

# Reproduction and meiosis

Revision notes · Compare asexual and sexual reproduction, and explain how meiosis makes genetically different gametes.

For Edexcel GCSE Biology 1BI0 and Combined Science 1SC0. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

## Reproduction and meiosis **Spec 3.1B-3.3**

### Asexual reproduction **Spec 3.1B** **Triple only**

In **asexual reproduction** there is only one parent. The offspring are genetically identical to the parent, so there is **no variation** in the population.

#### Asexual reproduction: advantages and disadvantages

|                     | Point                          | Why it matters                                                                                                  |
|---------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Advantage</b>    | No need to find a mate         | Saves time and energy. Useful when individuals are far apart.                                                   |
| <b>Advantage</b>    | Rapid reproductive cycle       | Many offspring are made quickly, so the population can grow fast.                                               |
| <b>Disadvantage</b> | No variation in the population | All the individuals have the same weaknesses. A new disease or a change in the environment could kill them all. |

The key idea is the trade-off. Asexual reproduction is quick and needs no partner, but the lack of variation makes the population vulnerable if conditions change.

*Exam tip: Do not just write that there is no variation. Link it to a consequence: for example, none of the population would be resistant to a new disease.*

### Sexual reproduction **Spec 3.2B** **Triple only**

In **sexual reproduction** two parents each produce gametes. The gametes fuse at fertilisation, so the offspring inherit a mixture of alleles from both parents. This produces **variation** in the population.

#### Sexual reproduction: advantages and disadvantages

|                     | Point                       | Why it matters                                                                                                                            |
|---------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Advantage</b>    | Variation in the population | If the environment changes or a disease appears, some individuals are likely to have characteristics that let them survive and reproduce. |
| <b>Disadvantage</b> | Requirement to find a mate  | This takes time and energy, and may not always be possible.                                                                               |

*Common mistake: Sexual reproduction does not make identical offspring, and the offspring are not identical to either parent. Always say they are genetically different.*

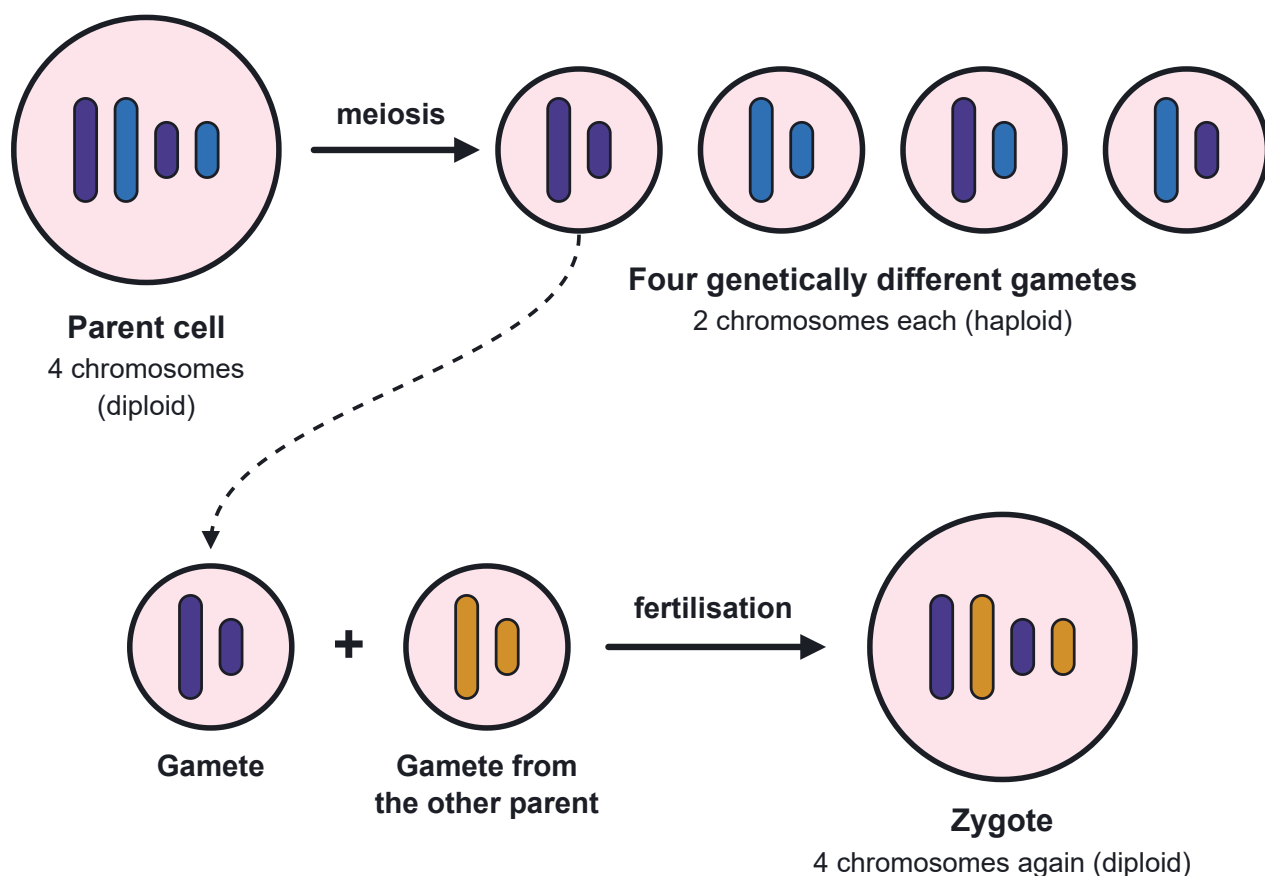
### Meiosis **Spec 3.3**

**Meiotic cell division** (meiosis) is the type of cell division that makes gametes. In humans it happens in the reproductive organs.

- One parent cell divides to produce **four daughter cells**.
- Each daughter cell has **half the number of chromosomes** of the parent cell.
- The daughter cells are **genetically different** from each other and from the parent cell.
- The daughter cells are **haploid gametes**, with one set of chromosomes.

A human body cell has 46 chromosomes. Meiosis makes sperm and egg cells with 23 chromosomes each. At fertilisation the two gametes fuse and the zygote has 46 chromosomes again, with half from each parent.

| Body cells and gametes                      |                         |                              |
|---------------------------------------------|-------------------------|------------------------------|
|                                             | Body cell (diploid)     | Gamete (haploid)             |
| <b>Chromosomes in a human cell</b>          | 46                      | 23                           |
| <b>Genetically identical to the others?</b> | Yes, if made by mitosis | No, each gamete is different |
| <b>Made by</b>                              | Mitosis                 | Meiosis                      |



Meiosis halves the chromosome number; **fertilisation** restores it in the zygote.

**Exam tip:** The stages of meiosis are not required. Learn the outcome: four genetically different haploid gametes, each with half the number of chromosomes.

### Quick check

1. Give one advantage and one disadvantage of asexual reproduction.
2. Give one advantage and one disadvantage of sexual reproduction.
3. How many daughter cells does one meiotic division produce?
4. How many chromosomes are in a human gamete?

## Quick check answers

### Reproduction and meiosis

- 1 . Advantage: no need to find a mate (or rapid reproductive cycle). Disadvantage: no variation in the population.
- 2 . Advantage: variation in the population. Disadvantage: the requirement to find a mate.
- 3 . Four.
- 4 . 23, which is half the number in a body cell (46).