Algebra I
Lesson 9-2

- I can factor polynomials by using the Distributive Property.
- I can solve quadratic equations of the form $ax^2 + bx = 0$.

$$2a(6a + 8) = 2a(6a) + 2a(8)$$
$$= 12a^2 + 16a$$

$12a^2 + 16a =$ $2a(6a + 8)$

_____Factoring_____ a polynomial means finding its _____completely_____ factored form.

Use the Distributive Property to factor each polynomial.

$12a^2 + 16a$

$12a^2 = 2 \cdot 2 \cdot 3 \cdot a \cdot a$

$16a = 2 \cdot 2 \cdot 2 \cdot 2 \cdot a$

$GCF = 2 \cdot 2 \cdot a = 4a$

$12a^2 + 16a = 4a(3a + 4)$

$3a^5b - a$

$3a^5b = 3 \cdot a \cdot a \cdot a \cdot a \cdot a \cdot b$

$-a = a \cdot -1$

$a(3a^4b - 1)$

$21cd - 3d$

$21cd = 3 \cdot 7 \cdot c \cdot d$

$3d = 3 \cdot d$

$3d(7c - 1)$

$18cd^2 + 12c^2d + 9cd$

$18cd^2 = 2 \cdot 3 \cdot 3 \cdot c \cdot d \cdot d$

$12c^2d = 2 \cdot 2 \cdot 3 \cdot c \cdot c \cdot d$

$9cd = 3 \cdot 3 \cdot c \cdot d$

$3cd(6d + 4c + 3)$

$18cd^2 + 12c^2d + 9cd$

The Distributive Property can also be used to factor some polynomials having ___four___ or ___more___ terms. This method is called ___factoring___ ___by___ ___grouping___ because pairs of terms are grouped together and factored. The Distributive Property is then applied ___a second time___ to factor a common ___binomial___ factor.

$(4ab + 8b) + (3a + 6)$

$4b(a+2) + 3(a+2)$

$(a+2)(4b+3)$

$4ab+3a+8b+6$

Recognizing binomials that are additive inverses is often helpful when factoring by grouping.

$(x^2+5x)+(7x+35)$

$x(x+5)+7(x+5)$

$(x+5)(x+7)$

$(35x - 5xy) + (3y - 21)$

$5x(7-y)+3(y-7)$

$5x(-y+7)+3(y-7)$

$-5x(y-7)+3(y-7)$

$(y-7)(-5x+3)$

$-5xy+3y+35x-21$

$(6a^2 - 15a) + (8a + 20)$

$3a(2a - 5) + 4(-2a + 5)$

$4 \cdot -1(2a - 5)$

$(3a)(2a-5) + (-4)(2a-5)$

$(2a-5)(3a + -4)$

$(2a-5)(3a-4)$

Factoring by Grouping

A polynomial can be factored by grouping if all of the following situations exist.

There are 4 or more terms
The terms with common factors can be grouped together
The two common factors are identical or additive inverses of each other

$2x^2 + 3x + 4xy + 5xy^2$

$x(2x + 3 + 4y + 5y^2)$

Assignment

Pg. 484 #16-38 even, 40-41

due Friday

Some equations can be solved by factoring. Consider the following products.

$6(0) =$

$0(-3) =$

$(5 - 5)(0) =$ (0)(0)

$-2(-3 + 3) =$

The Zero Product Property states that if the product of two factors is zero, then at least one of the factors must be zero.

For any real numbers a and b, if $ab = 0$, then either $a = 0$, $b = 0$, or both a and b equal 0.

Solve $(d-5)(3d+4)=0$. Then check the solutions.

$d-5=0$ or $3d+4=0$

$+5\ +5$ $\quad -4\ -4$

$d=5$ $\quad \frac{3d}{3}=\frac{-4}{3}$

$d=-\frac{4}{3}$

$\left\{-\frac{4}{3}, 5\right\}$

Solve $x^2=7x$. Then check the solutions.

$x^2=7x$

$-7x\ -7x$

$x^2-7x=0$

$x(x-7)=0$

$x=0$ or $x-7=0$

$x=7$

$\{0,7\}$

$7d^2-35d=0$

$7d(d-5)=0$

$7d=0$ or $d-5=0$

$d=0$ $\quad d=5$

$\{0,5\}$

$x^2-24x=0$

$x(x-24)=0$

$x=0$ or $x-24=0$

$x=24$

$\{0,24\}$

Assignment

Pg. 485 #48-58 even, 60-61