Temperature Evidence Teacher Quick Start

Original temperature core | Task edition 1.0.0 | Section 1 of 8

US Grade 6 provisional placement within the Grades 6 to 8 science band. Use a bounded paper lesson to distinguish temperature readings from changes and support a design choice with matched records.

Fit and preparation

Learners need small-table reading and whole-number subtraction. Use the supplied bridge when those are not secure. Paper and pencil only; no equipment, student account or internet is needed. Optional calculator and oral explanation supports are described in the notes.

Print and teach

Print Lesson and Practice pages 1-4, Independent Check pages 1-2, selected Response Lesson page A or B, and Later Check page 1 when needed. Keep this keyed teacher pack separate. Start with Readiness question 1 before the worked bridge; collect a response, then teach the bridge and model. Guide guided practice questions 1 and 2 before unseen independent questions 1 and 2. Cover the lower worked-bridge section on the first lesson page until the readiness response is collected, then reveal it. If the whole page has already been seen, treat that question as practice rather than independent readiness evidence.

Choose a response and look again

Mixed rows or endpoint/change confusion: Response A with Response question 1. A single favorable result or always claim: Response B with Response question 2. First clarify a thin or blank response by asking which values were used. After further teaching, give Later question 1 without the model visible. It reverses the direction of change and is not an equivalent test form.

Record evidence

Note reading and units, direction and subtraction, matched comparisons, observation versus explanation, and claim limits separately. Record support and prior exposure. Repeated shown tasks are practice; do not describe their reuse as unseen evidence.

Scope and timing

Selected NGSS middle-school energy ideas only; no full MS-PS3-3 or MS-PS3-4 claim. No apparatus is constructed or tested. All data are constructed. Plan about 5 minutes preparation and 35-50 minutes teaching plus later work; these are unmeasured author estimates.

Use limits

No classroom testing, human science review, measured timings, Word/Google Docs compatibility or assistive-technology validation is claimed.

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Temperature Evidence Answer Guidance

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Readiness question 1

Prompt: A water sample starts at 8 degrees Celsius and ends at 12 degrees Celsius after 15 minutes. Name the start, finish, direction and size of change. Can these two readings tell you why it changed?

Accepted answer: Start 8 degrees Celsius; finish 12 degrees Celsius; warmed by 4 degrees Celsius. These two readings do not isolate why it warmed.

Also accept: Accept a labeled arrow, number line or oral explanation with the direction and difference.

Notice: Separate endpoint from change; clarify access before treating a blank as a science difficulty.

Worked example 1

Prompt: Use the model table and graph to state the 20-minute temperature increase of each setup. Which sleeve better limits warming in this one constructed trial? Revise the claim that it stopped all energy transfer.

Accepted answer: No sleeve warms 10 degrees Celsius; A warms 4; B warms 6. A limits warming more than B and no sleeve in this trial. A still warmed, so stopped all transfer is unsupported.

Also accept: Endpoint comparisons are acceptable when the common 10-degree start and 20-minute interval are explicit.

Notice: Preserve quantity units, equal starts, duration and one-trial boundary.

Temperature Evidence Answer Guidance

Guided practice 1

Prompt: Find the increase in each design in Trial 1. Which sleeve limits warming more in that trial?

Accepted answer: No sleeve rises 9°C; H 5°C; J 6°C. H limits warming more than J in Trial 1.

Also accept: Accurate endpoint comparisons are acceptable with the shared 9°C start.

Notice: Point to the start and elapsed time before the comparison.

Guided practice 2

Prompt: Compare H and J across all three matched rows. Write a choice supported by all rows and one useful question these records cannot settle.

Accepted answer: H ends at 14,13,14 degrees Celsius versus J at 15,15,16. H shows less warming in all three matched trials. Whether this holds for another room temperature or longer duration is unknown.

Also accept: Any correct matched row-by-row comparisons and specific untested condition are acceptable.

Notice: Keep trial rows matched and avoid an always claim.

Temperature Evidence Answer Guidance

Independent question 1

Prompt: Which sleeve is better supported for limiting warming here? Give at least two matched trial comparisons between C and D.

Accepted answer: D. Trial 1: D 16°C versus C 18°C; Trial 2: D 15°C versus C 17°C. Both start at 11°C and D is 2°C lower in all three matched trials.

Also accept: Any two correct C-versus-D row comparisons; increases of C 7,6,7°C and D 5,4,5°C also support D.

Notice: No-sleeve values can strengthen but do not replace the requested C-versus-D comparison.

Independent question 2

Prompt: A classmate says Sleeve D cooled the water and stopped all energy transfer. Use the starting and ending temperatures to revise this statement. Then distinguish one observation from a qualitative energy-transfer explanation, and name a limit with useful next evidence.

Accepted answer: D ends at 15 to 16 degrees Celsius, which is 4 to 5 degrees Celsius above its 11-degree start, so it warmed. It limits warming relative to C; it did not stop warming. Observation: D ends 2 degrees cooler than C in every matched row. Explanation: the warmer 23-degree room gives net transfer toward cooler water in this passive setup. One limit is longer-duration performance; repeated matched trials over a longer interval would address it.

Also accept: Accept another accurate observation, qualitative net direction and specific untested condition with a matching next test. Do not require named transfer pathways or joule calculations.

Notice: Separate observed values from scientific explanation and bounded inference. Temperature change in degrees is not an amount of energy in joules.

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Response question 1

Prompt: Did either sample become colder? Find each increase. Which design shows less warming in this comparison?

Accepted answer: Both warmed. X increased 3°C; Y increased 6°C. X shows less warming.

Also accept: Number-line or oral calculation with the table is acceptable.

Notice: This route addresses reading values versus changes.

Response question 2

Prompt: A classmate says, 'L always works best because it reached 13°C once.' Does that one result justify the claim? Compare each matched row, then write a limited conclusion.

Accepted answer: No. L is lower than N in Trials 1 and 3 (13 versus 14°C), but higher in Trial 2 (15 versus 14°C). The single favorable result cannot support 'always.' A limited conclusion must mention the mixed pattern and tested conditions.

Also accept: A tentative preference for L based on its lower result in two of three matched trials is defensible if the Trial 2 reversal and need for more evidence are acknowledged. Do not claim equal performance or discard Trial 2 without a documented reason.

Notice: This route addresses cherry-picking and overclaiming, not arithmetic practice.

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Temperature Evidence Answer Guidance

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Later question 1

Prompt: Which sleeve better limits cooling? Compare all three temperature changes and explain the direction of net energy transfer. Is 'choose the lowest final temperature' a useful rule here?

Accepted answer: No sleeve falls 12°C; P falls 8°C; Q falls 4°C. Q best limits cooling here. Water is warmer than the room, so net energy transfer is outward toward cooler surroundings. The lowest final value would choose the worst protection for this goal.

Also accept: An accurate endpoint comparison with equal starts is sufficient if the direction and goal are clear.

Notice: This transfer reverses direction; it is not an equivalent test form.

Extension question 1

Prompt: Do these records justify a confident preference for E or F? What would you check next?

Accepted answer: No confident preference is justified by these small, overlapping results with unknown instrument accuracy. This does not prove equivalence. Check measurement accuracy, procedure, and additional independent matched trials.

Also accept: A student may calculate means (E 14.20°C, F about 14.17°C), but the tiny difference does not settle performance. Do not require means.

Notice: Displayed precision is not instrument accuracy; do not erase a trial as inconvenient.

Temperature Evidence Supplied Response Moves

Response A Read start and finish in one row

Signal: Endpoint is called change, a rise is called cooling, or values from different rows are combined.

Teach: Point to the start, then trace to the endpoint. Ask whether the number rose or fell before subtracting. Use the new X/Y data; do not prefill the answer.

Collect: New matched rows with a labeled change and correct warming direction.

Response B Use every matched trial and limit the claim

Signal: One favorable result is selected or the response uses always after clarification.

Teach: Keep all matched rows visible. Compare L and N within each trial and ask whether one design wins every row. Keep Trial 2 in view.

Collect: A claim that preserves the reversal in Trial 2 and asks for relevant further evidence.

After a response lesson

Use Later question 1 after another learning opportunity. Require direction, temperature differences and a goal-sensitive comparison. An observed cooling pattern supports the qualitative warmer-to-cooler net transfer idea. It does not give joules of transferred energy or isolate a pathway. If uncertainty remains, ask for the values used and plan additional teaching; do not infer a diagnosis.

Temperature Evidence Boundaries and Access

The tasks exercise selected analysis and energy-transfer ideas appearing in NGSS middle-school energy and engineering materials. This paper route does not meet the full MS-PS3-3 design/construct/test expectation, nor the full MS-PS3-4 investigation-planning expectation.

All data are constructed for teaching. Repeated rows are imagined independent trials with fresh samples, not repeated readings of one sample and not empirical evidence. They are not calibrated test forms. The kit cannot establish real sleeve performance, durable learning, classroom effectiveness, or a causal effect of instruction.

Access choices

Tracking a row and column: Use a straightedge or enlarged table, keeping labels and all values intact. Keep Same data comparison and claim. Limit: None intended; note any adult pointing to a specific answer cell.

Arithmetic transcription: Permit a labeled number line or calculator after the learner identifies start/end values. Keep Select matched evidence and justify the claim. Limit: Computation fluency is no longer inferred from calculator use.

Written language output: Permit an oral explanation while pointing to two rows, or a labeled model. Keep Scientific comparison, idea, and limit. Limit: Written composition is not assessed.

Extension reasoning

Displayed precision is the recording increment. Instrument accuracy concerns closeness to the actual temperature and requires instrument information or calibration evidence. Small differences do not establish superiority or equivalence.

Source and rights

Adapted retained first-party temperature evidence v0.1.6 tasks and data, plus thermal-foundation reading bridge and new bounded task combinations. Historical commission attribution is retained provenance, not a newly authenticated brief. No third-party lesson reproduced.

Science boundaries checked 18 October 2026 at https://www.nextgenscience.org/pe/ms-ps3-3-energy and https://www.nextgenscience.org/pe/ms-ps3-4-energy . Data and graph are original constructed teaching examples. Existing site Terms of Use apply; no external image or standards passage is reproduced.

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Fictional teaching response — sound for the named task

Named task: Standalone paper lesson: Independent questions 1 and 2

Fictional response — sound for the named task: “D is better supported for limiting warming in these trials: D/C are 16/18, 15/17 and 16/18°C. Both start at 11°C, so D warms by 5, 4 and 5°C, compared with C’s 7, 6 and 7°C. D did not cool the water. The endpoints are observations; net transfer from warmer surroundings toward cooler water is a qualitative explanation. These records do not show that energy transfer stopped or that D works best in every setting. For a hypothetical new-condition test, I would check instrument-accuracy information and repeat D/C comparisons in 25°C surroundings, with fresh 100 g samples starting at 11°C, a 20-minute interval and matching cups, lids, exposure and reading procedure. Retain all paired starts/endpoints and anomalies; no outcome is supplied or guaranteed.”

Visible evidence: All-row matched comparison, correct direction/change, a distinction between record and explanation, and a bounded conclusion.

Not established: Physical construction/testing or a measured transfer mechanism/rate.

Clarify: Ask which data are observed and which statement belongs to the explanatory model.

Next teaching/evidence: Reserve the separate later-check for another occasion. Keep this already answered independent task out of fresh-evidence claims.

This response is invented for teacher interpretation. Accept defensible alternatives. Record access, prior exposure and the actual response; do not assign an ability label or claim mastery from this example.

Later reassessment — save for later

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Fictional teaching response — partially developed

Named task: Standalone paper lesson: Independent questions 1 and 2

Fictional response — partially developed: “D is best because it ends at 16°C in Trial 1.”

Visible evidence: One accurate endpoint and the supported design choice.

Not established: A matched C comparison, the other rows, warming versus cooling, or a scope limit.

Clarify: Ask the learner to compare D with C in the same row, then inspect all remaining rows and the common start.

Next teaching/evidence: Use Response B in the response-lessons file: compare L and N in all three rows before evaluating the ‘always’ claim. This is practice, not a fresh independent check; save the later-check.

This response is invented for teacher interpretation. Accept defensible alternatives. Record access, prior exposure and the actual response; do not assign an ability label or claim mastery from this example.

Response pack — choose one of the two response lessons

Reserve: Later reassessment — save for later

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Fictional teaching response — plausible error

Named task: Standalone paper lesson: Independent questions 1 and 2

Fictional response — plausible error: “D is colder than C, so it cooled the water and stopped all energy transfer.”

Visible evidence: An accurate relative endpoint comparison.

Not established: Cooling from the initial state: D ends above 11°C in every trial. A lower endpoint than C does not establish stopped transfer.

Clarify: Ask for D’s start and finish before comparing it with another sample.

Next teaching/evidence: Use Response A: X and Y start at 12°C and end at 15°C and 18°C. Compute both increases and explain less warming versus cooling. Keep the separate later-check reserved.

This response is invented for teacher interpretation. Accept defensible alternatives. Record access, prior exposure and the actual response; do not assign an ability label or claim mastery from this example.

Response pack — choose one of the two response lessons

Reserve: Later reassessment — save for later