Sexual and asexual reproduction

4.6.1.1 · Biology · revision notes

How sexual reproduction (two parents, fusion of gametes, variation) differs from asexual reproduction (one parent, no gametes, clones). It is usually tested with short recall questions, 'compare' questions and 'explain why the offspring are identical' questions.

Key facts

- Gamete = sex cell with half the normal number of chromosomes
- Sexual reproduction = fusion of male and female gametes → mixing of genetic information → variation
- Meiosis makes gametes; asexual reproduction involves only mitosis
- Animal gametes: sperm and egg. Flowering plant gametes: pollen and egg
- Asexual reproduction = one parent, no gametes, no mixing → clones
- Clone = genetically identical offspring

Notes

Sexual reproduction

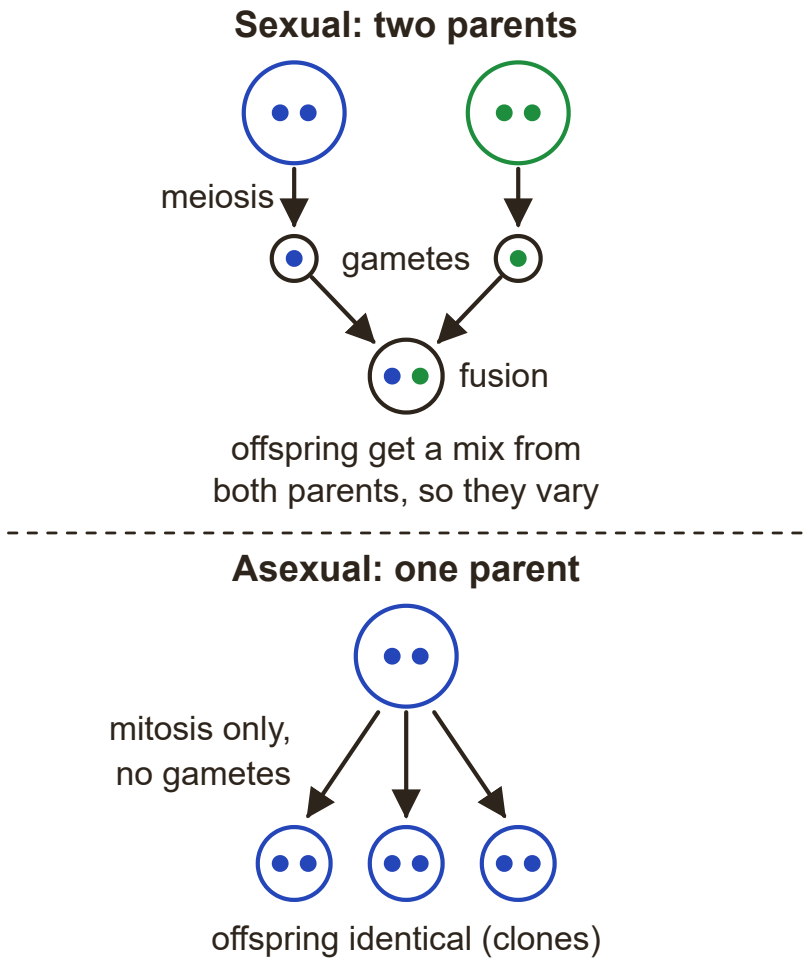
- Sexual reproduction involves the **joining (fusion) of a male gamete and a female gamete**.
- In animals the gametes are **sperm** and **egg** cells. In flowering plants they are **pollen** and **egg** cells.
- Gametes are made by **meiosis**, so each gamete has half the normal number of chromosomes.
- Genetic information from the two parents is **mixed**, so the offspring show **variation**: they are genetically different from each other and from their parents.

Asexual reproduction

- Asexual reproduction involves **only one parent**.
- There is **no fusion of gametes** and **no mixing of genetic information**.
- Only **mitosis** is involved, so the offspring are **genetically identical** to the parent and to each other. Genetically identical offspring are called **clones**.
- Examples: strawberry plants growing new plants on runners, and daffodils forming new bulbs.

Side by side

- Parents: sexual needs two; asexual needs one.
- Gametes: sexual uses gametes made by meiosis; asexual uses no gametes.
- Cell division: sexual involves meiosis (to make gametes); asexual involves only mitosis.
- Offspring: sexual gives genetically different offspring (variation); asexual gives genetically identical offspring (clones).



Coloured dots stand for genetic information: mixed in sexual reproduction, copied exactly in asexual reproduction.

How to answer each type of question

Recall: name the gametes or the type of cell division

1 mark each | Grade 3

1. Learn the pairs: sperm and egg (animals), pollen and egg (flowering plants).
2. Meiosis makes gametes; mitosis is the only cell division in asexual reproduction.

Example. (a) Name the male gamete in a flowering plant.
(b) Name the type of cell division involved in asexual reproduction.

Model answer.

(a) Pollen (1)
(b) Mitosis (1)

Compare sexual and asexual reproduction

3 to 4 marks | Grade 5

1. Make every point a comparison: 'sexual ... whereas asexual ...'.
2. Cover the number of parents, gametes, mixing of genetic information and whether the offspring vary.
3. Use the key words fusion, gametes, variation and clones.

Example. Compare sexual reproduction with asexual reproduction. [4 marks]

Model answer.

Sexual reproduction needs two parents, whereas asexual reproduction needs only one (1). Sexual reproduction involves the fusion of gametes, but asexual reproduction involves no gametes (1). In sexual reproduction genetic information from two parents is mixed, but in asexual reproduction there is no mixing (1). So sexual reproduction produces variation in the offspring, whereas asexual reproduction produces genetically identical offspring (clones) (1).
Also allow: sexual involves meiosis, whereas asexual involves only mitosis.

Explain why the offspring are identical (or different)

2 marks | Grade 5

1. Say which type of reproduction it is and why (one parent, no gametes).
2. Give the reason: no mixing of genetic information and only mitosis (or, for sexual, mixing of genetic information from two parents).
3. Finish with the result: clones or variation.

Example. A gardener grows five new strawberry plants from the runners of one parent plant. Explain why the five new plants are genetically identical to the parent plant. [2 marks]

Model answer. Growing plants from runners is asexual reproduction, with only one parent and no fusion of gametes (1). Only mitosis is involved, so there is no mixing of genetic information and the new plants have exactly the same genetic information as the parent (1).

Don’t lose marks

- Saying asexual reproduction uses meiosis. It involves only mitosis.
- Writing 'the genes are mixed' without saying that the genetic information comes from two parents.
- Saying pollen is the female gamete. Pollen is male; the egg cell is female.
- Calling asexual offspring 'similar' or 'the same'. Use 'genetically identical' or 'clones'.

More tips

Memory tricks

- A for Asexual, A for 'A copy': one parent, no gametes, clones.
- Count the parents: two parents always means gametes, fusion and variation.
- Mitosis makes identical cells (growth, repair, asexual reproduction). Meiosis makes gametes.

Exam technique

- In 'compare' questions, give both sides of every point (sexual ... whereas asexual ...). A one-sided statement often gets no credit.
- Key words examiners look for: fusion, gametes, mixing of genetic information, variation, clones, mitosis, meiosis.
- If the question describes an unfamiliar organism, look for clues: one parent and no gametes means asexual reproduction.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3 — **Name the gametes in animals and plants**
Animals: sperm and egg cells. Flowering plants: pollen and egg cells.

Grade 3 — **State how many parents each type needs**
Sexual reproduction needs two parents; asexual reproduction needs only one.

Grade 4 — **Define sexual reproduction**
The joining (fusion) of a male gamete and a female gamete.

Grade 5 — **Name the cell division each type uses**
Gametes are made by meiosis; asexual reproduction involves only mitosis.

Grade 5 — **Explain why sexually produced offspring vary**
Genetic information from two parents is mixed, so each offspring gets a different combination of alleles.

Grade 5 — **Explain why asexual offspring are clones**
There is no fusion of gametes and no mixing of genetic information, and only mitosis is involved.

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