

Start Here · Thermal Energy Evidence Kits

Foundation collection: Kit 1 reads temperature records; Kit 2 evaluates fair comparisons; Kit 3 compares trials and limits design claims. Use a sequence or enter at an observed response. Paper and pencil only; optional calculator, number line, pointing or oral explanation. Grade 6 is the provisional authoring target; related NGSS expectations span Grades 6–8. Check local course placement.

Choose and print

Kit 1: Read Temperature Data Before Explaining It — Teach the Lesson includes P/M/V/G/I. Kit 2: Was It a Fair Comparison? — Teach the Lesson includes P/M/G/I. Kit 3: Which Design Is Better Supported? — Teach the Lesson includes P/M/G/I. Each kit has separate student PDF/DOCX, teacher PDF/DOCX, five named student PDF selections and readable HTML.

For a short check use the kit's Use a Quick Check, task I. It repeats that kit's independent page; do not treat it as fresh after Teach the Lesson. Use the separately supplied Later Check T after I. Every selection contains its own setup/data. Student and teacher downloads are visibly separate.

Prepare without a lab

Read the one-page teacher quick start and the key for the selected route; print student pages only. Paper and pencil required. Optional supports: calculator, projection, number line, pointing, oral response. No physical investigation is authorized by these files.

Author planning estimates only: 35–45 min for Kits 1/2, 36–44 min for Kit 3; 10–15 min per reteach and 5–8 min per later check. Start Here reading/preparation estimate 10–15 min. None are observed classroom timings.

Begin where the evidence suggests

Use the included prerequisite check first. Clarify labels and response access, then teach the relevant route. A correct choice with no explanation calls for a question; a blank response does not identify the difficulty. Do not require a fixed claim/evidence/reasoning paragraph.

Vocabulary and representations

Words for the reasoning

Temperature: a reading at a stated time, in °C here. Temperature change: difference between start and finish for the same sample, with direction. Warming: final is higher. Cooling: final is lower. Elapsed time: duration between readings. Evidence: relevant observations used to support a claim. A limit: a condition or question that the record does not settle.

Matched comparison: relevant conditions agree so differences can be attributed more defensibly to the factor being compared. Confound: another relevant difference that mixes possible effects. Trial: a fresh comparison, not merely the next time reading of the same sample. Complete design: all construction choices together; a result does not isolate one material property.

Read before explaining

Read the heading, unit, sample label, time, start and finish. Trace one row or column completely. On Kit 1's graph, time advances in equal 5-minute spaces; points repeat the same table values. A graph is a representation, not an extra experiment. Use the accompanying text table when graph access is difficult; plotting is not a prerequisite.

Scientific boundaries

Temperature is a reading, not the total energy stored in a sample. Total energy also depends on the type, state and amount of matter. In these passive water examples, net thermal-energy transfer is from the warmer part toward the cooler part. A temperature record alone does not identify conduction, convection or radiation separately. Less warming does not mean cooling or stopped transfer.

When starts/masses/times differ, subtracting does not repair the comparison. A few matched trials can reveal a supplied pattern without proving a reliable difference. Small differences with unknown measurement accuracy warrant caution. Insufficient evidence of a difference is not proof of identical performance. Repeated trials do not automatically remove systematic bias.

All numerical activity data in this collection were invented, not measured or produced by a physical computer simulation. Keep the disclosure beside every extracted table. Never label a student's proposed redesign as tested unless actual testing occurs.

Response-to-next-task index and planning record

Use the exact selections below; each includes needed data. Teacher keys use the task IDs shown. All filenames begin with KitN-v1.0.0- for the relevant N.

Choose a supplied next task

Mixed rows, reversed warming/cooling: Kit 1 Reteach-Compare-the-Measurements.pdf, K1-A1/A2; teacher A. Confused final value with change: Kit 1 Reteach-Value-or-Change.pdf, K1-B1/B2/B3; teacher B. Ignored unequal mass/start: Kit 2 Reteach-Repair-the-Comparison.pdf, K2-A1/A2; teacher A. Vague procedure or material-property claim: Kit 2 Reteach-Specify-the-Plan.pdf, K2-B1/B2/B3; teacher B.

Used one convenient trial or said “always”: Kit 3 Reteach-Use-All-Results-and-Limit-the-Claim.pdf, F1–F4; teacher F. Misread Kit 3 measurements: Kit 3 Reteach-Compare-the-Measurements.pdf, R1–R3; teacher R. For later transfer use the chosen kit’s Use-a-Later-Check.pdf, T tasks and teacher T; these are new records, not validated equivalent forms.

Clarify before deciding

Ask: “Show me the values you used.” “What does the question ask us to compare?” “Can you explain aloud or label an arrow?” Record the response mode and supplied support. Separate difficulty expressing the reasoning from difficulty with the idea. A pointed-to matched comparison may show reasoning without a polished paragraph.

Local planning record · copy as needed

Date: _____ Kit/task ID: _____ Response mode/support: _____

Observed excerpt or pointed-to data: _____

Reading/direction: _____ Comparison: _____ Scientific connection/limits:

Next supplied selection/task: _____ Why: _____ New check/date:

Use descriptive visible/partly visible/not yet visible notes, not a composite scientific-ability score. Keep records locally; this collection does not require student uploads.

Sources, rights and separate review records

Read each resource's review report on its page. Independent AI review is not human subject review, classroom validation or an accessibility certification. The published review files identify actual inspected version/hashes, scope, findings, corrections and limitations separately for Kit 1, Kit 2, Kit 3 and Start Here.

What each record covers

Kit 1: temperature, row/time/units, graph-table equivalence, fresh checks and keys. Kit 2: question/controls/confounds, usable plans, fresh checks and keys. Kit 3: existing v1.0.0 independent instructional review; foundation integration checks preserve its reviewed student/teacher file bytes. Start Here: print paths, vocabulary, response index, planning record and honest standards/review boundaries.

For every resource, human science review and classroom-use feedback remain pending unless its own record states otherwise. PDF/Word production inspection does not claim testing in Microsoft Word, Google Docs or assistive technology. Website automated/browser checks and document inspections are different checks; record what actually ran.

Official sources and selected connections

Official sources checked 2026-09-29: NGSS MS-PS3-4 (<https://www.nextgenscience.org/pe/ms-ps3-4-energy>) supports temperature/energy distinctions and investigation planning; MS-PS3-3 (<https://www.nextgenscience.org/pe/ms-ps3-3-energy>) supports transfer direction and requires actual design, construction and testing. These paper tasks address selected components, not complete performance expectations. Original text/data/graph; no third-party passages or graphics reproduced. Classroom copying/adaptation follows <https://mentorteaching.com/terms-of-use/>.

DOE Building Science Education, Heat Flow (<https://bsesc.energy.gov/energy-basics/heat-flow>), supports background on the three transfer pathways. It does not validate the invented designs. Kit 1 reads observations; Kit 2 supports investigation planning; Kit 3 supports comparative evidence. Paper analysis does not fulfill physical design/construction/testing requirements.

Rights and provenance

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Foundation publication means these four resources exist with recorded checks and limits. Kits 4–6 and any reviewed practical route remain outside this release.