

Integers – Basic Operations and Absolute Value

Integers

They include all the counting numbers, zero, and the opposites of the counting numbers.

$\{\dots - 5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, \dots\}$



The integers never include any fractions or decimals.

Comparing Integers

The number to the right on the number line, is greater than the number to the left, and the number to the left on the number line, is less than the number to the right.

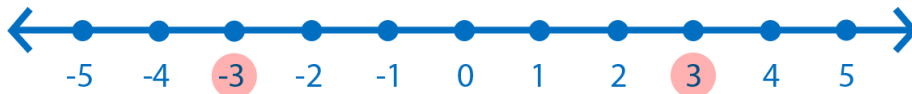
$5 > -2$, because on the number line, number 5 is to the right of number -2 .

$-4 < -2$, because on the number line, number -4 is to the left of number -2 .

Opposite Numbers

These are the numbers that have the same absolute value, but different signs. On the number line, opposite numbers are located on opposite sides of zero, having the same distance from zero.

For example, 3 and -3 are opposites.



The opposite of a number $-a$, is a .

$$-(-a) = a$$

Examples:

$$-(-6) = 6$$

$$-(-4) = 4$$

$$-(-(-2)) = -2$$

$$-(-(-(-7))) = 7$$

Absolute Value of a Number

The absolute value of a number is the number's distance from 0 on the number line.

The symbol for the absolute value is $| \quad |$.

Remember, the absolute value of a number is never negative.



$$|-4| = 4, \text{ because } -4 \text{ is } 4 \text{ units from } 0.$$

$$|3| = 3, \text{ because } 3 \text{ is } 3 \text{ units from } 0.$$

Adding Numbers with the Same Sign

1. Add their absolute values.
2. The sum will have the same sign as the original numbers.

Examples:

$$4 + 5 = 9$$

$$-7 + (-3) = -10$$

Adding Numbers with Different Signs

1. Subtract their absolute values, the larger minus the smaller.
2. The sum will take the sign of the number with the larger absolute value.

Examples:

$$14 + (-3) = 11$$

$$-14 + 3 = -11$$

$$-5 + 7 = 2$$

$$5 + (-7) = -2$$

Adding Opposite Numbers

The sum of a number and its opposite is zero.

Examples:

$$5 + (-5) = 0$$

$$-7 + 7 = 0$$

Subtracting Integers

When subtracting two numbers,
add the first number to the opposite of the second number.

Examples:

$$12 - 8 = 12 + (-8) = 4$$

$$-10 - 4 = -10 + (-4) = -14$$

$$3 - 7 = 3 + (-7) = -4$$

$$8 - (-2) = 8 + 2 = 10$$

Multiplying Integers

The product of two numbers with the same sign is positive.

The product of two numbers with different signs is negative.

$$+ \cdot + = +$$

$$4 \cdot 3 = 12$$

$$- \cdot - = +$$

$$(-4)(-3) = 12$$

$$+ \cdot - = -$$

$$4(-3) = -12$$

$$- \cdot + = -$$

$$-4(3) = -12$$

Dividing Integers

The quotient of two numbers with the same sign is positive.

The quotient of two numbers with different signs is negative.

$$+ \div + = +$$

$$10 \div 5 = 2$$

$$- \div - = +$$

$$(-10) \div (-5) = 2$$

$$+ \div - = -$$

$$10 \div (-5) = -2$$

$$- \div + = -$$

$$-10 \div (5) = -2$$