

Asexual and sexual reproduction

Revision notes • Asexual reproduction gives genetically identical offspring from one parent; sexual reproduction fuses gamete nuclei and gives varied offspring.

For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

Asexual and sexual reproduction Spec 16.1, 16.2

Asexual reproduction Spec 16.1.1, 16.1.2, 16.1.3

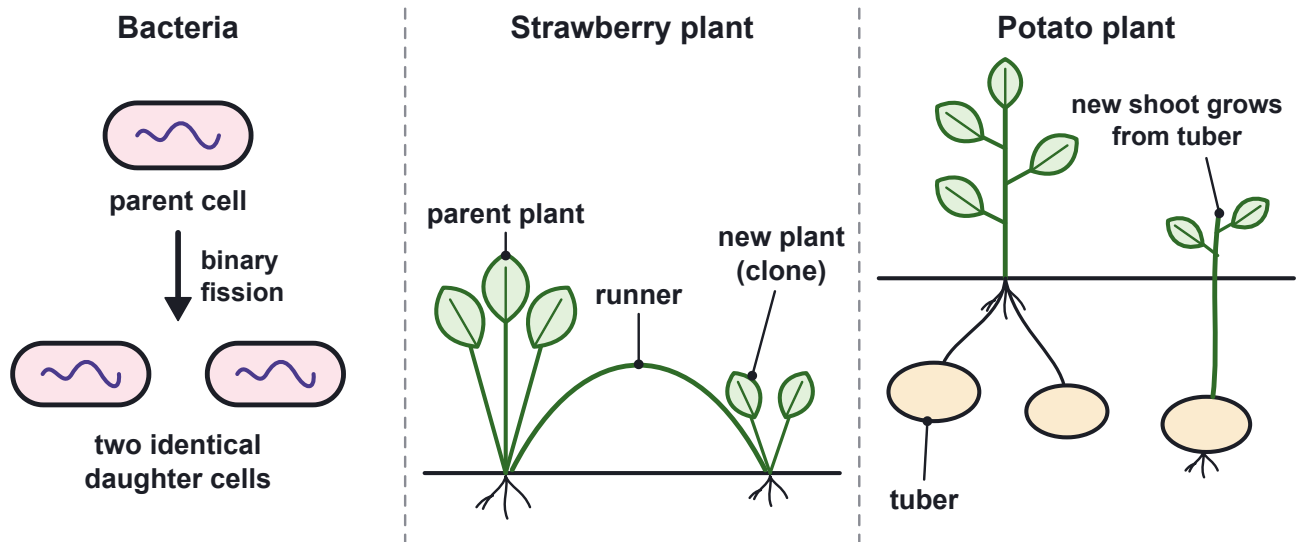
Asexual reproduction is a process resulting in the production of **genetically identical offspring** from **one parent**. There are no gametes and no fusion of nuclei, so there is no mixing of genetic information. The offspring are clones of the parent.

Asexual reproduction	A process resulting in the production of genetically identical offspring from one parent.
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Spotting examples of asexual reproduction

You must be able to identify asexual reproduction in diagrams, images and information you are given. Look for one parent only, and offspring that are copies of it.

Examples of asexual reproduction	
Organism	What happens
Bacteria	A bacterial cell divides in two (binary fission). Each new cell is genetically identical to the parent cell.
Strawberry plant	The parent plant grows horizontal stems called runners. A new plant grows from a bud on the runner and becomes separate from the parent.
Potato plant	Underground stems swell to form tubers. Each tuber can grow into a new plant that is genetically identical to the parent.
Daffodil	New bulbs grow from buds on the parent bulb. Each one separates and grows into a new plant that is genetically identical to the parent.
Fungi (such as bread mould)	The parent releases spores. Each spore can grow into a new fungus.



Three examples of **asexual reproduction**. Each has **one parent**, and the offspring are genetically identical to it.

Exam tip: In a 'spot the example' question, give the reason: **only one parent is involved and the offspring are genetically identical to it.**

Supplement

Advantages and disadvantages of asexual reproduction

Supplement

Asexual reproduction in the wild and in crop production

	Advantages	Disadvantages
To a population of a species in the wild	Only one parent is needed, so no mate has to be found. It is quick and uses less energy. Many offspring can be produced in a short time. A population can spread quickly into a favourable environment where it is well adapted.	There is no genetic variation, so all the individuals are equally affected by a change in the environment or by a new disease. The population may not survive. There is no new variation for natural selection to act on.
To crop production	All the plants have the same desirable features, so the crop is uniform in size, yield and quality. A plant with useful features can be copied exactly. Many plants can be produced quickly and cheaply.	All the plants are equally susceptible to the same disease or pest, so the whole crop can be lost. There is no variation, so no new varieties are produced.

Common mistake: Do not write that asexual offspring are 'similar' to the parent. The mark is for 'genetically identical'.

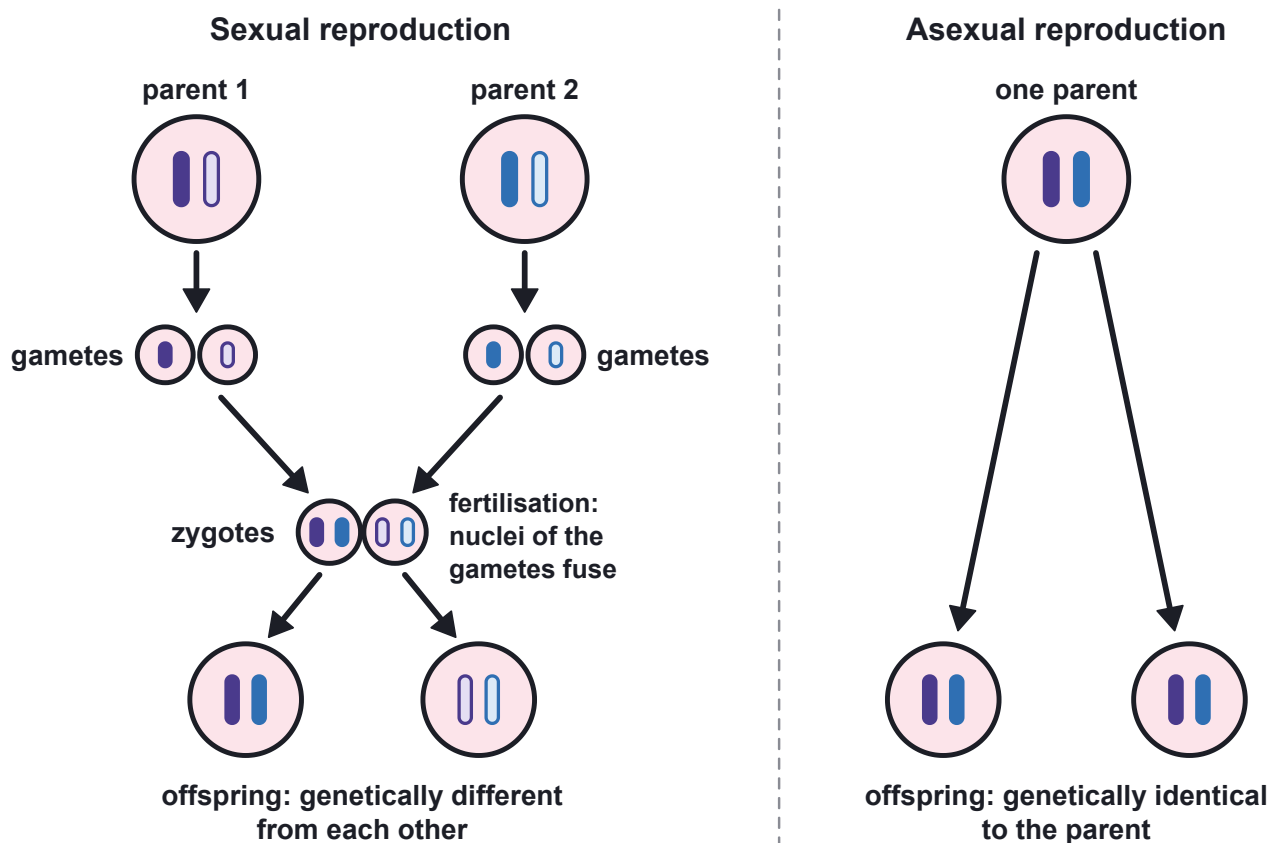
Sexual reproduction Spec 16.2.1, 16.2.2, 16.2.3, 16.2.4

Sexual reproduction is a process involving the **fusion of the nuclei of two gametes** to form a zygote and the production of offspring that are **genetically different from each other**. Gametes are the sex cells: sperm and egg cells in animals, and pollen nuclei and egg cells in flowering plants.

Fertilisation is the fusion of the nuclei of gametes. The gametes usually come from two parents, so the offspring inherit a mixture of genetic information from both of them.

Sexual reproduction	A process involving the fusion of the nuclei of two gametes to form a zygote and the production of offspring that are genetically different from each other.
Fertilisation	The fusion of the nuclei of gametes.

Sexual and asexual reproduction compared		
	Sexual reproduction	Asexual reproduction
Number of parents	Usually two	One
Gametes and fusion of nuclei	Yes	No
Offspring	Genetically different from each other	Genetically identical to the parent



In sexual reproduction the **nuclei of two gametes fuse**, so the offspring are genetically different from each other. Asexual offspring are genetically identical to the one parent.

Supplement

Haploid and diploid nuclei

Supplement

The nuclei of gametes are **haploid**: they contain a single set of chromosomes. The nucleus of a zygote is **diploid**: it contains two sets of chromosomes, one set from each parent. Fertilisation therefore restores the full (diploid) number of chromosomes.

Supplement

Advantages and disadvantages of sexual reproduction

Supplement

Sexual reproduction in the wild and in crop production

	Advantages	Disadvantages
To a population of a species in the wild	The offspring show genetic variation. If the environment changes, or a new disease appears, some individuals may survive and reproduce. This gives the population a better chance of adapting through natural selection.	Two parents are needed, so a mate must be found. It takes more time and energy. Fewer offspring are usually produced than by asexual reproduction, and the population increases more slowly.
To crop production	Variation can produce new varieties of crop, for example plants with higher yield or disease resistance. Some plants in the crop may survive a disease or pest that kills others.	The crop plants are not uniform, so size, yield and quality vary. Plants with the best features cannot be copied exactly. It is usually slower than asexual reproduction.

Exam tip: Cambridge definitions are marked word for word. Learn 'fusion of the nuclei of gametes' for fertilisation, and 'genetically different from each other' for the offspring of sexual reproduction.

Quick check

1. Define asexual reproduction.
2. Name two examples of asexual reproduction in plants.
3. Define fertilisation.
4. Are the offspring of sexual reproduction identical to each other?
5. **Supplement** State whether the nucleus of a zygote is haploid or diploid.

Quick check answers

Asexual and sexual reproduction

1. A process resulting in the production of genetically identical offspring from one parent.
2. Strawberry runners, potato tubers or daffodil bulbs.
3. The fusion of the nuclei of gametes.
4. No, they are genetically different from each other.
5. Diploid.