Solve Inequalities Using Multiplication or Division

45-minute instructional plan | Minnesota 2007 standards: 7.2.2.4; 7.2.4.1 (supporting equation properties)

Learning objectives

• Solve inequalities using multiplication or division.

• Reverse the inequality when multiplying or dividing by a negative number.

• Graph solutions with correct boundary symbols.

• Explain why multiplying by a negative reverses the order.

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

Multiplying or dividing an inequality by a negative number reverses its sign.

$$-3x \geq 15 \quad \Rightarrow \quad x \leq -5$$

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 –2y < 8 and claims y < –4. What must change?

$$-2y < 8 \Rightarrow y > -4$$

The sign reverses when dividing by –2.

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 5x ≥ 20.

$$x \geq 4$$

2. Solve –4y ≤ 12.

$$y \geq -3$$

3. Solve x/3 > –2.

$$\frac{x}{3} > -2 \Rightarrow x > -6$$

4. Solve –x/2 ≥ 5.

$$-\frac{x}{2} \geq 5 \Rightarrow x \leq -10$$

5. Solve (3/4)z < 9.

$$\frac{3}{4}z < 9 \Rightarrow z < 12$$

Group challenge

Four equal boxes have total mass at most 34 kg. Let w be one box mass. Solve and interpret the inequality.

$$4w \leq 34 \Rightarrow 0 \leq w \leq 8.5$$

Additional practice — if time allows

Solve –(3/2)x > 9.

$$-\frac{3}{2}x > 9 \Rightarrow x < -6$$

Exit ticket

Solve –5n < 15 and explain whether –3 belongs to the solution set.

$$n > -3 \quad (-3 \text{ excluded})$$

Teaching note

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