Solving Quadratic Equation

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Equation -

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

Solution :-

1. Divide all terms by a so as to reduce the coefficient of x^2 to

$$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$$

2. Subtract the constant term from both sides of the equation

$$x^2 + \frac{b}{a}x = -\frac{c}{a}$$

3. To have a square on the left side the third term (constant) should be $(\frac{b}{2a})^2$

4. So add that amount to both sides

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

5. Take the square root of both sides (remembering that the result could be plus or minus)

$$x + \frac{b}{2a} = \pm(\sqrt{(\frac{b}{2a})^2 - \frac{c}{a}}$$

6. with some simplification

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

The Quadratic Formula

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

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

Solutions to ax² + bx + c = 0 for a nonzero are

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

Figure: Quadratic Equation Solution

THANKS