First 5 Minutes — Review Question

GRADE 7 • TOPIC 5 • LESSON 5.7 | 5 points • Work independently

Lesson 5.7 • Solve Multi-Step Inequalities

Solve 4(x − 3) = 20.

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 multi-step inequality similar to solving a multi-step equation?

Explore It!

Charlene has 2 flash drives, each with d GB of data. She deletes 1 GB from each. Write an expression for the remaining data, then an inequality so it fits on an 8-GB card.

What we will learn

Write and solve inequalities with distribution, like terms and variables on both sides; justify solution sets and check boundary values.

Definitions & rules

Distribute to remove parentheses.

Combine like terms and move variable terms to one side.

Isolate the variable; reverse only when multiplying or dividing by a negative.

Example 1 — Solve Multi-Step Inequalities

GRADE 7 • TOPIC 5 • LESSON 5.7 | Guided example • Model and explain

Problem

Gabriela is 55 inches tall. Add 13 to 3 times the sum of her age x and 2; the result is greater than her height. What are possible ages?

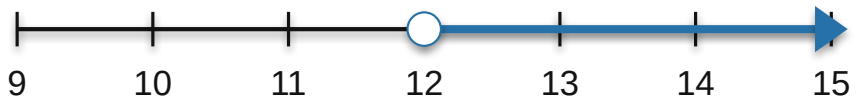
Worked solution

$3(x + 2) + 13 > 55.$

$3x + 19 > 55 \rightarrow 3x > 36.$

$x > 12.$

Distribute, combine like terms, and isolate the variable; interpret the solution.



Excluded endpoint • shade right

Example 2 — Solve Multi-Step Inequalities

GRADE 7 • TOPIC 5 • LESSON 5.7 | Guided example • Model and explain

Problem

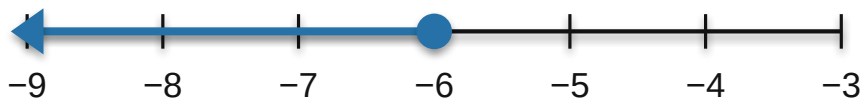
Solve and graph $-3(x + 4) + 3 \geq 9$.

Worked solution

$-3x - 12 + 3 \geq 9$.

$-3x - 9 \geq 9 \rightarrow -3x \geq 18$.

Divide by -3 and reverse: $x \leq -6$.



Included endpoint • shade left

Distribute, combine like terms, and isolate the variable; interpret the solution.

Example 3 — Solve Multi-Step Inequalities

GRADE 7 • TOPIC 5 • LESSON 5.7 | Guided example • Model and explain

Problem

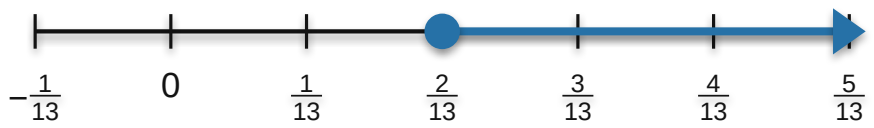
Solve and graph $2(3.5t - 2) + 6t \geq -2$.

Worked solution

$7t - 4 + 6t \geq -2$.

$13t - 4 \geq -2 \rightarrow 13t \geq 2$.

$t \geq \frac{2}{13}$.



Included endpoint • shade right

Distribute, combine like terms, and isolate the variable; interpret the solution.

Individual Work

GRADE 7 • TOPIC 5 • LESSON 5.7 | 10 minutes total • 10 points

Complete all five tasks. Show your reasoning.

7a. (p. 309) Solve $18 < -3(4x - 2)$.

7b. (p. 309) Graph the solution to the previous inequality.

8a. (p. 309) Michelle subtracts 6 to isolate 8y in $8y - 6 > -22$. Explain her error.

Individual Work — continued

GRADE 7 • TOPIC 5 • LESSON 5.7 | 10 minutes total • 10 points

Finish the remaining problems. Check your work.

8b. (p. 309) Solve and graph $2(4y - 3) > -22$.

9. (p. 309) A rectangle has sides x and $x + 7$. Its perimeter is greater than 154 in. Find possible values of x.

Individual Work — Answer Key

Distribute, combine like terms, and isolate the variable; interpret the solution.

7a. (p. 309)

$18 < -3(4x - 2) \rightarrow 18 < -12x + 6 \rightarrow 12 < -12x \rightarrow -1 > x$, so $x < -1$.

7b. (p. 309)

Draw an open circle at −1 because equality is excluded; shade left for all $x < -1$.

8a. (p. 309)

Michelle subtracted 6 instead of adding 6 when isolating 8y.

8b. (p. 309)

Distribute: $8y - 6 > -22$. Add 6: $8y > -16$. Divide by 8: $y > -2$. Open at −2; shade right.

9. (p. 309)

$2x + 2(x + 7) > 154 \rightarrow 4x + 14 > 154 \rightarrow x > 35$ inches.

Group Work

GRADE 7 • TOPIC 5 • LESSON 5.7 | 8 minutes total • 10 points

Work together. Each person must contribute a solution.

10. (p. 309) Explain why like terms inside parentheses can be combined before distributing, but unlike terms cannot. Use $-3 + 5$ and $x - 2$ as examples.

11. (p. 310) Solve $30 \geq 4z + 2$ and $15.6 < 2.7z - 3.3$. Do the solution sets overlap?

Group Work — continued

GRADE 7 • TOPIC 5 • LESSON 5.7 | 8 minutes total • 10 points

Agree on a solution and be ready to explain it.

12. (p. 310) A recipe uses 16w + 24w + 10w walnuts in total, which must be greater than 250. Find the minimum whole number w.

15. (p. 310) A fundraiser has $200 and earns $1.50 per sticker. Write and solve an inequality to raise at least $500.

Group Work — Answer Key

GRADE 7 • TOPIC 5 • LESSON 5.7 | Discuss and justify

Distribute, combine like terms, and isolate the variable; interpret the solution.

10. (p. 309)

−3 + 5 = 2 since both are constants. x and −2 are unlike terms, so distribute: −4(x − 2) = −4x + 8.

11. (p. 310)

a: $30 \geq 4z + 2 \rightarrow z \leq 7$. b: $15.6 < 2.7z - 3.3 \rightarrow 18.9 < 2.7z \rightarrow z > 7$. c: no overlap.

12. (p. 310)

$16w + 24w + 10w > 250 \rightarrow 50w > 250 \rightarrow w > 5$. At least 6 whole walnuts per spoonful.

15. (p. 310)

$200 + 1.50s \geq 500 \rightarrow 1.50s \geq 300 \rightarrow s \geq$ 200 stickers.

Exit Ticket

GRADE 7 • TOPIC 5 • LESSON 5.7 | 2 minutes • Independent check

Before you leave, solve this problem.

Solve and graph $-2(x + 5) + 3x \geq 4x - 1$.

Show your work.

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