GREATEST COMMON FACTOR (GCF)

1) A number that divides another number evenly is called a **factor** of that number. For example, 16 can be divided evenly by 1, 2, 4, 8, and 16. So the numbers 1, 2, 4, 8, and 16 are called factors of 16. To find the factors of a number, begin with 1 and the number itself, then divide the number by 2, 3, 4, etc., taking only pairs of factors that divide the number evenly. Stop when the factors start to repeat.

2) A number that divides a given set of numbers is called a **common factor** of the numbers. For example, if we list the factors of 16 and 24, we can see these numbers share common factors of 1, 2, 4, and 8. The **greatest common factor (GCF)** is the largest common factor that the numbers share. Here, 8 is the largest common factor of 16 and 24. So the GCF of 16 and 24 is 8.

> Factors of 16: 1, 2, 4, **8**, 16
> Factors of 24: 1, 2, 3, 4, 6, **8**, 12, 24

To find the GCF of a given set of numbers, list the factors of each number to find their greatest common factor.

3) The GCF of two or more variable terms is the **lowest** power of any variables common to each term. For example, the GCF of the terms x^3yz and x^2y^2 is x^2y because the terms share common factors of x^2 and y, as shown.

> $x^3yz = \mathbf{x} \cdot \mathbf{x} \cdot x \cdot \mathbf{y} \cdot z$
> $x^2y^2 = \mathbf{x} \cdot \mathbf{x} \cdot \mathbf{y} \cdot y$

4) To factor a polynomial expression, such as $24x^3yz - 16x^2y^2$,

a) Begin by finding the GCF of the terms of the expression. For the expression $24x^3yz - 16x^2y^2$, the GCF is $8x^2y$, because 8 is the gcf of the coefficients and x^2y is the gcf of the variables.

b) Next, divide each term of the expression by the GCF. For example, to factor $24x^3yz - 16x^2y^2$, divide each term by $8x^2y$:

$$\frac{24x^3yz}{8x^2y} - \frac{16x^2y^2}{8x^2y} = 3xz - 2y$$

c) Then use the distributive property to write the expression as a product of the GCF $8x^2y$ and the "quotient of the terms:" $3xz - 2y$:

$$24x^3yz - 16x^2y^2 = 8x^2y(3xz - 2y)$$

4) In general, to factor out the GCF from a polynomial expression,

a) Find the GCF of the terms of the polynomial.
b) Divide each term of the polynomial by the GCF.
c) Use the distributive property to write the polynomial as a product of the GCF and the quotient of the terms.