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

Global warming is the increase in average global temperatures caused by rising concentrations of greenhouse gases in the atmosphere.

- Greenhouse gases: CO■ (from burning fossil fuels, deforestation), methane (from cattle, rice paddies, landfill), water vapour, nitrous oxide.
- Greenhouse effect: greenhouse gases absorb infrared radiation from the Earth's surface and re-emit it → atmosphere warms.
- Consequences of global warming: rising sea levels (glaciers and ice caps melt), more extreme weather events, habitat change (species migrate or go extinct), ocean acidification (CO■ dissolves in seawater).

★ **HT** Positive feedback loop: warming → melting permafrost → releases methane → more warming.

★ **HT** Ocean acidification: CO■ + H■O → carbonic acid → lowers pH → harms marine organisms with calcium carbonate shells (e.g. coral).

- Responses: reduce fossil fuel use, increase renewable energy, reduce deforestation, carbon capture and storage, international agreements (Paris Agreement).

★ **HT** Uncertainty: scientific consensus agrees global warming is human-caused, but exact future effects are complex to predict.

Key Terms

Greenhouse gas	A gas (e.g. CO■, methane) that absorbs and re-emits infrared radiation, warming the atmosphere
Global warming	Rise in average global surface temperatures due to increased greenhouse gas concentrations
Climate change	Long-term changes in global weather patterns associated with global warming
Positive feedback	A feedback loop where the response amplifies the original change — e.g. warming → more methane → more warming
Ocean acidification	Decrease in ocean pH due to absorption of CO■ — harms marine life with calcium carbonate structures

■ **Exam Tip:** Distinguish greenhouse effect (natural and necessary) from enhanced greenhouse effect (extra warming due to human CO■ emissions). Global warming is not the same as "holes in the ozone layer" — these are different problems caused by different gases.