



Annual Examinations for Secondary Schools 2022

YEAR 11

BIOLOGY

TIME: 2 hours

Name: _____

Class: _____

Question No.	Section A							Section B					
	1	2	3	4	5	6	7	1	2	3	4	5	
Max. mark	5	6	9	11	9	7	8	15	15	15	15	15	
Actual mark													TOTAL MARK

85% Theory Paper	15% Practical	Final Score

Section A: Answer all questions in this section.

1. Name the phylum indicated by these descriptions:

Description of phylum	Phylum
Plants have roots, stems and leaves with vascular tissue. However, a damp environment is needed for reproduction to occur.	
Plants whose seeds are formed within the ovaries of flowers.	
Animals that have a sac-like body with a single opening surrounded by tentacles armed with stinging cells.	
Animals that have a soft unsegmented body with an external or an internal shell. They live in aquatic or moist environments.	
Animals that have a vertebral column extending to form a tail. The internal skeleton is usually made up of bone.	

(5)

Total: 5 marks

2. A group of students investigated the rate of transpiration by measuring the decrease in mass due to water loss. Leaves from the same plant of a similar surface area were cut and one or both surfaces were coated with grease to prevent transpiration.

Below are the results obtained:

	Leaf 1	Leaf 2	Leaf 3	Leaf 4
Epidermal surface coated with grease	None	Upper only	Lower only	Both
% decrease in mass	38	35	4	1

- a. Name the pores found on leaves that allow water evaporation from the leaf. (1)

- b. Give the vascular tissue through which water passes from the roots to the leaves. (1)

- c. State a conclusion that can be reached from these results. (2)

d. Why are the following precautions important for the reliability of the results?

i) The leaves are cut from the same plant. (1)

ii) The leaves have a similar surface area. (1)

Total: 6 marks

3. Water and mineral ions are absorbed by the roots in soil by processes of passive and active transport.

a. Define 'active transport'. (3)

b. Name the type of passive transport that allows water to enter plants. (1)

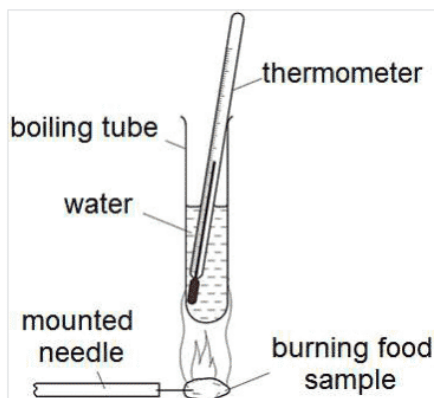
c. A student was invited to a research lab to observe passive diffusion in plant and animal cells.

i) Plant cells were placed on a microscope slide and covered with a sugar solution. This solution had a higher sugar concentration than the cytoplasm of the plant cells. Describe the changes that would happen to the cell structures of cell wall and cell membrane, cytoplasm and permanent vacuole. (3)

ii) In research on live (in vitro) animal tissues, some muscle tissue was bathed in a solution which had a concentration like the concentration of solutes in blood or tissue fluid. Explain why this is necessary for the research to proceed well. (2)

Total: 9 marks

4. In an investigation on the energy content of food, the following apparatus was set up.



Source: <https://schoolworkhelper.net/energy-content-food-lab-report-answers/>

Figure 1

The energy content of two different foodstuffs, a peanut and dried broad bean, was found. In this investigation, the student used a constant volume of water for each experiment. A thermometer was used to stir the water before the temperature change was read. The burning foodstuffs, of the same mass, were both kept at the same distance from the bottom of the boiling tube.

- a. From the text above, give **two** constant variables of this investigation. (2)

- b. Explain why the water in the boiling tube was stirred, before a reading of temperature was taken. (2)

- c. On taking temperature readings, the student noted that temperature increase of the water when the peanut was burnt was higher than temperature increase when the broad bean was burnt. What does this mean? (2)

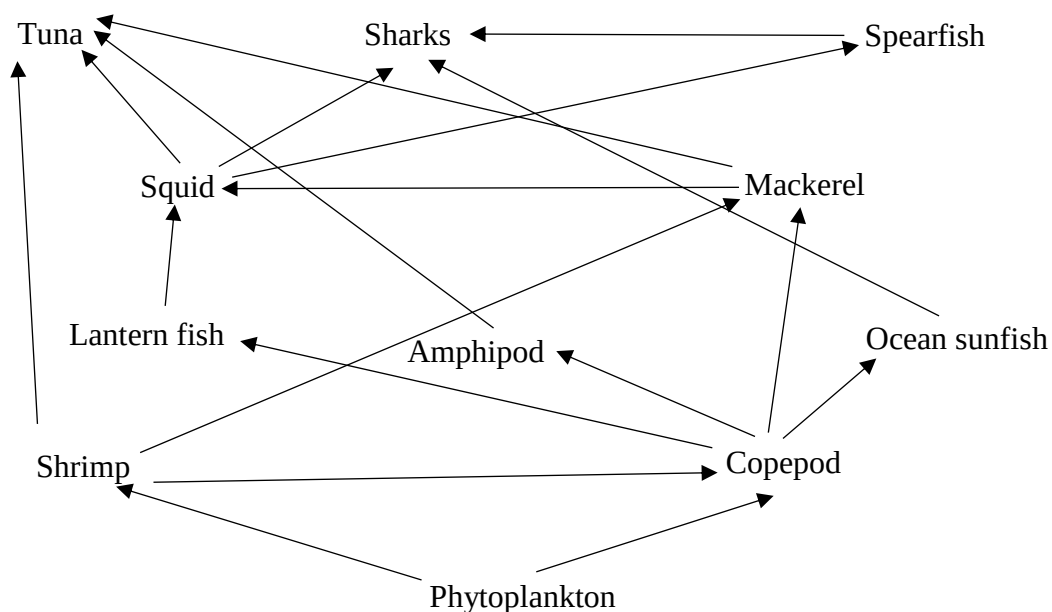
- d. The student decides to repeat each experiment to get two readings of each foodstuff. Give the importance of taking repeated readings. (2)

- e. The energy values obtained for the two peanut experiments were both lower than the official energy content value of a peanut.
- i) Describe a flaw in the experimental set-up that might cause this discrepancy. (2)

- ii) How may the apparatus be modified to make results more accurate? (1)

Total: 11 marks

5. The food web below shows the feeding relationships between some organisms in the Mediterranean Sea. Phytoplankton are microscopic photosynthetic organisms while copepods and amphipods are crustaceans.



Adapted from: Thematic Assessment - Marine and Coastal environment

Figure 2

- a. From the food web above, write down a food chain with **four** trophic levels. (2)
- b. Name a quaternary consumer found in the food web. (1)
- c. i) Give **one** characteristic of crustaceans. (1)

- ii) Explain why copepods and amphipods, both crustaceans, are found at different trophic levels. (2)

- d. i) Name **one** environmental factor that affects the growth and reproduction of phytoplankton. (1)

- ii) How will an abundance of shrimp affect the food web? (2)

Total: 9 marks

6. Biogas is produced by the microbial decomposition of organic matter by anaerobic respiration.

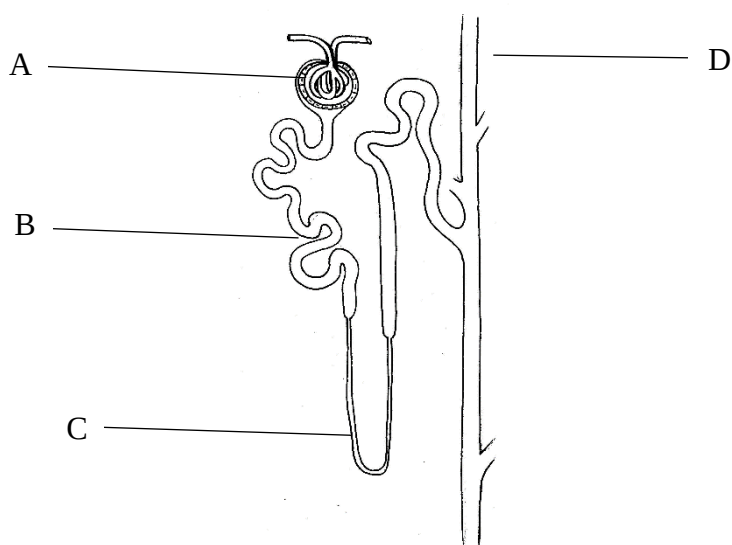
- a. Define 'anaerobic respiration'. (2)

- b. Biogas is produced in large structures called fermenters or anaerobic digestors. Both the temperature and pH are kept constant in these fermenters. Explain the importance of this feature. (3)

- c. List **two** economic uses of biogas. (2)

Total: 7 marks

7. Figure 3 shows a cross-section of a structure found in the cortex and medulla of a kidney.



Source: <http://www.aic.cuhk.edu.hk/web8/Kidney.htm>

Figure 3

- a. Fill in the table below, by giving the letter of the part of the nephron where the process takes place. (2)

Process	Part of nephron
Ultrafiltration	
Selective reabsorption of glucose	

- b. The kidney has an excretory function. Name the nitrogenous waste product that is excreted by the kidney. (1)

- c. Dandelion tea contains a natural diuretic. A diuretic stimulates the kidney to reduce the reabsorption of water back into the blood.

- i) From figure 3, name **two** structures where reabsorption of water takes place. (2)

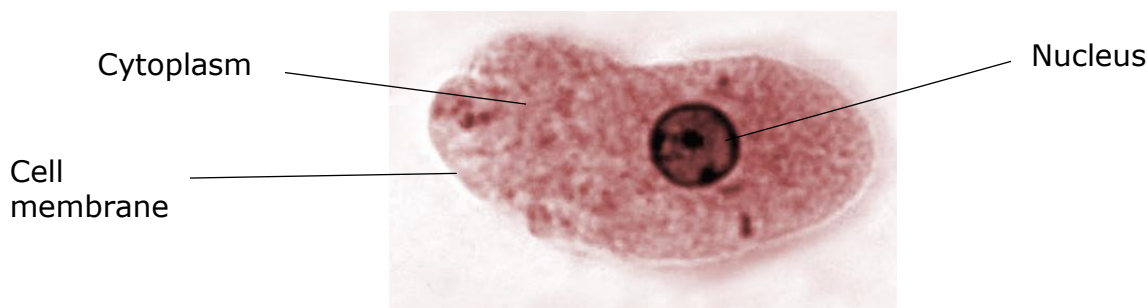
- ii) Describe how a diuretic works on the pituitary and how this affects one of the labelled structures in figure 3. (3)

Total: 8 marks

**Section B: Answer any THREE questions on a separate A4 sheet of paper.
A graph paper is needed for question 4.**

1. Plants use numerous mechanisms for their pollination.
 - a. Define the term 'pollination'. (2)
 - b. The flowers of the Greek plant *Aristolochia microstoma* emit a foul, musty scent that seems to mimic the smell of decaying insects. *A. microstoma* has inconspicuous brownish flowers that lie horizontally close to the ground or partly buried, among leaf litter or between rocks. When entering the tube of an *Aristolochia* flower, the flies are guided by downward-pointing hairs into a small chamber, which holds the female and male floral organs.
 - i) Name the male and female organs of a flower. (2)
 - ii) The insect pollinated flowers of this plant have different characteristics to other insect pollinated flowers. Compare **two** characteristics of *A. microstoma* to characteristics of insect pollinated flowers. (4)
 - iii) Why are the small hairs mentioned in the text important for pollination? (1)
 - c. Name **one** other importance of mimicry. (1)
 - d. Describe the process in the flower from pollination to fertilisation. (5)
- Total: 15 marks**

2. Amoebiasis is an infection caused by any of the amoeba of the *Entamoeba* genus. Below is a photomicrograph of an *Entamoeba*.



Source: <https://eol.org/pages/491174>

Figure 4

- a. A student thinks that this microscopic organism is a prokaryote.
 - i) Is the student correct or incorrect? (1)
 - ii) Give **one** reason for your answer. (1)
 - iii) In a homework task, the student writes the species of the amoeba that causes amoebiasis as: *Entamoeba Histolytica*. State **one** error made by the student. (1)
- b. Give **one** function of each of the following cellular structures:
 - i) nucleus; (1)
 - ii) cell membrane. (1)
- c. Describe the cytoplasm of a cell. (2)

- d. Amoeba organisms may be attacked by viruses. Pandoravirus infect amoebae by phagocytosis. The amoebae act as hosts for the reproduction of the virus. Describe the process of phagocytosis. (3)
- e. The *Entamoeba* parasite enters the human body through drinking infected water. The parasite inflames the colon of the alimentary canal and hinders the function of this structure.
- Define the term 'parasite'. (2)
 - State the function of the colon. (1)
 - Using your biological knowledge from eii, give an effect/symptom of this disease. (1)
- f. *Entamoeba* divides by binary fission. Is binary fission, sexual or asexual reproduction? (1)

Total: 15 marks

3a. Describe the functions of the following:

- Thick ventricle walls of the heart; (3)
- Phloem vessels in stem and roots; (4)
- Leaves in plants. (5)

b. Explain the importance of reflex actions. (3)

Total: 15 marks

4. In an investigation on the germination of seeds, the following results were obtained. The same number of seeds were sowed in two containers with distilled water. The average of the accumulated number of germinating seeds was calculated.

No. of days	16	20	24	28	32	36	40	44
Average of accumulated no. of germinating seeds	2	20	38	40	42	42	42	42

- a. Using a 2mm square graph paper, draw a graph of the average of accumulated no. of germinating seeds (y-axis) against the no. of days (x-axis). (6)
- b. Describe the trend observed in the results of this study. (2)
- c. Other than water, state **two** other necessary conditions for germination to occur. (2)
- d. Some of the seedlings were then sowed in two pots. One pot, A, was placed in a box with a slit to allow unilateral (from one direction only) light to enter. The second pot, B, was left on a bench exposed to light from all directions.
- Explain why light is important for these germinating seedlings. (2)
 - Describe the difference in the growth of the seedlings of pot A and pot B. (2)
 - Name the chemical that brings about growth in plants. (1)

Total: 15 marks

5. The Oriental Hornet (Žunžan bagħal) is a special insect having pigments in its exoskeleton that helps it store and convert the sun's energy. The exoskeleton has yellow and brown strips. The yellow strips absorb the sun's energy while the brown strips convert this energy to another type of energy. The insect is most active when the sun is most intense.
- a. Give **one** characteristic of insects. (1)
- b. Invertebrates having an exoskeleton also have spiracles on their exoskeleton.
- i) What are invertebrates? (1)
 - ii) Spiracles are able to open and close. What is the importance of this? (2)
 - iii) Spiracles form part of the insect's respiratory system. List the pathway of air from outside the exoskeleton to the cells of the insect. (2)
 - iv) List **one** characteristic of gaseous exchange surfaces. (1)
- c. Explain why the insect is most active during the sun intensive parts of the day. (2)
- d. The brown tissues in the exoskeleton contain the pigment melanin. This same pigment is found in human skin. In humans, melanin absorbs UV radiation reducing skin damage.
- i) Name the skin layer where melanin is stored in the skin. (1)
 - ii) Describe **two** functions of the dermal layer of the skin. (4)
 - iii) Melanin is made up from an amino acid. List the elements that make up amino acids. (1)

Total: 15 marks