4. An interesting thing happens when you multiply two **conjugate binomials**. Conjugates have the property of having the same **terms** but differ by the operation between the two terms (in one case addition and in one case subtraction). Multiply each of the following **conjugate pairs** and state your answers in **standard form**. The first is done as an example

(a) $(x+3)(x-3)$

$= x(x-3)+3(x-3)$

$= x^2-3x+3x-9$

$= x^2-9$

(b) $(x-5)(x+5)$

(c) $(10+x)(10-x)$

(d) $(2t+3)(2t-3)$

(e) $(5t+1)(5t-1)$

(f) $(8-3t)(8+3t)$

HW Question!

5. Write each of the following products in standard polynomial form.

(a) $(x+3)(x-2)(x-8)$

$x^2-8x-2x+16$

$(x+3)(x^2-10x+16)$

$x^3-10x^2+16x+3x^2-30x+48$

$x^3-7x^2-14x+48$

(b) $(x+2)(x-2)(x+3)(x-3)$ CHALLENGE!

Name: _____ Date: _____

# FACTORING POLYNOMIALS!

**Warm Up:** Write out each of the following products as polynomials:

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

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

GREATEST COMMON FACTOR

Factoring expressions is one of the **gateway skills** that is necessary for much of what we do in algebra for the rest of the course. The word **factor** has two meanings and both are important.

**THE TWO MEANINGS OF FACTOR**

1. **Factor (verb):** To rewrite an algebraic expression as an equivalent product.
2. **Factor (noun):** An algebraic expression that is one part of a larger factored expression.

***Exercise* #1:** Consider the expression $6x^2+15x$.

(a) Write the individual terms $6x^2$ and $15x$ as completely factored expressions. Determine their **greatest common factor**.

$6x^2 = 2 \cdot 3 \cdot x \cdot x$

$15x = 3 \cdot 5 \cdot x$

**GCF:** $3 \cdot x$ $3x$

(b) Using the Distributive Property, rewrite $6x^2+15x$ as a product involving the **GCF** from (a).

$3x(2x+5)$ $6x^2+15x$

It is important that you are **fluent** reversing the **distributive property** in order to factor out a common factor (most often the greatest common factor). Let's get some practice in the next exercise just identifying the greatest common factors.

***Exercise* #2:** For each of the following sets of monomials, identify the greatest common factor of each. Write each term as an extended product (if necessary).

(a) $12x^3$ and $18x$

$12x^3: 3 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x$

$18x: 3 \cdot 2 \cdot 3 \cdot x$

GCF: $6x$ $3 \cdot 2 \cdot x$

(b) $21x^2y^5$ and $14xy^7$

GCF: $7xy^5$

(c) $20x^3$, $-12x^2$, and $28x$

GCF: $4x$

Once you can identify the greatest common factor of a set of monomials, you can then easily use it and the distributive property to write equivalent factored expressions.

***Time to Practice!*** Write each polynomial below as a factored expression involving the greatest common factor of the polynomial.

(a) $6x^2+10x$

$2\times(3x+5)$

(b) $3x-24$

$3(x-8)$

(c) $10x^2-15x$

(d) $4x^2+8x+24$

(e) $6x^3-8x^2+2x$

$2x(3x^2-4x+1)$

(f) $10x^3-35x^2$

(g) $10x^2-40x-50$

(h) $8x^4-2x^2$

(i) $8x^3+24x^2-32x$

Name: _____ Date: _____

## FACTORING POLYNOMIALS
## HOMEWORK

1. Identify the greatest common factor for each of the following sets of monomials.

(a) $6x^2$ and $24x^3$ (b) $15x$ and $10x^2$ (c) $2x^4$ and $10x^2$

(d) $2x^3$, $6x^2$, and $12x$ (e) $16t^2$, $48t$, and 80 (f) $8t^5$, $12t^3$, and $16t$

2. Which of the following is the greatest common factor of the terms $36x^2y^4$ and $24xy^7$?

(1) $12xy^4$ (3) $6x^2y^3$

(2) $24x^2y^7$ (4) $3xy$

3. Write each of the following as equivalent products of the polynomial's greatest common factor with another polynomial (of the same number of terms). The first is done as an example.

(a) $8x-28$ (b) $50x+30$ (c) $24x^2+32x$

$=4(2x-7)$

(d) $18-12x$ (e) $6x^3+12x^2-3x$ (f) $x^2-x$

(g) $10x^2+35x-20$ (h) $21x^3-14x$ (i) $36x-8x^2$

(j) $30x^3-75x^2$ (k) $-16t^2+96t$ (l) $4t^3-32t^2+12t$

4. Which of the following is *not* a correct **factorization** of the binomial $10x^2 + 40x$?

(1) $10x(x+4)$ (3) $5x(2x+4)$

(2) $10(x^2+4x)$ (4) $5x(2x+8)$

Ella commends you for completing your homework. Hooray!