8.4
Solve Polynomial Equations in Factored Form

Factoring

- To **factor** a polynomial – _write it as_ _a product (multiplication)_

- **To Factor a Polynomial**:

- Step 1: Look for a _common monomial_
  - A monomial that can be _divided evenly out_ of _each term_ in the polynomial

  - Write the common monomial _first_ and _multiply it_ by what is left over _after dividing (put this part in parantheses)_

EX: Factor out the greatest common monomial factor.

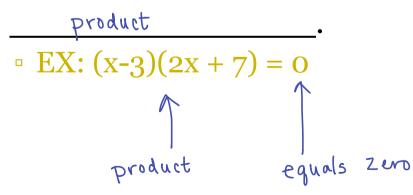- $12x + 42y$ * Divided out 6 from each

  $6(2x + 7y)$

- $4x^4 + 24x^3$ * Divided out $4x^3$ from each

  $4x^3(x + 6)$

- $15n^3 - 25n$

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

* Divided out 5n from each

- $8a^2b - 6ab^2 + 4ab$

$$2ab(4a - 3b + 2)$$

* Divided out 2ab from each

Zero-Product Property

- If ab = 0, then ___a = 0___ or ___b = 0___.
- This property is used to solve an equation when ___one side is zero___ and the other side is a ___product___.

  ◦ EX: (x-3)(2x + 7) = 0

  product   equals zero

To solve an equation by factoring:

- 1) Put the equation in __standard form (descending order)__ set equal to __zero__ .
  - EX: $2x^2 + 3x - 1 = 0$

- 2) __Factor - write as a product__ .
- 3) Set each factor __equal to zero__ and __solve__ .

EX: Solve the equation.

- $(2y + 5)(7y - 5) = 0$

* already factored and set
equal to zero

$$2y + 5 = 0 \qquad 7y - 5 = 0$$
$$ -5 \; -5 \qquad +5 \; +5$$
$$\frac{2y}{2} = \frac{-5}{2} \qquad \frac{7y}{7} = \frac{5}{7}$$
$$\boxed{y = \frac{-5}{2}} \qquad \boxed{y = \frac{5}{7}}$$

- $a^2 + 5a = 0$

$$a(a+5) = 0$$

$$\boxed{a = 0} \qquad \begin{array}{r} a + 5 = 0 \\ -5 \quad -5 \end{array}$$

$$\boxed{a = -5}$$

- $-28m^2 = 8m$

$$-8m \quad -8m$$

$$-28m^2 - 8m = 0$$

$$-4m(7m+2) = 0$$

$$\begin{array}{cc} -4m = 0 & 7m + 2 = 0 \\ \overline{-4} \quad \overline{-4} & -2 \quad -2 \\ \boxed{m=0} & \dfrac{7m}{7} = \dfrac{-2}{7} \\ & \boxed{m = -\dfrac{2}{7}} \end{array}$$