

## 9-2 Multiplying and Factoring

Rules for Multiplying Polynomials:

- There are **NONE** . . . . well, except to **DISTRIBUTE**
- You can multiply **ANY** two polynomials by each other!

**Monomial x Polynomial** - Distribute the Monomial

$$\begin{aligned}
 -4y^2 (5y^4 - 3y^2 + 2) &= -4y^2(5y^4) - 4y^2(-3y^2) - 4y^2(2) \\
 &= -20y^6 + 12y^4 - 8y^2 \quad (2y^0)
 \end{aligned}$$

$$\begin{aligned}
 2x (6x^3 - x^2 + 5x) &= \\
 &= 2x(6x^3) + 2x(-x^2) + 2x(5x) \\
 &= 12x^4 - 2x^3 + 10x^2
 \end{aligned}$$

## 9-2 Multiplying & Factoring the GCF

**GCF** - Greatest Common Factor - the largest monomial factor common to all terms in a polynomial

Find the GCF of:

$$15w + 21 = \text{GCF} = 3$$

$$36v + 24 = \text{GCF} = 12$$

$$5b^3 + 15b^2 - 30b^4 = \text{GCF} = 5b^2$$

*(Handwritten annotations: b b b, b b, b b b b)*

$$10x^3 - 25x^2 + 20x = 5x = \text{GCF}$$

**Factoring** - the opposite of Multiplying - the Distributive Property Backwar  
 - finding two polynomials whose product is equal to the original polynomial

- **Monomial Factoring should be done 1st (if possible)**

Factor out the GCF of:

$$15w + 21 = 3(5w + 7)$$

GCF = 3

$$36v + 24 = 12(3v + 2)$$

GCF = 12

$$5b^3 + 15b^2 - 30b^4 = 5b^2(b^1 + 3b^0 - 6b^2)$$

GCF =  $5b^2$

$$5b^2(b + 3 - 6b^2)$$

$$10x^3 - 25x^2 + 20x = 5x(2x^2 - 5x + 4)$$

GCF =  $5x$

## 9-2 Mutiplying & Factoring the GCF

You try:

$$9k(7k + 4) =$$

$$63k^2 + 36k$$

$$-3g^7(g^4 - 6g^2 + 5) =$$

$$-3g^{11} + 18g^9 - 15g^7$$

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

$$x^3 + x^2 - x^3 + x$$

Find the GCF for these and factor:

$$5b^3 + 15b - 30 = 5(b^3 + 3b - 6) \quad \text{GCF: } 5$$

$$15n^3 - 3n^2 + 12n = 3n(5n^2 - n + 4) \quad \text{GCF: } 3n$$

$$5x^4 + 4x^3 + 3x^2 = x^2(5x^2 + 4x + 3) \quad \text{GCF: } x^2$$

$$7g^2k^3 - 35g^5k^2 = 7g^2k^2(k - 5g^3) \quad \text{GCF: } 7g^2k^2$$

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