Warm Up

Lesson Presentation

Lesson Quiz

Warm Up

Solve.

1. $y + 7 < -11$ $y < -18$

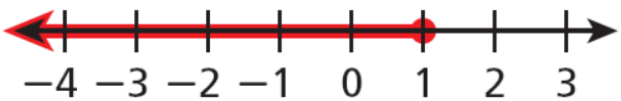
2. $4m \geq -12$ $m \geq -3$

3. $5 - 2x \leq 17$ $x \geq -6$

Use interval notation to indicate the graphed numbers.

4. 

(-2, 3]

5. 

(-∞, 1]

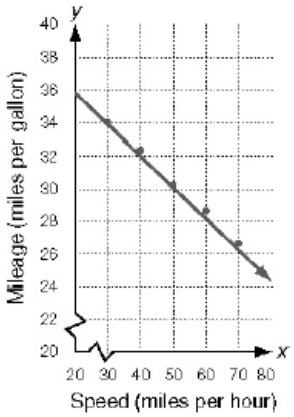
1.9

Problem Solving

1. The graph of $f(x) = 7x + 2$ is translated up 2 units and the [illegible] is steeper by a factor of 7.
2. 44; yes; Poss[illegible]swer: I tried points (3, 23), (4, 30[illegible]7), (7, 51), (8, 58); when x has [illegible]reater than 6, the [illegible]
3. [illegible]ated up 5 u[illegible]
4. 41; not[illegible]swer: I tried points (2[illegible]0), (8, 69), (10, 105), ar[illegible]ey match reasona[illegible]
5. Possib[illegible]: [illegible]atic parent functi[illegible]lated up[illegible]s best models these[illegible].

2.7

Problem Solving

1. Negative correlation
2. 

3. Slope ≈ -0.15
4. Possible answer: $y \approx -0.15x + 38$
5. $r \approx -0.98$
6. Possible answer: There is a strong negative correlation.
7. $y \approx -0.175x + 39.85$
8. A 9. C

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Objectives

Solve compound inequalities.

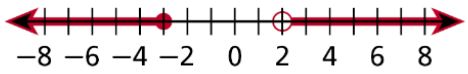
Write and solve absolute-value equations and inequalities.

Vocabulary

disjunction ✓
conjunction ✓
absolute-value

A compound statement is made up of more than one equation or inequality.

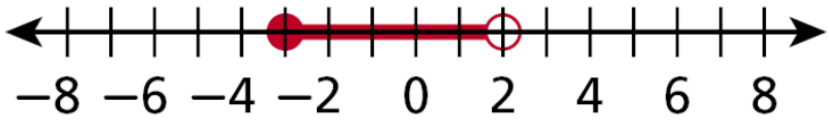
A **disjunction** is a compound statement that uses the word *or.*



Disjunction: $x \leq -3$ **OR** $x > 2$
Set builder notation: $\{x | x \leq -3$ **U** $x > 2\}$

A disjunction is true if and only if at least one of its parts is true.

A **conjunction** is a compound statement that uses the word *and*.



Conjunction: $x \geq -3$ **AND** $x < 2$
Set builder notation: $\{x | x \geq -3 \cap x < 2\}$.

A conjunction is true if and only if all of its parts are true. Conjunctions can be written as a single statement as shown.

$x \geq -3$ *and* $x < 2$ → $-3 \leq x < 2$

Reading Math

Dis- means "apart." Disjunctions have two separate pieces. Con- means "together" Conjunctions represent one piece.

[≥

] ≤

) <

(>

Example 1A: Solving Compound Inequalities

Solve the compound inequality. Then graph the solution set.

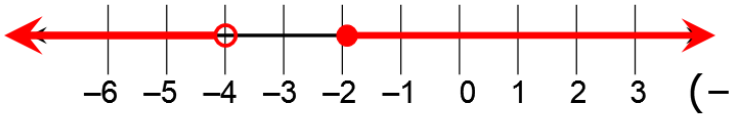
$6y < -24$ OR $y + 5 \geq 3$

Solve both inequalities for y.

$6y < -24$ *or* $y + 5 \geq 3$

$y < -4$ $y \geq -2$

The solution set is all points that satisfy $\{y | y < -4 \text{ or } y \geq -2\}$.



$(-\infty, -4)$ **U** $[-2, \infty)$

Example 1B: Solving Compound Inequalities

Solve the compound inequality. Then graph the solution set.

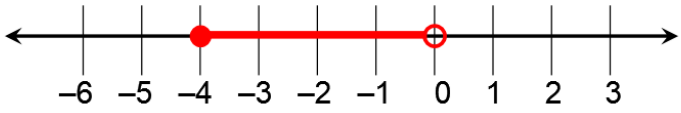
$\frac{1}{2}c \geq -2$ **AND** $2c + 1 < 1$

Solve both inequalities for c.

$\frac{1}{2}c \geq -2$ *and* $2c + 1 < 1$

$c \geq -4$ $\qquad$ $c < 0$

The solution set is the set of points that satisfy both $c \geq -4$ and $c < 0$.



$[-4, 0)$

Example 1C: Solving Compound Inequalities

Solve the compound inequality. Then graph the solution set.

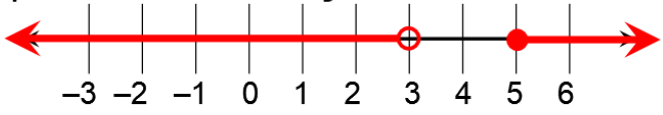
***x* – 5 < –2 OR –2*x* ≤ –10**

Solve both inequalities for x.

$x - 5 < -2$ *or* $-2x \leq -10$

$x < 3$ $\qquad$ $x \geq 5$

The solution set is the set of all points that satisfy $\{x | x < 3 \text{ or } x \geq 5\}$.



$(-\infty, 3)$ **U** $[5, \infty)$

Check It Out! Example 1b

Solve the compound inequality. Then graph the solution set.

$2x \geq -6$ AND $-x > -4$

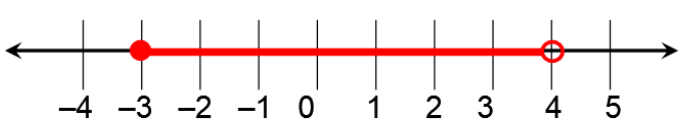
Solve both inequalities for x.

$2x \geq -6$ *and* $-x > -4$

$x \geq -3$ $\qquad$ $x < 4$

$x \geq -3 \cap x < 4$

The solution set is the set of points that satisfy both $\{x | x \geq -3 \cap x < 4\}$.



$[-3, 4)$

Recall that the **absolute value** of a number x, written $|x|$, **is the distance from x to zero on the number line.** Because absolute value represents distance without regard to direction, the absolute value of any real number is nonnegative.

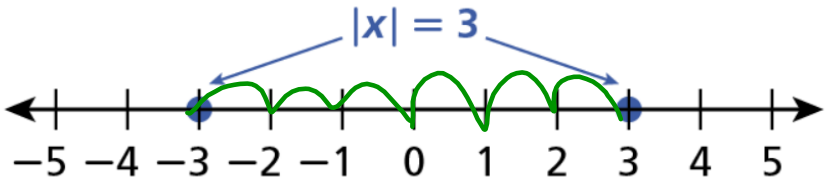
Absolute Value

WORDS	NUMBERS	ALGEBRA
The absolute value of a real number x, $\|x\|$, is equal to its distance from zero on a number line.	$\|5\| = 5$ $\|-5\| = 5$	$\|x\| = \begin{cases} x \text{ if } x \geq 0 \\ -x \text{ if } x < 0 \end{cases}$

$|-5| = 5$ $\qquad$ $|-3| = 3$

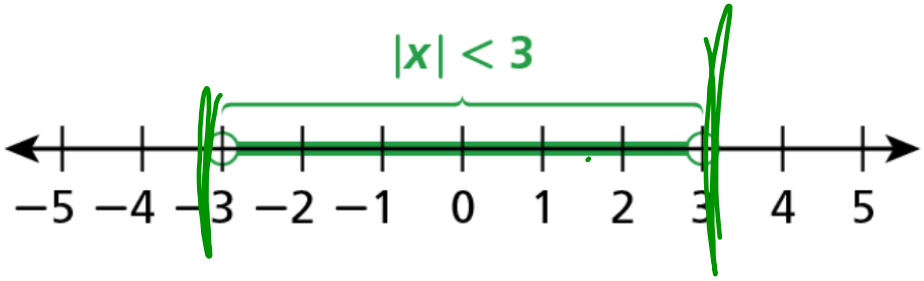
Absolute-value equations and inequalities can be represented by compound statements. Consider the equation $|x| = 3$.

The solutions of $|x| = 3$ are the two points that are 3 units from zero. The solution is a disjunction: $x = -3$ or $x = 3$.

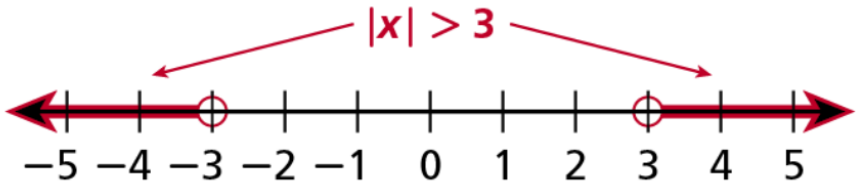


The solutions of $|x| < 3$ are the points that are less than 3 units from zero. The solution is a conjunction: $-3 < x < 3$.

$x < 3 \quad x > -3$



The solutions of $|x| > 3$ are the points that are more than 3 units from zero. The solution is a disjunction: $x < -3$ or $x > 3$.



Helpful Hint

When shading absolute value inequalities

Pairs by themselves

| | ≥ **or**

| | < **and**

Example 2A: Solving Absolute-Value Equations

Solve the equation.

$|-3 + k| = 10$

This can be read as "the distance from k to –3 is 10."

$-3 + k = 10$ or $-3 + k = -10$

Rewrite the absolute value as a disjunction.

$k = 13$ or $k = -7$

Add 3 to both sides of each equation.

You can solve absolute-value inequalities using the same methods that are used to solve an absolute-value equation.

Solving an Absolute-value Inequality
1. Isolate the absolute-value expression, if necessary.
2. Rewrite the absolute-value expression as a compound inequality.
3. Solve each part of the compound inequality for x.

Example 3A: Solving Absolute-Value Inequalities with Disjunctions

Solve the inequality. Then graph the solution.

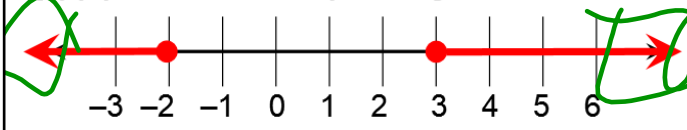
$|-4q + 2| \geq 10$

$-4q + 2 \geq 10$ or $-4q + 2 \leq -10$

$-4q \geq 8$ or $-4q \leq -12$

$q \leq -2$ or $q \geq 3$

$\{q|q \leq -2 \text{ or } q \geq 3\}$



$(-\infty, -2] \cup [3, \infty)$

Example 3B: Solving Absolute-Value Inequalities with Disjunctions

Solve the inequality. Then graph the solution.

$|0.5r| - 3 \geq -3$

$|.5r| \geq 0$

Check It Out! Example 3a

Solve the inequality. Then graph the solution.

$|4x - 8| > 12$

$|3x| + 36 > 12$

Example 4A: Solving Absolute-Value Inequalities with Conjunctions

Solve the compound inequality. Then graph the solution set.

$$\frac{|2x + 7|}{3} \leq 1$$

Example 4B: Solving Absolute-Value Inequalities with Conjunctions

Solve the compound inequality. Then graph the solution set.

$$-\frac{1}{2}|p-2| \geq 3$$

Check It Out! Example 4b

Solve the compound inequality. Then graph the solution set.

$-2|x+5| > 10$

Lesson Quiz: Part I

Solve. Then graph the solution.

1. $y - 4 \leq -6$ or $2y > 8$

2. $-7x < 21$ and $x + 7 \leq 6$

Solve each equation.

3. $|2v + 5| = 9$

4. $|5b| - 7 = 13$

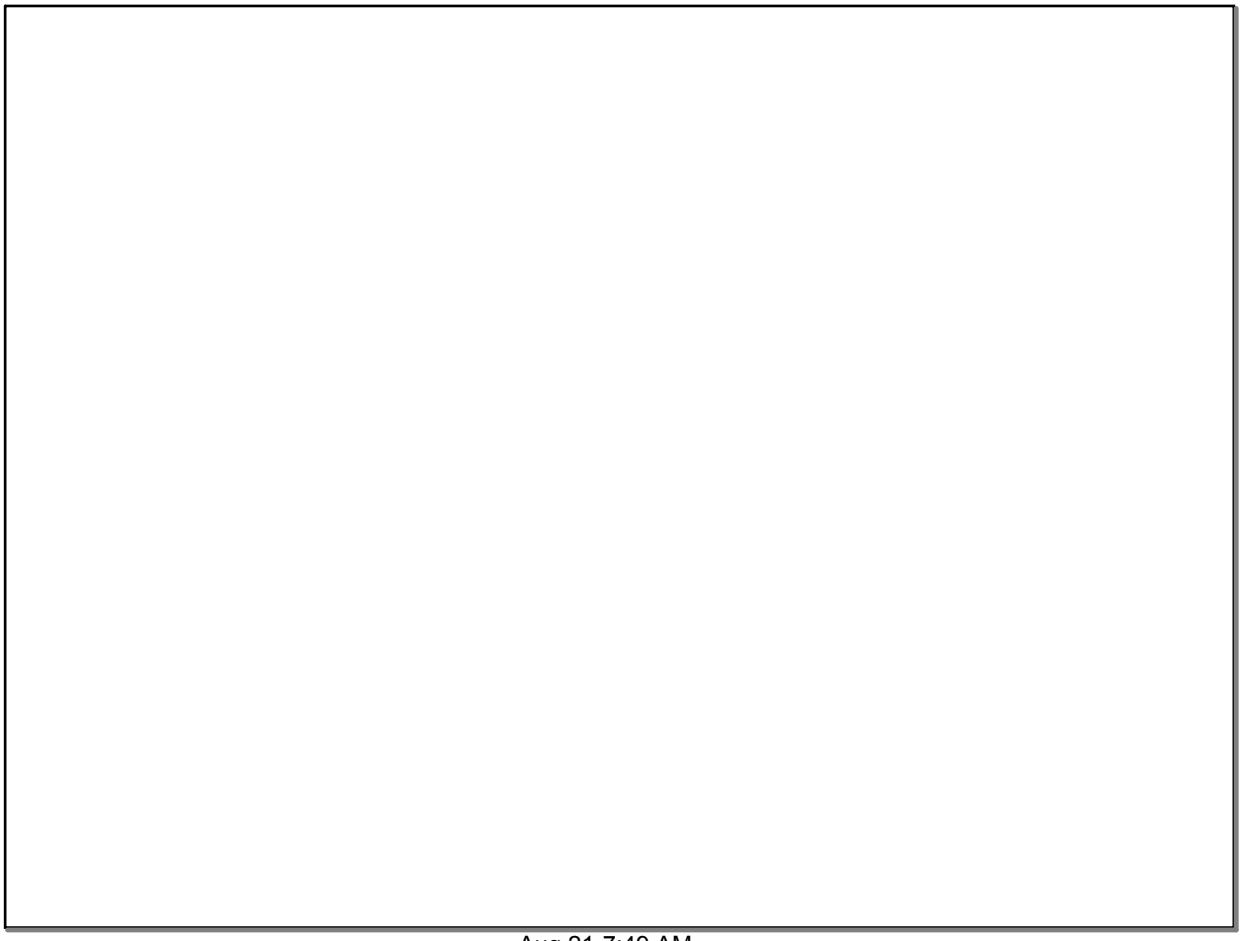
Lesson Quiz: Part II

Solve. Then graph the solution.

5. $|1 - 2x| > 7$

6. $|3k| + 11 > 8$

7. $-2|u + 7| \geq 16$



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