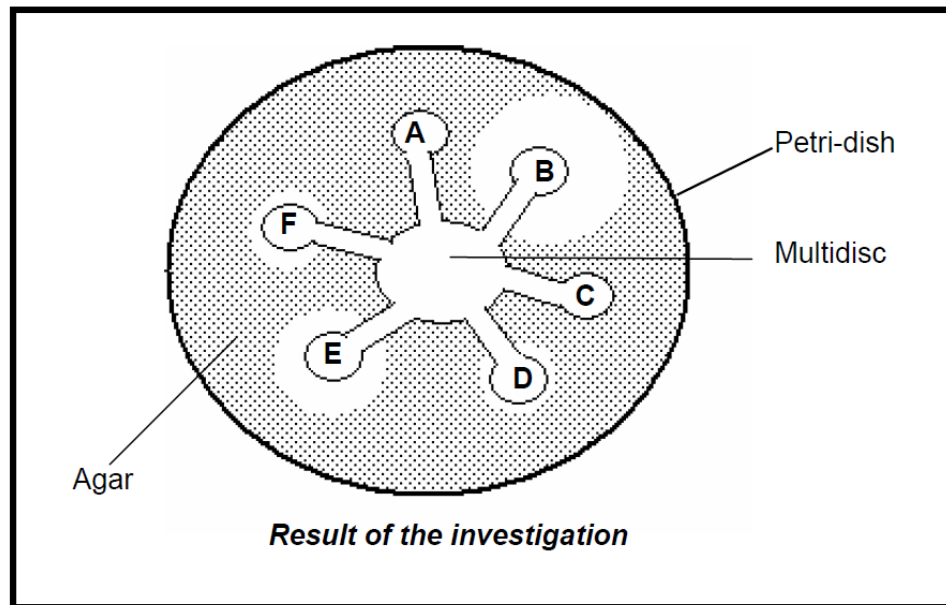
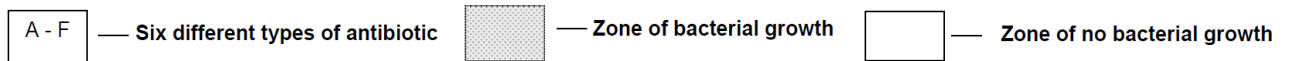


QUESTION 1

A sample was taken from a patient suffering from a throat infection. The bacteria on the swab were cultured on a nutrient agar in a petri-dish. A multidisc with a different type of antibiotic at the end of each of its six arms was then placed on top of the bacteria. The two halves of the petri-dish were then sealed together and placed in an incubator at 30 °C. The following diagram shows the result of the investigation after 48 hours:



Key:

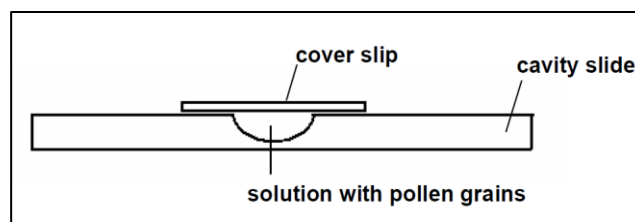


- 1.1 State ONE difference in the effectiveness of antibiotics **B** and **F**. (2)
- 1.2 The patient is known to be allergic to antibiotic **B**. (1)
- (a) Which antibiotic should the patient be given? (1)
- (b) Explain your answer to QUESTION 1.2 (a). (2)
- 1.3 The organism causing this infection seems to be resistant to two of these antibiotics. (2)
- (a) Which TWO antibiotics are referred to in the statement? (2)
- (b) Provide a visible reason for your answer to QUESTION 1.3 (a). (2)
- 1.4 In the early part of the 20th century, spider webs (in which many fungal spores were trapped) were placed on small cuts and wounds. Suggest ONE reason: (2)
- (a) why this might have proven useful in healing small cuts and wounds. (2)
- (b) why this might have been a dangerous/risky procedure. (2)
- 1.5 State TWO ways in which an antiseptic is different from an antibiotic. (2)
- (15)**

QUESTION 2

When a stigma is ripe, it secretes a fluid which stimulates pollen grains to grow tubes. The fluid contains sugar. Zama wanted to investigate the following question: How does the concentration of sugar affect the number of pollen grains that germinate/form pollen tubes in flowers? She designed the following investigation.

- She prepared 5 cavity slides as follows:
 - the first slide she filled with distilled water.
 - the second slide she filled with a 5% sugar solution.
 - the third slide she filled with a 10% sugar solution.
 - the fourth slide she filled with a 15% sugar solution.
 - the fifth slide she filled with a 20% sugar solution.



- She transferred the same number of pollen grains from the anthers of a flower into each cavity of the five slides.
- A cover slip was gently lowered onto the slide.
- All five slides were placed in a warm incubator and left for one hour.
- Each slide was then examined under a microscope and the number of pollen tubes in each slide was counted and recorded in the table below.

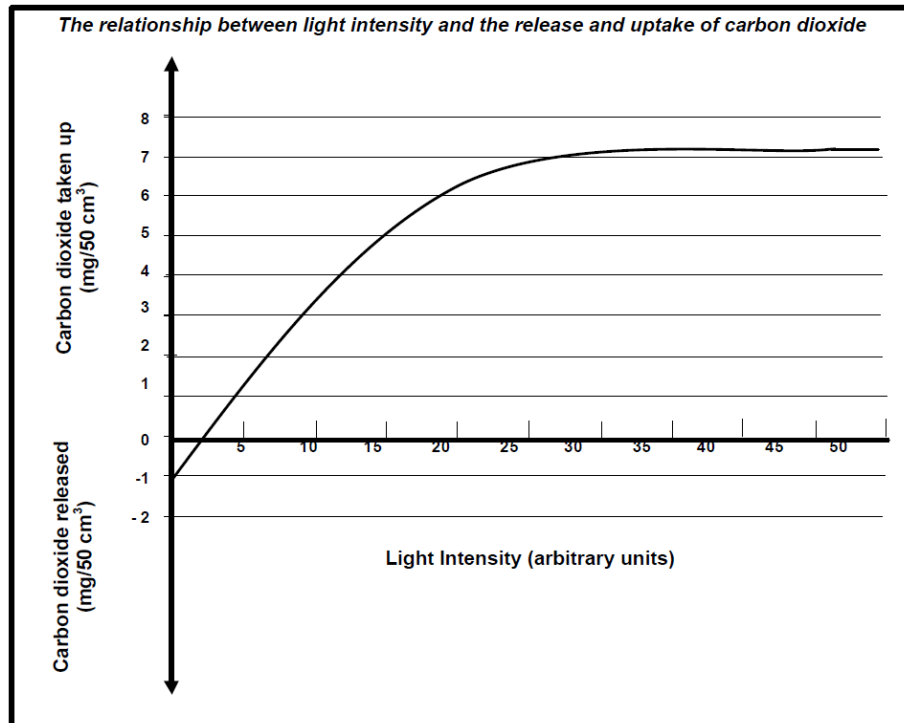
Concentration of sugar solution (%)	Number of pollen tubes
0	0
5	7
10	11
15	15
20	21

- 2.1 State a suitable hypothesis for Zama's investigation. (2)
- 2.2 Explain why Zama used distilled water in the first cavity slide. (2)
- 2.3 State any TWO ways to ensure the validity of Zama's investigation. (2)
- 2.4 Draw a line graph to represent the results of Zama's investigation. (6)
- 2.5 Calculate the percentage increase in the number of pollen tubes between a sugar concentration of 10 % up to 20 %. Show ALL calculations. (3)

(15)

QUESTION 3

An investigation was conducted to determine the relationship between light intensity and the release and uptake of carbon dioxide by the leaves of a plant. The results are indicated in the graph below.



- 3.1 At what range of light intensities is carbon dioxide released? (2)
- 3.2 Name the process, taking place in the leaves, which uses the carbon dioxide. (1)
- 3.3 Name the organelle in which the process in QUESTION 3.2. takes place. (1)
- 3.3 Why is most carbon dioxide released when the light intensity is zero (0) units? (2)
- 3.4 How much carbon dioxide is taken up by the leaves at a light intensity of 20 units? (2)
- 3.5 Name TWO external factors that need to be kept constant during the investigation. (2)

(10)

QUESTION 4

SOURCE A

The biggest challenges for plants to survive successfully on land is to prevent excessive water loss and dehydration, to effectively exchange gasses and ensure successful reproduction.

Over millennia plants have evolved countless adaptations to face these challenges. Structures like the stomata allow for effective gaseous exchange but can also adjust the amount of water lost by a plant's leaves during transpiration. The waxy cuticle that covers the outer surface of a plant's body also prevents excessive water loss, especially in dry and windy areas.

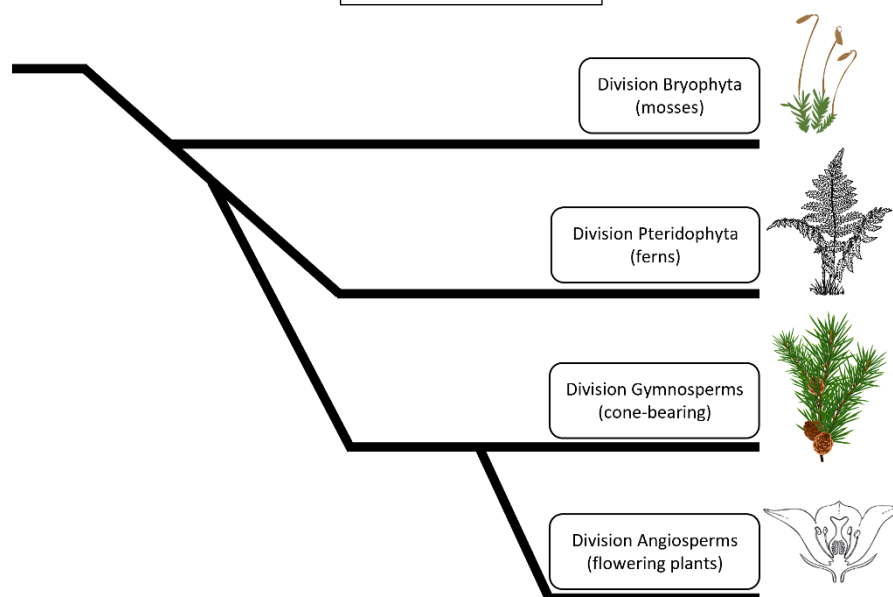
Roots not only anchor a plant in the soil, adsorb water and minerals. Stems contain vascular tissues like xylem and phloem to transport water and food up and down the plant between the leaves and roots. The leaves themselves have many adaptations to allow for efficient photosynthesis.

To survive on land, plants must be able to withstand wind and weather. Strengthening tissues in their stems help to support the plant body in harsh weather and keeps the organs, e.g. the leaves, in favourable positions for their functions.

Plants have also evolved to produce seeds that protects the new generation of seedlings inside a hard testa (seed coat) and allows them to stay dormant for long periods of time, until enough rain is available for germination.

Many plants have developed symbiotic relationships with their pollinators to ensure their species' continued survival.

SOURCE B



Phylogenetic tree of the Plant Kingdom

Write a mini-essay based on the sources (**A** and **B**) in which you briefly discuss the development of the different adaptations for a successful life on land between the four plant divisions. Refer to the different divisions and how they systematically evolved to better survive on land.

(10)

TOTAL: [50]