

Section 4 – Topic 3
Solving Quadratic Equations by Factoring –
Special Cases – Part 1

You'll see a few special cases when solving quadratics by factoring.

Factor the following trinomial.

$$a = 4x^2$$

$$c = 9$$

$$\sqrt{4x^2} = 2x$$

$$\sqrt{9} = 3$$

$$(2x+3)^2$$

$$4x^2 + 12x + 9$$

a.c		b
3·6		12
4·9		
3·12		
6·6		$\frac{6}{4} + \frac{6}{4}$

$$\left(x + \frac{3}{2}\right)\left(x + \frac{3}{2}\right)$$

$$(2x+3)^2$$

Notice that the two factors are the same.

$4x^2 + 12x + 9$ is an example of a perfect square trinomial.

$$(2x + 3)^2$$

$$2(2x)(3) = 12x$$

Things to note about a perfect square trinomial, $a^2 + 2ab + b^2$:

- The first term and the last term are perfect squares.
- The middle term is the product of two and the square root of the first term and the square root of the last term.
- $a^2 + 2ab + b^2 = (a + b)^2$ and $a^2 - 2ab + b^2 = (a - b)^2$.

Solve $4k^3x + 20k^2x^2 + 25kx^3 = 0$ for x .

$$kx(4k^2 + 20kx + 25x^2) = 0$$

$$kx(2k + 5x)^2 = 0$$

$$\sqrt{4k^2} = 2k$$

$$\sqrt{25x^2} = 5x$$

$$\frac{k}{k}x = 0 / \frac{1}{k}$$

$$x = 0$$

$$2k + 5x = 0$$

$$-2k \quad -5x$$

$$\frac{5x}{5} = \frac{-2k}{5}$$

$$x = \frac{-2k}{5}$$

If $k = 1$, what are the solutions for x ?

$$x = 0$$

$$x = \frac{-2}{5}$$

2. Solve for w : $4w^2 + 49 = -28w$.

$$4w^2 + 28w + 49$$

$$(2w + 7)^2$$

$$2w + 7 = 0$$

$$\frac{2w}{2} = \frac{-7}{2}$$

$$w = -\frac{7}{2}$$

$$\sqrt{4w^2} = 2w$$

$$\sqrt{49} = 7$$

3. Consider the trinomial:

$$64a^2 - 48ab + 9b^2 = 0.$$

$$\sqrt{64a^2} = 8a$$

$$\sqrt{9b^2} = 3b$$

$$(8a - 3b)^2$$

a. Solve for a in terms of b .

$$\begin{array}{r} 8a - 3b = 0 \\ + 3b + 3b \\ \hline 8a = 3b \end{array}$$

$$\frac{8a}{8} = \frac{3b}{8}$$

$$a = \frac{3b}{8}$$

b. Solve for b in terms of a .

$$\begin{array}{r} 8a - 3b = 0 \\ -8a \quad -8a \\ \hline -3b = -8a \\ \hline \quad -3 \quad -3 \end{array}$$

$$b = \frac{8a}{3}$$

Try it!

4. Solve for y : $289y^2 - 714y + 441 = 0$.

$$(17y - 21)^2 = 0$$

$$17y - 21 = 0$$

$$17y = 21$$

$$y = \frac{21}{17}$$

$$\sqrt{289y^2} = 17y$$

$$\sqrt{441} = 21$$

5. Factor $25a^2 - 40ab + 16b^2$.

$$\sqrt{25a^2} = 5a$$

$$\sqrt{16b^2} = 4b$$

$$(5a - 4b)^2$$

6. Consider the quadratic equation:

$$100x^2 - 140xy + 49y^2 = 0$$

- a. Solve for x in terms of y .

$$10x - 7y = 0$$

$$10x = 7y$$

$$x = \frac{7y}{10}$$

$$(10x - 7y)^2$$

Solve for y

$$10x - 7y = 0$$

$$-7y = -10x$$

$$y = \frac{10x}{7}$$

