

6.3

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10:47 AM

Factoring ax^2+bx+c

If the leading coefficient is not 1 then we do not have $(x \quad)(x \quad)$. Now we must consider the effect of this term. The best way... trial and error!

ex) factor $\frac{2x^2}{F} + \frac{7x}{O+I} + \frac{3}{L}$ to get $2x^2$ need $2x \cdot x$, $2=2 \cdot 1$

$$(2x + \quad)(x + \quad) \quad 1 \cdot 3$$

try them

$$(2x+3)(x+1) = 2x^2 + 2x + 3x + 3 \\ = 2x^2 + 5x + 3$$

$$\boxed{(2x+1)(x+3)} = 2x^2 + 6x + 1x + 3 \\ = 2x^2 + 7x + 3 \checkmark$$

The leading coefficient isn't always prime.

ex) $\frac{6x^2}{F} + \frac{11x}{O+I} + \frac{4}{L}$

to get $6x^2$ need $6 \cdot x \cdot x$, could be $1 \cdot 6 \cdot x \cdot x$ or $2 \cdot 3 \cdot x \cdot x$

$$\begin{matrix} (6x + \quad)(1x + \quad) & \text{or} & (2x + \quad)(3x + \quad) \\ \text{two numbers} & & \\ \text{multiply 4} & & \end{matrix}$$

$$1 \cdot 4, 2 \cdot 2$$

$$1 \cdot 4, 2 \cdot 2$$

try them

$$(6x+1)(x+4) = 6x^2 + 24x + 1x + 4$$

$$(6x+2)(x+2) = 6x^2 + 12x + 2x + 4$$

$$(6x+4)(x+1) = 6x^2 + 6x + 4x + 4$$

$$\boxed{(2x+1)(3x+4)} = 6x^2 + 8x + 3x + 4 = 6x^2 + 11x + 4$$

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

$$(2x+4)(3x+1) = 6x^2 + 2x + 12x + 4$$

So $6x^2 + 11x + 4 = (2x+1)(3x+4)$

Multistep Factoring

Sometimes it's easier to factor in steps.

$$\text{ex) } 2x^3 + 8x^2 + 6x$$

$$\text{GCF} = 2x$$

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

now factor $x^2 + 4x + 3$

$$\boxed{2x(x+1)(x+3)}$$

$$\begin{aligned} \text{check: } 2x(x+1)(x+3) &= 2x(x^2 + 3x + 1x + 3) \\ &= 2x(x^2 + 4x + 3) \\ &= 2x^3 + 8x^2 + 6x \quad \checkmark \end{aligned}$$

try one

$$= 4x^3 + 26x - 30 = -2x(2x^2 - 13x + 15)$$

$$= -2x(2x - \quad)(x - \quad)$$

$$\begin{array}{r} 1 \quad 15 \\ 3 \quad 5 \end{array}$$

$$\text{try them: } (2x-1)(x-15) = 2x^2 - 30x - 1x + 15 \rightarrow -31x$$

$$(2x-15)(x-1) = 2x^2 - 2x - 15x + 15 \rightarrow -17x$$

$$\boxed{(2x-3)(x-5)} = 2x^2 - 10x - 3x + 15 \rightarrow -13x$$

$$(2x-5)(x-3) = 2x^2 - 6x - 5x + 15 \rightarrow -11x$$

$$= \boxed{-2x(2x-3)(x-5)}$$

NOTE: ALWAYS try to factor something out first!