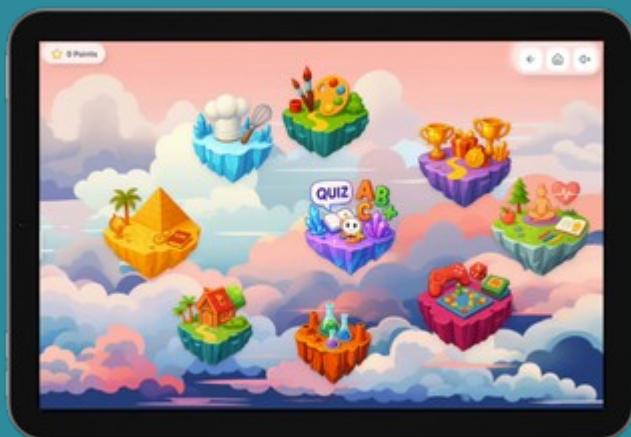




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Heat in Action - Year 3

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Heat in Action — Teaching Overview

Purpose

Year 3 students distinguish heat from temperature, identify everyday heat sources and investigate how a fabric wrap affects temperature change. They ask questions, plan a safe fair comparison, measure, represent and evaluate evidence, then apply an explanation.

Two routes

Full route: ten lessons of 60 minutes. Compact route: eight sessions of 60 minutes, using all ten lesson decks. Combine Lessons 1–2 in Session 1 and Lessons 9–10 in Session 8; Sessions 2–7 use Lessons 3–8 in order. The compact route retains the investigation, explanation and transfer assessment.

How the files work

Each numbered lesson has its own complete, editable presentation, with a cover, eight teaching slides and a closing slide. The quiz is a separate editable deck. Student pages follow the teacher plans; each worksheet answer is immediately after its matching worksheet.

Assessment approach

Collect questions, plans, actual records, graphs, explanations and advice across the unit. Use the two-page assessment and four-dimension rubric for the final judgement. A spoken, drawn, written or supported response can show the same science.

Presentation Files — Lessons 1–5

Lesson 1: Warm and cool evidence

Heat in Action - Year 3 - Lesson 01 - Presentation.pptx

Lesson 2: Where heat comes from

Heat in Action - Year 3 - Lesson 02 - Presentation.pptx

Lesson 3: Heat moves

Heat in Action - Year 3 - Lesson 03 - Presentation.pptx

Lesson 4: Questions and variables

Heat in Action - Year 3 - Lesson 04 - Presentation.pptx

Lesson 5: Measure safely

Heat in Action - Year 3 - Lesson 05 - Presentation.pptx

PREVIEW

Presentation Files — Lessons 6–10

Lesson 6: Represent change

Heat in Action - Year 3 - Lesson 06 - Presentation.pptx

Lesson 7: Explain the pattern

Heat in Action - Year 3 - Lesson 07 - Presentation.pptx

Lesson 8: Design advice

Heat in Action - Year 3 - Lesson 08 - Presentation.pptx

Lesson 9: Investigation conference

Heat in Action - Year 3 - Lesson 09 - Presentation.pptx

Lesson 10: New heat problem

Heat in Action - Year 3 - Lesson 10 - Presentation.pptx

PREVIEW

Compact Eight-Session Route

Session 1 • Lessons 1–2

30 min: predict, safely measure and compare two actual readings. 20 min: use source case pictures and W02 to explain sunlight, friction and electrical heating. 10 min: distinguish a prediction from evidence and correct the blanket misconception.

Sessions 2–4 • Lessons 3–5

Session 2: model warmer-to-cooler transfer and use W03. Session 3: question, prediction, one change and controls in W04. Session 4: teacher-managed trial, actual W05 records and method notes. Each session lasts 60 minutes.

Sessions 5–7 • Lessons 6–8

Session 5: table/graph with clear data origin. Session 6: compare temperature drops, explain and evaluate. Session 7: give evidence-based insulation advice with a useful limit. Each session lasts 60 minutes.

Session 8 • Lesson 9–10

35 min: conference using existing plan, data and explanation; complete the two assessment pages. 20 min: apply heat transfer to the cooler-bottle case and propose a safe next question. 5 min: reflect. Use the rubric and recorded evidence from earlier sessions.

Science and Safe Preparation

Core concepts

Temperature measures how hot or cold something is. Heat is energy transferred because temperatures differ. In these simple comparisons, net heat transfer is from warmer to cooler. Insulation resists transfer; it does not generate heat. A surface feeling warm is not a temperature measurement.

Teacher-managed materials

Use stable matching cups on a tray, equal water amount, one fabric wrap, a timer and suitable non-glass long-stem digital laboratory/cooking thermometers. Follow tool instructions and school safety requirements. Teacher prepares, checks and pours comfortably warm water below the school-approved limit.

Boundaries

No boiling water, flames, student-operated heating appliances, tasting or testing unknown hot surfaces by touch. Appliances appear only in reference pictures. Keep the sensor in the water and clear of the cup sides/base. Teacher decides who may handle approved tools.

If a safe practical is unavailable

Use the clearly labelled illustrative table to model recording, graphing and explanation. Do not claim these values were measured by the class. Students can still evaluate the proposed method and apply the science.

Investigation and Evidence Guide

Comparison

Question: does a fabric wrap reduce cooling over ten minutes? Change only the wrap. Match cup size/material, water amount, safe starting temperature, surroundings, reading procedure and times. Use the same type of probe in a consistent position. Teacher approves the plan.

Actual records

Read both samples at 0, 5 and 10 minutes. W05 has six compatible temperature cells for actual results. Record the number and name. Probe displays in pictures are apparatus illustration. Use readings from the supervised trial. Keep unexpected values and explain timing, starting-temperature or sensor-position differences; never replace them with expected values.

Illustrative example

Time (min): 0, 5, 10. Unwrapped (°C): 40, 35, 30. Wrapped (°C): 40, 38, 36. The drops are 10°C and 4°C. These invented teaching values are labelled illustrative, not classroom results; they do not set an operating temperature or gear for a result.

Reasoning limits

Use the measured or labelled illustrative values to support the claim. A single short comparison does not prove every wrap works equally well or that the object will remain warm indefinitely. A repeat, another safe material comparison or a more consistent method can strengthen the evidence.

Lesson 1: Warm and cool evidence

Learning focus

Use a thermometer to compare temperatures safely.

Vocabulary

Temperature: a measure of how hot or cold something is. Measure: use a tool and a unit.

Equipment

Two stable matching cups; teacher-prepared room-temperature and comfortably warm water; non-glass digital thermometers; tray; W01.

Preparation

Check school safety requirements. Teacher prepares and temperature-checks the water, labels the cups and handles all pouring. Use appropriate clean non-glass digital thermometers.

Teacher modelling

Read the number on the C unit after the display settles. Keep the sensor in the water, clear of the cup sides/base. Compare the two recorded numbers with the guessing by touch.

Lesson 1 — Teaching and Assessment

60-minute sequence

0–5 min: introduce the focus and retrieve an earlier idea.

5–15 min: teacher model or case discussion.

15–20 min: check the question, method and response options.

20–40 min: guided/student task using W01.

40–50 min: compare evidence and explain the science.

50–60 min: reflection and the evidence check.

Student task

Ask which sample has the higher temperature. Student predict with a reason, watch teacher-managed readings and record the actual readings in W01. Compare with a partner and revise the prediction if the evidence differs.

Evidence to collect

Accurate actual temperatures with $^{\circ}\text{C}$; comparison supported by the readings; a question or justified prediction.

Support

Read displays aloud; use warmer/cooler symbols and a partially complete table; a student may point, dictate or use a communication device.

Extension

Explain why two surfaces can feel different at the same temperature and why a thermometer is more useful for this comparison.

Lesson 2: Where heat comes from

Learning focus

Identify sunlight, friction and electrical heating as heat sources.

Vocabulary

Heat: energy transferred because of a temperature difference. Friction: resistance when surfaces rub.

Equipment

D1; C1 cards H01–H03; W02; safe pictures; optional gentle hand rubbing. No working appliances.

Preparation

Use supplied images for electrical devices. Never operate a heater, kettle or microwave with students. No flame or direct Sun viewing.

Teacher modelling

Sunlight can warm objects. Gentle rubbing can warm hands through friction. An electrical resistance heater converts electrical energy into thermal energy. This does not imply every appliance works in the same way.

Lesson 2 — Teaching and Assessment

60-minute sequence

0–5 min: introduce the focus and retrieve an earlier idea.

5–15 min: teacher model or case discussion.

15–20 min: check the question, method and response options.

20–40 min: guided/student task using W02.

40–50 min: compare evidence and explain the science.

50–60 min: reflection and the evidence check.

Student task

Sort the sunlight, friction and electrical-heating examples using W02.

Gently rub hands briefly if appropriate, then describe the warmth as an observation, not a precise thermometer reading. Compare the original prediction with the observed effect.

Evidence to collect

Correct examples for each source, distinguishes an observation from a prediction; recognises that insulating fabric does not make its own heat.

Support

Use the three large case cards and a picture/word bank; accept pointing and a spoken explanation.

Extension

Compare a blanket with a heat source. Explain why warm clothing can help keep warmth without producing it.

Lesson 3: Heat moves

Learning focus

Explain heat transfer from a warmer object to a cooler object.

Vocabulary

Transfer: movement of energy. Warmer and cooler: compare temperatures.

Equipment

D1/D2; card H04; teacher-managed warm-water cup and room-temperature metal spoon; W03.

Preparation

Teacher checks the water and spoon, uses a safe display and handles the liquid. No direct touching to test heat and not hot metal. A diagram may replace the demonstration.

Teacher modelling

Place a cooler spoon in warmer water. Explain that energy transfers from the warmer water to the cooler spoon. A falling water reading alone cannot tell how much energy went to the spoon versus the air or cup.

Lesson 3 — Teaching and Assessment

60-minute sequence

0–5 min: introduce the focus and retrieve an earlier idea.

5–15 min: teacher model or case discussion.

15–20 min: check the question, method and response options.

20–40 min: guided/student task using W03.

40–50 min: compare evidence and explain the science.

50–60 min: reflection and the evidence check.

Student task

Discuss the teacher demonstration and original model. Draw arrows for the warm-water/cool-spoon and cool-bottle/warm-room examples in W03. Explain the direction using the temperature difference.

Evidence to collect

Correct warmer-to-cooler arrow, with a reason; distinguishes temperature from transferred energy; recognises a model is simplified.

Support

Provide warm/cool labels and a physical arrow to point with; student may dictate a reason.

Extension

Predict what happens when the two objects reach the same temperature, explain that there is no net transfer due to a temperature difference.

Lesson 4: Questions and variables

Learning focus

Plan a safe fair comparison of cup insulation.

Vocabulary

Variable: a feature that can change. Fair test: compare one intended change while keeping other important conditions alike.

Equipment

Two matching cups; equal water amounts; same initial temperature; one fabric wrap secured by teacher; tray; two digital thermometers; timer; W04.

Preparation

Use clean dry fabric secured around the outside of one cup without covering the opening or thermometer. Teacher pours equal volumes from one safely checked kettle. Same cup material, size and position; no lids on either cup.

Teacher modelling

Question: Does a fabric wrap reduce the cooling of warm water over ten minutes? Change only the wrap. Measure temperature at 0, 5 and 10 minutes. Keep important conditions alike and record both actual starts.

Lesson 4 — Teaching and Assessment

60-minute sequence

0–5 min: introduce the focus and retrieve an earlier idea.

5–15 min: teacher model or case discussion.

15–20 min: check the question, method and response options.

20–40 min: guided/student task using W04.

40–50 min: compare evidence and explain the science.

50–60 min: reflection and the evidence check.

Student task

Students complete W04 with a testable question, prediction, one change, measurement and at least three controls. Rehearse positions and timing with empty cups. Teacher checks the plan before any warm-water trial.

Evidence to collect

Names changed/measured/controlled features and one concrete safeguard; explains how unequal starts could mislead.

Support

Offer labels and sentence frames; rehearse with empty labelled cups; accept oral planning or scribing.

Extension

Identify a remaining possible difference, such as thermometer variation; propose a safe repeat or swap positions on a repeat.

Lesson 5: Measure safely

Learning focus

Take and record consistent timed temperature measurements.

Vocabulary

Trial: one run of the investigation. Interval: time between readings.

Equipment

Approved W04 plan; two matching cups; one fabric wrap, equal volumes; teacher-checked warm water; tray; two digital thermometers; timer; W05.

Preparation

Teacher checks equipment and thermometer instructions, secures wrap, uses equal safe water amounts and positions cups away from traffic. Record actual starting values. 7. Non-glass suitable sensor is required.

Teacher modelling

Demonstrate sensor placement, stable readings and timed recording. Say the reading aloud before writing; include °C. Keep both measurement times at equivalent elapsed times.

Lesson 5 — Teaching and Assessment

60-minute sequence

0–5 min: introduce the focus and retrieve an earlier idea.

5–15 min: teacher model or case discussion.

15–20 min: check the question, method and response options.

20–40 min: guided/student task using W05.

40–50 min: compare evidence and explain the science.

50–60 min: reflection and the evidence check.

Student task

Carry out the approved teacher-managed comparison for ten minutes; observe and record 0, 5, 10 minutes on W05. Keep raw values, including unusual results. Record a method note, tidy and dry the work area.

Evidence to collect

Recorded actual data with units/times, consistent method; safe behaviour and honest treatment of unexpected values.

Support

Assign a comfortable adult reads/handles tool where needed; student selects a number or dictates the record.

Extension

Propose a repeat trial and identify what it could check; do not invent a repeat that was not conducted.

Lesson 6: Represent change

Learning focus

Use a table and line graph to show temperature over time.

Vocabulary

Axis: a numbered line on a graph. Scale: the steps used to show values.

Equipment

Actual W05 results; W06 labelled illustrative example; ruler/pencil; native worked graph.

Preparation

Retain actual data as collected. Use supplied illustrative values only to teach graphing or when the safe practical is not possible; do not label them classroom measurements.

Teacher modelling

Illustrative unwrapped cup 0 min 40°C, 5 min 35°C, 10 min 30°C. Label the axes Time (min) and Temperature (°C), use equal time gaps and a 0–40°C scale. Plot each pair and join the points to show change between readings.

Lesson 6 — Teaching and Assessment

60-minute sequence

0–5 min: introduce the focus and retrieve an earlier idea.

5–15 min: teacher model or case discussion.

15–20 min: check the question, method and response options.

20–40 min: guided/student task using W06.

40–50 min: compare evidence and explain the science.

50–60 min: reflection and the evidence check.

Student task

Use W06 to construct/read the supplied model graph; then represent actual W05 values separately if available. Check the coordinates, title, labels and scale with a partner. Explain a plot using at least two values.

Evidence to collect

Accurate table/graph with units and labels; distinguishes illustrative from actual results; describes change with values.

Support

Provide number line and one plotted example; adult scribes interpretation, select points to explain.

Extension

Compare two cup traces on the same scale using actual or explicitly labelled illustrative data; explain why a different scale could mislead.

Lesson 7: Explain the pattern

Learning focus

Use data to support an explanation of cooling and insulation.

Vocabulary

Evidence: observations or measurements that support an idea.

Limitation: something the evidence cannot tell us.

Equipment

Actual results/graphs; D2; H07; W07; labelled illustrative data table.

Preparation

Use actual values where possible. The fixed paired data on W07 are explicitly illustrative: unwrapped 40/31/30°C and wrapped 40/38/36°C at 0/5/10 min. No invented data or measured experiment.

Teacher modelling

Both example cups start at 40°C. Unwrapped drops 10°C, wrapped drops 4°C. The wrapped example cools less over ten minutes, supporting the insulation slowed transfer. One trial does not prove every wrap works best in every setting.

Lesson 7 — Teaching and Assessment

60-minute sequence

0–5 min: introduce the focus and retrieve an earlier idea.

5–15 min: teacher model or case discussion.

15–20 min: check the question, method and response options.

20–40 min: guided/student task using W07.

40–50 min: compare evidence and explain the science.

50–60 min: reflection and the evidence check.

Student task

Calculate changes on W07, choose the supported claim, explain the heat-transfer direction, and name a limit or method improvement. Compare a prediction with the data, including a revised explanation if needed.

Evidence to collect

Uses exact values and correct drop; supports claim without claiming insulation produces heat; evaluates method and limitations.

Support

Provide subtraction steps and sentence frames; use arrows and picture choices; students may give recorded oral reasoning.

Extension

Explain why matching starts alone is insufficient and how repeated fair trials could strengthen confidence.

Lesson 8: Design advice

Learning focus

Recommend an insulation choice using evidence and a practical need.

Vocabulary

Insulation: a material or layer that slows heat transfer. Recommendation: advice supported by a reason.

Equipment

W08; W05/W07 evidence; H08; original house illustration based on Australian official guidance; classroom safe fabric wrap

Preparation

Keep this a paper/oral recommendation, not installation or testing a hot drink. Adults manage all practical materials. Do not use building insulation, glass wool or heated plastic with students.

Teacher modelling

Use the measurement or labelled illustrative cup comparison to recommend a safe wrap for keeping a warm drink warm for longer. Explain a useful limit: ten minute cup evidence cannot prove performance for every container journey. Connect still air in suitable insulation to the official household guidance.

Lesson 8 — Teaching and Assessment

60-minute sequence

0–5 min: introduce the focus and retrieve an earlier idea.

5–15 min: teacher model or case discussion.

15–20 min: check the question, method and response options.

20–40 min: guided/student task using W08.

40–50 min: compare evidence and explain the science.

50–60 min: reflection and the evidence check.

Student task

Write, draw or record advice for a fictional class picnic organiser using W08. Name the need, evidence, explanation, limit and a useful follow-up question. Compare with a partner.

Evidence to collect

Makes a feasible recommendation with evidence; applies heat-transfer idea; acknowledges insulation does not generate heat and slows transfer in either direction depending on temperatures.

Support

Offer a need/evidence/question/limit frame and cards; a student can select pictures and create advice.

Extension

Apply the same principle to keeping a cooler lunch container cool in warmer surroundings; explain the reversed transfer direction.

Lesson 9: Investigation conference

Learning focus

Explain the investigation, evidence, method and uncertainty.

Vocabulary

Conclusion: an explanation supported by evidence. Uncertainty: what we cannot be sure about.

Equipment

W04–W08 portfolio; W09; A1 pages; R1 rubric; actual or clearly labelled illustrative data.

Preparation

Use evidence collected throughout teaching. Prepare short conferences or partner-supported recordings so every student contributes. Do not require whole-class public speaking.

Teacher modelling

Model a concise response, question, fair safe method, result with units, warmer-to-cooler explanation, useful recommendation and one limitation. For example, what unequal starts or late readings would mean.

Lesson 9 — Teaching and Assessment

60-minute sequence

0–5 min: introduce the focus and retrieve an earlier idea.

5–15 min: teacher model or case discussion.

15–20 min: check the question, method and response options.

20–40 min: guided/student task using W09.

40–50 min: compare evidence and explain the science.

50–60 min: reflection and the evidence check.

Student task

Students organise existing evidence on W09/A1, show their table/graph and explain their conclusion. Teacher checks individual understanding during the activity and uses accessible recorded/drawn alternatives where needed.

Evidence to collect

Individual understanding supported by a safe fair method, data representation, explanation, limitation and response to a transfer question.

Support

Use a communication board, prompt cards, adult scribing or a supported demonstration; assess the science shown, not the response mode.

Extension

Evaluate two methods and propose a concrete improvement that addresses a specific uncertainty.

Lesson 10: New heat problem

Learning focus

Apply heat-transfer understanding to an unfamiliar situation.

Vocabulary

Apply: use learning in another situation. Prediction: a reasoned idea to investigate.

Equipment

H08; W10; completed assessment evidence; cool-bottle/warm-room fictional diagram.

Preparation

Use an image or safe teacher-prepared object. Do not promise the bottle reaches room temperature within a short period or ask students to touch unknown surfaces.

Teacher modelling

A cooler sealed bottle in warmer room air tends to warm as heat transfers toward it. A trap may slow that warming rather than making the bottle hotter. Make an investigable comparison and a useful limit.

Lesson 10 — Teaching and Assessment

60-minute sequence

0–5 min: introduce the focus and retrieve an earlier idea.

5–15 min: teacher model or case discussion.

15–20 min: check the question, method and response options.

20–40 min: guided/student task using W10.

40–50 min: compare evidence and explain the science.

50–60 min: reflection and the evidence check.

Student task

Students use W10 to draw the transfer direction, predict the temperature change, explain how insulation could help and propose a next question. Share a brief piece of advice for a fictional picnic organiser and identify the evidence needed to test it.

Evidence to collect

Transfers the warmer-to-cooler explanation; applies science to a need; distinguishes a prediction from collected data; communicates reasoning.

Support

Use warm/cool labels, a moveable arrow and sentence frames; accept a supported verbal or practical response.

Extension

Explain what changes when the room is cooler than the bottle, without requiring advanced heat equations.

Using Displays, Cases and the Game

Displays

Use Key Ideas to introduce accurate language. Evidence in a Model separates the question, a simplified model and an explanation. A model illustrates an idea; it is not a measured trial. Revisit displays when students explain actual readings.

Case Cards H01–H08

H01 sunlight; H02 friction; H03 electrical heating; H04 warm water and cooler spoon; H05 consistent measurement; H06 unequal starts; H07 the labelled illustrative comparison; H08 insulation for a cool bottle. Give each group a complete pair of card pages. The case ID is a classroom reference, not a curriculum code.

Evidence Trail

Use the rules, six-space cooperative board and eight challenge cards together. Students notice, ask, compare, explain, apply and reflect. Follow the printed case worksheet ID on each challenge card; the relevant evidence is available throughout. Point or use large counters; do not score speed or confidence.

Teacher checking

Accept different relevant examples and response modes. Check heat-transfer direction, measurement units and the distinction between a prediction, a model, illustrative data and actual evidence. Use a prompt to revisit the case rather than supply an invented experimental result.

Assessment and Rubric — Teacher Guide

Evidence set

Use the investigation plan, actual or explicitly illustrative table/graph, explanation, insulation advice and cooler-bottle application. Assessment page 1 records planning and evidence; page 2 records explanation, a limit and transfer. W09 can organise existing evidence for the conference.

Checking the practical task

Look for one change, matched controls, a safe teacher-approved method, times and °C, and a clear data origin. A sound explanation cites values and connects warmer-to-cooler transfer to the effect of a wrap. Judge limitations honestly even if classroom results differ from the example.

Checking transfer

For a cooler bottle in warmer surroundings, net heat transfers from the surroundings towards the bottle. A suitable wrap slows this gain; it does not make cold or guarantee a fixed warming rate. A proposed follow-up needs a clear question, one change and controls.

Using the rubric

Judge Understanding, Evidence and method, Explanation and use, and Reflection separately. Record the science shown and the next teaching step. Communication aids, adult scribing or a supported response do not automatically lower achievement; separate access support from the scientific reasoning demonstrated.

> Heat in Action <

Key Ideas • Year 3

Heat

Energy transferred because temperatures differ.



Warmer water

Cooler spoon

Temperature

A measure of how hot or cold something is.



Transfer

Energy moves from warmer to cooler.



Warm cup

Warmer

Has a higher temperature in a comparison.



Cooler

Has a lower temperature in a comparison.



Measure

Use a tool and record the unit, °C.



Keep the sensor in the water, not touching the sides or base.

> **Measure safely. Explain with evidence.** <

How We Explain Our Evidence

Scientists use questions, evidence and explanations to understand what happens. Here is an example about heat in action.

1 Question

Does heat flow from the cooler spoon to the warmer water?



2 Evidence in our model

The water starts warmer than the spoon

Warm water (higher temperature)

Cooler spoon (lower temperature)



3 Explanation

No. Heat transfers from the warmer water to the cooler spoon. Their temperatures tend to become closer.



Illustrative model, not measured classroom results. Energy may also transfer to the cup and air.

Heat Case Cards 1

Look at each card. Read the question and use the picture to help you think about heat.
Cut out the cards to use for activities.

H01 Sunlight

Sunlight can warm objects.
Which source warms a sunny seat?



H02 Friction

Gently rubbing hands can make them warmer. What caused the warming?



H03 Electrical heating

An electric resistance heater converts electrical energy into thermal energy.
Use pictures only.



H04 Water and spoon

Warmer water transfers heat to a cooler spoon. Which way should the arrow point?

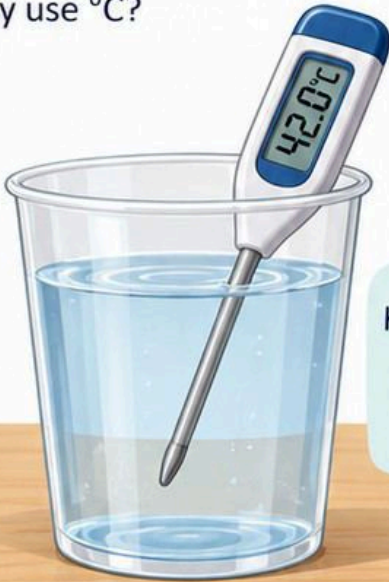


Heat Case Cards 2

Think about the heat.
Look at the situation.
Answer the question.

H05 Measure safely

Use a non-glass digital thermometer.
Teacher checks and handles all water.
Why use °C?



Keep the probe
in the water
and clear of
the base.

H06 Check a fair test

Fictional starts: Cup A 40°C; Cup B 30°C.
Is the starting temperature kept alike?



For a fair test, the starting temperature
should be the same.

H07 Compare the changes

Illustrative data: unwrapped 40°C to 30°C;
wrapped 40°C to 36°C in 1 hour.
Which cooled less?



Unwrapped
40°C → 30°C

Wrapped
40°C → 36°C

Which cooled less?
What does this tell you?

H08 Useful insulation

Insulation can slow heat transfer.
It does not make heat.
How can this help keep a cooler bottle cool?



Based on: DCCEE — Insulation and draught proofing (energy.gov.au)

Evidence Trail

Cooperative game • 2–4 students

Look closely
Think together
Find the evidence

1. Choose a challenge card.



2. Use a case card or class evidence to answer.



3. Ask one respectful question.



4. Check the teacher criteria, then move to the next stop.



Use large counters or point. Take your time.
Speak, draw, gesture or use a communication device.
Work together; there is no speed winner.



Worked turn

Card 1 asks about H04. Heat moves from warmer water to the cooler spoon.

Ask: Which starts warmer?

Then move from Notice to Ask.



Notice

Ask

Small steps
build big ideas!

Evidence Trail Board

Follow the steps. Use what you notice to build and share ideas about heat.



At each stop, answer one card, ask one respectful question and check the criteria.

Finish together: each student explains one idea with evidence.



Evidence Trail Challenge Cards

Use the teacher criteria after explaining your reasoning.

Think
Investigate
Explain

Real evidence
brighter ideas

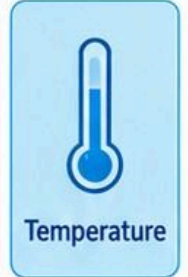
1 H04:

Which way does heat move between warmer water and a cooler spoon?



2 H05:

How are heat and temperature different?



3 H01-H03:

Name one source of warming and explain the example.



4 H06:

Why are unequal parts at temperatures available?



5 W05:

Name a safe, consistent measurement step.



6 H07:

Unwrapped

Wrapped



Illustrative



Find both temperature drops. Which cooled less?

7 H08:

How can insulation help a cooler bottle in warmer air?



8 W07:

Name one evidence limitation and a useful next step.



Name: _____

Date: _____

Heat in Action

① Notice and predict

Which safe sample might be warmer? Why?

② Read and record

Classroom observations — record actual results.

Sample	Temperature (°C)
A	
B	



③ Explain

The warmer sample is _____ because _____ °C is higher than _____ °C.

Did your prediction match the readings? What could you ask next?

Heat in Action

① Notice and predict

Which safe sample might be warmer? Why?

Prediction with a reason; results may differ.

② Read and record

Classroom observations — record actual results.

Sample	Temperature (°C)
A	actual reading
B	actual reading



③ Explain

The warmer sample is A or B because higher value °C is higher than lower value °C.

Use both measured values with °C. If equal, neither is warmer.

Did your prediction match the readings? What could you ask next?

Compare prediction with actual evidence; ask a relevant new question.

Name: _____

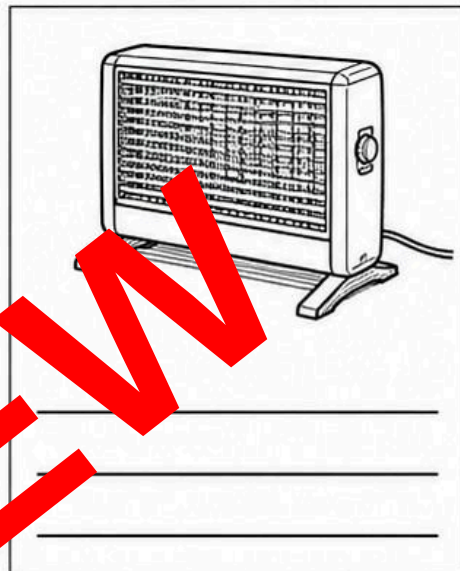
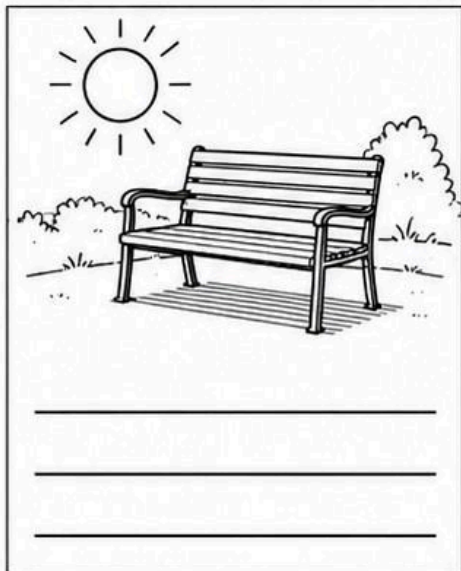
Date: _____

Heat in Action

Heat can be transferred in different ways. Look at the examples, think carefully and answer the questions.

1 Notice

Match each example to sunlight, friction or electrical heating.



2 Compare

A blanket slows heat transfer. Does it make heat by itself? Explain.

3 Reflect

An observation that could change my idea is...

Word bank: sunlight • friction • electrical heating • insulation

Name: **ANSWERS**

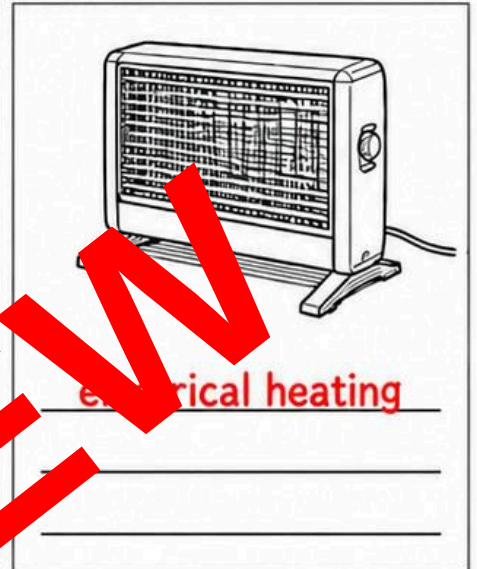
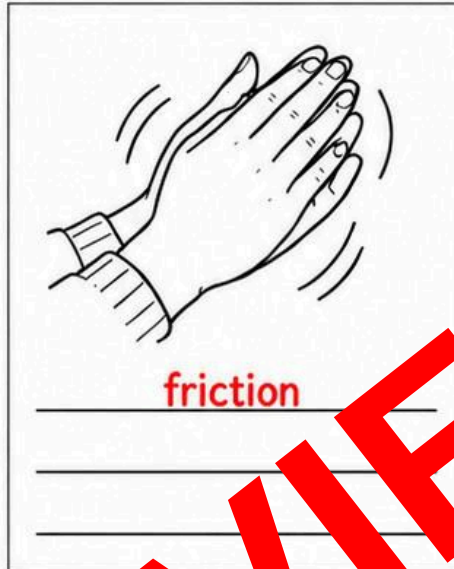
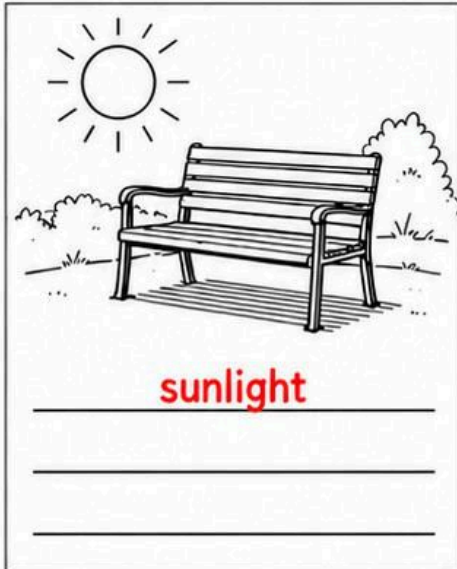
Date: _____

Heat in Action

Heat can be transferred in different ways. Look at the examples, think carefully and answer the questions.

1 Notice

Match each example to sunlight, friction or electrical heating.



2 Compare

A blanket slows heat transfer. Does it make heat by itself? Explain.

**No. It slows heat transfer from a warmer object;
it does not make heat.**

3 Reflect

An observation that could change my idea is...

Sample: thermometer readings could show that my prediction was wrong.

Word bank: sunlight • friction • electrical heating • insulation

Name: _____

Date: _____

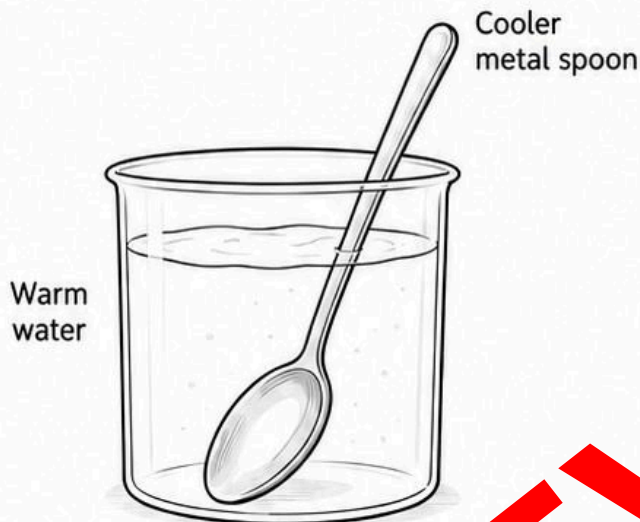
Heat in Action

In these examples, heat transfers from warmer to cooler.

1 Compare

Draw an arrow to show the main direction of heat transfer in each case.

A. Warm water with a cooler metal spoon



B. Cooler bottle in a warmer room



2 Explain

Heat moves from _____ to _____
because _____.

Heat moves from _____ to _____
because _____.

3 Reflect

What tends to happen as the two temperatures become closer?

Name: **ANSWERS**

Date: _____

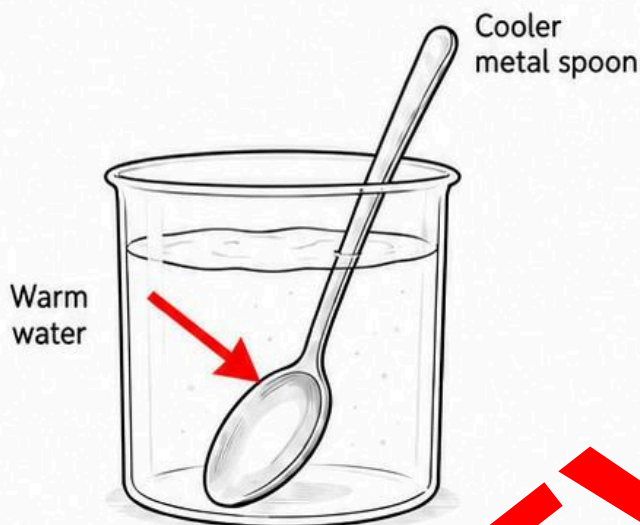
Heat in Action

In these examples, heat transfers from warmer to cooler.

1 Compare

Draw an arrow to show the main direction of heat transfer in each case.

A. Warm water with a cooler metal spoon



B. Cooler bottle in a warmer room



2 Explain

Heat moves from water to spoon because water starts warmer.

Heat moves from air to bottle because air starts warmer.

3 Reflect

What tends to happen as the two temperatures become closer?

Temperatures tend to become closer. At equal temperatures there is no net transfer due to a temperature difference.

Heat in Action

Name: _____

Date: _____

Some materials reduce the loss of heat. We can test this by comparing a cup with a fabric wrap to a cup without a wrap.

1 Question and prediction

Does a fabric wrap reduce cooling over ten minutes?

I predict _____ because _____

2 Plan a fair test

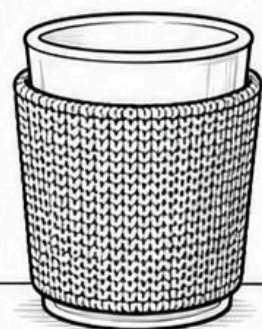
Change only:

Measure:

Keep alike:



Cup A
(no wrap)



Cup B
(fabric wrap)



3 Safe procedure

Read both cups at 0, 5 and 10 minutes.

One safety step:

Why could unequal starts mislead us?

Heat in Action

Name: ANSWERS

Date: _____

Some materials reduce the loss of heat. We can test this by comparing a cup with a fabric wrap to a cup without a wrap.

1 Question and prediction

Does a fabric wrap reduce cooling over ten minutes?

I predict the wrapped cup may cool less because the wrap slows transfer.

2 Plan a fair test

Change only:

fabric wrap

Measure:

temperature in °C over time

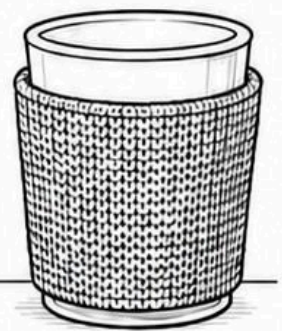
Keep alike:

same cup size/material; equal amount;

same safe start; same surroundings/times



Cup A
(no wrap)



Cup B
(fabric wrap)



3 Safe procedure

Read both cups at 0, 5 and 10 minutes.

One safety step:

Teacher checks and handles all water.

Why could unequal starts mislead us?

Different starts change the comparison, so the effect of the wrap is unclear.

Name: _____

Date: _____

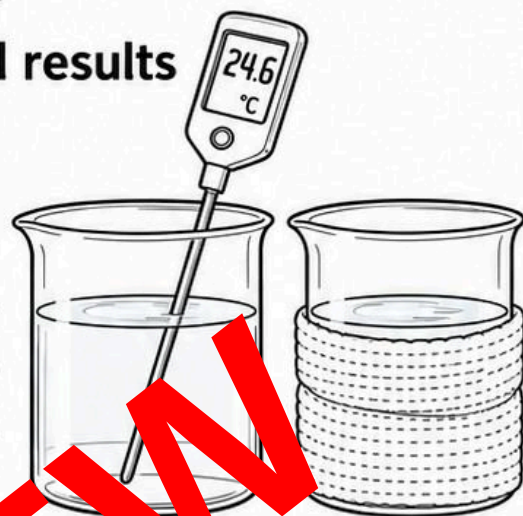
Heat in Action

Measure safely

Classroom trial — actual results

1 Before we begin

How will we keep the reading procedure consistent?



2 Record actual temperatures

Time (min)	Unwrapped (°C)	Wrapped (°C)
0		
5		
10		

3 Method note and reflection

Did timing starts or sensor positions differ?

What surprised us?

Teacher handles water. Keep unusual readings; never invent a result.

Name: **ANSWERS**

Date: _____

Heat in Action

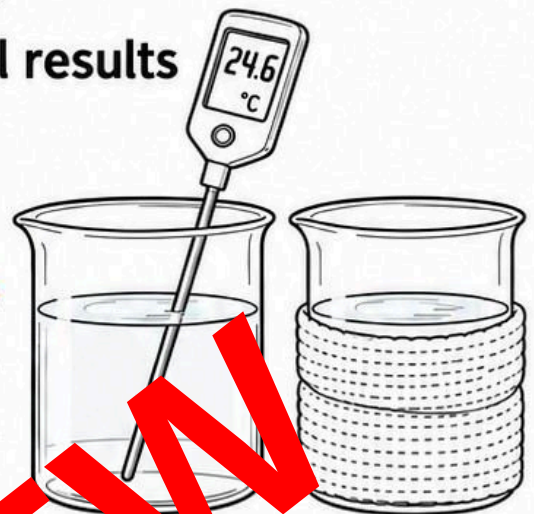
Measure safely

Classroom trial — actual results

1 Before we begin

How will we keep the reading procedure consistent?

Same sensor position, settled display and timed intervals.



2 Record actual temperatures

Time (min)	Unwrapped (°C)	Wrapped (°C)
0	actual reading	actual reading
5	actual reading	actual reading
10	actual reading	actual reading

3 Method note and reflection

Did timing starts or sensor positions differ?

Record any different start, late reading or changed sensor position.

What surprised us?

Accept unexpected observations. Use actual evidence; explain or repeat safely.

Teacher handles water. Keep unusual readings; never invent a result.

Heat in Action

Name: _____

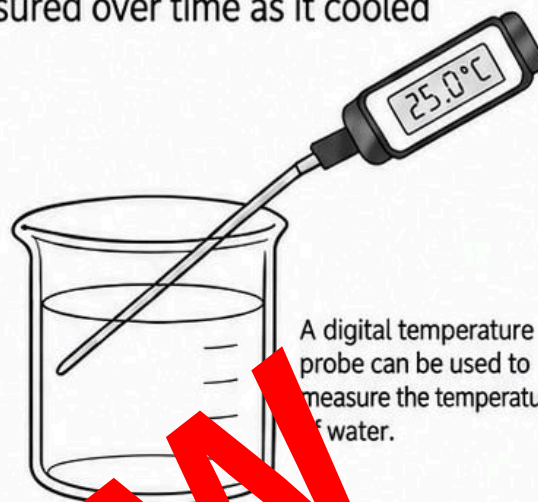
Date: _____

Represent change

The temperature of a warm water sample was measured over time as it cooled in the room.

Illustrative data — not class results

Time (min)	Temperature (°C)
0	40
5	35
10	30



A digital temperature probe can be used to measure the temperature of water.

Plot the values and join the points. Add a graph title



Explain the pattern with two values:

Use *actual* trial data on a separate graph if available.

Heat in Action

Name: ANSWERS

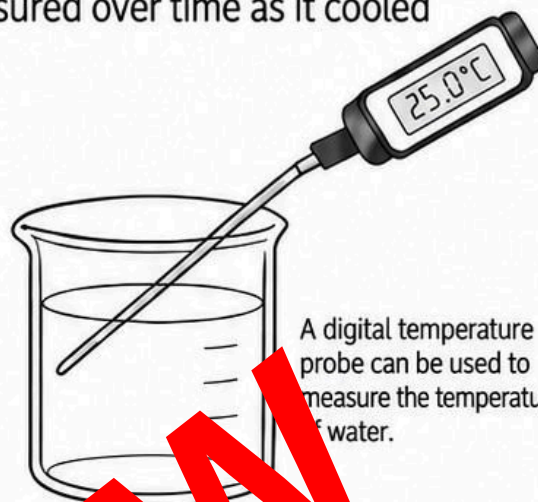
Date: _____

Represent change

The temperature of a warm water sample was measured over time as it cooled in the room.

Illustrative data — not class results

Time (min)	Temperature (°C)
0	40
5	35
10	30



Plot the values and join the points. Add a graph title



Explain the pattern with two values:

The example falls from 40°C to 30°C in ten minutes: a drop of 10°C.

Use *actual* trial data on a separate graph if available.

Name: _____

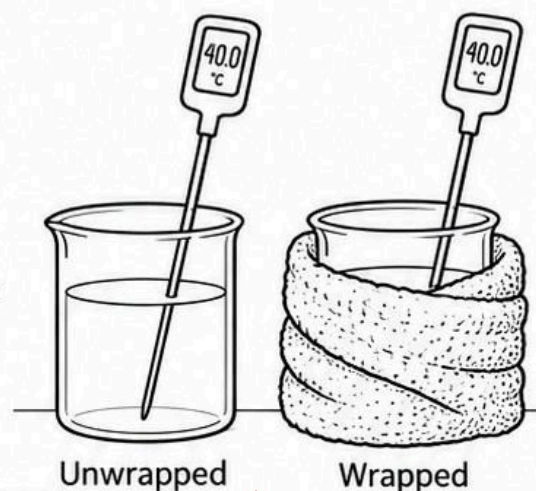
Date: _____

Heat in Action

Explain the pattern

Illustrative data — not class results

Two identical beakers of warm water were used. One was left unwrapped. The other was wrapped in an insulating towel. The temperature was measured with a digital temperature probe at the times shown.



Time (min)	Unwrapped (°C)	Wrapped (°C)
0	40	40
5	35	38
10	30	36

① Compare

Unwrapped drop: $40 - 30 =$ _____

Wrapped drop: $40 - 36 =$ _____ °C

② Explain

Which cooled faster? Use the values and heat transfer to explain.

③ Evaluate

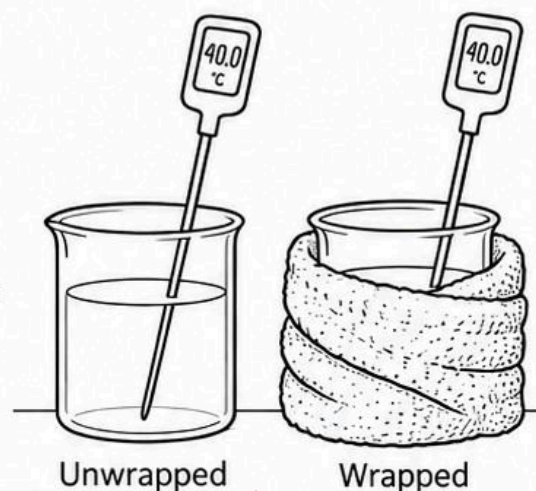
What can one ten-minute example **NOT** prove? Name one useful next step.

Heat in Action

Explain the pattern

Illustrative data — not class results

Two identical beakers of warm water were used. One was left unwrapped. The other was wrapped in an insulating towel. The temperature was measured with a digital temperature probe at the times shown.



Time (min)	Unwrapped (°C)	Wrapped (°C)
0	40	40
5	35	38
10	30	36

① Compare

Unwrapped drop: $40 - 30 = 10$ °C

Wrapped drop: $40 - 36 = 4$ °C

② Explain

Which cooled less? Use the values and heat transfer to explain.

The wrapped example cooled less: 4°C compared with 10°C.

It slows transfer to cooler surroundings; it did not make heat.

③ Evaluate

What can one ten-minute example **NOT** prove? Name one useful next step.

One example cannot prove every wrap works best in all conditions.

Repeat a safe fair test or compare another wrap.

Name: _____

Date: _____

Heat in Action

Design advice

A picnic organiser wants a warm drink to cool more slowly.
You will use evidence to choose a suitable wrapping for the drink bottle and give advice.



1 Choose

My recommended safe choice:

2 Explain with evidence

Evidence origin: ☐ class results ☐ illustrative example

The values that support my advice:

How the choice slows heat transfer:

3 State a limit

This evidence cannot prove...

A useful next question:

Name: **ANSWERS**

Date: _____

Heat in Action

Design advice

A picnic organiser wants a warm drink to cool more slowly.
You will use evidence to choose a suitable wrapping for the drink bottle and give advice.



1 Choose

My recommended safe choice:

Sample: use a safe fabric wrap.

2 Explain with evidence

Evidence origin: ☐ class results ☒ illustrative example

The values that support my advice:

Example: unwrapped 40→30°C wrapped 40→36°C in ten minutes.

How the choice slows heat transfer:

The wrap slows transfer from warmer water to cooler surroundings.

3 State a limit

This evidence cannot prove...

These cup results do not prove performance for every container or long trip.

A useful next question:

Would another safe wrap reduce cooling more?

Heat in Action

Investigation conference

Name: _____

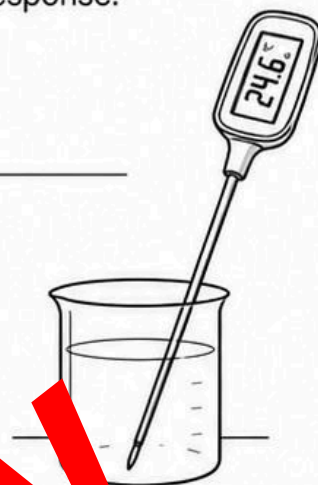
Date: _____

Use your existing evidence. Speak, draw, write or record a supported response.

1 Organise

My question: _____

My safe fair method:



2 Show evidence

Attach or sketch your table/graph; identify its origin.

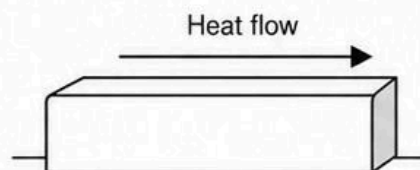
PREVIEW

3 Explain and reflect

My claim and supporting values:

Heat moves from _____ to _____ because _____.

One limitation and improvement:



Heat in Action

Investigation conference

Name: ANSWERS

Date: _____

Use your existing evidence. Speak, draw, write or record a supported response.

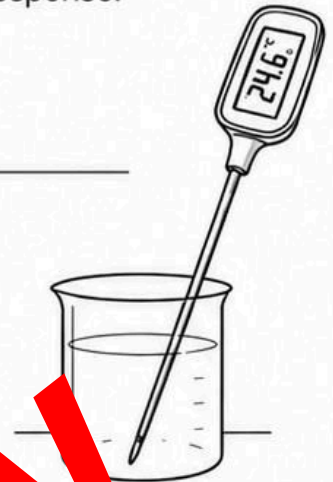
1 Organise

My question: Sample: Does a wrap reduce cooling?

My safe fair method:

Change wrap; keep cup, amount, start and timing alike.

Teacher handles water.



2 Show evidence

Attach or sketch your table/graph; identify its origin.

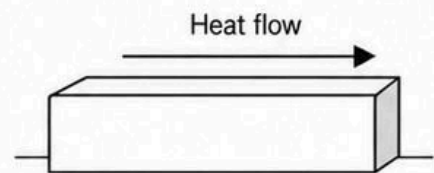
Use a labelled actual record, or clearly label illustrative data. Check axes and units.

PREVIEW

3 Explain and reflect

My claim and supporting values:

Illustrative example: wrapped drop 4°C; unwrapped 10°C.



Heat moves from warmer water to cooler surroundings because temperatures differ.

One limitation and improvement:

One trial is limited; repeat with consistent timings.

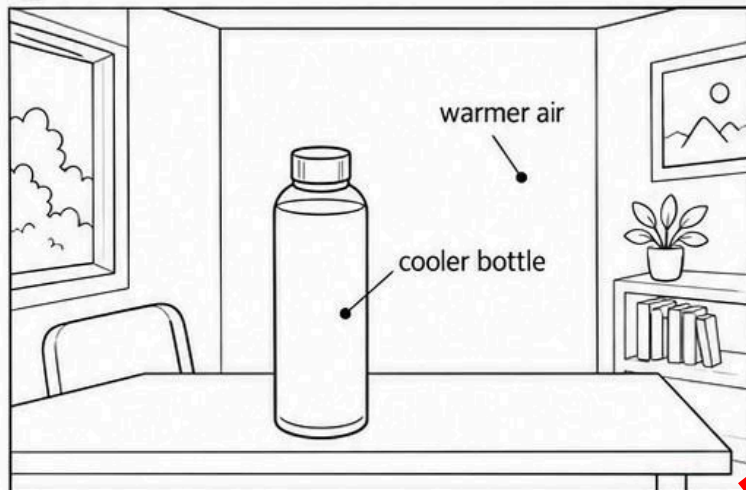
Heat in Action

New heat problem

Objects can be cooler or warmer than the air around them. Heat can transfer between them until they become the same temperature.

Name: _____ Date: _____

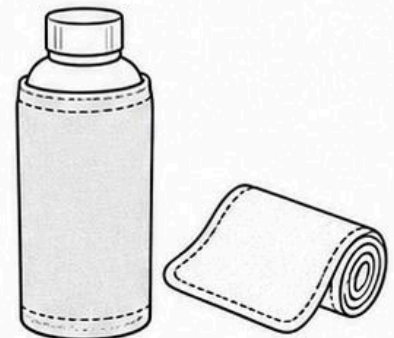
1 Predict



Draw the main heat-transfer arrow.
Predict the bottle's temperature change.

2 Apply

How could a safe wrap help?

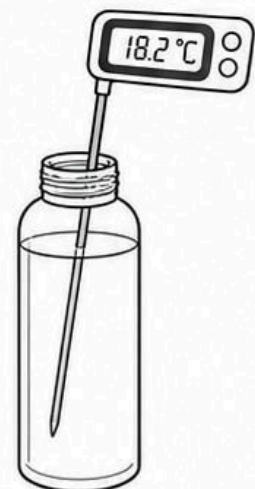


3 Ask and Reflect

A question you could investigate:

One change and two controls:

What evidence could change my prediction?



A prediction is not a measured result. No warming rate is guaranteed.

Heat in Action

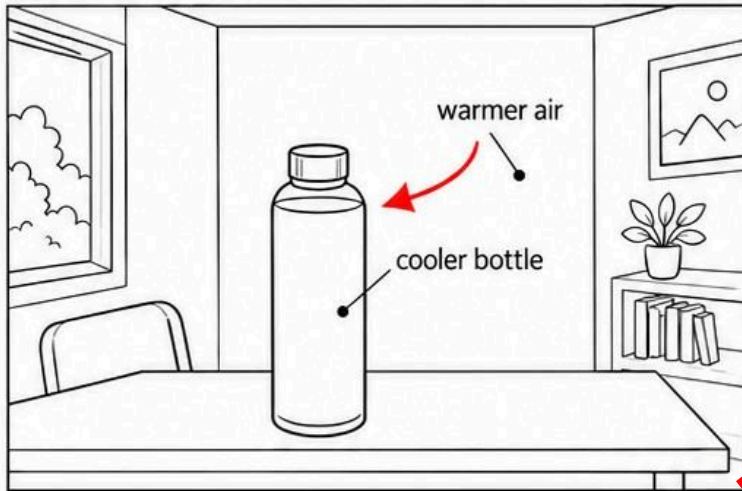
New heat problem

Objects can be cooler or warmer than the air around them. Heat can transfer between them until they become the same temperature.

Name: **ANSWERS**

Date: _____

1 Predict



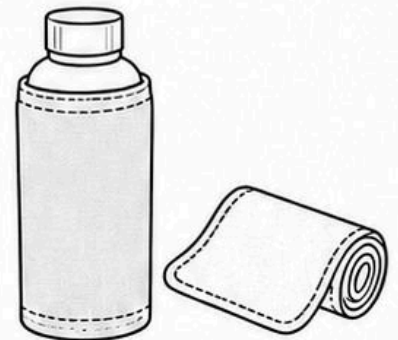
Draw the main heat-transfer arrow.
Predict the bottle's temperature change.

The bottle tends to warm as heat transfers toward it.

2 Apply

How could a safe wrap help?

A wrap can slow warming. It does not create heat or guarantee a fixed temperature.



3 Ask and Reflect

A question you could investigate:

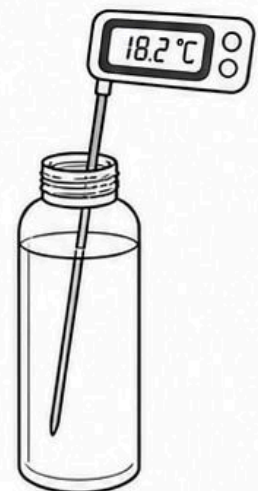
Does a wrap slow bottle warming?

One change and two controls:

Change the wrap. Keep bottle/amount and starting temperature alike.

What evidence could change my prediction?

Actual timed temperature readings could change the prediction.



A prediction is not a measured result. No warming rate is guaranteed.

Quiz: Heat in Action

Editable quiz file

Heat in Action - Year 3 - Quiz.pptx

How to use it

The deck contains ten questions with a separate answer slide after each question. Pause before revealing an answer. Students may point, speak, draw or write; ask for a reason where relevant. Use it for retrieval or discussion alongside the practical evidence.

Coverage

Heat-transfer direction, temperature units, heat source, consistent measurement, a fair comparison, illustrative values, graph reading, insulation, evidence limitations and a cooler-bottle application.

Teacher judgement

Use correct explanations rather than memorised wording. The quiz supports the assessment; combine it with investigation records and the two-page assessment before judging the rubric.

Name: _____

Date: _____

Assessment: Heat in Action

1 • Plan and evidence

Use a safe fair comparison to explain temperature change and heat transfer.

My investigation question:

Prediction and reason:

Change only:

Measure:

Keep alike:

Safety step:



Show your labelled table or graph. Mark its origin: ☐ actual class results ☐ illustrative data

Use evidence from the unit. Speak, draw, write or use supported responses.

Name: _____

Date: _____

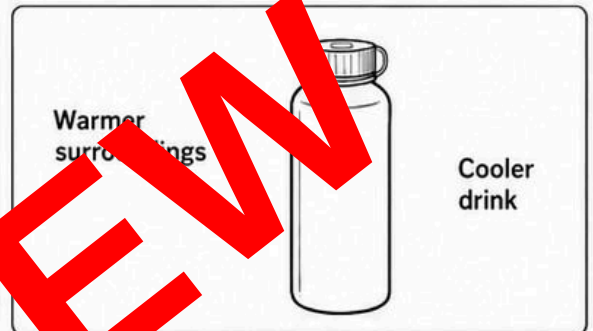
Assessment: Heat in Action

2 • Explain and apply

My claim and the values supporting it:



Which way did heat transfer? Explain why:



One method or evidence limitation:

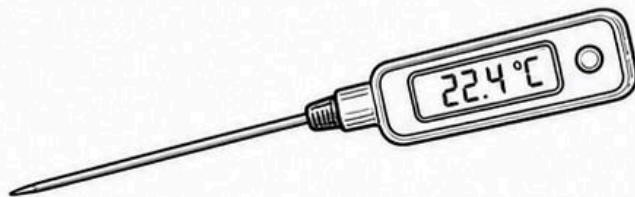
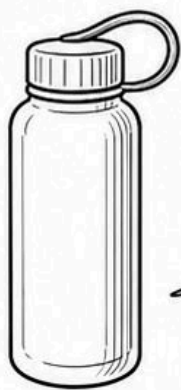
Advice for a practical need, with a useful limit:

A cooler sealed bottle in a warmer room. Show the heat-transfer direction and explain how a wrap might help.

Teacher conference check: ☐ temperature/heat distinction ☐ safe fair method ☐ evidence/graph
☐ explanation ☐ limitation ☐ useful transfer advice

Support for communication does not reduce the science expectation.

Rubric: Heat in Action



Insulation helps keep the water cooler for longer by slowing heat transfer from the warmer air.

Understanding

Developing	Heat and temperature or transfer direction are still confused.
Sound	Distinguishes temperature and heat; explains warmer to cooler transfer.
Transfer	Applies the direction accurately to the cool bottle case.

Evidence and method

Developing	Record or method lacks a key unit, control or safe step.
Sound	Uses a safe fair method and a labelled table or graph with °C and times.
Transfer	Justifies controls and a practical improvement to the method.

Explanation and conclusion

Developing	Claim is not yet connected to specific evidence.
Sound	Uses values to support an insulation recommendation without claiming it makes heat.
Transfer	Uses evidence to advise in a new situation and states a useful limit.

Reflection

Developing	Needs prompts to identify an evidence limitation.
Sound	Names a limitation and a sensible next question.
Transfer	Explains how a repeat or better comparison could strengthen the conclusion.

Judge the science shown. A communication aid, scribe or supported response does not automatically lower achievement.

Heat in Action - Year 3
Lesson 1: Warm and cool evidence



Our temperature question

Which sample has the higher temperature?

I can read and record a temperature in $^{\circ}\text{C}$.

I can use the number to support my comparison.

PREVIEW

Notice and predict

The teacher has prepared two safe samples.

Which might be warmer? Give a reason.

A prediction is an idea to test, not a result.

Temperature and measurement

Temperature tells us how hot or cold something is.

A digital thermometer gives a number and a unit: °C.

We compare readings instead of testing by touch.



PREVIEW

Read the display

Illustrative example: Cup A 22°C; Cup B 35°C

35 is greater than 22, so B has the higher temperature.

These numbers on the display record our actual readings.

Safe equipment

Teacher handles and checks all water

Use stable cups on a tray and non-glass digital thermometers.

No tasting, unknown hot surfaces or student-operated heaters.

Take a consistent reading

Put the sensor in the water, clear of the sides and base.

Wait for the reading to settle, following the tool instructions.

Read aloud and record the number with °C.

PREVIEW

Your comparison

Use W01 to record both actual readings.

Circle the warmer sample and support your choice with numbers.

Point, speak, draw or write to explain your comparison.

PREVIEW

Check the evidence

Which sample was warmer? How do you know?

Did the evidence agree with your prediction?

Ask one new question about temperature.

PREVIEW

We'll Do It!
Explain one idea with evidence.



Heat in Action - Year 3
Lesson 2: Where heat comes from



Heat-source examples

I can name sunlight, friction and electrical heating.

I can explain a source with a relevant example.

I can change an idea when observations do not support it.

What warmed it?

A sunny seat, gently rubbed hands and an electric heater can become warm.

What could explain each example?
Make a prediction before checking.



Sunlight

Energy from the Sun can warm objects.

A shaded object may be cooler than a similar sunlit object.

Never look directly at the sun or touch unknown hot surfaces.

PREVIEW

Friction

Surfaces resist each other when they rub.

Gently rubbing hands can make them feel warmer.

This observation does not tell us an exact temperature.

PREVIEW

Electrical heating

An electric resistance heater converts electrical energy into thermal energy.

We discuss a picture; an adult manages appliances.

A blanket is insulation, not an electrical heat source.

Sort the examples

Use cards H01, H02 and H03 to name each source.

Complete W02 using sunlight, friction or electrical heating.

Explain what produced the warming in each example.

An idea can change

Prediction: the blanket makes heat by itself.

Evidence: there is no heat-producing device inside the blanket.

Better explanation: blanket can slow heat leaving a warmer object.

PREVIEW

Check your examples

Name a heat source and explain how it warms something.

Which object slows heat transfer instead?

What observation did you have? Can you test another idea?

PREVIEW

PREVIEW

We'll Do It!
Explain one idea with evidence.



Heat in Action - Year 3

Lesson 3: Heat moves



Follow the transfer

I can compare the starting temperatures.

I can show heat moving from warmer to cooler.

I can explain that heat and temperature are different.

PREVIEW

A cooler spoon

A cooler metal spoon is placed in warmer water.

Which object starts warmer?

Predict the direction of heat transfer.



PREVIEW

Heat and temperature

Temperature is a measure of hotness, read in

Heat is energy transferred because temperatures differ.

Cold is not a substance flowing into the warmer object.

PREVIEW

Our transfer model

Warmer water transfers energy to the cooler spoon.

The spoon warms and the water can cool.

Over time, temperatures tend towards the same temperature.



PREVIEW

A safe demonstration

Teacher handles all liquid and checks temperature.

Use comfortably warm water, a suitable cup and a tray.

We observe and measure; we do not test by touching.

PREVIEW

Show the direction

On W03, draw an arrow from warmer water to the cooler spoon.

In a warm room, show heat moving towards a cooler bottle.

Write or say: Heat moves from _____ to _____ because _____.

What the model can show

An arrow shows the main direction, not every transfer.

Energy may also transfer to the cup and surrounding air.

One water reading does not measure all those transfers.

PREVIEW

Check a claim

Claim: cold flows from the spoon into the warm water.

Use the warmer-to-cooler idea to improve this claim.

What changes as the temperatures become closer?

PREVIEW

PREVIEW

We'll Do It!
Explain one idea with evidence.



Heat in reaction - Year 3
Lesson 4: Questions and variables



A fair insulation test

I can ask a question we can investigate

I can name what changes and what stays the same.

I can explain how the method will stay safe.

PREVIEW

Our test question

Does a fabric wrap reduce cooling over ten minutes.
Predict which cup will have a smaller temperature drop.
Give a reason using heat transfer.

PREVIEW

Three kinds of features

Change: the fabric wrap around one cup

Measure: water temperature in °C over time

Keep alike: cup, water amount, start temperature and surroundings.

PREVIEW

Why equal starts matter

Illustrative starts: Cup A 40°C; Cup B 30°C

These starts would make the wrong comparison harder to interpret.

Prepare both samples together and record the actual starts.

PREVIEW

Plan the equipment

Use two matching stable cups on the same tray.

Teacher adds equal amounts from one side to the other.

Keep both openings uncovered and the funnels positioned alike.

PREVIEW

Plan consistent times

Record both cups at 0, 5 and 10 minutes.
Keep each sensor in water, clear of the sides and base.
Use the same reading procedure for both cups.

PREVIEW

Rehearse before the trial

Use W04 to identify one change and at least three controls.
Practise roles with empty cups: timer, reader and recorder.
Teacher checks the plan and manages all water.

PREVIEW

Check the plan

What changes? What do we measure? What stays alike?

How could an unequal amount of stuff affect the result?

Name one specific safeguard

PREVIEW

PREVIEW

We'll Do It!
Explain one idea with evidence.



Heat in Action - Year 3
Lesson 5: Measure safely



Measure and record

I can use the same reading procedure for both cups.

I can record actual temperature with units and times.

I can keep unexpected observations.

PREVIEW

Recall our controls

What is the one intended change?

Check the same cups, amounts, surroundings and starting conditions.

Tell the teacher when an important condition differs.

Ready for safe measurements

Teacher checks and pours the water and manages spills.

Keep cups on a stable tray away from traffic.

No tasting, hot substances, or use of student-operated appliances.

PREVIEW

Position the sensor

Place it in the water, clear of the sides and base.

Wait for a settled reading using the thermometer instructions.

Keep the position consistent in both cups.



PREVIEW

Read, say, record

Reader says the number and °C.

Recorder writes it beside the correct cup and elapsed time.

Partner checks the record before the next reading.

PREVIEW

Use our ten-minute window

Record at 0, 5 and 10 minutes.

Keep the actual starting values and any method notes.

Use the intervals to discuss the temperature pattern.

PREVIEW

Keep honest data

Use W05 for classroom results, not the sample data table.

If a result surprises you, check it out and note what happened.

Do not change a number to fit your prediction.

PREVIEW

Check and clean up

Were the times and sensor positions consistent?

Which method note matters for your explanation?

Teacher empties cup, student empties and dry their work area.

PREVIEW

PREVIEW

We'll Do It!
Explain one idea with evidence.



Heat in Action - Year 3

Lesson 5: Represent change



Show the temperature pattern

I can organise times and temperatures in a table.

I can label and plot a line graph.

I can explain a pattern using numbers.

PREVIEW

Which values belong together?

Every reading has a time and a temperature

Illustrative pairs: (0,40), (5,35), (10,30).

Do not mix our actual results with this example.

PREVIEW

Read the example table

Illustrative unwrapped cup: 0 min = 40°C

5 min = 35°C; 10 min = 30°C.

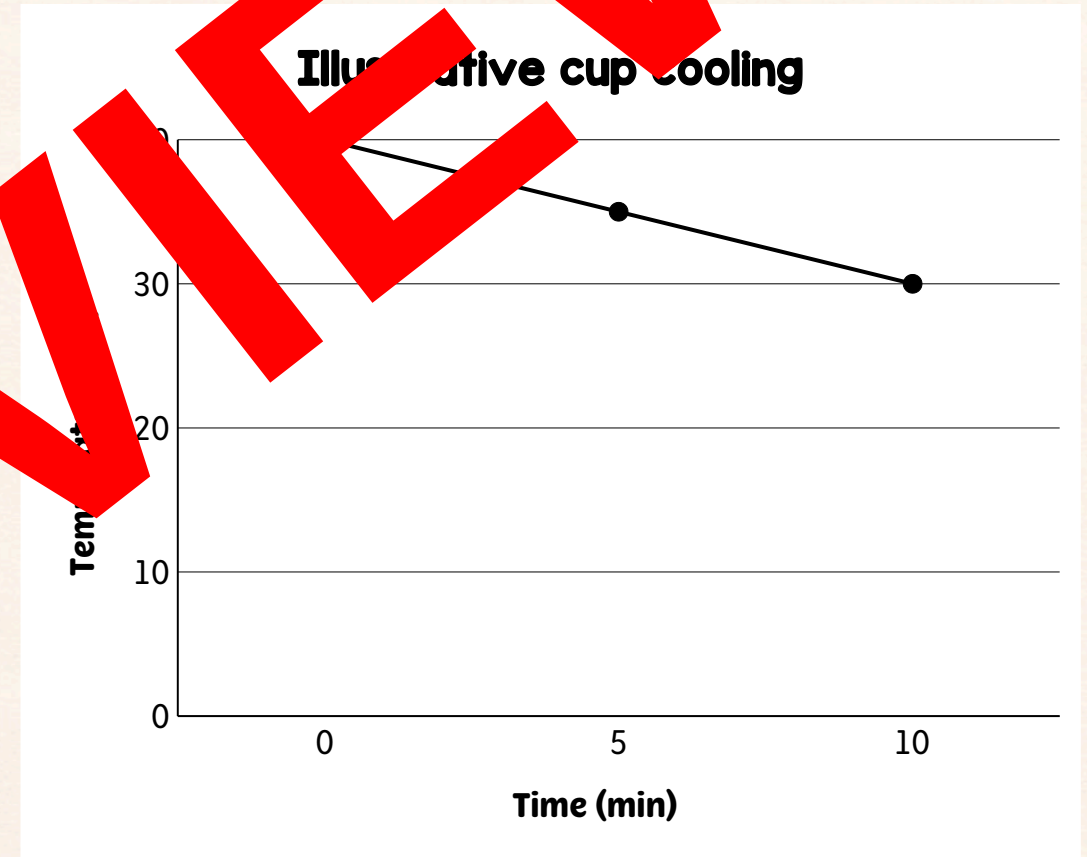
All three readings belong to the same example cup.

A labelled line graph

Time in minutes is on the horizontal axis.

Temperature in $^{\circ}\text{C}$ is on the vertical axis.

Plot each pair, then join the points.



Illustrative data – not classroom results

Check the scale

Equal time gaps need equal spacing.

Use a temperature scale that includes all values.

The example graph starts at 0°C and reaches 40°C .

PREVIEW

Build your graph

Use W06 for the labelled illustrative example

If you have classroom data, crop it on a separate record.

Keep a clear title, label and units

Read a pattern

The example falls from 40°C to 30°C in ten minutes.

That is a drop of 10°C .

This graph describes the example, not a guaranteed class result.

PREVIEW

Check with a partner

Are all table values and graph points consistent?

Are the axes, units and scale clear?

Explain one change with the values.

PREVIEW

PREVIEW

We'll Do It!
Explain one idea with evidence.



Heat in Action - Year 3
Lesson 1: Explain the pattern



Explain with evidence

I can describe the pattern using two or more values.

I can explain cooling using heat transfer.

I can name a limit to my conclusion.

PREVIEW

Observation or claim?

Observation: the unwrapped example melts from 40°C to 30°C .

Claim: every fabric is always the best insulator.

Which statement is supported by the evidence?

PREVIEW

Compare the example changes

Both illustrative cups start at 40°C.

At ten minutes: unwrapped 30°C; wrapped 36°C.

Drops: unwrapped 10°C; wrapped 1°C.

PREVIEW

A supported explanation

The wrapped example cools less over the same time.
The wrap slowed transfer to cooler surroundings.
It did not create heat or prevent a transfer.

PREVIEW

Change an idea when needed

Prediction: the wrapped cup will get hotter by itself.

Example evidence: it falls from 40°C to 36°C

Revised idea: the wrap slowed cooling; it did not heat the water.

PREVIEW

Use your own evidence

Complete W07 using the labelled illustrative table.

Discuss actual W05 results separately, even if the pattern differs.

Keep the record honest and explain the difference.

PREVIEW

Fairness and limits

Were the amounts, cups, times and starts alike?

One trial may include reading or timing differences.

A repeat can help check the pattern; never invent one.

PREVIEW

Check your conclusion

State the claim and the values supporting it.

Explain which way heat moved.

Name one limit and one sensible next step.

PREVIEW

PREVIEW

We'll Do It!
Explain one idea with evidence.



Heat in Action - Year 3

Lesson 8: Design advice



Use science for a need

I can recommend a safe insulation choice.

I can explain my advice with evidence.

I can state a useful insight to the advice.

PREVIEW

A picnic-container problem

A fictional organiser wants a warm drink to cool more slowly.

What can our cup evidence help us decide?

We recommend our paper products handle real drinks.

PREVIEW

Use the test evidence

The illustrative wrapped cup drops 4°C in 10 minutes.

The unwrapped example drops 1°C .

Our actual class evidence may show a different pattern.

Insulation in everyday life

Suitable insulation can trap still air and resist heat movement.

It can reduce heat loss from a warmer home.

It can also reduce heat gain into a cooler home.



Based on: DCCEEV and draught proofing (energy.gov.au)

Make a careful recommendation

I recommend a safe wrap because the evidence shows less cooling.

The wrap slows transfer from warmer water to cooler surroundings.

It does not make the water hotter by itself.

Advice with a limit

Our test lasted ten minutes with these supported amounts.

It cannot prove performance for every container or long trip.

Another fair trial would compare a second safe wrap.

PREVIEW

Your advice

On W08, identify the need, choice, evidence, reason and limit.

Use your own class results or label the supplied example.

Speak, write, draw or record your explanation.

PREVIEW

A cooler lunch container

In warmer surroundings, heat moves toward the cooler lunch container.

How could insulation help to slow that transfer?

State a helpful condition and one limit.

PREVIEW

We'll Do It!
Explain one idea with evidence.



Heat in Action - Year 3
Lesson 9: Investigation on conference



Explain our investigation

I can show my question, method and evidence.

I can explain transfer and name collaboration.

I can communicate to help a listener understand.

PREVIEW

Choose your evidence

Find your plan, readings, graph and recommendation.
Label any illustrative example you used.
Select the values that support your conclusion.

PREVIEW

An explanation in order

Question → safe fair method → evidence → explanation.

Add the recommendation and on limitation.

Use W09 to organise what you will show.

PREVIEW

A method to evaluate

Fictional case: the cups started at 40°C and 20°C .

Would this clearly test the effect of a wrap?

Explain what should be kept alike and why.

PREVIEW

Our individual assessment

Use A1 to present a table or graph and explain the transfer.
Show one safe action and one fair-test control.
State what the evidence cannot tell us.

PREVIEW

Ways to communicate

Speak, draw, write, show arrows or use a communication device.

A partner or adult may support your response.

The science expectation stays the same.

PREVIEW

Listen and ask respectfully

Ask: Which value supports that idea?

Ask: What could affect the result?

Give your partner time and a response choice.

PREVIEW

Conference check

Explain which way heat moved and why.
Use the values, method and limitations to support your claim.
Apply the idea to the transfer prompt in A1.

PREVIEW

PREVIEW

We'll Do It!
Explain one idea with evidence.



Heat in Action - Year 3

Lesson 10: New heat problem



A new transfer problem

I can apply warmer-to-cooler transfer to a new case.

I can predict a change and explain the reason.

I can identify evidence needed to check my advice.

PREVIEW

A cooler bottle in a warmer room

The sealed bottle starts cooler than the room air.

Which is warmer? Which is cooler?

Predict the main direction of heat transfer.

PREVIEW

Apply the same idea

Heat transfers from warmer surroundings towards the cooler bottle.

The bottle tends to warm over time.

We do not know how quickly without measurements.

PREVIEW

Will a wrap help?

Insulation can slow transfer into the cooler bottle.
It does not make heat or guarantee a fixed temperature.
The temperature difference determines the transfer direction.

PREVIEW

Improve the explanation

Claim: a blanket always makes any object better.

Use the cool-bottle example to improve this claim.

Explain why the surroundings matter.

PREVIEW

Plan a question to test

Does a safe wrap slow the bottle warming?

Name one change, a temperature measurement and important controls.

Teacher checks any practical plan before testing.

PREVIEW

Your transfer response

Use W10 to draw an arrow and explain the temperature change.

Give the organiser evidence-based advice and a limitation.

Name a useful next question.

PREVIEW

Check what you know

Which parts are predictions and which are observations?

What data could change your explanation?

Show how this advice helps with the organiser's need.

PREVIEW

PREVIEW

We'll Do It!
Explain one idea with evidence.



Heat in Action - Year 3

Unit Quiz



Ways to show your thinking

Point, speak, draw or write your response.

Give a reason or use evidence when asked.

Your teacher will pause before each answer.

PREVIEW

Question 1: Heat-transfer direction

Does heat flow from the cooler object to the warmer object in a simple contact comparison?

Explain your thinking before checking.

PREVIEW

Answer 1: Heat-transfer direction

No. Net heat transfer is from warmer to cooler. Their temperatures tend towards the same temperature.

PREVIEW

Question 2: Heat and temperature

Are heat and temperature interchangeable words?

Explain your thinking before checking.

PREVIEW

Answer 2: Heat and temperature

No. Temperature measures hotness in $^{\circ}\text{C}$ but heat is energy transferred because of a temperature difference.

PREVIEW

Question 3: A heat source

Name a source for each: sunny seat, gently rubbed hands;
electric resistance heater.

Explain your thinking before checking.

PREVIEW

Answer 3: A heat source

Sunlight; friction; electrical heating. Explain how each example can warm something.

PREVIEW

Question 4: A fair comparison

Name the intended change and three controls in our cup-wrap test.

Explain your thinking before checking.

PREVIEW

Answer 4: A fair comparison

Change the wrap. Keep cup size/material, water amount, starting temperature, surroundings and timing alike. Any three relevant controls are acceptable.

PREVIEW

Question 5: A safe reading

How do we measure warm-water temperature safely and consistently?

Explain your thinking before checking.

PREVIEW

Answer 5: A safe reading

Teacher checks/handles water. Use a suitable non-glass digital thermometer, sensor in water clear of sides, base, settled readings and matching timed intervals.

PREVIEW

Question 6: Interpret a record

Illustrative unwrapped cup: 40°C at 0 min, 35°C at 5 min, 30°C at 10 min. What is the ten-minute drop?

Explain your thinking before checking.

PREVIEW

Answer 6: Interpret a record

A drop of 10°C : $40 - 30 = 10$. The example is based over ten minutes; it is not a promised class result.

PREVIEW

Question 7: Insulation and evidence

Illustrative wrapped cup: 40°C to 36°C . Unwrapped: 40°C to 30°C . Which cools less? What does that suggest?

Explain your thinking before checking.

PREVIEW

Answer 7: Insulation and evidence

The wrapped example drops 4°C versus 10°C . This supports slower heat transfer with that wrap in this example, not heat production.

PREVIEW

Question 8: A useful limitation

Why does one ten-minute trial not provide a wrap is always best?

Explain your thinking before checking.

PREVIEW

Answer 8: A useful limitation

Timing, thermometer readings, cup position or other differences may matter. It tests limited conditions. Repeated fair trials or another container could check the claim.

PREVIEW

Question 9: A new transfer case

A cooler bottle stands in a warmer room. Which way does heat transfer? How might a wrap help?

Explain your thinking before checking.

PREVIEW

Answer 9: A new transfer case

Net transfer is from warmer room air to cooler bottle.

A wrap can slow the warming; it does not create heat. No warming rate is guaranteed.

PREVIEW

Question 10: Unequal starts

Fictional trial: wrapped cup starts at 30°C and unwrapped at 40°C. Can the final temperatures alone show which wrap works better?

Explain your thinking before checking.

PREVIEW

Answer 10: Unequal starts

No. Starting temperature also differs so the comparison is unclear. Use equal safe starting conditions, record them and compare changes over the same time.

PREVIEW

Well Done!
Use evidence to explain heat.

