

Recap of yesterday's lesson:

Factor the following. Remember to common factor first if needed:

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

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

$$= 2(x - 1)(x - 3)$$

M: 3

A: -4

N: -1 and -3

$$\begin{array}{c} 3 \\ / \quad \backslash \\ -1 \quad -3 \end{array}$$

b) $x^2 + 7x - 8$

$$= (x - 1)(x + 8)$$

M: -8

A: 7

N: -1, 8

$$\begin{array}{c} -8 \\ / \quad \backslash \\ -8 \quad 1 \\ -1 \times 8 \end{array}$$

Lesson 4: Factoring Quadratics (part 2) in the form $ax^2 + bx + c$, where $a \neq 1$

By the end of this lesson you should be able to:

- Decide whether there is a common factor or not
- If no common factor, be able to determine the values of r and s , that allow you to factor the quadratic

In these equations, you can't find a common factor to make $a = 1$, so you have to follow a different strategy to factor...

If the quadratic can be factored, then the factors will be in the form **$(px+r)(qx+s)$**

where $a = pq$

$c = rs$

$b = ps + qr$

You need to find two numbers that have a product (multiplication) that equals $a(c)$ and a sum (addition) that equals b .

EX 1:

Finding the right strategy to factor trinomials where $a \neq 1$

Factor $9x^2 - 12x - 5$ by finding the values of pq and rs

We need to know:

$$a = (p)(q)$$

$$b = ps + qr$$

$$c = (r)(s)$$

$$\text{Therefore, } ax^2 + bx + c = pqx^2 + (ps + qr)x + rs$$

$$\frac{(3)(1) + (3)(-5)}{-5}$$

9	
-3	-3
1	9
3	3
-9	-1

r	s
1	-5
-1	5
-5	1
5	-1

$$y = (px + r)(qx + s)$$

$$y = (3x - 5)(3x + 1)$$

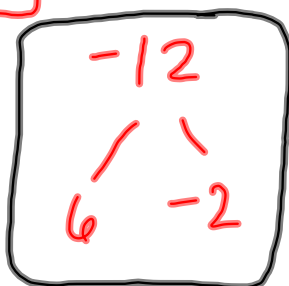
Example 3: Factor using the decomposition strategy

Factor $4x^2 + 4x - 3$

M: -12

A: 4

N: 6, -2



* Look for 2 numbers that ADD to give you the value of b and MULTIPLY to give you the value of (a)(c) = -12

→ ADD to 4

* factor by grouping the first two terms and last two terms

$$= 4x^2 + 4x - 3$$

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

$$= 2x(2x + 3) - 1(2x + 3)$$

$$= (2x + 3)(2x - 1)$$

$$\begin{aligned}
 &2x^2 + 5x - 12 \\
 &\quad \swarrow \searrow \\
 &= \underbrace{2x^2 + 8x}_{2x(x+4)} - \underbrace{3x - 12}_{-3(x+4)} \\
 &= 2x(x+4) - 3(x+4) \\
 &= (x+4)(2x-3)
 \end{aligned}$$

$$M: (2)(-12) = -24$$

$$A: 5$$

$$N: 8 \text{ and } -3$$

$$\begin{array}{r}
 -24 \\
 \swarrow \searrow \\
 \begin{array}{|c|c|}
 \hline
 12 & -2 \\
 \hline
 8 & -3 \\
 \hline
 \end{array}
 \end{array}$$