

## Opposites and Absolute Value

### I. Opposites

Opposites are two numbers that are the same distance from 0 but on opposite sides of 0.

-2 is two places to the left of 0.

2 is two places to the right of 0.

2 and -2 are opposites because they are both 2 places from 0 but they are on opposite sides of 0.

What is the opposite of 9? \_\_\_\_\_

What is the opposite of -16? \_\_\_\_\_

(The opposite of 9 is -9. The opposite of -16 is 16.)

The Opposite of zero is zero!

When a negative sign is written in front of a parentheses it can be read, "The opposite of the number inside ( )."

$-(3)$  is read "the opposite of 3."

We simplify  $-(3) = -3$

This says: the opposite of 3 is equal to negative 3.

$-(-8)$  is read: "The opposite of negative eight."

We simplify:  $-(-8) = 8$

We read: "The opposite of negative 8 is eight."

$-(0) = 0$

Says: "The opposite of zero is zero."

Zero is not positive (it isn't to the right of zero.)

Zero is not negative (it isn't to the left of zero.)

A signed number tells two things about the number's position on the number line:

a. it's distance from zero (How far from 0)?

b. it's direction from zero (Which side of 0)?

The whole numbers and their opposites are called the INTEGERS.

I. **PROBLEMS:**

1. Tell each number's distance and direction from zero.
  - a. -7 is \_\_\_\_\_places from 0; it is to the \_\_\_\_\_ of 0.
  - b. 14 is \_\_\_\_\_places from 0; it is to the \_\_\_\_\_ of 0.
  - c. 0 is \_\_\_\_\_places from 0; it is **at** 0.
2. Where are all negative numbers?\_\_\_\_\_
3. Where are all positive numbers?\_\_\_\_\_
4. What is the opposite of -23?\_\_\_\_\_
5. What is the opposite of 47?\_\_\_\_\_
6. Tell how each statement is read. Simplify the expression below it.
  - a.  $-(-3)$  is read\_\_\_\_\_  
it is the same as\_\_\_\_\_.
  - b.  $-(45)$  is read\_\_\_\_\_  
it is the same as\_\_\_\_\_.
  - c.  $-(0)$  is read\_\_\_\_\_; it is simply 0.

II. Absolute Value

There are times when the only thing we need to know about a number is its distance from zero. We may not care about its direction from zero. This is called the absolute value of the number.

**REMEMBER:**

A signed number tells **two** things:

1. distance from 0
2. direction from 0

There are times when we will need to know only the **distance** of a number from 0.

The absolute value of a number tells only **one** thing:

1. distance from 0.

The absolute value of 9 is 9. (9 is 9 places from 0.)  
The absolute value of -4 is 4. (-4 is 4 places from 0.)  
The absolute value of 0 is 0. (0 is 0 places from 0.)

We work with the understanding that 9 and 4 don't tell which side of zero 9 and -4 are on. The **absolute value simply tells how far these numbers are from 0.**

There is a symbol used to say "the absolute value of." It is  $||$ .

NOTICE this is not a curved parentheses - these lines are straight.

$|3|$  is read, "The absolute value of 3."

$|-8|$  is read, "The absolute value of negative 8." NOTICE the negative sign is inside the  $||$ .

To evaluate or simplify an absolute value of a number, think: "What is the number's distance from 0?" Do not tell which side of 0 the number is on.

Evaluate (find the value of)

1.  $|3| = 3$  (because 3 is 3 places from 0)
2.  $|-8| = 8$  (because -8 is 8 places from 0)

Do not confuse opposites and absolute values.

To find the opposite of any non-zero number, you just change its sign. (Doesn't that put it the same distance from zero but on the other side of zero?) **The absolute value of a number will never be negative.**

We know that a negative sign in front of a parentheses is read "The opposite of the number." Similarly, a negative sign in front of the absolute value symbol is read, "The opposite of the absolute value of the number." To evaluate the opposite of the absolute value of a number, you must first know the absolute value. Then you will give the opposite of that number. You will see that the opposite of the absolute value of any non-zero number will be negative.

**EVALUATE:**

$-|9|$  is read, "The opposite of the absolute value of 9."

To evaluate, first think:

$$|9| = 9$$

Then think:

the opposite of 9 is -9

You will write:

$$-|9| = -9$$

To find the opposite of the absolute value of a number takes two steps:

1. Find the absolute value.
2. Find the opposite of your first answer.

**EVALUATE:**

$-|-6|$  This is read, "The opposite of the absolute value of negative 6." First think:  $|-6| = 6$   
Then think: "The opposite of 6 is -6."

You will write:  $-|-6| = -6$

$-|0|$  This is read: "The opposite of the absolute value of 0."

$$-|0| = 0$$

Start early in your study of algebra:

1. Know all words used.
2. Know the symbols.

*This instructional aid was prepared by the Tallahassee Community College Learning Commons.*

Algebra is like a foreign language!  
You must be able to read it and understand what you are being asked.  
We will use the words **opposite** and **absolute value** in other sections of your text.

**PART II - PROBLEMS:**

You are to do two things with each problem.

- a. Tell how it is read.
- b. Evaluate or simplify it.

- |             |            |           |
|-------------|------------|-----------|
| 1. $-(9)$   | 4. $ -28 $ | 7. $-(0)$ |
| 2. $-(-12)$ | 5. $- -4 $ | 8. $ 0 $  |
| 3. $ 34 $   | 6. $- 5 $  | 9. $- 0 $ |

**KEY: PART I:**

- |  |        |  |
|--|--------|--|
| 1. a. 7, left<br>b. 14, right<br>c. zero | 5. -47 | 6. a. "opposite of negative 3" is <u>3</u><br>b. "opposite of 45" is <u>-45</u><br>c. "opposite of 0". |
| 2. left of 0                             |        |  |
| 3. right of 0                            |        |  |
| 4. 23                                    |        |  |

**KEY: PART II:** (The **ways the original problems are read** are inside parentheses.)

- |  |   |
|--|---|
| 1. a. (The opposite of nine)<br>b. -9    | 5. a. (opposite of absolute value of negative 4)<br>b. -4 |
| 2. a. (opposite of negative 12)<br>b. 12 | 6. a. (opposite of absolute value of 5)<br>b. -5          |
| 3. a. (absolute value of 34)<br>b. 34    | 7. a. (opposite of zero)<br>b. 0                          |
| 4. a. (absolute value of -28)<br>b. 28   | 8. a. (absolute value of zero)<br>b. 0                    |
|  | 9. a. (opposite of absolute value of zero)<br>b. 0        |

**NOTICE:** In 3 and 4, you found the absolute values; neither answer was negative. In 5 and 6, you found the opposite of the absolute values; both answers were negative. In 7, 8 and 9, the answers are all zero. Zero is never negative. (It isn't positive either).