Basic Factoring

Expand ⟷ Factoring

Expand: $2x^2(5x-3)$ ①

$= (2x^2)(5x) - (2x^2)(3)$ ②

$= 10x^3 - 6x^2$

① Common: $15x^4 - 10x^3$ — largest "common" power

$= 5x^3(3x-2)$

② Group: $= 6x^3 - 12x + 3x^2 - 6$ — 4 terms

(Noah's Trick!) $= \underset{2x}{6x}\underset{3}{}(x^2-2) + \underset{3}{3}\underset{1}{}(x^2-2)$ — 2 terms

$= 3(x^2-2)(2x+1)$

Always look for common factors

$2x^3 - 10x^2 - 48x$

$= 2x(\tfrac{1}{x}x^2 - \underset{T}{5}x - \underset{x}{24})$ $\begin{array}{c|c} \times & + \\ \hline -24 & -5 \end{array}$ $-8, +3$

$= 2x(x-8)(x+3)$

③ Trinomial (3 terms)

$(x+3)(x-5)$

$= x(x-5) + 3(x-5)$

$= x^2 - 5x + 3x - 15$

$= 1x^2 - 2x - 15$ (1 × −15 = −15; −2 = +3 − 5)

$1x^2 + 8x + 15$ $\begin{array}{c|c} \times & + \\ \hline 15 & 8 \end{array}$ $5, 3$

$= (x+5)(x+3)$

$x^2 + 5x + 3x + 15$

$= x(x+5) + 3(x+5)$

$= (x+5)(x+3)$

Trinomials w/ "a" ≠ 1

"$ax^2 + bx + c$"

Ex Factor $10x^2 + x - 3$

(no common factoring)

Decomposition

$10x^2 + x - 3$

X	+
$(10)(-3)$	
-30	$+1$

$6, -5$

$= 10x^2 + 6x - 5x - 3$

$= 2x(5x+3) - 1(5x+3)$

$= (5x+3)(2x-1)$

"Criss-Cross"

$10x^2 + x - 3$

1st 3rd

$5x + 3$ → $6x$

$2x - 1$ → $-5x$

$(5x+3)(2x-1)$

Slide & Divide.

$10x^2 + x - 3$ — slide

$\Rightarrow x^2 + x - 30$

X	+
-30	$+1$

divide output by slide

$6, -5$

$\left(x + \frac{6}{10}\right)\left(x - \frac{5}{10}\right)$ reduce fractions

$\left(x + \frac{3}{5}\right)\left(x - \frac{1}{2}\right)$

$= (5x+3)(2x-1)$