

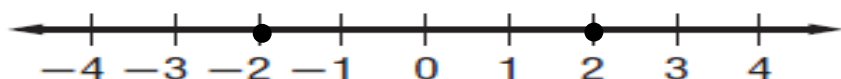
## Absolute Value Equations

Suppose you and your friend, Ahmad, each live on the same street as your school, but on opposite sides of the school. Each lives 2 miles from the school. What can you say about your trips to school? Do you travel the same distance?

Consider placing both houses and the school on a number line with the school at the origin. Your house is located at 2, and Ahmad's is located at -2.

Certainly -5 and 5 are quite different, but they have something in common. They are the same distance from 0 on the number line. This means that you and Ahmad travel the same distance, but in different directions, when you go to school.

We say that -2 and 2 have the same **absolute value**. The absolute value of a number is the number of units it is from 0 on the number line. We use the symbol  $|x|$  to represent the absolute value of a number  $x$ .



The absolute value of -2 is 2.  $|-2| = 2$

The absolute value of 2 is 2.  $|2| = 2$

### Absolute value definition:

For any real number  $a$  :

If  $a \geq 0$ , then  $|a| = a$

If  $a < 0$ , then  $|a| = -a$

**Example 1:** Find the absolute value of:

a) 7

$$|7| = 7$$

b) -5

$$|-5| = -(-5) = 5$$

c)  $x-4$

$$|x-4| = x-4 \text{ if } x \geq 4$$

$$|x-4| = -(x-4) \text{ if } x < 4$$