

Earth's Atmosphere

AP Environmental Science · Unit 4: Earth Systems and Resources

The Teaching Analogy

"Think of the atmosphere like a blanket on a bed. The troposphere is that thin first layer right against you — where all the weather happens. The greenhouse effect? CO₂ and water vapor act like that blanket — they let sunlight in, but trap the heat trying to escape back out. Without any greenhouse gases, Earth would be about sixty degrees Fahrenheit colder. Completely frozen."

Key Concept

Earth's atmosphere is a layered envelope of gases — mostly nitrogen (78%) and oxygen (21%) — that surrounds the planet. The greenhouse effect occurs when greenhouse gases like CO₂ and water vapor absorb outgoing infrared radiation and re-emit it back toward Earth's surface, keeping the planet warm enough to support life. Without this effect, Earth's average temperature would drop by approximately 60°F.

Guided Practice

1. In the blanket analogy, what does the "blanket" represent? What real atmospheric gases play this role, and why can't visible light just pass straight back through them on the way out?
2. If you "climbed through the blanket" from troposphere to stratosphere, what temperature change would you notice — and why does the stratosphere actually warm up rather than cool down?
3. Human activities have increased atmospheric CO₂ from about 280 ppm (pre-industrial) to over 420 ppm today. Using the blanket analogy, explain what this means for the thickness of Earth's "blanket" and predicted temperature effects.

Extension Activity

The Blanket Lab: Set up two identical thermometers inside clear containers — one open, one sealed with plastic wrap (representing CO₂ "trapping"). Shine a lamp on both for 10 minutes. Record temperature differences. Students map their results to the greenhouse effect and discuss: why is some greenhouse effect necessary for life, and when does it become a problem?