# Extinction

4.6.3.6 · Inheritance, variation and evolution · revision notes

A species is extinct when no individuals of that species remain alive. You need the factors that can cause extinction and to apply them to examples in 'suggest why' and data questions.

## Key facts

- Extinct = no individuals of the species remain alive
- Causes: climate change (ice age, global warming, drought); habitat loss; new predators; new diseases; new competitors for food or mates; a catastrophic event
- Catastrophic events: massive volcanic eruptions, collisions with asteroids
- Little variation or rapid change → greater risk of extinction

## Notes

### What extinction is

- A species is **extinct** when there are **no remaining individuals** of that species still alive.
- Extinction is permanent: the species and its alleles are lost for ever.
- Fossils show that very many species that once lived are now extinct.

### Causes of extinction

- **Changes to the environment** over geological time, such as **climate change**: an ice age, global warming or drought. If a species cannot survive in the new conditions, it dies out.
- **Loss of habitat** or habitat change, e.g. forests cut down, so the species has nowhere to live, feed or breed.
- **New predators**, e.g. animals brought to an island by humans that eat native animals or their eggs, or human hunters.
- **New diseases** (pathogens): if no individuals are resistant, the whole population can be killed.
- **New, more successful competitors** that take the food, mates, space or other resources the species needs.
- A single **catastrophic event**, such as a massive **volcanic eruption** or a **collision with an asteroid**. An asteroid collision is thought to have contributed to the extinction of the dinosaurs.

### Which species are most at risk

- Species with **little genetic variation**: there may be no individuals with characteristics that help them survive a change.
- Species facing a **rapid change**: natural selection takes many generations, so there may not be time for the population to change.
- Species with **small populations**, or that live in only one place such as a single island.

## How to answer each type of question

### Give factors that can cause extinction

1 to 3 marks | Grade 4

1. Choose from: climate change (ice age, global warming, drought), habitat loss, new predators, new diseases, competition for food or mates, catastrophic events.
2. Give clearly different factors, not two versions of the same one.

**Example.** Give three factors that can cause a species to become extinct. [3 marks]

**Model answer.** Any three: climate change, e.g. an ice age or global warming (1); loss of habitat (1); new predators (1); new diseases (1); new competitors for food or mates (1); a catastrophic event such as an asteroid collision or a massive volcanic eruption (1).

### Suggest why a species became extinct

2 to 3 marks | Grade 5

1. Find the clue in the information (a new animal arrived, the climate changed, a disease spread).
2. Name the factor.
3. Explain the effect: fewer survive and reproduce, until the population falls to zero.

**Example.** A species of flightless bird lived only on one island. Sailors brought rats to the island. The rats ate the birds' eggs. Within 100 years the bird species was extinct.
Explain why the bird became extinct. [3 marks]

**Model answer.** The rats were a new predator on the island (1). The birds had no defence against them, so many eggs were eaten (1). Fewer young birds survived to reproduce, so the population fell until none were left (1).

### Explain why variation reduces the risk of extinction

2 to 3 marks | Grade 7

1. More variation means some individuals are likely to have characteristics suited to the change.
2. They survive, reproduce and pass on their alleles.
3. So the species does not die out.

**Example.** Explain why a species with a lot of genetic variation is less likely to become extinct when a new disease appears. [3 marks]

**Model answer.** With more variation, some individuals are more likely to be resistant to the disease (1). These individuals survive and reproduce (1), passing on the alleles for resistance, so the species does not die out (1).

## Don’t lose marks

- Writing 'the environment changed' or 'the weather': these get no mark. Name the change, e.g. climate change, an ice age, global warming, drought or habitat loss.

- Confusing extinct with endangered. An endangered species still has living individuals.
- Giving 'humans' as a cause without saying what humans did (e.g. brought in a new predator, destroyed a habitat).
- Writing 'competition' on its own. Say what is competed for: competition for food or competition for mates.

## More tips

### Memory tricks

- Causes of extinction: 'Every Panda Dreads Catastrophic Competition' (Environment change, Predators, Diseases, Catastrophes, Competitors).
- 'New' is the key word: new predators, new diseases, new competitors.

### Exam technique

- Use the clues in the question: examiners expect you to name the factor that is described.
- Link each factor to its effect on survival and reproduction.
- When asked for several factors, make each one clearly different.

## What each grade needs

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

**Grade 3** — **Define extinction**
A species is extinct when there are no remaining individuals of that species still alive.

**Grade 4** — **List the causes of extinction**
Climate change, habitat loss, new predators, new diseases, new competitors and catastrophic events.

**Grade 5** — **Give examples of catastrophic events**
Massive volcanic eruptions or collisions with asteroids.

**Grade 5** — **Explain how a factor leads to extinction**
Link the factor to fewer individuals surviving and reproducing until none are left.

**Grade 5** — **Suggest causes from information given**
Use clues in a description or data to name the factor and explain its effect.

**Grade 7** — **Explain why variation reduces extinction risk**
Some individuals are more likely to have characteristics that let them survive the change.

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