

Lesson 5.4 Factoring Quadratic Expressions

Can we make it more simple? Can I factor out a common number or variable?

$$5x^2 + 20x - 25$$

$$5(x^2 + 4x - 5)$$

$$-x^2 - 3x + 7$$

$$-1(x^2 + 3x - 7)$$

Always factor out a negative leading coefficient

$$s^3 + 2s^2 - 7s$$

$$s(s^2 + 2s - 7)$$

The next question is, Can I factor what is inside the parentheses? Yes, then do so.

Factoring a Quadratic

$$x^2 + 10x + 24$$

$$(x \quad x)$$

$$\hookrightarrow (x+4)(x+6) \quad \underline{\text{Ans}}$$

Check:

$$(x+4)(x+6)$$

$$x^2 + 10x$$

$$4x + 24$$

$$x^2 + 10x + 24 \quad \checkmark$$

① make a list of All factors of 24

② which factors add up to the coefficient

$$(x+4)(x+6) \quad () + () = 10$$

$$1 \cdot 24$$

$$2 \cdot 12$$

$$3 \cdot 8$$

$$4 \cdot 6 \rightarrow 4+6=10$$

③ take factor pairs put into template

last 3 steps :)

#4 check your factoring!

#5 check your factoring!

#6 check your factoring!

$$x^2 + 7x - 18$$

Focus on positive factors
assign the +/- later.
 $(-)(+) = 18$ $(-)(-) = 7$

$$(x+9)(x-2) \text{ Ans}$$

1. 18
2. 9 $\rightarrow$ 2 & 9 diff 7
3. 6 $9-2 = +7$

check $\circ$ $(x+9)(x-2)$

$$\begin{array}{r} x^2 - 2x \\ + 9x - 18 \\ \hline x^2 + 7x - 18 \end{array}$$
 yeah!

$\uparrow$ look at the factor pair in regard to a positive value coefficient, assign + & - afterwards

$$x^2 - 6x + 8$$

$(-)(-)$ $(-)+(-) = -$

$$(x-2)(x-4) \text{ Ans}$$

1. 8
2. 4 $\bar{2} + \bar{4} = \bar{6}$
 $-2 - 4 = -6$

$(x-2)(x-4)$

$$\begin{array}{r} x^2 - 4x \\ - 2x + 8 \\ \hline x^2 - 6x + 8 \end{array}$$

$$x^2 - 8x - 20$$

$(+)(-)$ big guy will be neg difference

$$(x+2)(x-10) \text{ Ans}$$

1. 20 19
2. 10 8 $\star$
4. 5 $\rightarrow +2 - 10 = -8$

$$\begin{array}{r} x^2 - 10x \\ + 2x - 20 \\ \hline x^2 - 8x - 20 \end{array} = x^2 - 8x - 20 \checkmark$$

$$2(\star) + 5(\star)$$

what is in common?
So factor out the star

$\star(2+5)$
 leftovers

so: $2x(x+3) - 3(x+3)$ common factor
 $(x+3)(2x-3)$

$$4x^2 + 16x + 15 \quad a=4$$

$$b=16$$

$$c=15$$

#1 $a \cdot c = 4(15) = 60$

#2 Factors for $a \cdot c$

$(+)(+)$ $(-)(-)=16$

$1 \cdot 60$

61

$2 \cdot 30$

32

$3 \cdot 20$

23

$4 \cdot 15$

19

$5 \cdot 12$

17

$6 \cdot 10$

16

note closer to 16

6+10

#3 $4x^2 + 16x + 15$

$2x(2x+3) + 5(2x+3)$

$(2x+3)(2x+5)$ Ans
left over

#3 Rewrite the linear term with factor pairs

#4 Split Quadratic

#5 Factor left side & right

#6 Factor whole thing

$-3x^2 + 16x + 12$

$(-1)(3x^2 - 16x - 12)$

$3(-12) = -36$

$(-)(+)$

calculator by negative signs

$18 = 36/x$

$2 \cdot 18$

$(2)(18) + 2 - 18 = -16$

$3x^2 + 2x - 18x - 12$

Always factor out (-)

$x(3x+2) - 6(3x+2)$

$(3x+2)(x-6)$ Ans

I put the + value so not to be confused by negative signs