

## 7-4 Solving Quadratic equations by completing the square Day 2

Remember:

$$a^2 + 2ab + b^2 = (a + b)^2$$

$\left( \frac{\text{middle term}}{2} \right)^2$

Solve by completing the square.

$$x^2 + 6x + 1 = 0$$

-1 -1

$$x^2 + 6x + 9 = -1 + 9$$

$$\sqrt{(x+3)^2} = \sqrt{8}$$

$$x+3 = \pm\sqrt{8}$$

$\begin{array}{r} 8 \\ \swarrow \downarrow \searrow \\ 4 \quad 2 \end{array}$

$$\frac{b}{2} = \frac{6}{2} = 3 = 9$$

↑

$$x+3 = \pm 2\sqrt{2}$$

-3 -3

$$x = -3 \pm 2\sqrt{2}$$

Today the difference is that we will have a LEADING COEFFICIENT on our squared term that is not 1.

When there is a leading coefficient (not 1) we must:

- 1 - Move the constant to the other side
- 2 - Factor out the leading coefficient
- 3 - Complete the square.

**DONT FORGET TO ACCOUNT FOR THE GCF ON THE OUTSIDE**

You Try

$$2x^2 - 8x = 16$$

$$2(x^2 - 4x + 4) = 16 + 8$$

$$\frac{2(x-2)^2}{2} = \frac{24}{2}$$

$$\sqrt{(x-2)^2} = \sqrt{12}$$

$$x-2 = \pm\sqrt{12}$$

$\begin{array}{r} 12 \\ \swarrow \downarrow \searrow \\ 4 \quad 3 \end{array}$

$$\frac{-4}{2} \pm (-2)^2 = 4$$

$$x-2 = \pm 2\sqrt{3}$$

+2 +2

$$x = 2 \pm 2\sqrt{3}$$

Solve by completing the square.

$$3x^2 - 9x = 28$$

$$3(x^2 - 3x + \frac{9}{4}) = 28 + \frac{27}{4}$$

$$3(x - \frac{3}{2})^2 = \frac{112}{4} + \frac{27}{4} = \frac{139}{4}$$

$$\frac{3(x - \frac{3}{2})^2}{3} = \frac{139}{4} \cdot \frac{1}{3}$$

$$(\frac{-3}{2})^2 = \frac{9}{4}$$

$$\sqrt{(x - \frac{3}{2})^2} = \sqrt{\frac{139}{12}}$$

$$x - \frac{3}{2} = \pm \sqrt{\frac{139}{12}}$$

$$x = \frac{3}{2} \pm \sqrt{\frac{139}{12}}$$

Solve by completing the square.

$$2x^2 + 4x + 3 = 0$$

$$-3 \quad -3$$

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

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

$$2(x+1)^2 = -1 \quad \leftarrow \text{no real solution}$$

$$\frac{2}{2} = \frac{1^2}{1} = 1$$

You Try

$$2c^2 + 8c - 1 = 0 \quad \leftarrow 2 \times 2$$

$$2(c^2 + 4c + 4) = 1 + 8 -$$

$$2(c+2)^2 = \frac{9}{2}$$

$$\sqrt{(c+2)^2} = \sqrt{\frac{9}{2}}$$

$$c+2 = \pm \sqrt{\frac{9}{2}}$$

$$c = -2 \pm \sqrt{\frac{9}{2}}$$

$$4x^2 + 16x - 40 = 0$$

$$+40$$

$$4x^2 + 16x = 40$$

$$4(x^2 + 4x + 4) = 40 + 16$$

$$4(x+2)^2 = \frac{56}{4}$$

$$(x+2)^2 = 14$$

$$x = -2 \pm \sqrt{14}$$

$$5v^2 - 10v - 21 = 0$$

$$5v^2 - 10v = 21$$

$$5(v^2 - 2v + \quad) = 21$$