



L-Università  
ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE  
EXAMINATIONS BOARD

**INTERMEDIATE MATRICULATION LEVEL  
2019 FIRST SESSION**

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SUBJECT: **Biology**  
DATE: 6<sup>th</sup> May 2019  
TIME: 4:00 p.m. to 7:05 p.m.

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### 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	11	Total
Score												
Maximum	5	9	6	6	14	10	25	25	25	25	25	100

**SECTION A: Answer ALL questions in this section.**

1. This question is about the human gaseous exchange system.

In the human lungs, the alveoli are the gaseous exchange surfaces.

a. List **THREE** characteristics of a gaseous exchange surface.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (3)

b. Explain why a ventilation mechanism is needed for gaseous exchange to occur.

\_\_\_\_\_

\_\_\_\_\_ (2)

**(Total: 5 marks)**

2. This question is about the human reproductive system.

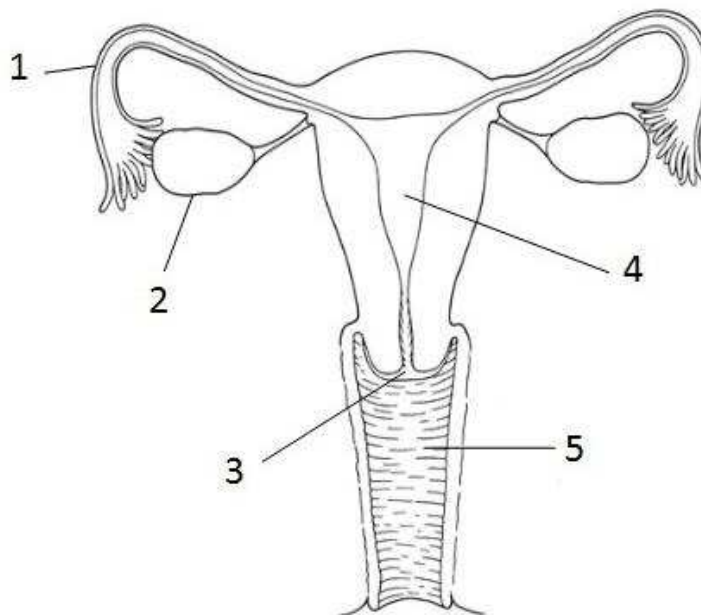


Figure 2.1: The female reproductive system  
 (<http://www.6aming.com/business/female-reproductive-system-diagram-without-labels>)

a. Name the labelled structures of the female reproductive system.

1: \_\_\_\_\_ (1)

2: \_\_\_\_\_ (1)

3: \_\_\_\_\_ (1)

4: \_\_\_\_\_ (1)

5: \_\_\_\_\_ (1)

b. Explain the role of structure 1 in reproduction.

\_\_\_\_\_  
\_\_\_\_\_ (2)

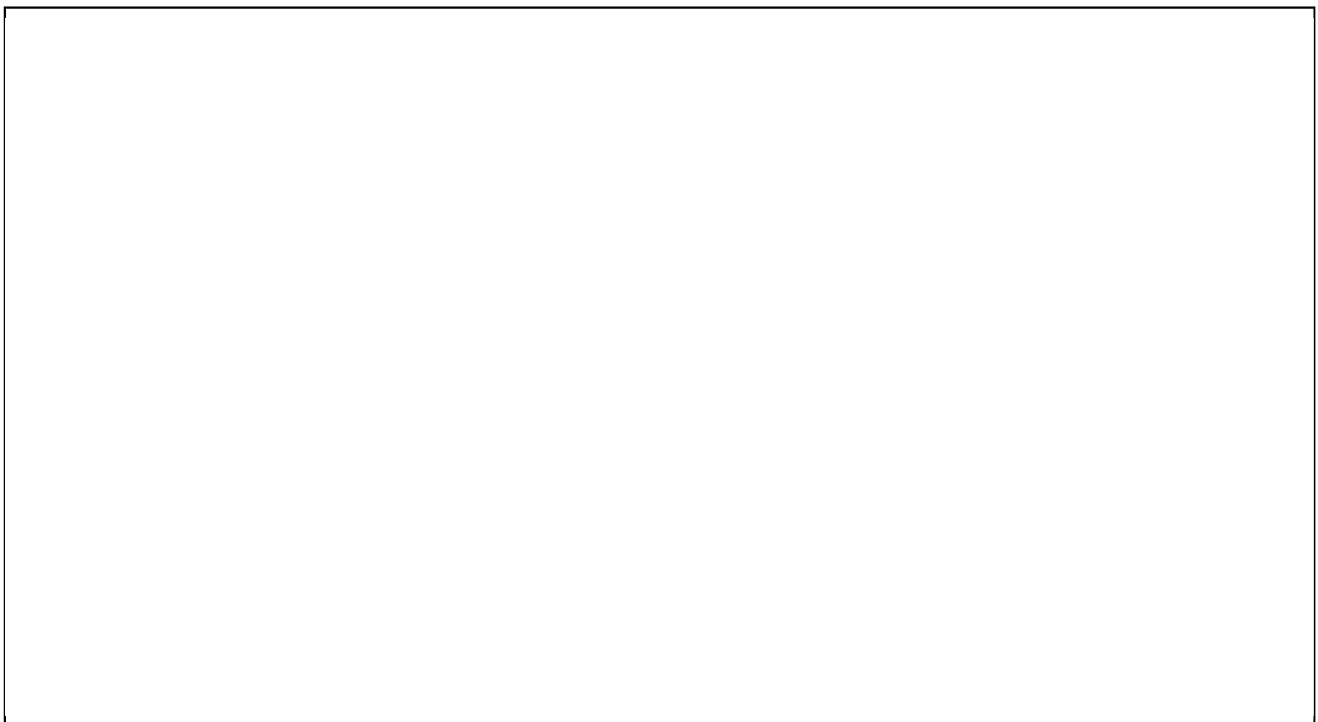
c. Two hormones produced by the pituitary gland act on structure 2. Name these **TWO** hormones.

\_\_\_\_\_  
\_\_\_\_\_ (2)

**(Total: 9 marks)**

3. This question is about biological membranes.

Draw the fluid mosaic model of the eukaryotic cell membrane and by means of this diagram explain how passive and active transport take place. Label your diagram.



**(Total: 6 marks)**

***Please turn the page.***

4. This question is about ecological relationships.

Figure 3.1 below shows a soil food web.

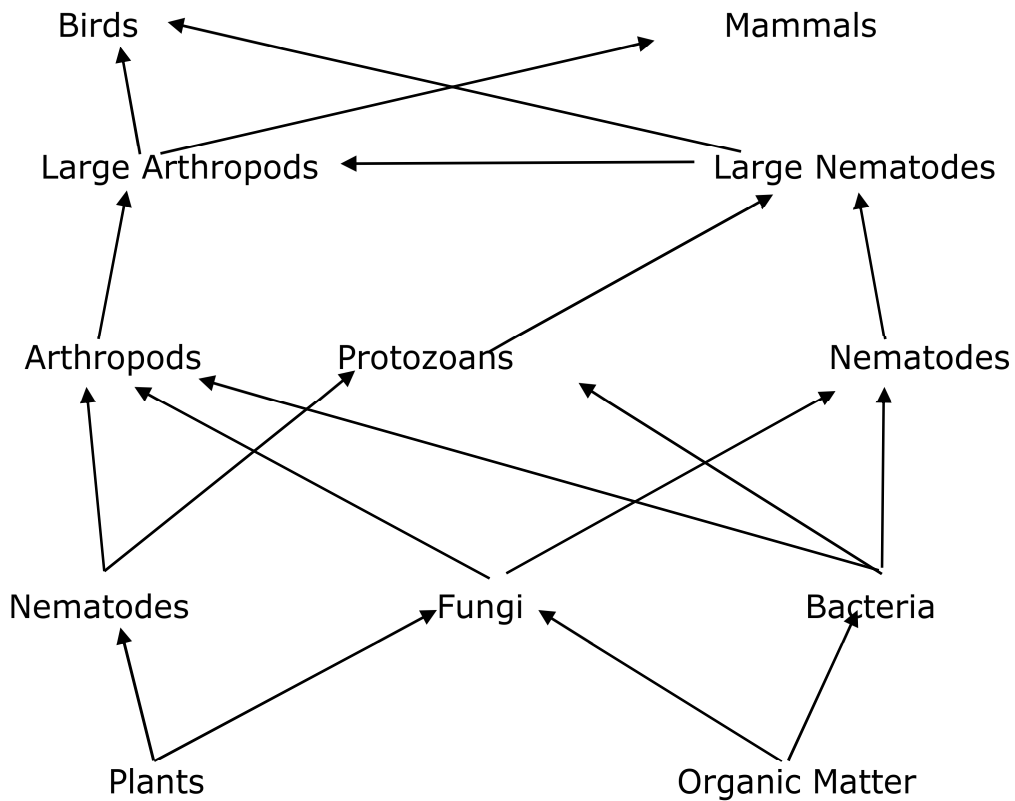


Figure 3.1: Food Web

a. From the food web identify:

i) an autotroph; \_\_\_\_\_ (1)

ii) a decomposer. \_\_\_\_\_ (1)

b. Use the food web in Figure 3.1 to draw a food chain with **FIVE** trophic levels. (2)

c. Only 10% of the energy is passed from one trophic level to another. Explain.

\_\_\_\_\_  
 \_\_\_\_\_ (2)

**(Total: 6 marks)**

5. This question is about cell division.

The cell cycle consists of three main phases.

a. List the **THREE** main phases and briefly describe what happens in each phase.

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(6)

b. DNA replication happens in one of the phases. Give the function of the following enzymes involved in DNA replication.

i) DNA polymerase:

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(2)

ii) Helicase:

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(2)

c. Fill in the following table to compare and contrast mitosis and meiosis. (4)

	<b>Mitosis</b>	<b>Meiosis</b>
Function		
Number of daughter cells produced		
Number of divisions		
Resulting cells are haploid or diploid?		

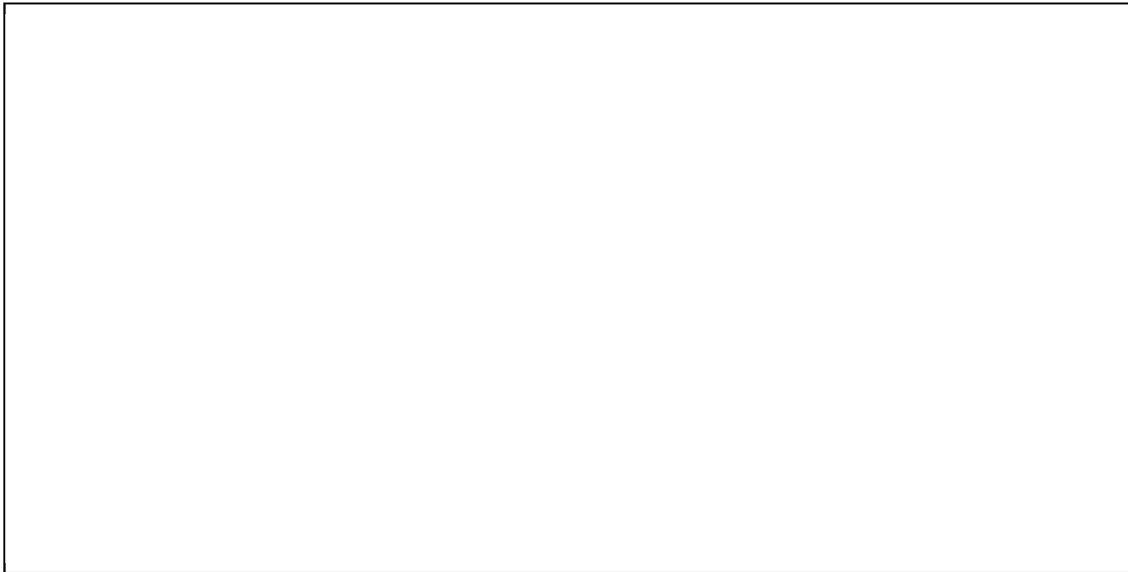
**(Total: 14 marks)**

***Please turn the page.***

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6. This question is about cellular respiration.

a. In the box below, draw a labelled diagram of the organelle responsible for cellular respiration. (3)



b. The first series of reactions is common to both aerobic and anaerobic respiration.

i) What is the name of this process?

\_\_\_\_\_ (1)

ii) The process starts off with glucose. What is the name of the final sugar produced in this process?

\_\_\_\_\_ (1)

iii) Name **TWO** other products produced by this process.

\_\_\_\_\_ (2)

c. The series of reactions mentioned in part b. is followed by Krebs cycle, in aerobic respiration. Briefly explain what happens in Krebs cycle.

\_\_\_\_\_  
\_\_\_\_\_ (2)

d. Finally, a chain of electron carriers leads to the formation of ATP. What name is given to this process?

\_\_\_\_\_ (1)

**(Total: 10 marks)**

**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.**

7. This question is about evolution.

- a. Define the term evolution. (4)
- b. Define the term species and explain why members of the same species show variation. (7)
- c. 'Survival of the fittest' is a phrase used to describe the mechanism of natural selection.
  - i) Explain natural selection. (5)
  - ii) Give and describe **THREE** examples of natural selection. (9)

**(Total: 25 marks)**

8. This question is about water.

- a. Give a brief description of the structure of the water molecule. You must include a simple diagram to support your answer. (7)
- b. Water has a number of unique properties.
  - i) What enables water to have these unique properties? (6)
  - ii) List and describe **THREE** of water's unique properties and highlight their importance to organisms. (12)

**(Total: 25 marks)**

9. Discuss the following statements, using your biological knowledge:

- a. The separation and correct disposal of organic waste is a sustainable activity. (5)
- b. Human activity has directly contributed to the extinction of many species. (9)
- c. Water pollution is damaging our food supply. (5)
- d. Water is considered an essential resource. (6)

**(Total: 25 marks)**

***Please turn the page.***

10. This question concerns the human nervous system.

The human nervous system is a complex system of neurones that run to and from the brain and spinal cord to the body.

- a. Give **TWO** functions of the nervous system. (4)
- b. Draw a labelled diagram of a sensory and a motor neurone. On each diagram add the direction of the impulse. (8)
- c. Describe the transmission of a nerve impulse from the end of a neurone to the beginning of the intermediate neurone. (7)
- d. The brain is a large organ divided into several regions. State the functions of each of the following regions of the brain:
  - i) cerebrum;
  - ii) medulla oblongata;
  - iii) cerebellum. (6)

**(Total: 25 marks)**

11. This question is about gene technology.

- a. Explain the term gene technology. (4)
- b. Define genetically modified organism and give **ONE** example of such an organism. (4)
- c. Gene technology has targeted the treatment of several human genetic diseases. One of these is cystic fibrosis. Name and explain the gene technology used to treat this disease. (10)
- d. Explain the term recombinant DNA. (7)

**(Total: 25 marks)**