

Cell division, variation and evolution: practice questions

7 questions • 23 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 / 23

1 Which statement explains why brothers and sisters are not genetically identical? [1 mark]

- A. ☐ They are made by mitosis
- B. ☐ Fertilisation is random, so any sperm can fuse with any egg
- C. ☐ Each parent only passes on one chromosome
- D. ☐ They have different numbers of chromosomes

2 State two uses of mitosis in a human. [2 marks]

3 Compare mitosis and meiosis, in terms of the number of cells produced, the number of chromosomes in each human cell, and genetic variation. [4 marks]

4 Two identical twins were brought up in different places. One twin is 5 kg heavier than the other. (a) Suggest why the twins have the same eye colour. (1) (b) Suggest why the twins have different body masses. (2) [3 marks]

5 State what is meant by the term mutation.

[2 marks]

6 **Biology only**

[5 marks]

(a) Name one factor that can increase the rate of mutation. (1) (b) Explain how a mutation in a gene can change the phenotype. (3) (c) State what effect most mutations have on the phenotype. (1)

7 Some bacteria are resistant to an antibiotic. Explain how the number of resistant bacteria can increase in a population when the antibiotic is used, and explain why this makes infections difficult to control. **[6 marks]**

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. [2]

- growth (1)
- repair (1)
- allow replacing damaged cells
- ignore asexual reproduction

3. [4]

- mitosis produces two cells and meiosis produces four cells (1)
- mitosis: each cell has 46 chromosomes / diploid; meiosis: 23 chromosomes / haploid (1)
- mitosis produces cells that are genetically identical (1)
- meiosis produces cells that are genetically different (1)

4. [3]

- they have the same alleles / genes / are genetically identical (1)
- difference caused by the environment (1)
- for example different diet / different amount of exercise (1)

5. [2]

- a (rare,) random change (1)
- in genetic material / DNA that can be inherited (1)
- allow change in the base sequence of DNA for the second marking point

6. [5] **Biology only**

- ionising radiation / gamma rays / X-rays / ultraviolet rays / chemicals in tobacco (1)
- mutation changes the base sequence of the gene (1)
- this changes the sequence of amino acids in the protein (1)
- the protein has a different shape / does not work, changing the phenotype (1)
- no effect (1)
- ignore harmful for (c)

7. [6]

Level 3 5-6	A clear, logical explanation that links variation, selection, survival, inheritance and the increase in the resistant population, and explains why infections become difficult to control.
Level 2 3-4	An explanation with some of the key steps in order, but with a missing link, or the effect on infection control is not explained.
Level 1 1-2	A few relevant points, such as that some bacteria survive the antibiotic. Little or no use of the idea of natural selection.

Indicative content

- a mutation produces an allele that gives resistance to the antibiotic (variation)
- the antibiotic kills non-resistant bacteria; the resistant bacteria survive (selection pressure)
- the resistant bacteria reproduce, with less competition, and pass on the resistance allele
- over time the proportion of resistant bacteria increases
- the antibiotic no longer works against the infection, so it is difficult to control / can spread to other people