

GCSE Biology (9 – 1)

Plant Diseases and Defences

Name:

Group:

Instructions

- Read each question carefully before you begin to answer it.
- Use black ink or black ball-point pen for your answers.
- Fill in the boxes at the top of this page with your name and group.
- Attempt to answer every question in the booklet.
- Answer the questions in the spaces provided – there may be more space than you need in some answer spaces.
- Calculators may be used for this booklet.
- For any calculations, you **must** show all your working.
- Any and all drawings or graphs should be completed in pencil.



For markers use	
Question	Mark
1	/4
2	/7
3	/7
4	/6
5	/8
6	/12
7	/6
Total	/50
%	
Grade	

Information

- The maximum mark for this paper is 50 marks.
- The marks for each question are shown in brackets.
- Please be aware that good English and clear presentation are required in your answers.



1. Plants face constant threats from infection by pathogens and damage from herbivores. Circle the letter of the correct answer for each of the following questions regarding plant diseases and defences.

a) Which of the following is an example of a **physical** defence mechanism in plants against pathogens?

- A Production of antimicrobial chemicals.
- B Rapid cell death to isolate the infection.
- C A thick waxy cuticle on the leaf surface.
- D Increased production of enzymes that break down pathogen cell walls.

(1 mark)

b) The figure below shows a rose leaf with symptoms of a common plant disease.



Which of the following is responsible for these symptoms?

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|----------------------|-------------------|--------------------|----------|
| A | B | C | D |
| Tobacco Mosaic Virus | Black Spot fungus | Damage from aphids | Blight |

(1 mark)

c) A gardener observes that the older leaves of their tomato plants are turning yellow between the veins, while the veins themselves remain green. This is a symptom of a mineral deficiency.

Which of the following mineral ions is most likely deficient in these tomato plants?

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|----------|-----------|-----------|-----------|
| A | B | C | D |
| Nitrate | Phosphate | Potassium | Magnesium |

(1 mark)

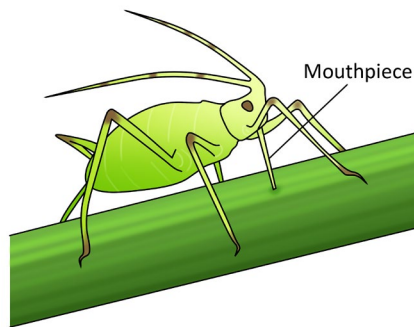
d) Which of the following is an example of a **chemical** defence used by plants to deter herbivores?

- A Thorns on the stem.
- B Waxy cuticle on the leaves.
- C Production of toxic compounds.
- D Mimicry of dead leaves.

(1 mark)

(Total for Question 1 is 4 marks)

2. An aphid pierces plant tissue with its mouthpart to consume plant sap.
The figure below shows an aphid feeding from a plant.



Aphids are capable of transferring plant pathogens from plant to plant when they feed.

- a) Describe the physical barriers a virus has to get through in a leaf when an aphid takes a bite?

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(3 marks)

- b) Plants also have chemical defences against pathogens.

Describe **one** example of a chemical defence a plant might use against aphids and explain how this defence works.

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(3 marks)

- c) If the gardener suspects their plants have a fungal disease, suggest one method they could use to try and prevent its spread to other plants.

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(1 mark)

(Total for Question 2 is 7 marks)

3. A gardener observes several of their rose bushes showing unusual symptoms. Some leaves have developed black spots surrounded by yellowing, while other bushes have stems with swollen, distorted growths.

a) State **two** different visual signs of plant disease shown by the gardener's rose bushes.

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(2 marks)

b) Suggest **two** different causes, other than a lack of nutrients, that could be responsible for these visual signs of disease in the rose bushes.

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(2 marks)

c) The gardener wants to identify the specific diseases affecting their rose bushes so they can take appropriate action.

Describe three methods the gardener could use to help them identify the causes of these symptoms.

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(3 marks)

(Total for Question 3 is 7 marks)

- **Group A:** Plants watered with a complete nutrient solution containing all essential minerals.
- **Group B:** Plants watered with a nutrient solution lacking magnesium ions.
- **Group C:** Plants watered with a nutrient solution lacking nitrate ions.

After eight weeks, the student observes differences in the appearance of the plants in each group.

Describe the expected visual symptoms of the plants in Group B and Group C, and explain how the lack of magnesium and nitrate ions leads to these symptoms.

This image shows a full page of white paper with horizontal dotted lines, resembling notebook paper. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

(6 marks)

(Total for Question 4 is 6 marks)

5. Tobacco Mosaic Virus (TMV) is a common plant pathogen that affects many species, including tomatoes and tobacco plants. The figure below shows a photograph of a tobacco leaf infected with TMV.



- a) Describe the main visual symptom of Tobacco Mosaic Virus (TMV) infection visible in the figure above.

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(2 marks)

- b) Explain how a virus, such as TMV, can cause disease in a plant.

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(3 marks)

- c) Suggest **two** ways that Tobacco Mosaic Virus could spread from one plant to another.

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(2 marks)

- d) Describe **one** method a gardener could use to help prevent the spread of TMV in their greenhouse.

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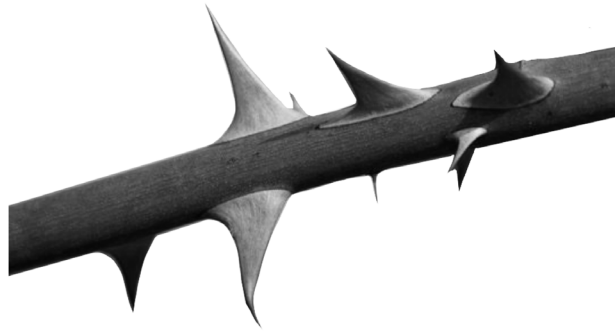
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(1 mark)

(Total for Question 5 is 8 marks)

6. The figure below shows thorns on the stem of a plant.



a) Describe how a plant can use thorns to protect itself from herbivores and state why this is a benefit to the plant.

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(2 marks)

Black spot is a fungal disease that commonly affects rose bushes, causing characteristic black spots on the leaves surrounded by yellowing.

The figure below shows a plant infected with black spot fungus.



b) Explain how a fungus, such as the one that causes black spot, obtains nutrients from a plant?

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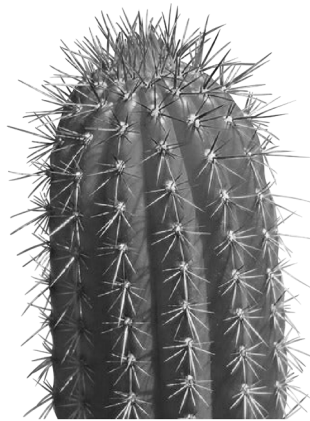
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(2 marks)

7. Plants have evolved various structural features to help them survive. Some of these features, known as mechanical adaptations, provide protection against herbivores. The figure below shows a cactus.



- a) Explain how the sharp structures found on the surface of a cactus can act as a defence against being eaten by herbivores.

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(2 marks)

- b) Some plants have leaves that exhibit rapid movement when touched, such as drooping or curling. Explain how this response could be beneficial to the plant.

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(2 marks)

- c) Give **one** example of how a plant uses mimicry as a defence mechanism against herbivores and describe how this adaptation might protect the plant.

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(2 marks)

(Total for Question 7 is 6 marks)