9-7-18

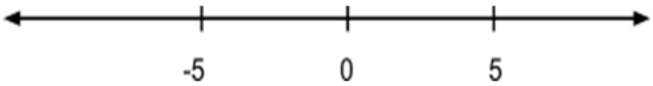
Aim: SWBAT define and identify properties of addition and multiplication.

HW: None

Do Now: Page 6

Notes:

Opposite numbers are the same distance from zero on a number line in opposite directions. For example 5 and -5 are opposites. They are both 5 spaces away from zero.



zero is a special integer because it is neither positive nor negative.

Why is zero an integer? because it's a whole #

Comparing Integers : > is greater than < is less than

Examples: 36 > 12 *is read* "36 *is greater than* 12"

15 < 29 is read "15 is *less than* 29"

The number ***farther right*** on the number line is the ***larger*** number.

Ex. 15 < 25 92 > 63 0 < 12

-5 < 0 -5 > -18 -12 < 12

Ordering Integers: Order from least to greatest.

-5, -9, 0, -3 -9, -5, -3, 0 -2, 7, -5, -1 -5, -2, -1, 7

****The three questions most often missed.**

*1. Name a number that is not an integer? $\frac{1}{2}$

2. Name the largest negative integer. -1

3. Name the smallest positive integer. 1

Absolute Value measures the __________ a number is from zero on the number line. Distance is always POSITIVE, therefore, Absolute Value is ALWAYS__________.

The symbol for absolute value is "| |."

|4| " What is the absolute value of 4?" |4| = 4

|-4| "What is the absolute value of -4?" |-4| = 4

True or False -4 = 4 FALSE |-4| = |4| TRUE

4 = 4

The negative symbol "-" means **opposite**. For example the "opposite of 4" is -4.

Simplify the expression. (Start from the inside and work it out)

*1) - (-4) 4 2) - (-(-4)) -4 3) -[-(-(-4))] 4 4) -(-(-(-(-4)) -4

"The opp. of neg. 4"

5) -|-4| -4 6) - (- |-4|) 4 7) - - - |-4| -4

subtraction negative "the opposite of x"

5 - 2 -3 -x

3

HOMEWORK – SETS OF NUMBERS

****Use the chart we made in class to help you answer these questions!****

Answer the following with.... **SOMETIMES** **ALWAYS** **NEVER**

1) Counting Numbers are Whole Numbers.	S	A	N
2) Whole Numbers are Real Numbers.	S	A	N
3) Counting Numbers are Integers.	S	A	N
4) Integers are Counting Numbers.	S	A	N
5) Counting Numbers are Rational..	S	A	N
6) Real Numbers are Irrational.	S	A	N
7) Integers are Rational Numbers.	S	A	N
8) Rational Numbers are Whole Numbers.	S	A	N
9) Whole Numbers are Rational.	S	A	N
10) Rational Numbers are Irrational.	S	A	N

State ALL of the sets of numbers that each of the following belongs to:

Real **Irrational** **Rational** **Integer** **Whole** **Natural**

11) 0 R, Rat., I, W

12) −5 R, Rat, I

13) 3.421123... R, Irr

14) 2.56 R, Rat

15) 20 R, Rat, I, W, N

16) $-\frac{3}{5}$ R, Rat.

17) $0.\overline{6}$ R, Rat.

4

Write the OPPOSITE and then ABSOLUTE VALUE of each integer:

18) 7 -7 7

19) -25 25 25

20) 106 -106 106

21) 0 0 0

Complete the Statement with < or >.

22) -6 < 4

23) -2 > -4

24) 0 < 8

Match the integer expression with the verbal expression:

E 25) -|12|

D 26) |-12|

C 27) -|-12|

A 28) -(-12)

B 29) |12|

~~A.~~ the opposite of negative twelve

~~B.~~ the absolute value of twelve

C. the opposite of the absolute value of negative twelve

~~D.~~ the absolute value of negative twelve

~~E.~~ the opposite of the absolute value of twelve

Simplify the expression:

30) -(-9) 9

31) |-16| 16

32) -|-16| -16

The table below shows the distances of the runners from the finish line when the winner won the race. Use the table to answer Questions 33 – 35.

Runner	Distance (ft)
Sarah	-16
Beth	-2
Juanita	0
Tamika	-9
Ingrid	-36

33) Who won the race? Juanita

34) Who finished further back, Sarah or Tamika?

35) Arrange the girls' names in order from first-place to last-place finish.

(Hint: use a number line to help you)

J	B	T	S	I
1st Place	2nd Place	3rd Place	4th Place	5th Place

AIM: SWBAT identify properties of addition and multiplication and use the properties to add integers.

"DO NOW"

Write the opposite of each integer.

1) 3 -3 2) -5 5 3) -7 7 4) 9 -9

Find the absolute value.

5) $|-12|$ 12 6) $|-4|$ 4 7) $|9|$ 9 * 8) $-|18|$ -18

Compare using $<$ or $>$.

9) 8 $>$ -6 10) -7 $<$ -4 11) -9 $<$ 5 12) -7 $<$ -3

Order from least to greatest.

13) -1, -6, 0, -3, -5 -6, -5, -3, -1, 0

14) -18, -20, -15, -17 -20, -18, -17, -15

State ALL the sets of numbers each belongs to.

15) -20 R, Rat., I

16) $-\frac{1}{2}$ R, Rat

17) $0.\overline{5}$ R, Rat.

18) π R, Irr.

6

Properties of Addition and Multiplication

1) **Commutative Property of addition and multiplication:** (Commutative, x; Commutative, +)
Changing the order of the numbers without changing the answer. **(#'s commute)**

Examples: A) $2 + 3 = 3 + 2$ B) $4 \cdot 5 = 5 \cdot 4$

2) **Associative Property of addition and multiplication:** (Associative, x; Associative, +)
Moving the **grouping** symbols without changing the answer.

Examples: A) $6 + (2 + 3) = (6 + 2) + 3$ B) $7 \cdot (4 \cdot 6) = (7 \cdot 4) \cdot 6$

3) **Additive Identity Property: (Identity, +) Identity of # does not change**
Any number plus zero equals that number. ***The identity element of addition is zero.***

Examples: A) $9 + 0 = 9$ B) $x + 0 = x$

4) **Multiplicative Identity Property: (Identity, x) Identity of # does not change**
Any number times one is that number. *** The identity element of multiplication is one.***

Examples: A) $4 \cdot 1 = 4$ B) $x \cdot 1 = x$

5) **Additive Inverse Property: (Inverse, +) (Opposites)**
For every number, a, $a + -a = 0$. ***Remember: Zero is the identity element***

Examples: A) $9 + -9 = 0$ B) $-x + x = 0$

6) **Multiplicative Inverse Property: (Inverse, x) (Reciprocal)**
For every number, a, $\frac{a}{1} \cdot \frac{1}{a} = 1$ ***Remember: One is the identity element***

Examples: A) $4 \cdot \frac{1}{4} = 1$ B) $x \cdot \frac{1}{x} = 1$

7) **Multiplicative Property of Zero: (Zero, x) (Everything becomes zero)**
Any number times zero is zero

Examples: A) $10 \cdot 0 = 0$ B) $x \cdot 0 = 0$

8) **Distributive Property (over addition or subtraction)**
Multiplying a group by a number (term)

Example: A) $4(x + y) = 4x + 4y$ B) $2(3x + 4) = 2 \cdot 3x + 2 \cdot 4$

$2(3x + 4) = 6x + 8$

NOTE: You can also use the distributive property backwards by factoring out the GCF
Example: $4x + 14 = 2\,(2x + 7)$

7

Name the property for each of the following:

1) $(13 + 7) + 8 = 13 + (7 + 8)$ ______________________

2) $0 \bullet (x + 3) = 0$ ______________________

3) $9 \bullet 5 = 5 \bullet 9$ ______________________

4) $(62 + 3) + 0 = (62 + 3)$ ______________________

5) $2(4x + 9) = 8x + 18$ ______________________

6) $(19 + 8) + 6 = (8 + 19) + 6$ ______________________

7) $(2 \bullet 3) \bullet 7 = 2 \bullet (3 \bullet 7)$ ______________________

8) $56 \bullet 1 = 56$ ______________________

9) $2x + 6y = 2(x + 3y)$ ______________________

10) $7 \cdot \frac{1}{7} = 1$ ______________________

11) $-6 + (3 \bullet 8) = -6 + (8 \bullet 3)$ ______________________

12) $-15 + 15 = 0$ ______________________

Adding Integers

Adding integers means adding with both positive and negative numbers (the whole numbers and their opposites). Before we discuss any rules about adding integers, let's explore . . .

Let's look at some examples together:

1) $-2 + 2 =$ _______	2) $-4 + 0 =$ _______	3) $-5 + 5 =$ _______
4) $-2 + 5 =$ _______	5) $-5 + 2 =$ _______	6) $-2 + -5 =$ _______
7) $-2 + 3 =$ _______	8) $2 + -3 =$ _______	9) $-2 + -3 =$ _______
10) $-6 + 1 =$ _______	11) $-1 + 6 =$ _______	12) $-6 + -1 =$ _______

8