AQA GCSE Biology | 8461

SPECIFICATION POINT 4.3.3.2

Plant defence responses

Past-paper questions

Tier	**Higher**
Question groups	**11**
Available paper years	**2007–2022**

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.

4.3.3.2 Plant defence responses

Question 01

June 2007 | BLY1B | Original Q6 | Legacy

QUESTION SIX

Read the passage.

GM Cotton

The bollworm is an insect that attacks cotton plants.

Scientists have developed genetically modified (GM) cotton plants by inserting a gene into the cotton plants.

The gene enables the cotton plants to produce a poison to kill the bollworm and prevent damage to the cotton crop.

Cotton growers do not need to buy as much pesticide to control the bollworm.

GM cotton seeds are more expensive than ordinary cotton seeds.

However, after seven years of growing the GM cotton, growers are now buying and using as much pesticide as farmers growing non-GM cotton.

6A Which of the following is likely to occur as a result of the bollworm being unable to feed on the cotton plants?

1 Other insects may increase in number.

2 Other insects will not be able to feed on the cotton plants.

3 The bollworm will become resistant to the poison produced by the cotton crop.

4 The predators of the bollworm will begin to eat the cotton plants.

6B The gene that was inserted into the cotton plants allowed the plants to . . .

1 produce more cotton.

2 produce a pesticide.

3 resist all insects.

4 resist pesticides.

4.3.3.2 Plant defence responses

Question 01 · continued June 2007 | BLY1B | Original Q6 | Legacy

6C After growing GM cotton for three years, the cotton growers were making 30 % more profit than when they grew the non-GM cotton.

This was a result of . . .

1 not having to buy as much pesticide.

2 having a bigger market for their cotton.

3 paying less for the GM seeds.

4 all insect pests having been destroyed.

6D After growing the GM cotton for seven years, the cotton growers were making less money than they did when growing non-GM cotton.

This was most likely because . . .

1 the bollworm had become resistant to the poison produced by the cotton crop.

2 pesticides could not control the bollworm.

3 the GM cotton seeds had become too expensive to buy.

4 there was no market for the GM cotton.

4.3.3.2 Plant defence responses

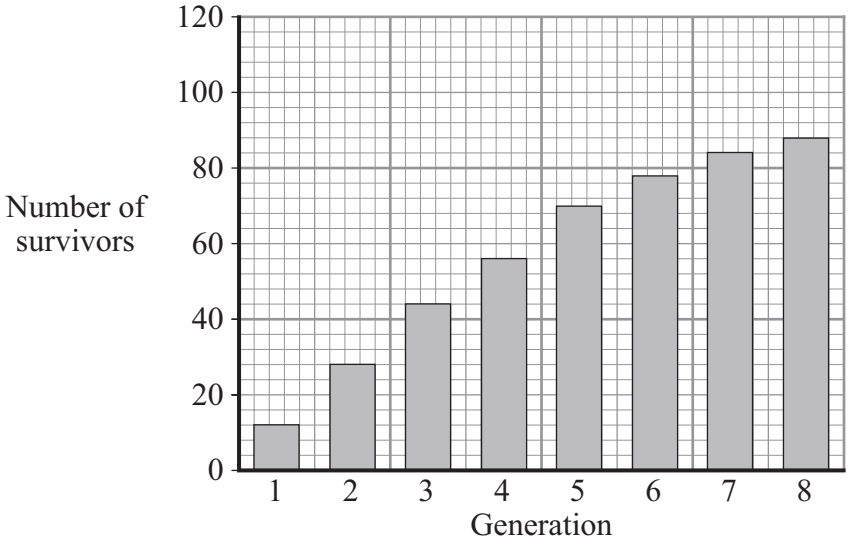
Question 02

June 2008 | BLY1BP | Original Q4 | Legacy

QUESTION FOUR

Greenflies are pests that feed on plants.

In a controlled experiment, 1000 greenflies were sprayed with an insecticide. Those that survived were counted. The survivors were allowed to breed until the population reached 1000 again. These were then sprayed and the survivors counted. This was done for eight generations.



4A How many greenflies in **generation 7** survived the spraying?

1 84

2 85

3 86

4 88

4B What trend is shown by the data?

1 The number of survivors increased by the same number in each generation.

2 There was a greater increase in the number of survivors between earlier generations than between later generations.

3 There was a smaller increase in the number of survivors between earlier generations than between later generations.

4 There was no relationship between the number of survivors and the number of generations.

4.3.3.2 Plant defence responses

Question 02 · continued June 2008 | BLY1BP | Original Q4 | Legacy

4C The number of survivors increased with each generation.

What is the most likely reason for this?

1 The greenflies learn to avoid the spray.

2 The survivors had developed a resistance to the insecticide and passed on the gene.

3 More greenflies were sprayed in the later generations.

4 A more dilute insecticide was used in order to save money.

4D Which one of the following is a disadvantage of using insecticides?

1 Insecticides can be applied easily to plants.

2 Insecticides can kill the plant as well as the greenflies.

3 Insecticides can be washed into streams and rivers where they can kill other animals.

4 Insecticides save plant producers money.

4.3.3.2 Plant defence responses

Question 03

June 2008 | BLY1BP | Original Q7 | Legacy

QUESTION SEVEN

Corn borer insects damage corn crops. Genetically modified (GM) corn plants produce a poison which kills the corn borer insects. Experts say that corn borer insects will develop resistance to the poison within 3 to 4 years.

7A The first GM corn plant was produced by inserting genes from bacteria into the cells of an embryo corn plant.

These genes were 'cut out' from the bacteria by using . . .

1 enzymes.

2 gametes.

3 hormones.

4 chromosomes.

7B One advantage of using GM corn plants rather than normal corn plants is that . . .

1 insects will become resistant.

2 biodiversity is reduced.

3 less money is spent on pesticides.

4 all the offspring will be identical.

7C One disadvantage of using GM corn plants is that . . .

1 the corn borer will pass the gene on to other insects.

2 all insects which feed on the corn will become resistant.

3 corn borer predators might become extinct.

4 the corn plants cannot be eaten.

4.3.3.2 Plant defence responses

Question 03 · continued June 2008 | BLY1BP | Original Q7 | Legacy

7D Which of the following best describes how the corn borer insects might develop resistance?

1 A mutation in the corn plant allows the corn borer insects to eat the corn and survive to reproduce.

2 An enzyme is produced which breaks down the poison.

3 Resistant corn borer insects only mate with other resistant corn borer insects.

4 Some corn plants become resistant to the predators of the corn borer insect.

Turn over for the next question

4.3.3.2 Plant defence responses

Question 04

March 2009 | BLY1BP | Original Q8 | Legacy

QUESTION EIGHT

Read the passage about controlling rabbit numbers.

> Before 1859 there were no rabbits in Australia. 24 rabbits were released in 1859.
>
> In 1926, it was estimated that there were 1 000 000 000 rabbits.
>
> The rabbit is a native of southern Europe where its population remained relatively constant until the introduction of myxomatosis, a viral disease that kills rabbits.
> The disease was introduced into the populations of Australian and European rabbits in the 1950s. It killed 99.8% of all rabbits. In recent years, the rabbit population has recovered a little. It is believed that up to 10% of the rabbit population is now genetically resistant to the disease. In a few areas of Australia, rabbits have destroyed all the acacia plants. Many farmers in Australia now use poisons to control rabbit numbers.

8A Which is a likely reason for the more rapid increase in rabbit numbers in Australia compared with Europe?

1 The rabbits evolved more rapidly in Australia.

2 Some rabbits in Australia were resistant to myxomatosis.

3 The rabbits could breed more rapidly in Australia.

4 The rabbits faced little competition in Australia.

8B Resistance to myxomatosis in rabbits was caused initially by changes in their . . .

1 competitors.

2 environment.

3 genes.

4 reproductive systems.

8C The European lynx, a natural predator of the rabbit, is an endangered species.

The evidence in the passage suggests that this could have been caused by . . .

1 the increased percentage of resistant rabbits.

2 the use of poisons.

3 the loss of the acacia plants.

4 the introduction of myxomatosis.

4.3.3.2 Plant defence responses

Question 04 · continued

8D Which is the main reason why Australian farmers *now use poisons to control rabbit numbers*?

1 Poisons will selectively kill genetically resistant rabbits.

2 Poisons are cheaper than using myxomatosis.

3 Myxomatosis is not as effective as it once was in killing rabbits.

4 The rabbit is not a native species in Australia.

Turn over for the next question

4.3.3.2 Plant defence responses

Question 05

March 2010 | BLY1BP | Original Q4 | Legacy

QUESTION FOUR

Some plants produce poisonous chemicals for protection.

- The Bullshorn acacia does not have poisonous chemicals to defend itself.
- The Bullshorn acacia compete with poisonous acacia plants that grow in the same area.
- The Bullshorn acacia has ants living at the base of its thorns.
- The ants eat a sugary substance from the Bullshorn acacia and also eat insects that feed on the acacia.

4A The most likely reason for the presence of ants on the Bullshorn acacia is that . . .

1 the Bullshorn acacia does not have to produce poisonous substances.

2 the ants are able to find food easily.

3 the Bullshorn acacia can use the extra sugar for growth.

4 the ants reduce competition between acacia plants.

A scientist removed the ants from one plant and left another plant with its ants. He then measured the growth rate of the plants. The results are shown in the table below.

Date plants measured	**Increase in Bullshorn acacia height (cm)**	
	With ants	Without ants
May	0	0
June	29	7
July	91	14

4B What was the hypothesis being tested in this investigation?

1 The presence of ants increases the growth rate of the Bullshorn acacia.

2 The Bullshorn acacia protects ant species.

3 The ants help in the sexual reproduction of the Bullshorn acacia.

4 The Bullshorn acacia uses the carbon dioxide from the ants for photosynthesis.

4.3.3.2 Plant defence responses

Question 05 · continued

4C The scientist's data might be unreliable because . . .

1 only two plants were used in the experiment.

2 there is little difference between the growth of the two plants.

3 readings were taken on only three occasions.

4 the actual height of the plants is not recorded.

4D Using all the information in this question, which row in the table suggests the best conditions for the Bullshorn acacia to grow successfully?

	Poisonous acacia	**Ants**
1	not present	not present
2	present	not present
3	not present	present
4	present	present

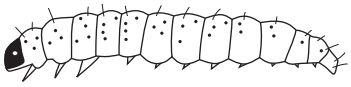
4.3.3.2 Plant defence responses

Question 06

March 2011 | BLY1BP | Original Q4 | Legacy

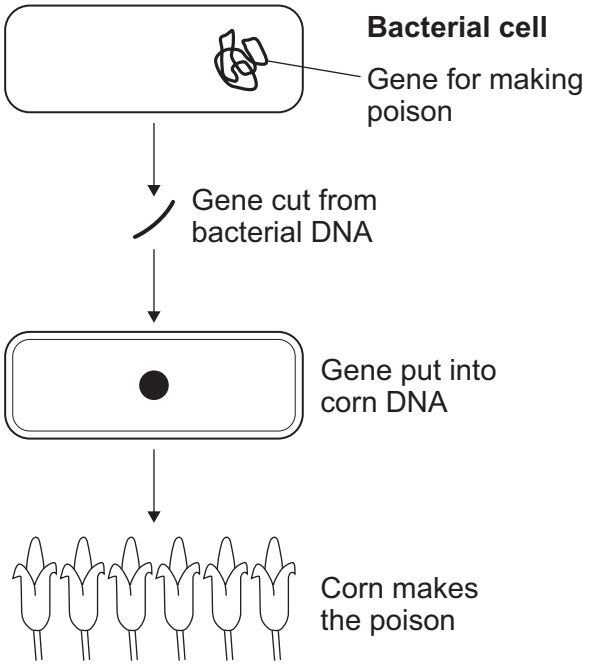
QUESTION FOUR

The drawing shows a European corn borer. European corn borers eat and destroy corn stems.



It is possible to produce corn plants that produce a poison which kills the corn borer if it eats any part of the plant.

The gene for making the poison is cut from the genetic material of a bacterial cell. The gene is then inserted into the cells of a corn plant. The corn plant then produces the poison.



4A Transferring genes from one organism to another is called . . .

1 cloning.

2 evolution.

3 genetic engineering.

4 tissue culture.

4.3.3.2 Plant defence responses

Question 06 · continued

4B One economic benefit of producing this type of corn is that . . .

1 more people will want to buy this type of corn.

2 there will be fewer pests.

3 the farmer will need to use less fertiliser.

4 the farmer will produce more corn.

4C An environmental concern about growing this type of corn is that . . .

1 more chemicals will have to be used on the land.

2 it is against some people's religious beliefs.

3 the bacterial gene may get transferred to wild plant species.

4 this type of corn will be much more expensive.

4D Scientists think that this type of corn is not harmful for people to eat.

This is very difficult to prove because . . .

1 people will not volunteer to be part of a trial.

2 the human diet contains a wide variety of foods.

3 scientists are not allowed to carry out experiments on humans.

4 animals that eat this corn appear to be healthy.

4.3.3.2 Plant defence responses

Question 07

June 2012 | BL1HP | Original Q3 | Legacy

3 *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Plants and animals have become adapted in many different ways to reduce the risk of being eaten by predators.

Describe these adaptations.

Give examples of animals and plants adapted in the ways you describe.

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(6 marks)

6

4.3.3.2 Plant defence responses

Question 08

June 2014 | BL1HP | Original Q2 | Legacy

2 **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Animals and plants have features (adaptations) that allow them to survive in the conditions in which they normally live.

Describe how animals and plants are adapted to survive in dry conditions such as deserts.

For each adaptation that you give, describe how the adaptation helps the animal or plant to survive in dry conditions.

To obtain full marks you should refer to **both** animals and plants.

[6 marks]

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Extra space .....

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4.3.3.2 Plant defence responses

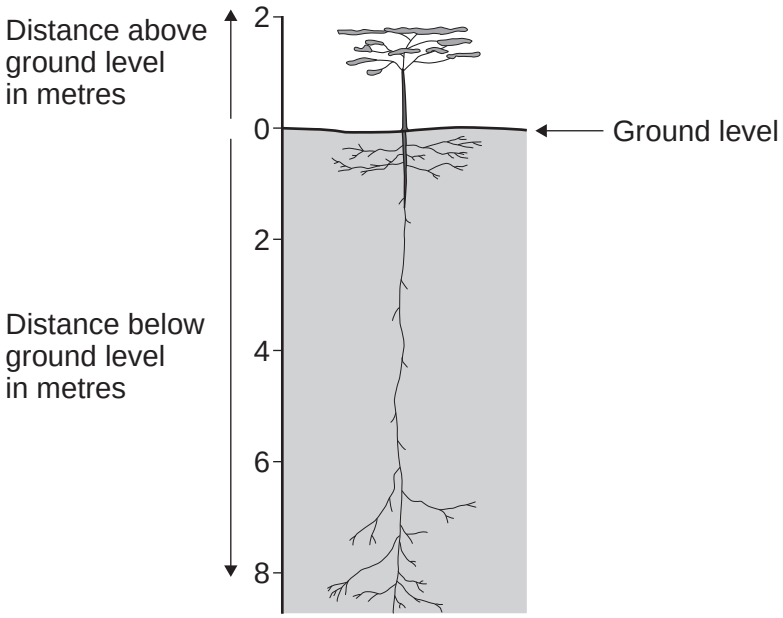
Question 09

June 2017 | BL1HP | Original Q5 | Legacy

5 Plants and animals living in hot, dry habitats have adaptations to survive.

5 (a) **Figure 3** shows an acacia tree.

Figure 3



5 (a) (i) Describe the root system of the acacia tree, shown in **Figure 3**.

Suggest how the root system helps the acacia tree to survive in dry habitats.

[3 marks]

Question 5 continues on the next page

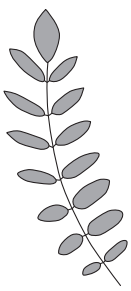
4.3.3.2 Plant defence responses

Question 09 · continued

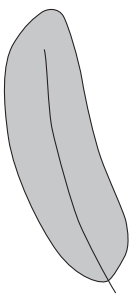
5 (a) (ii) **Figure 4** shows one leaf from an acacia tree and one leaf from a tree that lives in a cool, moist habitat. The leaves are drawn to the same scale.

Figure 4

One leaf from an acacia tree living in a hot, dry habitat



One leaf from a tree living in a cool, moist habitat



Use information from **Figure 4** to suggest how the leaf of the acacia tree helps the tree to survive in hot, dry habitats.

[2 marks]

5 (b) The branches of acacia trees have long, sharp thorns.

What is the advantage to the tree of having long, sharp thorns?

[1 mark]

4.3.3.2 Plant defence responses

Question 09 · continued

5 (c) Most animals store fat in their bodies.

5 (c) (i) Suggest **one** reason why animals store fat.

[1 mark]

5 (c) (ii) **Figure 5** shows a camel and a llama.

Camels live in hot environments. Llamas live in cold environments.

Figure 5

Camel



Llama



Table 2 gives information about stored fat in a camel and in a llama.

Table 2

	Percentage of body mass which is stored fat	Part of the body where most fat is stored
Camel	21	In the hump
Llama	20	In a layer under the skin

Suggest why most of the fat is found in different parts of the body of the two animals.

[2 marks]

9

4.3.3.2 Plant defence responses

Question 10

November 2020 | 8461/1H | Original Q5

0 5 Many plants have evolved defence mechanisms.

Figure 8 shows part of a gorse plant and part of a deadly nightshade plant.

Figure 8



Gorse plant

Deadly nightshade plant

0 5 . 1 The gorse plant has evolved to have sharp thorns.

What type of defence response are thorns?

[1 mark]

0 5 . 2 How do thorns defend the gorse plant?

[1 mark]

0 5 . 3 The deadly nightshade plant has poisonous berries.

What type of defence response are poisonous berries?

[1 mark]

4.3.3.2 Plant defence responses

Question 10 · continued

0 5 . 4 A scientist noticed that in one area the gorse plants had yellow leaves and had stunted growth.

One reason for yellow leaves and stunted growth is a deficiency of nitrate ions in the soil.

Explain **two** other possible reasons for the yellow leaves and stunted growth.

Do **not** refer to nitrate ions in your answer.

[5 marks]

Reason 1 _____

_____

Explanation _____

_____

_____

_____

Reason 2 _____

_____

Explanation _____

_____

_____

_____

Question 5 continues on the next page

4.3.3.2 Plant defence responses

Question 10 · continued

The gorse plant has nodules on its roots.

The nodules are part of the living root tissue.

Bacteria which convert nitrogen gas into soluble nitrate ions live in the nodule tissue.

Figure 9 shows the nodules on the roots.

Figure 9



0 5 . 5 Suggest how the nodules benefit the bacteria.

[2 marks]

0 5 . 6 Explain how the nodules benefit the gorse plant.

[2 marks]

4.3.3.2 Plant defence responses

Question 10 · continued

0 5 . 7 For many years drugs have been extracted from plants.

Which plant material was chewed as a painkiller?

[1 mark]

Tick (✓) **one** box.

- Blackcurrant berries ☐
- Foxglove leaves ☐
- Rose petals ☐
- Willow bark ☐

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Turn over for the next question

4.3.3.2 Plant defence responses

Question 11

June 2022 | 8461/1H | Original Q4

0 4 Plants and animals have many defence responses.

0 4 . 1 **Table 5** shows some plant defences.

Identify whether each defence is a chemical response or a physical response.

[2 marks]

Tick (✓) **one** box in each row.

Table 5

	Type of response	
Plant defence	**Chemical**	**Physical**
Thick, waxy layer on leaf surface		
Berries that are poisonous		
Bark on trees that falls off		

4.3.3.2 Plant defence responses

Question 11 · continued

Mimicry is a mechanical adaptation seen in both plants and animals.

Figure 5 shows two insects.

Figure 5



Hornet **Hornet Moth**

0 4 . 2 Hornets are insects that sting other animals and cause pain.

Hornet moths do **not** sting other animals.

Suggest how mimicry helps the **hornet moth** survive.

[1 mark]

Question 4 continues on the next page

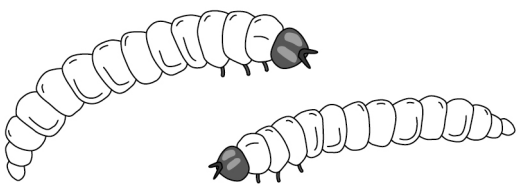
4.3.3.2 Plant defence responses

Question 11 · continued

Adult hornet moths lay eggs that hatch into larvae.

Figure 6 shows the larvae of a hornet moth.

Figure 6



0 4 . 3 The larvae of the hornet moth:

- live inside the roots of trees
- use the tree roots as a source of food
- cause damage to the tree roots.

Explain why a tree might die if the roots of the tree are damaged.

[6 marks]

4.3.3.2 Plant defence responses

Question 11 · continued

0 4 . 4 The larvae of the hornet moth form when fertilised eggs divide by mitosis.

Describe how mitosis produces two genetically identical cells.

[4 marks]

0 4 . 5 The cells which are first formed from the fertilised eggs of the hornet moth are stem cells.

Name the process by which these stem cells then form specialised cells.

[1 mark]

14