

Substitute Guide: Thermal Energy at School

Grade: 7 **Subject:** Science **Time:** ~45 min core + ~15 min extension Science

Learning goal (plain language)

Students learn the three ways heat (thermal energy) moves — **conduction** (touch), **convection** (moving air or liquid), and **radiation** (rays, like sunlight) — and that **temperature reflects how fast the particles are moving**. They practice by reading a diagram and a data table about a school building, then write a short evidence-based explanation. **You do not need a science background to run this.** Everything students need is printed in their packet.

Standards alignment

Framework: 19 TAC §112.27 (Grade 7 Science). Knowledge & skills **7.8** — thermal energy flowing into and out of systems.

- **Primary** — **7.8A:** methods of thermal energy transfer (conduction, convection, radiation).
- **Primary** — **7.8C:** the relationship between temperature and the kinetic energy of particles.

Provisional — pending educator verification against the current official TAC source.

(Standards are paraphrased here, not quoted. Please confirm codes and wording against your official source.)

Setup Before class (5 min)

- Count and hand out one **student packet** per student.
- Confirm each student has a **pencil**. No calculators, computers, or lab items are needed.
- Write the date on the board and remind students to fill in the name line.
- Keep the **answer key** with you — it is a separate file and is **not** in the student packet.

Materials What's needed

- Printed student packet (4–6 pages) per student.
- Pencil per student.
- This guide and the separate answer key (teacher only).
- No technology, no calculator, no lab equipment, no safety hazards.

Timing Suggested pacing (~45–60 min)

Segment	Time	What students do
Start — Notice & Wonder	5 min	Q1–Q2 warm-up
Build — Read the science	5–10 min	Read passage, word bank, diagram; Q3
Apply — Use the data	20–25 min	Table 1; Q4–Q7
Explain — CER	5–10 min	Q8 claim/evidence/reasoning

Segment	Time	What students do
Close — ACE	5 min	Articulate / Connect / Extend
Continue — early finishers optional ~15 min "Cool bench" design		

Script Read aloud to start

"Today's assignment is a paper science investigation called *Thermal Energy at School*. You will work by yourself with just a pencil — no computers or calculators. First read the short passage and study the diagram and the data table. Then answer the questions in order; if one is tricky, skip it and come back. Write in complete sentences where it asks you to explain. You may quietly read the passage aloud to yourself. Put your name, class period, and date at the top now. You have about 45 minutes; raise your hand if you need help understanding a word."

Support When students ask for help

- **You may read any part aloud** to a student or the class.
- If they are stuck on a mode, point them to the **Word Bank** and **Figure 1** — the answers to "which mode" are visible there.
- Encourage the printed **sentence stems** for the CER (Q8) and ACE sections.
- Do **not** give answers; prompt with "What does the data show?" or "Which picture matches this?"
- It is fine if a student cannot finish the optional early-finisher task.

Access Accommodations & language support

- **Read-aloud** of any passage or question is allowed for all students.
- Point students to the **sentence stems** and the **Word Bank** (definitions provided).
- Extended time is fine; the core can stop after Q8 if time runs short.
- Students may answer in phrases if writing full sentences is a barrier, as long as the idea is clear.
- The packet is grayscale-safe — it prints and reads clearly in black and white.

Tools Allowed & not allowed

Allowed: pencil, the printed packet, quiet self-read-aloud. **Not needed / not allowed:** calculator (no math required), phones, computers, lab materials.

Collect at the end: Collect every packet, whether finished or not, with names on them. Stack them for the teacher. Note on a sticky how far most students got and any questions that caused confusion.

Answer key: The **answer key is a separate file** (answerkey.html) and is for the teacher only. Please do not hand it to students.

Teacher follow-up (for the returning teacher)

Watch for the common misconception that "cold flows in" — thermal energy actually *leaves* the warmer object. A quick next-day discussion sorting a few real school examples into conduction / convection / radiation, plus reviewing the observation-vs- inference item (Q4), would reinforce this well. The CER (Q8) responses show who can cite data as evidence.