

## Lesson #6.4a: Factoring Trinomials

Learning Goal: We are learning to factor trinomials.

Once again, let's play: "Find the Pair!"

- 1) Find two numbers which multiply to
- <sup>M</sup>
- 60 and add to
- <sup>A</sup>
- 7

1, -60  
2, -30  
3, -20  
4, -15  
5, -12 = -7

$$\begin{aligned}
 &6x^2 - 1x - 35 \\
 &6x^2 + 14x - 15x - 35 \\
 &2x(3x+7) - 5(3x+7) \\
 &(3x+7)(2x-5)
 \end{aligned}$$

Factoring

Now we are going to learn why we find pairs. The following trinomials need to be factored. Remember that factoring is the opposite of expanding, and when we FOILED a few lessons ago, we ended up with trinomials. Therefore, today's factoring is the opposite of FOILING. Our answers will always be *(binomial)(binomial)*. The method we use is called "decomposition"

Let's say our trinomial looks like:  $Ax^2 + Bx + C$ 

## How to Set-Up Factoring by Decomposition

- Multiply the first coefficient (A) and the constant term (C) together. This is the number that you are finding the factors of.
- The specific factor pair that you are looking for, must add up to the middle coefficient (B) term.
- The rest I will teach you by example (too wordy to write!)

2)  $8x^2 + 6x - 5$        $M: -40$        $A: +6$

$$\begin{aligned}
 &= 8x^2 - 4x + 10x - 5 \\
 &= 4x(2x-1) + 5(2x-1) \\
 &= (2x-1)(4x+5)
 \end{aligned}$$

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3)  $x^2 + 17x + 52$        $M: 52$        $A: +17$

$$\begin{aligned}
 &= x^2 + 4x + 13x + 52 \\
 &= x(x+4) + 13(x+4) \\
 &= (x+4)(x+13)
 \end{aligned}$$

+1, +52  
2, 26  
4, 13 = 17!

4)  $2n^2 + n - 36$  M: -72 A: +1

$$= \frac{2n^2 - 8n}{2n} + \frac{9n - 36}{+9}$$

$$= 2n(n-4) + 9(n-4)$$

$$= (n-4)(2n+9)$$

-1, +72  
-8, +9

5)  $9a^2 - 47a + 10$

$$= \frac{9a^2 - 2a}{a} - \frac{45a + 10}{-5}$$

$$= a(9a-2) - 5(9a-2)$$

$$= (9a-2)(a-5)$$

M: 90 A: -47

$$-1, -90$$

$$(-2, -45) = -47$$

6)  $n^2 + 5n + 6$  M: 6 A: 5

$$= \frac{n^2 + 2n}{n} + \frac{3n + 6}{+3}$$

$$= n(n+2) + 3(n+2)$$

$$= (n+2)(n+3)$$

$\begin{pmatrix} 1 & 6 \\ 2 & 3 \end{pmatrix}$

7)  $9n^2 - 34n - 8$

$$= \frac{9n^2 + 2n}{n} - \frac{36n - 8}{-4}$$

$$= n(9n+2) - 4(9n+2)$$

$$= (9n+2)(n-4)$$

M: -72 A: -34

$$1, -72$$

$$(2, -36)$$

8)  $2r^2 - 5r - 3$  M: -6 A: -5

$$= \frac{2r^2 - 6r}{2r} + \frac{1r - 3}{+1}$$

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

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

$1, -6 \div -5$   
I'm supping them to help show you something.

9)  $x^2 - 12x + 27$

#### Success Criteria:

- I can set up my factoring by finding a factor pair that multiplies to the first and last terms (AxC), but adds to the middle term (B).
- I can use "Factoring by Decomposition" to factor a trinomial