

Substitute Guide: Proportional Reasoning and Percents

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

Learning goal (plain language)

Students practice **unit rates** (a price or amount "per one"), **proportional relationships** (a steady rate shown as a table, a graph, and an equation $y = k \cdot x$), and **percents** (tax, tip, and discounts). **You do not need a math background to run this.** Every formula and a worked example are printed in the student packet. Students **show their work**; you do not need to teach the method — the packet does the teaching. Your job is to hand it out, read the start script, keep the room on task, and collect the packets.

Standards alignment

Framework: 19 TAC §111.27 (Grade 7 Mathematics). Knowledge & skills **7.4** — proportional relationships and percents.

- **Primary — 7.4A:** represent constant rates of change / the constant of proportionality ($k = y/x$) in tables, graphs, equations, and situations.
- **Primary — 7.4D:** solve problems involving ratios, rates, and percents, including tax, tip, and discount.
- **Supporting — 7.4E:** convert between measurement/rate representations to compare proportional situations.

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**. A **basic calculator is allowed but not required**; students who have one may use it.
- 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; a basic four-function calculator is optional.
- This guide and the separate answer key (teacher only).
- No technology, no internet, no special supplies.

Timing Suggested pacing (~45–60 min)

Segment	Time	What students do
Start — Retrieval warm-up	5 min	Q1–Q2 (unit rate, simple percent)
Build — Study the math	5–10 min	Read reference box, worked example, graph; Q3
Apply — Use what you know	20–25 min	Q4–Q7 (four forms, tax/tip, error analysis, recipe)
Explain — Justify (CER)	5–10 min	Q8 claim/evidence/reasoning
Close — ACE	5 min	Articulate / Connect / Extend
Continue — early finishers	optional ~15 min	Two-discounts challenge

Script Read aloud to start

"Today's assignment is a paper math packet called *Proportional Reasoning and Percents*. You will work by yourself with a pencil. A basic calculator is allowed if you have one, but you do not need one. The most important rule: **show your work** — write down the numbers you use, not just a final answer. Everything you need is printed in the packet, including a worked example and all the formulas. Start with the warm-up, then read the Build section before the Apply questions. If a question is tricky, skip it and come back. Put your name, class period, and date at the top now. You have about 45 minutes; raise your hand if you need help reading a question."

Support When students ask for help

- **Students show their work; you do not need to teach the method.** Point them back to the printed **reference box** and the **worked example** — the method is right there.
- **You may read any part aloud** to a student or the class.
- If a student is stuck, prompt with "What does the worked example do?" or "What's the unit rate — the amount for one?" rather than giving the answer.
- For percents, remind them the packet shows: multiply for "percent of," and subtract for a discount ("percent off").
- It is fine if a student cannot finish the optional early-finisher challenge.

Access Accommodations & language support

- **Read-aloud** of any question is allowed for all students.
- Point students to the **worked example**, the **formulas** in the reference box, and the **sentence stems** for Q8 and ACE.
- A **calculator is allowed** for any student who wants one — this removes the arithmetic barrier so students can focus on the reasoning.
- Extended time is fine; the core can stop after Q8 if time runs short.
- Students may show work with numbers and short phrases if writing full sentences is a barrier, as long as the reasoning 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, a basic (four-function) calculator, quiet self-read-aloud. **Not needed / not allowed:** phones, internet, graphing/AI calculators, or getting answers from another student.

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)

The highest-value items to review next class are the **error analysis (Q6)** and the **justification (Q8)**, which reveal the "percent of" vs. "percent off" confusion and whether students subtract a discount. Watch for **additive instead of multiplicative reasoning** on the recipe scaling (Q7). The four-forms item (Q4) shows who can move between a table, an equation, and a graph point using $k = y \div x$. The separate answer key lists worked steps, alternate strategies, and a 3-point rubric for Q8.

G07_MATH_Proportions_01 — Proportional Reasoning and Percents Substitute Guide