

This is the **Higher Combined** version — includes Higher Tier content. Some Separate-only details are omitted.

Natural selection is the process by which better-adapted individuals survive and reproduce more, gradually changing the characteristics of a population over generations.

- Darwin's theory (developed independently by Wallace too): variation exists → competition → survival of the fittest → inheritance → change over time.
  - Step 1: Random variation exists in a population due to mutations and sexual reproduction.
  - Step 2: More offspring are produced than the environment can support — competition for resources (food, water, mates, space).
  - Step 3: Individuals with advantageous characteristics are more likely to survive and reproduce.
  - Step 4: Survivors pass on the alleles for their advantageous characteristics to offspring.
  - Step 5: Over many generations, beneficial alleles become more frequent — the population changes.
  - Evidence for evolution: fossil record (shows gradual change over time), DNA evidence (related species have similar DNA), antibiotic resistance (observable natural selection today), comparative anatomy.
  - "Fittest" in evolutionary biology means BEST ADAPTED to the current environment — not strongest.
- ★ HT Darwin's theory was controversial because it challenged religious views of creation and there was no known mechanism for inheritance at the time.

### Key Terms

<b>Natural selection</b>	Process where better-adapted individuals survive and reproduce → advantageous alleles increase in frequency
<b>Adaptation</b>	An inherited characteristic that increases an organism's chances of survival and reproduction in its environment
<b>Fitness</b>	In biology: the ability of an organism to survive and reproduce in its environment — not physical strength
<b>Evolution</b>	Change in the inherited characteristics of a population over successive generations

■ **Exam Tip:** For natural selection questions, always include: 1) VARIATION exists, 2) COMPETITION, 3) SURVIVE and REPRODUCE, 4) INHERIT advantageous alleles, 5) FREQUENCY of allele INCREASES over generations. You need all 5 elements for full marks.