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BIOLOGY

PAPER 3 3009/3

Friday **11 JUNE 2021** 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 the 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. Green plants manufacture biological molecules such as amino acids and sucrose from the products of photosynthesis. These molecules are transported around the plant to where they are needed by the process of translocation.

(a) (i) Write the balanced chemical equation for the process of photosynthesis.

[3]

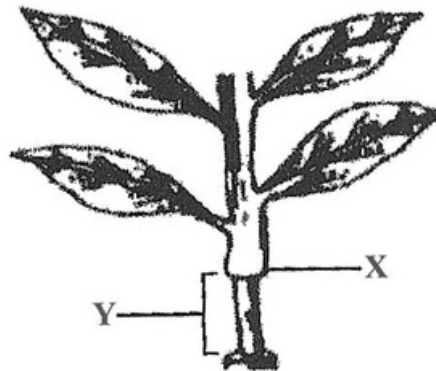
(ii) State the name of **one** raw material needed for photosynthesis and describe how the plant obtains this raw material.

raw material _____

description _____

_____ [3]

- (b) The diagram shows a ringing experiment carried out on a green plant to investigate what happens when translocation is prevented from occurring across region Y. Ringing involves removal of the outer layers of the stem within a narrow strip, to form a complete ring.



(i) Ringing prevents translocation by removing a specific tissue from the stem.

Name this tissue.

_____ [1]



- (ii) Suggest **one** visible change that will occur at point **X** on the plant stem.

_____ [1]

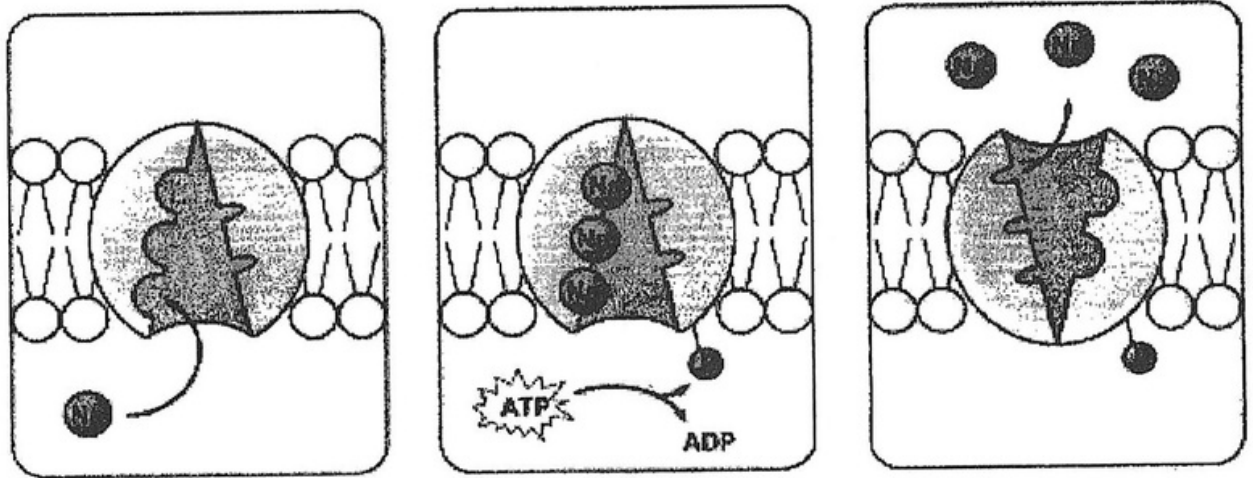
- (iii) Explain why this change happens at **X**.

_____ [2]

TOTAL MARKS [10]



2. The diagrams show the sequence of events in the process by which sodium ions (Na^+) move **out** of an animal cell across the cell membrane.



Key Na^+

- (a) On **one** of the diagrams, draw a line to each of the structures stated in (i), (ii) and (iii). Label each line using the letter indicated.

- (i) phospholipid bilayer ----- **P** [1]
 (ii) transport protein ----- **Q** [1]
 (iii) cytoplasm ----- **R** [1]

- (b) State the meaning of the term bilayer when referring to phospholipids in the cell membrane.

 _____ [1]

- (c) State the name of the process by which sodium ions move out of the animal cell and explain your choice.

name of process _____

explanation _____

_____ [3]



- (d) Compare active transport with osmosis.

[3]

TOTAL MARKS [10]

[5]

5/10/2020



[1]

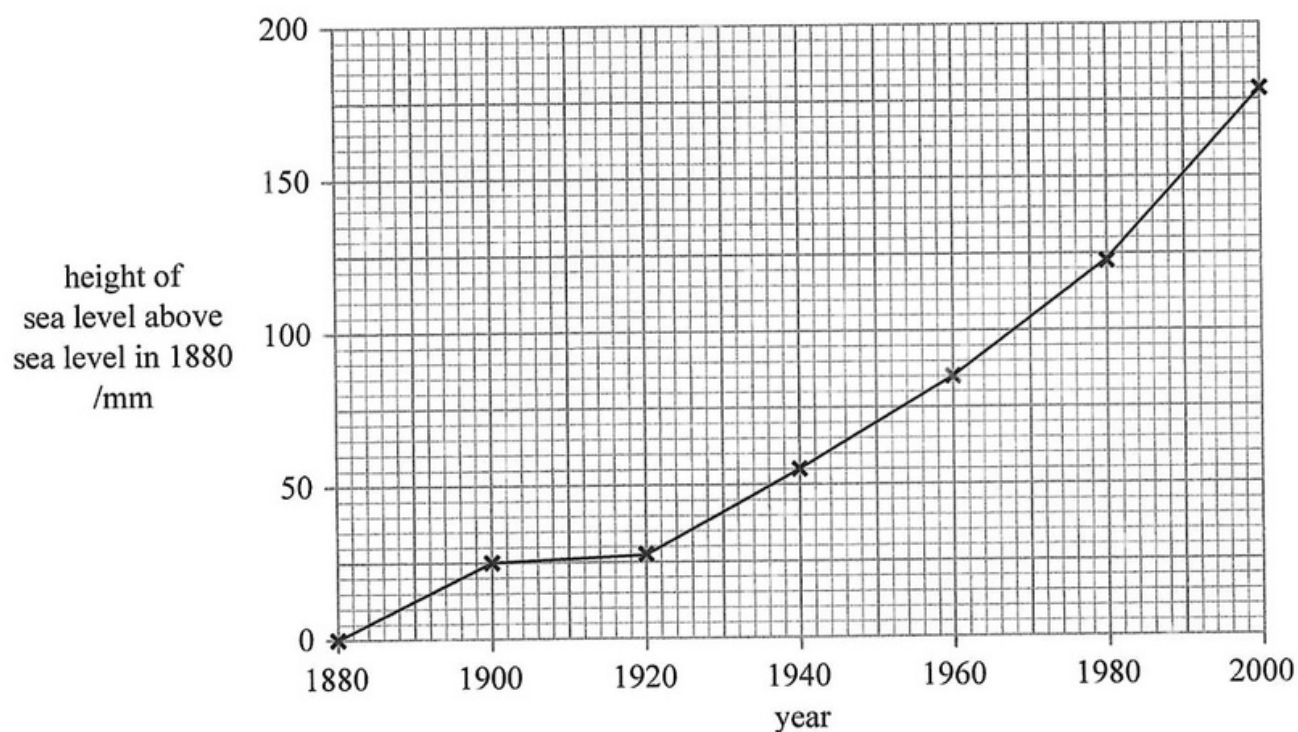
[Turn over

3. A current environmental problem is that of global warming resulting from the greenhouse effect.

(a) State the meaning of the term global warming **and** explain how global warming occurs.

[3]

(b) The graph shows changes to sea level around the coast of Greenland from 1880 to 2000.



(i) Describe the pattern of change in sea level shown by the graph.

[2]

(ii) During which 20-year period did the greatest increase in sea level occur?

[1]



- (iii) Explain how global warming affects sea level.

[1]

- (c) Explain how global warming can affect plant and animal species.

[3]

TOTAL MARKS [10]

4. Stem cells are considered to be a potential treatment for many human diseases.

(a) Explain the meaning of the term stem cell.

[2]

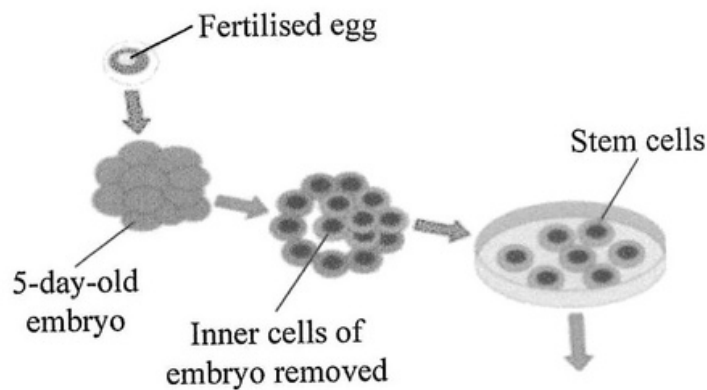
(b) (i) Name **one** disease that has the potential to be treated using stem cells.

[1]

(ii) Suggest **two** advantages of treating some diseases with stem cells.

[2]

(c) The diagram shows one method by which stem cells can be produced.



(i) Name the method shown in the diagram.

[1]



- (ii) Suggest **two** reasons why many people are against this method of stem cell production.

1. _____

_____ [1]

2. _____

_____ [1]

- (d) Biotechnology can also be used to produce genetically modified foods (GMFs).

Describe **two** advantages of genetically modified foods.

_____ [2]

TOTAL MARKS [10]



SECTION B

Answer any **TWO** questions.

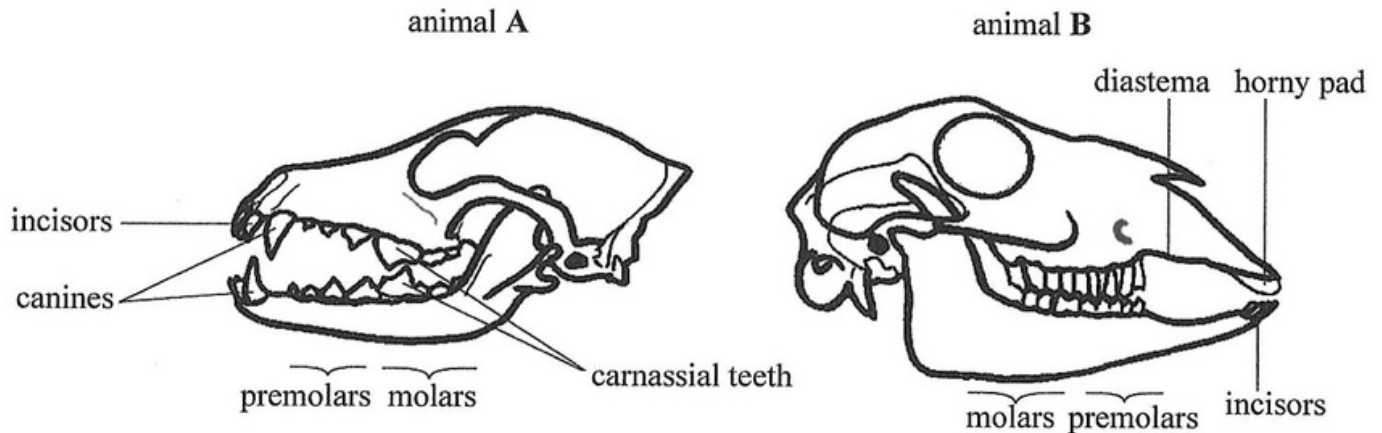
5. Environmental groups in The Bahamas are concerned about the impact of various forms of pollution on the local environment.
- (a) Distinguish between biodegradable and non-biodegradable pollutants and give **one** example of each type. [4]
 - (b)
 - (i) Describe **two** ways in which plastic is causing harm to the local marine organisms. [2]
 - (ii) State **two** ways in which the Bahamian government is trying to control pollution from plastics. [2]
 - (c) The devastation caused by hurricanes in The Bahamas often causes wetlands to become polluted with raw sewage and crude oil.
 - (i) Explain how pollution with raw sewage leads to eutrophication and explain the consequences of eutrophication for wetland ecosystems. [5]
 - (ii) Eutrophication is one way in which raw sewage can cause problems.

State **three other ways** in which raw sewage can cause problems to tourists and local inhabitants living on the islands. [3]
 - (iii) Describe **four** effects that pollution with crude oil could have on nesting coastal birds and their habitat. [4]

TOTAL MARKS [20]



6. The dentition of many animals is directly linked to their type of nutrition. The diagram shows the dentition of two animals, animal A and animal B.



- (a) (i) State the type of nutrition for animal A and explain **two** reasons for your choice. [3]
- (ii) State the type of nutrition for animal B and explain **two** reasons for your choice. [3]
- (iii) Give **two** differences between the dentition of animal A and that of a human. [2]
- (b) For many years biotechnology has harnessed the use of helpful microbes in the food and drug industry.

A student found the following information on the internet on how to make homemade yoghurt. Listed below are the steps to make homemade yoghurt.

1. Heat milk in saucepan to 80 °C.
2. Allow warmed milk to cool back to about 46 °C.
3. Add *Lactobacillus* culture to milk and leave in a warm place for at least 8 hours.
4. Pour the yoghurt in a sterile container and place in the refrigerator.

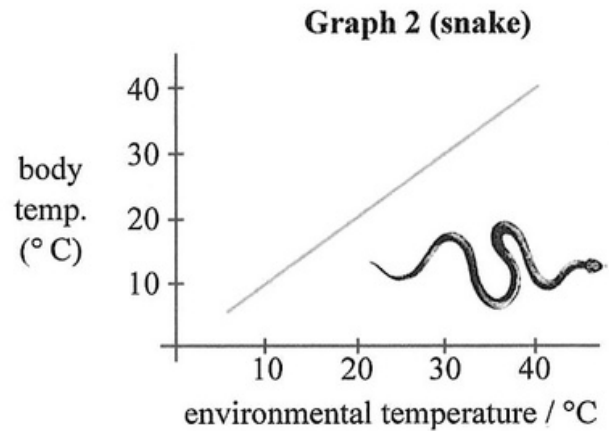
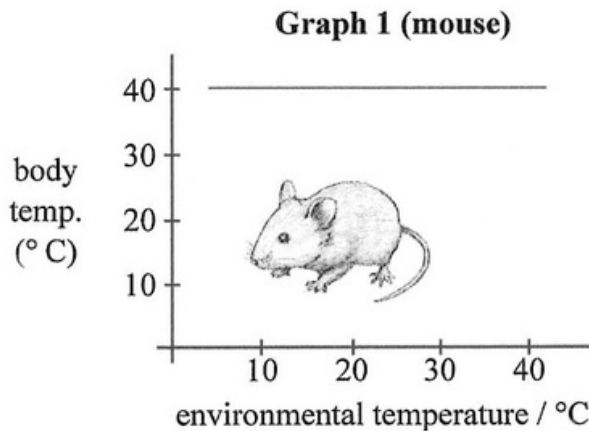
- (i) State the reasons for carrying out steps 1, 2 and 4 in the process. [3]
- (ii) Outline the role of the *Lactobacillus* in step 3 of the process. [4]
- (c) Describe **three** different ways in which microbes provide benefits to humans and **two** different ways in which they cause harm to humans. [5]

TOTAL MARKS [20]

[Turn over]

7. This question refers to temperature regulation in organisms.

The graphs show the body temperatures recorded when a mouse (graph 1) and a snake (graph 2) were subject to changes in outside temperatures.



- (a) (i) State the term used to describe the method of temperature regulation in each of these organisms. Explain your choice using evidence shown on the graphs. [4]
- (ii) Describe **three** adaptations of mice that enable them to survive when the environmental temperature is high. [3]
- (iii) Suggest **two** ways in which snakes survive when the environmental temperature is low. [2]
- (b) In humans the response to changes in environmental temperature is an involuntary action using negative feedback in order to maintain homeostatic balance.
- Explain the meaning of the terms involuntary action and homeostatic balance. [2]
- (c) (i) Name **three** structures found in the skin involved in temperature regulation. For each structure named, describe how it responds to a **drop** in environmental temperature. [6]
- (ii) Explain why these changes described in (c) (ii) are examples of negative feedback. [3]

TOTAL MARKS [20]



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