# 7.3

## 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 $\underset{F}{2x^2}+\underset{O+I}{7x}+\underset{L}{3}$ to get $2x^2$ need $2x\cdot x$, $2=2\cdot 1$

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

try them

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

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

The leading coefficient isn't always prime.

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

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

$(6x+\quad)(1x+\quad)$ or $(2x+\quad)(3x+\quad)$

two numbers multiply 4

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

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.

ex) $2x^3+8x^2+6x$

GCF $=2x$

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

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

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

Check: $2x(x+1)(x+3) = 2x(x^2+3x+1x+3)$

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

$= 2x^3+8x^2+6x$ ✓

try one

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

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

1 15
3 5

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

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

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

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

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

NOTE: ALWAYS try to factor something out first!