

9-6-19

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

HW: Packet Page 9

Do Now: Packet Page 5

True or False $-4 = 4$ False

$|-4| = |4|$ True
 $4 = 4$

- {
 A subtraction sign
 A negative sign
 An opposite sign

- When it's a subtraction sign, it separates.

$10 - 2$
 "10 minus 2"

$14 - 6$
 "14 minus 6"

$30 - 15$
 "30 minus 15"

- When it's a negative sign, it comes with the number.

$10 - (-2)$
 "10 minus -2"

$-14 - 6$
 "-14 minus 6"

$-30 - (-15)$
 "-30 minus -15"

- When it's an opposite sign, it usually comes in a series or before a group.

$-(-3)$
 "the opp. of -3"

$-(-(-3))$
 "the opp. of the opp. of -3"

$-|-3|$
 "the opp. of the abs. value of -3"

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

	A	B	C
5	$-(-4)$ 4	$-(-(-4))$ -4	$-[-(-(-4))]$ 4
6	$-(-(-(-4)))$ -4	$-(- -4)$ 4	$--- -4 $ -4

HOMWORK

Write the **OPPOSITE** and the **ABSOLUTE VALUE** of each integer:

- 1) 7 -7 7 3) -25 25 25
 2) 106 -106 106 4) 0 0 0

Complete the statement with < or >.

- 5) -6 < 4 6) -2 > -4 7) 0 < 8

Match the integer expression with the verbal expression:

- E 8) $-|12|$ A. the opposite of negative twelve
D 9) $|-12|$ ~~B.~~ the absolute value of twelve
C 10) $-|-12|$ ~~C.~~ the opposite of the absolute value of negative twelve
A 11) $-(-12)$ ~~D.~~ the absolute value of negative twelve
B 12) $|12|$ ~~E.~~ the opposite of the absolute value of twelve

Simplify the expression.

- 13) $-(-9)$ 14) $|-16|$ 15) $-|-16|$
9 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 16 - 18.

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

- 16) Who won the race? Juanita
 17) Who finished further back, Sarah or Tamika? Sarah
 18) Arrange the girls' names in order from first-place to last-place finish.

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

Aim: SWBAT identify properties of addition and multiplication.

Do Now: Complete each table.

Write the opposite of each integer.

	A	B	C	D
1	3 -3	-5 5	-7 7	9 -9

Evaluate.

	A	B	C	D
2	$ -12 $ 12	$ -4 $ 4	$ 9 $ 9	$- 18 $ -18

Compare using $<$ or $>$.

	A	B	C	D
3	8 $>$ -6	-7 $<$ -4	-9 $<$ 5	-7 $<$ -3

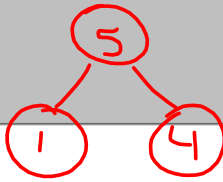
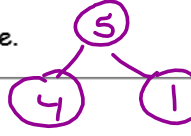
Order the integers from least to greatest.

	A	B
3	-1, -6, 0, -3, -5 -6, -5, -3, -1, 0	-18, -20, -15, -17 -20, -18, -17, -15

Properties of Real Numbers

Properties refer to the behaviors of real numbers under the operations of addition and/or multiplication and help to provide some of the basic foundations of mathematics.

Properties of Addition

Commutative (Commutative, +) 	Property $a + b = b + a$	Example $2 + 3 = 3 + 2$
	When two real numbers are added in any order, the sum will always be the same. 	
Associative (Associative, +)	Property $(a + b) + c = a + (b + c)$	Example $6 + (2 + 3) = (6 + 2) + 3$
	When adding three real numbers, the sum is always the same regardless of their grouping.	
Additive Identity (Identity, +)	Property $a + 0 = a$	Example $2 + 0 = 2$
	When a real number is added in to zero, the sum will always be the original real number.	
Additive Inverse (Inverse, +)	Property $a + (-a) = 0$	Example $5 + (-5) = 0$
	When a real number and its opposite are added, the sum will always be zero.	

Properties of Multiplication

	Property	Example
Commutative (Commutative, \cdot)	$a \cdot b = b \cdot a$	$7 \cdot 8 = 8 \cdot 7$
	When two real numbers are multiplied in any order, the product will always be the same.	

	Property	Example
Associative (Associative, \cdot)	$(a \cdot b) \cdot c = a \cdot (b \cdot c)$	$5 \cdot (3 \cdot 2) = (5 \cdot 3) \cdot 2$
	When multiplying three real numbers, the product is always the same regardless of their grouping.	

	Property	Example
Multiplicative Identity (Identity, \cdot)	$a \cdot 1 = a$	$4 \cdot 1 = 4$
	When a real number is multiplied with 1, the product will always be the original real number.	

	Property	Example
Multiplicative Inverse (Inverse, \cdot)	$a \cdot \frac{1}{a} = 1 \quad (a \neq 0)$	$5 \cdot \frac{1}{5} = 1$
	When a nonzero real number and its inverse (reciprocal) are multiplied, the product will always be one.	

	Property	Example
Multiplicative Property of Zero (Zero, \cdot)	$a \cdot 0 = 0$	$4 \cdot 0 = 0$
	When a real number is multiplied with zero, the product will always be zero.	

Property of Multiplication Combined with Addition

	Property	Example
Distributive	$a(b + c) = ab + ac$	$5(3 + 2) = 5 \cdot 3 + 5 \cdot 2$
	Multiplying a real number by a sum is the same as completing each multiplication separately and combining the products.	

Identify the illustrated property.

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

2) $0 \cdot (x + 3) = 0$

3) $9 \cdot 5 = 5 \cdot 9$

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

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

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

7) $(2 \cdot 3) \cdot 7 = 2 \cdot (3 \cdot 7)$

8) $56 \cdot 1 = 56$

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

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

11) $-6 + (3 \cdot 8) = -6 + (8 \cdot 3)$

12) $-15 + 15 = 0$

Associative, +
 Multiplicative, 0
 Commutative, •

Distributive

HOMEWORK

State the name of the property that is shown.

1) $(x + 9) + 1 = x + (9 + 1)$

1) _____

2) $1 \cdot x = x$

2) _____

3) $(2 + 3) + 5 = 2 + (3 + 5)$

3) _____

4) $(12 + 9) + 15 = (9 + 12) + 15$

4) _____

5) $(2 + 7) \cdot 0 = 0$

5) _____

6) $12 \cdot (7 \cdot 15) = (12 \cdot 7) \cdot 15$

6) _____

7) $0 + (9 + 1) = 9 + 1$

7) _____

8) $3(4x + 9) = 12x + 27$

8) _____

9) $r \cdot 1 = r$

9) _____

10) $(8 \cdot 6) \cdot 9 = 8 \cdot (6 \cdot 9)$

10) _____

11) $106 \cdot 0 = 0$

11) _____

12) $4(a + b) = 4a + 4b$

12) _____

13) $-y + y = 0$

13) _____

14) $(2 + y) + 8 = 8 + (2 + y)$

14) _____

15) $c \cdot \frac{1}{c} = 1$

15) _____

16) $(8 \cdot 6) + 9 = (6 \cdot 8) + 9$

16) _____