

GCSE Combined Science: Trilogy

Worksheet: Sexual and asexual reproduction

TIME 35 min	TOTAL 31 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Sexual and asexual reproduction

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Organisms can reproduce sexually or asexually.

0 1 . 1

Which statement about asexual reproduction is correct?

Tick (✓) **one** box.

It always involves two parents

☐

It involves the fusion of gametes

☐

It produces genetically identical offspring

☐

It produces genetically varied offspring

☐

[1 mark]

0 1 . 2

Complete the sentences.

Sexual reproduction involves the joining (fusion) of male and female

In sexual reproduction there is mixing of genetic information, which leads to in the offspring.

[2 marks]

0 1 . 3

Yeast is a single-celled fungus that usually reproduces asexually by budding, but can reproduce sexually when conditions become stressful.
Give **one** advantage to yeast of switching to sexual reproduction when conditions become stressful.

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.....

[1 mark]

0 2

Many organisms reproduce sexually, some reproduce asexually, and some can do both depending on conditions.

0 2 . 1

Compare sexual and asexual reproduction.

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[6 marks]

0 3

Sexual and asexual reproduction produce offspring in different ways.

0 3 . 1

Give **two** differences between sexual reproduction and asexual reproduction.

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[2 marks]

0 3 . 2

Explain why offspring produced by sexual reproduction show variation.

.....

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[2 marks]

0 3 . 3

Explain why offspring produced by asexual reproduction are genetically identical to their parent.

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.....

.....

[2 marks]

0 4

Some species of sea anemone can reproduce in two ways.

- Method 1: an adult splits into two pieces, and each piece grows into a new anemone.
- Method 2: adults release eggs and sperm into the sea water, where fertilisation takes place.

The body cells of this species of sea anemone contain 30 chromosomes.

0 4 . 1

Which method is asexual reproduction?

Give a reason for your answer.

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.....

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.....

[2 marks]

0 4 . 2

Give the number of chromosomes in each of the following cells.

A body cell of an anemone produced by method 1

An egg cell

A fertilised egg cell

[3 marks]

0 4 . 3

Describe how the genetic information in the anemones produced by method 1 compares with the genetic information in the parent.

.....

.....

[1 mark]

0 5

Bacteria commonly reproduce asexually by binary fission, in which one bacterial cell divides into two.

0 5 . 1

Explain why binary fission is a type of asexual reproduction.

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[2 marks]

0 5 . 2

Despite reproducing asexually, bacterial populations can change (evolve) very rapidly.
Suggest why.

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[2 marks]

0 6

A species of bacterium reproduces asexually. Under ideal conditions it doubles in number every 20 minutes. A population starts with 500 bacteria.

0 6 . 1

Calculate the number of bacteria after 2 hours.

.....

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.....

.....

Number of bacteria =

[2 marks]

0 6 . 2

At the start, one of the 500 bacteria had a mutation. Assume that the mutation does not change how often the bacterium divides.
Calculate how many of the bacteria present after 2 hours would carry this mutation.

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Number of bacteria =

[1 mark]

0 6 . 3

Explain why all of these bacteria carry the mutation.

.....

.....

.....

.....

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Sexual and asexual reproduction · 31 marks

Question 1 (4 marks)

01.1 [1 mark]

Correct: It produces genetically identical offspring

01.2 [2 marks]

Answer: gametes; variety (variation)

- gametes (allow sex cells) (1)
 - variety / variation (1)
-

01.3 [1 mark]

Answer: It produces variation, so some offspring may have characteristics suited to surviving the new conditions

- produces variation, so some offspring may be better suited to surviving the new / stressful conditions (1)
-

Question 2 (6 marks)

02.1 [6 marks]

Levels of response

- **Level 3 (5–6)** A detailed, coherent answer. Relevant points are accurate, linked in a logical sequence and use correct scientific terms.
- **Level 2 (3–4)** Several relevant points with some linking, but the answer has gaps, errors or lacks detail.
- **Level 1 (1–2)** Simple statements making one or two relevant points, with little or no linking.
- **No marks (0)** Nothing relevant or worthy of credit.

Indicative content

- sexual reproduction involves the fusion (joining) of two gametes (sex cells), one from each of two parents
- offspring produced by sexual reproduction contain a mixture of genetic information from both parents, leading to genetic variation
- this variation means a population is more likely to include individuals able to survive if the environment changes
- asexual reproduction involves only one parent, with no fusion of gametes
- offspring produced by asexual reproduction are genetically identical to the parent (clones), so there is no genetic variation between generations (other than by mutation)
- gametes are formed by meiosis, whereas asexual reproduction involves only mitosis
- sexual reproduction generally requires two parents (e.g. finding a mate) and is slower, whereas asexual reproduction does not need a mate and can increase a population rapidly when conditions are favourable

Notes: Level 3 (5–6 marks): compares both processes AND their outcomes (variation / identical offspring), using correct scientific terms, with clear comparative statements. Level 2 (3–4 marks): describes sexual and asexual reproduction with some comparison, but with gaps or one side underdeveloped. Level 1 (1–2 marks): simple statements about one type of reproduction with little or no comparison.

Question 3 (6 marks)

03.1 [2 marks]

Answer: Sexual reproduction involves two parents and the fusion of gametes; asexual involves one parent and no gametes. Sexual reproduction mixes genetic information and gives variation; asexual produces clones

- sexual involves two parents but asexual involves only one (1)
- sexual involves the fusion / joining of gametes but asexual does not (1)
- sexual produces variation / genetically different offspring but asexual produces clones (1)
- sexual involves meiosis (to make gametes) but asexual involves only mitosis (1)

Any 2 of the points above.

03.2 [2 marks]

Answer: Genetic information from two parents is mixed when gametes fuse, and the gametes are genetically different from each other

- genetic information from two parents is mixed (when gametes fuse) (1)
- gametes (made by meiosis) are genetically different from each other (1)

03.3 [2 marks]

Answer: There is only one parent and no fusion of gametes, so there is no mixing of genetic information; only mitosis is involved, which produces genetically identical cells

- only one parent / no fusion of gametes / no mixing of genetic information (1)
- only mitosis is involved (which makes genetically identical cells) (1)

Question 4 (6 marks)

04.1 [2 marks]

Answer: Method 1: there is only one parent and no fusion of gametes

- method 1 (1)
- only one parent / no gametes / no fusion of gametes (1)

04.2 [3 marks]

Answer: 30; 15; 30

- 30 (1)
- 15 (1)
- 30 (1)

04.3 [1 mark]

Answer: It is identical; they are clones of the parent

- identical (to the parent) / they are clones (1)
-

Question 5 (4 marks)

05.1 [2 marks]

Answer: There is only one parent cell and no fusion of gametes, so the two new cells are genetically identical to the parent

- there is only one parent (cell) and no fusion of gametes (1)
- so the two new cells are genetically identical to the parent (clones) (1)

05.2 [2 marks]

Answer: Mutations still occur during binary fission, producing new genetic variants; because bacteria reproduce so quickly, a useful mutation can spread through a very large population in a short time

- mutations still occur during binary fission, producing new genetic variants (1)
- bacteria reproduce very quickly (a short generation time), so a useful mutation can spread through a large population in a short time (1)

Question 6 (5 marks)

06.1 [2 marks]

Answer: 32 000

- 2 hours = 6 divisions ($120 \div 20$) (1)
- $500 \times 2^6 = 32\,000$ (1)

Notes: Correct answer with no working scores 2 marks.

06.2 [1 mark]

Answer: 64

- $2^6 = 64$ (1)

06.3 [2 marks]

Answer: Binary fission is asexual reproduction: only one parent is involved and there is no mixing of genetic information, so every offspring is a genetically identical clone of its parent and inherits the mutation

- binary fission is asexual: only one parent is involved and there is no fusion of gametes / no mixing of genetic information (1)
 - so every offspring is genetically identical to its parent (a clone) and inherits the mutation (1)
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