AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.6.1.3

# DNA and the genome

## Past-paper questions

| | |
|---|---|
| Tier | **Higher** |
| Question groups | **3** |
| Available paper years | **2019–2020** |

## 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.

### 4.6.1.3 DNA and the genome

**Question 01**

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]**

4.6.1.3 DNA and the genome

Question 01 · 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]**

_____

_____

_____

_____

9

4.6.1.3 DNA and the genome

Question 02

June 2019 | 8464/B/2H | Original Q4

**0 4** Animals have adaptations to survive in their environment.

These adaptations may be structural, behavioural or functional.

**0 4 . 1** Draw **one** line from each animal adaptation to the type of adaptation it is.

**[2 marks]**

| Animal adaptation | Type of adaptation |
|---|---|
|  Male palm cockatoos use sticks to beat on hollow branches to attract females. | Structural |
|  The harmless hornet moth has black and yellow stripes to look like a bee or wasp. | Behavioural |
|  Sea spiders have automatic muscle contractions that move oxygen around their bodies. | Functional |

4.6.1.3 DNA and the genome

Question 02 · continued



Plants also have adaptations.

There are more than 28 000 known species of orchid plants.

**0 4 . 2** Many orchid plants:

- grow attached to other types of plants
- have brightly coloured flowers
- produce large quantities of pollen
- produce thousands of tiny, light seeds.

Describe how these adaptations help orchid plants to survive and compete.

**[4 marks]**

**Question 4 continues on the next page**

4.6.1.3 DNA and the genome

Question 02 · continued



A rare orchid has been found in the mountains in China.

The orchid has pale yellow flowers.

DNA analysis of the genome shows that it is an ancestral species.

All other present day orchids evolved from this ancestral species millions of years ago.

**0 4 . 3** One present day species has bright purple flowers.

Describe how an orchid with bright purple flowers may have evolved from the ancestral species which has pale yellow flowers.

**[4 marks]**

4.6.1.3 DNA and the genome

Question 02 · continued



**0 4 . 4** The DNA code determines the sequence of amino acids which are joined together to form a specific protein.

**Table 3** shows part of the amino acid sequence for the colour pigment protein in five orchid species.

The rest of the amino acid sequence is the same for all the species.

**Table 3**

| Species | Amino acid sequence | Flower colour |
|---|---|---|
| Ancestral species | ala-leu-gly-isoleu-tyr-gly-ala-leu-gly-ala | pale yellow |
| Species **A** | ala-isoleu-gly-ala-tyr-gly-ala-tyr-gly-ala | pale yellow |
| Species **B** | ala-leu-ala-isoleu-tyr-gly-ala-tyr-gly-ala | pink |
| Species **C** | ala-isoleu-gly-ala-gly-tyr-gly-leu-gly-ala | bright red |
| Species **D** | ala-leu-gly-isoleu-tyr-tyr-ala-leu-gly-ala | purple |

**Key:**
ala = alanine
gly = glycine
isoleu = isoleucine
leu = leucine
tyr = tyrosine

Suggest which orchid species is most closely related to the ancestral species.

Give a reason for your answer.

**[2 marks]**

Species _____

Reason _____

_____

12

4.6.1.3 DNA and the genome

Question 03

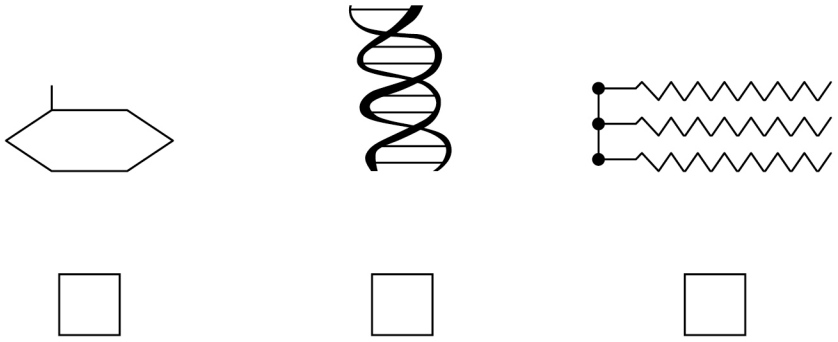
November 2020 | 8464/B/2H | Original Q1

**0 1** This question is about DNA and genes.

**0 1 . 1** Which diagram represents a DNA molecule?

**[1 mark]**

Tick (✓) **one** box.



☐ ☐ ☐

**0 1 . 2** Describe the structure of a DNA molecule.

**[1 mark]**

_____

_____

**0 1 . 3** A gene is a small section of DNA on a chromosome.

Complete the sentences.

**[2 marks]**

A gene codes for a particular sequence of _____ .

This sequence makes a specific _____ .

4.6.1.3 DNA and the genome

Question 03 · continued



**0 1 . 4** What is meant by the term genome?

**[1 mark]**

**0 1 . 5** The complete human genome is now known.

Which important scientific advance was made using knowledge of the human genome?

**[1 mark]**

Tick (✓) **one** box.

- Discovering antibiotic resistant bacteria ☐
- Finding more foods to eat from tropical forests ☐
- Tracing how aboriginal people spread across Australia ☐
- Working out when the last ice age ended ☐

**Question 1 continues on the next page**

4.6.1.3 DNA and the genome

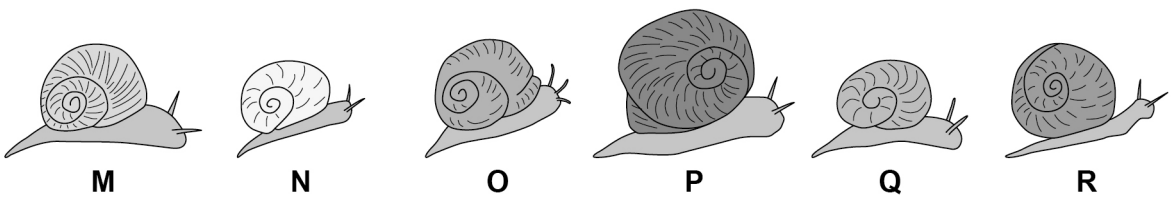
Question 03 · continued



A student found six different snails of one species in his garden.

**Figure 1** shows the snails.

**Figure 1**




**0 1 . 6** All the snails are different.

What scientific term describes differences in characteristics between individuals of a species?

**[1 mark]**

**0 1 . 7** A change in DNA has caused snail **P** to be very different from the other five snails.

Suggest why there might be an increasing number of snails similar to snail **P** in each future generation.

**[2 marks]**

9