

Start Here · Five-kit route

Stage 2 adds Kit 4 (explain the pattern) and Kit 5 (revise a claim) to the verified foundation. This updated guide is v 1.1.0; Kits 1–5 are v 1.0.0. The original foundation bundle and guide v 1.0.0 remain available. Grade 6 is a provisional authoring target within the NGSS Grades 6–8 band; check local course placement. Paper and pencil only. Optional calculator, number line, pointing, projection, oral explanation or labeled diagram.

Choose a sequence or enter from a response

Kit 1: read measurements—headings, units, time, starts, change. Kit 2: evaluate comparison conditions—question, confounds, matched repair, recording. Kit 3: support a design choice—paired evidence across trials and limits. Kit 4: explain the pattern—sample/surroundings, net-transfer direction and scientific connection. Kit 5: revise a particular claim—compare new conditions/evidence and retain, narrow, change or remain uncertain.

Each kit has its own prerequisite bridge. The sequence helps connect ideas but is not required before entering a kit. Check the bridge; clarify task/language/representation access. A correct selected design does not by itself show explanation; a blank response does not identify a science difficulty.

Prepare and print

Required: paper and pencil. Optional: calculator, number line, pointing, projection, oral response or labeled representation. Read the one-page teacher quick start and relevant key. Print student files only, keeping keys separate. Use actual standalone selections listed here, not the whole packet when exposure/reveal matters.

Author estimates, not classroom timings: Kits 1/2 35–45 min; Kit 3 36–44 min; Kit 4 36–45 min; Kit 5 45–55 min or two lessons. Reteach 10–15 min in Kits 1–4, 15–20 min in Kit 5; later 5–8 min in foundation, 8–12 min Kit 4, 10–15 min Kit 5. Guide preparation 10–15 min estimate.

Equipment-free supplied-data analysis is not evidence of conducting an investigation or designing, constructing and testing a physical device. Kit 6 and the practical pathway are outside this five-kit release.

Vocabulary and scientific boundaries

Observation: a supplied reading at a stated time. Evidence: a relevant observation selected for a question.

Explanation: connect that evidence to a scientific idea. Temperature: reading in °C here; change: start-to-finish difference with direction. Warming: higher final; cooling: lower final. Sample: matter studied; surroundings: parts outside it; net: overall transfer accounting for opposite directions.

Matched comparison: relevant conditions agree for the intended question. Confound: another relevant difference mixes possible effects. Independent trial: a fresh comparison; repeated time readings from one sample are one run. Complete design: construction choices together, not an isolated material property. Claim scope: conditions/results the statement actually concerns.

Revision can retain a bounded claim, narrow its scope, change a conclusion or withhold confidence. Decisions depend on exact wording and comparability. A new result does not require reversal. One design's changed-condition record does not rank it against an untested design. Keep contrary raw records; an exclusion needs a procedural reason, not convenience.

A temperature reading is not total energy. Type, state and amount of matter also affect total energy. For these passive, single-phase cases, net thermal-energy transfer is from warmer parts toward cooler parts. An arrow represents that net transfer, not a substance called cold or an individual particle path. Temperature readings alone do not isolate conduction, convection or radiation, calculate total transferred energy, or show an instantaneous transfer rate. Limiting warming is not cooling; limiting transfer is not stopping it.

At idealized uniform equal temperatures, with no other input/output or phase change, there is no net thermal-energy transfer driven by a temperature difference; particles at 22°C still move. One unchanged reading does not establish equilibrium or absent particle motion.

Small/variable differences plus unknown accuracy can leave a comparison uncertain; overlap does not prove identical performance. Display precision is not accuracy. More trials do not automatically remove systematic bias. No joules, statistical significance or total-energy ratios from Celsius numbers are required.

Every dataset is constructed teaching data, not experiment measurements or computer simulation. All fictional responses are labeled. The Kit 1 graph repeats its model table; the Kit 4 arrow is an explanatory model, not an observed pathway. Text alternatives give equivalent information, not assessment answers.

Foundation print choices · Preserved files

Folders kit 1/kit 2/kit 3 contain the original verified v 1.0.0 classroom assets. Filename prefix: KitN-v 1.0.0-. Full student/teacher files are Student-Packet.pdf/docx and Teacher-Guide.pdf/docx. Separate readable HTML is retained. Print selections are in each kit's print-selections folder.

Kit 1 · Read Temperature Data Before Explaining It

Teach-the-Lesson.pdf:P/M/V/G/I,full student pp 1–5,teacher P/M-V/G-I. Use-a-Quick-Check.pdf:I,full p 5,teacher G/I. Reteach-Compare-the-Measurements.pdf:A,full p 6,K1-A1/A2,teacher A. Reteach-Value-or-Change.pdf:B,full p 7,K1-B1–B3,teacher B. Use-a-Later-Check.pdf:T,full p 8,K1-T1–T3,teacher T.

Kit 2 · Was It a Fair Comparison?

Teach-the-Lesson.pdf:P/M/G/I,full student pp 1–4,teacher P/M/G-I. Use-a-Quick-Check.pdf:I,full p 4. Reteach-Repair-the-Comparison.pdf:A,full p 5,K2-A1/A2,teacher A. Reteach-Specify-the-Plan.pdf:B,full p 6,K2-B1–B3,teacher B. Use-a-Later-Check.pdf:T,full p 7,K2-T1–T3,teacher T.

Kit 3 · Which Design Is Better Supported?

Teach-the-Lesson.pdf:P/M/G/I,full student pp 1–4,teacher P/M/G-I. Use-a-Quick-Check.pdf:I,full p 4,teacher I. Reteach-Compare-the-Measurements.pdf:R,full p 5,R1–R3,teacher R. Reteach-Use-All-Results-and-Limit-the-Claim.pdf:F,full pp 6–7,F1–F4,teacher F. Use-a-Later-Check.pdf:T,full p 8,T1–T3,teacher T. Kit 3 retains its legacy IDs;qualify them as Kit 3/R1,etc.in shared notes.

For every kit,Quick Check reuses I from Teach the Lesson. It is an alternate print route,not an unseen recheck after I. Foundation fresh checks are inside reteaches and later T. Record if any were already shown.

Stage 2 print choices and reveal sequence

Filename prefixes: Kit4-v 1.0.0- and Kit5-v 1.0.0-. Each kit has separate student/teacher PDF,DOCX and HTML,and five standalone student PDF selections. Keys and exact full/selection page references are in teacher quick start and X.

Kit 4 · Explain Why the Temperature Changed

Teach-the-Lesson.pdf:P/M/V/G/I,full student pp 1–5,teacher pp 2–5. Use-a-Quick-Check.pdf:I,full p 5,teacher p 5,reused after I. Reteach-Connect-Evidence-to-the-Explanation.pdf:A/Ac,full pp 6–7,K4-A1–A3,teacher p 6. Reteach-Trace-Energy-Transfer.pdf:B/Bc,full pp 8–9,K4-B1–B3,teacher p 7. Use-a-Later-Check.pdf:T/E,full pp 10–11,K4-T1–T3,teacher p 8.

Kit 5 · Revise the Claim When Results Change

Teach-the-Lesson.pdf:P → M0 → M1 → MR → G0 → G1 → I0 → I1,full pp 1–8,teacher pp 2–7. Use-a-Quick-Check.pdf:I0 → I1,full pp 7–8,teacher p 7,reused after I. Reteach-Keep-the-Evidence-Change-the-Claim.pdf:A0 → A1 → Ac 0 → Ac 1,full pp 9–12,K5-A1–A4,teacher pp 8–10. Reteach-Compare-Conditions-Before-Revising.pdf:B0 → B1 → Bc 0 → Bc 1,full pp 13–16,K5-B1–B5,teacher pp 11–12. Use-a-Later-Check.pdf:T0 → T1,full pp 17–18,K5-T1–T3,teacher p 13.

Kit 5: print one-sided;hand out initial record first;record the original claim;then hand out the separate new-evidence page. Keep both visible for revision. MR is an actual seven-field revision record;teacher MR has a completed example. Student full packet/download preview is not a reveal-safe whole-class handout.

After I,use a still-unseen Later Check;after reteach,use its supplied fresh recheck. All student task IDs,dataset IDs,exposure states and authorized reuse are listed in task-exposure-map.csv/HTML. Freshness is conditional on actual prior exposure,not the filename. If all were shown,use as practice and document that limitation.

Response → actual next task

Clarify meaning/access first: “Show the values you used.” “What does your statement claim?” “Which part is warmer?” “Can you explain aloud or label a drawing?” Record mode/support. Do not infer misunderstanding from writing fluency.

Mixed rows/reversed direction → Kit 1 Compare the Measurements,K1-A1/A2. Confuses endpoint and change → Kit 1 Value or Change,K1-B1–B3. Uses subtraction to excuse unequal conditions → Kit 2 Repair the Comparison,K2-A1/A2. Vague recording plan → Kit 2 Specify the Plan,K2-B1–B3.

Uses one convenient trial or says always → Kit 3 Use All Results and Limit the Claim,F1–F4. Misreads Kit 3 values → Kit 3 Compare the Measurements,R1–R3. Repeats readings without a scientific link → Kit 4 Connect Evidence to the Explanation,K4-A1–A3. Reversed net arrow/cold substance/stopped transfer → Kit 4 Trace Energy Transfer,K4-B1–B3,after checking intended meaning.

Ignores inconvenient new results/overgeneralizes → Kit 5 Keep the Evidence,Change the Claim,K5-A1–A4. Pools incomparable new records or changes automatically → Kit 5 Compare Conditions Before Revising,K5-B1–B5. Correct reasoning with unclear writing → oral/labeled response,not automatic science reteach. Quick Check I is reused;choose unseen Ac/Bc or T for later evidence.

Local planning record · copy if useful

Date:_____ Kit/task:_____ Mode/support:_____

Observed excerpt or pointed-to values:_____

Data reading:_____ Comparison/conditions:_____

Science connection/claim limits:_____ Revision rationale:_____

Next supplied selection/task:_____ Why:_____

Later check/date/exposure:_____

Use visible/partly visible/not yet visible descriptions with evidence,not a composite ability score or mastery label. Keep notes locally;no student accounts/uploads or automated scoring are required.

Sources, rights and separate review records

Official sources checked 2026-09-29: NGSS MS-PS3-3 (<https://www.nextgenscience.org/pe/ms-ps3-3-energy>) and MS-PS3-4 (<https://www.nextgenscience.org/pe/ms-ps3-4-energy>); NSTA revision connection (<https://my.nsta.org/ngss/NSforSEP.aspx?id=3>). These support specific ideas, not validation or complete standards coverage. All text/data/representations are original; external sources are paraphrased and linked, not reproduced. Classroom copying/adaptation follows <https://mentorteaching.com/terms-of-use/>.

Kit 4's equal-temperature particle-motion distinction is supported by OpenStax College Physics 2 e 13.1 and 13.4 (links in its teacher S and source-to-claim record). W3 C WCAG2.2 Quick Reference: <https://www.w3.org/WAI/WCAG22/quickref/> informs website checks; clean visual layout does not certify documents or site conformance.

Specific connections, not a blanket alignment badge

Kit 1 supports measurement reading; Kit 2 selected planning/controls; Kit 3 comparative evidence; Kit 4 connects observations to net-transfer explanation; Kit 5 evaluates new evidence/conditions and revision. Selected ideas in MS-PS3-3/4 and NSTA's 6–8 revision connection are used. These supplied-data tasks do not conduct an investigation or physically design, construct and test a device, or complete those expectations.

Review status is per resource

Foundation Kit 1/2/3 and guide v 1.0.0 retain their dated independent AI reports; those are baseline evidence, not renewed human approval. Kit 4, Kit 5 and shared Start Here v 1.1.0/integration have separate Stage 2 records with exact candidate hashes, scope, findings and limitations. Read the accompanying records for actual completion status; file production alone does not imply review or publication.

For each resource, human science review and classroom-use feedback remain pending. No Microsoft Word, Google Docs, assistive-technology or classroom test is claimed. Actual LibreOffice/PDF inspections, automated/browser checks and independent AI review are different scopes. AI review is not human subject review, classroom validation or accessibility certification.

Stage 2 is staged for publication approval; the live foundation remains v 1.0.0 until separate authorization and deployment. Kits 6/practical remain outside the available five-kit candidate. Original material and data only; external source rights are not granted. Preserve existing Terms of Use and attribution notes.