

Quadratic Equations Challenge

Take the general form of a quadratic equation in standard form and

1. Complete the square.
2. Solve for x .

HINT: *Simplify as much as you can as you go.*

$$0 = ax^2 + bx + c$$

3. What did you discover?

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$$0 = ax^2 + bx + c$$

$$0 = a\left(x^2 + \frac{b}{a}x\right) + c$$

$$0 = a\left(x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} - \frac{b^2}{4a^2}\right) + c$$

$$0 = a\left(x^2 + \frac{b}{a}x + \frac{b^2}{4a^2}\right) - \frac{ab^2}{4a^2} + c$$

$$0 = a\left(x + \frac{b}{2a}\right)^2 - \frac{b^2}{4a} + c$$

$$0 = a\left(x + \frac{b}{2a}\right)^2 - \frac{b^2}{4a} + \frac{4ac}{4a}$$

$$\frac{b^2}{4a} - \frac{4ac}{4a} = a\left(x + \frac{b}{2a}\right)^2$$

$$\frac{b^2 - 4ac}{4a} = a\left(x + \frac{b}{2a}\right)^2$$

$$\frac{b^2 - 4ac}{4a} \div a = \left(x + \frac{b}{2a}\right)^2$$

$$\frac{b^2 - 4ac}{4a} \times \frac{1}{a} = \left(x + \frac{b}{2a}\right)^2$$

$$\frac{b^2 - 4ac}{4a^2} = \left(x + \frac{b}{2a}\right)^2$$

$$\pm \sqrt{\frac{b^2 - 4ac}{4a^2}} = x + \frac{b}{2a}$$

$$\frac{\pm \sqrt{b^2 - 4ac}}{2a} = x + \frac{b}{2a}$$

$$-\frac{b}{2a} + \frac{\pm \sqrt{b^2 - 4ac}}{2a} = x$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = x$$

3. What did you discover?

Completing the square on the general form derives the quadratic formula.