



The **greatest common factor** of two expressions is the largest monomial term that will divide into both expressions evenly. An effective way to find the *greatest common factor* is to break down (or factor) each expression into the smallest pieces possible.

Example 1: $12x^2 \longrightarrow 12 \cdot x^2 \longrightarrow$ so $12x^2$ factors into $2 \cdot 2 \cdot 3 \cdot x \cdot x$

$$\begin{array}{c}
 12 \\
 \swarrow \quad \searrow \\
 2 \quad \quad 6 \\
 \quad \quad \swarrow \quad \searrow \\
 \quad \quad 2 \quad \quad 3
 \end{array}
 \cdot
 \begin{array}{c}
 x^2 \\
 \swarrow \quad \searrow \\
 x \quad \quad x
 \end{array}$$

Finding the Greatest Common Factor (GCF) of two expressions

Step 1: Factor each individual expression.

Step 2: Find what's *common* to both.

Step 3: Create the *GCF* by multiplying the factors that are common to both expressions.

Example 2: Find the greatest common factor of $8x$ and $12x^2$

Step 1: $8x \longrightarrow (2) \cdot (2) \cdot 2 \cdot (x)$
 $12x^2 \longrightarrow (2) \cdot (2) \cdot 3 \cdot (x) \cdot x$

Step 2: Each expression has two 2's and one x . (The common factors are circled.)

Step 3: The *greatest common factor* is $2 \cdot 2 \cdot x$, or $4x$.

Use the process described above to find the *greatest common factor* for each pair of expressions:

1. 4, 12	2. 8, 12	3. 15, 25
4. 14, 49	5. 16, 24	6. $3x$, 9
7. $2x$, $2y$	8. x^2 , $2x$	9. $3x^2$, $3x$
10. $27x^2$, $81x$	11. $84xy^2$, $144xy$	12. $18t^4$, $42t^2$

Use It!



To factor polynomial expressions, start by finding the *greatest common factor* of the individual terms.

Example 1: Factor $2x^2 + 4x$

$$\begin{aligned} 2x^2 &= (2) \cdot x \cdot (x) \\ 4x &= (2) \cdot 2 \cdot (x) \end{aligned}$$

The GCF is $2x$.

So, $2x^2 + 4x = 2x(x + 2)$

Check: $2x(x + 2) = 2x^2 + 4x$

Example 2: Factor $3x^2 + 6x - 3$

$$\begin{aligned} 3x^2 &= (3) \cdot x \cdot x \\ 6x &= (3) \cdot 2 \cdot x \\ -3 &= (3) \cdot -1 \end{aligned}$$

The GCF is 3 .

So, $3x^2 + 6x - 3 = 3(x^2 + 2x - 1)$

Check: $3(x^2 + 2x - 1) = 3x^2 + 6x - 3$

Factoring out a common monomial

Step 1: Factor each term.

Step 2: Build the *GCF* from the common values.

Step 3: Rewrite the binomial as the product of the *GCF* and the unused values.

Step 4: Check by multiplying.

Use the process described above to factor out the greatest common factor from each.

1. Factor this expression: $5y - 10 =$

____(____ - ____)

2. Factor this expression: $4t^2 + 5t =$

____(____ + ____)

3. Factor this expression: $10x^2 - 15x =$

____(____ - ____)

4. Factor this expression: $24a + 15 =$

____(____ + ____)

Just the Factors, Ma'am

Factor out the *GCF* for each problem. Check your work by multiplying.

1. $4x + 8$

2. $12b + 18$

3. $z^2 + 4z$

4. $3x^2 + 6x + 12$

5. $5t^2 + 10t$

6. $7r + 21$

7. $4x^2 + 16$

8. $5n - 20$

9. $9y^2 - 27y$

10. $6c^3 + 12c^2 - 15c$

11. $12ab + 15ac$

12. $24m - 16$