Solve Inequalities Using Addition or Subtraction

45-minute instructional plan | Minnesota 2007 standards: 7.2.2.4; 7.2.4.1 (related algebraic reasoning)

Learning objectives

• Translate at most, at least, less than, and more than.

• Solve inequalities by addition or subtraction.

• Show inclusive/exclusive boundaries on a number line.

• Interpret solution sets in context.

Suggested 45-minute sequence

0–5 min	Review and quick check
5–8 min	Why the lesson matters / real-life launch
8–11 min	Read the learning objectives
11–18 min	Explore model and vocabulary
18–30 min	Guided examples and error analysis
30–38 min	Independent practice
38–43 min	Group reasoning
43–45 min	Independent exit ticket

Core concept

Subtract or add the same quantity on both sides; the symbol does not reverse.

$$x + 7 \geq -2 \quad \Rightarrow \quad x \geq -9$$

Teaching prompts

• Ask students to name the unknown and units before manipulating the equation or inequality.

• Ask: Which steps preserve the solution set, and why?

• Distinguish open/closed circles, the direction of the number line, and discrete contextual solutions when relevant.

Common misconception / correction

A student solves x – 5 ≥ 3 and concludes x ≥ –2. What operation was incorrect?

$$x - 5 \geq 3 \Rightarrow x \geq 8$$

Add 5 to both sides, not subtract 5.

Differentiation and assessment

Support: pre-label the variable, highlight fixed versus repeated quantities, and provide an annotated example. Extension: require a second representation or a reasoned equivalence argument.

Assessment: a correct exit response with justified steps suggests readiness for the next lesson; otherwise use an additional model and one follow-up problem.

Worked answer key

1. Solve x + 4 > 11.

$$x > 7$$

2. Solve y – 6 ≤ –2.

$$y \leq 4$$

3. Solve n + 3/4 ≥ 2.

$$n + \frac{3}{4} \geq 2 \Rightarrow n \geq \frac{5}{4}$$

4. Solve x – 2.5 < –6.

$$x < -3.5$$

5. Solve –7 + x ≥ 5.

$$x \geq 12$$

Group challenge

A bus already has 19 riders and holds no more than 44. Write and solve an inequality for the additional riders r. Explain why r must be a whole number.

$$19 + r \leq 44 \Rightarrow 0 \leq r \leq 25$$

Additional practice — if time allows

Solve a strict inequality: z – 3/2 > –5/2.

$$z - \frac{3}{2} > -\frac{5}{2} \Rightarrow z > -1$$

Exit ticket

Solve v – 4.5 ≥ 2, and name the boundary type.

$$v \geq 6.5$$

Teaching note

Ask students to justify their methods. Use incorrect answers to identify the next instructional step.