

DNA, genes and protein synthesis: practice questions

6 questions • 18 marks • mark scheme at the back

For Pearson Edexcel International GCSE Biology 4BI1 and Science (Double Award) 4SD0. **Biology only** is not in the Double Award and is only examined on Paper 2.

Name

Total / 18

1 Which statement correctly describes a gene? [1 mark]

- A. ☐ The entire DNA of an organism
- B. ☐ A section of a DNA molecule that codes for a specific protein
- C. ☐ A structure in the nucleus made of many chromosomes
- D. ☐ A single base in a DNA molecule

2 Describe how genes, chromosomes and the nucleus are related. [3 marks]

3 In a human body cell, where are chromosomes found? [1 mark]

- A. ☐ Ribosomes
- B. ☐ Cell membrane
- C. ☐ Nucleus
- D. ☐ Mitochondria

4 **Biology only** [3 marks]

A section of one strand of a DNA molecule has the base sequence A T T G C A. (a) Write the base sequence of the complementary strand. (1) (b) Describe the structure of a DNA molecule. (2)

5

Biology only

[4 marks]

The template strand of a gene has the base sequence T A C C T T G C A. (a) Write the sequence of mRNA that is made from this gene. (2) (b) State the anticodons of the tRNA molecules that pair with the first two codons. (2)

Answer =

[illegible]

6

Biology only

[6 marks]

Describe how the information in a gene is used to make a protein. In your answer, include the roles of mRNA, ribosomes, tRNA, codons and anticodons.

[illegible]

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B (1)

2. [3]

- the nucleus contains chromosomes (1)
- genes are located on the chromosomes (1)
- each gene is a section of DNA that codes for a specific protein (1)
- allow chromosomes are made of DNA / one long DNA molecule

3. [1]

C C (1)

4. [3] **Biology only**

- T A A C G T (1)
- two strands coiled to form a double helix (1)
- strands linked by (a series of) paired bases (1)
- allow A with T and C with G for the third marking point

5. [4] **Biology only**

- first codon A U G (1)
- second and third codons G A A C G U (1)
- first anticodon UAC (1)
- second anticodon CUU (1)
- allow ecf from (a)

6. [6] **Biology only**

Level 3 5-6	A clear, correct and well-organised account of both transcription and translation, in the right order, using most of the terms (mRNA, ribosome, tRNA, codon, anticodon) accurately.
Level 2 3-4	A mostly correct account of both stages, or a detailed account of one stage, with some of the terms used. Some steps may be missing or out of order.
Level 1 1-2	A few relevant points, for example that mRNA carries a copy of the gene to a ribosome. Little detail or sequencing.

Indicative content

- transcription in the nucleus: a copy of the gene is made as mRNA (single strand, complementary bases, U instead of T)
- mRNA leaves the nucleus and attaches to a ribosome
- mRNA is read in codons, groups of three bases, each coding for one amino acid
- tRNA molecules each carry a specific amino acid to the ribosome
- the anticodon of tRNA pairs with the complementary codon on mRNA
- amino acids are joined in order to make a polypeptide, which folds to form a protein