

Greenhouse effect · supported focus

International Baccalaureate · IB Diploma · Physics · HL

Scope and prerequisites

Supported HL focus. First assessment 2025; full Physics guide acquired (84 PDF pages). Remaining guide, assessment and practical requirements retain their recorded holds.

Prerequisites: read the stated quantities and units, use arithmetic and the model conditions below. Each lesson develops its own method before independent transfer.

These are original or explicitly fictional teaching examples, not actual measurements or completed assessed learner investigations.

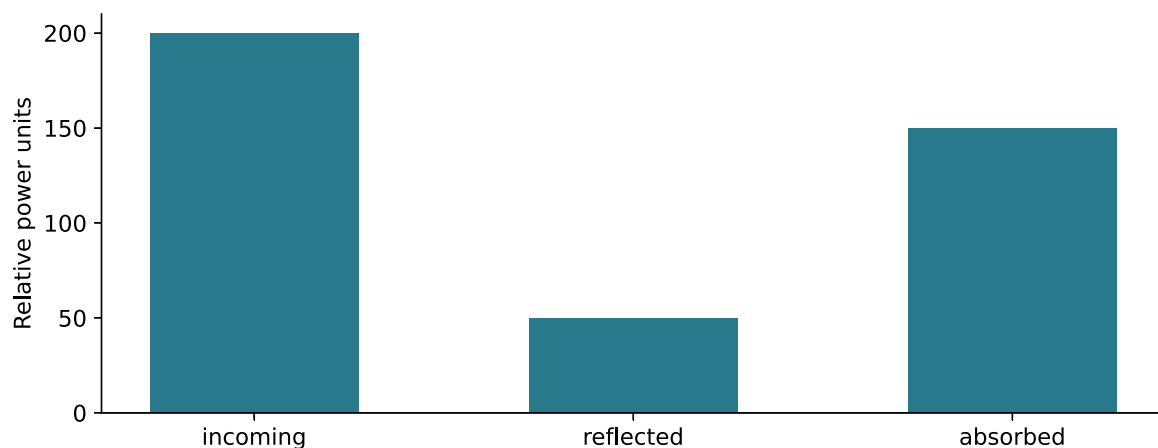
Climate evidence, energy budgets and policy

■ What would explain this observation?

- One cold day does not disprove a warming climate. Weather describes short-term conditions; climate describes distributions over longer times and regions.
 - Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.
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■ Build the model

- The Earth energy balance includes incoming solar radiation, reflection, absorption and outgoing infrared radiation. Greenhouse gases absorb and emit infrared radiation. Feedback can alter the response to an initial forcing.
- **mitigation** : Actions addressing causes of environmental change; **adaptation** : Actions reducing harm from environmental impacts.



■ Choose evidence that can test it

- Distinguish mitigation, which addresses drivers, from adaptation, which reduces harm from impacts. A policy assessment needs evidence about effectiveness, cost, equity and uncertainty; one criterion is not the entire decision.
 - Compare multi-year data using consistent baselines. State the region, timescale and uncertainty. At HL, connect a management decision to law, economics and ethics rather than treating these lenses as extra definitions only.
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■ Work from known quantities

- State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution.
- Known: a surface receives 200 power units and reflects 50. Absorbed input = incoming-reflected = $200 - 50 = 150$. Reflected fraction = $50/200 = 0.25 = 25\%$. A change in reflectivity alters the absorbed budget under this model.

Example:

Incoming energy is 240 units and reflected energy 72. Find reflected percentage. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

■ Check the conclusion and its limits

- The greenhouse effect is not the same process as ozone depletion. A carbon footprint estimate depends on its system boundary.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

One local weather observation establishes a global climate trend. This claim is false: The greenhouse effect is not the same process as ozone depletion. A carbon footprint estimate depends on its system boundary.

Key:

Climate evidence, energy budgets and policy: Distinguish mitigation, which addresses drivers, from adaptation, which reduces harm from impacts. A policy assessment needs evidence about effectiveness, cost, equity and uncertainty; one criterion is not the entire decision.