

M10 - 5.3 - Factor by Decomposition $ax^2 + bx + c$ ($a \neq 1$) Notes

Factor by Decomposition

Put an Arrow from a to $\times c$

\times

$$2x^2 + 7x + 6$$

$a \neq 1$ ✓

Setup $a \times c$

_____ X _____ = ac	<u>3</u> X <u>4</u> = ac 12	1,12
_____ + _____ = b	<u>3</u> + <u>4</u> = b 7	2,6 3,4

1) Decompose
2) Group
3) GCF
4) GCF

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

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.

Step 3 GCF: Remove a GCF from each.

In your Head

FOIL

Quick Method

$2x^2 + 7x + 6$	$2x^2 + 7x + 6$	Set Up Brackets
$(2x + 3)(x + 2)$	$(2x \quad)(x \quad)$	$2x \times x = 2x^2$

Then Figure out what works!

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

$2x^2 + 4x + 3x + 6$

$2x^2 + 7x + 6$ ✓

$2x^2 + 5x + 2$

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

$(2x + 1)(x + 2)$

$a \neq 1$ ✓

Decompose
Group

_____ X _____ = ac	<u>4</u> X <u>1</u> = ac 4
_____ + _____ = b	<u>4</u> + <u>1</u> = b 5

GCF **$GCF = 1$**

Factor GCF out each set of brackets

$2x^2 + 3x - 2$

$2x^2 + 4x - x - 2$
 $(2x^2 + 4x)(-x - 2)$
 $2x(x + 2) - 1(x + 2)$

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

$a \neq 1$ ✓

Decompose
Group

_____ X _____ = ac	<u>4</u> X <u>-1</u> = ac -4
_____ + _____ = b	<u>4</u> + <u>-1</u> = b 3

Don't Cut off a negative!

GCF
Factor GCF out each set of brackets