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BIOLOGY

PAPER 3 3009/3

Thursday

22 MAY 2025

12:30 p.m.–2:00 p.m.
(1 hr. 30 mins.)

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. Candidates are advised to spend no more than **35 minutes** on **Section A**.

Answer **TWO** out of **THREE** questions in **Section B**, the answer lines are provided at the end of the Question Paper.

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

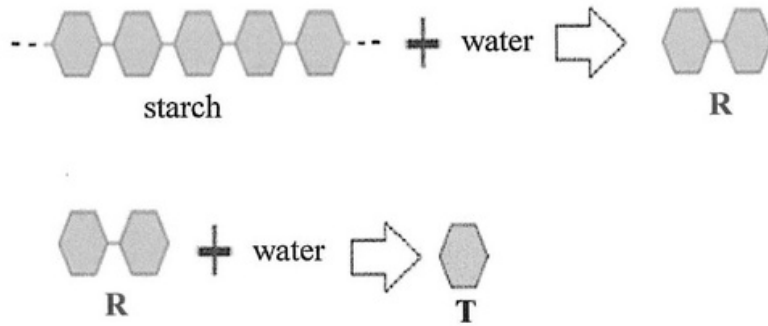
Calculators are permitted. However, **NO** graphing calculators are allowed.

For Examiner's Use	
1	
2	
3	
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7	
TOTAL	

This question paper consists of 22 printed pages and 2 blank pages.

SECTION A

1. The diagram below shows a chemical process acting on a molecule of starch.



- (a) Explain the process occurring in the diagram above.

_____ [2]

- (b) Name the molecules labelled **R** and **T**.

R: _____ [1]

T: _____ [1]

- (c) State the name of an enzyme that is used in the reaction that changes **R** into **T**.

_____ [1]

- (d) Starch is one type of carbohydrate.

Name another type of carbohydrate found in the walls of plant cells and state its function.

type of carbohydrate _____ [1]

function _____ [1]



- (e) Explain why sugars are more easily transported around the body than starches.

[2]

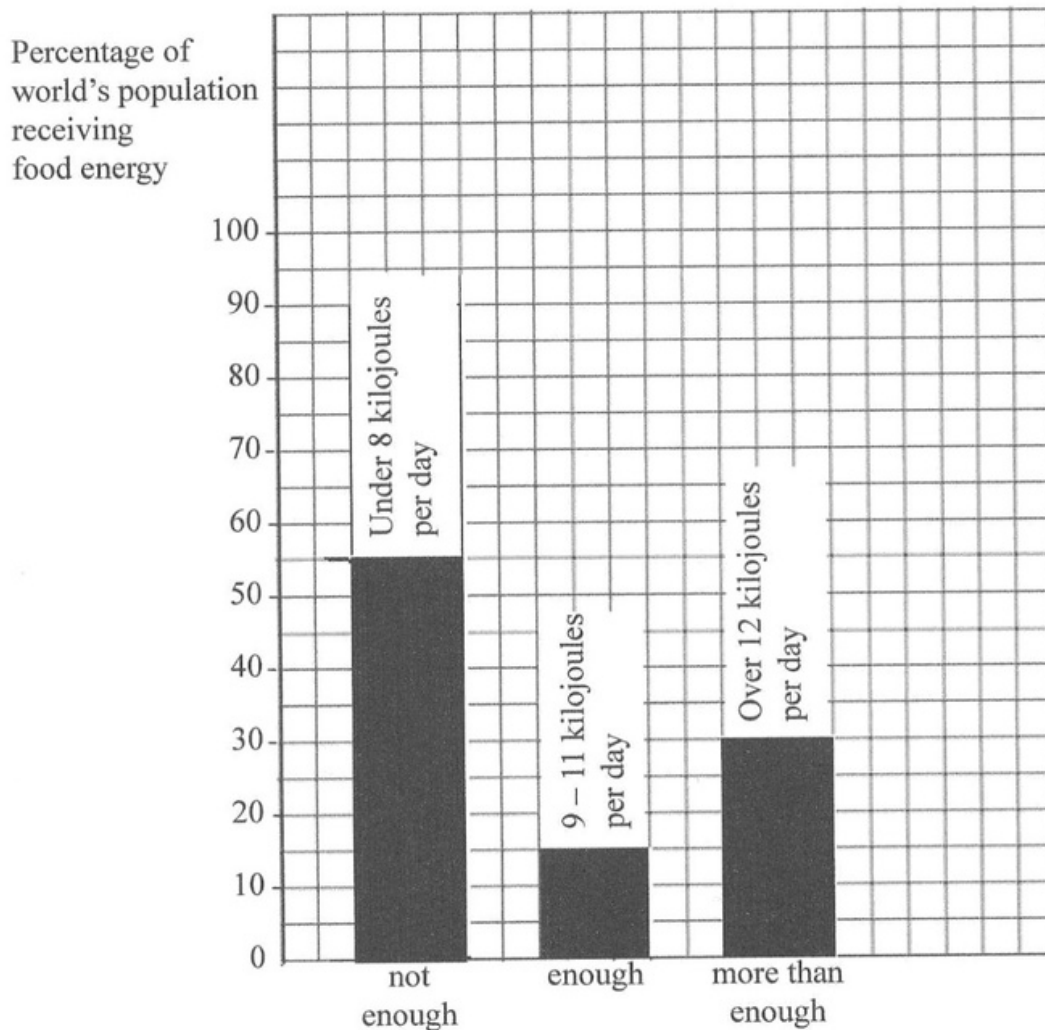
- (f) State the name of the organ in the human body to which molecule **T** is transported for storage after being absorbed in the small intestine.

[1]

TOTAL MARKS [10]

2. The bar chart shows the percentage of the world's population in each of the three groups:

- People whose diets provide under 8 000 kilojoules per day.
- People whose diets provide 9 000 – 11 000 kilojoules per day.
- People whose diets provide over 12 000 kilojoules per day.



- (a) (i) Calculate the difference in the percentage of the world's population whose diets provide **under 8 000 kilojoules per day** and the world's population whose diets provide over **12 000 kilojoules per day**.

[1]



- (ii) State the **minimum** difference in the energy intake per day for people whose diets did **not provide enough energy** and people whose diets provide **more than enough** energy.

_____ [1]

- (iii) People whose diets provide **more than enough energy** per day are susceptible to a health condition, which can lead to numerous health problems and diseases.

State the name of this health condition.

_____ [1]

- (b) A mother whose diet is **not providing enough energy** per day is breast-feeding her baby.

- (i) Name a deficiency disease that a breast-fed baby is at risk of developing, if the mother is not receiving sufficient energy and protein in her diet.

_____ [1]

- (ii) Describe **TWO** signs or symptoms of the deficiency disease named in part (b)(i).

_____ [2]

- (c) State **TWO** consequences of climate change that can result in low food production by farmers.

_____ [2]



- (d) In recent years, there has been a significant increase in war and civil unrest in many regions.

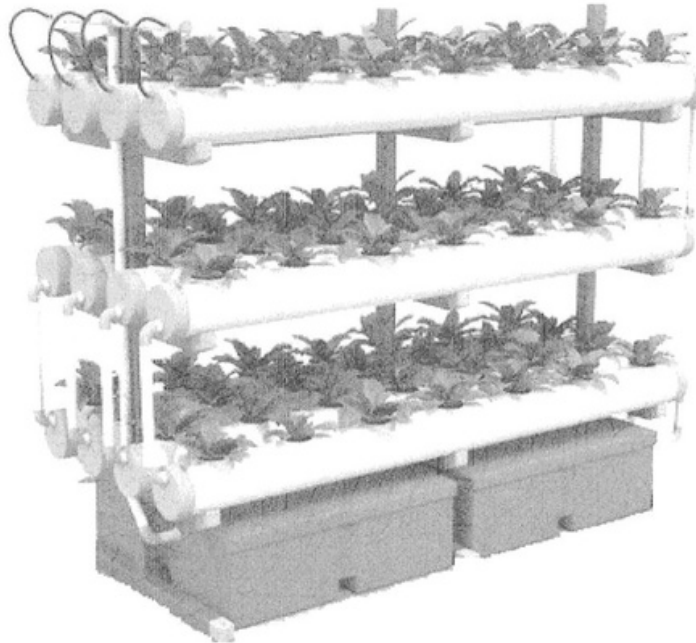
Describe **TWO** ways in which war and civil unrest can reduce the food supplies for populations living in these regions.

[2]

TOTAL MARKS [10]



3. The photograph below represents a modern farming technique known as a vertical hydroponic system.



- (a) Define hydroponics.

_____ [2]

- (b) Outline **TWO** advantages and **TWO** disadvantages of this type of modern farming practice.

- (i) advantages:

1. _____ [1]

2. _____ [1]

- (ii) disadvantages:

1. _____ [1]

2. _____ [1]



- (c) Name **TWO** other modern farming techniques and explain how each have helped to increase crop yields.

1. _____

_____ [1]

2. _____

_____ [1]

- (d) Name and describe the negative effects of **TWO** agricultural practices in The Bahamas.

1. _____

_____ [1]

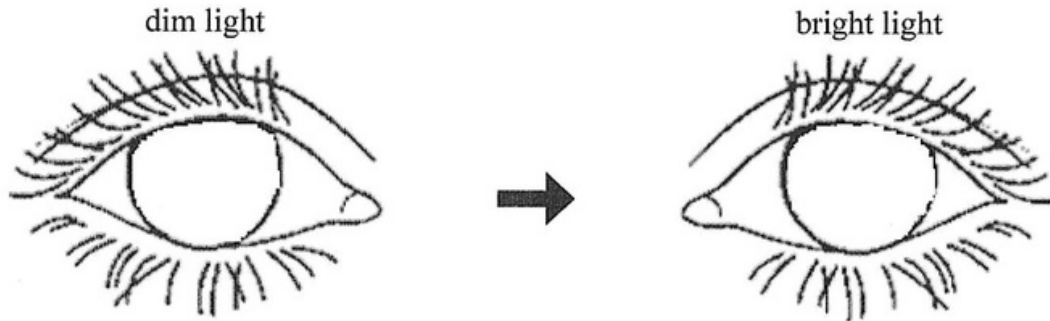
2. _____

_____ [1]

TOTAL MARKS [10]



4. The diagram shows a frontal view of the human eye in dim light and in bright light. The pupil is not shown.



- (a) (i) Complete the diagrams to show what happens to the pupil when the lighting changes from dim to bright. [1]
- (ii) Explain how the muscles in the iris work together to bring about this reflex response when the light changes from dim to bright.
- _____
- _____
- _____ [2]
- (b) Describe what happens to the suspensory ligaments, the ciliary muscles and the lens when the eye changes focus from a distant object to a near object.
- (i) Suspensory ligaments: _____ [1]
- (ii) Ciliary muscle: _____ [1]
- (iii) Lens: _____ [1]

- (c) Some eye defects can result in a blurred image if the distance from the eye to the object being viewed is outside a limited range.

(i) State the name of an example of this type of eye defect.

_____ [1]

(ii) State **ONE** possible cause for the eye defect named in (c)(i).

_____ [1]

(iii) State a corrective measure that could be taken to reduce the effect of the eye defect named in (c) (i) and describe the effect of this corrective measure.

corrective measure _____ [1]

effect _____

_____ [1]

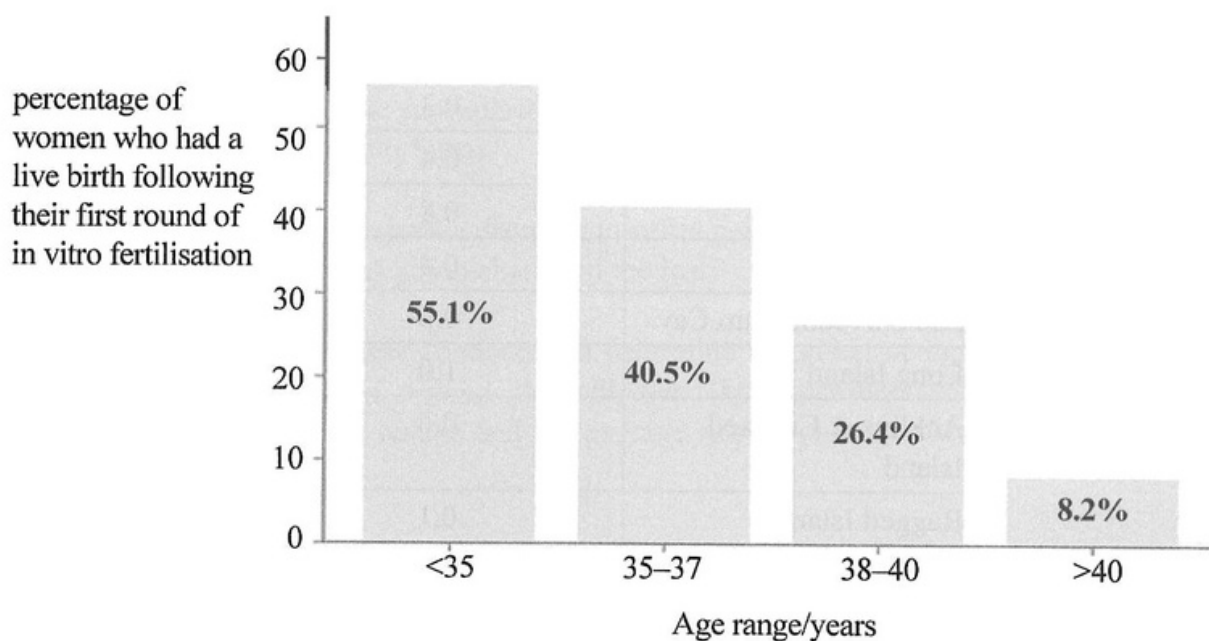
TOTAL MARKS [10]



SECTION B

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

5. The bar chart shows, for each age range, the percentage of women who had a live birth following their first round of in vitro fertilisation (IVF).



- (a) Use the bar chart to identify the age group having the most success with IVF treatment. [1]
- (b) Calculate the increase in the percentage of women having live births between age ranges of 35-37 years and age range of 38-40 years. [1]
- (c) Define in vitro fertilisation [IVF] and outline the steps involved in this process. [7]
- (d) Describe **TWO** disadvantages for potential mothers when using IVF. [2]
- (e) Explain **TWO** advantages and **ONE** disadvantage to the use of surrogacy. [3]
- (f) Describe **TWO** ethical concerns of surrogacy. [2]
- (g) Alcohol, cocaine and marijuana, can have adverse effects on the development of the foetus.

Choose **TWO** of these drugs. State the names of the drugs you have chosen and, for each, describe **TWO** adverse effects on the developing foetus. [4]

TOTAL MARKS [20]

[Turn over]



6. The table shows the percentage reduction in area covered by mangroves (wetlands), for each of the different islands in The Bahamas from 2016 to 2022.

Islands of The Bahamas	Percentage reduction area
Grand Bahama	10.6
Abaco	4.4
Bimini	0.1
New Providence	0.3
Eleuthera	0.3
Andros	0.4
Cat Island	0.8
The Exumas	0.4
San Salvador/Rum Cay	0.6
Long Island	1.0
Acklins & Crooked Island	0.6
Ragged Island	0.1
Mayaguana	0.3
Inagua	0.1

The mangrove ecosystem is classified as a wetland.

- (a) (i) Explain the term wetland and give another example. [2]
- (ii) State **THREE** reasons why the mangrove ecosystem is important. [3]
- (b) (i) Name the islands of The Bahamas where the area covered by mangroves has been reduced by between 0.5% and 4.0% from 2016 to 2022. [1]
- (ii) Describe **FOUR** ways by which these mangrove losses could have occurred. [4]
- (iii) Suggest **TWO** ways to reduce or prevent the continued loss of area covered by the mangrove ecosystem in The Bahamas. [2]
- (c) (i) State the name of any **TWO** mangrove plants found in the mangrove ecosystem. [2]
- (ii) Describe **THREE** adaptations of mangrove plants for living in their environment and explain how each adaptation is beneficial to the plant. [6]



TOTAL MARKS [20]

7. This question is about photosynthesis.

- (a) Write a complete chemical equation that represents photosynthesis (include the conditions). [2]
- (b) Name the tissue in the leaf where most photosynthesis takes place and describe how this tissue is adapted for photosynthesis. [3]
- (c) There are many specialised cells in the leaf.
- (i) Name the specialised cell in the leaf that regulates gas exchange and name the structure it forms. [2]
- (ii) Describe how a decrease in water potential of the specialised cells named in (c) (i) affects gas exchange in the leaf. [6]
- (d) An experiment was conducted to determine the effect of light intensity on the rate of photosynthesis of a pond plant *Elodea*. The experiment was repeated to obtain five complete sets of results and the average rate of photosynthesis was calculated at each light intensity.

The results are shown in the table.

Light intensity/lux	Rate of photosynthesis/mm ³ of oxygen per minute					
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average
2 000	2	1	2	2	3	2
4 000	6	7	5	6	6	6
6 000	17	15	15	16	17	██████
8 000	23	23	22	23	24	23
10 000	37	30	31	28	29	31

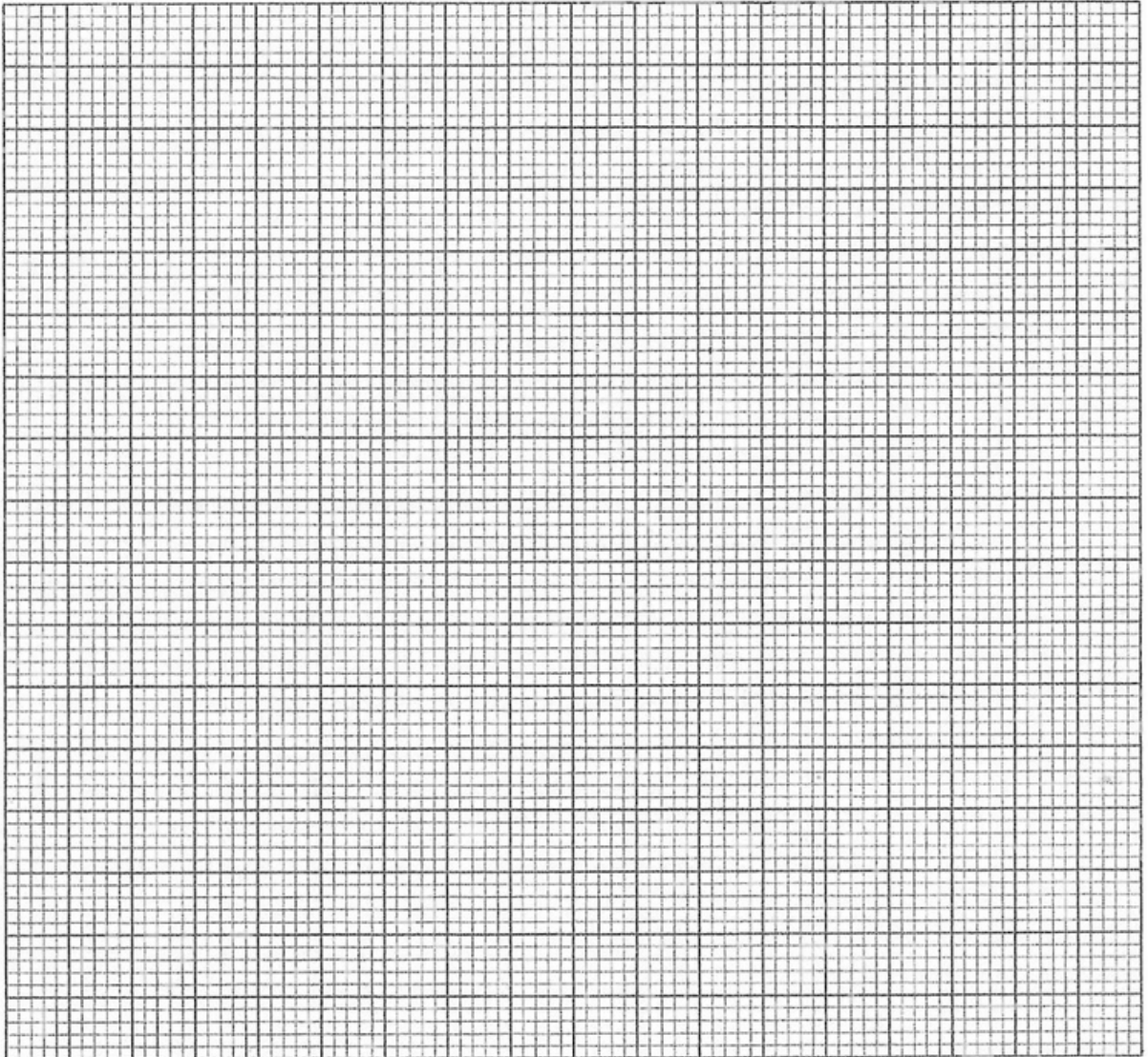
- (i) Calculate the average rate of photosynthesis for the plant when the light intensity is 6 000 lux. [1]
- (ii) On the grid provided on page 14, use the table of results to construct a graph showing the average rate of photosynthesis of the plant at varying light intensities. [4]
- (iii) Describe and explain the results shown in the graph. [2]

TOTAL MARKS [20]

[Turn over



Question.....
Write on both sides of the paper



Question.....

Write on both sides of the paper

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook page or a sheet of stationery. There is no handwriting or other markings on the page.

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Question.....

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[illegible]

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