AQA GCSE Biology | 8461

SPECIFICATION POINT 4.6.1.5

DNA structure (biology only)

Past-paper questions

Tier	**Foundation**
Question groups	**6**
Available paper years	**2013–2025**

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:** _____

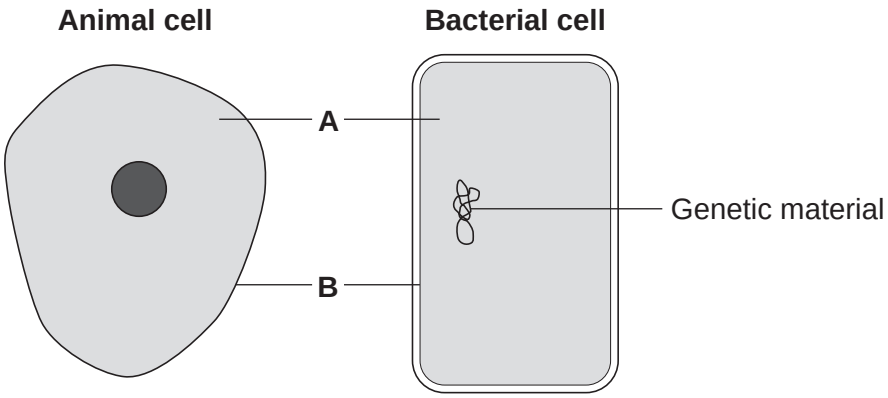
Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.6.1.5 DNA structure (biology only)

Question 01

June 2013 | BL2FP | Original Q1 | Legacy

1 The diagrams show an animal cell and a bacterial cell.



1 (a) (i) Structures **A** and **B** are found in both the animal cell and the bacterial cell.

Use words from the box to name structures **A** and **B**.

cell membrane	**chloroplast**	**cytoplasm**	**vacuole**

A .....

B .....

(2 marks)

1 (a) (ii) Both cells contain genetic material.

Name the structure in the animal cell that contains genetic material.

.....

(1 mark)

4.6.1.5 DNA structure (biology only)

Question 01 · continued

1 (b) **List A** gives three structures found in animal cells.

List B gives four functions of cell structures.

Draw **one** line from each structure in **List A** to its correct function in **List B**.

List A – Structure	List B – Function
Cell membrane	Controls what substances enter the cell
Mitochondrion	Photosynthesis
Ribosome	Protein synthesis
	Respiration

(3 marks)

6

4.6.1.5 DNA structure (biology only)

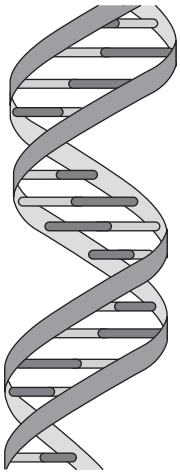
Question 02

June 2015 | BL2FP | Original Q9 | Legacy

9 DNA is the genetic material of human cells.

Figure 10 shows the structure of part of a DNA molecule.

Figure 10



9 (a) (i) Describe where DNA is found in a human cell.

[2 marks]

.....

.....

.....

9 (a) (ii) When a cell divides by mitosis the new cells are genetically identical.

What causes the cells to be genetically identical?

[1 mark]

.....

.....

9 (b) Many genes have different forms called alleles.

9 (b) (i) A person has polydactyly (extra fingers or toes). Polydactyly is caused by a dominant allele.
What is the smallest number of copies of the dominant allele for polydactyly that could be found in a body cell of this person?

[1 mark]

.....

9 (b) (ii) Another person has cystic fibrosis. Cystic fibrosis (CF) is caused by a recessive allele.
How many copies of the recessive CF allele are there in a body cell of this person?

[1 mark]

.....

4.6.1.5 DNA structure (biology only)

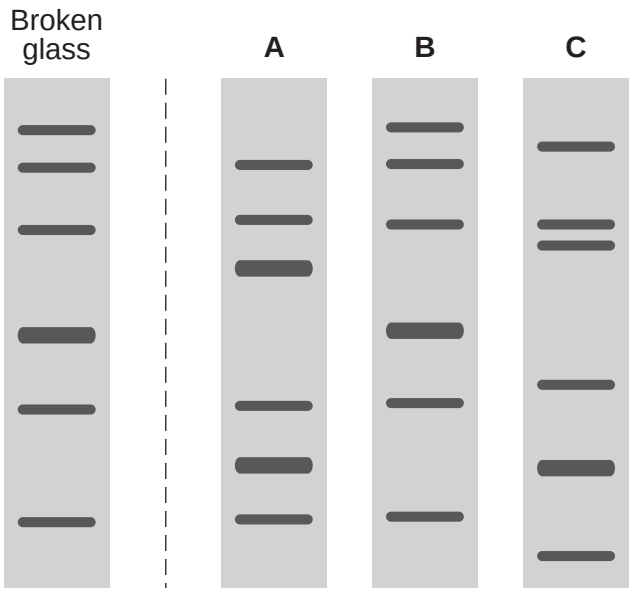
Question 02 · continued

9 (c) A burglar broke into a house. The burglar cut his hand on some broken glass. Scientists extracted DNA from the blood on the broken glass.

The scientists analysed the DNA from the glass and DNA from three suspects, **A**, **B** and **C**. The scientists used a method called DNA fingerprinting.

Figure 11 shows the scientists' results.

Figure 11



Which suspect, **A**, **B** or **C**, is most likely to have been the burglar?

[1 mark]

Tick (✓) **one** box.

A ☐

B ☐

C ☐

6

4.6.1.5 DNA structure (biology only)

Question 03

June 2019 | 8461/2F | Original Q8

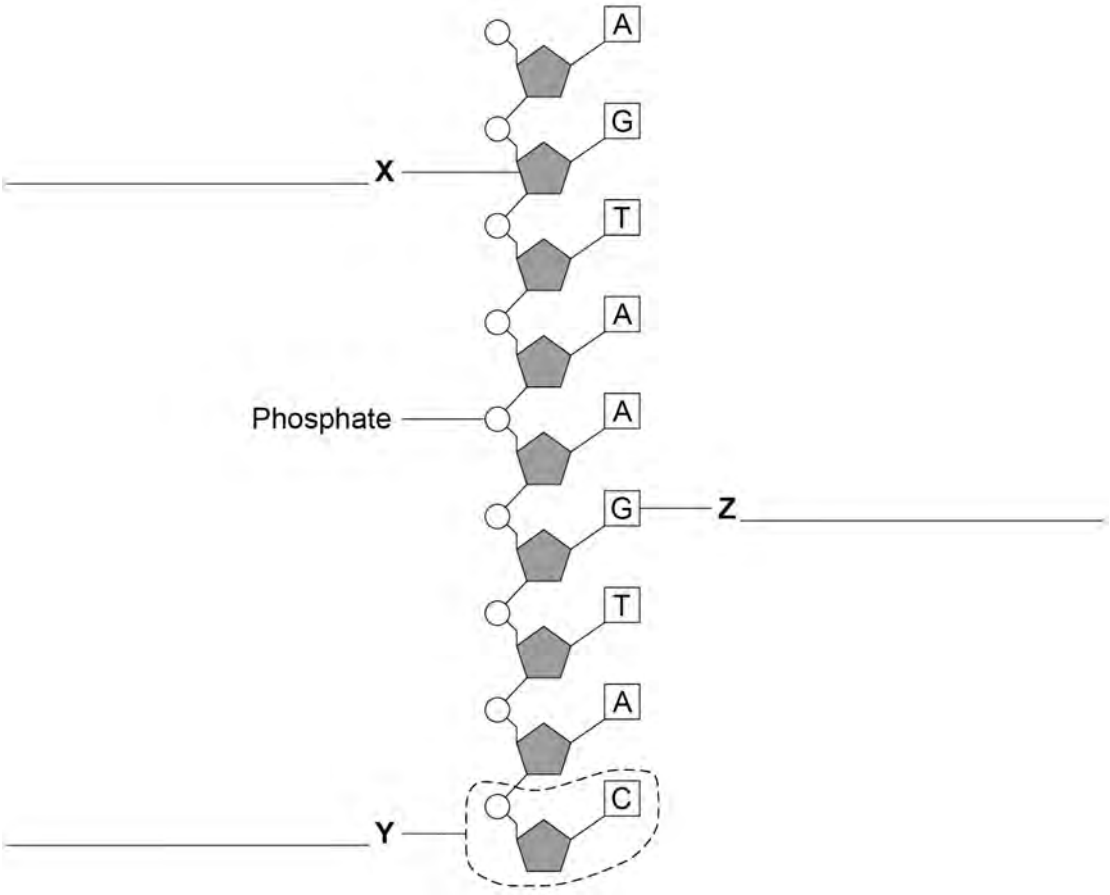
0 8 Genetic material is made of DNA.

0 8 . 1 Which structures in the nucleus of a human cell contain DNA?

[1 mark]

Figure 16 shows part of one strand of a DNA molecule.

Figure 16



0 8 . 2 Label parts **X**, **Y** and **Z** on **Figure 16**.

[3 marks]

Choose answers from the box.

Base	**Fatty acid**	**Nucleotide**	**Sugar**	**Glycerol**

4.6.1.5 DNA structure (biology only)

Question 03 · continued

0 8 . 3 A complete DNA molecule is made of two strands twisted around each other.

What scientific term describes this structure?

[1 mark]

_____

0 8 . 4 DNA codes for the production of proteins.

A protein molecule is a long chain of amino acids.

How many amino acids could be coded for by the piece of DNA shown in **Figure 16**?

[1 mark]

Tick (✓) **one** box.

2 ☐ 3 ☐ 9 ☐ 18 ☐

0 8 . 5 Scientists have now studied the whole human genome.

Give **two** benefits of understanding the human genome.

[2 marks]

1 _____

_____

2 _____

_____

8

4.6.1.5 DNA structure (biology only)

Question 04

November 2020 | 8461/2F | Original Q7

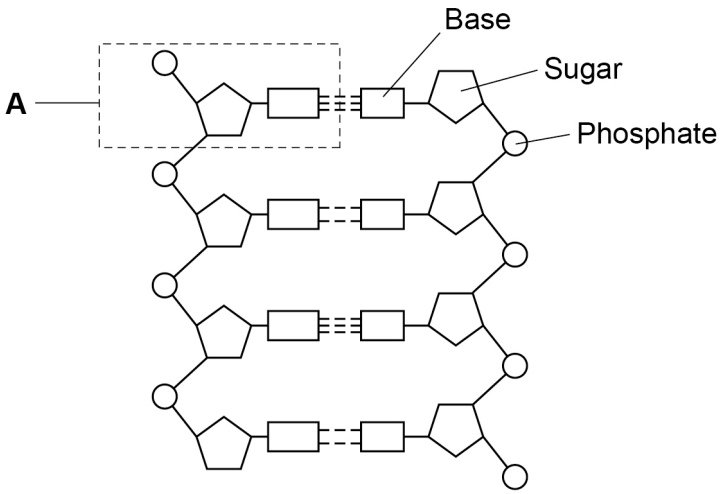
0 7 This question is about DNA.

0 7 . 1 Describe the shape of a DNA molecule.

[2 marks]

Figure 10 shows part of a DNA molecule.

Figure 10



0 7 . 2 DNA codes for a sequence of amino acids.

Which part of DNA forms the code for a particular amino acid?

[1 mark]

Tick (✓) **one** box.

- Bases ☐
- Phosphates ☐
- Sugars ☐

4.6.1.5 DNA structure (biology only)

Question 04 · continued

0 7 . 3 Which substance is produced when amino acids are joined together?

[1 mark]

Tick (✓) **one** box.

Carbohydrate ☐

Fat ☐

Protein ☐

0 7 . 4 DNA is made of repeating units. One of the units is labelled **A** in **Figure 10**.

What is the name of the repeating unit labelled **A**?

[1 mark]

Tick (✓) **one** box.

Chromosome ☐

Enzyme ☐

Nucleotide ☐

Question 7 continues on the next page

4.6.1.5 DNA structure (biology only)

Question 04 · continued

0 7 . 5 The DNA in one human body cell is the length of 6 000 million repeating units (part **A**).

Each repeating unit is 0.34 nanometres (nm) long.

Calculate the length of the DNA in the cell in millions of nanometres.

[2 marks]

Length = _____ million nm

0 7 . 6 Give your answer to Question **07.5** in metres.

1 metre = 1×10^9 nanometres

[1 mark]

Length = _____ m

0 7 . 7 DNA analysis can show people which alleles they have.

Patients who have certain types of cancer can be offered DNA analysis.

The family of the patient can also be offered DNA analysis.

Suggest **one** advantage of having DNA analysis.

[1 mark]

9

4.6.1.5 DNA structure (biology only)

Question 05

November 2021 | 8461/2F | Original Q8

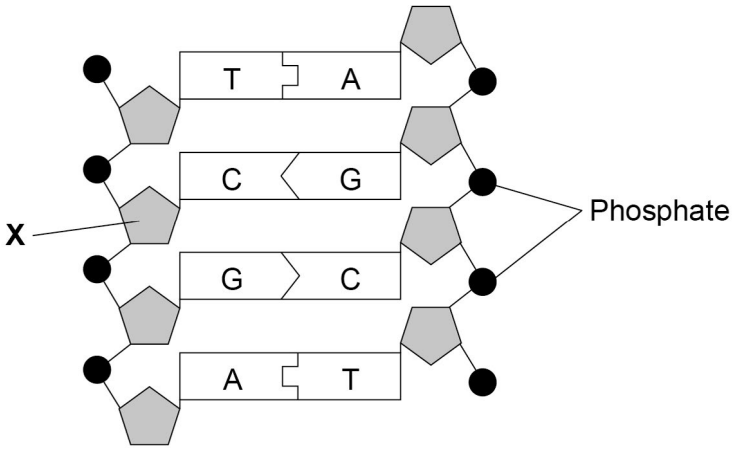
0 8 The nucleus of a cell contains DNA.

0 8 . 1 Name the structures inside the cell nucleus that contain DNA.

[1 mark]

Figure 13 shows part of a DNA molecule.

Figure 13



0 8 . 2 Name the part of the DNA molecule labelled **X**.

[1 mark]

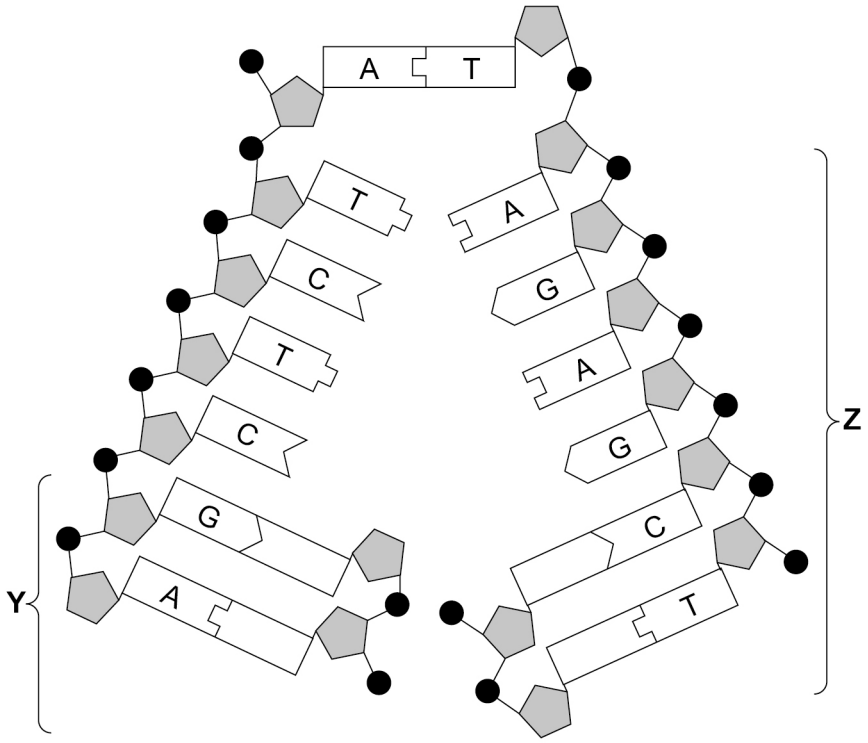
0 8 . 3 What type of substances are labelled **A**, **C**, **G** and **T** in **Figure 13**?

[1 mark]

Question 05 · continued

Figure 14 shows another section of a DNA molecule.

Figure 14



0 8 . 4 Four of the substances you named in Question **08.3** are **not** labelled in part **Y** of **Figure 14**.

Label each of these substances with the correct letter, **A**, **C**, **G** or **T**.

Use information from other parts of **Figure 14** to help you.

[1 mark]

0 8 . 5 What is happening to the DNA in part **Z** of **Figure 14**?

[1 mark]

Tick (✓) **one** box.

- Differentiation ☐
- Evolution ☐
- Fertilisation ☐
- Replication ☐

4.6.1.5 DNA structure (biology only)

Question 05 · continued

0 8 . 6 A gene is a length of DNA.

What type of substance does a gene code for?

[1 mark]

0 8 . 7 Most human body cells contain 6×10^{-12} grams of DNA.

What mass of DNA will a human sperm cell contain?

[1 mark]

Tick (✓) **one** box.

- 6×10^{-6} grams ☐
- 6×10^{-12} grams ☐
- 3×10^{-6} grams ☐
- 3×10^{-12} grams ☐

0 8 . 8 What is the name of the type of cell division that produces sperm cells?

[1 mark]

Tick (✓) **one** box.

- Binary fission ☐
- Differentiation ☐
- Meiosis ☐
- Mitosis ☐

8

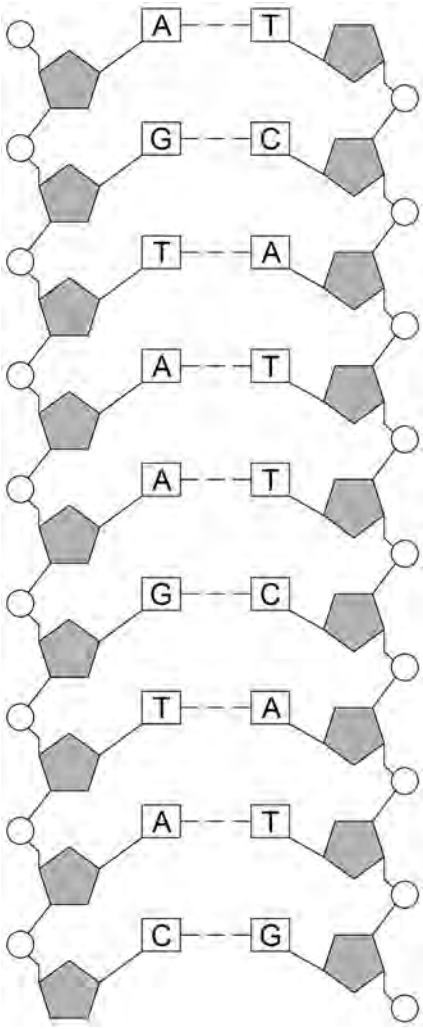
4.6.1.5 DNA structure (biology only)

Question 06

June 2025 | 8461/2F | Original Q5

0 5 **Figure 8** shows part of a DNA molecule.

Figure 8



The letters **A**, **C**, **G** and **T** in **Figure 8** represent four different compounds.

Question 06 · continued

0 5 . 1 What are **A**, **C**, **G** and **T** called?

[1 mark]

Tick (✓) **one** box.

- Bases ☐
- Fatty acids ☐
- Sugars ☐

0 5 . 2 The section of DNA shown in **Figure 8** contains the following sequence of these compounds:

A G T A A G T A C

A sequence of three compounds codes for one amino acid.

How many amino acids would this section of DNA code for?

[1 mark]

0 5 . 3 Sometimes a change occurs in the sequence of the compounds **A**, **C**, **G** and **T** in the DNA.

What name is given to a change in DNA?

[1 mark]

Tick (✓) **one** box.

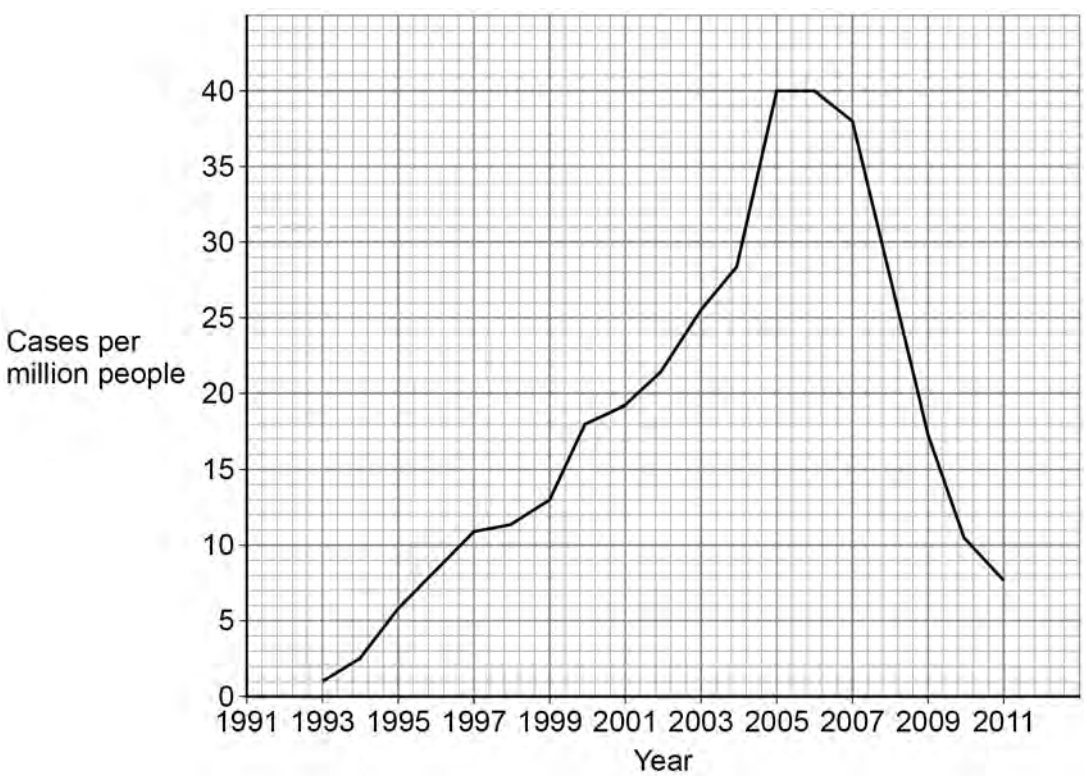
- Differentiation ☐
- Mutation ☐
- Natural selection ☐

Changes in the DNA of a bacterial pathogen can produce new strains of the pathogen.

Many people have been infected with a bacterial pathogen called MRSA.

Figure 9 shows how many cases of MRSA occurred in one country from 1993 to 2011.

Figure 9



0 5 . 4 Calculate the mean rate of increase in MRSA cases per year in the 12 years from 1993 to 2005.

[3 marks]

Mean rate of increase = _____ cases per million people per year

4.6.1.5 DNA structure (biology only)

Question 06 · continued

0 5 . 5 Most antibiotics will **not** kill MRSA bacteria.

Which word describes bacteria that are **not** killed by antibiotics?

[1 mark]

Tick (✓) **one** box.

Immune ☐

Powerful ☐

Resistant ☐

0 5 . 6 **Figure 9** shows that the number of cases of MRSA decreased after 2006.

Suggest **one** reason for this decrease.

[1 mark]

_____

_____

8