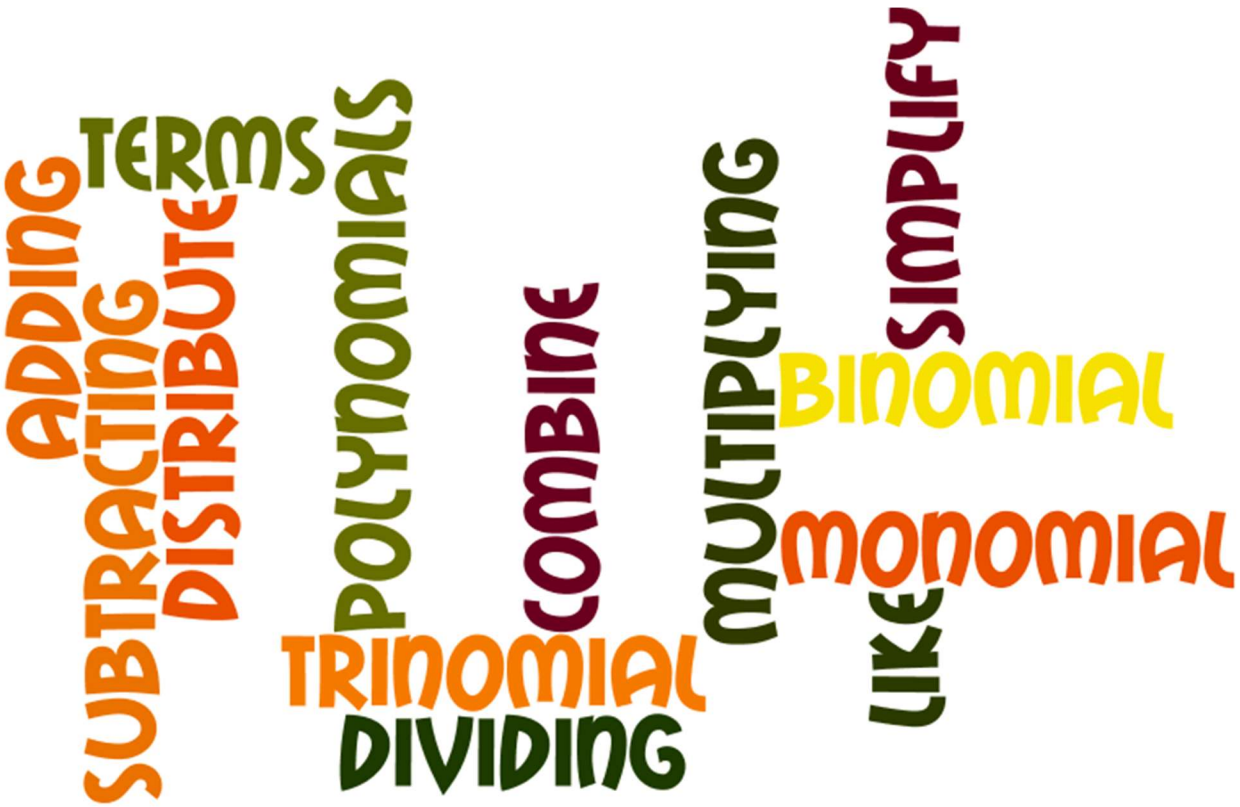
ALGEBRA 1

Unit 2



Operations with Functions

Created by: M. Signore & G. Garcia

Lesson #6: Intro to Polynomials

Do Now:

Directions: Read each statement. If you believe that a statement is true, write, "**agree**." If you believe that the statement is false, write, "**disagree**" and be ready to explain why you disagree!

1] _____ A variable is a symbol, usually a letter, used to represent an unknown value.

2] _____ $3x^2$ and $3x^3$ are like terms

3] _____ $3x^3 \bullet 3x^2 = 9x^5$

4] _____ An algebraic expression is a mathematical statement that contains an equal sign.

5] _____ $2x^2 + 3x$ is in simplest form, because $2x^2$ and $3x$ are not like terms, because like terms are expressions that contain the same variable raised to the same power.

6] _____ $5x^2y^3z^5$ is a polynomial.

7] _____ $x + x = x^2$

8] _____ $x \bullet x = x^2$

Monomials, Binomials, & Polynomials

Monomials:
(mono implies one)

contains 1 term

Word(s) similar:

Examples:

Binomials:
(bi implies two)

contains 2 unlike terms

Words similar:

Examples:

Trinomials:
(tri implies three)

contains 3 unlike terms

Words similar:

Examples:

Polynomials:
poly implies many

- contains many unlike terms
- A polynomial *cannot* have a variable in the denominator

Word(s) similar:

Examples:

Polynomial Dissection:

$-5w - 9 + w^2 + 1 - 10w + 17xy$

Terms	Constants
• part of an algebraic expression; separated by addition or subtraction signs	• the numbers that stand alone
Variables	**Coefficients**
• the letter(s) representing unknown quantities	• the number in front of the variable
Simplify:	**Standard Form:**

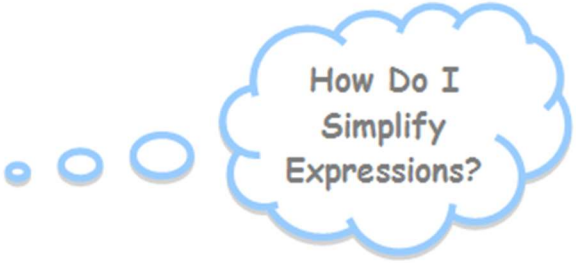
If there is no equal sign (=), then you are simplifying!!

Steps:

1st Distribute, if necessary.

2nd Collect like terms.

3rd Continue until there are **no parenthesis** & **no like terms!!!!!!**



Practice: Identify the following examples as **Polynomials** or **Not Polynomials** and justify your answer using the definitions above.

Expression	Poly or Not a Poly?	Why?
$3y$		
$\frac{x}{5} + \frac{y}{3}$		
$12x^2 + 2y^3$		
$4x + 2y - 3z$		

Once an expression has been identified as a polynomial, it can be further classified into the type of polynomial

Expression	Classification	Why
$4z^2 + 3y$		
$-9abc$		

Draw arrows to match the 4 expressions below with their classification.

a) $4b + 5c$	monomial
b) $3xyz + 2xy + 1$	binomial
c) $-14b - 2ab + 13abc - 11$	trinomial
d) $xy/z - 2$	polynomial

QUICK CHECK

Multiple Choice:

1) What type of expression is $2b - 11 + 4b^2$?
   a. Monomial
   b. Trinomial
   c. Binomial
   d. Not a polynomial

Why?

_____

2) Which of these terms is a binomial?
   a. $4 + 17$
   b. $3 - b^2$
   c. $b^{-4} + 29$
   d. $-4xyz^3$

Why?

_____

3) Which of the following is classified as a monomial?
   a. $-5x^{-2}$
   b. $\frac{n}{m}$
   c. $\sqrt{y}$
   d. $-x^3$

Why?

_____

Identify each polynomial below with its more specific classification: monomial (m), binomial (b), trinomial (t), or polynomial (p).

a) $4ab$ _____ b) $-14y - xy + y^3$ ___ c) $5n^2 + 3/m - 140$ ___

d) $18 + x^2$ _____ e) $11v + b^2 - 7a^3$ ___ f) $ax - 14a + x^2$ ___

g) $k^2 - 15k - 3 + k^4$ _____ h) $14nk^3$ ___ i) $3ab^3 - 99c$ ___

Lesson #7: Simplifying Expressions

Do Now:

Like Terms

Expression	How many terms are there?	What are the terms?	What are the variables?	What is the constant?	What is the value of the coefficient(s)?
$2x + 7$	2	$2x$ and 7	x	7	2
$4p - 9$					
$p + 2u - h$					
$-.5w + 8$					
$9 + 8z - 12p$					
$d + k$					
6					
$-9t + 4e + 8$					

- One way to simplify an expression is to *"combine like terms."*

What does it mean to combine like terms?	

You can only combine terms that have the same _____ *and the same* _____.

Are each of the following pairs *like terms*? Justify why or why not?

a) $4x, 2x$

b) $6b^2, 6a^2$

c) $2xy, 5xy$

d) $3x, 3x^2$

Guided Practice: Simplify the following expressions

$-4xy + 12xy$	$y + y - 10x$
$-7 + x - 5 + 2x$	$-5y + -9y + 5x + -10x + 14y$
$6w^2 + 11w + 8w^2 - 15w$	$6x + 4 + 15 - 7x$

Independent Practice:

1. $5a + 2b - 5b + 9a$	2. $2c - 3 + 9d + 7 - 6d$
3. $j - 4k + 7 + 2j - 3k$	4. $4c + 7 - 3c + 8$

HW #7: Simplifying Expressions

1. $6d - e + 3d - 2e$	**2.** $3 + 2c + 5c + 2$	**3.** $2a + 3b - 5b + 7a$
4. $6c - 7 + d + 4 - 6d$	**5.** $b - 3n + 12 - 6b + 2n$	**6.** $9c - 4 - 13c + 6$
7. $23 + 8m + 4n - 5m - 27$	**8.** $8x - 2y + 3x + 5y$	**9.** $11a - 3b + 6a - 7b$
10. $7 + 2y - 8x$	**11.** $7x - 5y - 4x + 3y$	**12.** $7 - 5c - d + 9c + 2$

Lesson #8: Adding and Subtracting Polynomials

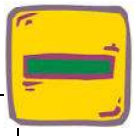
Adding Polynomials: aka "Combining Like Terms"

1) Line the like terms up vertically
2) Follow rules for addition with integers

Add: $5x - 1$, $3x + 4$, and $9x - 7$.	$(7a^2 - 3b + 4) + (-6a^2 - 5b)$
Find the sum of $5x^2 + 7x - 2$ and $9x^2 - 12x + 13$.	

Subtracting Polynomials:

Simply DISTRIBUTE the "-1" & then Combine Like Terms!



$(2x^2 - 4) - (x^2 + 3x - 3)$	$(-6m - 2q + 8) - (2m + 2q + 7)$

Subtract $2x^2 + 9x - 3$ from $5x^2 - 7x$.	Subtract $-8y^2 - y + 5$ from $2y^2 + 9$.

Independent Practice:

Perform the indicated operation for the following:

1] $(5x - 1) + (10x^2 + 7x)$	2] $(3x^2 - 1) - (2x^2 + 7x)$
3] $(20x^2 + 2) + (15x^2 - 8) + (3x^2 - 4)$	4] $(6x - 2y - 6) - (-3x - 5y - 4)$

BONUS: The lengths of the correct paths through a maze are represented by $3x^2 + 6$, $2x^2 - x$, $7x + 2$, $5x^2 - 3$, $-4x^2 + 1$, and $8x + 3$. Which of the followings represents the length of the correct path through the maze?

A] $6x^2 + 9$ B] $6x^2 + 14x + 9$ C] $14x^2 + 14x + 9$

Homework #8: Adding and Subtracting Polynomials

1) $(2p^3 + 6p^2 + 10p) + (9p^3 + 11p + 3p)$

2)
$$\begin{array}{r} 7w^3 + 19w^2 + 89 \\ +\ \ 2w^3\ -\ 5w^2\ +1 \end{array}$$

3)
$$\begin{array}{r} 7x^3 + 9x^2 + 9 \\ +\ 2x^3 + 5\_\_\_\_\_ \end{array}$$

4) $4a + (9a + 3)$

5) $8c + (7 - 9c)$

6) $r + (s + 2r)$

7) $(5 - 6y) + (-9y + 2)$

8) $(4x^2 - 7x + 5) - (x^2 + 11x - 9)$	
9) $(5x + 6) - (2x - 9)$	10) $3x^2 + 7x - 6 - (-x^2 - 11x + 15)$
11) $8x - (5y + 4x)$	12) $-x^2 - 11x + 15 - (3x^2 + 7x - 6)$

Classwork: Adding and Subtracting Polynomials

Identify if the polynomial is a monomial, a binomial, or a trinomial.

1) $2a+3b-c$	2) $5x^4y^2z$
3) $4xy^2-7$	4) What does descending order of exponents mean?

Simplify the polynomial.

1) $-6x-y-2x+4y$	2) $n^2-5n+6n^2+8n-5n^2$
3) Add $6y+12$ and $-2y-9$	4) $(4+3n+5n^2)-(-2-n+3n^2)$

5) $(2x-5)+(x-2)$	6) $(2y^2-3y-6)-(y^2+7y-4)$
7) $(-3u^2v-2uv^2)+(7u^2v-2uv^2+v^3)$	8) Subtract $a-6$ from $3a+12$
9) Subtract $\left(3z^2+2z+1\right)$ from $\left(z^2-4z\right)$	10) $\left(2k^2+1\right)+\left(k^2-2k+5\right)$

Adding & Subtracting Polys Regents Test

1) What is $9 + 2y^2$ - 11y increased by $13y^2$ - 7 + 2y?
A) $15y^4$ - $9y^2 + 2$ B) $15y^2$ - 9y - 2 C) $15y^2 + 9y + 2$ D) $15y^2$ - 9y + 2

2) The Valdez family is filling their swimming pool. The pool will hold $10m^2 + 12m$ - 16 gallons of water. If the tank truck has already delivered $7m^2$ - 8m + 12 gallons, how many more gallons of water, in terms of *m*, must be delivered to fill the pool?
Show your work.

Answer: _____ gal

Questions 4 through 6 refer to the following:

Write the given sum as a polynomial in standard form:

4) $(3x^2 - 5x + 9) + (7x^2 + 8x - 15)$
Answer: _____

5) $(9x^2 - 5x - 9) + (-7x^2 + 4x + 6) + (2x^2 - 11x - 4)$
Answer: _____

6) $\left(\frac{5}{8}x^3 - \frac{2}{5}x^2\right) + \left(\frac{2}{5}x^3 + \frac{5}{8}x^2\right)$
Answer: _____

7) The perimeter of a triangle is $24x - 6$. If two of the sides measure $5x - 7$ and $2x + 5$, then how long is the third side in terms of x?
Show your work.

Answer: _____

8) The sum of $3x^2 + x + 8$ and $x^2 - 9$ can be expressed as
A) $3x^4 + x - 1$ B) $4x^4 + x - 1$ C) $4x^2 + x - 1$ D) $4x^2 + x - 17$

9) What is the difference of $7c^2 + c - 8$ taken from the sum of $9c^2 + 5c - 3$ and $c^2 - 7c - 4$?
A) $10c^2 - 2c - 7$ B) $-10c^2 + 2c + 7$ C) $-3c^2 + 3c - 1$ D) $3c^2 - 3c + 1$

10) When $-2x^2 + 4x + 2$ is subtracted from $x^2 + 6x - 4$, what is the result?
A) $3x^2 + 2x - 6$ B) $2x^2 - 2x - 6$ C) $-x^2 + 10x - 2$ D) $-3x^2 - 2x + 6$

Questions 11 through 14 refer to the following:

Express the given difference as a polynomial in standard form:

11) $5x^2 - 4x + 7 - (2x^2 - 3x - 4)$

Answer: _____

12) $(7x^2 - 5x + 2) - (-3x^2 + 8x - 4)$

Answer: _____

13) $7x^2 - 8x + 2 - (3x^2 - 5x - 6)$

Answer: _____

14) $(5x^2 - 9x + 3) - (-4x^2 + 3x - 5)$

Answer: _____

15) The expression $(x^2 - 5x - 2) - (-6x^2 - 7x - 3)$ is equivalent to

A) $7x^2 - 12x - 5$ B) $7x^2 + 2x + 1$ C) $7x^2 + 2x - 5$ D) $7x^2 - 2x + 1$

16) The perimeter of a triangle is $15x - 8$. If two of the sides measure $2x - 5$ and $3x + 7$, then how long is the third side in terms of x?
Show your work.

Answer: _____

17) The sum of $3x^2 + 4x - (2)$ and $x^2 - 5x + 3$ is

A) $4x^2 - x + 1$ B) $4x^2 + x + 1$ C) $4x^2 - x - 1$ D) $4x^2 + x - 1$

Express the given expression as the sum (or difference) of monomials:

18) $\left(\frac{1}{3}x^3 - \frac{1}{2}x^2\right) - \left(\frac{2}{3}x^3 - \frac{3}{2}x^2\right)$

Answer: _____

---

19) What is the difference of $3x^2 - 8x - 4$ from $8x^2 - 5x - 1$?

A) $5x^2 - 13x + 3$ B) $5x^2 + 3x + 3$ C) $-5x^2 - 3x - 3$ D) $5x^2 + 3x - 5$

Lesson #9: The Distributive Property

KEY VOCABULARY

_____ _____ are expressions that have the same value for all values of the variables.

Ex. $3(x + 2) = 3x + 3(2)$

The Distributive Property

Algebra	**Examples**
Over Addition	
$a(b + c) = ab + ac$	$3(4 + 2) = 3(\_\_\_) + 3(\_\_\_)$
$(b + c)a = ba + ca$	$(3 + 5)2 = \_\_\_(2) + \_\_\_(2)$
Over Subtraction	
$a(b - c) = ab - ac$	$5(6 - 4) = \_\_\_(\_\_\_) - \_\_\_(\_\_\_)$
$(b - c)a = ba - ca$	$(8 - 6)4 = \_\_\_(\_\_\_) - \_\_\_(\_\_\_)$

Examples

1. $3(x + 2) =$

   $3(\_\_\_) + 3(\_\_\_)$

   _____

2. $2(r - 4) =$

   $2(\_\_\_) - 2(\_\_\_)$

   _____

3. $(n + 6)n$

   $\_\_\_(\_\_\_) + \_\_\_(\_\_\_)$

   _____

Your Turn

1. $2(x + 3)$	2. $(2 - n)8$	3. $4(y + 2)$
4. $6(4 - x)$	5. $n(n - 9)$	6. $3m(m - 5)$

DISTRIBUTING A NEGATIVE can be TRICKY! Follow the same steps shown earlier; just **BE CAREFUL WITH YOUR NEGATIVES!**

Examples

4. $-2(x + 7) =$

   $= (\_\_\_)(x) + (\_\_\_)(7)$ Distribute _____ .

   $=$ _____ + _____ Simplify.

   $=$ _____

5. $(5 - y)(-3y) =$

   $= (\_\_\_)(-3y) - (\_\_\_)(-3y)$ Distribute _____ .

   $=$ _____ - _____ Simplify.

   $=$ _____

6. -(2x - 11) =

= (___)(2x) - (___)(11) Distribute _____ .

= _____ - _____ Simplify.

= _____

Your Turn

7. -5(n + 4)	8. -(4 - y)	9. (m - 5)(-3m)
10. -a(3 + a)	11. -(2x - 11)	12. $-\frac{3}{4}(p-1)$

Distribute BEFORE combining like terms.

Examples

1. 2(6x - 4) + x = _____(6x) - ___ (4) + x Distribute _____ .

= _____ - _____ + x Simplify.

= _____ Combine like terms.

2. -2(m + 5) - 4x = (_____)(m) + (_____)(5) - 4x Distribute _____ .

= _____ + _____ - 4x Simplify.

= _____ Combine like terms.

= _____ Rewrite as _____.

3. $x - 3(x - 4)$ = _____ Distribute _____.

= _____ Simplify.

= _____ Combine like terms.

Your Turn

1. $2(4a + 1) + a$	2. $3(2 - c) - c$	3. $6r + (r + 4)2$
4. $15t - (t - 4)$	5. $-6(v + 1) + v$	6. $6(5 - z) + 2z$

HW #9: The Distributive Property

1. $5(2x - 11)$	2. $-7(5x - 4)$
3. $-2(6x + y)$	4. $3(6x - 5)$
5. $10(12 - 2k)$	6. $-4(-8 - 4y)$
7. $7(2 + 3x) + 8$	8. $9 + 5(4x + 4)$
9. $12 + 3(x + 8)$	10. $3(7x + 2) + 8x$

The Distributive Property Regents Test

1) $4(7x - 8) + 6(5x + 10)$	2) $6(4x^2 - 5x + 2) + 3(-8x^2 + 11x + 4)$
3) $5(4x^2 - 8x + 3) - 7(6x^2 - 4x + 11)$	4) $4(6x^3 - 4x^2 + 7x + 1) - 9(4x^3 - 2x^2 - 6x)$
5) $10(4x^2 + 8x + 7) - 8(5x^2 + 10x - 9)$	6) $6(4x^2 - 3x + 2) + 5(3x - 6)$
7) $9(4x^2 - 7x + 12) - 12(3x^2 - 5x - 9)$	8) $4(6x^3 - 4x^2 + 11) - 7(5x^2 + 9)$

Lesson #7,8,9 Practice

1. _____Term	a. The number in front of a variable. (Big number)
2. _____Constant	b. A letter.
3. _____ Coefficient	c. A number that is by itself
4. _____Variable	d. Two or more terms that have the same variables/exponents or two terms that have no variables.
5. _____Exponent	e. A number, a variable or the product of a number and a variable.
6. _____What are like terms?	f. 1
7. Expression	g. Shows a mathematical relationship. The difference between this and an equation is that there is no solution to this.
8. The exponent, if not shown, of any variable or number is ____?	h. Raised to the power of (Little number)

Simplify the following:

$7x + 5 - 3x$	$6w^2 + 11w + 8w^2 - 15w$	$6x + 4 + 15 - 7x$
$(12x - 5) - (7x - 11)$	$(2x^2 - 3x + 7) - (-3x^2 + 4x - 7)$	$11a^2b - 12ab^2$

$4(7x - 8) + 6(5x + 10)$	$6(4x^2 - 5x + 2) + 3(-8x^2 + 11x + 4)$
$5(4x^2 - 8x + 3) - 7(6x^2 - 4x + 11)$	$4(6x^3 - 4x^2 + 7x + 1) - 9(4x^3 - 2x^2 - 6x + 1)$
$10(4x^2 + 8x + 7) - 8(5x^2 + 10x - 9)$	$6(4x^2 - 3x + 2) + 5(3x - 6)$
$9(4x^2 - 7x + 12) - 12(3x^2 - 5x - 9)$	$4(6x^3 - 4x^2 + 11) - 7(5x^2 + 9)$
$3(12x^4 - 16x^3 + 4x^2 - 8x + 24) - 4(9x^4 - 12x^3 - 3x^2 - 6x + 18)$	

Lesson #10: Multiplying Monomials

Expression	Expanded Form	Simplified
1) $4^3 \bullet 4^2$	$4 \bullet 4 \bullet 4 \bullet 4 \bullet 4$	
2) $(8^2)(8^4)$		
3) $x^4 \bullet x$		

Expression	Expanded Form	Simplified
1) $(w^2)^3$	$(w^2)\ (w^2)\ (w^2)$	
2) $(p^5)^2$		
4) $(6x^5)^2$		

Tool Box for Multiplying Polynomials:

Multiplying Signed Numbers:	Exponent Law:
(+) • (+) = (+) • (-) =	$x^a \bullet x^b = x^{a+b}$
(-) • (+) = (-) • (-) =	Simplify: $x^4 \bullet x^3$

Simplify:

1) $3x^2 \cdot 2x^3$	2) $(ax^3)(a^2x^2)$	3) $-4y \cdot y^2 \cdot 3y^3$
4) $(x^5)^2$	5) $(3r^2)^2$	6) $(ax^2)^4$
7) $(x^2y^3)(4xy^4)^2$		

Multiplying Monomials:

Type	Expression	Observations
monomial • monomial	$(4x^3) \cdot (3x^2)$	
monomial • binomial	$x(x + 17)$	
monomial • trinomial	$2x(x^2 + 5x - 6)$	
monomial • polynomial	$2x (-3x + 2y - 4)$	

Directions: Simplify each expression. Show all work *or* explain what you did

1) $3x^2 \cdot 5x^7$	2) $5w^8 \cdot 7w^3$
3) $(7p^3)(-2p^5)$	4) $8p^4m^2 \cdot 4p^5m^3$
5) $10d(2a - 3c + 4b)$	6) $4(3 - 6a + 8s)$
7) $3xy(4x^2 - 3y + 2)$	8) $(-2m^7)^4$

HW#10: Multiplying Monomials

Multiply the following monomials. Write answers in simplest form

1. $(3xy)(2x^3y)$	2. $(-x^4y)(-5x^2y^3)$
3. $(x^3)^2$	4. $(4x^3)^2$
5. $(-6x^3y^6)^2$	6. $(-2x)(x^2y)(4x^3y^3)$
7. $(5a^2)(a^3 - 2a^2 - 1)$	8. $-5c(4c^2 - 2c)$
9. $5r^2s^2(-2r^2 + 3rs - 4s^2)$	10. $3xy(x^2 + xy + y^2)$

Lesson #11: Multiplying Binomials (Box Method)

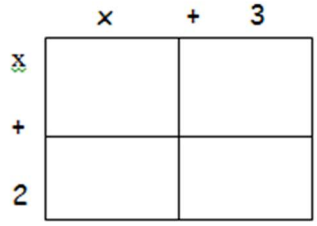
Do Now: How do you think you would multiply $(m + 8)^2$?

"BOX" METHOD FOR MULTIPLYING BINOMIALS

Multiplying two binomials is very much like finding the area of a rectangle with those binomials as dimensions. The box method for multiplication can be helpful in understanding this concept.

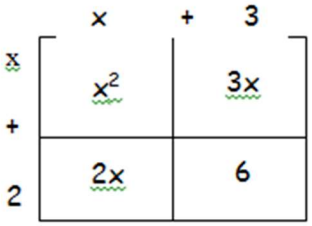
Example: To multiply **(x + 3) by (x + 2),**

First set the dimensions on the box:



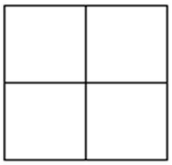
Next, find the area of each individual rectangle
From this, we can see that the area is:

$A = x^2 + 3x + 2x + 6$



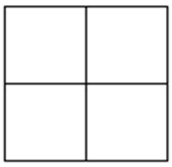
***Now try these:**

1. (x + 8) by (x + 2)



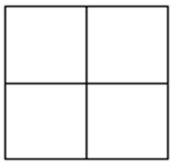
Area: _____

2. (x + 5) by (x + 6)



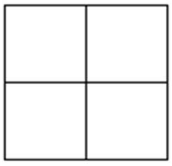
Area: _____

3. (x + 3) by (x – 4)
(Be Careful!)



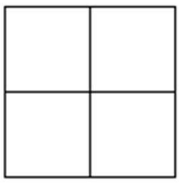
Area: _____

4. (x – 5) by (x + 1)



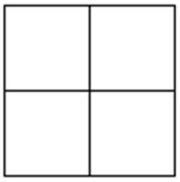
Area: _____

5. (x + 5) by (x + 6)



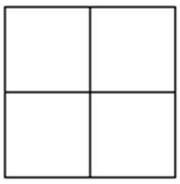
Area: _____

6. (2x + 1) by (x + 7)
(Be Careful!)



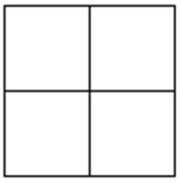
Area: _____

7. (x + 7) by (x + 5)



Area: _____

8. (2x + 2) by (x + 3)



Area: _____

HW #11: Multiplying Binomials

1) $(y + 8)^2$	2) $(6x + 7)(6x - 7)$
3) $(5x + 2)^2$	4) $(7x + 7)(2x - 4)$
5) $(3x - 5)(3x - 5)$	6) $(5 - 3x)(5 - 3x)$

The Box Method Regents Test

1) The expression $(x - 4)^2$ is equivalent to

A) $x^2 - 16$ B) $x^2 + 8x + 16$ C) $x^2 + 16$ D) $x^2 - 8x + 16$

2) What is the product of $(x + 3)$ and $(x + 2)$?

Answer: _____

3) What is the product of $(4 + 3x)(4 - 3x)$?

Answer: _____

4) What is the product of $(y - 3)^2$?

Answer: _____

Questions 5 through 8 refer to the following:

Represent the given product of the two binomial expressions as the sum of monomials:

5) $(a + 6)(a + 8)$

Answer: _____

6) $(m + 3n)(m - 5n)$

Answer: _____

7) $(x + 5)^2$

Answer: _____

8) $\left(\frac{1}{3}x - \frac{1}{2}\right)\left(\frac{1}{3}x + \frac{1}{2}\right)$

Answer: _____

9) $(y + 3)(5y + 1)$

Show your work.

10) $(6y - 5)(4y - 3)$

Show your work.

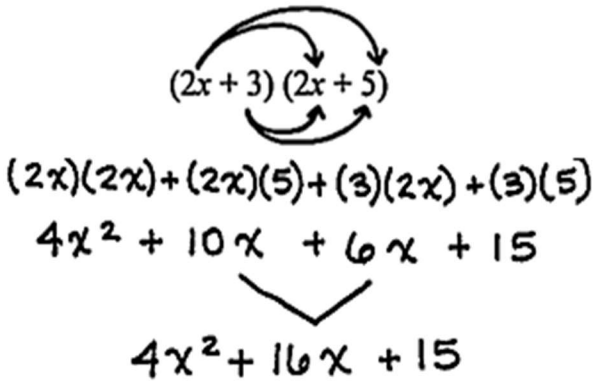
Lesson #11 cont'd: Multiplying Binomials

(Double Distribution)

Do Now: multiply $(3a+b)(4a+8b)$

Double Distribution

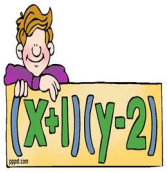
1)



Steps:

1) Double Distribute
   (*Multiply each term by each other term*)
2) Keep the signs
   (*between each term*)
3) Combine Like Terms

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



You Try:

1) $(x + 2)^2$	2) $(8x + 10)\,(x + 1)$
3) $(4x - 9)(4x + 9)$	4) $(4x - 9)^2$
10) $(7x - 11)\,(x - 4)$	11) $(6x + 3)\,(8x + 5)$

HW #11 cont'd: Multiplying Binomials

1) $(x + y)^2$	2) $(x + y)(x - y)$
3) $(c - 5)(3c - 1)$	4) $(8 - c)(3 - c)$
5) $(5 - 3x)(-5 - 3x)$	6) $(-2x + 3)(-2x - 3)$

Double Distribution Regents Test

Questions 1 through 6 refer to the following:

Represent the given product of the two binomial expressions as the sum of monomials:

1) $(p + 6)(8p - 11)$
Answer: _____

2) $(2x + 1)(x + 5)$
Answer: _____

3) $(x + 7)(x - 2)$
Answer: _____

4) $(9a + 5b)(9a - 5b)$
Answer: _____

5) $(5y - 2)(y - 4)$
Answer: _____

6) $(p + q)(p - q)$
Answer: _____

Questions 7 and 8 refer to the following:

Use the distributive law to write the given algebraic expression as a polynomial in standard form:

7) $(y + 3)(5y + 1)$
Show your work.

Answer: _____

8) $(y - 9)(13y - 2)$
Show your work.

Answer: _____

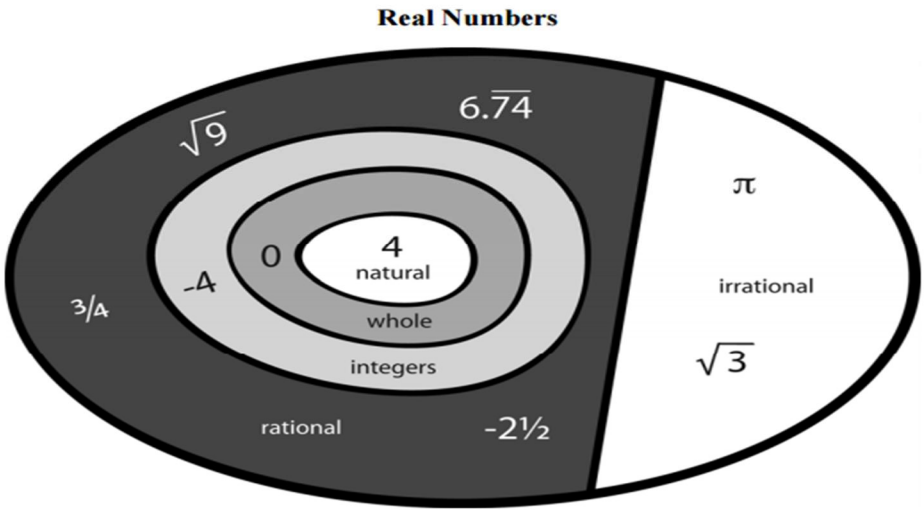
9) What is the product of $(6r - s)(r + 2s)$?
Answer: _____

10) What is the product of $(x - 8)(x + 9)$?
Answer: _____

Lesson #12: Dividing Polynomials

Do Now: Multiply the following binomials using a method of your choice

(y+3) (y-4)



Natural Numbers: The counting numbers: {1, 2, 3 …}

Whole Numbers: The set of counting numbers plus zero: {0, 1, 2, 3 …}

Integers: The set of natural numbers and their opposites plus zero: {…–3, –2, –1, 0, 1, 2, 3 …} The set of integers does not include decimals or fractions.

Rational Numbers: Numbers that can be expressed as the ratio of two integers. Decimal representations of rational numbers either terminate or repeat.
Examples: 2.375, 4, –0.25, $-0.\overline{14}$

Irrational Numbers: Numbers that cannot be expressed as a ratio of two integers. Their decimal representations neither terminate nor repeat.
Examples: π, $\sqrt{3}$, 0.141141114111141…

Real Numbers: The set of rational and irrational numbers

Steps for Dividing Monomials:

1st Divide Coefficients "plain numbers"

2nd Subtract Exponents

Simplify

Dividing Monomials:

1] Simplify $\frac{8a^2}{4}$	2] $\frac{12a}{4}$
3] $\frac{-12x^3y^5}{-6x^3y}$	4] $\frac{-30x^{10}}{6x^2}$

You Try:

1] Simplify: $\frac{36x^3}{24x}$	2] Simplify: $\frac{-6mn^4}{-24m^5n^2}$
3] Simplify: $\frac{14a^2bc}{42ab^3c^4}$	4] Simplify: $\frac{30x^3y^5}{-5x^3}$

Dividing POLYNOMIALS by Monomials:

1) Divide each term of the polynomial by the monomial.
2) Hints about your answers:
   * *If you are dividing a trinomial, your answer will be a trinomial.*
   * *If you are dividing a binomial, your answer will be a binomial.*
   * *If you are dividing a monomial, your answer will be a monomial.*

Example: **Divide $(12x^5 + 15x^3 - 6x^2) \div (3x^2)$**

The other way to write a division problem.

Notice the long fraction bar means all terms are being dividing by $3x^2$.

$$\frac{12x^5 + 15x^3 - 6x^2}{3x^2}$$

My Division Work

$$\frac{12x^5}{3x^2} + \frac{15x^3}{3x^2} - \frac{6x^2}{3x^2}$$

$$4x^3 + 5x - 2 \text{ Answer}$$

Let's Try:

1) $\frac{8n^3 + 4n}{2n}$	2) $\frac{6x^5 - 9x^2}{3x^3}$
3) $\frac{-14n^4 - 21n^3}{7n^3}$	4) $\frac{4x^5 - x^4}{-x^3}$

5) $\frac{2x^3 - 5x^2 + 3x}{x}$	6) $\frac{15x^3 + 9x^2 + 6x^2}{3x}$
7) $\frac{4x^5 + 16x^4 + 8x^3}{-4x^2}$	8) $\frac{6x^6 + 6x^5 - 6x^4}{3x^3}$

Practice: Find each quotient.

1. $(20x^2 + 12x) \div 4x$	**2.** $(18n^2 + 6n) \div 3n$
3. $(b^3 - 12b^2 + 6b) \div 2b$	**4.** $(8r^4 + 4r^2 - 20r) \div 4r$
5. $\frac{12p^3r^2 + 18p^2r - 6pr}{6pr}$	**6.** $(6q^2 - 18q - 9q) \div 9q$

HW #12: Dividing Polynomials

Find each quotient:

$\frac{33y^4 + 11y^3 - 44y^2}{11y}$	$\frac{4u^3 + 10u^2 - 6u}{2u}$
$\frac{8r^4 - 4r^3 - r^2}{-2r}$	$\frac{x^2y - xy^2 - xy}{xy}$
$\frac{6c^3d - 12cd^3 - 15cd}{3cd}$	$\frac{10a^2b - 15ab^2}{5ab}$
$(12a^5 + 2a^3) \div (2a^2)$	$\frac{28r^3s^2 + 42r^2s^3 - 56r^3s^3}{-7r^2s^2}$