First 5 Minutes — Review Question

GRADE 7 • TOPIC 5 • LESSON 5.6 | 5 points • Work independently

Lesson 5.6 • Solve Two-Step Inequalities

Solve $-5x \leq 15$.

1. Show each step in your notebook.
2. Explain the operation or rule you used.

Real-Life Connection & Key Concepts

Essential question

How is solving a two-step inequality similar to solving a two-step equation?

Solve & Discuss It!

Rico and Halima have $30 for supplies. Craft sticks cost $4.75 per box of 275; tape is $3.50 and glue is $5 or $3.50. How can they buy at least 1,000 sticks plus tape and glue?

What we will learn

Translate two-step constraints; solve positive and negative rational-coefficient inequalities; interpret integer solutions.

Definitions & rules

Undo addition or subtraction first, then multiplication or division.

Reverse the inequality only for a negative multiplier/divisor.

Interpret continuous and whole-number solutions in the context.

Example 1 — Solve Two-Step Inequalities

GRADE 7 • TOPIC 5 • LESSON 5.6 | Guided example • Model and explain

Problem

Hamish has $25.97. He wants a $14 canvas and paint pens costing $3.15 each. How many pens p can he buy?

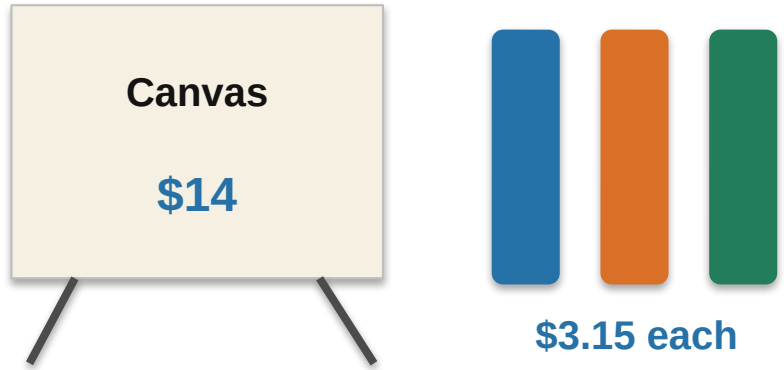
Worked solution

$14 + 3.15p \leq 25.97$.

$3.15p \leq 11.97 \rightarrow p \leq 3.80$.

He can buy at most 3 whole pens.

Undo the constant and coefficient; reverse the sign only for a negative divisor.



Example 2 — Solve Two-Step Inequalities

Problem

A science club has raised $498.75. It sells booklets for $17.95 each and hopes to exceed last year’s $658.35. How many more booklets b must it sell?

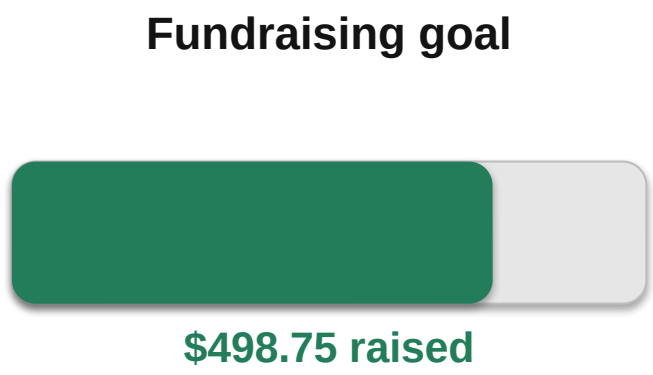
Worked solution

$498.75 + 17.95b > 658.35.$

$17.95b > 159.60 \rightarrow b > \frac{159.60}{17.95} \approx 8.89.$

The club must sell at least 9 booklets.

Undo the constant and coefficient; reverse the sign only for a negative divisor.



Example 3 — Solve Two-Step Inequalities

GRADE 7 • TOPIC 5 • LESSON 5.6 | Guided example • Model and explain

Problem

Solve $-10 - (\frac{9}{2})x < 80$.

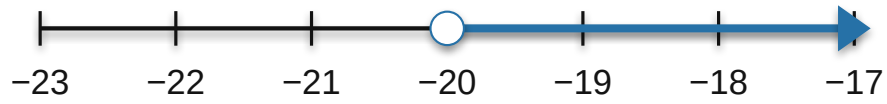
Worked solution

Add 10: $-(\frac{9}{2})x < 90$.

Multiply by $-\frac{2}{9}$ and reverse the sign.

$x > -20$.

Undo the constant and coefficient; reverse the sign only for a negative divisor.



Excluded endpoint • shade right

Individual Work

GRADE 7 • TOPIC 5 • LESSON 5.6 | 10 minutes total • 10 points

Complete all five tasks. Show your reasoning.

8. (p. 303) Solve $\frac{n}{5} - 8 \leq 95$.

9. (p. 303) Solve $\frac{b}{45} + 7 > 5$.

10a. (p. 303) Solve and graph $2x + 6 < 10$.

Individual Work — continued

GRADE 7 • TOPIC 5 • LESSON 5.6 | 10 minutes total • 10 points

Finish the remaining problems. Check your work.

10b. (p. 303) Solve and graph $-2x + 22 < 18$.

10c. (p. 303) Do the solution sets in the previous two problems overlap? Explain.

Individual Work — Answer Key

Undo the constant and coefficient; reverse the sign only for a negative divisor.

8. (p. 303)

$\frac{n}{5} - 8 \le 95 \rightarrow \frac{n}{5} \le 103 \rightarrow n \le 515.$

9. (p. 303)

$\frac{b}{45} + 7 > 5 \rightarrow \frac{b}{45} > -2 \rightarrow b > -90.$

10a. (p. 303)

Subtract 6: $2x < 4$. Divide by 2: $x < 2$. Open at 2; shade left.

10b. (p. 303)

Subtract 22: $-2x < -4$. Divide by -2 and reverse: $x > 2$. Open at 2; shade right.

10c. (p. 303)

No overlap: $x < 2$ and $x > 2$ cannot both hold, and 2 itself is excluded.

Group Work

GRADE 7 • TOPIC 5 • LESSON 5.6 | 8 minutes total • 10 points

Work together. Each person must contribute a solution.

11. (p. 303) A trip costs $30 plus $0.20 per mile. Total is at most $94. Find possible miles m.

12. (p. 303) A rectangle is 7.6 m long; perimeter is at most 28 m. Find possible widths w.

Group Work — continued

GRADE 7 • TOPIC 5 • LESSON 5.6 | 8 minutes total • 10 points

Agree on a solution and be ready to explain it.

13. (p. 304) A price p is discounted 40%, then 25%, then $5. The final price is at most $7.60. Find the maximum original price.

14. (p. 304) A total of 598 increases by 15.75 each minute. It must be at most 850. Find the possible number of minutes m.

Group Work — Answer Key

Undo the constant and coefficient; reverse the sign only for a negative divisor.

11. (p. 303)

$30 + 0.20m \le 94 \rightarrow 0.20m \le 64 \rightarrow m \le 320$ miles.

12. (p. 303)

$2(7.6) + 2w \le 28 \rightarrow 2w \le 12.8 \rightarrow w \le 6.4$ m, with $w > 0$.

13. (p. 304)

Original p: $0.60p \times 0.75 - 5 \le 7.60 \rightarrow 0.45p \le 12.60 \rightarrow p \le \$28$ (nonnegative).

14. (p. 304)

$598 + 15.75m \le 850 \rightarrow 15.75m \le 252 \rightarrow m \le 16$ min.

Exit Ticket

GRADE 7 • TOPIC 5 • LESSON 5.6 | 2 minutes • Independent check

Before you leave, solve this problem.

Solve and graph $-(\frac{2}{5})x + 7 \geq 9$.

Show your work.

Write the answer with the correct units or graph, if needed.