Solving Multi-Step Inequalities

Warm Up

Problem of the Day

Lesson Presentation

Lesson Quizzes

Solving Multi-Step Inequalities

Warm Up

Solve. Check each answer.

1. $7k < 42$ $k < 6$

2. $98 > -14n$ $-7 < n$

3. $9 < 12t$ $\frac{3}{4} < t$

4. $21g < 3$ $g < \frac{1}{7}$

Solving Multi-Step Inequalities

Problem of the Day

It's 15 miles from Dixon to Elmont and 20 miles from Elmont to Fairlawn. Write an inequality for x, the distance in miles from Dixon to Fairlawn.

$5 \leq x \leq 35$ (Dixon could be between Elmont and Fairlawn or Elmont could be between Dixon and Fairlawn.)

Solving Multi-Step Inequalities

Learn to solve multi-step inequalities.

Solving Multi-Step Inequalities

When you solve two-step equations, you can use the order of operations in reverse to isolate the variable. You can use the same process when solving multi-step inequalities.

Solving Multi-Step Inequalities

Additional Example 1A: Solving Two-Step Inequalities

Solve. Then graph the solution set on a number line.

$$\frac{y}{2} - 6 > 1$$

$$\frac{y}{2} - 6 > 1$$

$$\underline{+6} \quad \underline{+6}$$

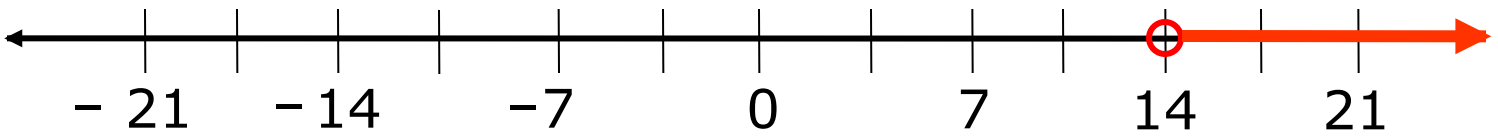
$$\frac{y}{2} > 7$$

Add 6 to both sides.

$$(2)\frac{y}{2} > (2)7$$

Multiply both sides by 2.

$$y > 14$$



Solving Multi-Step Inequalities

Additional Example 1B: Solving Two-Step Inequalities

Solve. Then graph the solution set on a number line.

$$5 \geq \frac{m}{-3} + 8$$

$$5 \geq \frac{m}{-3} + 8$$

$$-8 \qquad -8$$

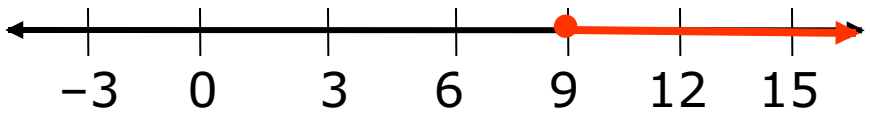
Subtract 8 from both sides.

$$-3 \geq \frac{m}{-3}$$

$$(-3)(-3) \leq \frac{m}{-3}(-3)$$

Multiply both sides by –3, and reverse the inequality symbol.

$$m \geq 9$$



Solving Multi-Step Inequalities

Check It Out: Example 1A

Solve. Then graph the solution set on a number line.

$$\frac{h}{7} + 1 > -1$$

$$\frac{h}{7} + 1 > -1$$

$$\underline{-1} \qquad \underline{-1}$$

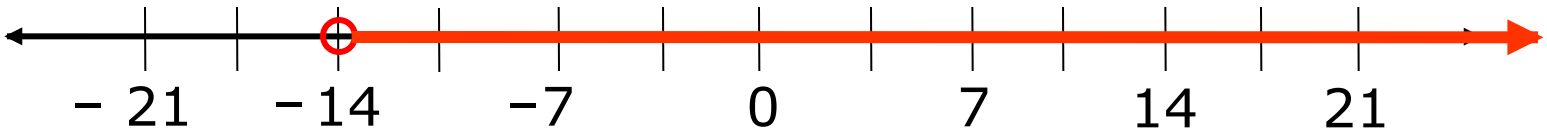
$$\frac{h}{7} > -2$$

Subtract 1 from both sides.

$$(7)\frac{h}{7} > (7)(-2)$$

Multiply both sides by 7.

$$h > -14$$



Solving Multi-Step Inequalities

Check It Out: Example 1B

Solve. Then graph the solution set on a number line.

$$\frac{m}{-2} + 1 \geq 7$$

$$\frac{m}{-2} + 1 \geq 7$$

$$\underline{\quad -1 \quad} \qquad \underline{-1}$$

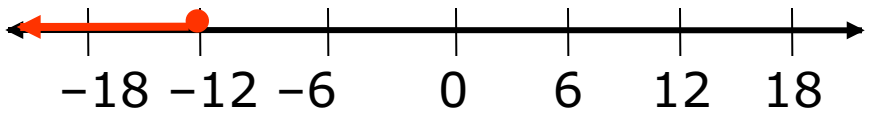
$$\frac{m}{-2} \geq 6$$

Subtract 1 from both sides.

$$(-2)\frac{m}{-2} \leq (-2)(6)$$

$$m \leq -12$$

Multiply both sides by –2, and reverse the inequality symbol.



Solving Multi-Step Inequalities

Additional Example 2A: Solving Multi-Step Inequalities

Solve. Then graph the solution set on a number line.

$$6y - 5 - 2y < 11$$

$$4y - 5 < 11$$

Combine like terms.

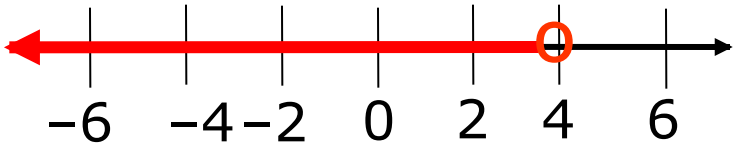
$$\begin{array}{rr} +5 & +5 \\ \hline 4y & < 16 \end{array}$$

Add 5 to both sides.

$$\frac{4y}{4} < \frac{16}{4}$$

Divide both sides by 4.

$$y < 4$$



Solving Multi-Step Inequalities

Additional Example 2B: Solving Two-Step Inequalities

Solve. Then graph the solution set on a number line.

$-11 \geq 2(-3x + 1) + 5$

$-11 \geq 2(-3x) + 2(1) + 5$

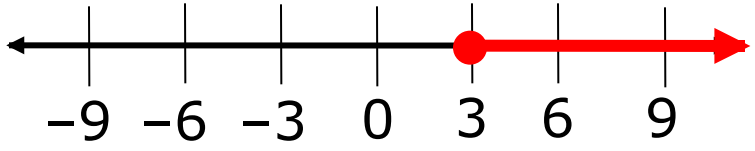
$-11 \geq -6x + 7$ *Simplify.*

$-7 \qquad -7$ *Subtract 7 from both sides.*

$-18 \leq -6x$

$\frac{-18}{-6} \leq \frac{-6x}{-6}$ *Divide both sides by –6, and reverse the inequality symbol.*

$3 \leq x$



Solving Multi-Step Inequalities

Check It Out: Example 2A

Solve. Then graph the solution set on a number line.

$$4y - 3 - 2y < 9$$

$$2y - 3 < 9$$

Combine like terms.

$$+3 \quad +3$$

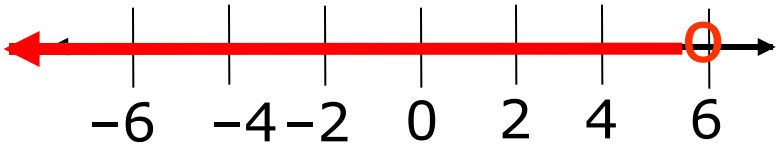
Add 3 to both sides.

$$2y < 12$$

$$\frac{2y}{2} < \frac{12}{2}$$

Divide both sides by 2.

$$y < 6$$



Solving Multi-Step Inequalities

Check It Out: Example 2B

Solve. Then graph the solution set on a number line.

$$-7 \geq 2(-4x + 1) + 7$$

$$-7 \geq 2(-4x) + 2(1) + 7$$

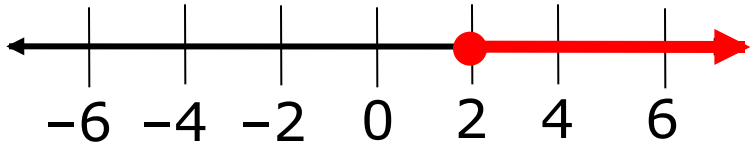
$$-7 \geq -8x + 9$$ *Simplify.*

$$-9 \qquad -9$$ *Subtract 9 from both sides.*

$$-16 \leq -8x$$

$$\frac{-16}{-8} \leq \frac{-8x}{-8}$$ *Divide both sides by –8, and reverse the inequality symbol.*

$$2 \leq x$$



Solving Multi-Step Inequalities

Additional Example 3: *Application*

Sun-Li has $30 to spend at the carnival. Admission is $5, and each ride costs $2. What is the greatest number of rides she can ride?

Let r represent the number of rides Sun-Li can ride.

$$5 + 2r \leq 30$$

$$-5 \qquad -5$$

Subtract 5 from both sides.

$$2r \leq 25$$

Divide both sides by 2.

$$\frac{2r}{2} \leq \frac{25}{2}$$

$$r \leq \frac{25}{2}, \text{ or } 12\frac{1}{2}$$

Sun-Li can ride only a whole number of rides, so the most she can ride is 12.

Solving Multi-Step Inequalities

Check It Out: Example 3

Brice has $30 to take his brother and his friends to the movies. If each ticket costs $4.00, and he must buy tickets for himself and his brother, what is the greatest number of friends he can invite?

Let t represent the number of tickets.

$$8 + 4t \leq 30$$

$$-8 \qquad -8$$

Subtract 8 from both sides.

$$4t \leq 22$$

Divide both sides by 4.

$$\frac{4t}{4} \leq \frac{22}{4}$$

$$t \leq 5.5$$

Brice can only buy a whole number of tickets, so the most people he can invite is 5.

Lesson Quizzes

Standard Lesson Quiz

Lesson Quiz for Student Response Systems

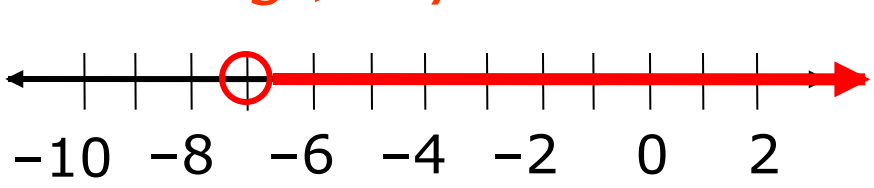
Solving Multi-Step Inequalities

Lesson Quiz: Part I

Solve. Then graph each solution set on a number line.

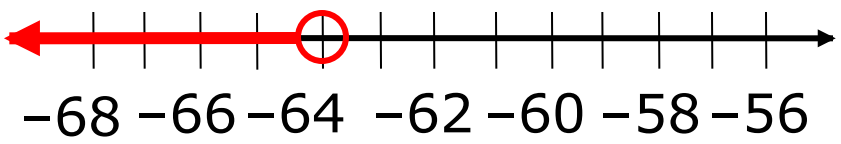
1. $7s + 14 > -35$

$s > -7$



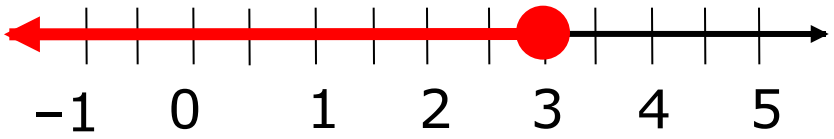
2. $\frac{y}{-8} + 12 > 20$

$y < -64$



3. $18n - 22 \leq 32$

$n \leq 3$



Solving Multi-Step Inequalities

Lesson Quiz: Part II

4. A cyclist has $7.00. At the first stop on the tour, energy bars are $1.15 each, and a sports drink is $1.75. What is the greatest number of energy bars the cyclist can buy if he buys one sports drink?

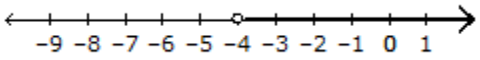
4

Solving Multi-Step Inequalities

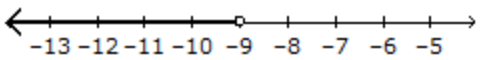
Lesson Quiz for Student Response Systems

1. Solve and then identify the graph of the solution set on a number line. $8p + 19 > -53$

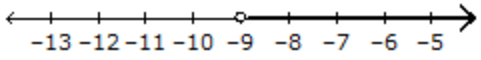
A. $p > -4$



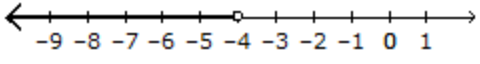
B. $p < -9$



C. $p > -9$



D. $p < -4$



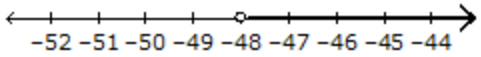
Solving Multi-Step Inequalities

Lesson Quiz for Student Response Systems

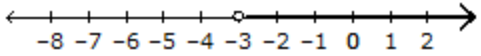
2. Solve and then identify the graph of the solution set on a number line.

$$\frac{z}{-4} + 13 > 25$$

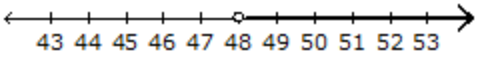
A. $z > -48$



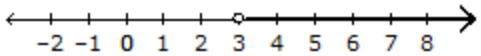
B. $z > -3$



C. $z > 48$



D. $z < 4$



Lesson Quiz for Student Response Systems

3. Peter has $1500 with him to go on a vacation. He spends $550 towards travel expenses. A resort charges him $100 dollars per day. For how many days can he stay at the resort?

A. 9 days

B. 10 days

C. 11 days

D. 12 days