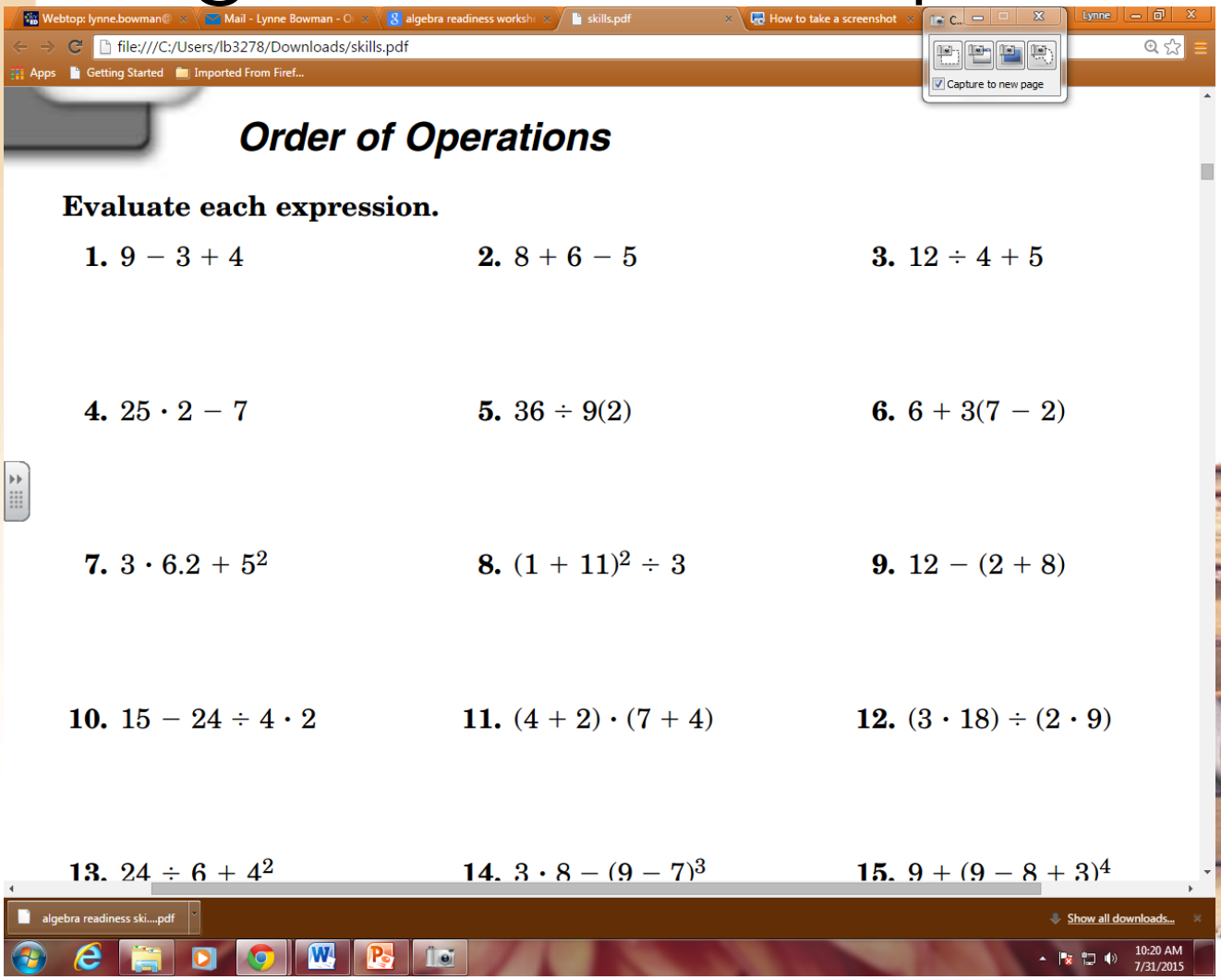
Algebra readiness practice



Order of Operations

Evaluate each expression.

1. $9 - 3 + 4$

2. $8 + 6 - 5$

3. $12 \div 4 + 5$

4. $25 \cdot 2 - 7$

5. $36 \div 9(2)$

6. $6 + 3(7 - 2)$

7. $3 \cdot 6.2 + 5^2$

8. $(1 + 11)^2 \div 3$

9. $12 - (2 + 8)$

10. $15 - 24 \div 4 \cdot 2$

11. $(4 + 2) \cdot (7 + 4)$

12. $(3 \cdot 18) \div (2 \cdot 9)$

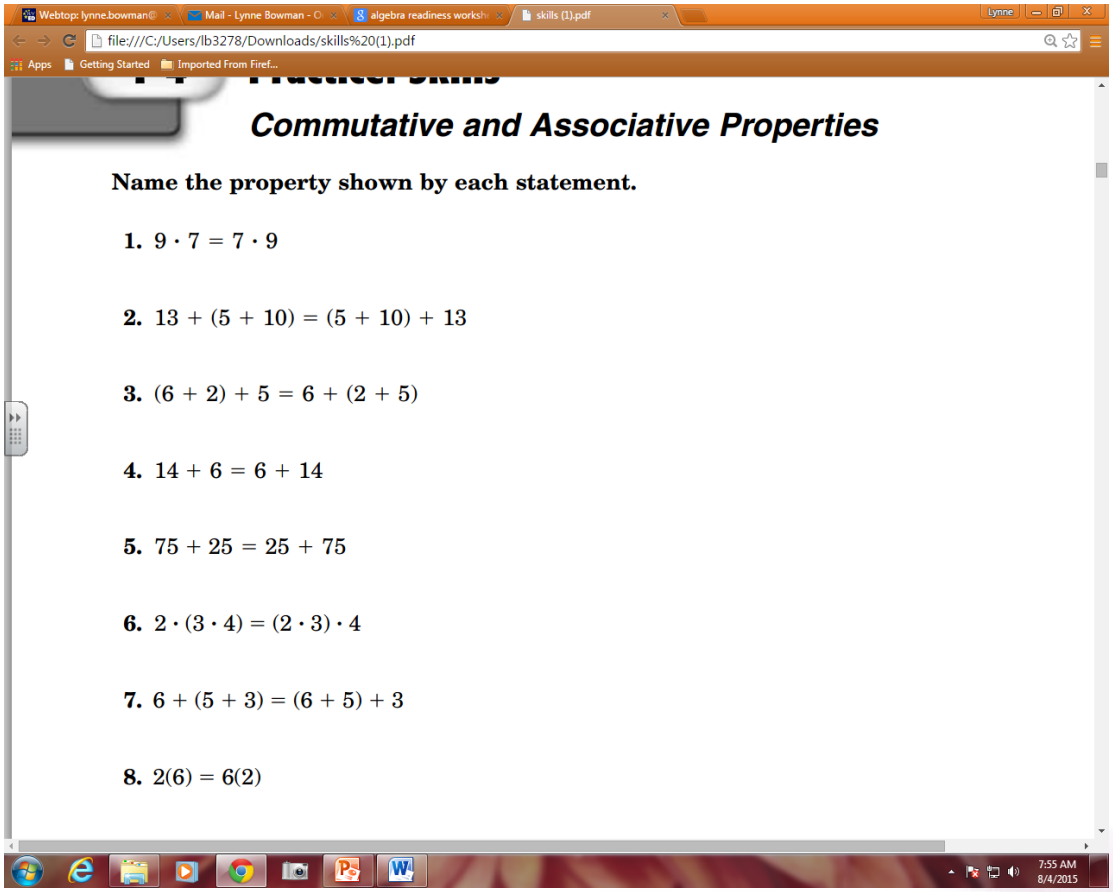
13. $24 \div 6 + 4^2$

14. $3 \cdot 8 - (9 - 7)^3$

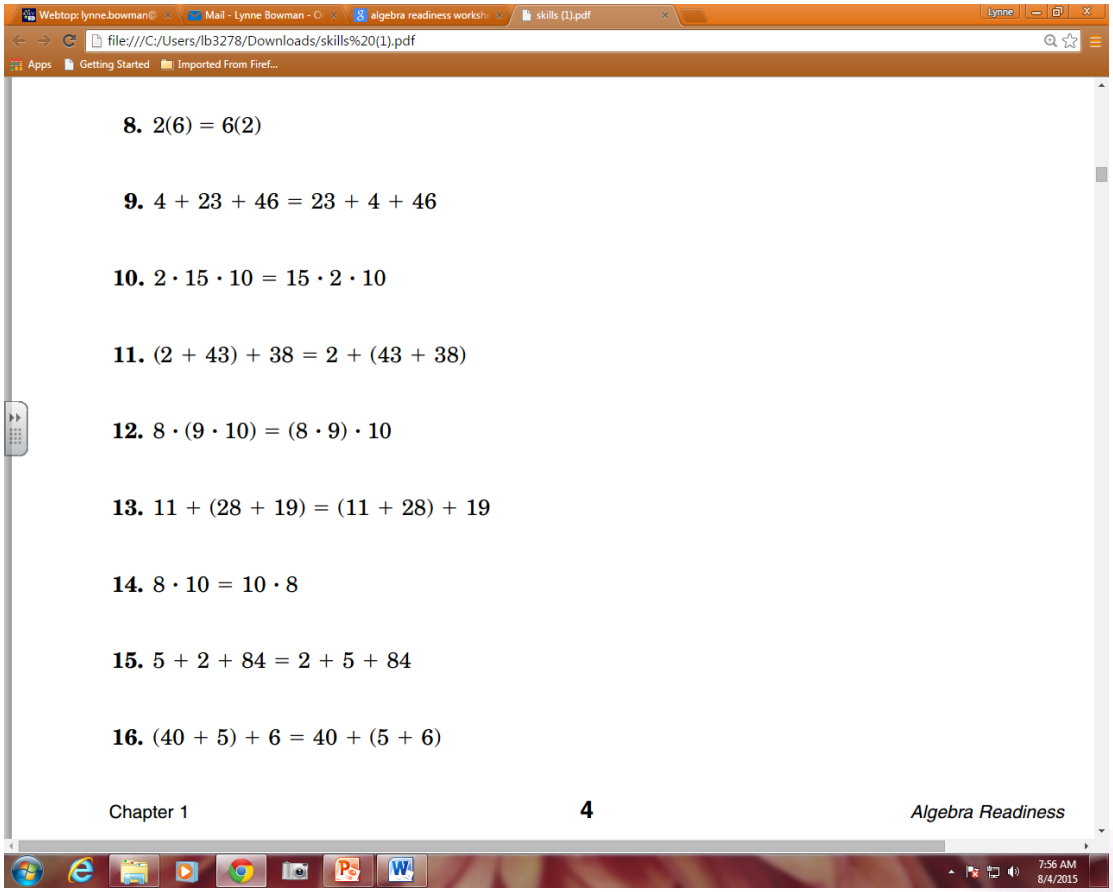
15. $9 + (9 - 8 + 3)^4$

Order of Operations

Algebra Readiness Practice



Algebra Readiness Practice



8. $2(6) = 6(2)$

9. $4 + 23 + 46 = 23 + 4 + 46$

10. $2 \cdot 15 \cdot 10 = 15 \cdot 2 \cdot 10$

11. $(2 + 43) + 38 = 2 + (43 + 38)$

12. $8 \cdot (9 \cdot 10) = (8 \cdot 9) \cdot 10$

13. $11 + (28 + 19) = (11 + 28) + 19$

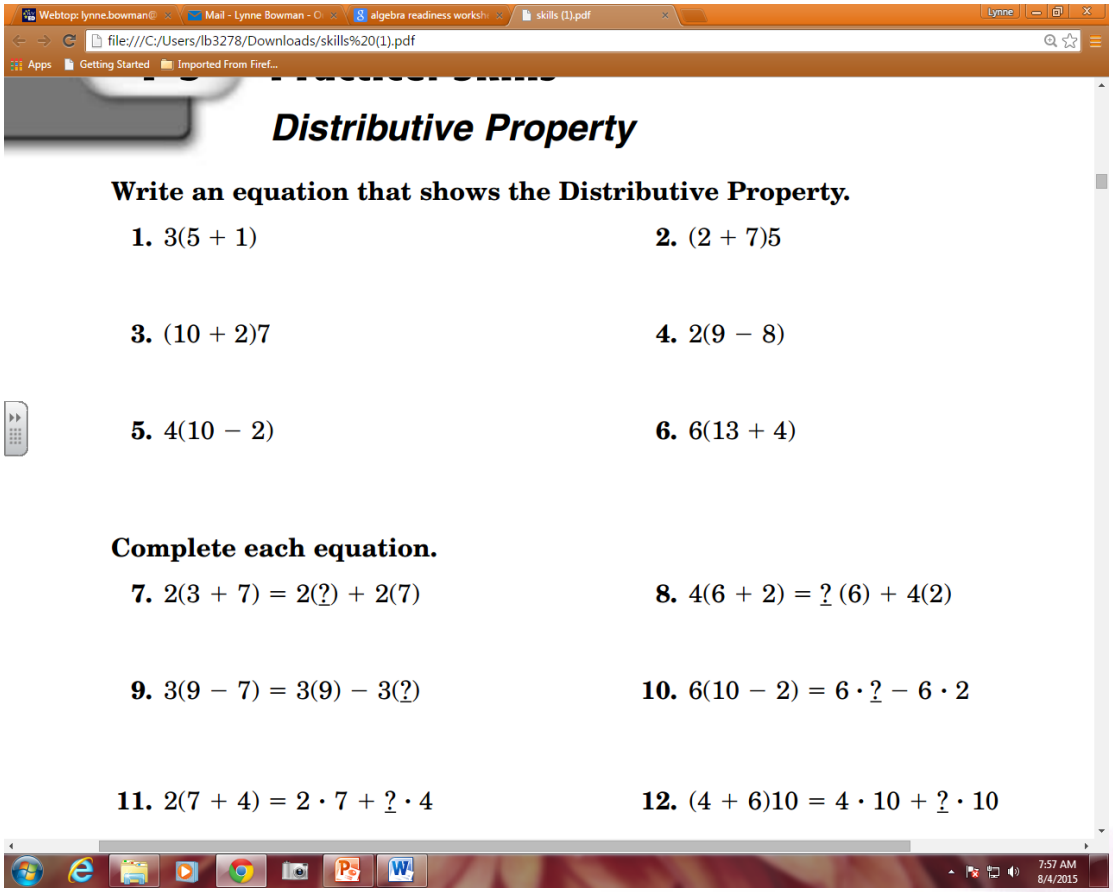
14. $8 \cdot 10 = 10 \cdot 8$

15. $5 + 2 + 84 = 2 + 5 + 84$

16. $(40 + 5) + 6 = 40 + (5 + 6)$

Chapter 1 4 *Algebra Readiness*

Algebra Readiness Practice



Distributive Property

Write an equation that shows the Distributive Property.

1. $3(5 + 1)$

2. $(2 + 7)5$

3. $(10 + 2)7$

4. $2(9 - 8)$

5. $4(10 - 2)$

6. $6(13 + 4)$

Complete each equation.

7. $2(3 + 7) = 2(\underline{?}) + 2(7)$

8. $4(6 + 2) = \underline{?}\,(6) + 4(2)$

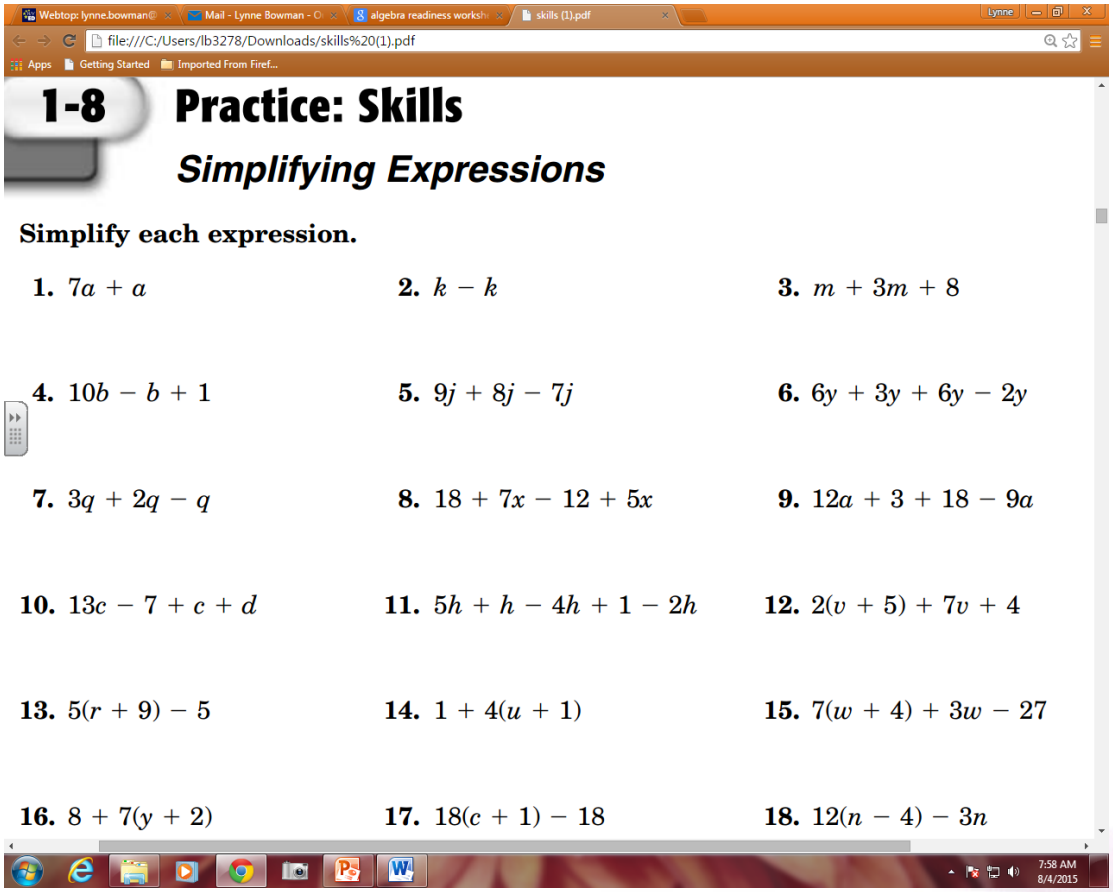
9. $3(9 - 7) = 3(9) - 3(\underline{?})$

10. $6(10 - 2) = 6 \cdot \underline{?} - 6 \cdot 2$

11. $2(7 + 4) = 2 \cdot 7 + \underline{?} \cdot 4$

12. $(4 + 6)10 = 4 \cdot 10 + \underline{?} \cdot 10$

Algebra Readiness Practice



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1-8 Practice: Skills

Simplifying Expressions

Simplify each expression.

1. $7a + a$	**2.** $k - k$	**3.** $m + 3m + 8$
4. $10b - b + 1$	**5.** $9j + 8j - 7j$	**6.** $6y + 3y + 6y - 2y$
7. $3q + 2q - q$	**8.** $18 + 7x - 12 + 5x$	**9.** $12a + 3 + 18 - 9a$
10. $13c - 7 + c + d$	**11.** $5h + h - 4h + 1 - 2h$	**12.** $2(v + 5) + 7v + 4$
13. $5(r + 9) - 5$	**14.** $1 + 4(u + 1)$	**15.** $7(w + 4) + 3w - 27$
16. $8 + 7(y + 2)$	**17.** $18(c + 1) - 18$	**18.** $12(n - 4) - 3n$

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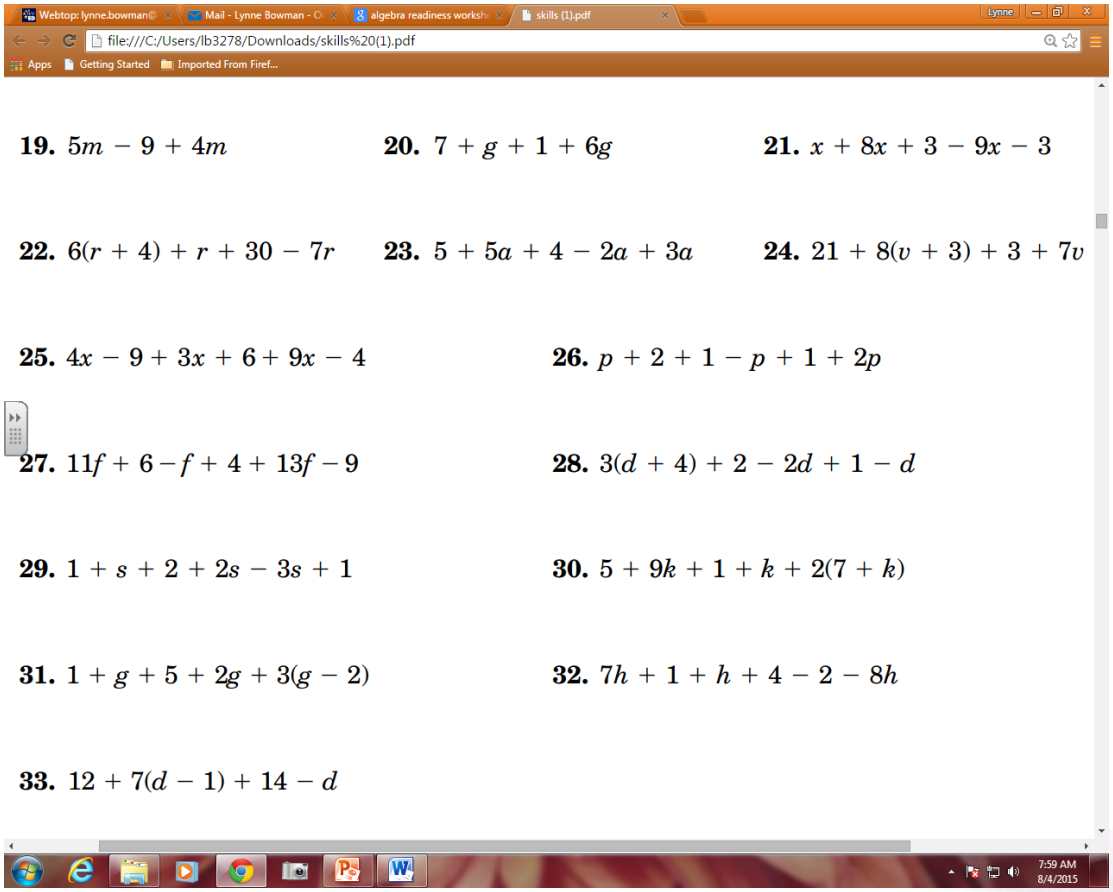
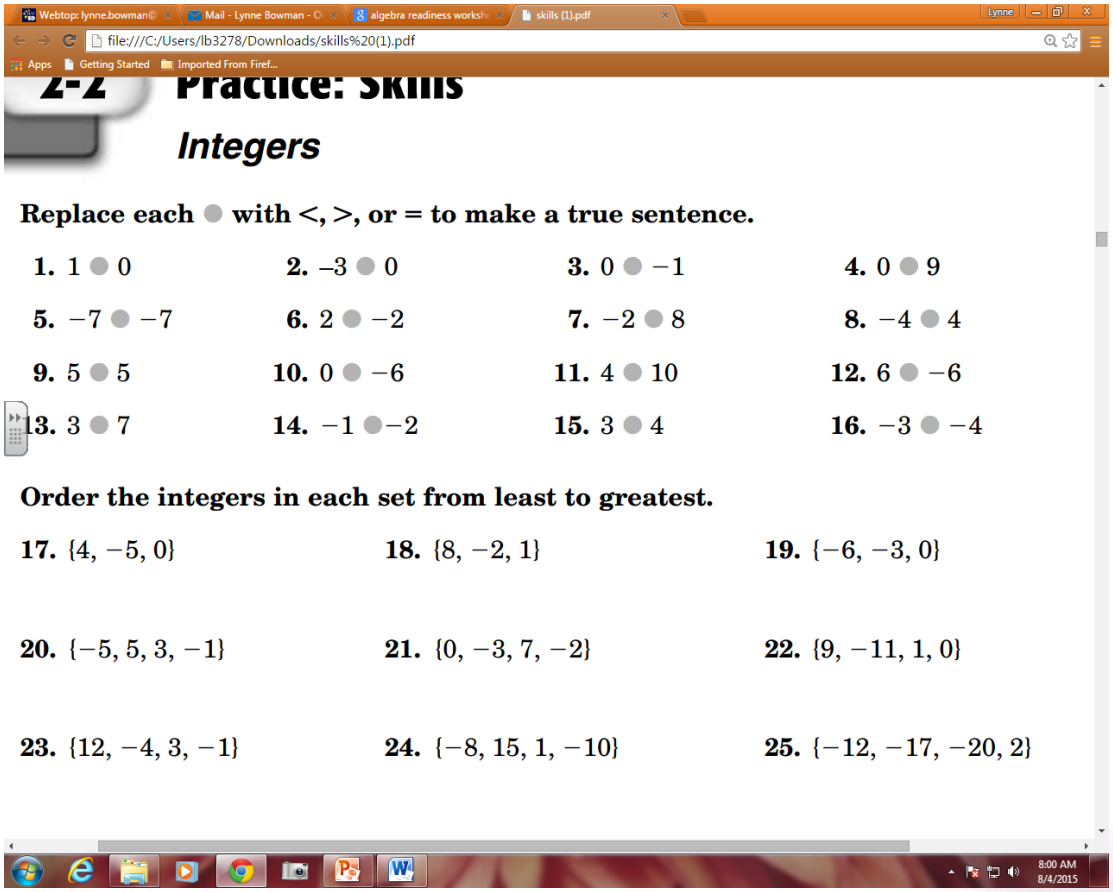
Algebra Readiness Practice



Algebra Readiness Practice



2-2 **Practice: Skills**

Integers

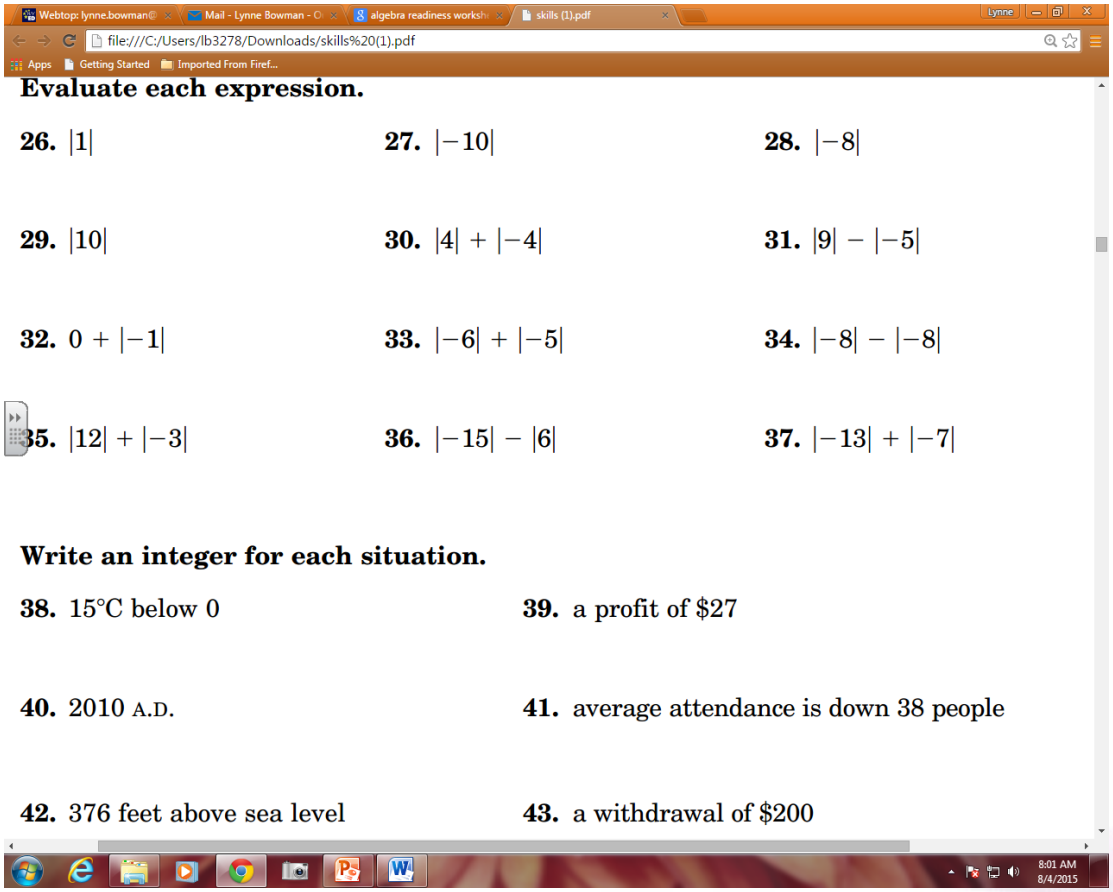
Replace each ● with <, >, or = to make a true sentence.

1. 1 ● 0	**2.** –3 ● 0	**3.** 0 ● –1	**4.** 0 ● 9
5. –7 ● –7	**6.** 2 ● –2	**7.** –2 ● 8	**8.** –4 ● 4
9. 5 ● 5	**10.** 0 ● –6	**11.** 4 ● 10	**12.** 6 ● –6
13. 3 ● 7	**14.** –1 ● –2	**15.** 3 ● 4	**16.** –3 ● –4

Order the integers in each set from least to greatest.

17. {4, –5, 0}	**18.** {8, –2, 1}	**19.** {–6, –3, 0}
20. {–5, 5, 3, –1}	**21.** {0, –3, 7, –2}	**22.** {9, –11, 1, 0}
23. {12, –4, 3, –1}	**24.** {–8, 15, 1, –10}	**25.** {–12, –17, –20, 2}

Algebra Readiness Practice



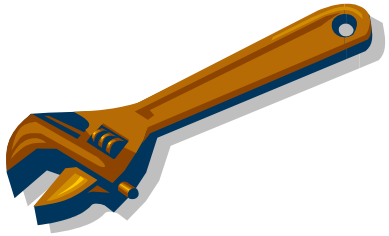
Warm Up #1

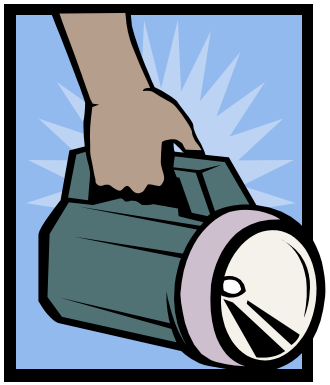
Write the operation symbol that corresponds to each phrase.

1. divided by
2. difference
3. more than
4. product
5. minus
6. sum
7. multiplied by
8. quotient

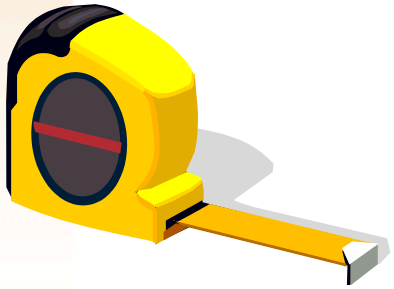
Find each amount.

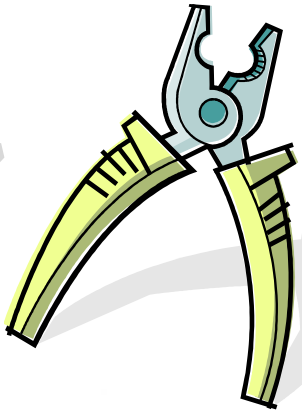
9. 12 more than 9
10. 8 less than 13
11. 16 divided by 4
12. twice 25

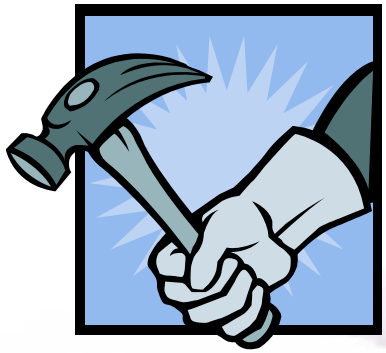




Chapter 1
Tools of Algebra







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1.6 Multiplying & Dividing real numbers

1.7 The Distributive Property

1.8 Properties of Real Numbers

1.9 Graphing data on the coordinate plane

Lesson #1-1: Using Variables

Model relationships with variables, equations, and formulas

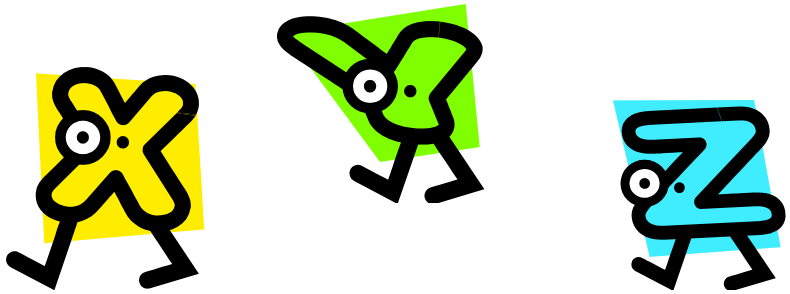
Concept: **Unit 1**

Tools of Algebra

1 - 1

Variables

A ***Variable*** is a letter that represents an unknown number.



An ***algebraic expression*** is a mathematical phrase that includes numbers, variables, and operation symbols. (NO = sign!)

Some examples:

n + 7

x – 5

3p

$\frac{y}{2}$

Special Words used in algebra

Addition: more than, added to, plus, sum of, increased by, total

Subtraction: less than, subtracted from, minus, difference, fewer than, decreased by

Multiply: times, product, multiplied by

Divide: divided by, quotient

Equal: is

"Seven more than n" **7 + n**

"the difference of n and 7" **n – 7**

"the product of n and 7" **7n**

"the quotient of n and 7" $\frac{n}{7}$

Now you try...

“the sum of t and 15”	t + 15
“two times a number x”	2x
“9 less than a number y”	y - 9
“the difference of a number p and 3”	p - 3

Write each as a verbal expression.

- $\frac{y}{10}$
- $19 + x$
- $23 - 7$
- $6x$

Now you try...

18 + y	18 plus y
20x	the product of 20 and x
18 - 15	18 minus 15
$\frac{7}{x}$	the quotient of 7 and x

Evaluate each expression…

Evaluate means to solve the problem and produce one number as the answer.

4 cubed

25 less than 35

the quotient of 70 and 7

Now you try...

the product of 15 and 3	45
90 decreased by 9	81
18 increase by 12	30
the quotient of 100 and 25	4

Write an expression for each phrase.

- the difference of 8 and a number plus 13
- 10 plus the quotient of a number and 15
- the sum of the quotient of p and 14 and the quotient of q and 3

Now you try...

the product of a number and 18 minus 3

$18x - 3$

the quotient of 25 and x plus the product of 26 and y

$$\frac{25}{X} + 26Y$$

8 less than y divided by 14

$$\frac{y - 8}{14}$$

Warm Up #2

Write an expression for each phrase.

1. the sum of 9 and k minus 17
2. 15 plus the quotient of 60 and w
3. 8 minus the product of 10 and y
4. 6.7 more than 5 times n
5. 11 less than the product of 37 and x

Lesson #1-1: Using Variables

SWBAT model relationships with variables, equations, and formulas

Concept: **Unit 1**

Tools of Algebra

An ***Algebraic Equation*** is a mathematical sentence that includes numbers, variables, an operation symbol, and an equal sign!

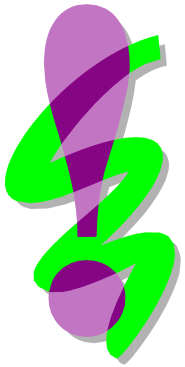
Some examples:

$n + 7 = 10$

$x - 5 = 3$

$3p = 15$

$\frac{y}{2} = 5$



An equation has an = sign and an expression does not!

- A **true sentence** is a mathematical sentence that is always correct.
- A **false sentence** is a mathematical sentence that is incorrect.
- An **open sentence** is a mathematical sentence that contains one or more variables.

Examples of True Equations:

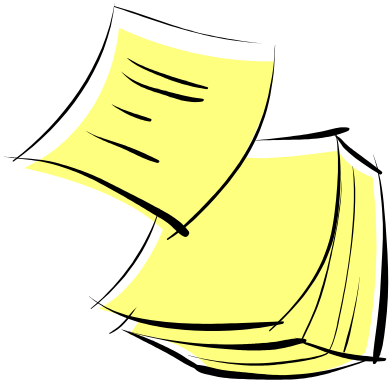
2 + 3 = 5

6 – 5 = 0 + 1

Examples of Open Equations:

2 + x = 5

16 – 5 = x + 5



Open equations have one or more variables!

Writing Equations:

IS means = sign

"2 more than twice a number is 5"

2 + 2x = 5

2 + 2x = 5

Sometimes you have to decide what the variable is…

It can be any letter. We usually see x and y used as variables.

"a number divided by 3 is 8"

x ÷ 3 = 8

or $\frac{x}{3}=8$

Now you try...

“the sum of a number and ten is the same as 15”

x + 10 = 15

Now you try...

“The total pay is the number of hours times 6.50”

{Sometimes, two variables are needed}

Writing an Equation…

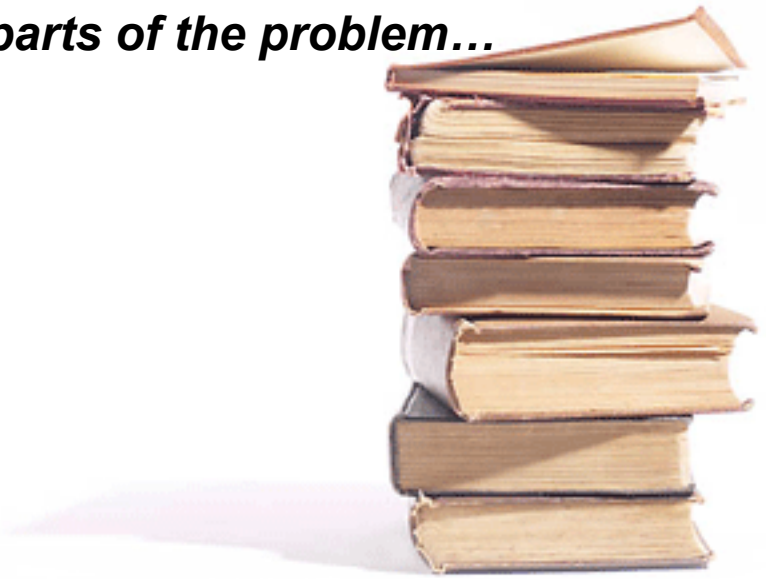
Track One Media sells all CDs for $12 each. Write an equation for the total cost of a given number of CDs.

Define variables and identify key parts of the problem…

Writing an Equation…

Write an equation to show the total income from selling tickets to a school play for $5 each.

Define variables and identify key parts of the problem…



Let's look at another...

Number of CDs	Cost
1	$8.50
2	$17.00
3	$25.50
4	$34.00

This table shows the relationship between number of CDs and cost.

How much is 1 CD?

$8.50

Cost = $8.50 times (number of CDs)

C = total cost for CDs

n = number of CDs bought

C = 8.50 n

Number of CDs	Cost
1	$8.50
2	$17.00
3	$25.50
4	$34.00

We use a table of values to represent a relationship.

Number of hours	Total pay in dollars
5	40
10	80
15	120
20	160

From the table, we can come up with an equation.

Total pay = (number of hours) times (hourly pay)

What is the hourly pay?

$8 per hour

Total pay = 8 (number of hours)

T = 8h

Write an equation for the data below…

# of Tickets	Total Cost
2	$7
4	$14
6	$21

Write an equation for the data below…

Gallons used	4	6	8	10
Miles Traveled	80	120	160	200

Write an equation for the data below…

# of Hours	Total Pay
8	$40
12	$60
16	$80

Pass out of class...

Define variables and write an equation to model each situation.

(1) The total cost equals the number of pounds of pears times $1.19 per pound.

(1) You have $20.00. Then, you buy a bouquet. How much do you have left?

(3) You go out to lunch with five friends and split the check equally. What is your share of the check?

Warm Up #3

Write an algebraic expression for each phrase.

1. 7 less than 9
2. the product of 8 and p
3. 4 more than twice c

Write an equation to model the situation.

4. The total cost is the number of sandwiches times $3.50
5. The perimeter of a regular hexagon is 6 times the length of one side.

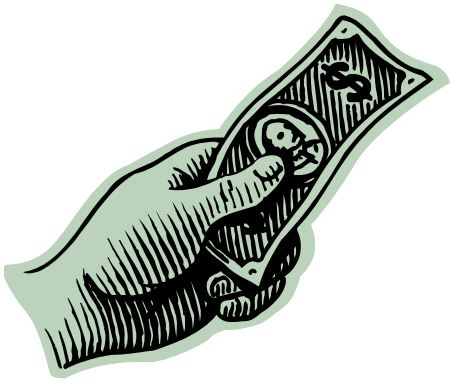
Lesson #1-2: Exponents and Order of Operations

SWBAT simplify and evaluate expressions, formulas, and expressions containing grouping symbols

1 – 2

Exponents and Order of Operations

Which is simpler… a dollar bill or twenty nickels?



I don't know about you, but I would rather have a dollar bill than twenty nickels in my pocket…

To simplify an expression, we write it in the simplest form.

Example: Instead of $2 + 3 + 5$, we write 10.

Instead of $2 \cdot 8 + 2 \cdot 3$, we write 22.

We use ***order of operations*** to help us get the right answer. ***PEMDAS***

Parentheses first, then exponents, then multiplication and division, then addition and subtraction.

In the above example, we multiply first and then add.

An **exponent** tells you how many times to multiply a number (the base) by itself.

2^4 Means 2 times 2 times 2 times 2

Or $2 \cdot 2 \cdot 2 \cdot 2$

This is also read as

"2 to the 4th power"

A **power** has two parts, a base and an exponent, such as 2^4

2^4 is 16 in simplest form.

Always follow order of operations starting with the inside parentheses.

PLEASE EXCUSE MY DEAR AUNT SALLY

P	**Parentheses**	
E	**Exponents**	
M	**Multiplication**	}
D	**Division**	}
A	**Addition**	
S	**Subtraction**	

Left to right when multiplication and division are the only operations left in the problem

Left to right when addition and subtraction are the only operations left in the problem

Simplify an expression...

Simplify: $25 - 8 \bullet 2 + 3^2$

Remember order of operations!

Simplify an expression...

$$4 \bullet 7 + 4 \div 2^3$$

Simplify an expression...

$$(17-7)\div 5+1$$

Simplify an expression...

$$9+\left[4-(10-9)^2\right]^3$$

We evaluate expressions by plugging numbers in for the variables.

Example:

Evaluate the expression for c = 5 and d = 2.

2c + 3d

Evaluate for x = 11 and y = 8

$$xy^2$$

Now you try...

Evaluate the expression if m = 3, p = 7, and q = 4

$$mp^2 - q$$

$$(3)(7)^2 - (4)$$

$$(3)(49) - (4)$$

$$147 - 4$$

$$143$$

Now you try...

Evaluate the expression if m = 3, p = 7, and q = 4

$$m\left(p^2 - q\right)$$

$$3\left(7^2 - 4\right)$$

$$3\left(49 - 4\right)$$

$$3\left(45\right)$$

$$135$$

Warm Up #4

Write each decimal as a fraction and each fraction as a decimal.

(1) 0.5

(2) 0.05

(3) 3.25

(4) 0.325

(5) $\frac{2}{5}$

(6) $\frac{3}{8}$

(7) $\frac{2}{3}$

(8) $\frac{32}{9}$

Lesson #1-3: Exploring Real Numbers

SWBAT classify numbers.

Concept: Unit 1

Tools of Algebra

Real Numbers – any number that you can think of.

In algebra, there are different sets of numbers.

Natural numbers – counting numbers

1, 2, 3, 4, …

Whole numbers – zero and all positive numbers

0, 1, 2, 3,…

Integers include all negative numbers, zero, and all positive numbers

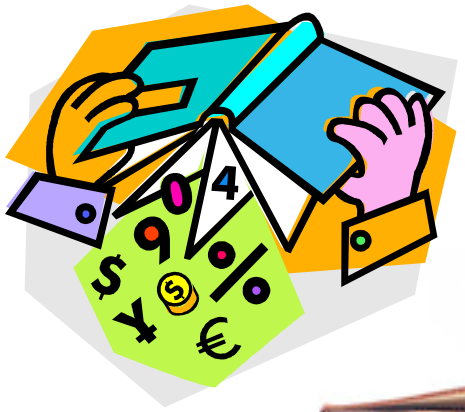
… -3, -2, -1, 0, 1, 2, 3,…

Rational numbers can be written as a fraction. Rational numbers in decimal form must terminate (have an end to the number)

Examples of rational numbers:

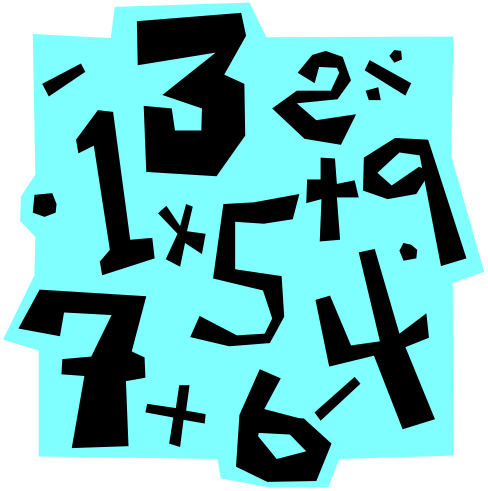
$$6.27,\ \frac{3}{5},\ 17,\ 2.5,\ \sqrt{16}$$

Irrational numbers are repeating or non-terminating decimals and numbers that cannot be written as a fraction.



Examples of irrational numbers:

$$\pi,\ -\sqrt{123},\ \sqrt{10},\ \sqrt{\frac{2}{3}},\ .\overline{31}$$



Real Numbers

Rational Numbers

Irrational Numbers

Integers

Whole Numbers

Natural Numbers

Name the set(s) of numbers to which each number belongs…

(1) $\frac{-17}{31}$

(2) 23

(3) 0

(4) 4.581

Name the set(s) of numbers to which each number belongs…

(1) $\frac{5}{12}$

(2) -12

(3) -4.67

(4) 66

Which set of numbers is most reasonable for each situation?

(a) The number of students who will go on a field trip

(b) The height of the door frame in the classroom

(c) The cost of a scooter

(d) Outdoor temperature

(e) The number of beans in a bag

With a partner, answer the following…..

Which set of numbers is most reasonable for each situation?

a. your shoe size
b. The number of siblings you have
c. A temperature in a news report
d. The number of quarts of paint you need to buy to paint a room

Warm Up #5

Name the set(s) of number to which each number belongs.

(1) -14

(2) $\frac{1}{2014}$

(1) -6.8

(2) 70

(3) $\sqrt{5}$

(4) 0

Lesson #1-3:
Exploring Real Numbers

SWBAT compare numbers.

Concept: Unit 1

Tools of Algebra

Vocabulary…

- **counterexample** – any example that proves a statement false

- You only need ONE counterexample to prove that a statement is false

- For instance, suppose a friend says that all integers are whole numbers. A counterexample might be -3 because it is an integer but it is not a whole #, proving the statement incorrect!

Is each statement true or false? If it is false, give a counterexample.

All whole numbers are rational numbers.

No fractions are whole numbers.

All whole numbers are integers.

An *inequality* a mathematical sentence that compares the value of two expressions using an inequality symbol.

$x < 5$ **x is less than 5**

$x \leq 5$ **x is less than or equal to 5**

$x > 3$ **x is greater than 3**

$x \geq 3$ **x is greater than or equal to 3**

We use inequalities to compare fractions and decimals.

$$\frac{1}{2} < \frac{5}{8} \qquad -\frac{3}{8} > -\frac{5}{12}$$

$$\frac{3}{5} = 0.6$$

We can also order fractions and/or decimals. *Pay attention to whether it says to order them least to greatest or vice versa.*

Order from least to greatest:

$$\frac{5}{6}, \frac{1}{2}, \frac{2}{3}$$

$$\frac{1}{2}, \frac{2}{3}, \frac{5}{6}$$

Order the fractions from least to greatest.

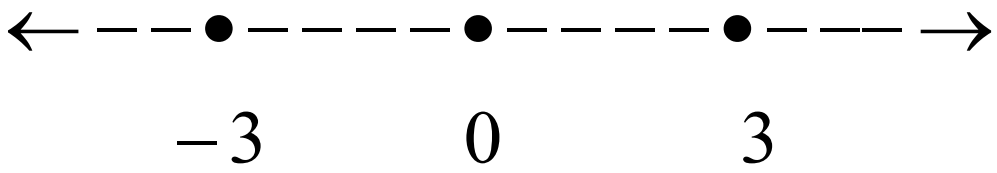
$$\frac{3}{8}, \frac{-1}{2}, \frac{-5}{12}$$

Least to greatest – start with the highest negative number and work your way to zero, then start with the smallest positive number and work your way up.

Order the fractions from greatest to least.

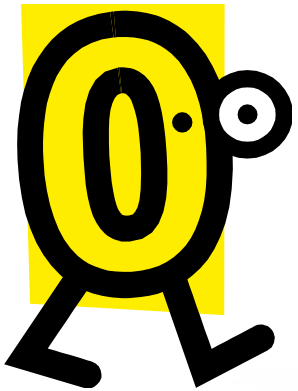
$$\frac{1}{12}, \frac{-2}{3}, \frac{-5}{8}$$

Opposite numbers are the same distance from zero on the number line.



-3 and 3 are opposites of each other

Zero is the only number without an opposite!



The absolute value of a number is its distance from zero. Because distance is ALWAYS positive, so is absolute value.

You know you have to find absolute value when a number has two straight lines on either side of it.

$|5|$ Means the absolute value of 5.

How far is 5 from zero?

5 units

$|-5|$ Means the absolute value of – 5.

How far is – 5 from zero?

5 units

*So both $|5|$ *and* $|-5| = 5$

Now you try...

1. What is the opposite of 7?

2. What is the opposite of -4?

3. What is $|-3|$?

4. What is $|10|$?

5. What is $\left|\frac{-2}{3}\right|$?

Warm Up #6

Name the set(s) of numbers to which each given number belongs.

(1) -2.7

(2) $\sqrt{11}$

(3) 160

Compare the fractions.

(4) $\frac{3}{4}$ $\frac{5}{8}$

(5) $\frac{-3}{4}$ $\frac{-5}{8}$

(6) Find $\left|\frac{-7}{12}\right|$

Lesson #1-4: Adding Real Numbers

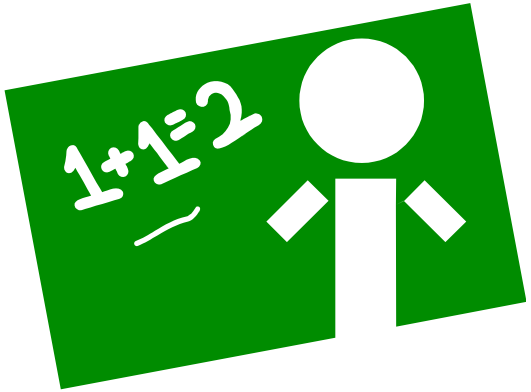
SWBAT add real numbers using models and rules; apply addition

Absolute Value

The absolute value of a number is its distance from zero. Because distance is ALWAYS positive, so is absolute value.

$|-20|$ — $|-500|$

$|100|$ — $|8.77|$



Identity Property of Addition

Adding zero to a number does not change the number

5 + 0 = 5

-3 + 0 = - 3

Inverse Property of Addition

When you add a number to its opposite, the result is zero

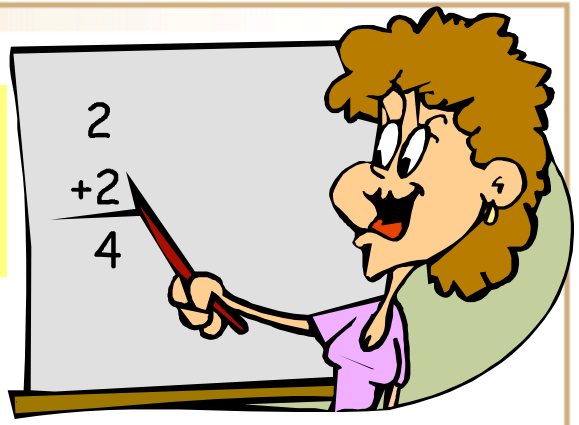
5 + - 5 = 0

- 3 + 3 = 0

Rule 1

Adding numbers with the *same* sign…

Keep the sign and add the numbers



Examples:

$$2+6=8$$

$$-2+(-6)=-8$$

Note: the ( ) around the -6 just shows that the negative belongs with the 6.

Rule 2

Adding numbers with *different* signs…

Take the sign of the number with the larger absolute value and subtract the numbers.

Examples:

$$-2+6=4$$

6 is the number with the larger distance from zero (absolute value) so the answer is positive

6 – 2 = 4

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

-5 has the larger absolute value so the answer is negative

5 – 3 = 2

The answer is - 2

Now you try...

$3+12$ $=15$

$-7+(-4)$ $=-11$

$-8+13$ $=5$

$-27+19$ $=-8$

Lets try some evaluate problems. Remember to plug the numbers in for the variables.

Evaluate the expression for a = - 2, b = 3, and c = - 4.

$$-a+2+c$$

The "-" in front of the a can also be read "the opposite of"

$$-(-2)+2+(-4)$$

The opposite of – 2 is 2

$$2+2+(-4)$$

Order of operations!

$$4+(-4)$$

A number added to its opposite is zero!

$$=0$$

Evaluate the expression for a = -2, b = 3, and c = - 4.

$$-(c+a+5)$$

$$-(-4+(-2)+5)$$

1st plug in the numbers

Next, do what is inside the ( ) first!

$$-(-6+5)$$

$$-(-1)$$

The opposite of – 1 is…

$$=1$$

Evaluate the expression for a = 3, b = -2, and c = 2.5.

b plus c plus twice a

$$b+c+2a$$

1st you have to write an algebraic expression

$$-2+2.5+2(3)$$

Next you plug in the numbers

$$-2+2.5+6$$

Remember order of operations! Multiply 1st!

$$.5+6$$

Add from left to right

$$=6.5$$

In Algebra 1, you are introduced to a matrix. The plural of matrix is matrices.

All we do in Algebra 1 is sort information using a matrix. We also add and subtract matrices. You will learn how to use matrices in many ways in Algebra 2.

A *matrix* is an organization of numbers in rows and columns.

Examples:

$$\begin{bmatrix} -1 & 2 \\ 4 & 0 \end{bmatrix}$$

$$\begin{bmatrix} -4 & 2 & 0 & 5 \\ 7 & 1 & -2 & \frac{1}{2} \end{bmatrix}$$

-1 and 2 are elements in row 1

- 1 and 4 are elements in column 1

Columns go up and down

Rows go across

You can only add or subtract matrices if they are the same size. {Same number of rows in each matrix, same number of columns in each matrix}

$$\begin{bmatrix} 5 & 0 \\ 1 & -2 \end{bmatrix} \textit{and} \begin{bmatrix} 1 & 0 & -3 \\ -5 & 8 & 0 \\ 0 & -1 & 2 \end{bmatrix}$$

Cannot be added together. They are not the same size!

We add two matrices by adding the corresponding elements.

$$\begin{bmatrix} -5 & 2.7 \\ 7 & -3 \end{bmatrix} + \begin{bmatrix} -3 & -3.9 \\ -4 & 2 \end{bmatrix}$$

1st we add corresponding elements

$$\begin{bmatrix} -5+(-3) & 2.7+(-3.9) \\ 7+(-4) & -3+2 \end{bmatrix}$$

$$\begin{bmatrix} -8 & -1.2 \\ 3 & -1 \end{bmatrix}$$

Then we follow the rules for adding numbers

Now you try...

Add the matrices, if possible.

1. $\begin{bmatrix} -7 \\ 3 \\ 0 \end{bmatrix} + \begin{bmatrix} 5 & 0 \\ -1 & 2 \end{bmatrix}$

Not possible. The matrices have different dimensions.

2. $\begin{bmatrix} 7 & -8 & 1 \end{bmatrix} + \begin{bmatrix} 0 & 5 & -2 \end{bmatrix}$

$\begin{bmatrix} 7 & -3 & -1 \end{bmatrix}$

Add corresponding elements!

Warm Up #8

Simplify:

(1) $10 + |-3| + (-3)$

(2) $-(-2) + 2 + (-4)$

(3) $-4 + 3(3)$

(4) $-1\frac{1}{5} + (-3\frac{4}{15})$

Compare using <, >, or =.

(1) -1.23 ____ -1.18

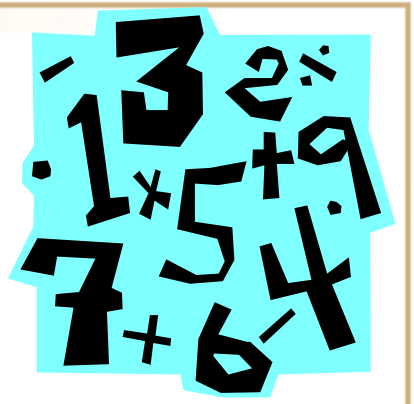
(2) $\left|\frac{-3}{10}\right|$ ____ $\left|\frac{2}{9}\right|$

Lesson #1-5:
Subtracting Real Numbers

Objective: SWBAT subtract real numbers; apply subtraction to matrices

Concept: Unit 1

Tools of Algebra



To subtract two numbers, we simply change it to an addition problem and follow the addition rules. ADD ITS OPPOSITE.

Example: Simplify the expression.

$$3-5$$

Change the subtraction sign to addition.

$$3+(-5)$$

Change the sign of the 5 to negative.

$$-2$$

Add using rule 2 of addition

Let's try another

Example: Simplify the expression.

$$-4-(-9)$$

$$-4+9$$

$$5$$

1st change the subtraction sign to a +.

2nd change the sign of the -9 to a +.

We do not mess with the - 4

Then follow your addition rule #2

Let's try another

Example: Simplify the expression.

$$-6-2$$

Add the opposite…

$$-6+(-2)$$

Change the – to a +, then change the sign of the 2 to a negative.

$$-8$$

On this one, we use rule #1 of addition.

Now you try...

Simplify each expression.

1. $8-(-4)$

2. $-3.7-4.3$

3. $-\frac{8}{9}-\left(-\frac{5}{6}\right)$

1. $8+4$

12

2. $-3.7+(-4.3)$

-8.0

3. $-\frac{8}{9}+\frac{5}{6}$

$-\frac{16}{18}+\frac{15}{18}$

$-\frac{1}{18}$

Absolute Value

The absolute value of a number is its distance from zero. Because distance is ALWAYS positive, so is absolute value.

$|-20|$ — $|-500|$

$|100|$ — $|8.77|$

Absolute Value…

1. $|5 - 11|$

2. $|-10 - (-4)|$

3. $|8 - 7|$

4. $|-13 - (-21)|$

Let's try another

Simplify each expression.

Treat absolute value signs like parentheses. Do what is inside first!

1. $|7 - 8|$

$|7 + (-8)|$

$|-1|$

$= 1$

2. $|-4 - (-10)|$

$|-4 + 10|$

$|6|$

$= 6$

Let's try another

Evaluate – a – b for a = - 3 and b = - 5.

1st substitute the values in for a and b

$$-(-3)-(-5)$$

2nd simplify change subtraction to addition

$$-(-3)+5$$

When you have two negatives next to each other, it becomes a positive

$$3+5$$

$$=8$$

Let's try another

Evaluate when t = -2 and r = -7

(1)r – t

(1)t – r

(1)-t – r

(1)-r – (-t)

Now you try...

Evaluate each expression for a = - 2, b = 3.5, and c = - 4

1. $a - b + c$

2. $|a + b|$

1. $(-2) - 3.5 + (-4)$

$-2 + (-3.5) + (-4)$

$-5.5 + (-4)$

-9.5

2. $|-2 + 3.5|$

$|1.5|$

1.5

Subtract matrices just like you add them. Add the opposite of each element.

$$\begin{bmatrix} -3 & 4 \\ 0 & -1 \end{bmatrix} - \begin{bmatrix} -5 & 6 \\ 9 & -4 \end{bmatrix}$$

Remember, they must be the same size!

$$\begin{bmatrix} -3-(-5) & 4-6 \\ 0-9 & -1-(-4) \end{bmatrix}$$

$$\begin{bmatrix} -3+5 & 4+(-6) \\ 0+(-9) & -1+4 \end{bmatrix} = \begin{bmatrix} 2 & -2 \\ -9 & 3 \end{bmatrix}$$

Warm Up #9

Use <, >, or = to compare.

1. $\frac{4}{9}$ ____ 0.444...
2. $\frac{4}{13}$ ____ $\frac{4}{15}$
3. $\frac{3}{7}$ ____ $\frac{11}{25}$
4. $\frac{22}{7}$ ____ 3.14
5. $\frac{1}{9}$ ____ 0.101101110...
6. - 1.08____- 1.008

Lesson #1-6: Multiplying and Dividing Real Numbers

Objective: SWBAT multiply and divide real numbers

Concept: Unit 1

Tools of Algebra

Identity property of multiplication:

Multiply any number by 1 and get the same number.

Examples: $5 \cdot 1 = 5$

$-2 \cdot 1 = -2$

Multiplication property of zero:

Multiply any number by 0 and get 0.

Examples: $3 \cdot 0 = 0$

$-15 \cdot 0 = 0$

Multiplication property of –1:

Multiply any number by –1 and get the number's opposite.

Examples: $9 \cdot -1 = -9$

$$(-1)(-5) = 5$$

Multiplication Rules:

Multiply two numbers with the *same* sign, get a *positive*

Multiply two numbers with *different* signs, get a *negative*

Examples: $(-5)(-3) = 15$

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

Examples: Simplify each expression.

1. $(10)(-12) = -120$

2. $(53)(0) = 0$

3. $(-8)(-5) = 40$

Examples: Simplify each expression.

4. $(-5)^2 = (-5)(-5) = 25$

Since the –5 is in the ( ), the –5 is squared.

5. $-5^2 = -(5 \cdot 5) = -25$

The negative is not being squared here, only the 5.

Evaluate -2xy when x = -20 and y = -30

Evaluate (-2)(-3)(cd) when c = -8 and d = -7

Evaluate –(ab) when a = -6 and b = 5

Simplify each expression using PEMDAS.

$-4^3 =$

$(-2)^4 =$

$(-0.3)^2 =$

$-\left(\frac{3}{4}\right)^2 =$

You can use the expression $-5.5\left(\frac{a}{1000}\right)$ to calculate the change in temperature in degrees Fahrenheit for an increase in altitude, *a*, measured in feet. A hot air balloon starts on the ground and then rises 8000 feet. Find the change in temperature at the altitude of the balloon.

a. Find the change in Temp if a balloon Rises 4500 ft. from the ground.

b. Suppose the temperature is 40˚F at ground level. What is the approximate air temperature at the altitude of the balloon?

Division Rules are the same as multiplication:

Divide two numbers with the *same* sign, get a *positive*.

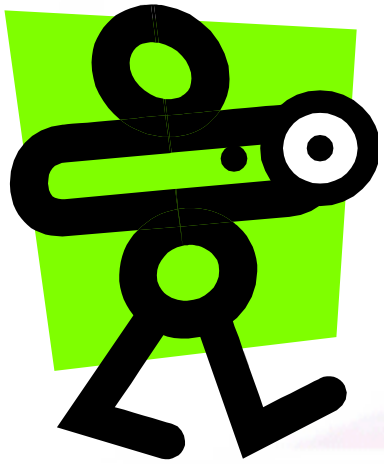
Divide two numbers with *different* signs, get a *negative*.

Examples: Simplify each expression.

1. $(-36) \div (-9) = 4$

2. $\frac{56}{-2} = -28$

3. $\frac{18}{3} = 6$



Evaluate $\frac{-x}{-4} + 2y, z$ when x = -20, y = 6, and z = -1

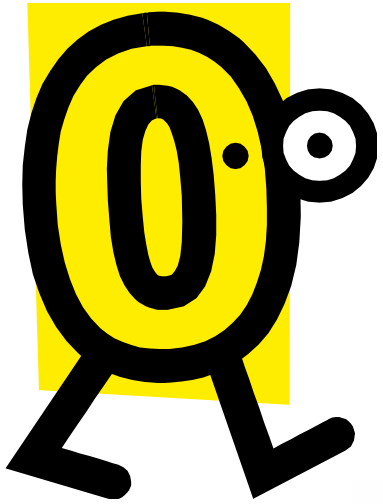
Evaluate each expression when x = 8, y = -5, and z = -3

$3x$, $2z + y$, 10

$$\frac{2z + x}{2y}$$

$3z^2 - 4y$, x

Zero is a very special number!



****Remember, anything multiplied by zero gives you zero.**

You also get zero when you divide zero by any number.

Examples:

$$\frac{0}{-5} = 0$$

$$0 \div 3 = 0$$

However, you cannot divide by zero! You get undefined!

Examples:

$$\frac{-8}{0} = undefined$$

$$10 \div 0 = undefined$$

Every number *except zero* has a multiplicative inverse, or reciprocal.

When you multiply a number by its reciprocal, you always get 1.

Examples:

The reciprocal of 5 **is** $\frac{1}{5}$

The reciprocal of $\frac{3}{7}$ **is** $\frac{7}{3}$

The reciprocal of $\frac{1}{10}$ **is** 10

Evaluate the expression: $\frac{x}{y} = x\,,\ y$

when $x = \frac{-3}{4}$ *and* $y = \frac{-5}{2}$

when $x = 8$ *and* $y = \frac{-4}{5}$

Warm Up #10

Evaluate each expression when x = 8, y = -5, and z = -3

$3x$, $2z + y$, 10

$$\frac{2z + x}{2y}$$

$3z^2 - 4y$, x

$$\frac{2x}{5y} = 2x \text{ , } 5y \quad \textit{when } x = \frac{-3}{4} \textit{ and } \quad y = \frac{-4}{5}$$

Lesson #1-7: Distributive Property

SWBAT use the distributive property and simplify algebraic expressions

Concept: Unit 1

Tools of Algebra

Unit 1 Test – Thursday 9/19

The Distributive Property is used to multiply a number by something in parentheses being added or subtracted.

$$5(x+2)$$

$$5 \cdot x + 5 \cdot 2$$

$$5x + 10$$

We "distribute" the 5 to everything in parentheses.

Everything in parentheses gets multiplied by 5.

More examples...

Example 1

$$2(5x+3)$$

$$2\cdot 5x+2\cdot 3$$

$$10x+6$$

Example 2

$$2(3-7t)$$

$$2\cdot 3-2\cdot 7t$$

$$6-14t$$

Example 3

$$-(6x+4)$$

$$-1(6x+4)$$

$$-1\cdot 6x+(-1)(4)$$

$$-6x+(-4)$$

$$-6x-4$$

More examples...

Example 4 $(6x+4)\left(\frac{1}{2}\right)$

$\frac{1}{2}(6x+4)$ ***Rewrite with the*** $\frac{1}{2}$ ***in front of the ( ).***

$\frac{1}{2}\cdot 6x+\frac{1}{2}\cdot 4$

$3x+2$

More examples...

Example 5

$$-3(2x-5)$$

$$-3(2x+(-5))$$

$$-3\cdot 2x+(-3)(-5)$$

$$-6x+15$$

Add the opposite inside the parentheses

Some important definitions…

$$6a^2 - 5ab + 3b - 12$$

Each of these is called a term. Terms are connected by pluses and minuses

The number in front of the variable is called a coefficient

A number without a variable is called a constant

$$3x^2 + 5x^2 + 2x - x + 3 + 8$$

Terms that have the same variable are called <u>like terms</u>

These terms do not have a variable. They are both constants. They are like terms

We combine like terms by adding their coefficients.

The above simplifies to $8x^2 + x + 11$

Some examples…

Like terms

$3x$ *and* $-2x$

$-5x^2$ *and* $9x^2$

xy *and* $-5xy$

$-2x^2y^3$ *and* $4x^2y^3$

Not like terms

$8x$ *and* $7y$

$5y$ *and* $2y^2$

$4y$ *and* $5xy$

x^2y *and* xy^2

Simplify each expression…

1. $-9w^3 - 3w^3$

   $-12w^3$

Combine the coefficients…

-9 and -3

2. $9x + 2x - 5x$

   $6x$

Combine the coefficients…

9, 2, and -5

Write an expression for each phrase…

1. **"3 times the quantity x minus 5"**

$$3(x-5)$$

2. ***"the product of -6and the quantity 7 minus m"***

$$-6(7-m)$$

3. ***"The product of 14 and the quantity 8 plus w"***

$$14(8+w)$$

Warm Up #12

Simplify each expression by combining all like terms.

$9(5+x)-6(x+3)$

$-(m+3)-2(m+3)$

$4(y+8)-5(2y-1)$

$1.3a+2b-4c+3.1b-4a$

Lesson #1-8: Properties of Real Numbers

SWBAT identify properties and use deductive reasoning

Concept: Unit 1

Tools of Algebra

Unit 1 Test Soon!

Addition Properties:

Commutative Property → a + b = b + a

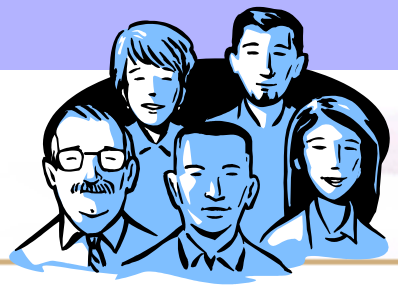
Example: 7 + 3 = 3 + 7

(Think of a commute as back and forth from school to home and back. It is the same both ways!

Associative Property → (a + b) + c = a + (b + c)

Example: (6 + 4) + 5 = 6 + (4 + 5)

(Think of who you associate with or who is in your group)



Multiplication Properties:

Commutative Property → $a \cdot b = b \cdot a$

Example: $3 \cdot 7 = 7 \cdot 3$

(Again, think of the commute from home to school and back)

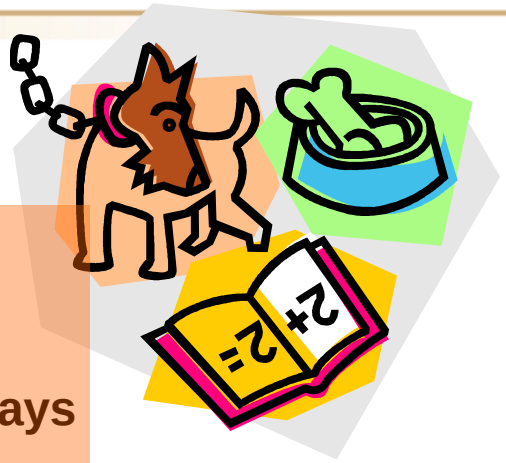
Associative Property → $(a \cdot b) \cdot c = a \cdot (b \cdot c)$

Example: $(6 \cdot 4) \cdot 3 = 6 \cdot (4 \cdot 3)$

(Again, think of grouping)

Both the commutative and associative properties apply only to addition and multiplication. Order and grouping do not matter with these two operations.

Other important properties…



Identity Property of Addition → a + 0 = a

Example: 5 + 0 = 5

(If you add zero to any number, the number stays the same)

Identity Property of Multiplication → a · 1 = a

Example: 7·1 = 7

(If you multiply any number by one, the number stays the same)

Still more important properties…

Inverse Property of Addition → $a+(-a)=0$

Example: 5 + (- 5) = 0

(If you add a number to its opposite, you get zero!)

Inverse Property of Multiplication → $a\left(\frac{1}{a}\right)=1$

Example: $5\left(\frac{1}{5}\right)=1$

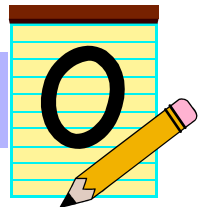
(If you multiply a number and its reciprocal, you get one!)

More Properties…

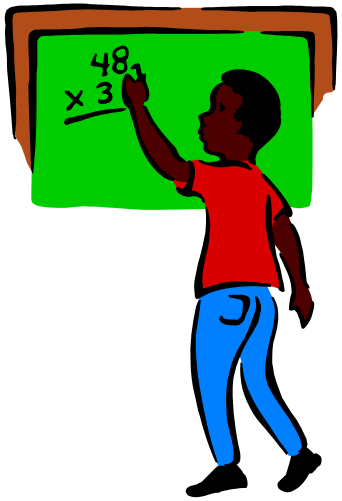
Distributive Property → a(b + c) = ab + ac

a(b – c) = ab – ac

Multiplication Property of Zero → n · 0 = 0



Multiplication Property of – 1 → - 1 · n = - n



Name That Property!!!

1. $9+7=7+9$

1. Associative Property of Addition

2. $t+0=t$

2. Identity Property of Addition

3. $(d\cdot 4)\cdot 3=d\cdot(4\cdot 3)$

3. Associative Property of Multiplication

4. $3\cdot a=a\cdot 3$

4. Commutative Property of Multiplication

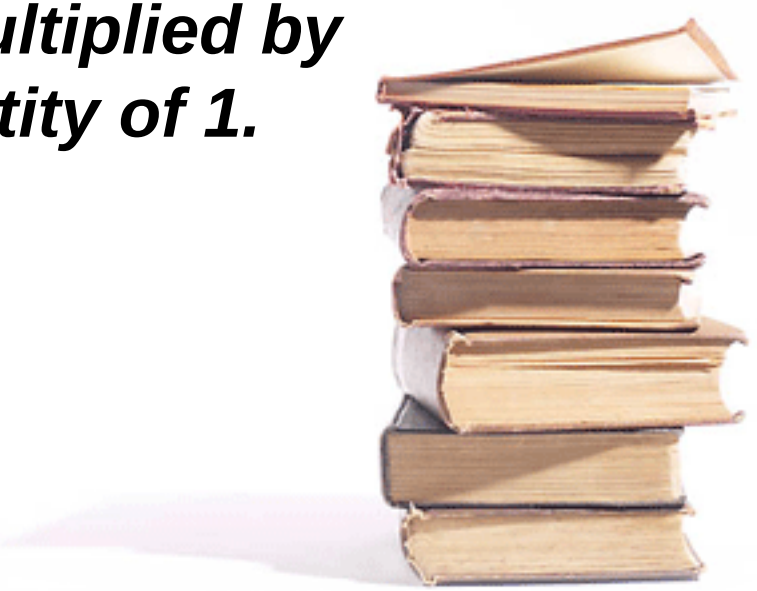
5. $6+(-6)=0$

5. Inverse Property of Addition

Name That Property!!!

$$1m = m$$

Identity Property of Multiplication: m is multiplied by the multiplicative identity of 1.



Name That Property!!!

$$2+0=2$$

Identity Property of Addition: the identity for addition, zero, is added and does not change the value of the original number

Name That Property!!!

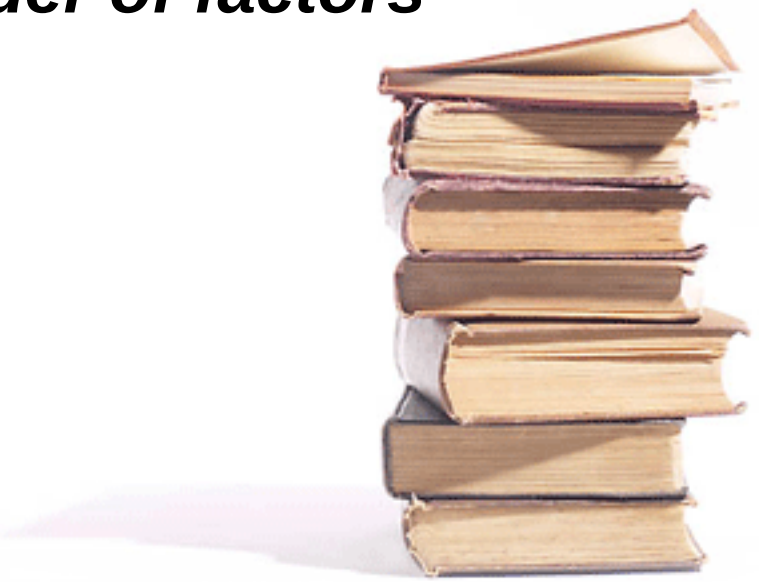
$$(-3+4)+5=-3(4+5)$$

Associative Property of Addition: the grouping of terms changes

Name That Property!!!

$$np = pn$$

Commutative Property of Multiplication: the order of factors changes



Name That Property!!!

$$3(8*0)=(3*8)0$$

Associative Property of Multiplication: the grouping of factors changes

Name That Property!!!

$$p + q = q + p$$

Commutative Property of Addition: the order of terms changes

Warm Up #13 – Simplify each expression.

1. $4+7x+6+x$

2. $(5*16)*2$

3. $-(-5-4m)$

4. $9\frac{}{}(-3)-4\frac{}{}-8$

5. $9x+3(x+4)$

6. $3x+6y-8x-y$

Lesson #1-9: Graphing Data on the Coordinate Plane

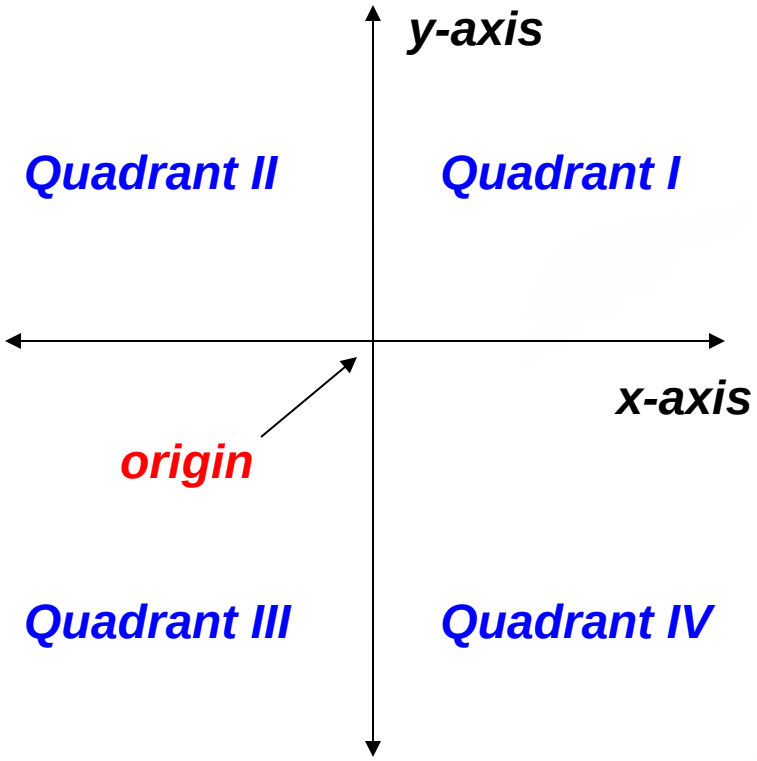
SWBAT graph points on the coordinate plane and analyze data using scatter plots

Concept: Unit 1

Tools of Algebra

Unit 1 Test Soon!

Label the coordinate plane…

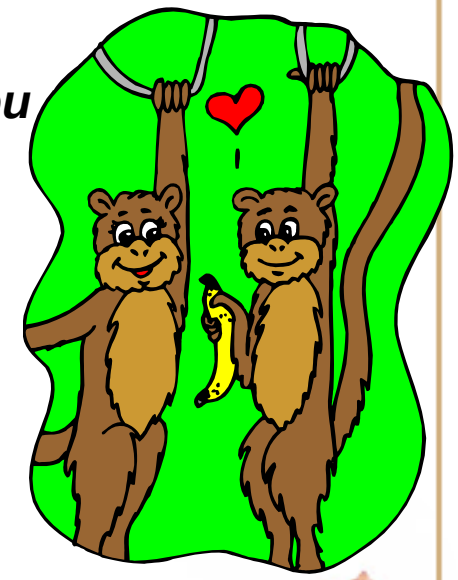


$(-2, 5)$ ***represents an ordered pair. This tells you where a point is on the coordinate plane.***

$(-2, 5)$

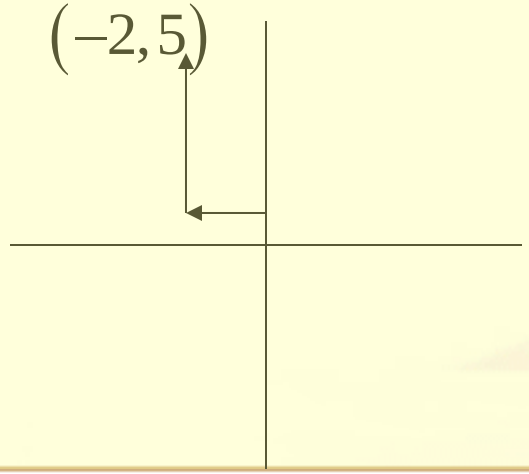
x-coordinate or abscissa

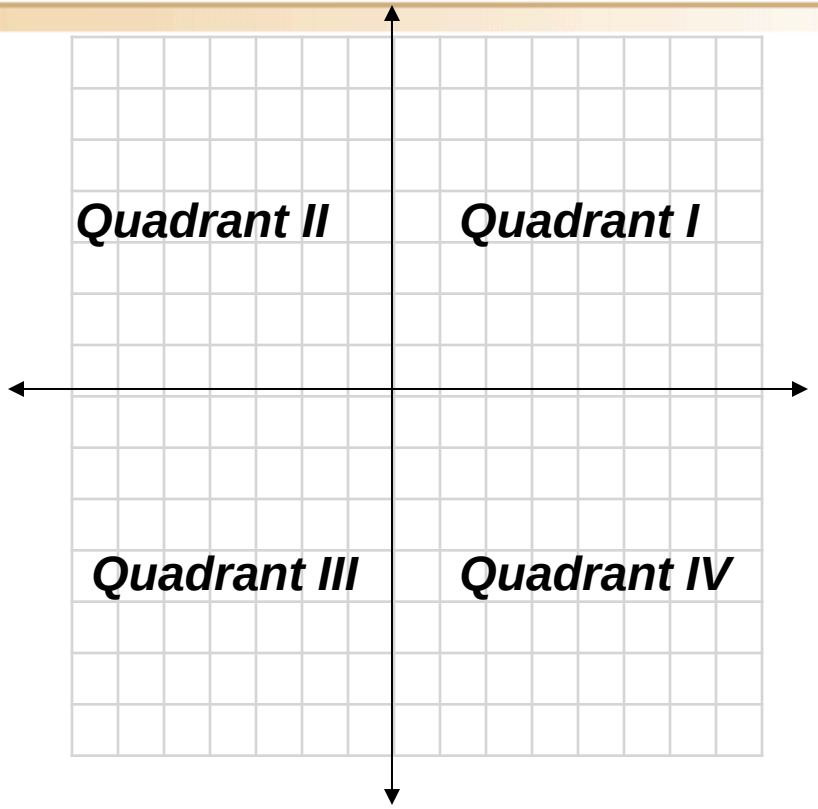
y-coordinate or ordinate



For this ordered pair, you would start at the origin, move to the left 2 and up 5

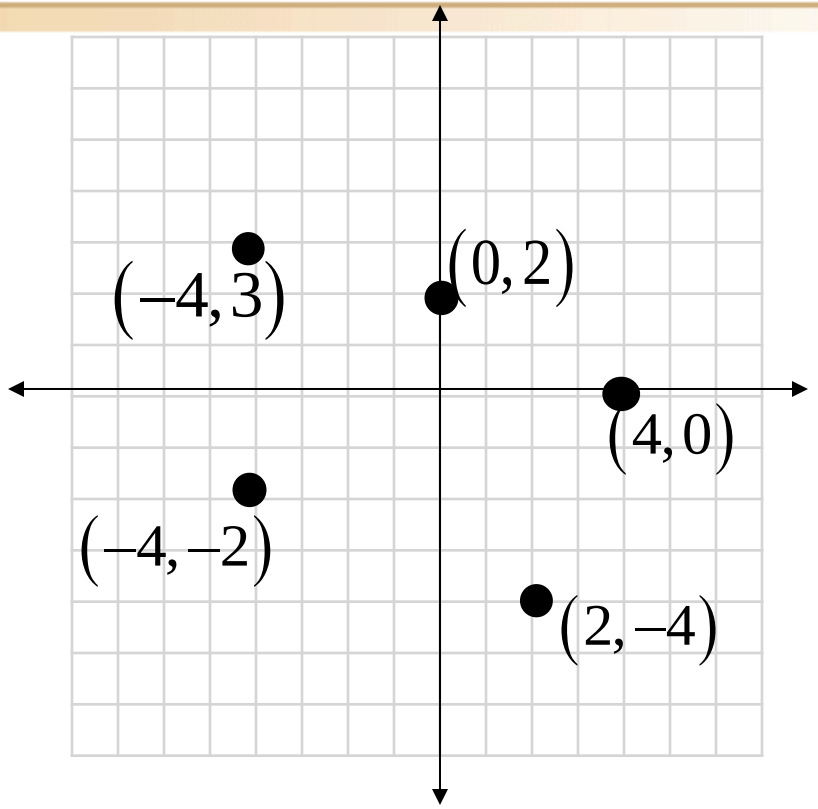
$(-2, 5)$





Describe the location – what quadrant or axis is the point located on?

Label the points



$(-4, 3)$ ***is in quadrant II***

$(-4, -2)$ ***is in quadrant III***

$(2, -4)$ ***is in quadrant IV***

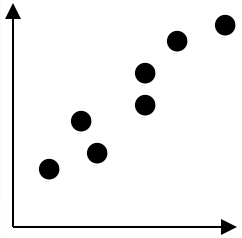
$(4, 0)$ ***is on the x-axis***

$(0, 2)$ ***is on the y-axis***

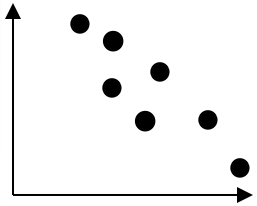
A Scatter plot represents data from two groups plotted on a coordinate plane.

A scatter plot shows a positive correlation, a negative correlation, or no correlation.

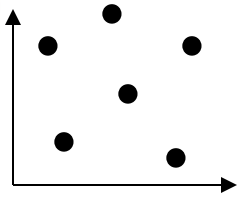
Examples:



Positive Correlation

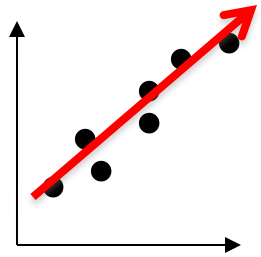


Negative Correlation

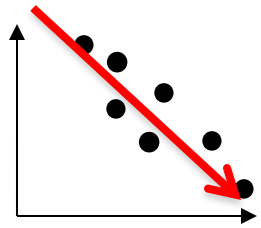


No Correlation

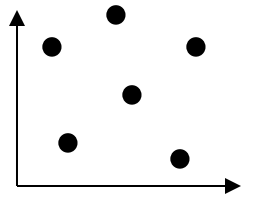
A trend line on a scatter plot shows a correlation more clearly. You will learn how to calculate the equation for a trend line later but for now, we can estimate this line by forming a line with equal amount of points above the line as there are below the line.



Positive Correlation



Negative Correlation



No Correlation with NO trend line.