A roof and its energy budget

Climate and energy | constructed energy budget

Instructional alignment HS-ESS2-4

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

Practice Use a quantitative energy model
Crosscutting concept Energy and matter

1. A reflects 25% and absorbs 600 W/m². B reflects 60% and absorbs 320 W/m².

2. Higher reflection reduces absorbed solar energy, which can reduce heating under comparable conditions.

3. Area coverage, weather, storage, building systems and heat exchange must be modeled to estimate a temperature outcome.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Treating an energy-flux difference as an equal numerical temperature difference. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Double roof area. Distinguish energy per square meter from total power.

Related public evidence

ESS_2026_08_43 | public question

Official mapping for that example

ESS_2026_08_23 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

The afternoon shore breeze

Weather and circulation | constructed temperature transect

Instructional alignment HS-ESS2-8

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

Practice Develop a model and test its prediction
Crosscutting concept Cause and effect

1. Surface air flows from water toward land, rises over land, returns aloft toward water, and descends over water in the simplified model.

2. Air over warmer land expands and rises, supporting a pressure-driven circulation with cooler replacement air at the surface.

3. A persistent measured surface wind in the opposite direction would require accounting for larger-scale weather or revising the model.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Equating the motion of warm rising air with the horizontal wind direction. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Reverse the nighttime surface temperature contrast and revise the arrows.

Related public evidence

ESS_2026_08_44 | public question

Official mapping for that example

ESS_2026_08_37 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

A moving plate, a time pattern

Plate tectonics | constructed island-age model

Instructional alignment HS-ESS2-1

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

Practice Use a quantitative model of a surface process
Crosscutting concept Patterns; scale and proportion

1. 200 km/2 million years=0.1 m/year=10 cm/year. The Z pair gives the same estimate.

2. Older islands have traveled farther from the active hot spot as the plate moves.

3. The model assumes approximately fixed hot spot and roughly constant motion. Inconsistent age-distance measurements could require a more complex model.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Reading the age sequence as evidence that all islands erupted at the same time. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Introduce a bend in the chain while retaining ages. Identify a possible change in plate motion.

Related public evidence

ESS_2026_08_35 | public question

Official mapping for that example

ESS_2026_08_11 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

Water through a sediment column

Water and Earth materials | constructed investigation design

Instructional alignment HS-ESS2-5

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

Practice Plan an investigation of water interacting with Earth materials
Crosscutting concept Structure and function; cause and effect

1. Use replicate columns, equal geometry, starting dryness, input volume and time. Change grain size while controlling packing and material composition as closely as feasible.

2. A drains 80 mL and retains 20 mL. B drains 30 mL and retains 70 mL under the stated assumptions.

3. Pore connections and water adhesion to particle surfaces can affect movement and retention. Measure porosity, packing or surface properties to distinguish mechanisms.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Equating high porosity with guaranteed rapid drainage without considering pore connection and water retention. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Change grain size and packing together. Explain why the cause of a changed drainage rate becomes harder to identify.

Related public evidence

ESS_2026_08_20 | public question

Official mapping for that example

ESS_2026_08_19 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

A repeated dimming

Orbital evidence | constructed light-curve data

Instructional alignment HS-ESS1-4

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

Practice Use mathematics to test an orbital model
Crosscutting concept Patterns

1. The intervals are six days, giving a modeled six-day period.

2. Repeated similar dips support periodic transit geometry. One dip alone does not establish a repeating orbit.

3. Stellar variability, an eclipsing companion or instrumentation require consideration; additional cycles and independent measurements could test the interpretation.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Equating transit duration with the full orbital period. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Make the intervals 6, 6 and 12 days. Propose a missed observation and a competing model.

Related public evidence

ESS_2026_08_41 | public question

Official mapping for that example

ESS_2026_08_3 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

Recycling under constraints

Resources and decisions | constructed resource comparison

Instructional alignment HS-ESS3-2

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

Practice Evaluate competing resource solutions
Crosscutting concept Systems; cause and effect

1. A costs about $1667 per tonne and fits the budget. B costs $1875 per tonne and exceeds it.

2. A is feasible under the given ceiling and has the lower stated cost per recovered tonne. A decision must also consider recovery uncertainty and environmental effects.

3. Energy use, emissions, displaced mining impacts, local waste composition and recovery quality would inform evaluation.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Treating a single cost-benefit ratio as a complete account of environmental and social consequences. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Add a reuse option and specify the comparable evidence needed to evaluate all three.

Related public evidence

ESS_2026_08_27 | public question

Official mapping for that example

ESS_2026_06_4 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed