

Start Here · Six-kit supplied-data route

New guide v1.2.0. Preserve the archived foundation guide v1.0.0 and Stage 2 guide v1.1.0. Grade 6 is a provisional authoring target; relevant NGSS expectations span Grades 6–8. Check local placement. The six core kits form a focused sequence about thermal evidence, not a complete curriculum.

Six connected questions

Kit 1: read measurements, including headings, units, start, time and change. Kit 2: evaluate comparison conditions: what is being compared and what must match? Kit 3: support a design choice with relevant paired evidence across trials. Kit 4: explain the pattern using the sample, surroundings and net transfer. Kit 5: revise a particular claim: retain, narrow, change or remain uncertain. Kit 6: choose, propose a test and improve a thermal design against criteria and constraints.

Each kit includes its own bridge. Open that bridge when entering midway; do not depend on unpublished prerequisites. The required route needs no equipment beyond paper and pencil. Optional supports include a calculator, number line, projection, pointing, oral responses or labeled responses. The separate Practical P1 has materials and operational instructions; it is never required for success on paper tasks.

Read the teacher quick start and intended key before printing. Student downloads have no teacher answers. The print and task map records actual file names and page references; keys are in each teacher guide. Start Here and the selector use the same task and resource manifest.

Foundation is verified published. Stage 2 and Stage 3 are staged candidates, not live releases. Historical reviews remain attached to unchanged versions. Review records distinguish production, independent AI review, publication authorization and actual publication. No human or pilot gate is required. Voluntary feedback is optional.

Vocabulary, science and representation

Criterion: required performance. Constraint: resource, size or procedure limit. Prediction: testable expectation, not outcome. Observation: supplied reading. Evidence: relevant observation selected for a question. Explanation: connect evidence to a scientific idea. Revision: reconsider a particular claim using relevant new information.

Temperature in °C is not total energy. Matter type, state and amount also matter. Warming is a rise; cooling is a fall. In passive cases, net energy transfers from warmer parts toward cooler parts. Limiting warming does not cool water; slowing transfer does not stop it. Temperature data alone do not isolate a pathway, instantaneous rate or total energy.

Match conditions for the intended question. Subtraction cannot remove confounds in mass, start or time. Comparisons of whole designs can vary multiple construction features; isolated feature claims need comparisons that separate those features. Fresh trials use fresh samples; several timed readings of one sample remain one run.

A displayed boundary pass is nominal. Unknown accuracy and trial variation limit confidence; headroom is not a reliability probability. Similar readings do not prove equality; retain contrary records. One new design result under changed conditions cannot establish a new ranking against an untested design.

Respond in connected prose, orally while pointing to data, or with a labeled representation. Clarify the question, table access, vocabulary and response mode before choosing a reteach. Sparse language can express adequate reasoning.

A labeled model, sparse connected prose or an oral account may show the same reasoning. Ask “Which values?” “Which part is warmer?” “What exact claim?” before prescribing reteaching. Record support and actual exposure. No rigid paragraph template, student label or automated diagnosis.

Print and exposure choices

All core kits have a full student packet and a separate teacher guide. Kits 1–5 use prefixes KitN-v1.0.0-, with selections Teach-the-Lesson, Use-a-Quick-Check, two Reteach selections and Use-a-Later-Check. Foundation files and their exact old names are preserved; Kit 3 retains legacy task IDs, qualified as kit3/I1 etc. The complete printable map follows in this guide.

Kit 6 uses the prefix Kit6-v1.0.0-: Teach-the-Design-Challenge (student P/M/G/I0/I1; guide P–I); Use-a-Quick-Check (I0/I1; guide I); Reteach-Meet-Every-Requirement (A/Ac; guide A); Reteach-Improve-the-Design-and-the-Test (B/Bc; guide B); Use-a-Later-Check (T0/T1; guide T). Exact full-page references: Kit 6 teacher X.

Quick Check in every core kit reuses its independent task. It is an alternate print route, not fresh after lesson exposure. Reteach rechecks and later tasks are fresh only until shown or attempted. Record modeled, practiced, independent, reused and later exposure in [task-exposure-map.csv/HTML](#).

Kit 5, Kit 6 and portfolio sequences require an initial record or proposal before a separate page of new evidence. Print on one side and distribute in order; the full packet or preview does not preserve the staged reveal. Keep earlier records visible after the reveal. P1 first comparisons and redesign and retest are actual distinct phases, not prewritten successful outcomes.

Portfolio Integrative-A and Integrative-B are two fresh different contexts, not equivalent forms. Teacher E pages contain twelve explicitly fictional annotated responses. Blank record R keeps dimensions separate. Do not interpret score changes as learning effects.

Response → supplied next task

Measurement reading or direction unclear → Kit 1 Compare the Measurements, K1-A1/A2; endpoint and change confused → Kit 1 Value or Change, K1-B1–B3. Unequal comparison conditions → Kit 2 Repair the Comparison, K2-A1/A2; incomplete plan → Kit 2 Specify the Plan, K2-B1–B3.

One convenient trial or an “always” claim → Kit 3 Use All Results and Limit the Claim, F1–F4, full student pp. 6–7. Repeated readings without explanation → Kit 4 Connect Evidence to the Explanation, K4-A1–A3, pp. 6–7. Cold treated as a substance, reversed direction or stopped transfer → clarify wording, then Kit 4 Trace Energy Transfer, K4-B1–B3, pp. 8–9.

Ignoring new inconvenient evidence → Kit 5 Keep the Evidence, Change the Claim, K5-A1–A4, pp. 9–12. Pooling incomparable new records or assuming the newest wins → Kit 5 Compare Conditions Before Revising, K5-B1–B5, pp. 13–16. Use the initial → new reveal sequence.

Missing a design requirement or replacing every trial with a mean → Kit 6 Meet Every Requirement, K6-A1/A2 then fresh A3, pp. 6–7. Unsupported improvement or feature attribution → Kit 6 Improve the Design and the Test, K6-B1/B2 then fresh B3, pp. 8–9. Correct reasoning but unclear writing → oral or labeled clarification rather than automatic science reteach.

After independent I, choose a still unseen Later Check, not the reused Quick Check. If all checks are already shown, use them as practice and record the limitation. The portfolio examples distinguish visible evidence, unconfirmed interpretation, a clarifying prompt and the exact next task.

Practical P1 and actual session routes

P1 is an optional distinct companion: cool water warms toward room temperature; construct safe sleeves, compare fresh paired trials, retain raw records, redesign and retest against an identified reference. Use its operational card, measured quantity, geometry and instrument requirements, blank forms and three selections. Follow ordinary supervision and school procedures. No tasting, hot apparatus or student cutting or puncturing.

The P1 data fallback is complete if equipment or access is unsuitable. It supports reasoning but does not show learner construction or testing. Blank empirical records contain no invented readings. Completed fictional records are labeled constructed. Practical success is unknown until actual measurements; negligible, variable or worse results remain valid outcomes.

The Session Routes teacher guide provides six paper sessions and eight design and investigation sessions with exact task and print references, targets, demonstrations, work, collected responses and next decisions. Times are author planning estimates, not observed durations. Practical repetitions may need continuation blocks; no equipment homework is required.

The six-session paper route uses Kits 1–6 and continues the staged Kit 6 proposal → new-evidence cycle. The eight-session route uses Kits 1/2/3, a paired Kit 4/5 explanation and revision block, Kit 6, then the P1 first test, redesign and retest. Each block has prerequisites and routing alternatives; teachers can enter through a kit bridge.

A provided protocol is not evidence that an experiment occurred. AI content and method review is not a safety certification, empirical performance test or validation of classroom effectiveness. No human reviewer or pilot is required; optional feedback can inform future versions.

Sources, rights, review and versions

Official sources verified 2026-09-30: NGSS MS-PS3-3 for temperature, transfer and device work; MS-ETS1-3 for systematic criteria, constraints and design data; MS-ETS1-4 for model, test and iterative thinking; NSTA Safety and School Science Instruction for supervision, risk and control conditions; WCAG 2.2 Quick Reference for website checks. See source-to-claim.md for exact task connections and gaps.

Paper analysis addresses selected ideas, not physical design, construction or testing, or complete expectations. The practical protocol may support more components when learners actually perform them; possession of the file is not completion. No source endorses these resources. Cases, tables and text are original; external material is paraphrased and linked, not copied. Preserve site Terms of Use and legacy license records.

Stage 3 records for each resource separately cover Kit 6, P1, shared teaching and integration; blind solve, distinct methods audit and a fresh final approver use actual versioned files and digests. Isolated sessions using the same model may be used; they do not guarantee independent errors or human expertise. Read the report for the actual decision rather than infer it from file existence.

Foundation publication is distinct from staged Stage 2 and Stage 3. This newly versioned guide does not modify any original Kit 1–5 downloads or the old archive. Publication requires separate authorization; no deployment is claimed here.

No physical execution, classroom effectiveness, Microsoft Word/Google Docs or assistive technology testing is claimed without evidence. Actual LibreOffice rendering, PDF inspection and automated and manual browser checks are recorded separately. A clean layout is not conformance.

Generated pathway and print index

Read Temperature Data Before Explaining It · Reteach Compare the Measurements · Kit1-v1.0.0-Reteach-Compare-the-Measurements.pdf; teacher Teacher guide p5. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Read Temperature Data Before Explaining It · Reteach Value or Change · Kit1-v1.0.0-Reteach-Value-or-Change.pdf; teacher Teacher guide p6. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Read Temperature Data Before Explaining It · Teach the Lesson · Kit1-v1.0.0-Teach-the-Lesson.pdf; teacher Teacher guide p3. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Read Temperature Data Before Explaining It · Use a Later Check · Kit1-v1.0.0-Use-a-Later-Check.pdf; teacher Teacher guide p7. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

This index and the website selector derive from resource-task-manifest.json. Staged entries are not live; public mode includes only published foundation. Full paths and next-check links are in the printable HTML index.

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Read Temperature Data Before Explaining It · Use a Quick Check · Kit1-v1.0.0-Use-a-Quick-Check.pdf; teacher Teacher guide p4. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Was It a Fair Comparison? · Reteach Repair the Comparison · Kit2-v1.0.0-Reteach-Repair-the-Comparison.pdf; teacher Teacher guide p5. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Was It a Fair Comparison? · Reteach Specify the Plan · Kit2-v1.0.0-Reteach-Specify-the-Plan.pdf; teacher Teacher guide p6. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Was It a Fair Comparison? · Teach the Lesson · Kit2-v1.0.0-Teach-the-Lesson.pdf; teacher Teacher guide p3. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

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Was It a Fair Comparison? · Use a Quick Check · Kit2-v1.0.0-Use-a-Quick-Check.pdf; teacher Teacher guide p4. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Which Design Is Better Supported? · Reteach Compare the Measurements · Kit3-v1.0.0-Reteach-Compare-the-Measurements.pdf; teacher Teacher guide p6. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Which Design Is Better Supported? · Reteach Use All Results and Limit the Claim · Kit3-v1.0.0-Reteach-Use-All-Results-and-Limit-the-Claim.pdf; teacher Teacher guide p7. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

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Which Design Is Better Supported? · Teach the Lesson · Kit3-v1.0.0-Teach-the-Lesson.pdf; teacher Teacher guide p3. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Which Design Is Better Supported? · Use a Later Check · Kit3-v1.0.0-Use-a-Later-Check.pdf; teacher Teacher guide p8. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Which Design Is Better Supported? · Use a Quick Check · Kit3-v1.0.0-Use-a-Quick-Check.pdf; teacher Teacher guide p5. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Explain Why the Temperature Changed · Reteach Connect Evidence to the Explanation · Kit4-v1.0.0-Reteach-Connect-Evidence-to-the-Explanation.pdf; teacher Teacher guide p6. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

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Explain Why the Temperature Changed · Reteach Trace Energy Transfer · Kit4-v1.0.0-Reteach-Trace-Energy-Transfer.pdf; teacher Teacher guide p7. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Explain Why the Temperature Changed · Teach the Lesson · Kit4-v1.0.0-Teach-the-Lesson.pdf; teacher Teacher guide p3. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Explain Why the Temperature Changed · Use a Later Check · Kit4-v1.0.0-Use-a-Later-Check.pdf; teacher Teacher guide p8. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Explain Why the Temperature Changed · Use a Quick Check · Kit4-v1.0.0-Use-a-Quick-Check.pdf; teacher Teacher guide p5. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

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Revise the Claim When Results Change · Reteach Compare Conditions Before Revising · Kit5-v1.0.0-Reteach-Compare-Conditions-Before-Revising.pdf; teacher Teacher guide p11. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Revise the Claim When Results Change · Reteach Keep the Evidence Change the Claim · Kit5-v1.0.0-Reteach-Keep-the-Evidence-Change-the-Claim.pdf; teacher Teacher guide p8. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Revise the Claim When Results Change · Teach the Lesson · Kit5-v1.0.0-Teach-the-Lesson.pdf; teacher Teacher guide p3. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Revise the Claim When Results Change · Use a Later Check · Kit5-v1.0.0-Use-a-Later-Check.pdf; teacher Teacher guide p13. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

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Revise the Claim When Results Change · Use a Quick Check · Kit5-v1.0.0-Use-a-Quick-Check.pdf; teacher Teacher guide p7. Quick Check reuses independent I; Later is fresh only until shown. Select relevant key by stable task ID.

Choose, Test & Improve a Thermal Protector · Teach the Design Challenge · Kit6-v1.0.0-Teach-the-Design-Challenge.pdf; teacher Teacher guide p2; exact task-key headings inside. Quick Check reuses I0/I1; fresh Ac/Bc/T only until shown.

Choose, Test & Improve a Thermal Protector · Use a Quick Check · Kit6-v1.0.0-Use-a-Quick-Check.pdf; teacher Teacher guide p5; exact task-key headings inside. Quick Check reuses I0/I1; fresh Ac/Bc/T only until shown.

Choose, Test & Improve a Thermal Protector · Reteach Meet Every Requirement · Kit6-v1.0.0-Reteach-Meet-Every-Requirement.pdf; teacher Teacher guide p6; exact task-key headings inside. Quick Check reuses I0/I1; fresh Ac/Bc/T only until shown.

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Choose, Test & Improve a Thermal Protector · Use a Later Check · Kit6-v1.0.0-Use-a-Later-Check.pdf; teacher Teacher guide p8; exact task-key headings inside. Quick Check reuses I0/I1; fresh Ac/Bc/T only until shown.

Cool-Water Design Investigation · Prepare and Run the First Comparison · P1-v1.0.0-Prepare-and-Run-the-First-Comparison.pdf; teacher Teacher guide p2; exact task-key headings inside. Use P1-L1 after reflection only if unseen; fallback does not show physical construction/testing.

Cool-Water Design Investigation · Redesign and Retest · P1-v1.0.0-Redesign-and-Retest.pdf; teacher Teacher guide p6; exact task-key headings inside. Use P1-L1 after reflection only if unseen; fallback does not show physical construction/testing.

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Cool-Water Design Investigation · Compare the Results and Reflect · P1-v1.0.0-Compare-the-Results-and-Reflect.pdf; teacher Teacher guide p6; exact task-key headings inside. Use P1-L1 after reflection only if unseen; fallback does not show physical construction/testing.

Cool-Water Design Investigation · Use a Later Reasoning Check · P1-v1.0.0-Use-a-Later-Reasoning-Check.pdf; teacher Teacher guide p17; exact task-key headings inside. Use P1-L1 after reflection only if unseen; fallback does not show physical construction/testing.

Thermal Energy Evidence Portfolio · Integrative A · Portfolio-v1.0.0-Integrative-A.pdf; teacher Teacher guide p2; exact task-key headings inside. A and B are different tasks, not equivalent forms; B is fresh only until shown.

Thermal Energy Evidence Portfolio · Integrative B · Portfolio-v1.0.0-Integrative-B.pdf; teacher Teacher guide p3; exact task-key headings inside. A and B are different tasks, not equivalent forms; B is fresh only until shown.

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