AQA GCSE Biology | 8461

SPECIFICATION POINT 4.3.3.1

Detection and identification of plant diseases

Past-paper questions

Tier	**Higher**
Question groups	**5**
Available paper years	**2008–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

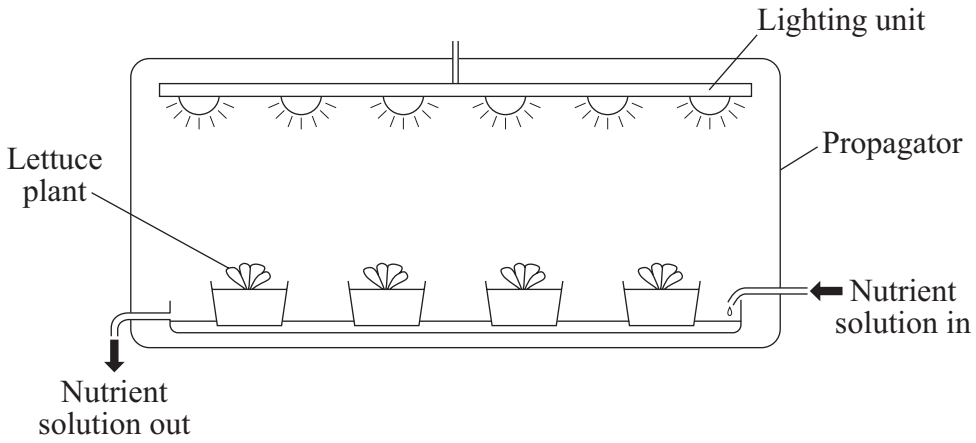
4.3.3.1 Detection and identification of plant diseases

Question 01

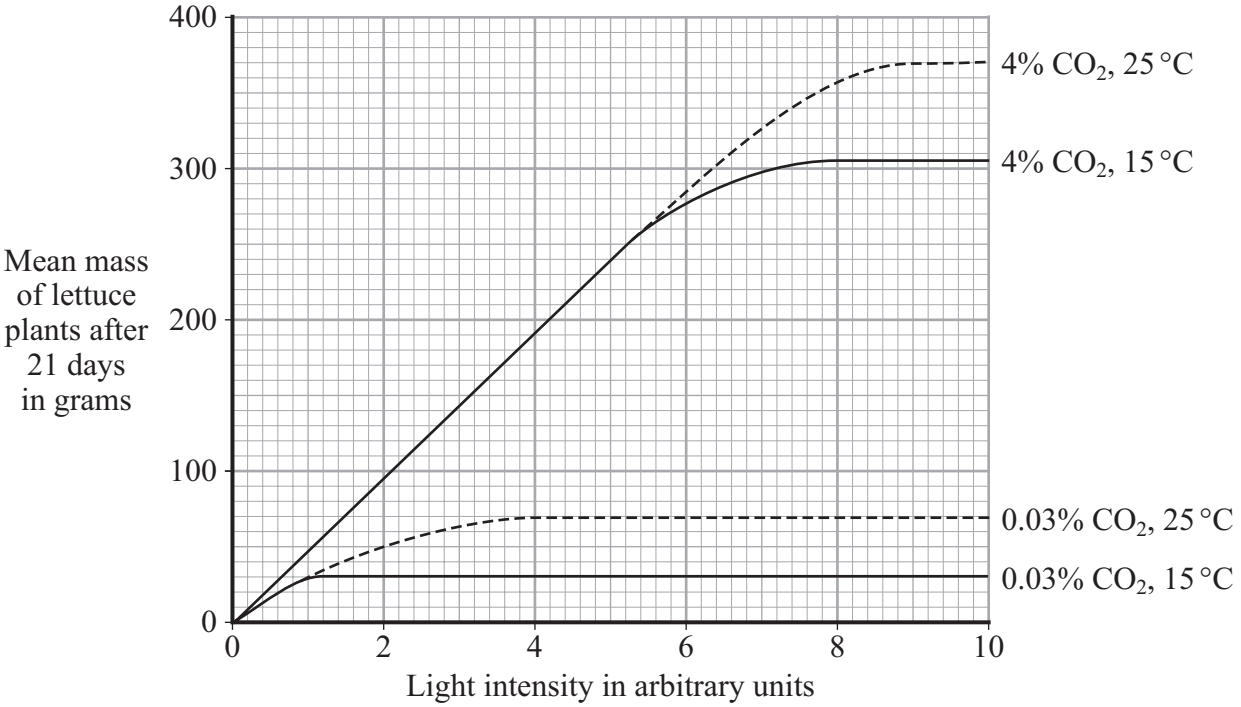
June 2008 | BLY2H | Original Q6 | Legacy

6 Changing the conditions in which plants grow affects how fast they grow.

The diagram shows a propagator in which scientists can control temperature, light intensity and carbon dioxide concentration.



The graph shows the effects of changing the temperature, light intensity and carbon dioxide concentration on the growth of lettuce plants.



4.3.3.1 Detection and identification of plant diseases

Question 01 · continued

for mark

6 (a) Describe and explain the effect of increasing light intensity on the mean mass of lettuce plants at 4% carbon dioxide and 15 °C.

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(3 marks)

6 (b) Growers wish to make maximum profits from their lettuces.

What do they need to consider before making decisions about the growing conditions for their lettuces?

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(2 marks)

Question 6 continues on the next page

4.3.3.1 Detection and identification of plant diseases

Question 01 · continued

for mark

6 (c) The nutrient solution contains nitrate ions and magnesium ions.

Complete the table to show the functions of these ions in plants and their deficiency symptoms.

Ion	Function in plants	Deficiency symptoms
Nitrate	.....	.....
	.....	.....
	.....	.....
Magnesium	.....	.....
	.....	.....
	.....	.....

(4 marks)

9

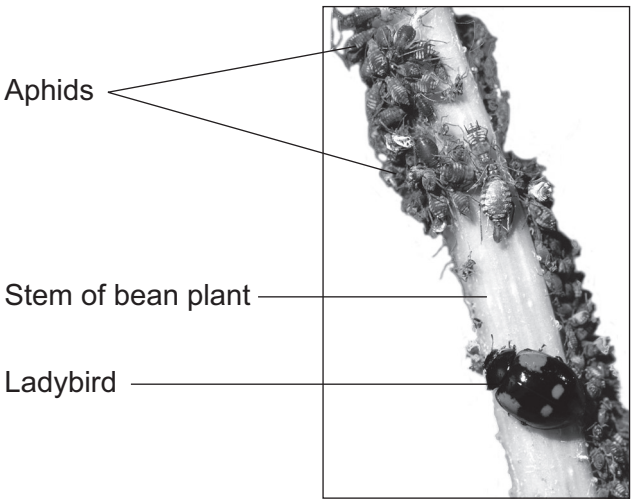
4.3.3.1 Detection and identification of plant diseases

Question 02

January 2012 | BL1HP | Original Q3 | Legacy

3 Students investigated a food chain in a garden.

The students found 650 aphids feeding on one bean plant.
Five ladybirds were feeding on the aphids.



3 (a) (i) Draw a pyramid of biomass for this food chain.
Label the pyramid.

(2 marks)

4.3.3.1 Detection and identification of plant diseases

Question 02 · continued

3 (a) (ii) The biomass in the five ladybirds is less than the biomass in the bean plant.

Give **two** reasons why.

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(2 marks)

3 (b) The carbon in dead bean plants is returned to the atmosphere via the carbon cycle.

Describe this part of the carbon cycle.

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(4 marks)

8

4.3.3.1 Detection and identification of plant diseases

Question 03

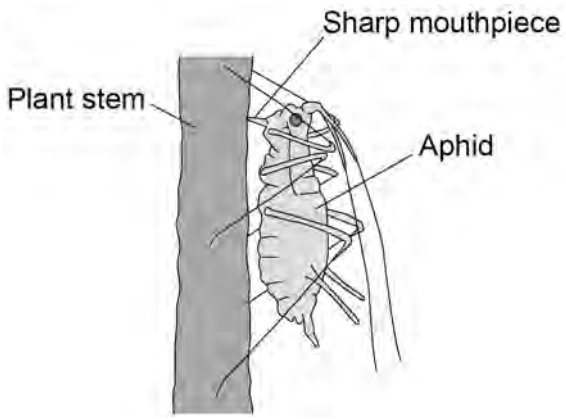
June 2018 | 8461/1H | Original Q5

0 5 Plants can be infected by fungi, viruses and insects.

Aphids are small insects that carry pathogens.

Figure 6 shows an aphid feeding from a plant stem.

Figure 6



0 5 . 1 An aphid feeds by inserting its sharp mouthpiece into the stem of a plant.

Give the reason why the mouthpiece of an aphid contains a high concentration of dissolved sugars after feeding.

[1 mark]

Question 5 continues on the next page

4.3.3.1 Detection and identification of plant diseases

Question 03 · continued

0 5 . 2 Plants infected with aphids may show symptoms of magnesium deficiency.

Magnesium deficiency symptoms include:

- yellow leaves
- stunted growth.

Explain how a deficiency of magnesium could cause these symptoms.

[5 marks]

4.3.3.1 Detection and identification of plant diseases

Question 03 · continued

0 5 . 3 A farmer thinks a potato crop is infected with potato virus Y (PVY).

The farmer obtains a monoclonal antibody test kit for PVY.

To make the monoclonal antibodies a scientist first isolates the PVY protein from the virus.

Describe how the scientist would use the protein to produce the PVY monoclonal antibody.

[4 marks]

10

4.3.3.1 Detection and identification of plant diseases

Question 04

0 1 A root is a plant organ.

Plant roots contain many different types of tissue.

0 1 . 1 What is a tissue?

[1 mark]

0 1 . 2 Tissue in the tip of a plant root contains stem cells.

Stem cells can differentiate into any type of cell.

Name the type of tissue in plants that contains stem cells.

[1 mark]

In the past many drugs were extracted from plants.

0 1 . 3 Aspirin is a painkiller.

Which plant does aspirin originate from?

[1 mark]

Question 1 continues on the next page

4.3.3.1 Detection and identification of plant diseases

Question 04 · continued

Scientists have extracted chemical **A** from the deadly nightshade plant.

Chemical **A** can be used as a painkiller.

Table 1 shows information about where chemical **A** is found.

Table 1

Part of deadly nightshade plant	Mass of chemical A in 100 g of plant tissue in grams
Roots	1.3
Leaves	1.2
Berries	0.7

0 1 . 4 The scientists usually extract chemical **A** from the berries of the deadly nightshade plant.

Suggest **one** reason why berries are used instead of leaves or roots.

[1 mark]

4.3.3.1 Detection and identification of plant diseases

Question 04 · continued

A deadly nightshade plant has chlorosis (yellow leaves).

The mass of chemical **A** found in the **leaves** of the plant is 60% of the mass shown in **Table 1**.

0 1 . 5 Calculate the mass of chemical **A** in 200 g of the **leaves** with chlorosis.

Give your answer in mg.

[4 marks]

Mass of chemical **A** = _____ mg

0 1 . 6 Suggest **one** reason why the leaves of the deadly nightshade plant have chlorosis.

[1 mark]

Question 1 continues on the next page

4.3.3.1 Detection and identification of plant diseases

Chemical **A** has **not** been tested in large-scale clinical trials in the UK.

0 1 . 7 It is important for drugs to be tested in clinical trials before the drugs are approved for use by the public.

Give **two** reasons why.

[2 marks]

1 _____

_____

2 _____

_____

There are many online reports making claims about the effects of chemical **A**.

Some of these reports are biased.

0 1 . 8 Suggest **one** reason why a report making claims about the effects of chemical **A** may be biased.

[1 mark]

_____

_____

4.3.3.1 Detection and identification of plant diseases

Question 04 · continued

0 1 . 9 How can scientists be sure that claims about new drugs are valid?

[1 mark]

Tick (✓) **one** box.

- Advertise the claims on social media. ☐
- Ask an international company to produce the drug. ☐
- Have the claims peer reviewed. ☐
- Publish the claims in a newspaper. ☐

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Turn over for the next question

4.3.3.1 Detection and identification of plant diseases

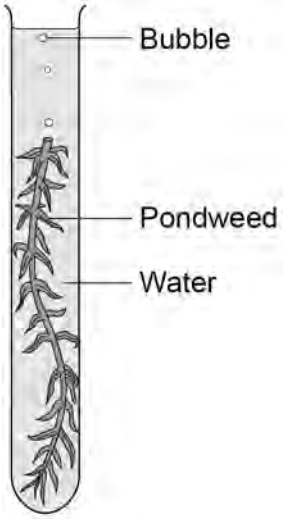
Question 05

June 2025 | 8461/1H | Original Q4

0 4 A student investigated the effect of temperature on the rate of photosynthesis in pondweed.

Figure 4 shows how the student set up the apparatus.

Figure 4



This is the method used.

1. Prepare five tubes of pondweed as shown in **Figure 4**.
2. Place one tube into each of five water baths set at different temperatures.
3. Wait two minutes.
4. Measure the time taken for each piece of pondweed to release 10 bubbles.

0 4 . 1 What is the independent variable in the investigation?

[1 mark]

Question 4 continues on the next page

4.3.3.1 Detection and identification of plant diseases

Question 05 · continued

Table 4 shows the results.

Table 4

Temperature in °C	Time taken for pondweed to release 10 bubbles in seconds
10	84
20	43
30	27
40	25
50	33

0 4 . 2 Calculate the rate of photosynthesis at **20 °C**.

Give your answer to 3 significant figures.

Give the unit.

[4 marks]

Rate (3 significant figures) = _____

Unit = _____

4.3.3.1 Detection and identification of plant diseases

Question 05 · continued

0 4 . 3 Explain the difference in the rate of photosynthesis at 40 °C compared with the rate of photosynthesis at 10 °C.

[3 marks]

0 4 . 4 Give **two** other factors that affect the rate of photosynthesis.

Do **not** refer to temperature in your answer.

[2 marks]

1

2

0 4 . 5 Describe **one** way the method could be changed to obtain more accurate results for the rate of photosynthesis.

[1 mark]

Question 4 continues on the next page

4.3.3.1 Detection and identification of plant diseases

Question 05 · continued

A gardener noticed that some plants were not growing as well as usual.

0 4 . 6 Describe **two** ways the gardener could identify a plant disease.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 7 One of the plants had purple spots on its leaves and the leaves fell off.

What disease is the plant most likely to have?

[1 mark]

_____

0 4 . 8 A different plant had yellow leaves, but no spots.

Explain why plants may develop yellow leaves.

[2 marks]

_____

_____

_____

_____

_____

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