Grade 7 Math · Lesson 6 — Load Plan for Saturday

Equations and Inequalities · 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 6 (The Logistics Coordinator), by Dr. Gene A Constant.
- **Free tool:** Equation Explorer (solve for x, starting with one-step equations), free, no login, plays in the browser: globalsovereignuniversity.org/equation-explorer.
- **Free class:** Lesson 6 of the free Grade 7 Mathematics class: globalsovereignuniversity.org/grade-7-math-class#lesson-6.
- **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 6. Set out 5 small boxes or envelopes and a pile of 72 coins, beans or buttons.

Why this lesson

Equations and inequalities answer the two real questions of logistics: exactly how many, and how many at most. Undoing steps in reverse order is a habit that carries into all of algebra.

What the learner will be able to do

- Solve one-step and two-step equations
- Solve equations with parentheses and with fractions
- Write an inequality from a real limit
- Solve inequalities and graph the answers
- Flip the inequality sign when multiplying or dividing by a negative

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)

"Put 5 closed boxes and 12 loose coins on a scale or in a pile. If the total is 72 coins, how many coins are in each box? Undo the loose coins first."

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 How Many Items in a Box? (Section 6.1) together: A crew brings back 5 sealed boxes and 12 loose cans, 72 items in all. Each box holds x items. Write the equation: 5x + 12 = 72. Subtract 12 from both sides: 5x = 60. Divide both sides by 5: x = 12. Check: 5 × 12 + 12 = 72. Each box holds 12 items. Then read Four Identical Bins (Section 6.2) together: Four storage bins each hold c crates of food plus 5 crates of water. All four hold 68 crates. Write the equation: 4(c + 5) = 68. Divide both sides by 4: c + 5 = 17. (Or distribute first: 4c + 20 = 68.) Subtract 5: c = 12. Each bin holds 12 crates of food.

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

3 · The Talk (8 min)

1. Why do you undo the adding or subtracting before the multiplying or dividing? 2. What is the difference between an equation and an inequality answer? 3. When must you flip the inequality sign?

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

- Q1: You undo the steps in the reverse order they were done, like taking off shoes before socks.
- Q2: An equation has one answer. An inequality has a range of answers, such as 20 boxes or fewer.
- Q3: When you multiply or divide both sides by a negative number. Test it: $2 < 5$, but $-2 > -5$.

4 · Solo Climb (12 min)

Five problems on your own, with your work shown.
1. A loading dock must be 1,000 feet of shelving. 250 feet are done, and the crew adds 50 feet a day (d). Solve 50d + 250 = 1,000.
2. Half of the volunteers (v/2) sign up for the night shift, but 3 cancel, leaving 14. Solve v/2 − 3 = 14.
3. The tech budget is $500. A battery costs $200 and the rest buys 6 identical lights. Solve 6p + 200 = 500.
4. You can spend at most $150. A tool kit costs $45 and tarp costs $15 a yard. Solve 15y + 45 ≤ 150.
5. A first-aid station is stocked with 120 bandages and must keep at least 40. Each training class uses 8. Solve 120 − 8s ≥ 40.

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. Simplify: 7a − 3 + 2a + 9
2. Expand: −2(5x − 4)

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)

"Undo in reverse order, and do the same to both sides. Divide by a negative and the sign flips." · Homework: Find a real limit at home: a shelf that holds so many books, a bag that holds so many pounds. Write it as an inequality and solve it.

The badge moment: finishing all five steps earns the Bronze ring of this lesson's badge, The Load Master. 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

- Doing the steps in the wrong order: undo adding or subtracting before you divide.
- Forgetting to flip the inequality sign when you divide by a negative number.
- Giving a fraction of a box or a driver when the answer must be a whole number.

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 does not know when to flip the inequality sign. Help them test it with real numbers, without giving the answer."

Adapt It and Measure It

Differentiation

- Struggling: use real boxes and coins to act out every two-step equation.
- Ahead: write an inequality for a real limit at home, such as a shelf or a bag, and solve it.
- Large co-op: each team plans one truck load under a weight limit.
- Reluctant: let the child plan how many of something they can buy with a set amount of money.

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 6 BADGE — The Load Master · 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. d = 15 days
2. v = 34 volunteers
3. p = $50 per light
4. y ≤ 7 yards
5. s ≤ 10 classes (−8s ≥ −80; flip the sign)

Keep It Fresh: 1. 9a + 6 · 2. −10x + 8

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 6 (The Logistics Coordinator).

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