

## What We Are Learning

## Understanding Integers

## Vocabulary

These are the math words we are learning:

**absolute value**

the distance a number is from zero on a number line

**additive inverse** the opposite of a number

**integers** the set of whole numbers and their opposites

**opposites** numbers that are the same distance from zero on a number line

*Dear Family,*

The student will be learning about integers and how these numbers relate to the coordinate plane. The set of integers includes the set of whole numbers (0, 1, 2, 3, ...) and their opposites (−1, −2, −3, ...).

Number lines will be used to introduce the concept of “opposite” numbers. The **opposite** of a number is the same distance from 0 on a number line as the given number. In mathematics, this is called absolute value. Absolute value is designated by the symbol  $| |$ . Absolute value is always positive because it denotes distance from zero, and distance cannot be negative.

$$|7| = 7$$

$$|-7| = 7$$

The student will learn how to add, subtract, multiply, and divide integers by following a few important, yet simple, guidelines.

**Guidelines for Adding Integers**

If the signs are the **same**, find the **sum** of the absolute values of the integers and give that sum the same sign of the integers in the problem.

**Find the sum.**  $-5 + -7$

*Think: Find the sum of 5 and 7. The signs are the same so give the sum the sign of the integers.*

$$-5 + -7 = -12$$

If the signs are **different**, find the **difference** of the absolute values. Use the sign of the integer with the greater absolute value.

**Find the sum.**  $-1 + 8$

*Think: Find the difference between 1 and 8. Because  $8 > 1$ , use the sign of 8.*

$$-1 + 8 = 7$$

To subtract integers, change the subtraction sign to an addition sign and then add the opposite of what is shown. Then use the guidelines for adding integers.

**Find each difference.**

**A.  $8 - 3$**

$$8 + (-3) = 5$$

Add the opposite of 3. Since  $8 > 3$ , use the sign of 8.

**B.  $-5 - 4$**

$$-5 + (-4) = -9$$

Add the opposite of 4. The signs are the same, so use the sign of the integers.

To multiply and divide integers, the student will use the same process for multiplying and dividing whole numbers, except that he or she must determine the sign of the product or quotient.

- If the integers have the same sign, the product or the quotient will **ALWAYS** be positive.  $-5(-6) = 30$
- If the integers have different signs, the product or quotient will **ALWAYS** be negative.  $-5(6) = -30$

The student will practice solving equations containing integers, such as  $y - (-4) = -9$ . To solve for  $y$ , you must get the variable by itself on one side of the equation. This is called isolating the variable, and it involves using inverse operations on both sides of the equation. Remember that inverse operations “undo” one another.

**Solve each equation.**

**A.**  $y - (-4) = -9$

$$y - (-4) = -9$$

$$\underline{+ (-4)} = \underline{+ (-4)}$$

$$y = -13$$

$(-4)$  is subtracted from  $y$ .

To undo the subtraction and get  $y$  by itself, add  $-4$  to both sides of the equation.

**B.**  $-184 = 8n$

$$184 = 8n$$

$$\frac{-184}{8} = \frac{8n}{8}$$

$$-23 = n$$

8 is multiplied by  $n$ .

To undo the multiplication and get  $n$  by itself, divide both sides of the equation by 8.

Continue to practice using integers with the student. He or she will use these skills throughout all aspects of mathematics.

**Sincerely,**

## What We Are Learning

## Applying Integers

## Vocabulary

These are the math words we are learning:

**coordinates** the numbers in an ordered pair that locate a point on a coordinate plane

**coordinate plane** formed by two number lines in a plane that intersect at right angles at zero on each number line

**linear equation** an equation whose solutions form a straight line on a coordinate plane

**origin** the point where the  $x$ -axis and  $y$ -axis intersect on the coordinate plane

**quadrants** the four areas created by the axes on a coordinate plane

**$x$ -axis** the horizontal axis on the coordinate plane

**$x$ -coordinate** the first value in an ordered pair

**$y$ -axis** the vertical axis on the coordinate plane

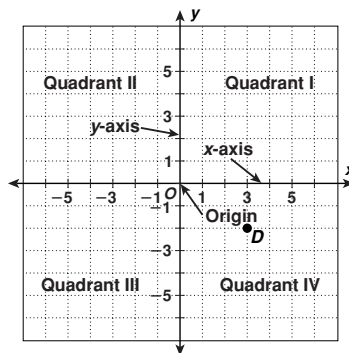
**$y$ -coordinate** the second value in an ordered pair

*Dear Family,*

The student will learn to identify and plot points on the coordinate plane. A coordinate plane contains a horizontal number line, the  $x$ -axis, and a vertical number line, the  $y$ -axis. The axes divide the coordinate plane into four areas, or quadrants.

The origin is the point where the axes intersect and is identified by the ordered pair  $(0, 0)$ . An ordered pair  $(x, y)$  names the  $x$ - and  $y$ -coordinates of a point. The  $x$ -coordinate tells how far to move left or right from the origin. The  $y$ -coordinate tells how far to move up or down.

Point  $D$  is located in Quadrant IV in the coordinate plane shown below. From the origin, point  $D$  is located three units to the right and 2 units down. The ordered pair  $(3, -2)$  describes the location of point  $D$ . Add some points to the coordinate grid and work with the student to name the ordered pairs that identify those points.



The student will also learn about equations in two variables.

**Write an equation in two variables that gives the values in the table. Use the equation to find the value of  $y$  for the indicated value of  $x$ .**

$x$	5	6	7	8	9	10
$y$	13	15	17	19	21	■

$y$  is 2 times  $x + 3$ .

$$y = 2x + 3$$

$$y = 2(10) + 3$$

$$y = 20 + 3$$

$$y = 23$$

When  $x$  is 10,  $y$  is 23.

Compare  $x$  and  $y$  to find a pattern.

Use the pattern to write an equation.

Substitute 10 for  $x$ .

Simplify.

The student will learn to read solutions on graphs and to graph linear equations. The graph of a linear equation forms a straight line.

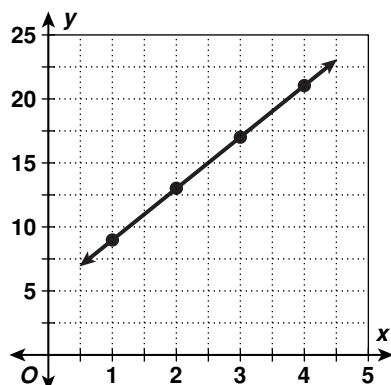
**Use the given  $x$ -values to write solutions of the equation as ordered pairs. Then, graph the equation.**

**$y = 4x + 5$  for  $x = 1, 2, 3, 4$**

Make a table by using the given values for  $x$  to find values for  $y$ .

$x$	$4x + 5$	$y$	$(x, y)$	Write the solutions as ordered pairs.
1	$4(1) + 5$	9	(1, 9)	
2	$4(2) + 5$	13	(2, 13)	
3	$4(3) + 5$	17	(3, 17)	
4	$4(4) + 5$	21	(4, 21)	

Graph the ordered pairs on a coordinate plane.



Draw a line through the points to represent all the values of  $x$  you could have chosen and the corresponding values of  $y$ .

The student will also determine whether an ordered pair is a solution of an equation by substituting the ordered pair into the equation to see if the values make the equation true.

**Sincerely,**