Pros and cons of sexual and asexual reproduction

4.6.1.3 · Inheritance, variation and evolution · revision notes

The advantages and disadvantages of sexual and asexual reproduction, and organisms that use both. This is in GCSE Biology only, not in Combined Science. It is asked as 'give an advantage', 'suggest why' or a 4 to 6 mark 'evaluate' question about an organism you may not have met.

Key facts

- Sexual: variation → survival advantage if the environment changes (natural selection)
- Asexual: one parent; no need to find a mate (time and energy efficient); faster; many identical offspring when conditions are favourable
- Malarial parasite: asexual in the human host, sexual in the mosquito
- Strawberries (runners) and daffodils (bulb division) reproduce asexually, and sexually by seeds
- Selective breeding speeds up natural selection, e.g. to increase food production
- Asexual disadvantage: no variation, so one change (e.g. a new disease) can affect the whole population
- Fungi: asexual by spores, sexual to give variation

Notes

Advantages of sexual reproduction

- It produces **variation** in the offspring.
- If the environment changes, variation gives a **survival advantage**: some individuals are likely to have characteristics that help them survive, and these are passed on by **natural selection**.
- Humans can speed up natural selection by **selective breeding**, for example to increase food production.

Advantages of asexual reproduction

- **Only one parent** is needed.
- It is more **time and energy efficient**, because there is no need to find a mate.
- It is **faster** than sexual reproduction.
- **Many identical offspring** can be produced when conditions are favourable.

The disadvantages

- Sexual reproduction: two parents are needed, finding a mate takes time and energy, and it is slower.
- Asexual reproduction: there is no variation, so if conditions change (for example a new disease appears), the whole population is equally affected and could be wiped out.

Organisms that use both methods

- **Malarial parasites** reproduce asexually in the human host, but sexually in the mosquito.
- Many **fungi** reproduce asexually by **spores**, but also reproduce sexually to give variation.
- Many **plants** produce seeds by sexual reproduction, but also reproduce asexually: **strawberry** plants by runners and **daffodils** by bulb division.

How to answer each type of question

Give one advantage of each type 1 to 2 marks **Grade 4**

1. Asexual: choose from one parent, faster, no need to find a mate, many offspring when conditions are favourable.
2. Sexual: variation, so a better chance of survival if the environment changes.

Example. Daffodils can reproduce sexually by seeds and asexually by bulb division.
(a) Give one advantage to the daffodil of reproducing asexually.
(b) Give one advantage to the daffodil of reproducing sexually. [2 marks]

Model answer.

(a) Any one: only one parent is needed / it is faster / no need for a mate / many identical plants can be produced when conditions are favourable (1)
(b) It produces variation, so some offspring may survive if the environment changes (1)

Explain why variation is an advantage 2 to 3 marks **Grade 5**

1. Say that sexual reproduction mixes genetic information, giving variation.
2. Link it to a change in the environment (e.g. a new disease, drier conditions).
3. Some individuals have characteristics suited to the change, so they survive and breed (natural selection).

Example. A species of fungus usually reproduces asexually by spores. When the soil becomes dry, it also reproduces sexually.
Explain the advantage to the fungus of reproducing sexually when conditions change. [3 marks]

Model answer. Sexual reproduction mixes genetic information, so the offspring show variation (1). Some of the offspring are likely to have characteristics that help them survive in the new, drier conditions (1). These individuals survive and reproduce, passing on their alleles, so the species is less likely to die out (1).

Evaluate the advantages and disadvantages for a given organism 4 to 6 marks **Grade 8**

1. Use the organism and information given, not just learnt lists.
2. Give advantages and disadvantages of each method.
3. Link each point to survival (e.g. increasing numbers quickly, coping with change).
4. Finish with a justified conclusion, such as why using both methods is best.

Example. Aphids are small insects that feed on plants. In spring and summer, female aphids reproduce asexually, producing many young. In autumn, aphids reproduce sexually and lay eggs that survive the winter.
Evaluate the advantages and disadvantages to aphids of reproducing in these two ways. [4 marks]

Model answer. Asexual reproduction needs only one parent, so no time or energy is spent finding a mate (1). It is fast, so the population can increase quickly while there is plenty of food in summer (1). However, the young are genetically identical, so a change such as a new disease could affect them all (1). Sexual reproduction in autumn gives variation, so some of the offspring are more likely to survive changes in conditions over winter and the next year (1). Using both methods gives aphids fast population growth when conditions are good and variation when conditions change.

Don't lose marks

- Saying sexual reproduction is better 'because it gives variation' without explaining why variation helps (survival if the environment changes).
- Saying asexual reproduction 'uses less energy' without the reason: there is no need to find a mate.
- Mixing up the malarial parasite: it reproduces asexually in the human and sexually in the mosquito.
- Calling runners or bulbs sexual reproduction. They are asexual; seeds come from sexual reproduction.

More tips

Memory tricks

- Asexual in four words: one parent, no mate, fast, many copies.
- Sexual means variety; variety means survival when things change.
- Organisms that do both: Malaria (asexual in humans, sexual in mosquitoes), Fungi (spores and sex), Plants (strawberry runners, daffodil bulbs).

Exam technique

- In 'evaluate' questions, give advantages and disadvantages, then end with a conclusion.
- Apply your answer to the organism in the question (its food supply, seasons, environment) instead of just listing facts.
- Link variation to natural selection: variation → some survive a change → they breed → they pass on their alleles.

What each grade needs

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

Grade 4 **Give an advantage of asexual reproduction**

Only one parent is needed, so there is no need to find a mate.

Grade 4 **Give an advantage of sexual reproduction**
It produces variation in the offspring.

Grade 4 **Explain why asexual reproduction is efficient**
No time or energy is spent finding a mate, and many identical offspring can be produced quickly when conditions are favourable.

Grade 5 **Explain why variation helps a species survive**
If the environment changes, some individuals are likely to have characteristics that help them survive, by natural selection.

Grade 6 **Name organisms that reproduce both ways**
Malarial parasites, many fungi, and plants such as strawberries and daffodils.

Grade 7 **Explain why some organisms use both methods**
Asexual reproduction to increase numbers quickly in good conditions; sexual reproduction to give variation for when conditions change.

Grade 8 **Evaluate reproduction methods for an unfamiliar organism**
Weigh the speed and efficiency of asexual reproduction against the variation from sexual reproduction, using the information given.

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