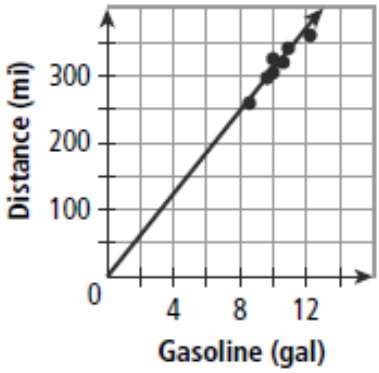
Warm up:
Find the line of best fit for the following points:
(1,3) (10, 45) (7, 29) (5, 15) (30, 100)

L_1	L_2
1	3
10	45
7	29
5	15
30	100

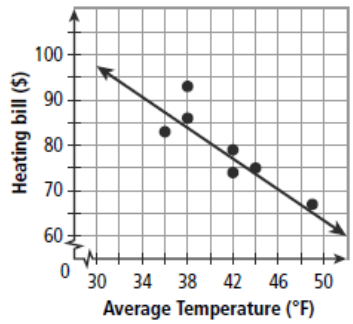
$r = .98$

2.



Positive; possible answer: $d \approx 30g$

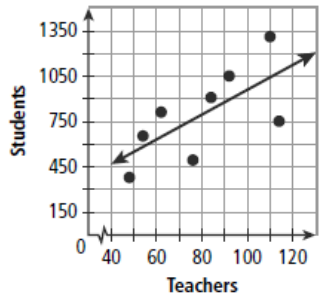
3a.



b. $r \approx -0.864$; $h \approx -1.68t + 148.88$

c. \$81.68; correlation coefficient is fairly close to −1, so the prediction is somewhat close to the actual value.

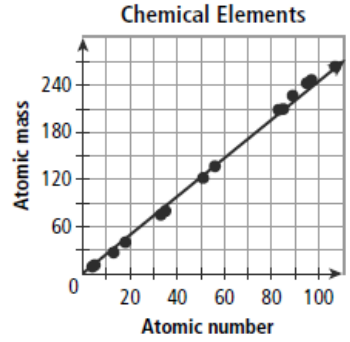
4a.



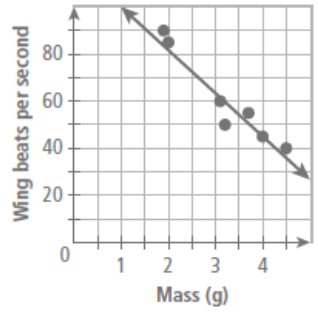
b. $r \approx 0.679$; $y \approx 8.2x + 140.7$

c. 56 teachers; the correlation coefficient is not very close to 1, so the number of teachers by itself is not a good predictor of the number of students in a school.

5. Possible answer: $w \approx 2.5n - 5.5$



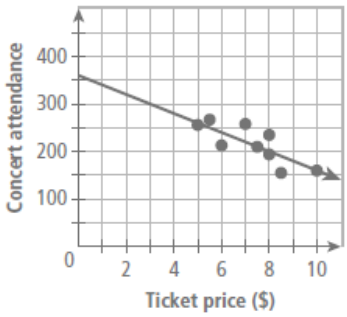
6a.



b. $r \approx -0.961$; $w \approx 121.97 - 19.14m$

c. −241.75 beats/s; not possible

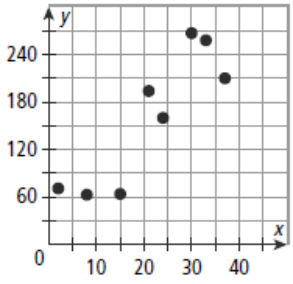
7a.



b. $r \approx -0.801$; $a \approx -20.95p + 368.89$

c. 180 people; fairly accurate

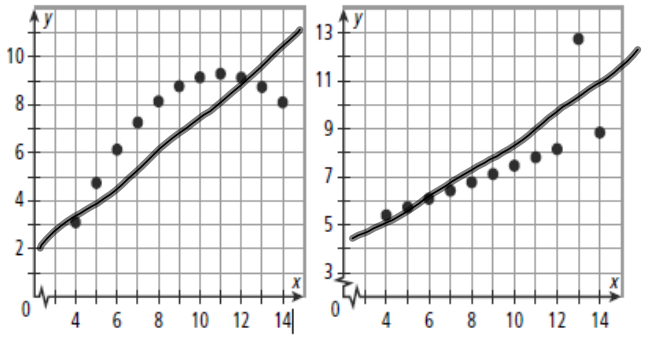
8.



Possible answer: $y = \frac{20}{3}x + 20$

16. No; e.g., there may be a third variable, such as temperature, that causes both variables to change.

24.



$r = 0.816$ and $y = 0.5x + 3$ for both sets
Possible answer: There may be a better model or an outlier.

Objectives

Solve compound inequalities.

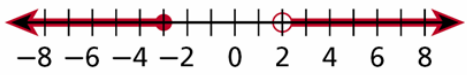
Write and solve absolute-value equations and inequalities.

Vocabulary

disjunction
conjunction
absolute-value

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

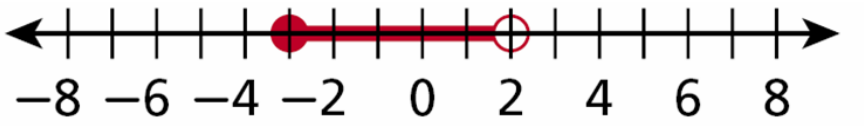
A **disjunction** is a compound statement that uses the word *or.*



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* $x < 2 \longrightarrow -3 \leq x < 2$

To solve a compound inequality just solve each inequality for the variable and then using the "describing" word graph and then write the final inequality as your answer.

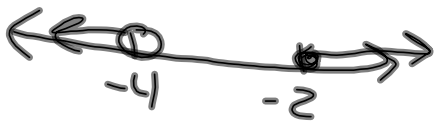
Solve the compound inequality. Then graph the solution set.

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

$\frac{6y}{6} < \frac{-24}{6}$ $\quad y + 5 \geq 3$

$-5 \quad -5$

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



Solve the compound inequality. Then graph the solution set.

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

$\cdot 2 \qquad -1 \quad -1$

$c \geq -4$ $\quad \frac{2c}{2} < \frac{0}{2}$

AND $\quad c < 0$

Solve the compound inequality. Then graph the solution set.

$x - 5 < -2$ OR $-2x \leq -10$

$+5 \quad +5 \qquad \frac{-2x}{-2} \leq \frac{-10}{-2}$

$x < 3$ or $x \geq 5$

Solve the compound inequality. Then graph the solution set.

$x - 2 < 1$ OR $5x \geq 30$

Solve the compound inequality. Then graph the solution set.

$x - 5 < 12$ **OR** $6x \leq 12$

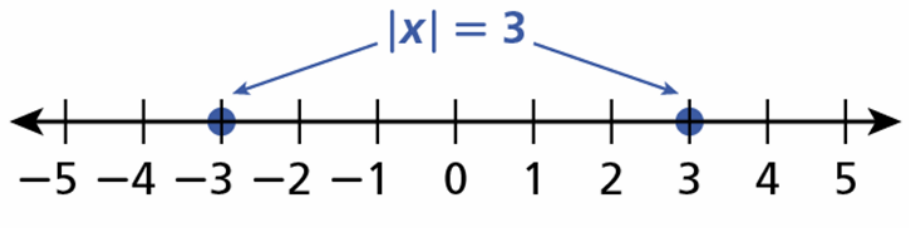
Recall that the **absolute value** of a number x, written $|x|$, is the distance from x to zero on the number line. Because absolute value represents distance without regard to direction, the absolute value of any real number is nonnegative.

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.	$\|5\| = 5$ $\|-5\| = 5$	$\|x\| = \begin{cases} x \text{ if } x \geq 0 \\ -x \text{ if } x < 0 \end{cases}$

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 $x = 3$.



To solve an absolute value function:
1) Isolate the absolute value
2) Set what is inside the absolute value equal to the positive AND the negative versions of the answer.
3) Solve both equations.

Solve the equation.

$|-3 + k| = 10$

$-3+k=10$ $\quad -3+k=-10$

$k=13$ $\quad k=-7$

Solve the equation.

$\left|\frac{x}{4}\right| - 6 = -2$

$+6 \quad +6$

$\left|\frac{x}{4}\right| = 4$

$\frac{x}{4}=4$ $\quad \frac{x}{4}=-4$

$x=16$ $\quad x=-16$

Solve the equation.

$|x + 9| = 13$

Solve the equation.

$|6x| - 8 = 22$

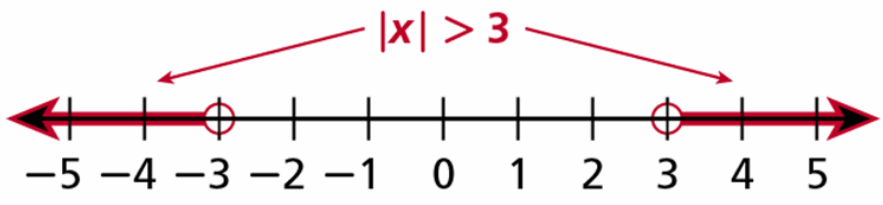
$+8 \quad +8$

$|6x| = 30$

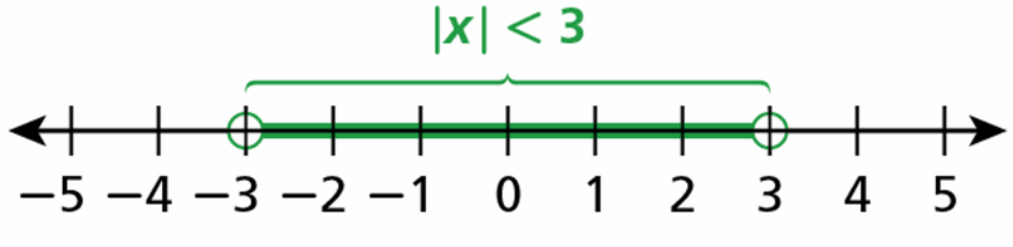
$6x = 30 \qquad 6x = -30$

$x = 5 \quad \text{or} \quad x = -5$

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



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



Absolute-Value Equations and Inequalities

For all real numbers x and all positive real numbers a:

$\lvert x\rvert = a$	$\lvert x\rvert < a$	$\lvert x\rvert > a$
$x = -a$ OR $x = a$	$x > -a$ AND $x < a$	$x < -a$ OR $x > a$
	$-a < x < a$	

Note: The symbol ≤ can replace <, and the rules still apply. The symbol ≥ can replace >, and the rules still apply.

Helpful Hint

Think: Great**or** inequalities involving > or ≥ symbols are disjunctions.

Think: Less th**and** inequalities involving < or ≤ symbols are conjunctions.

For absolute value inequalities:
1) Isolate the absolute value sign
2) *If greater than sign write a disjunction (or)
*If less than sign write a conjunction (and).
3) Solve the inequality.

Solve the inequality. Then graph the solution.

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

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

$-2 \quad -2 \qquad -2 \quad -2$

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

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

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

Solve the inequality. Then graph the solution.

$|4x - 8| > 12$

$4x - 8 > 12$ OR $4x - 8 < -12$

$4x > 20$ $4x < -4$

$x > 5$ OR $x < -1$

Solve the inequality. Then graph the solution.

$|3x| + 36 > 12$

Solve the compound inequality. Then graph the solution set.

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

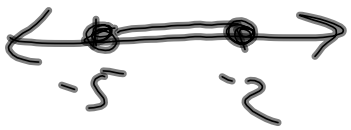
3

$|2x+7| \leq 3$

$2x+7 \geq -3$ AND $2x+7 \leq 3$

$2x \geq -10$ $\quad 2x \leq -4$

$x \geq -5$ AND $x \leq -2$



Solve the compound inequality. Then graph the solution set.

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

Solve the compound inequality. Then graph the solution set.

$$\frac{|x-5|}{2} \leq 4$$

Solve the compound inequality. Then graph the solution set.

$-2|x+5| > 10$

Homework:

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59, 63