



L-Università
ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**INTERMEDIATE MATRICULATION LEVEL
2020 SECOND SESSION**

SUBJECT: **Biology**
DATE: 12th December 2020
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.

For examiners' use only:

Question	1	2	3	4	5	6	7	8	9	10	11	Total
Score												
Maximum	9	12	5	8	7	9	25	25	25	25	25	100

SECTION A: Answer ALL questions in this section.

1. This question is about the chemistry of life.

a. Name the **THREE** most common elements in biological molecules.

_____ (1)

b. Name another **TWO** elements found in living organisms.

_____ (1)

c. Complete the following table. Place a 'x' in the appropriate box.

	water	amino acid	dipeptide	protein	lipid	monosaccharide	polysaccharide
Monomer							
Polymer							
Contains nitrogen							
Made up of only 2 elements							
Contains glycosidic bonds							
Contains peptide bonds							
Contains partial charges							

(7)

(Total: 9 marks)

2. This question is about cell structure.

Figure 1 below, represents a simple diagram of a plant cell, showing only the cell plasma membrane and the cell wall.

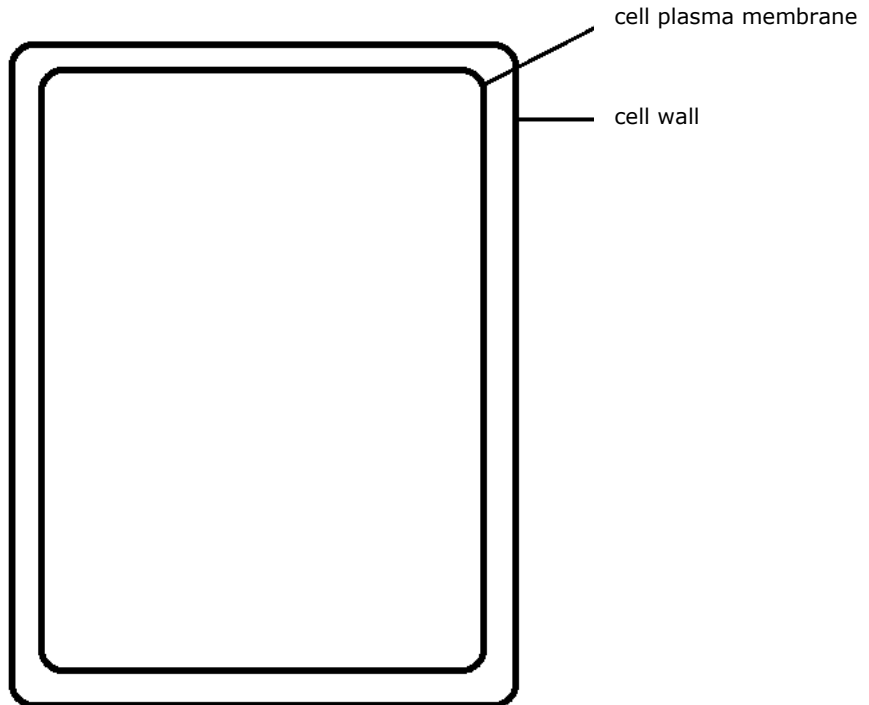


Figure 1: Plant cell

a. On Figure 1 above, draw and label **SEVEN** organelles found in a typical plant cell. (7)

b. The cell wall is found in plant cells but **not** in animal cells. Mention another organelle typically found in plant cells but **not** in animal cells.

_____ (1)

c. Name an organelle that you have drawn in Figure 1, which is found in both eukaryotic and prokaryotic cells.

_____ (1)

d. The cell plasma membrane is found in all cells. Give a brief description of the cell plasma membrane.

_____ (3)

(Total: 12 marks)
Please turn the page.

3. This question is about gene technology.

Genetically modified corn is genetically engineered for insect resistance.

a. Define genetically modified organism.

_____ (2)

b. Mention **ONE** other example of gene technology.

_____ (1)

c. Describe the benefit of the gene technology listed in part (b).

 _____ (2)

(Total: 5 marks)

4. This question is about protein synthesis.

Figure 2 below, shows the process of transcription during protein synthesis.

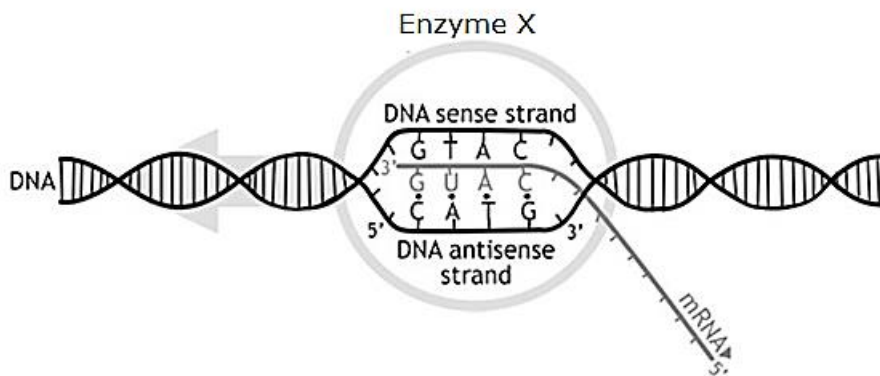


Figure 2

Adapted from: https://www.diffen.com/difference/Replication_vs_Transcription

a. Name enzyme X.

_____ (1)

b. List the site in the eukaryotic cell where transcription occurs.

_____ (1)

c. Nucleic acids are also synthesized during DNA replication.

i. State **ONE** similarity between DNA replication and transcription, other than the one given in the initial statement.

_____ (1)

ii. Give **ONE** difference between DNA replication and transcription.

_____ (1)

d. In describing translation, a student wrote 'transfer RNA (tRNA) collects amino acids'. Explain.

_____ (4)

(Total: 8 marks)

5. This question is about the human digestive system.

a. Briefly explain the following in the human digestive system:

i. large food molecules need to be digested;

_____ (2)

ii. enzymes are essential during digestion;

_____ (2)

This question continues on next page.

iii. optimum pH conditions are of utmost importance in different parts of the digestive system.

_____ (3)

(Total: 7 marks)

6. This question is about thermoregulation.

a. Complete the following table by indicating whether the statement refers to a mechanism which leads the body to lose heat or to gain heat. Use the terms 'lose' or 'gain' heat to complete the table.

Mechanism	Lose/Gain heat
Shivering	
Increased metabolism	
Vasodilation of capillaries	
Vasoconstriction of capillaries	

(2)

b. How does sweating control the body temperature?

_____ (2)

c. Describe the role of thermoreceptors in the skin in thermoregulation.

_____ (2)

d. Describe the role of thermoreceptors in the hypothalamus for thermoregulation.

_____ (2)

- e. Give **ONE** reason why it is important to control body temperature.

(1)

(Total: 9 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 enzymes.
- a. Give a biological explanation for the following properties of enzymes. (4)
- i. enzymes are specific in their action. (4)
 - ii. enzymes are used over and over again without changing. (6)
- b. Temperature affects metabolic reactions. (4)
- i. How does temperature affect metabolic reactions? (4)
 - ii. With reference to enzymes and lock and key mechanism, explain why temperature changes the rate of reactions. (6)
- c. Describe how enzymes can be inhibited by poisons. (5)

(Total: 25 marks)

8. This question is about cell division.
- a. Describe the interphase stage of the cell cycle. (4)
- b. Describe the importance of cell division in unicellular and multicellular organisms. (7)
- c. Compare and contrast the process of mitosis with that of meiosis. (14)

(Total: 25 marks)

9. This question is about human impact on the environment.
- a. Carbon dioxide is a greenhouse gas. Explain. (4)
- b. CFCs are considered as pollutants. Explain. (4)
- c. Give an account of how climate change is affecting the global environment. (13)
- d. Explain the importance of waste being disposed in engineered landfills instead of a dumpsite. (4)

(Total: 25 marks)

Please turn the page.

10. This question concerns the animal transport system.

- a. Explain why large multicellular animals need a circulatory system. (7)
- b. Blood vessels are components of the human circulatory system. Relate the structure of veins and arteries with their function. Include a diagram of a cross-section of an artery and vein to support your answer. (12)
- c. Distinguish between the composition of blood and tissue fluid. (6)

(Total: 25 marks)

11. This question is about defence against disease.

An article issued in a medical journal (in April 2020) contained the following statement:

'...in the current coronavirus disease 2019 (COVID-19) pandemic, 50% of patients with COVID-19 who have died had secondary bacterial infections, ...)

[https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247\(20\)30009-4/fulltext](https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(20)30009-4/fulltext)

- a. Both viruses and bacteria are pathogens. These pathogens contain antigens. Distinguish between a pathogen and an antigen. (4)
- b. COVID-19 enters the body via the eyes, nose or mouth. Explain why the virus does not enter the body through the skin. (6)
- c. Several medical researchers are working to produce a vaccine.
 - i. What is a vaccine? (5)
 - ii. Explain why vaccination gives a form of active immunity. (7)
- d. What is the function of the phagocytic white blood cells in an immune response? (3)

(Total: 25 marks)