

Intro to Factoring

Clear Learning Target

*You will be able to factor polynomials
using least common factors.*

Word Worth Knowing!

factoring - to express a polynomial as the product of monomials and polynomials.

Example #1: Factor the expression.

$$p^2 - p^5$$

$$\frac{p^2}{p^2}$$

① Expand terms

$$p \cdot p - p \cdot p \cdot p \cdot p \cdot p$$

② Common factors

$$p^2 (1 - p^3)$$

③ Take out circled factors

no leftovers

④ Put "leftovers" in parentheses

You Try! Factor the expression.

$$x^3 + x$$

$$\textcircled{x} \cdot x \cdot x + \textcircled{x}$$

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

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

Example #2: Factor the expression.

$$4x^3 + 10x$$

$$\textcircled{2} \cdot \textcircled{2} \cdot x \cdot x \cdot x + \textcircled{2} \cdot \textcircled{5} \cdot \textcircled{x}$$

$$2x(2x^2 + 5)$$

You Try! Factor the expression.

$$9p^2 - 3p^5$$

$$\textcircled{3} \cdot 3 \cdot \textcircled{p \cdot p} - \textcircled{3} \cdot \textcircled{p \cdot p} \cdot p \cdot p \cdot p$$

$$3p^2(3 - p^3)$$

NOTE: *This factoring pattern continues no matter how many terms are in a polynomial - in order to be factored out and put in front, a number or letter must be a part of **all** terms of the polynomial.*

Example: $2x^3 + 4x^2 + 8x + 6$

We CAN factor 2 out of this polynomial because **every coefficient is divisible by 2, but we CANNOT factor our x because it only appears in 3 of the 4 terms.*

Word Worth Knowing!

Zero Product Property - *if the product of two factors is 0, then at least one of the factors must be 0.*

Example #3: Solve for the variable.

$$(2d + 6)(3d - 15) = 0$$

factor #1 factor #2

$$2d + 6 = 0$$

~~-6~~ ~~-6~~

$$2d = -6$$

$$d = -3$$

$$3d - 15 = 0$$

+15 +15

$$3d = 15$$

$$d = 5$$

You Try! Solve for the variable.

$$3n(n + 2)$$

$$\begin{array}{r} 3n = 0 \\ \hline 3 \quad 3 \\ \hline n = 0 \end{array}$$

$$\begin{array}{r} n + 2 = 0 \\ \hline -2 \quad -2 \\ \hline n = -2 \end{array}$$