

Name: KEY Hour: \_\_\_\_\_ Date: \_\_\_\_\_

## NOTES: Intro to Factoring

- Goals: #1 - I can factor out the GCF of polynomials.  
#2 - I can factor 4 terms by grouping.



*Homework: MORE PRACTICE.*

Exploration #1: Work with a partner and answer the following questions.

1. Multiply the following polynomials.

a.  $3x(3x^2 - 5)$

$9x^3 - 15x$

b.  $7x^2(2x - 3)$

$14x^3 - 21x^2$

2. Find the greatest common factor (GCF) of the pair of numbers.

a. 15, 30

$15$

b. 32, 40

$8$

c. 1, 3

$1$

Notes:

To multiply polynomials, we distribute. We use this same idea to factor polynomials.

When factoring a polynomial, we factor out the GCF of the polynomials.

Example #1: Factor out the greatest common factor.

1.  $9x^3 - 15x$

$3x(3x^2 - 5)$

2.  $14x^3 - 21x^2$

$7x^2(2x - 3)$

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3.  $3n^3 - 3n^2 + 12n$

$$\boxed{3n(n^2 - 11n + 4)}$$

4.  $8y^3 - 2y$

$$\boxed{2y(4y^2 - 1)}$$

You practice: Factor out the greatest common factor.

1.  $4y^3 - 10y^2$

$$2y^2(2y - 5)$$

2.  $9x^3 + 6x^2 + 18x$

$$3x(3x^2 + 2x + 9)$$

Notes:

When we see 4 terms in the polynomial, we factor by grouping

EXAMPLE: Factor the polynomial by grouping.

$$\begin{array}{l} \underbrace{x^3 - 2x^2} \quad | \quad \underbrace{-9x + 18} \\ x^2(x-2) - 9(x-2) \\ \boxed{(x-2)(x^2-9)} \end{array}$$

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Example #1: Factor the polynomial by grouping.

1.  $\underline{2x^3 - 8x^2} + \underline{3x - 12}$

$$2x^2(x - 4) + 3(x - 4)$$

$$\boxed{(x - 4)(2x^2 + 3)}$$

2.  $\underline{10x^2 - 15x} + \underline{2x - 3}$

$$5x(2x - 3) + 1(2x - 3)$$

$$\boxed{(2x - 3)(5x + 1)}$$

You practice: Factor the polynomial by grouping.

1.  $\underline{2x^3 - 3x^2} - \underline{4x + 6}$

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

$$\boxed{(2x - 3)(x^2 - 2)}$$

2.  $\underline{10x^2 - 7x} - \underline{10x + 7}$

$$x(10x - 7) - 1(10x - 7)$$

$$\boxed{(10x - 7)(x - 1)}$$

## MORE PRACTICE:

1. Factor out the greatest common factor.

a.  $2x + 2$

$$\boxed{2(x+1)}$$

b.  $6x^2 - 15x$

$$\boxed{3x(2x-5)}$$

c.  $3s^4 + 16s$

$$\boxed{s(3s^3+16)}$$

d.  $5d^6 - 2d^2$

$$\boxed{d^2(5d^4-2)}$$

e.  $7w^5 - 35w^2$

$$\boxed{7w^2(w^3-5)}$$

f.  $12a^5 - 8a$

$$\boxed{4a(3a^4-2)}$$

g.  $8x^3y^2 - 16x^4y$

$$\boxed{8x^3y(y-2x)}$$

h.  $18x^2y - 4x^3y$

$$\boxed{2x^2y(9-2x)}$$

2. Factor by grouping.

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

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

$$\boxed{(x+1)(x^2+2)}$$

b.  $a^3 + 13a^2 - 5a - 65$

$$a^2(a+13) - 5(a+13)$$

$$\boxed{(a+13)(a^2-5)}$$

c.  $z^3 - 4z^2 + 3z - 12$

$$z^2(z-4) + 3(z-4)$$

$$\boxed{(z-4)(z^2+3)}$$

d.  $5d^6 - 2d^2$

$$\boxed{d^2(5d^4-2)}$$

e.  $4y^3 - 7y^2 - 16y + 28$

$$y^2(4y-7) - 4(4y-7)$$

$$\boxed{(4y-7)(y^2-4)}$$

f.  $m^3 - 3m^2 - 4m + 12$

$$m^2(m-3) - 4(m-3)$$

$$\boxed{(m-3)(m^2-4)}$$