M10 - 5.2 - Factoring (a=1) Trinomials Notes

Factor by Decomposition

"a" is the number to the left of the x^2 term.
"b" is the number to the left of the x term.
"c" is the number by itself.

$$a = 1$$

$1x^2 + 2x - 3$ $\quad a = 1$
$\qquad\qquad\qquad b = 2$
$\qquad\qquad\qquad c = -3$

Identifying "a", "b", and "c" in:
$$ax^2 + bx + c$$

Binomials

$$b = 0$$

$$a \neq 1$$

$2x^2 - 3x + 4$ $\quad a = 2$
$\qquad\qquad\qquad b = -3$
$\qquad\qquad\qquad c = 3$

$y = kx^2 + mx + h$ $\quad a = k$
$\qquad\qquad\qquad\qquad b = m$
$\qquad\qquad\qquad\qquad c = h$

$2x^2 + 4$

$$c = 0$$

$x^2 + 4x$

$$\begin{array}{ccc} a & b & c \\ 1x^2 + 5x & - & 6 \end{array} \quad \text{Label a,b \& c}$$

REARRANGE

$6 - 5x + x^2$

$x^2 - 5x + 6$

$\begin{array}{ccc} a & b & c \\ 1x^2 & +5x & + 6 \end{array}$ $\boxed{a = 1}$ ✓

Setup

$x^2 + 2x + 3x + 6$ *Decompose*
$(x^2 + 2x)|(+3x + 6)$ *Group*
$x(x + 2) + 3(x + 2)$ *GCF*
           Switch

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

$\underline{\quad} \times \underline{\quad} = c$

$\underline{\quad} + \underline{\quad} = b$

$\underline{\;2\;} \times \underline{\;3\;} = \cancel{c}\, 6$

$\underline{\;2\;} + \underline{\;3\;} = \cancel{b}\, 5$

Products

1,6
2,3

What are two numbers that:
Multiply to "c", the last number
Add together to get "b", the middle number.

Quick Method

$\boxed{\begin{array}{l} x^2 + 5x + 6 \\ (x + 2)(x + 3) \end{array}}$ The numbers go in the brackets.

Step 1 Decompose: What are two numbers that: multiply to get "$a \times c$" and add to get "b."
         "b" gets split up into the two numbers above on the right.
Step 2 Group: Place brackets around the first two terms, and the second two terms.
Step 3 GCF: Remove a GCF from Groups.   They both have a $(x + 2)$ Poetry
Step 3 GCF: Remove a GCF from each.   Take out a $(x + 2)$

$(x + 2)(x + 3)$

$x^2 + 3x + 2x + 6$

$\boxed{x^2 + 5x + 6}$ ✓

Check by Multiplying out
In your Head

FOIL

The answer should be the same as the original question.

$x^2 + 6x + 8$

$\boxed{(x + 2)(x + 4)}$ $a = 1$ ✓

$\underline{\;2\;} \times \underline{\;4\;} = \cancel{c}\, 8$

$\underline{\;2\;} + \underline{\;4\;} = \cancel{b}\, 6$

$x^2 - 3x - 10$

$\boxed{(x - 5)(x + 2)}$ $a = 1$ ✓

$\underline{\;-5\;} \times \underline{\;2\;} = \cancel{c}\, -10$

$\underline{\;-5\;} + \underline{\;2\;} = \cancel{b}\, -3$

Remember the sign of the numbers you choose goes in the bracket along with the number.

$\boxed{x^2 + 4x + 15}$ Cannot factor