

Chapter 7 — Percent Increase, Decrease, Discount, Tax, Markup, and Tip — Teacher Guide

Chapter at a glance

Lesson duration	4 lessons, 45–65 minutes each (see pacing table below)
Materials	Price cards, play money, original-change-final strips, percent bars, double number lines, calculators for checking, context cards for discount/tax/tip/markup/increase/decrease, the two chapter diagrams
Launch question	“A hoodie is 25% off, a backpack has 12% tax, an item is marked up 30% — which situations make the final amount smaller, and which make it larger?”
Key representation	The original-change-final bar — keep one visible throughout instruction
Anticipated responses	Correct: finds the percent amount from the original before adding or subtracting. Partial: finds the change amount but confuses the final step or direction. Incorrect: subtracts or adds the percent number directly (for example, “ $80 - 20 = 60$ ” for 20% off).
If the readiness check fails	Reteach finding a percent of a number from Chapter 6 before starting the Launch; do not skip the original-change-final strip
Talk prompt	“What is 100% in this problem? Does the context add or remove an amount?”
Exit ticket	5 items — find a sale price, find a price with tax, explain discount vs. subtracting a flat amount, state the original-change-final routine, give a magnitude check (see Section 14)
Reteach / extend	Reteach: single-step discount and tax problems only, with the original-change-final strip. Extend: successive changes, final-percent shortcuts, reverse problems.

Purpose and pacing

Chapter 7 applies the part-percent-whole relationship to change over time or across a transaction. Keep the original amount labeled as 100% throughout the lesson. The

chapter should be taught as one coherent structure with several contexts, not as six unrelated rules.

Lesson	Focus	Suggested time
Lesson 1	Readiness, launch, discounts, and original-change-final model	45–60 minutes
Lesson 2	Tax, tip, markup, increase, and decrease	45–60 minutes
Lesson 3	Final-percent shortcuts, error diagnosis, and base tracking	45–60 minutes
Lesson 4	Mixed practice, Tripwire, Exit Ticket, and targeted reteaching	50–65 minutes

Materials

Prepare price cards, play money, original-change-final strips, percent bars, double number lines, calculators for checking, and context cards for discount, tax, tip, markup, increase, and decrease. Label the original amount as 100% on every model.

Teacher launch guidance

Present all six contexts before naming the operations. Ask students to sort them into “final amount smaller” and “final amount larger.” Then ask what all six situations have in common. The common structure is original amount, percent of original, and final amount.

When introducing the final-percent shortcut, require students to derive it. For 25% off, ask what percent remains. For 12% tax, ask what percent is paid. The shortcut should compress reasoning that students already understand, not replace it.

Teacher prompts

Purpose	Prompt
Identify the base	“What is 100% in this problem?”
Identify direction	“Does the context remove or add an amount?”
Find the change	“What is the percent of the original?”
Separate change and final	“Have you found the amount changed or the final amount?”
Use a shortcut	“What percent remains or is paid?”
Check magnitude	“Should the final amount be above or below the original?”
Track multiple steps	“What is the base for this step?”

Differentiation

Students needing concrete support

Use \$10, \$20, \$40, and \$100 examples first. Build the percent amount with counters or a 100-square grid. Keep the original, change, and final portions physically separate. Have students state “subtract” or “add” before calculating.

Students needing language support

Use the sentence frames:

- “The original amount is _____.”
- “The percent change is _____% of _____.”
- “The change amount is _____.”
- “The final amount is _____ because I added/subtracted _____.”
- “The answer is reasonable because _____.”

Students ready to extend

Use successive changes, final-percent shortcuts, reverse problems, markup and discount comparisons, and contexts where the base changes at a second step. Ask students to prove why two 20% discounts are not one 40% discount.

Formative assessment

Record whether students can identify the base, calculate the change amount, determine direction, distinguish change from final, and check magnitude. A correct final amount obtained by subtracting the percent number should be treated as evidence of a serious conceptual gap even if an isolated answer happens to be correct.

Revision Support: Expected Ideas and Teacher Moves

Use this compact guide with the new Cumulative Connection and Strategy Studio tasks. Accept equivalent representations when the relationship, units, and reasoning are correct.

Cumulative Connection: Find the final price after a 20% discount on \$80. Name the base in a percent-increase problem. Explain why a 20% increase followed by a 20% decrease does not return to the original amount. Estimate a 15% tip on \$42.

Strategy Studio guidance: Expected ideas: sequential discounts multiply by 0.80 and then 0.90, giving 72% of the original, so the total reduction is 28%; \$50 to \$65 is a 30% increase; tax and tip order may differ depending on whether the tip is calculated before or after tax, so the assumption must be stated; equal percentage increase/decrease do not cancel.

Transfer Bridge Teacher Guidance

Use the four tasks to distinguish imitation from transfer. Ask students to name the relationship, keep units visible, compare representations, and explain or repair an error. Accept equivalent methods when the structure and interpretation are correct.

Expected guidance: Familiar: $\$80 \times 0.80 = \64 . Altered: $(\$65 - \$50)/\$50 = 30\%$. Non-routine: tax and tip need named bases; if both are based on the pre-tax bill, compute

separately, but if tip is based on the taxed total, the result differs. Repair: $\$100 \times 1.20 \times 0.80 = \96 , not $\$100$.

Record whether the difficulty is classification, representation, operation, computation, units, interpretation, or checking. Do not assign more routine practice until the source of the error is identified.

Discussion and evidence note

Ask students to name the relationship before calculating, compare at least two representations when appropriate, and revise an explanation after hearing another strategy. Record whether the difficulty is classification, representation, operation, computation, units, or checking.

Answer Key

Ready-to-Learn Check

- 12.
- 20.
- 0.12.
- Yes, because 15% of 100 is 15.
- Less than.
- Greater than.
- The price before the discount.

Worksheet A

- Less.** Likely wrong answer: “greater,” reasoning that a percent added to a price always makes it larger. Misconception: not connecting “off” to a decrease. Next move: “does ‘off’ make the price go up or down?”
- Decrease.** Likely wrong answer: “increase.” Misconception: same as #1. Next move: same check.
- 12% of \$50, or \$6.** Likely wrong answer: \$12 (uses the percent number directly instead of converting to a decimal first). Misconception: skipping the percent-to-decimal step. Next move: “12% as a decimal is what number? Multiply that by \$50.”
- \$100.** Likely wrong answer: \$130 (uses the marked-up price instead of the original cost as the base). Misconception: not identifying which

amount is 100% before the change is applied. Next move: “what was the price before the markup?”

- Add the change amount.** Common flaw: says “multiply” without specifying what happens after finding the percent amount. Next move: ask for the full two-step process.
- Subtract the change amount.** Common flaw: same incomplete answer as #5. Next move: same check.
- \$36.** Likely wrong answer: \$30 (subtracts the percent number, 10, from \$40 instead of finding 10% of \$40). Misconception: the chapter’s central error — treating the percent number as a dollar amount. Next move: “is \$10 off the same as 10% off?”
- \$60.** Likely wrong answer: \$55 (subtracts 25 from 80 directly). Misconception: same as #7. Next move: same check.
- \$56.** Likely wrong answer: \$62 (adds 12 to \$50 instead of finding 12% of \$50 first). Misconception: same recurring error, applied to an addition context. Next move: “what is 12% of \$50 in dollars, before adding it?”
- \$130.** Likely wrong answer: \$30 (reports the markup amount alone,

- forgetting to add it to the original). Misconception: confusing the change amount with the final amount. Next move: “is \$30 the amount added, or the final price?”
11. **72.** Likely wrong answer: 48 (subtracts the change amount instead of adding it, despite the problem stating an increase). Misconception: direction of change not matched to the operation. Next move: “does ‘increases’ mean the final value is bigger or smaller than 60?”
 12. **81.** Likely wrong answer: 99 (adds the change amount instead of subtracting it, despite the problem stating a decrease). Misconception: same direction error, opposite case. Next move: “does ‘decreases’ mean the final value is bigger or smaller than 90?”
 13. **Added because tax is an extra charge.** Common flaw: correct conclusion without the reasoning — just states “added.” Next move: ask what tax pays for that the original price didn’t include.
 14. **Subtracted because “off” removes part of the original price.** Common flaw: same incomplete reasoning as #13. Next move: same check.
 3. **\$71.68.** Likely wrong answer: \$71 (rounds the tax to a whole dollar before adding, losing precision). Misconception: rounding too early. Next move: “keep two decimal places until the final step — what is 12% of \$64 exactly?”
 4. **\$270.** Likely wrong answer: \$258 (adds 8 directly to \$250 instead of finding 8% first). Misconception: skipping the percent-to-decimal conversion. Next move: “8% of \$250 in dollars — what is that, before adding?”
 5. **\$100.** Likely wrong answer: \$60 (subtracts the markup instead of adding it). Misconception: direction of change reversed — markup should increase the price. Next move: “does a markup make the price go up or down?”
 6. **590.** Likely wrong answer: 410 (subtracts the change amount instead of adding it, despite “increases”). Misconception: direction not matched to the operation. Next move: “does ‘increases’ mean the final value is bigger or smaller than 500?”
 7. **168.** Likely wrong answer: 312 (adds the change amount instead of subtracting it, despite “decreases”). Misconception: same direction error, opposite case. Next move: same check.

Worksheet B

1. **\$102.** Likely wrong answer: \$105 (subtracts the percent number, 15, directly from \$120). Misconception: the chapter’s central error — treating the percent number as a dollar amount. Next move: “is \$15 off the same as 15% off?”
2. **\$60.** Likely wrong answer: \$55 (subtracts 20 directly from \$75). Misconception: same as #1. Next move: same check.
8. **The original price before the discount; it is the 100% base.** Common flaw: names the sale price as the base instead of the original price. Next move: ask which amount represents 100% in this problem.
9. **85% of \$120 = \$102.** Likely wrong answer: uses 15% directly and reports \$18 as if it were the final price, instead of subtracting from — or using the remaining 85% of — the

original. Misconception: confusing the change amount with the final amount. Next move: “does \$18 answer ‘how much off,’ or ‘what’s the final price?’”

10. **Original-change: tax is \$7.68, final \$71.68; final percent: 112% of \$64 is \$71.68.** Common flaw: gets two different final answers from the two methods and doesn’t notice or reconcile the mismatch. Next move: “do both methods agree? If not, which step is different?”
11. **15% of \$60 is \$9, so the sale price is \$51.** Likely wrong answer: agrees with the student’s claim that the discount is \$15 — exactly the error stated in the problem. Misconception: treating the percent number as a dollar amount. Next move: “is \$15 the same as 15% here? Calculate 15% of \$60 directly.”
12. **Answers vary but must add or subtract a percent amount from a named base.** Common flaw: creates one context for an increase and one for a decrease, but doesn’t clearly name the base (100%) in either. Next move: ask the student to label the original amount in both contexts.

Worksheet C

1. **\$240.** Likely wrong answer: \$280 (subtracts 20 directly from \$300 instead of finding 20% first). Misconception: treating the percent number as a dollar amount. Next move: “is \$20 the same as 20% here?”
2. **\$51.75.** Likely wrong answer: \$6.75 (reports the tip amount alone instead of adding it to the bill). Misconception: confusing the change amount with the final total.
3. **\$112.** Likely wrong answer: \$48 (subtracts the markup instead of adding it). Misconception: direction of change reversed. Next move: “does a markup make the price go up or down from the cost?”
4. **The student subtracted \$15 rather than 15% of \$60; 15% of \$60 is \$9, so the correct sale price is \$51.** Common flaw: identifies that the answer is wrong but doesn’t recompute the correct discount and sale price. Next move: require both the corrected discount amount and the corrected final price.
5. **\$54.** Likely wrong answer: \$46 (subtracts the change amount instead of adding it, despite “increases”). Misconception: direction not matched to the operation. Next move: “does ‘increases’ mean more or less than \$50?”
6. **135.** Likely wrong answer: 155 (subtracts the percent number, 25, directly from 180 instead of finding 25% first). Misconception: treating the percent number as the change amount. Next move: “is 25 the same as 25% of 180?”
7. **First discount: \$20, new base \$80; tax: 10% of \$80 is \$8; final \$88.** Likely wrong answer: applies the 10% tax to the original \$100 instead of the discounted \$80, giving a different final amount. Misconception: not updating the base after the first step. Next move: “after the discount, what is the new 100% for the tax step?”
8. **The discount amounts are \$10 and \$40 because the original bases differ.** Likely wrong answer:

says both discounts are the same dollar amount, since the percent (20%) is the same. Misconception: not recognizing that the same percent produces different amounts from different bases. Next move: “does 20% of \$50 equal 20% of \$200?”

9. **Answers vary.** Common flaw: the created problem doesn't actually involve a percent increase, or the “solution” doesn't match the scenario. Next move: check that the base, percent, and direction are all clearly identified.
10. **Answers vary.** Common flaw: same as #9, for a decrease context. Next move: same check.
11. **\$84. The length of the sale (3 days) and the number of other discounted items (5) were not needed to find the jacket's sale price.** Likely wrong answer: works the 3 days or 5 other items into the calculation somehow. Misconception: assuming every number in a word problem must be used. Next move: “what does the question actually ask for? Which numbers answer that?”
12. **Answers vary; must describe a situation where 300 is the original amount, 0.15 (15%) is the percent change, and 45 is the resulting change amount, with each meaning stated.** Common flaw: gives a context but doesn't identify all three roles, or confuses the change amount (45) with the final amount. Next move: ask the student to finish three sentences — “300 is __,” “15% means __,” “45 is __.”

Extend Your Thinking

1. After the first 20% discount, the new base is 80% of the original, so the second 20% is taken from a smaller amount.
2. No. For an original 100, increase to 125, then decrease 25% of 125, which is 31.25; final 93.75.
3. Both calculate 15% of the same original bill, but tax is paid to the seller or government while tip is paid as an additional service amount; the mathematical structure is addition.
4. No. For a cost of 100, markup gives 130, and 30% off 130 is 39, leaving 91.
5. Answers vary; 115% is 100% plus 15%.
6. The shortcut is efficient once the direction and base are clear; the original-change-final method is clearer for first learning and error diagnosis.

Tripwire and Exit Ticket

Tripwire: discount \$14;

sale price \$56.

Exit Ticket: \$63; \$56; a 20% discount is 20% of the original price, not \$20; identify original, find percent change, add or subtract, check; final amount should be below the original for a discount/decrease and above for tax/tip/markup/increase.

