Solving Inequalities by Multiplying or Dividing

Warm Up

Problem of the Day

Lesson Presentation

Lesson Quizzes

Solving Inequalities by Multiplying or Dividing

Warm Up

Solve.

1. $n + 42 > 27$ $n > -15$

2. $r + 15 < 39$ $r < 24$

3. $-17 < w - 52$ $35 < w$

4. $34 < m - 19$ $53 < m$

Problem of the Day

Aracelli started riding her bike at 2 P.M. and returned home at 4 P.M. She rode less than 50 miles. What is the least her speed could have been at 3 P.M.? Explain.

0 mi/h (She could have been resting or stopped at a light, for example.)

Solving Inequalities by Multiplying or Dividing

Learn to solve one-step inequalities by multiplying or dividing.

Solving Inequalities by Multiplying or Dividing

Multiplication and Division Properties of Inequality			
Positive		**Negative**	
You can multiply or divide both sides of an inequality by the same **positive number**, and the statement will still be true.		You can multiply or divide both sides of an inequality by the same **negative number**, but you must reverse the direction of the inequality symbol for the statement to be true.	
$8 > 6$ $8 \cdot 2 > 6 \cdot 2$ $16 > 12$	$-10 \leq 14$ $\frac{-10}{2} \leq \frac{14}{2}$ $-5 \leq 7$	$3 \geq -2$ $3(-3) \leq -2(-3)$ $-9 \leq 6$	$-9 < 18$ $\frac{-9}{-9} > \frac{18}{-9}$ $1 > -2$

Additional Example 1A: Solving Inequalities by Multiplying

Solve.

$$\frac{c}{4} \leq -4$$

$$\frac{c}{4} \leq -4$$

$$(4)\frac{c}{4} \leq (4)(-4)$$ *Multiply both sides by 4.*

$$c \leq -16$$

Additional Example 1B: Solving Inequalities by Multiplying

Solve.

$$\frac{t}{-4} > 0.3$$

$$\frac{t}{-4} > 0.3$$

$$(-4)\frac{t}{-4} < (-4)0.3$$

Multiply both sides by –4 and reverse the inequality symbol.

$$t < -1.2$$

Check It Out: Example 1A

Solve.

$$\frac{n}{6} \leq -5$$

$$\frac{n}{6} \leq -5$$

$$(6)\frac{n}{6} \leq (6)(-5)$$ *Multiply both sides by 6.*

$$n \leq -30$$

Check It Out: Example 1B

Solve.

$$\frac{r}{-3} > 0.9$$

$$\frac{r}{-3} > 0.9$$

$$(-3)\frac{r}{-3} < (-3)0.9$$

Multiply both sides by −3 and reverse the inequality symbol.

$$r < -2.7$$

Additional Example 2A: Solving Inequalities by Dividing

Solve. Check your answer.

$$5a \geq 23$$

$$\frac{5a}{5} \geq \frac{23}{5}$$

Divide both sides by 5.

$$a \geq \frac{23}{5}, \text{ or } 4\frac{3}{5}$$

Check

$$5a \geq 23$$

$$5(5) \stackrel{?}{\geq} 23$$

5 is greater than $4\frac{3}{5}$.

Substitute 5 for a.

$$25 \stackrel{?}{\geq} 23 \checkmark$$

Additional Example 2B: Solving Inequalities by Dividing

Solve. Check your answer.

$$192 < -24b$$

$$\frac{192}{-24} < \frac{-24b}{-24}$$

$$-8 > b$$

Divide both sides by –24, and reverse the inequality symbol.

Check

$$192 < -24b$$

$$192 \stackrel{?}{<} -24(-10)$$

–10 is less than –8. Substitute –10 for b.

$$192 \stackrel{?}{<} 240$$ ✓

Check It Out: Example 2A

Solve. Check your answer.

$$6b \geq 25$$

$$\frac{6b}{6} \geq \frac{25}{6}$$

Divide both sides by 6.

$$b \geq \frac{25}{6}, \text{ or } 4\frac{1}{6}$$

Check

$$6b \geq 25$$

$$6(6) \stackrel{?}{\geq} 25$$

$$36 \stackrel{?}{\geq} 25 \checkmark$$

6 is greater than $4\frac{1}{6}$.

Substitute 6 for b.

Check It Out: Example 2B

Solve. Check your answer.

$$85 < -17b$$

$$\frac{85}{-17} < \frac{-17b}{-17}$$

$$-5 > b$$

Divide both sides by –17, and reverse the inequality symbol.

Check

$$85 < -17b$$

$$85 \overset{?}{<} -17(-6)$$

$$85 \overset{?}{<} 102 \quad \checkmark$$

–6 is less than –5. Substitute –6 for b.

Additional Example 3: *Application*

It cost Josh $85 to make candles for the craft fair. How many candles must he sell at $4.00 each to make a profit?

Since profit is the amount earned minus the amount spent, Josh needs to earn more than $85.

Let c represent the number of candles that must be sold.

$4c > 85$ *Write an inequality.*

$\frac{4c}{4} > \frac{85}{4}$ *Divide both sides by 4.*

$c > 21.25$

Josh cannot sell 0.25 candle, so he needs to sell at least 22 candles, or more than 21 candles, to earn a profit.

Check It Out: Example 3

It cost the class $15 to make cookies for the bake sale. How many cookies must they sell at 10¢ each to make a profit?

Since profit is the amount earned minus the amount spent, the class needs to earn more than $15.

Let c represent the number of cookies that must be sold.

$0.10c > 15$ *Write an inequality.*

$\frac{0.10c}{0.10} > \frac{15}{0.10}$ *Divide both sides by .10.*

$c > 150$

The class must sell more than 150 cookies to make a profit.

Lesson Quizzes

Standard Lesson Quiz

Lesson Quiz for Student Response Systems

Solving Inequalities by Multiplying or Dividing

Lesson Quiz

Solve.

1. $\frac{s}{9} > 12$ $s > 108$

2. $\frac{b}{-14} > 6$ $b < -84$

Solve. Check each answer.

3. $18w < 4$ $w < \frac{2}{9}$

4. $-4f > 36$ $f < -9$

5. It cost a candle company $51 to make a dozen candles. How many candles must it sell at $7 apiece to make a profit? more than 7 candles, or at least 8 candles

Lesson Quiz for Student Response Systems

1. Solve $-9p > 36$.

A. $p < 4$

B. $p > 4$

C. $p > -4$

D. $p < -4$

Lesson Quiz for Student Response Systems

2. Solve $\frac{b}{-12} > 6$.

A. $b < 72$

B. $b > 72$

C. $b > -72$

D. $b < -72$

Lesson Quiz for Student Response Systems

3. It costs Dorothy $315 to make cakes. How many cakes must she sell at $6 a piece to make a profit?

A. at least 51

B. at least 53

C. at least 55

D. at least 57