The Opposite and the Absolute Value

The **opposite** of a number (also known as the *additive inverse*) is the number that is the same distance from 0 on the number line.

**Example 1:**

The opposite of 3 is ______.

Answer: $-3$, since the distance from 0 to 3 on the number line is the same as the distance from 0 to $-3$.

**Example 2:**

The opposite of $-3$ is ______.

Answer: ______.

Written in math terms:

$$-(-3) = 3$$

"the opposite of $-3$ is 3"

The **absolute value** of a number represents the distance between 0 and the number on the number line.

The absolute value of $x$ is written as $|x|$. 
Example 3:

\[ |-4| = \text{_____} \]

**NOTE:** The absolute value of a number is always positive, since it represents a distance.

Example 4:
Evaluate:

\[ a) \ |5| = \]

\[ b) \ |-2| = \]

\[ c) \ -|10| = \]

**Formal Definition of Absolute Value:**

\[ |x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases} \]
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Practice Problems

1. What is the opposite of 9?

2. What is the opposite of −9?

3. What is the absolute value of 9?

4. What is the absolute value of −9?

5. What is the opposite of the absolute value of 9?

6. What is the opposite of the absolute value of −9?

7. Evaluate:
   a) |−3| =
   b) −|−4| =
   c) |−2| + |−3| =