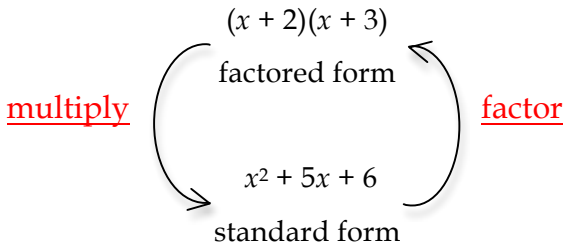
Algebra 1: 12.3 Guided Notes **Name** _____ **Period** _____
Factoring Polynomials



Factor Out the (GCF) Greatest Common Factor

Steps:

1) *Find the GCF, if possible*
   a. *What is the* greatest integer *that all the terms have in common?*
   b. *Do all terms have a variable? If so, find the variable with the smallest exponent.*
2) *Divide each term by the GCF. Don't forget the quotient rule for exponents!*
3) *Rewrite the polynomial as a product of the GCF and the remaining terms.*

Quotient Rule

$$\frac{x^a}{x^b} = x^{a-b}$$

Factor out the GCF, if possible.

1. $4x+12$

   $GCF = 4$

   $\frac{4x}{4}+\frac{12}{4}=x+3$

   $4(x+3)$

2. x^3-5x

   $GCF = x$

   $\frac{x^3}{x}-\frac{5x}{x}=x^2-5$

   $x(x^2-5)$

3. $3x^2-9x-3$

   $GCF = 3$

   $\frac{3x^2}{3}-\frac{9x}{3}-\frac{3}{3}=x^2-3x-1$

   $3(x^2-3x-1)$

4. $5x^2-10x+5$

   $GCF = 5$

   $\frac{5x^2}{5}+\frac{-10x}{5}+\frac{5}{5}=x^2-2x+1$

   $5(x^2-2x+1)$

5. $2x-11$

   No GCF.

6. $-7x^3-14x^2$

   $GCF = -7x^2$

   $\frac{-7x^3}{-7x^2}+\frac{-14x^2}{-7x^2}=x+2$

   $-7x^2(x+2)$

How can you check to see if you factored out the GCF correctly?

Use the Distributive Property to multiply the GCF and the remaining terms in parenthesis. You should get the standard form of the polynomial.

Factor Trinomials of the Form $1x^2 + bx + c$

Steps:

1) *List the factor pairs of* $a \cdot c$.
2) *Find the factor pair whose sum equals* $\boldsymbol{b}$.
3) *Rewrite the trinomial as the product of two binomials, (x + 1st factor)(x + 2nd factor).*

Factor each polynomial.

1. $x^2 + 7x + 6$

   $a = 1,\ b = 7,\ c = 6$

   Factors Pairs of 6 $(a \cdot c)$

   $1 \cdot 6$

   $2 \cdot 3$

   Sum = 7 (b)

   $1 + 6 = 7$ ✓

   $x^2 + 7x + 6 = (x + 1)(x + 6)$

2. $x^2 + 5x + 4$ *All terms are positive!*

   $a = 1,\ b = 5,\ c = 4$

   Factors Pairs of 4 $(a \cdot c)$

   $1 \cdot 4$

   $2 \cdot 2$

   Sum = 5 (b)

   $1 + 4 = 5$ ✓

   $x^2 + 5x + 4 = (x + 1)(x + 4)$

3. $x^2 - 6x + 9$ *The middle term is negative!*

   $a = 1,\ b = -6,\ c = 9$

   Factors Pairs of 9 $(a \cdot c)$

   $-1 \cdot (-9)$

   $-3 \cdot (-3)$

   Sum = –6 (b)

   $-3 + (-3) = -6$ ✓

   $x^2 - 6x + 9 = (x - 3)(x - 3)$

4. $x^2 + 5x - 6$ *The last term is negative!*

   $a = 1,\ b = 5,\ c = -6$

   Factors Pairs of –6 $(a \cdot c)$

   $1 \cdot (-6)$ or $-1 \cdot 6$

   $2 \cdot (-3)$ or $-2 \cdot 3$

   Sum = 5 (b)

   $-1 + 6 = 5$ ✓

   $x^2 + 5x - 6 = (x - 1)(x + 6)$

5. $x^2 + 10x + 16$

   $a = 1,\ b = 10,\ c = 16$

   Factors Pairs of 16 $(a \cdot c)$

   $1 \cdot 16$

   $2 \cdot 8$

   $4 \cdot 4$

   Sum = 10 (b)

   $2 + 8 = 10$ ✓

   $x^2 + 10x + 16 = (x + 2)(x + 8)$

6. $x^2 - 3x - 18$ *The middle & last terms are negative!*

   $a = 1,\ b = -3,\ c = -18$

   Factors Pairs of –18 $(a \cdot c)$

   $1 \cdot (-18)$ or $-1 \cdot 18$

   $2 \cdot (-9)$ or $-2 \cdot 9$

   $3 \cdot (-6)$ or $-3 \cdot 6$

   Sum = –3 (b)

   $3 + (-6) = -3$ ✓

   $x^2 - 3x - 18 = (x + 3)(x - 6)$