



GCSE Biology

Plant Diseases

Question Paper

Time available: 50 minutes

Marks available: 43 marks

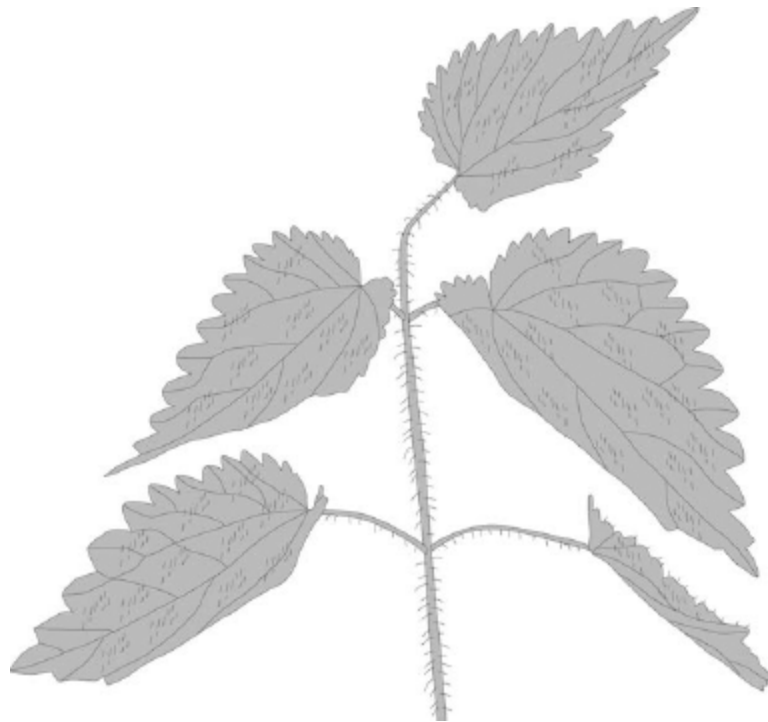
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1.

Plants have adaptations to help defend themselves and to help them survive.

Figure 1 shows a nettle plant.

Figure 1



(a) Explain how the nettle is adapted for defence and protection.

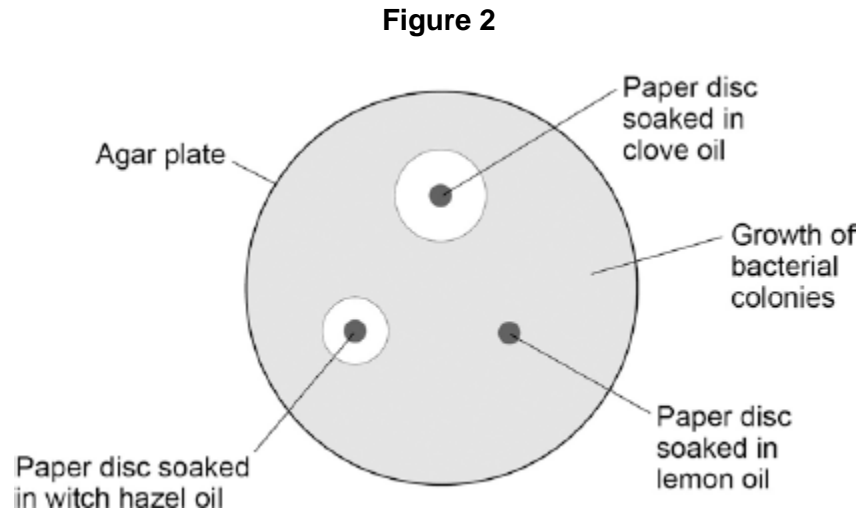
(3)

- (b) Witch hazel is another plant adapted for defence.

Witch hazel produces oil with antiseptic properties. The oil prevents bacteria from attacking the plant.

A student investigated how effective three different plant oils were at preventing the growth of bacteria.

Figure 2 shows the results.



Which plant oil is the most effective at preventing the growth of bacteria?

Give a reason for your answer.

Oil _____

Reason _____

(2)

- (c) The student tested tea tree oil using the same method.

The results showed tea tree oil was the most effective at preventing bacterial growth.

The student concluded that tea tree oil could be used to treat bacterial infections instead of antibiotics.

Give **one** reason why this is **not** a valid conclusion.

(1)

(Total 6 marks)

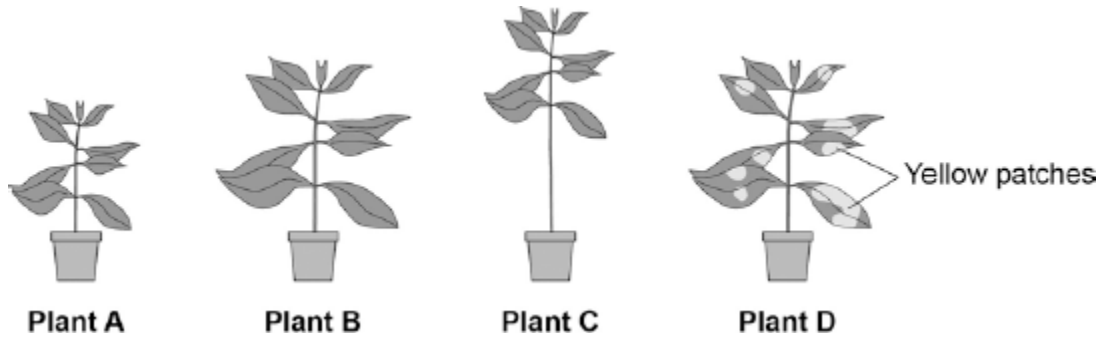
2.

To be healthy, plants need the right amount of mineral ions from the soil.

The diagram below shows four plants.

The plants were grown in four different growing conditions:

- sunny area, with nitrate and magnesium added to the soil
- sunny area, with magnesium but **no** nitrate added to the soil
- sunny area, with nitrate but **no** magnesium added to the soil
- dark area, with nitrate and magnesium added to the soil.



(a) Which plant was grown with no **nitrate**?

Tick **one** box.

A B C D

(1)

(b) Which plant was grown with no **magnesium**?

Tick **one** box.

A B C D

(1)

(c) Give **one** variable that was kept constant in this experiment.

(1)

(d) Plants need other minerals for healthy growth such as potassium ions and phosphate ions.

A farmer wanted to compare the percentage of minerals in two types of manure.

- Cow manure from her own farm.
- Chicken manure pellets she could buy.

The table below shows data for each type of manure.

	Phosphate ions in %	Potassium ions in %
Cow manure	0.4	0.5
Chicken manure pellets	2.5	2.3

Suggest **one** advantage and **one** disadvantage of using the chicken manure pellets compared to the cow manure.

Advantage _____

Disadvantage _____

(2)

(Total 5 marks)

3.

A gardener is looking at the plants in his greenhouse.

(a) Some of the plants have a disease.

Give **two** ways the gardener could identify the pathogen infecting the plants.

1. _____

2. _____

(2)

(b) Plants can become unhealthy if they do not have essential mineral ions.

Describe the appearance of plants with:

- **nitrate** deficiency
- **magnesium** deficiency.

Nitrate deficiency _____

Magnesium deficiency _____

(2)

(c) Plants need other mineral ions.

- Potassium ions are needed for healthy root growth.
- Phosphate ions are needed for healthy flowers and fruits.

The gardener makes his own garden compost.

The percentage (%) of minerals in his compost was compared with two fertilisers he could buy.

The data are shown in the table below.

	Percentage (%) mineral content			Cost in £ / kg
	Nitrate ions	Phosphate ions	Potassium ions	
Garden compost	0.5	0.3	0.8	0.00
Fertiliser S	5.0	1.3	6.6	4.99
Fertiliser T	3.0	12.0	6.0	9.99

The gardener buys Fertiliser **S**.

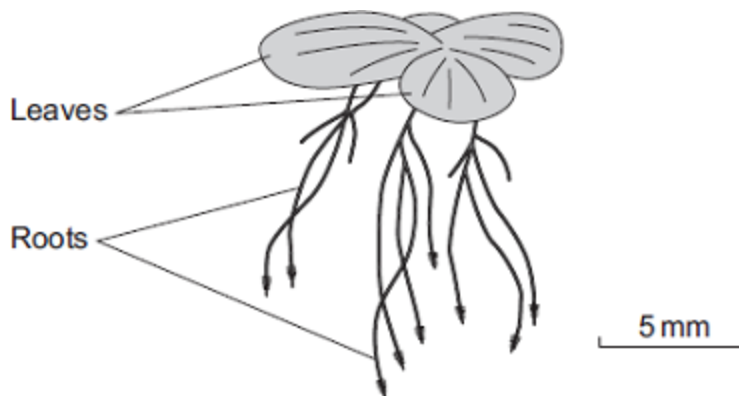
Explain why he chose Fertiliser **S**.

(4)
(Total 8 marks)

4.

Duckweed is a plant. Duckweed grows in ponds. The leaves of duckweed float on the surface of the water and its roots hang down in the water.

The drawing shows a duckweed plant.



- (a) Duckweed roots absorb nitrate ions from the water. The nitrate ions help the duckweed to grow.

Draw a ring around the correct answer to complete the sentence.

Duckweed needs nitrate ions to make

carbohydrate.

fat.

protein.

(1)

- (b) Some students grew duckweed plants in three different solutions of mineral ions, **A**, **B** and **C**, and in distilled water (**D**).

Table 1 shows the concentrations of mineral ions in each of **A**, **B**, **C** and **D** at the start of the investigation.

Table 1

Mineral ion	Concentration of mineral ions in mg per dm ³ at the start of the investigation			
	A	B	C	D
Nitrate	1000	4	4	0
Phosphate	300	0	0	0
Magnesium	200	84	24	0

The students counted the number of duckweed leaves in **A**, **B**, **C** and **D** at the start of the investigation and after 28 days.

Table 2 shows their results.

Table 2

	A	B	C	D
Number of leaves at start	4	4	4	4
Number of leaves after 28 days	50	27	14	6

- (i) Using **Table 1** and **Table 2**, describe the effect of magnesium ions on the growth of duckweed.

(1)

- (ii) Solution **A** contained the highest concentration of nitrate ions.

One student said, 'The results show that nitrate ions are needed for the growth of duckweed.'

What evidence in **Table 2** supports what the student said?

(1)

- (c) The students measured the growth of the duckweed by counting the number of leaves.

- (i) Suggest a better method of measuring the growth of the duckweed.

(1)

- (ii) Suggest why your method is better than the students' method.

(1)

(Total 5 marks)

5.

Tobacco mosaic virus (TMV) is a disease affecting plants.

The diagram below shows a leaf infected with TMV.



Yellow patches where
TMV has destroyed
chloroplasts

© Nigel Cattlin/Visuals Unlimited/Getty Images

- (a) All tools should be washed in disinfectant after using them on plants infected with TMV.

Suggest why.

(1)

- (b) Scientists produced a single plant that contained a TMV-resistant gene.

Suggest how scientists can use this plant to produce **many** plants with the TMV-resistant gene.

(1)

(c) Some plants produce fruits which contain glucose.

Describe how you would test for the presence of glucose in fruit.

(2)

(d) TMV can cause plants to produce less chlorophyll.

This causes leaf discoloration.

Explain why plants with TMV have stunted growth.

(4)

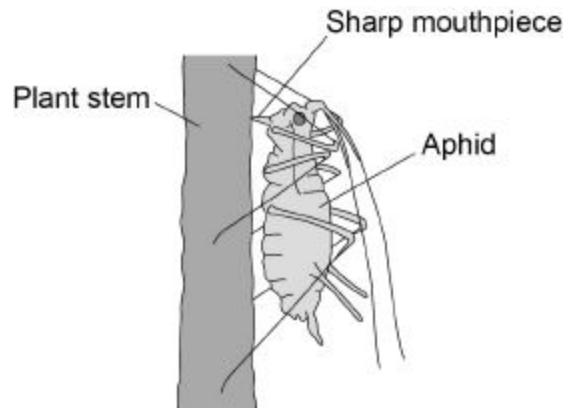
(Total 8 marks)

6.

Aphids are small insects that carry pathogens.

Figure 1 shows an aphid feeding from a plant stem.

Figure 1



(a) An aphid feeds by inserting its sharp mouthpiece into the stem of a plant.

After feeding, the mouthpiece of an aphid contains a high concentration of dissolved sugars.

Which part of the plant was the aphid feeding from?

Tick **one** box.

Palisade layer

Phloem

Stomata

Xylem

(1)

(b) What is the process that transports dissolved sugars around a plant?

Tick **one** box.

- Filtration
- Respiration
- Translocation
- Transpiration

(1)

(c) Plants infected with aphids have stunted growth.

Explain **one** way the removal of dissolved sugars from the stem of the plant causes stunted growth.

(2)

(d) Most aphids do not have wings when they hatch. After several generations, some aphids hatch which have wings and can fly.

Explain the advantage to the aphid of being able to fly.

(2)

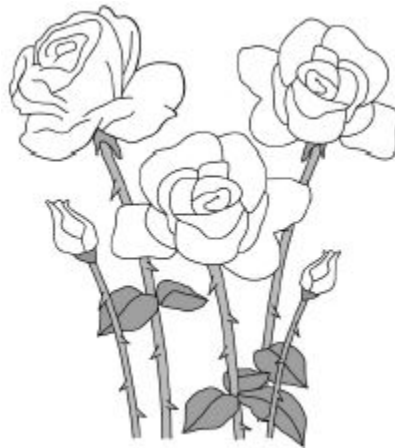
- (e) The leaves of some plants release oils onto their surface.

Suggest how the production of oil on the surface of a leaf may protect the plant from aphids.

(1)

Figure 2 shows part of a rose plant.

Figure 2

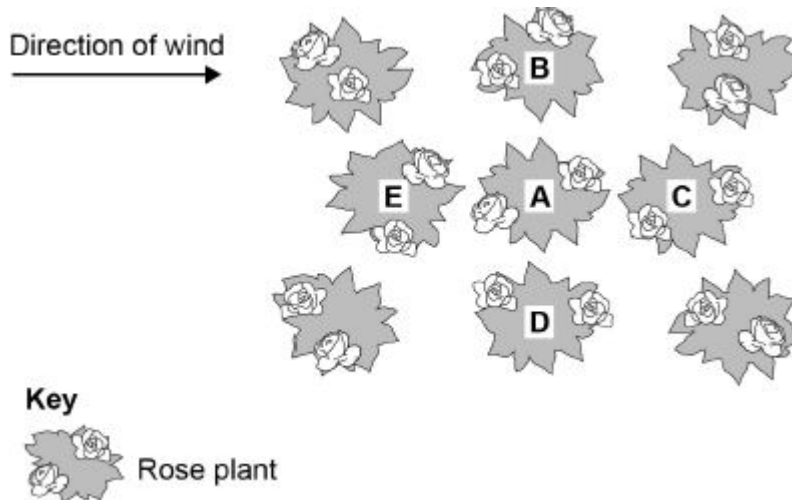


- (f) Give **one** adaptation shown in **Figure 2** that helps the rose plant defend itself.

(1)

Figure 3 shows a plan of a garden containing rose plants.

Figure 3



(g) Plant **A** has the fungal disease rose black spot.

Which plant in **Figure 3** is the fungus likely to spread to first?

Give a reason for your answer.

Plant _____

Reason _____

(2)

(h) Suggest **one** way the gardener could reduce the spread of rose black spot to the other plants in the garden.

(1)

(Total 11 marks)