

Factoring

Factoring basics:

1. Factor out common monomial factors.

$$20x^2 + 4x + 6 = 2(10x^2 + 2x + 3)$$

$$x^4 + 3x^3 + 2x = x(x^3 + 3x^2 + 2)$$

2. Look for special patterns:

* difference of two squares

$$a^2 - b^2$$

↑ ↑
perfect squares
 $(a+b)(a-b)$

$$16x^2 - 25$$

↓ ↓
4x 5
 $(4x+5)(4x-5)$

* perfect square trinomial

$$25x^2 + 60x + 36$$

↓ ↗ ↘ ↓
5x 5x · 6 = 2 6
 $(5x+6)(5x+6)$
 $(5x+6)^2$

3. "Reverse FOIL"
- $x^2 + 7x + 12$

Try $(x+6)(x+2)$

Check using FOIL: $x^2 + 2x + 6x + 12$
 $x^2 + 8x + 12$ ✗

Try: $(x+4)(x+3)$

FOIL: $x^2 + 3x + 4x + 12$
 $x^2 + 7x + 12$ ✓

If you are solving an equation, apply the *zero product property*:if $a \cdot b = 0$ then
 $a = 0$ or $b = 0$

$$0 = x^2 + 6x + 5$$

$$0 = (x+5)(x+1)$$

check FOIL: $x^2 + 1x + 5x + 5$
 $x^2 + 6x + 5$

→ $x+5=0$ or $x+1=0$
 $x=-5$ $x=-1$