



SUBJECT: **Biology**
 DATE: 2nd September 2022
 TIME: 4:00 p.m. to 7:05 p.m.

Directions to Candidates

- Write your index number in the space at the top left-hand corner of this page.
 - Answer **ALL** questions in Section A and **TWO** questions from Section B.
 - Write all your answers to questions from Section A in the spaces provided in this booklet. Candidates are advised that under no circumstances should answers to Section A be submitted in the separate answer booklet provided.
 - Write all your answers to questions from Section B in the separate answer booklet provided.
 - If more than two questions from Section B are attempted, only the first two answers shall be taken into consideration.
 - The mark allocation is indicated at the end of each question. Marks allocated to parts of questions are also indicated.
 - You are reminded of the necessity for good English and orderly presentation in your answers.
 - In calculations you are advised to show all the steps in your working, giving your answer at each stage.
 - The use of electronic calculators is permitted.
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For examiners' use only:

Question	1	2	3	4	5	6	7	8	9	10	Total
Score											
Maximum	10	9	14	7	10	25	25	25	25	25	100

SECTION A: Answer ALL questions in this section.

1. This question is about biomolecules. Below is an illustration of a triglyceride.

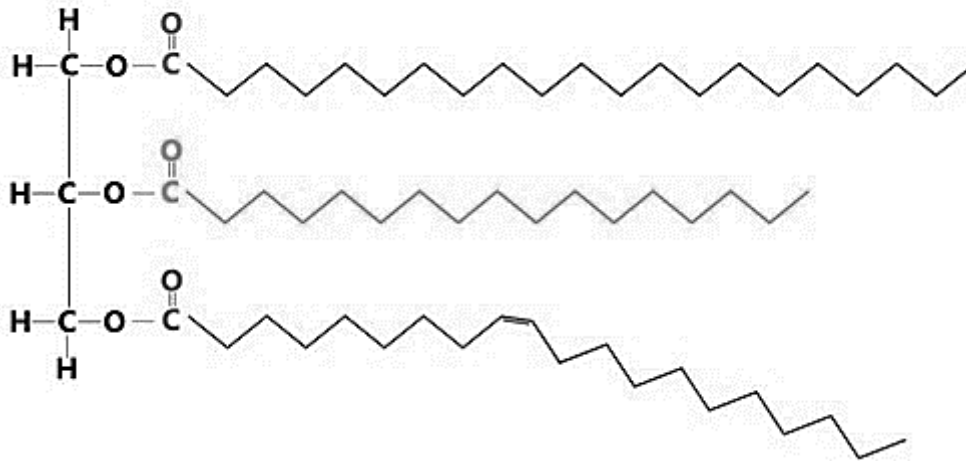


Figure 1: Triglyceride
(www.ScienceDirect.com)

a. Name the **TWO** main components of triglycerides.

Component 1: _____

Component 2: _____ (2)

b. Name **TWO** lipid biomolecules that form part of cell membranes of cells.

(i) _____

(ii) _____ (2)

c. Briefly describe **ONE** main function of lipids in the human body, other than the one mentioned in part (b).

_____ (1)

d. Define the term dipeptide.

_____ (1)

- e. Give **ONE** example of a fibrous protein and **ONE** example of a globular protein and list their main function.

Structure of Protein	Example	Function
Fibrous		
Globular		

(4)

(Total: 10 marks)

2. This question is about homeostasis.

Homeostasis is the maintenance of internal conditions of the body close to their optimum.

- a. Which **TWO** systems of the body are responsible for maintaining homeostasis?

(2)

- b. What is an endocrine gland?

(2)

- c. The thermoregulatory centre is responsible for controlling body temperature.

- (i) Where is this centre located?

(1)

Please turn the page.

c. Fill in the missing information in the table below about enzymes involved in digestion.

Enzyme	Where it is produced	Substrate	Product
Pancreatic amylase		Starch	
		Fats	Fatty acids and glycerol
Pepsin			Peptides
	Pancreas	Proteins	

(8)

d. To which organ is the blood which has just absorbed nutrients in the intestine, first transported to?

_____ (1)

e. Name the blood vessel responsible for the delivery of blood as described in part (d).

_____ (1)

(Total: 14 marks)

4. This question is about cellular respiration and photosynthesis.

a. Mark the following statements as true (T) or false (F).

Statement	(T) or (F)
Cellular respiration occurs in both animal and plant cells	
ATP is released as a final product from the process of photosynthesis	
Respiration is the process by which oxygen is inhaled into the lungs	
Photosynthesis requires both carbon dioxide and water to occur	
Oxygen is always needed for cellular respiration to occur	
Glucose is produced during photosynthesis	

(3)

Question continues on next page.

b. Both respiration and photosynthesis occur in cellular organelles. Name the organelle in which each of these two processes occur.

Respiration: _____(1)

Photosynthesis: _____(1)

c. List **ONE** factor which affects the rate of photosynthesis and **ONE** factor that affects the rate of respiration.

Rate of respiration: _____(1)

Rate of photosynthesis: _____(1)

(Total: 7 marks)

5. This question is about human reproduction.

a. Label the five structures (A – E) on the illustration of the female reproductive system below. (5)

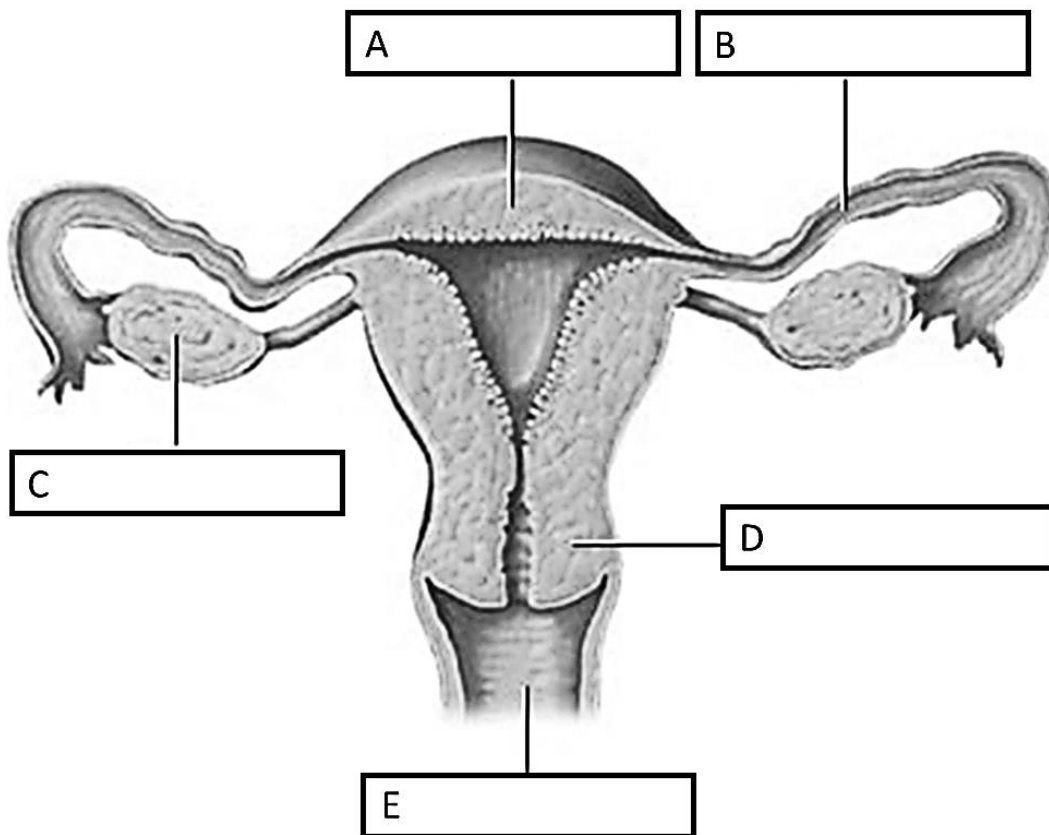


Figure 2: The female reproductive system
(www.ScienceDirect.com)

b. List **ONE** role of each hormone with respect to human reproduction in the table below.

Hormone	Role
Follicle Stimulating Hormone	
Luteinizing Hormone	
Oestrogen	
Progesterone	
Testosterone	

(5)

(Total: 10 marks)

Questions continue on next page.

SECTION B:

Answer any TWO questions from this section; each question carries 25 marks. If more than two questions are attempted, only the first two answers shall be taken into consideration.

Write all your answers to questions from this section in the separate answer booklet provided.

6. This question is about cell division and the cell cycle.
- a. Name and describe the **THREE** phases of the cell cycle. (6)
 - b. Give a detailed illustrated account of the different phases of mitosis. (16)
 - c. Mutations sometimes occur in genes which control cell division. Describe and explain the result of such mutations. (3)

(Total: 25 marks)

7. This question is about DNA replication and protein synthesis.
- a. Explain why DNA replication is described as being semi-conservative. (2)
 - b. Outline the sequence of events which occur during DNA replication. (5)
 - c. The genetic code is described as being a triplet code, degenerate, universal, punctuated and non-overlapping. Define each of the terms mentioned. (5)
 - d. Outline the main differences between DNA and RNA. (3)
 - e. A mutation in a particular gene resulted in the production of an inactive enzyme. Explain in detail why this occurs. (5)
 - f. Briefly explain **FIVE** differences between transcription and DNA replication. Tabulate your answer. (5)

(Total: 25 marks)

8. This question is about evolution.

Read the text below and answer the questions that follow.

When it comes to the evolution of life, various philosophers and scientists, including an eighteenth-century English doctor named Erasmus Darwin, proposed different aspects of what later would become evolutionary theory. But evolution did not reach the status of being a scientific theory until Darwin's grandson, the more famous Charles Darwin, published his famous book *On the Origin of Species*. Darwin and a scientific contemporary of his, Alfred Russel Wallace, proposed that evolution occurs because of a phenomenon called natural selection.

(Source: <http://www.nationalgeographic.org/encyclopedia/theory-evolution/>)

- a. Define the term 'species'. (2)
- b. Using examples, explain natural selection. (15)
- c. Using your knowledge about climate change and evolution, discuss the effects on the evolution of plant species resulting from climate change. (8)

(Total: 25 marks)

9. This question is about energy relationships.

- a. Discuss in detail why there is a limit in the number of trophic levels that can be sustained in an ecosystem. Discuss your answer in terms of biomass and energy transfer in food chains. (8)
- b. Energy continuously flows through an ecosystem while nutrients are constantly recycled. Nutrient cycles show the movement of nutrients from the biotic to the abiotic parts of the ecosystem. Describe the:
 - (i) carbon cycle; (9)
 - (ii) nitrogen cycle. (8)

In **each** case, include an illustration (which may take the form of a flow chart) to support your answer.

(Total: 25 marks)

10. This question is about the transport system.

- a. Multicellular organisms have developed a bulk transport system while unicellular organisms make use of simple diffusion as a transport mechanism. Explain this statement. (4)
- b. All circulatory systems have three main parts; (i) the transport medium, (ii) the vascular system and (iii) the pumping organ. Identify body parts that make up these three parts of the human circulatory system. (5)
- c. Describe the structural characteristics of an erythrocyte which enable it to transport oxygen efficiently. (6)
- d. Compare the structural characteristics and function between the following three blood vessels: (i) arteries; (ii) veins; (iii) capillaries. (9)
- e. Name the medium that allows diffusion of substances between blood and body tissues. (1)

(Total: 25 marks)

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