

You may need to use the Distributive Property, combine like terms, and solve for the variable to find the solution. You can also use inverse relationships and properties to solve them.

$$4(y - 4) + 8 \leq 20$$

$$4y - 16 + 8 \leq 20$$

$$4y - 8 \leq 20$$

$$4y - 8 + 8 \leq 20 + 8$$

$$4y \leq 28$$

$$\frac{4y}{4} \leq \frac{28}{4}$$

$$y \leq 7$$



Do You Understand?

- 1. Essential Question** How is solving a multi-step inequality similar to and different from solving a multi-step equation?

- we both use properties to solve.
- There are infinite res for inequality but in equation only countable res.

- 2. Be Precise** Explain how you would combine like terms and use properties of operations to solve the inequality $5(2t + 3) - 3t < 16$. MP.6

$$10t + 15 - 3t < 16$$

$$7t < 1$$

$$t < \frac{1}{7}$$

IPR any property \Rightarrow)

- 3. Critique Reasoning** Gloria's solution to a multi-step inequality is $r > 7$. She states that the graph will have an open dot at 7 and extend with an arrow to the right indefinitely. Is she correct? Explain. MP.3

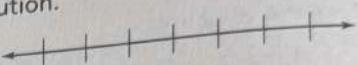
Yes. Because $r > 7$

So the dot should be open at 7 and to the right.

298 5-7 Solve Multi-Step Inequalities

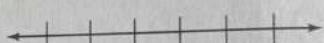
Do You Know How?

- 4.** Solve the inequality $2(n + 3) - 4 < 6$. Then graph the solution.



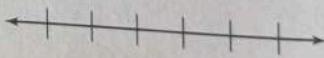
$$n < 2$$

- 5.** Solve the inequality $-2(x + 3) + 2 \geq 6$. Then graph the solution.



$$x \leq -5$$

- 6.** Three times the difference of Federico's age and 4, increased by 7, is greater than 37. What are possible values of Federico's age? Graph his possible ages on the number line.



$$\text{age } > 14$$



11. a. Solve the inequality $30 \geq 6\left(\frac{2}{3}z + \frac{1}{3}\right)$.

b. Solve the inequality $15.6 < 2.7(z - 1) - 0.6$.

c. Are there any values of z that solve both inequalities? Use a number line to support your answer.

No

12. Mr. Lin baked banana bread for a bake sale to raise money for the math team. He said that he added a spoonful of walnuts for each of the students in his three classes, and that he added more than 250 walnuts. He used the inequality $16w + 24w + 10w > 250$ to represent the situation, where w represents the number of walnuts in each spoonful. How many walnuts could be in each spoonful?



$$w > 5$$

14. Higher Order Thinking Solve each of the given inequalities for z . Which of the inequalities has 5 as a solution?

Inequality 1
 $4(2.8z + 1.75) > -26.6$

$$z > -3$$

Inequality 2
 $2(1.9z + 1.5) \leq 18.2$

$$z \leq 4$$

Inequality 2

Assessment Practice

15. Solve the inequality. Explain how you found your answer.

$$4(x - 2) - 3 \geq -3(-2 + 6) + 2$$

Solve the right side.

$$\Leftrightarrow 4(x - 2) - 3 \geq -10$$

$$4(x - 2) \geq -7$$

$$\begin{array}{rcl} x - 2 & \geq & \frac{-7}{4} \\ x & \geq & \frac{1}{4} \end{array}$$



Topic Essential Question

How can you solve real-world problems involving linear equations and algebraic inequalities?

Vocabulary

Complete each definition.

Vocabulary

1. You compare two numbers by using the symbols $<$, $>$, \leq , or \geq .

2. A statement that compares two expressions using an inequality symbol is called an inequality.

3. You can use the distributive property to remove parentheses from an expression such as $-10(x + 1)$.

Use Vocabulary

Write an equation for each situation. Then solve the equation.

more than 3 times as many as x from Topic 5

Like two-step equations, solving two-step inequalities involves carrying out two different operations—addition or subtraction, and multiplication or division. Unlike two-step equations, which have a single solution, two-step inequalities have multiple solutions.

Do You Understand?

1. **Essential Question** How is solving a two-step inequality similar to and different from solving a two-step equation?

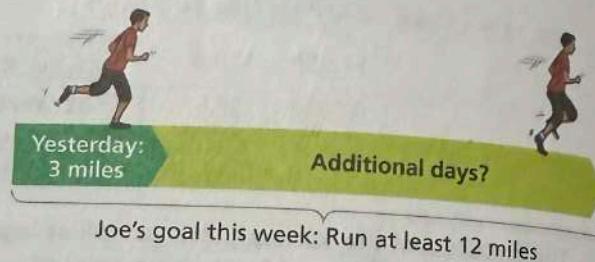
2. **Reasoning** What is the difference between the number of solutions for a two-step equation and for a two-step inequality? MP.2

3. Why are inverse relationships between operations used to solve two-step inequalities?

Isolate the variable

Do You Know How?

4. Joe ran 3 miles yesterday and wants to run at least 12 miles this week. Write an inequality that can be used to determine the additional number of days Joe must run this week if each run is 3 miles. Then solve the inequality.



5. Solve $4 + 6.5x < 36.5$.

$$\begin{aligned} 6.5x &< 32.5 \\ x &< 5 \end{aligned}$$

6. Tomas has \$1,000 to spend on a vacation. His plane ticket costs \$348.25. If he stays 5.5 days at his destination, how much can he spend each day? Write an inequality and then solve.

$$\$18.50$$

7. Solve $12 - \frac{3}{5}x > 39$.

$$x < -46$$





Practice & Problem Solving



Leveled Practice For 8 and 9, fill in the boxes to write and solve each inequality.

8. Eight less than the product of a number n and $\frac{1}{5}$ is no more than 95.

$$\boxed{\frac{1}{5}} n - 8 \leq 95$$

$$\boxed{\frac{1}{5}} n \leq 103$$

$$n \leq \boxed{515}$$

9. Seven more than the quotient of a number b and 45 is greater than 5.

$$\boxed{b} + \boxed{7} > \boxed{5}$$

$$\boxed{b} > \boxed{-2}$$

$$\boxed{b} > \boxed{-90}$$

10. Solve the inequalities and compare.

- a. Solve $2x + 6 < 10$.

$$x < 2$$

- b. Solve $-2x + 22 < 18$.

$$x > 2$$

- c. Which is the correct comparison of solutions for $2x + 6 < 10$ and $-2x + 22 < 18$?

- (A) The inequalities have some common solutions.
- (B) The inequalities have one common solution.
- (C) The inequalities have no common solutions.
- (D) The inequalities have the same solutions.

11. **Make Sense and Persevere** Talia has a daily budget of \$94 for a car rental. Write and solve an inequality to find the greatest distance Talia can drive each day while staying within her budget.

Car Rental

\$30 per day
plus \$0.20 per mile



$$30 + 0.2m \leq 94$$

$$\frac{m}{5} \leq 64$$

$$m \leq 320$$

12. **Model with Math** A manager needs to rope off a rectangular section for a private party. The length of the section must be 7.6 meters. The manager can use no more than 28 meters of rope. What inequality could you use to find the possible width, w , of the roped-off section?

$$2(w + 7.6) \leq 28$$

$$w + 7.6 \leq 14$$

$$w \leq 6.4$$



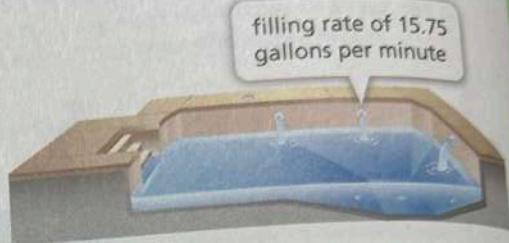
- 13. Higher Order Thinking** Andrea went to the store to buy a sweater that was on sale for 40% off the original price. It was then put on clearance at an additional 25% off the sale price. She also used a coupon that saved her an additional \$5. Andrea did not spend more than \$7.60 for the sweater. What are the possible values for the original price of the sweater?



- 14.** A pool can hold 850 gallons. It now has 598 gallons of water and is being filled at the rate shown. How many more minutes, m , can water continue to flow into the pool before it overflows? Write and solve an inequality.

$$850 - 598 \geq 15.75m$$

$$252 \geq 15.75m$$

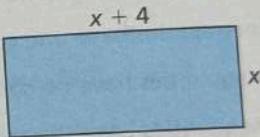


(C) Assessment Practice

- 15.** Use the rectangle diagram at the right.

PART A

Write and solve an inequality to find the values of x for which the perimeter of the rectangle is less than 120.



$$2(x + x + 4) < 120$$

$$2x + 4 < 60$$

$$2x < 56$$

$$x < 28$$

PART B

Based on your answer to Part A, are there any values that can be eliminated from the solution set? Explain.

$x > 0$ because
 x is distance

- 16.** Write and solve the inequality.

$\frac{4}{7}$ times a number minus 8.5 is no more than 11.5.

$$\frac{4}{7}x - 8.5 \leq 11.5$$

$$\frac{4}{7}x \leq 20$$

$$x \leq 35$$

