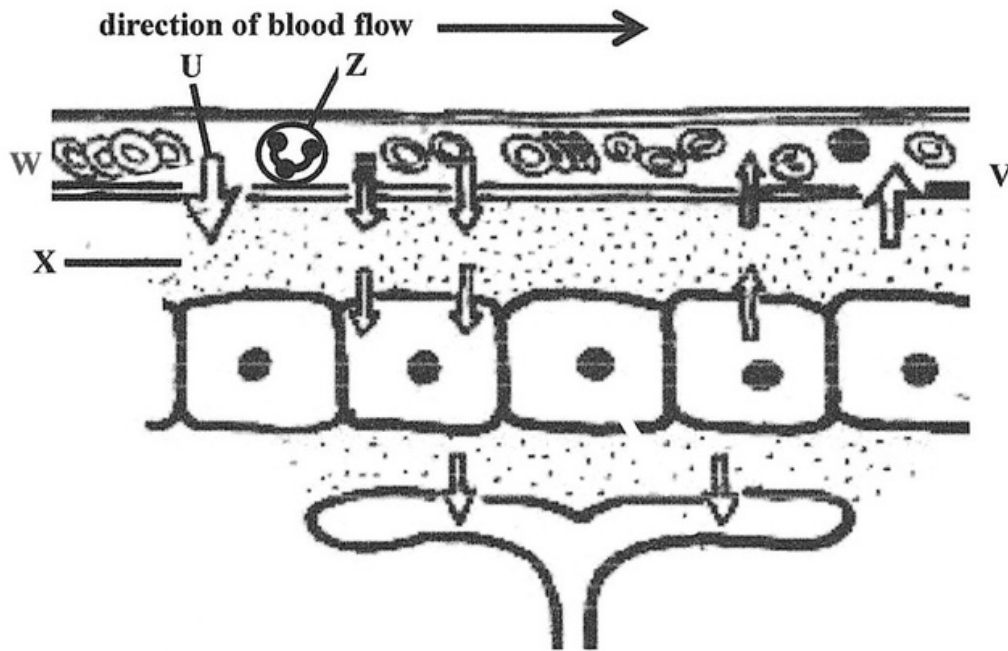
explanation _____

[3]

TOTAL MARKS [10]



3. The diagram shows the exchange of substances between a blood capillary and body tissues.



- (a) State **TWO** ways in which a capillary is adapted for its function.

[2]

- (b) Substances are constantly being exchanged between the blood and body cells.

- (i) Name **TWO** useful substances which leave the blood at arrow U.

1 _____

2 _____ [2]

- (ii) Identify **ONE** substance found in higher concentration in the blood at V than at W.

_____ [1]



- (c) (i) Name the liquid labelled **X**.
_____ [1]
- (ii) On the diagram, draw a line showing where excess liquid **X** drains and collects and label it **Y**. [1]
- (d) State the name of the cell labelled **Z** and describe its role in the immune response.
name _____ [1]
role _____

_____ [2]

TOTAL MARKS [10]

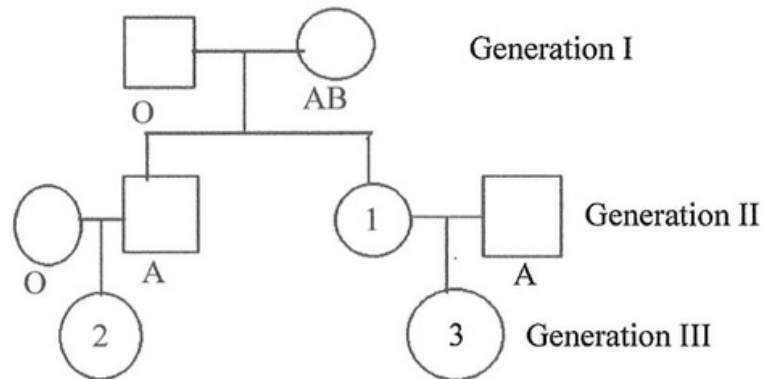
4. The inheritance of the ABO blood groups involves co-dominance.

- (a) Explain the meaning of co-dominance.

_____ [1]
- (b) (i) State the meaning of heterozygous.

_____ [1]
- (ii) State the **THREE** possible heterozygous genotypes in the ABO blood groups.
_____ [1]

- (c) The diagram shows a pedigree chart for the inheritance of blood groups over three generations in a family.



- (i) Use a Punnett square diagram to show the possible genotypes for the offspring of generation I parents.

[3]

- (ii) What chance is there of generation I parents having a child with blood group A?

[1]

- (iii) Individual 1 in generation II has child 3 with blood group B. Suggest the genotype for individual 1.

[1]

- (d) State the blood group known as the universal donor and explain what the term universal donor means.

blood group _____

Explanation _____

[2]

TOTAL MARKS [10]



SECTION B

Answer **TWO** of three questions in the spaces in this question booklet.

5. This question refers to the process of photosynthesis and the use of new technologies in crop farming.
- (a) Write the balanced chemical equation for photosynthesis. [3]
 - (b) Describe how plants obtain and transport the following substances.
 - (i) carbon dioxide [3]
 - (ii) water [3]
 - (c) Give an example of **ONE** mineral ion needed by plants for photosynthesis and state why this mineral is needed. [2]
 - (d) Hydroponics and tissue culture are both techniques used in modern day crop farming.
 - (i) Describe what is meant by ‘hydroponics’ and ‘tissue culture.’ [4]
 - (ii) What are **THREE** advantages and **TWO** disadvantages of using hydroponics and/or tissue culture over traditional methods of crop production? [5]

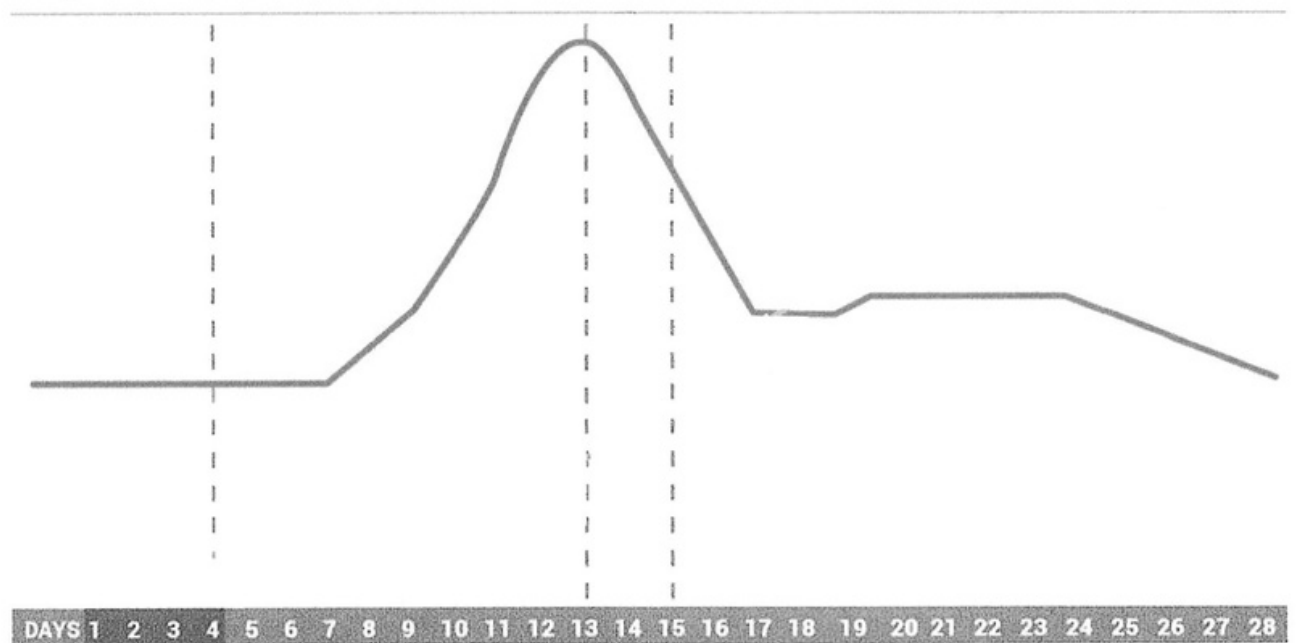
TOTAL MARKS [20]

6. Hormones play a key role in the reproductive cycles of females.

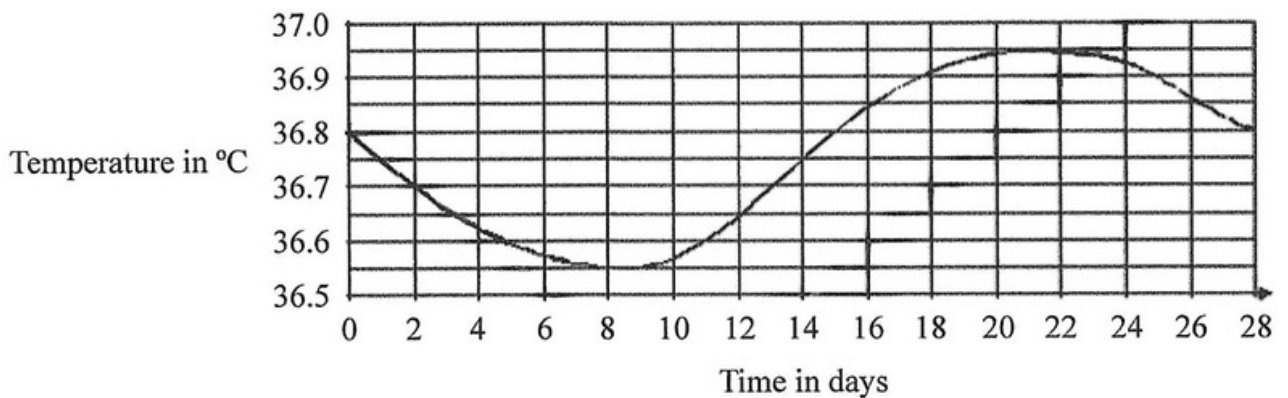
- (a) One hormone is FSH. State the site of FSH production, site where this hormone action occurs and the function of FSH. [3]
- (b) Hormone X is produced in the ovary, in women. The concentration of hormone X was measured in the blood of a female each day during her menstrual cycle. Temperature changes in her body were also measured.

The graphs below show changes in hormone concentration and changes in body temperature.

Graph showing changes in hormone concentration



Graph showing changes in body temperature



- (i) State the name of the hormone being studied in the investigation and give **TWO** reasons for your choice. [3]
 - (ii) Describe the relationship between hormone **X** and the changes in body temperature. [1]
 - (iii) Name another hormone, not previously referred to in this question, and state its function in the menstrual cycle. [2]
- (c) In vitro fertilisation (IVF) is a form of infertility treatment.
- (i) Outline the steps involved in the process of IVF. [4]
 - (ii) Why is it more likely that women receiving IVF have multiple births? [2]
- (d) Hormones are also used in oral contraceptives.

List **TWO** advantages and **THREE** disadvantages of using hormones to control fertility in females. [5]

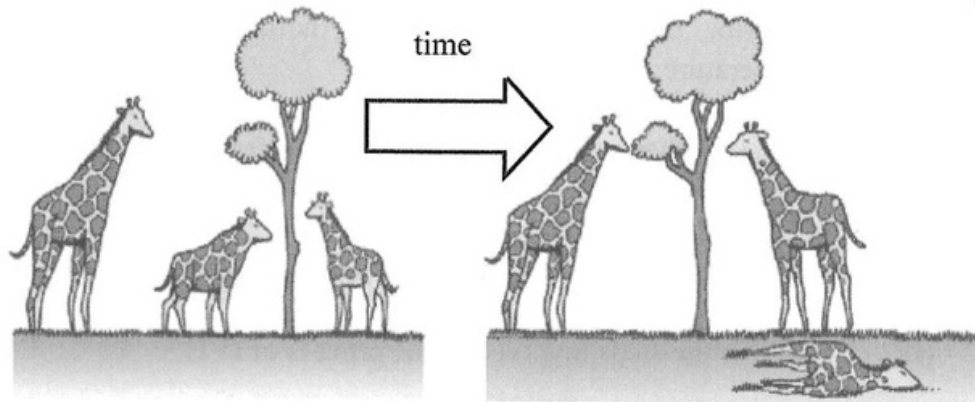
TOTAL MARKS [20]

7. The process of natural selection is a result of variation which can be caused by mutation.

- (a)
 - (i) Define the term mutation. [2]
 - (ii) State **TWO** factors which can increase the rate of mutation. [2]
- (b) Down's syndrome is an example of a disease resulting from chromosomal mutation.

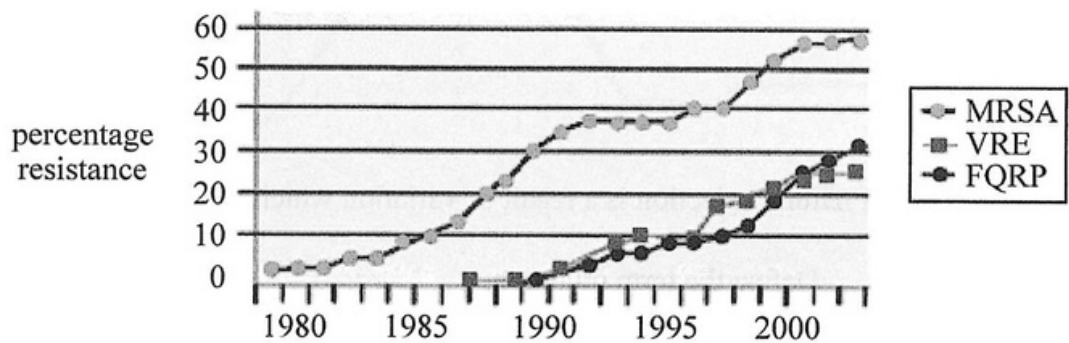
Explain in detail how chromosomes in a person with Down's syndrome compare to those of people without Down's syndrome. [3]

- (c) (i) Using the pictures below, outline the steps involved in the process of evolution by natural selection. [5]



- (ii) Explain how artificial selection differs from natural selection. [2]

- (d) The graph below shows resistance rates of three types of bacteria to three different antibiotics. [5]



Source: Centres for Disease Control and Prevention

MRSA = Methicillin-resistant *Staphylococcus Aureus*
VRE = Vancomycin-resistant Enterococci
FQRP = Floroquinolone-resistant *Pseudomonas aeruginosa*

- (i) Describe any trends shown by the graph between the years 1980 to 2000. [2]
- (ii) Explain how natural selection can cause the development of a population of bacteria resistant to an antibiotic. [4]

TOTAL MARKS [20]



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