

Annual Examinations for Secondary Schools 2022

YEAR 9	BIOLOGY	TIME: 2 hours
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Name: _____

Class: _____

Question No.	Section A							Section B					
	1	2	3	4	5	6	7	1	2	3	4	5	
Max. mark	7	9	9	12	5	5	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. Figure 1 shows two different cells, cell A and cell B.

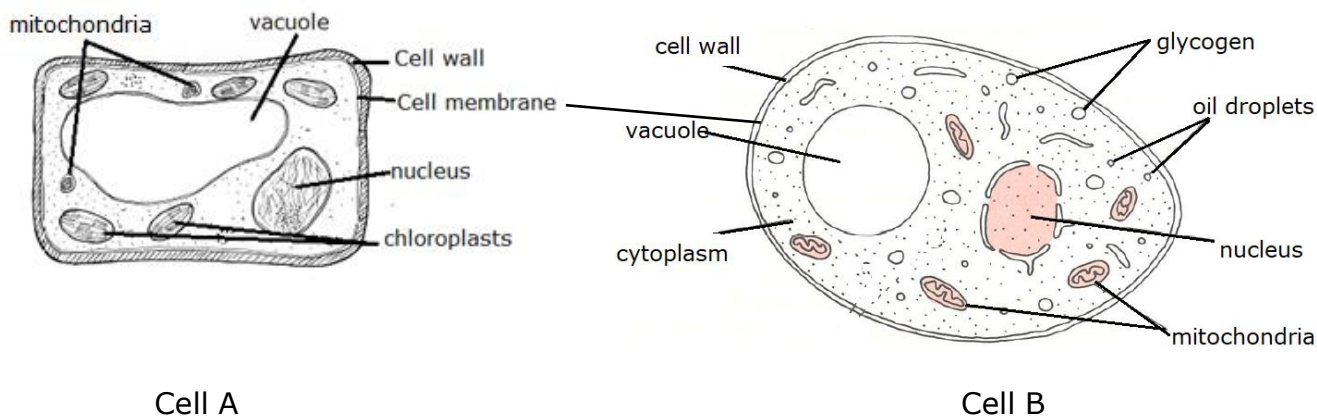


Figure 1

a. Both these cells are defined as eukaryotic cells. What makes these cells eukaryotes? (2)

b. i) These two cells are enclosed in a cell wall. The cell wall of cell A is made up of cellulose. Is cell A an animal, bacterial, fungal or plant cell? (1)

ii) From cell A, identify **one** other structure that confirms your answer to b i). (1)

c. Both cell A and cell B contain mitochondria. State **one** function of this organelle. (1)

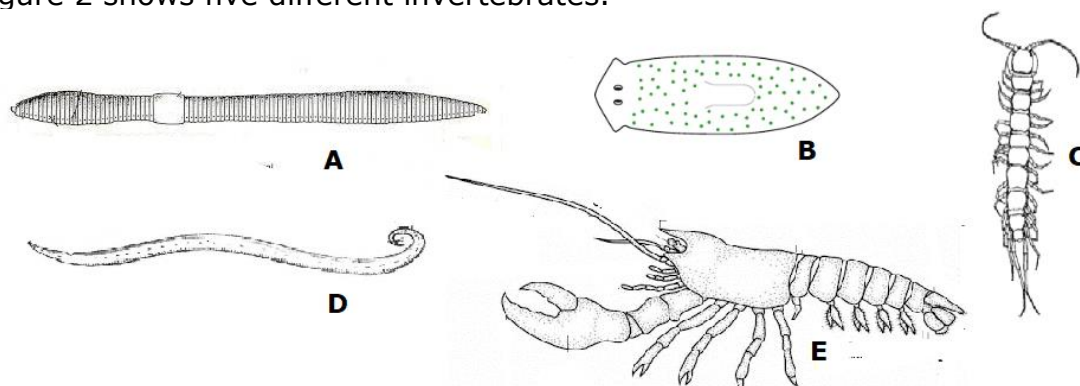
d. Cell B contains glycogen food stores.

i) Name the main food store molecule of cell A. (1)

ii) State the process that produces the building blocks of the food store molecule named in d. i). (1)

Total: 7 marks

2. Figure 2 shows five different invertebrates.



(Diagrams shown are not to scale)

<https://www.pinterest.ru/>, <https://www.brainkart.com/>, <https://www.pinterest.com/>

Figure 2

a. Define the term invertebrate. (1)

b. Below is a dichotomous key of the organisms in figure 2.

1.	Organisms show segmentation Organisms do not show segmentation	Go to 2 Go to 4
2.	Invertebrates have at least a pair of antennae Invertebrate does not have antennae	Go to 3 <i>Lumbricus terrestris</i>
3.	Organism has identical limbs Organism has one pair of limbs adapted to claws	<i>Scutigera immaculata</i> <i>Homarus gammarus</i>
4.	Organism is long and round Organism is flat with a spade shaped head	<i>Ascaris lumbricoides</i> <i>Planaria dactyligera</i>

i) From the key identify the scientific name of organism: (2)

A _____ D _____

ii) Explain the importance of using scientific names instead of common nomenclature. (2)

ic. The organism *Planaria dactyligera* is flat and very thin. It does not have a respiratory or circulatory system. Describe and explain how the *Planaria* gets oxygen for cellular respiration. (2)

d. *Homarus gammarus* is an arthropod.

i) From the key, give **one** characteristic of arthropods. (1)

ii) State **one** other characteristic of arthropods. (1)

Total: 9 marks

3. In an investigation on germination of sunflower seeds, two sets of seeds were put in the following conditions and their final mass recorded. The initial mass of each group was 6.3 g.

Seed set	Conditions	Final mass (g)
A	Soaked in water and left in light for 3 days. Small roots present.	5.7
B	Soaked in water and left in light for 8 days. Long roots and green shoot present.	7.4

Table 1

- a. Apart from water, name **one** other factor which seeds require for germination. (1)

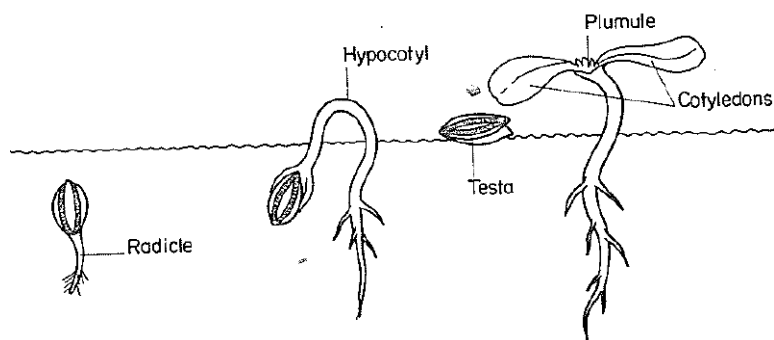
- b. Explain:

- i) the loss in mass of set A. (2)

- ii) the increase in mass of set B. (2)

- c. Why did the scientist use two sets of seeds of identical mass? (2)

- d. Figure 3 shows the germination of a sunflower seed.



Taken from Workout Biology, O.F.G Kilgour

Figure 3

- i) Name the type of germination a sunflower seed undergoes. (1)

- ii) State the role of the testa (seed coat). (1)

Total: 9 marks

4. Figure 4 shows the change in the rate of transpiration when a plant is placed in two different conditions.

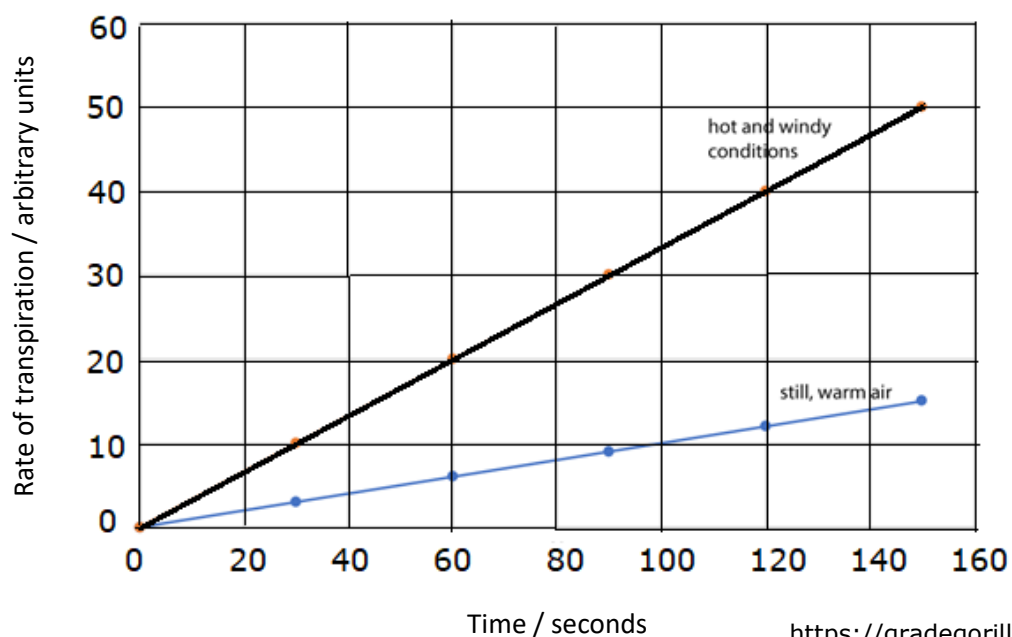


Figure 4

- a. Which condition brings about the higher rate of water loss from the plant? (1)

- b. Name **one** other condition that affects the rate of transpiration of a plant. (1)

- c. Explain how the above conditions change the rate of transpiration. (4)

Warm to hot air _____

Still to windy _____

- d. Some plants native to a hot, dry environment have adapted through time, to reduce transpiration. Explain the plant adaptations listed in the table below. The first response has been included. (6)

Adaptation	Explanation
Stomata open only at night	Ambient temperature is lower at night than during the day. There is less water loss than during the day.
In cacti, leaves are reduced to spines	
Pine trees have sunken stomata	
Cacti have a very thick waxy cuticle	

Total: 12 marks

5. Figure 5 shows a model prediction of the effect of predation of one animal on another. The continuous dark line predicts the changes in the number of predators while the dotted line shows the changes in the number of prey.

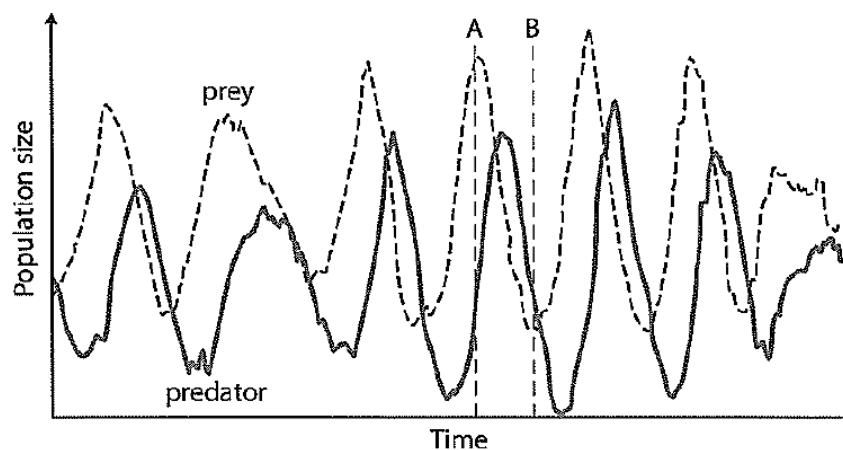


Figure 5

- a. Describe the population size of the predator and the prey at point A. (2)
-
-
- b. i) Describe the population size of the predator and the prey at point B. (1)
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- ii) Explain the changes in population size of predators and prey immediately after point B. (2)

Total: 5 marks

6. In an experiment on soil particles in different types of soils, the following results were obtained.

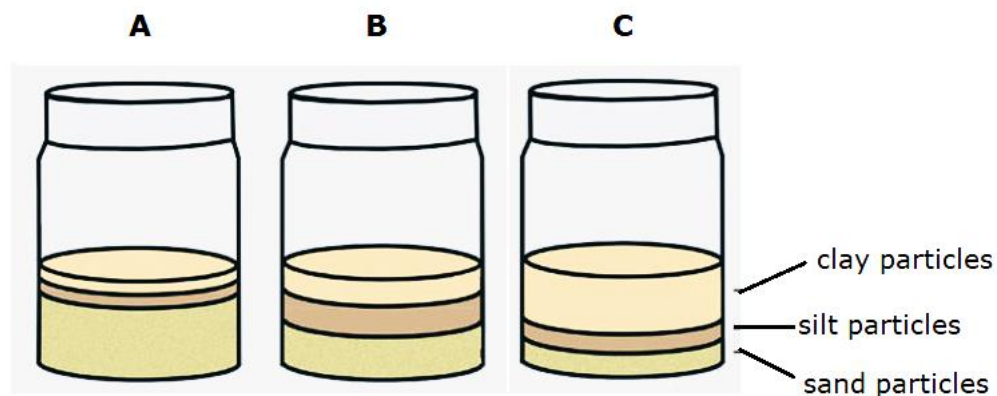


Figure 6

- a. i) From Figure 6, determine which jar contains loam soil. (1)

- ii) Give **one** reason why sand particles are first to form a sediment when soil is shaken and left to settle. (1)

- b. Some plants are unable to grow in clay soil. Mention **two** characteristics of this type of soil that hinders plant growth. (2)

- c. Sandy soil is more susceptible to soil erosion. Define soil erosion. (1)

Total: 5 marks

7. Organisms of the kingdom fungi can be described as either being beneficial or harmful.
- a. Name a unicellular fungus and describe a beneficial role of this fungus. (1, 2)
- _____
- _____
- _____
- b. Certain moulds are parasitic on grasses.
- i) Define parasitism. (2)
- _____
- _____
- ii) Grasses are monocots. Give **one** characteristic of monocots. (1)
- _____
- c. Some multicellular fungi are saprophytic. Explain how this role helps in the ecosystem. (2)
- _____
- _____

Total: 8 marks

Section B: Answer any **three** questions from this section on the A4 paper provided. A graph paper is needed for Question 1.

1. In an investigation on osmosis, a dialysis bag was filled with solutions of different concentrations and submerged in distilled water for 30 minutes.
- The following results were obtained.

Concentration (M)	Percentage change in mass (%)
0	2.5
0.2	7.0
0.4	14.9
0.6	20.3
0.8	24.4
1.0	23.8

- a. On the graph paper provided, plot a graph of Percentage change in mass (%) against concentration (M). Join the points with a ruler. (5)
- b. Describe the general trends of this graph. (2)
- c. Define osmosis. (3)
- d. Explain why osmosis is so important in the structural support systems of plants. (3)
- e. Explain why animal cells burst if water continues to enter the cells due to a large concentration gradient but plant cells do not. (2)

Total: 15 marks

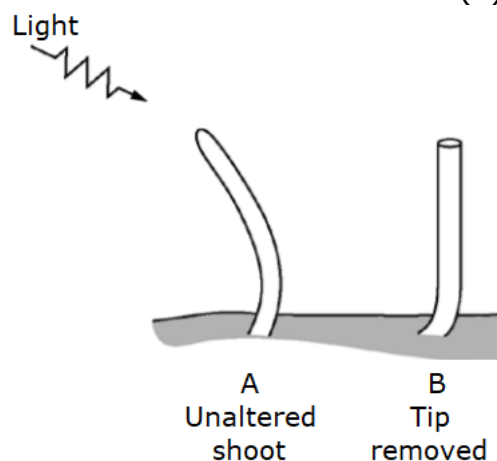
2. Plants need to respond to changes in their environment and plant hormones are the chemicals that coordinate and control these responses. The chemicals are made in one area of the plant and carried around the plant to other areas where they cause an effect.

Plants may not be able to move to another location, but they are able to change how they grow in response to their environment. Growth toward or away from a stimulus is known as a tropism. Auxins, allow plants to curve in specific directions as they grow. The auxin moves to one side of the stem, where it starts a chain of events that cause rapid cell growth on just that one side of the stem. With one side of the stem growing faster than the other, the plant begins to bend.

- a. i) Name the stimulus that causes plants to grow in geotropism. (1)
ii) From the text, state an effect of a stimulus. (1)
iii) Explain why it is important for organisms to respond to change in the environment. (2)

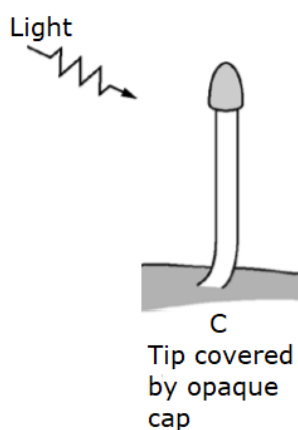
- b. Figure 7 shows two plant coleoptiles (shoots) placed under unilateral light.

- i) Does plant A show positive or negative phototropism? (1)
ii) Use your biological knowledge to explain why plant A grows towards light but plant B does not. (4)



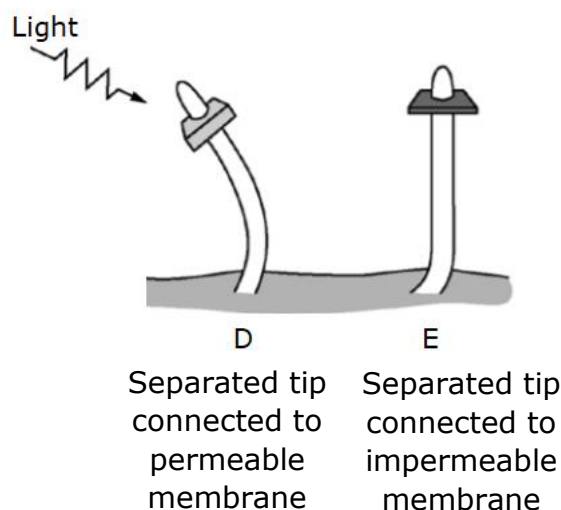
<https://www.slideserve.com/montana/contents-environment-plant-movement>
Figure 7

- c. Figure 8 shows another coleoptile that does not respond to the stimulus. Explain why. (2)



<https://www.slideserve.com/montana/contents-environment-plant-movement>
Figure 8

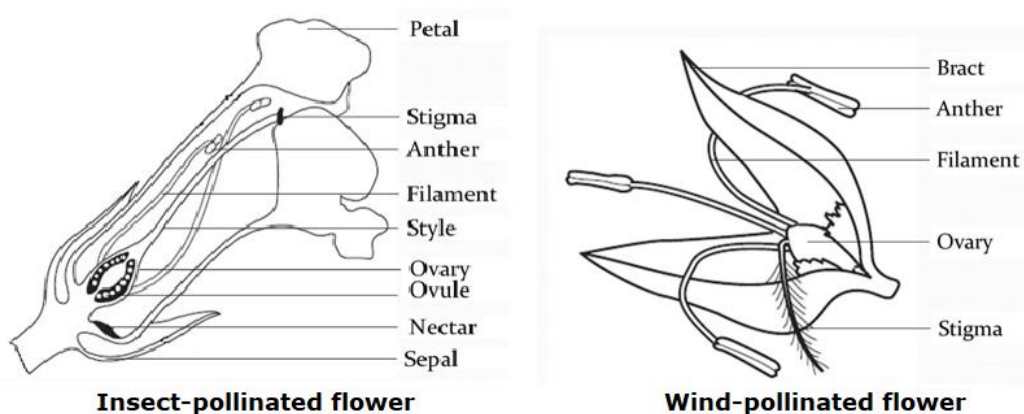
- d. Figure 9 shows two coleoptiles, both with the tip cut off and then put on membranes with characteristics specified in the diagram.



<https://www.slideserve.com/montana/contents-environment-plant-movement>
Figure 9

Use Figure 9, to describe the characteristics of this phototropic response. (4)
Total: 15 marks

- 3a. i) Distinguish between sexual and asexual reproduction. (2)
ii) State **one** type of asexual reproduction in plants. (1)
- b. Figure 10 shows an insect-pollinated flower and a wind-pollinated flower.



<https://slideplayer.com/slide/1727450/>

Figure 10

- i) State **two** differences, visible in the figure between the reproductive organs of the two flowers. (2)
ii) List **two** other differences between an insect-pollinated flower and a wind-pollinated flower. (2)
iii) Define pollination. (2)
iv) Why is cross-pollination preferable to self-pollination? (2)
- c. Define fertilisation. (2)
- d. State **two** types of seed dispersal. (2)

Total: 15 marks

4. Erysipelas is a bacterial infection of the skin. The bacteria attack the dermis layer causing a rash and tender skin. Erysipelas is usually caused by the bacterium *Streptococcus pyogenes*. The bacteria enter the dermis layer through a scratch or insect bite.
- a. Explain why the bacteria only enter the dermis when the skin is damaged. (2)
 - b. Name **two** structures found in the dermis and explain the roles of these structures in thermoregulation. (4)
 - c. The innermost layer of the skin is the subcutaneous layer. State **two** functions of this layer. (2)
 - d.
 - i) Bacteria are unicellular organisms. Explain. (1)
 - ii) Draw a general structure of a bacterium. Label three structures. (4)
 - iii) *Streptococcus pyogenes* divides by binary fission. Describe the process of binary fission. (2)

Total: 15 marks

5. Use your biological knowledge to explain the following:
- a. Viruses such as SARS-CoV-2 are not given a scientific nomenclature (binomial name). (3)
 - b. Not all vascular plants bear seeds. (4)
 - c. Dolphins and whales are not fish. (3)
 - d. When unicellular protists such as the *Amoeba*, are put in distilled water, these cells osmoregulate and do not burst. (5)

Total: 15 marks