

3.6 * Factoring Tricky Trinomials *

↳ ax^2+bx+c with "a" not 1.

Warmup 1. Expand.

a) $(3k-2)(k+1)$
 $= 3k^2 + 3k - 2k - 2$
 $= 3k^2 + k - 2$

b) $(3x+4)(2x+1)$
 $= 6x^2 + 3x + 8x + 4$
 $= 6x^2 + 11x + 4$

c) $(2m-3)(4m-5)$
 $= 8m^2 - 10m - 12m + 15$
 $= 8m^2 - 22m + 15$

Ex₁ $(2x-5)$ is a factor of $2x^2+9x-35$. What is the other factor?

Sol'n $2x^2+9x-35 = (2x-5)(x+7)$

Method: Fiddle with first number $2x^2$
 • Fiddle with last number -35
 • Hope FOIL check works out to middle number $9x$

Check: FOIL: $2x^2+14x-5x-35$
 $= 2x^2+9x-35$

Guess and Check

Remark: The above method is not for everyone. It is playful, flexible, and challenging to teach. But, if you know your times tables, this is the fastest method on the planet. More on this later.

Ex₂ a) Factor $2x^2+5x+2$.

Sol'n "a"=2 "b"=5 "c"=2

Decomposition

STEP #1: Find two integers whose product is $a \times c$
 $= (2) \times (2)$
 $= 4 \times 1, 4; -1, -4; 2, 2; -2, -2.$

STEP #2: Find the pair from STEP #1 that add to "b" = 5. \times 1 and 4.

STEP #3: Break up the middle term using your STEP #2 numbers

$$2x^2+5x+2$$

$$= 2x^2 + 1x + 4x + 2$$

STEP #4: Group Factors
 $= x(2x+1) + 2(2x+1)$, pull out x and pull out 2
 $= (2x+1)(x+2)$, group to front.

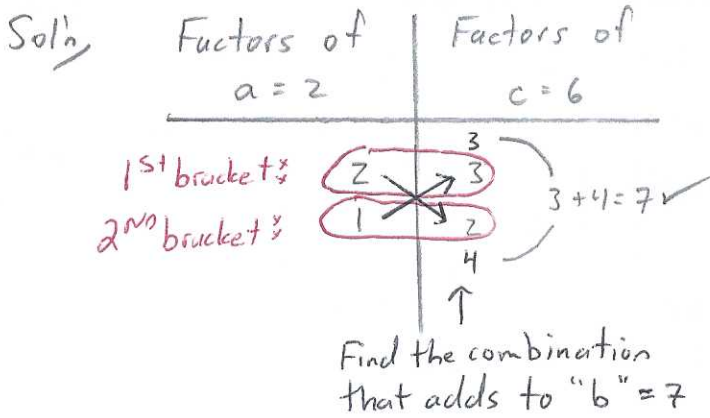
b) Factor $3x^2+7x+2$

Sol'n $= 3x^2 + 6x + 1x + 2$, decompose $7x$
 $= 3x(x+2) + 1(x+2)$, pull out $3x$ from 1st pair and $+1$ from 2nd pair
 $= (x+2)(3x+1)$, group to front.

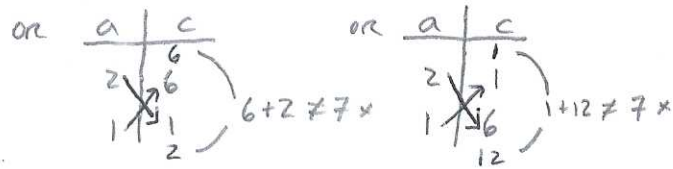
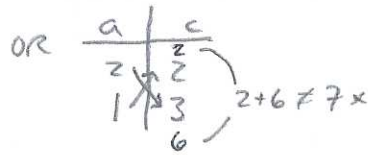
(a)(c) = 6
 (b) = 7 } 6, 1

e →

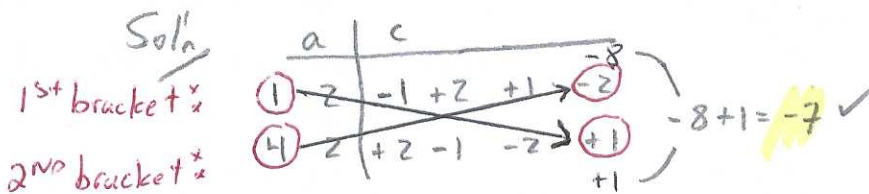
Ex₃ a) Factor $2n^2 + 7n + 6$.



$= (2n + 3)(n + 2)$ ✓✓
 ✓ DONE



b) Factor $4m^2 - 7m - 2$



$= (m - 2)(4m + 1)$ ✓✓ DONE

ck: $4m^2 + 1m - 8m - 2$
 F O I L
 $4m^2 - 7m - 2$

STOP. Optional →

Ex₃ Factor a) $2x^2 + 5x + 2$

Sol'n Think FOIL backwards...

$(2x \times x)$ or $(x \times 2x)$ } I am half done.

Since positive product of $c=2$ and positive sum of $b=5$, I need I^+, I^+ . Two positive integers. Guess while thinking about FOIL's OI products: $(2x + 1)(x + 2)$.

Check: $1x + 4x = 5x$ ✓

b) $3x^2 + 7x + 2$, need $I^+ I^+$ as guesses

Sol'n $= (3x + 1)(x + 2)$ that product to +2.

Check: $6x + 2x = 8x$ ✓

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c) $4m^2 - 7m - 2$ Negative Product. So Guess using $-2 = (I^+)(I^-)$

$= (2m + 2)(2m - 1)$ ×

$\frac{4m - 2m}{2m \times}$

$= (4m + 2)(m - 1)$ ×

$\frac{2m - 4m}{-2m \times}$

$= (4m + 1)(m - 2)$ ✓

$\frac{+1m - 8m}{-7m}$

-7m ✓ Yay!

d) $2h^2 - 5h + 2$, Guess with I^-, I^-

$= (2h - 1)(h - 2)$ ✓✓ DONE.

a-c chart

Guess and Check