AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.6.2.4

Genetic engineering

Past-paper questions

Tier	**Higher**
Question groups	**4**
Available paper years	**2018–2025**

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.

4.6.2.4 Genetic engineering

Question 01

June 2018 | 8464/B/2H | Original Q5

0 5 Read the following.

> In the 1950s farmers in India could not grow enough rice to feed the rapidly increasing population.
>
> At the International Rice Research Institute (IRRI) scientists began a selective breeding programme with 10 000 different varieties of rice plants.
>
> In 1966 the IRRI produced a new variety called IR8 which gave a yield of up to ten times the traditional varieties. IR8 has short stems and large rice grains.
>
> IR8 was grown by farmers all over India so people had enough to eat.

0 5 . 1 The IR8 variety of rice was produced by selective breeding.

Describe the steps the scientists would have taken to produce IR8

[4 marks]

4.6.2.4 Genetic engineering

Question 01 · continued

0 5 . 2 The IRRI has now developed several new varieties of genetically modified (GM) rice plants.

Some people in India agree and some people disagree with GM varieties of rice being grown.

Explain why.

[4 marks]

8

4.6.2.4 Genetic engineering

Question 02

June 2019 | 8464/B/2H | Original Q3

0 3 . 1 Vectors are used in the process of genetic engineering.

Which **two** statements are correct?

[2 marks]

Tick (✓) **two** boxes.

- Vectors are enzymes used to 'cut open' the DNA molecule. ☐
- Vectors are used to insert genes into cells. ☐
- Vectors are used to isolate the required gene. ☐
- Vectors are used to stimulate cell division. ☐
- Vectors are usually plasmids or viruses. ☐

0 3 . 2 Scientists have genetically engineered a variety of wheat to be resistant to herbicides.

The herbicide resistant variety of wheat will give a higher yield than the non-herbicide resistant variety.

Explain why.

[3 marks]

4.6.2.4 Genetic engineering

Question 02 · continued

0 3 . 3 Give **two** examples of genetic engineering in use today.

Do **not** refer to herbicide resistance in your answer.

[2 marks]

1 _____

_____

2 _____

_____

0 3 . 4 Scientists working on the 'Human Genome Project' have now mapped the entire genetic code of humans.

Explain **one** way this could be important for people in the future.

[2 marks]

_____

_____

_____

_____

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4.6.2.4 Genetic engineering

Question 03

0 2 Potatoes are a food crop.

0 2 . 1 Potato plants are classified as eukaryota.

What type of classification group is eukaryota?

[1 mark]

Tick (✓) **one** box.

Class ☐

Domain ☐

Kingdom ☐

Phylum ☐

0 2 . 2 Potato plants can reproduce by asexual reproduction.

Which statement is true for asexual reproduction?

[1 mark]

Tick (✓) **one** box.

Meiosis occurs. ☐

Offspring are genetically identical. ☐

Pollen and egg cells are produced. ☐

Question 2 continues on the next page

4.6.2.4 Genetic engineering

Question 03 · continued

0 2 . 3 Flowers of potato plants contain gametes for sexual reproduction.

How is a gamete different from other cells in a potato plant?

[1 mark]

Tick (✓) **one** box.

A gamete contains one-quarter of the number of chromosomes. ☐

A gamete contains half of the number of chromosomes. ☐

A gamete contains double the number of chromosomes. ☐

0 2 . 4 Plants in the same genus as potatoes have been studied by scientists.

Describe **one** way a new plant species could be identified as being in the same genus as potatoes.

[1 mark]

4.6.2.4 Genetic engineering

Question 03 · continued

0 2 . 5 Scientists have collected and stored seeds from species in the same genus as potatoes.

In the future, these seeds may be used for genetic modification of potato plants.

Genetically modified potato plants could help supply food to the human population as the climate changes.

Explain why genetic modification of crop plants may be important for the human population to survive climate change.

[6 marks]

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4.6.2.4 Genetic engineering

Question 04

0 4 Farmers can increase crop yield by controlling the conditions the plants grow in.

0 4 . 1 Maize is a crop plant.

A variety of maize has been genetically modified (GM) to be resistant to a herbicide.

Explain how growing GM herbicide-resistant maize can produce a larger yield than growing non-GM maize.

[4 marks]

Extra space

0 4 . 2 Explain how growing a GM herbicide-resistant crop can **decrease** the biodiversity of animals.

[2 marks]

Question 4 continues on the next page

4.6.2.4 Genetic engineering

Question 04 · continued

Bees are a type of insect.

The number of insects near a crop can be increased by planting hedgerows.

0 4 . 3 Increasing the number of bees **and** other insects increases crop yield.

Suggest **two** reasons why increasing the number of insects can increase crop yield.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 4 Hedgerows provide habitats for insects.

Give **one** reason why increasing hedgerow habitats increases insect numbers.

[1 mark]

_____

_____

0 4 . 5 Some farmland contains areas of peat.

When peat is dug up:

- the oxygen levels in the peat increase
- the peat decays quickly.

Explain why increasing the level of oxygen in peat contributes to climate change.

[2 marks]

_____

_____

_____

_____

_____

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