Lesson #4 Factoring Difference of Squares

What happens when we don't have a middle term?

Ex 1) Factor $w^2 - 25$

-25
-5×5
25×-1
-25×1

Notice! w^2 and 25 are perfect squares.

This is the same as: $w^2 + 0w - 25$

$-5 \times 5 = -25$
$-5 + 5 = 0$

$= (w-5)(w+5)$

Ex 2) Factor $y^2 - 16$

$\sqrt{16} = 4$

Notice! y^2 and 16 are perfect squares.

$-4 \times 4 = -16$
$-4 + 4 = 0$

$= (y-4)(y+4)$

Ex 3) Expand $(2x + 7)(2x - 7)$

$4x^2 - 14x + 14x - 49$

$4x^2 - 49$

Notice! $4x^2$ and 49 are perfect squares.

$\sqrt{4x^2} - 49$

$\sqrt{49} = 7$

$-7 \times 7 = -49$
$-7 + 7 = 0$

$= (2x+7)(2x-7)$

In general...

To factor a difference of squares

$$a^2 - b^2 = (a + \sqrt{b})(a - \sqrt{b})$$

Examples

a) $w^2 - 36$ $\sqrt{36} = 6$

$= (w+6)(w-6)$

b) $n^2 - 64$ $\sqrt{64} = 8$

$= (n+8)(n-8)$

c) $9k^2 - 16$ $\sqrt{9} = 3$ $\sqrt{16} = 4$

$= (3k+4)(3k-4)$

d) $4c^2 - 25$ $\sqrt{4} = 2$ $\sqrt{25} = 5$

$= (2c-5)(2c+5)$

**Remember always to common factor FIRST if you can!!

e) $5y^2 - 80$

$= 5(\frac{5y^2-80}{5})$ $\sqrt{16} = 4$

$= 5(y^2 - 16)$

$= 5(y+4)(y-4)$

f) $6m^2 - 54$

$= 6(\frac{6m^2-54}{6})$ $\sqrt{9} = 3$

$= 6(m^2 - 9)$

$= 6(m+3)(m-3)$