Grade 7 Math · Lesson 4 — Opening Day

Percents, Markups, Taxes and Scale Drawings · ages 11 to 14 · 45 minutes · the workbook, one screen, this page, a pencil and paper

At a Glance

- **The book:** 7th Grade Math Workbook: Real-World Problem Solving, Chapter 4 (The Shop Owner), by Dr. Gene A Constant.
- **Free tool:** Percent Power (tips, tax and discounts), free, no login, plays in the browser: globalsovereignuniversity.org/percent-power.
- **Free class:** Lesson 4 of the free Grade 7 Mathematics class: globalsovereignuniversity.org/grade-7-math-class#lesson-4.
- **Ages and time:** Grade 7 · ages 11 to 14 · 45 minutes.
- **Prep (5 min):** read the Teaching Creed and have the workbook open to Chapter 4. Lay out 100 pennies, beans or squares of paper in a 10-by-10 grid.

Why this lesson

Prices, tax, discounts and interest are percents, and percents are where adults lose the most money by not checking. Seeing 15 out of 100 on a real grid turns a word into something a child can count.

What the learner will be able to do

- Find a percent of a number
- Figure a markup, a discount, sales tax and simple interest
- Find a percent increase or decrease
- Apply two percent changes one after the other
- Use a scale drawing to find real lengths and areas

The 45-Minute Climb

How to read this: the gold box in each step is your lesson, word for word. Run it as written. The notes beneath are optional support. "The group" means your family; "host" means you.

1 · The Hook (5 min)

"Lay out 100 pennies or beans in a 10-by-10 square. Push 15 of them aside. That is 15%. Now what is 15% of $40?"

Say it like this: let your child do it with real objects if you can, then ask how they know their answer is right before you check it.

2 · Work It Together (15 min)

Open the workbook to the worked example Sales Tax on a Sale (Section 4.1) together: A customer buys $450 of tools. The town's sales tax is 6%. Change 6% to a decimal: 0.06. Multiply: 450 × 0.06 = 27. The tax is $27, so the customer pays $477. Then read Pricing a New Item (Section 4.2) together: The store pays $40 for a garden kit and marks it up 15%. Find the markup: 40 × 0.15 = 6. Add it to the cost: 40 + 6 = 46. The selling price is $46. (Shortcut: 40 × 1.15 = 46.).

Read each step aloud and let your child say the next step before you read it. Then play one round of Percent Power.

3 · The Talk (8 min)

1. Why can you not just add a 10% loss and a 20% loss? 2. What is the difference between a markup and a discount? 3. On a scale drawing, why do you change each length to real feet before finding area?

You are not fishing for one right answer. You are listening for understanding:

- Q1: The second percent works on a smaller amount, so the total loss is less than 30%.
- Q2: A markup adds a percent to what the store paid. A discount takes a percent off the price.
- Q3: Area does not grow by the same scale as length. Change the lengths first, then multiply.

4 · Solo Climb (12 min)

Five problems on your own, with your work shown.
1. A bin holds 800 pounds of birdseed. Damp gets in and spoils 5%. How many pounds are spoiled and how many are left?
2. Bags of winter bird food cost $25. To clear them by spring, the owner takes 20% off. What is the new price?
3. Customers last year: 320 a week. This year the store grew by 15%. How many customers a week now?
4. A customer fixes up a used mower for $120 and sells it for $180. What is the profit as a percent of the cost?
5. A display model of a water tower uses 1 inch = 5 feet. The real tower is 45 feet tall. How tall is the model?

Why solo: a test, a job and real life ask you to work alone. Five problems rehearse exactly that. The answers are at the end of this plan.

Keep It Fresh (5 min, the next day)

Two review problems from the book's Extra Practice.
1. Which is the better buy: 3 pounds of seed for $7.50, or 5 pounds for $11.75?
2. Solve the proportion 4/9 = x/36.

Ready to move on? Four of the five Solo Climb problems right, with work shown, means this skill is solid. If not, reread the worked examples together and try two more problems from the chapter before the next lesson. Short review of old skills keeps them from fading.

5 · The Takeaway (5 min)

"To find a percent of a number, change it to a decimal and multiply. Each new percent works on the new amount." · Homework: Find a sale sign in a store or flyer. Work out the sale price yourself, then add your state's sales tax to see what you would really pay.

The badge moment: finishing all five steps earns the Bronze ring of this lesson's badge, The Fair Price. Mark it on the Climber's Passport now; the homework is how Silver and Gold are earned during the week.

Common Mistakes to Watch For

- Adding two percent changes together. A 10% loss then a 20% loss is not a 30% loss.
- Forgetting to add the markup or tax back onto the starting amount.
- Finding the paper area of a scale drawing first and then multiplying by the scale.

The Teaching Creed

You are not the expert; the book and the method are. Your job is to ask "how do you know?" one more time than feels natural, and to celebrate wrong answers out loud. In here, a wrong answer is where the lesson lives.

GENO, GSU's free tutor, can explain any step a second way, any hour, in 83 languages, with no login: globalsovereignuniversity.org/free-tutor. A prompt for the host: Ask GENO: "My child thinks a 10% loss followed by a 20% loss is a 30% loss. Help them see why it is not, without giving the answer."

Adapt It and Measure It

Differentiation

- Struggling: shade squares on a 10-by-10 grid for every percent before multiplying.
- Ahead: find a real receipt and check the tax rate the store used.
- Large co-op: run a pretend store with price tags, a sale and a tax table.
- Reluctant: let the child plan a sale on something they own and price it three ways.

Evidence of learning (no exam)

Look for three things. Tried: finished all five Solo Climb problems with work shown. Noticed: can name the mistake in Common Mistakes that they almost made. Changed: the next day, solves one new problem from the same chapter without help. Those three words are the whole rubric, and they match the badge tiers below.

Gamify It — The Campus Climb

Every GSU lesson is one badge on the Climber's Passport, earned at four depths: Bronze, Silver, Gold and Platinum.

LESSON 4 BADGE — The Fair Price · Bronze — The Climb: finished the 45-minute lesson, all five steps. · Silver — The Try: did the homework and explained it to the host. · Gold — The Proof: completed the chapter's Action Report in the workbook with every answer checked against the Answer Key. · Platinum — The Teacher: ran this lesson as host for someone else. The harvest of a teacher is teachers.

Answers for the Host

1. 40 pounds spoiled; 760 pounds left
2. $20 (25 − 5)
3. 368 customers (320 + 48)
4. 50% (60 ÷ 120)
5. 9 inches (45 ÷ 5)

Keep It Fresh: 1. 5 pounds for $11.75 ($2.35 a pound vs. $2.50) · 2. x = 16

Every answer above comes from the workbook's own Answer Key. The book behind this lesson: 7th Grade Math Workbook: Real-World Problem Solving, Chapter 4 (The Shop Owner).

Global Sovereign University: Different by Design. Better by Mission.

The Foundation for Global Instruction · a 501(c)(3) nonprofit · Eugene, Oregon · globalsovereignuniversity.org · FREE TO KEEP · FREE TO SHARE