Section 6.1: THE GREATEST COMMON FACTOR AND FACTORING BY GROUPING

When you are done with your homework you should be able to…

- Find the greatest common factor (GCF)
- Factor out the GCF of a polynomial
- Factor by grouping

WARM-UP:

1. Multiply:

$x^2\left(7x^4-8\right)$

2. Divide:

$$\frac{16x^4-8x^2}{4x^2}$$

FACTORING A _____ CONTAINING THE SUM OF _____ MEANS FINDING AN _____ EXPRESSION THAT IS A _____.

FACTORING OUT THE GREATEST COMMON FACTOR (GCF)

We use the _____ property to _____ a monomial and a _____ of _____ or more _____.

When we _____, we _____ this process, expressing the _____ as a _____.

MULTIPLICATION **FACTORING**

In any _____ problem, the first step is to look for the _____ _____ _____. The _____ is an _____ of the _____ degree that _____ each _____ of the _____.

The _____ part of the _____ always contains the _____ _____ of a _____ that appears in _____ terms of the _____.

Example 1: Find the greatest common factor of each list of monomials:

a. 5 and $15x$

b. $-3x^4$ and $6x^3$

c. x^2y, $7x^3y$ and $14x^2$

STEPS FOR FACTORING A MONOMIAL FROM A POLYNOMIAL

1. Determine the _____ _____ factor of _____ terms in the _____.
2. Express each _____ as the _____ of the _____ and its other _____.
3. Use the _____ _____ to factor out the _____.

Example 2: Factor each polynomial using the GCF:

a. $9x+9$

b. $32x-24$

c. $18x^3y^2-12x^3y-24x^2y$

d. $7(x+1)+21x(x+1)$

FACTORING BY GROUPING

1. _____ terms that have a _____ _____ factor. There will usually be _____ groups. Sometimes the terms must be _____.
2. _____ out the _____ monomial _____ from each _____.
3. _____ out the remaining common _____ factor (if one exists).

Example 3: Factor by grouping:

a. $x^2+3x+5x+15$

b. $x^3-3x^2+4x-12$

c. $xy-6x+2y+12$

d. $10x^2-12xy+35xy-42y^2$

Example 4: Factor each polynomial:

a. $x^3 - 5 + 2x^3 y - 10y$

b. $7x^5 - 7x^4 + x^3 - x^2 + 3x - 3$

c. $8x^5(x+2) - 10x^3(x+2) - 2x^2(x+2)$

d. $12x^2 - 25$

APPLICATION

An explosion causes debris to rise vertically with an initial velocity of 72 feet per second. The polynomial $72x - 16x^2$ describes the height of the debris above the ground, in feet, after x seconds.

a. Find the height of the debris after 4 seconds.

b. Factor the polynomial.

c. Use the factored form of the polynomial in part (b) to find the height of the debris after 4 seconds. Do you get the same answer as you did in part (a)? If so, does this prove that your factorization is correct?