Opposites and Absolute Value

I. <u>Opposites</u>

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 <u>not</u> positive (it isn't to the <u>**right**</u> of zero.)

Zero is <u>not</u> negative (it isn't to the <u>**left**</u> of zero.)

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

a.   it's <u>**distance**</u> from zero (How far from 0)?
b.   it's <u>**direction**</u> from zero (Which side of 0)?

The <u>**whole numbers and their opposites**</u> are called the <u>**INTEGERS**</u>.

I. <u>PROBLEMS:</u>

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 <u>inside</u> 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?) **<u>The absolute value of a number will never be negative</u>**.

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 **<u>opposite of the absolute value</u>** 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. **<u>EVALUATE:</u>**

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

To evaluate, first think: To find the opposite of the
                             absolute value of a
       |9| = 9   number takes <u>two</u> steps:
Then think:
          the opposite of 9 is -9 1. Find the absolute value.
          You will write: 2. Find the opposite of
                                      your first answer.
          -|9| = -9 **<u>EVALUATE:</u>**
   -|-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.

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 5. -47 b. 14, right 6. a. "opposite of negative 3" is 3 c. zero b. "opposite of 45" is -45 2. left of 0 c. "opposite 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)   5. a. (opposite of absolute
 b. -9   value of negative 4)
2.   a. (opposite of negative 12)   b. -4
 b. 12   6. a. (opposite of absolute

3.   a. (absolute value of 34)   value of 5) b. 34   b. -5

4.   a. (absolute value of -28)   7. a. (opposite of zero) b. 28   b. 0

                    8. a. (absolute value of zero) b. 0

                    9. a. (opposite of absolute

value of zero) 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 aswers are all zero. Zero is never negative. (It isn't positive either).