

## Bell Ringer - Story Problem

You live 2 miles from Millburn Middle School. Your friend lives 5 miles from Millburn Middle School.

1. Find the minimum distance ( $d$ ) between your two houses.
2. Find the maximum distance ( $d$ ) between your two houses.
3. Write a compound inequality to represent the possible distances between your two houses.

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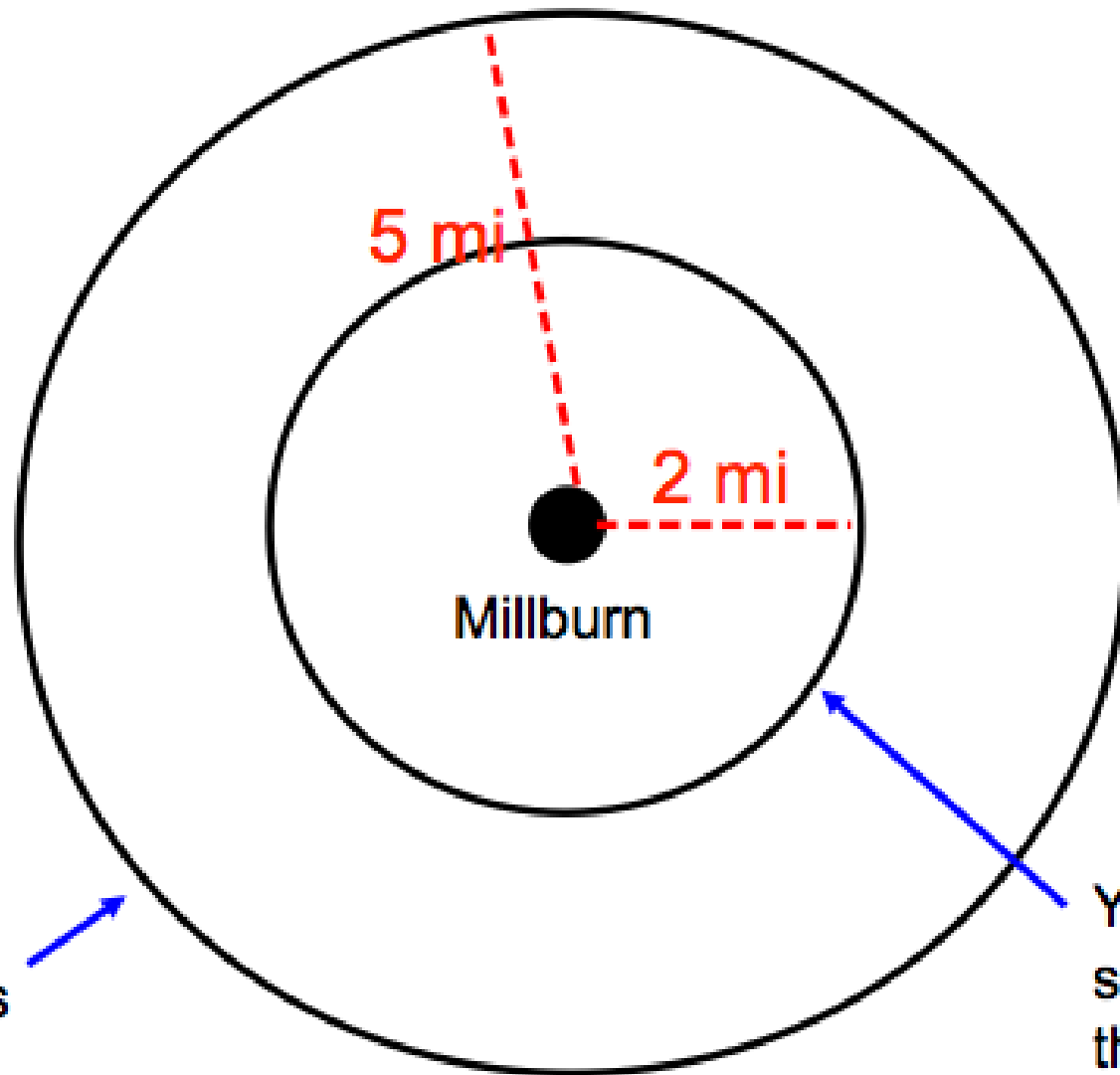
$$d = 3$$

2. Find the maximum distance ( $d$ ) between your two houses.

$$d = 7$$

3. Write a compound inequality to represent the possible distances between your two houses.

$$3 \leq d \leq 7$$



Your friend lives  
somewhere on  
this circle

Your live  
somewhere on  
this circle

# Absolute Value and Solving Absolute Value Equations

**Absolute Value** - the distance between zero and the given number

- value is never negative
- symbol  $|3| = 3$  and  $|-3| = 3$

## Solving Absolute Value Equations

Absolute value equations have two solutions because the expression inside the absolute value symbols can be either positive or negative.

### Steps to solve

- 1) Isolate the absolute value expression within the equation
- 2) Write the expression as two equations; one positive and one negative
- 3) Isolate the variable of each equation

Solve the equation.

$$1. |3x + 5| = 23$$

$$3x + 5 = 23$$
$$\quad - 5 \quad - 5$$

$$\frac{3x}{3} = \frac{18}{3}$$

$$x = 6$$

$$3x + 5 = -23$$
$$\quad - 5 \quad - 5$$

$$\frac{3x}{3} = \frac{-28}{3}$$

$$x = \frac{-28}{3} \text{ or } -9\frac{1}{3}$$

$$\cancel{-1} \left( \frac{-28}{3} \right) + 5$$

$$-28 + 5 = -23$$

Solve the equation.

$$2. |5 - 4x| - 3 = 4$$

$+3 \quad +3$

$$|5 - 4x| = 7$$

$$\begin{array}{r} 5 - 4x = 7 \\ -5 \quad -5 \end{array}$$

$$\begin{array}{r} -4x = 2 \\ -4 \quad -4 \end{array}$$

$$x = -\frac{1}{2}$$

or

$$\begin{array}{r} 5 - 4x = -7 \\ -5 \quad -5 \end{array}$$

$$\begin{array}{r} -4x = -12 \\ -4 \quad -4 \end{array}$$

$$x = 3$$

Solve the equation.

$$3. \quad |7x + 3| + 2 = 33$$

$$\quad \quad \quad - 2 \quad - 2$$
$$|7x + 3| = 31$$

$$7x + 3 = 31$$

$$\quad - 3 \quad - 3$$

$$\frac{7x}{7} = \frac{28}{7}$$

$$x = 4$$

$$7x + 3 = -31$$

$$\quad - 3 \quad - 3$$

$$\frac{7x}{7} = \frac{-34}{7}$$

$$x = \frac{-34}{7}$$

Solve the equation.

$$3. \frac{|4x - 5|}{3} = 7 \cdot 3$$

$$4x - 5 = 21$$
$$+5 \quad +5$$

$$\frac{4x}{4} = \frac{26}{4}$$

$$x = \frac{13}{2}$$

$$4x - 5 = -21$$
$$+5 \quad +5$$

$$\frac{4x}{4} = \frac{-16}{4}$$

$$x = -4$$