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:

1. Make a list of all factors of \( ab \)
2. Which factors add up to the coefficient?

\[ 5(x + 4)(x + 6) \]

\[ (x + 4)(x + 6) \]

Check:

\[ (x + 4)(x + 6) = 2 \cdot 12 \]
\[ = 3 \cdot 8 \]
\[ = 4 \cdot 6 \rightarrow 4 + 6 = 10 \]

\[ x^2 + 10x + 24 \]

Take factor pairs put into template

Last 3 steps:

4. Check your factoring!
5. Check your factoring!
6. Check your factoring!
Focus on Positive factors

\[ x^2 + 7x - 18 \]

\[ (x+9)(x-2) \] Ans

\[ x^2 - 2x \]
\[ + 9x - 18 \]
\[ x^2 + 7x - 18 \text{ year} \]

\[ x^2 - 6x + 8 \]

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

\[ x^2 - 2x \]
\[ + 9x - 18 \]
\[ x^2 + 7x - 18 \text{ year} \]

\[ x^2 - 6x + 8 \]

\[ x^2 - 10x + 8 \]

\[ (-x-) \]
\[ (-+(-)) = - \]

\[ x^2 - 6x + 8 \]

\[ x^2 - 10x - 20 \]

\[ (+x-(-)) \] difference

\[ (x+2)(x-10) \] Ans

\[ x^2 - 10x \]
\[ 2x - 20 \]
\[ x^2 - 8x - 20 \]

\[ 2 \left( \sqrt{x} \right) + 5 \left( \sqrt{x} \right) \]

What is \( \sqrt{x} \) common?

\[ 2 \left( \sqrt{x} + 5 \right) \]

\[ 2x(x+3) - 3(x+3) \text{ common} \]

\[ (x+3)(2x-3) \]
\[4x^2 + 16x + 15\] 
\[a = 4\]
\[b = 16\]
\[c = 15\]

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

#2 Factors for \(a \cdot c\)

\(+)(+)(+)(+) = 16\]

#3 \[4x^2 + 6x + 10x + 15\]

\[2x(x+3) + 5(x+3)\]

\[(x+5)(x+3)\] Ans

#3 Rewrite the linear term with factor pairs

# Split Quadratic

#5 Factor Left Side & Right

#6 Factor Whole Thing

\[-3x^2 + 16x + 12\]

\[(1)(3x^2 - 16x - 12)\]

\[b(-12) = -36\]

\[3x^2 + 2x - 18x - 12\]

Always factor out(-)

\[X(3x + 2) - 6(3x + 2)\]

\[(a)(18) + 2 - 18 = -16\]

\[(2x+2)(x-6)\] Ans