

IB

N/A

# FACTORIZING QUADRATICS When $a \neq 1$

## I. Steps to factor $ax^2 + bx + c$ problems...

1. Figure out 2 numbers that multiply to  $a \cdot c$ , and **add to  $b$** .

ex/  $f(x) = 4x^2 + 12x + 5$

$a \cdot c = (4)(5) = 20$        $b = 12$

10 & 2!!!       $(10)(2) = 20 \checkmark$

$10 + 2 = 12 \checkmark$

2. Split the  $bx$  term into those 2 numbers (with  $x$ )

ex/  $f(x) = 4x^2 + 12x + 5$

$f(x) = 4x^2 + 10x + 2x + 5$

3. Factor what you can out of the 2 groups (1<sup>st</sup> 2 & 2<sup>nd</sup> 2)

ex/  $f(x) = \underbrace{4x^2 + 10x}_{\text{GROUP 1}} + \underbrace{2x + 5}_{\text{GROUP 2}}$

$f(x) = 2x(2x+5) + 1(2x+5)$

You always factor out something - even if it's just 1!

4. Factor out (backwards distribute) the matching ( )

ex/  $f(x) = 2x(2x+5) + 1(2x+5)$

$f(x) = (2x+5)(2x+1)$

$f(x) = (2x+5)(2x+1)$

ex/ Factor.  $f(x) = 3x^2 - 11x + 6$

$$a \cdot c = (3)(6) = 18$$

$$b = -11$$

$$-2 \text{ \& } -9$$

$$(-2)(-9) = 18 \checkmark$$

$$-2 + -9 = -11 \checkmark$$

$$f(x) = \underline{3x^2 - 2x} - \underline{9x + 6}$$

$$f(x) = x(3x - 2) - 3(3x - 2)$$

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

II. If you want zeros... Set it equal to 0!

ex/  $f(x) = (x - 3)(3x - 2)$

$$0 = (x - 3)(3x - 2)$$

$$x - 3 = 0$$

$$3x - 2 = 0$$

$$x = 3$$

$$3x = 2$$

$$x = \frac{2}{3}$$

$$\boxed{x = \left\{ \frac{2}{3}, 3 \right\}}$$