

Mathematics 1 - Quadratic Equations

Topics : [Computer engineering](#)

Written on [March 13, 2024](#)

1. Definition:

- A quadratic equation is a second-degree polynomial equation in one variable. It has the form: $ax^2 + bx + c = 0$
- Here, a , b , and c are constants, and x is the variable. a cannot be equal to 0, otherwise, it wouldn't be a quadratic equation.

2. Solutions:

- Quadratic equations typically have two solutions, which can be real or complex numbers. These solutions are called roots or zeroes of the equation.
- The solutions can be found using methods like factoring, completing the square, quadratic formula, or graphical methods.

3. Discriminant:

- The discriminant (Δ) of a quadratic equation is given by: $\Delta = b^2 - 4ac$
- The discriminant determines the nature of the roots:
 - If $\Delta > 0$, the equation has two distinct real roots.
 - If $\Delta = 0$, the equation has exactly one real root (the roots are repeated).
 - If $\Delta < 0$, the equation has two complex roots.

4. Vertex:

- The vertex of a quadratic function in the form $y = ax^2 + bx + c$ is given by the point (h, k) , where: $h = -b/2a$ and $k = f(h) = ah^2 + bh + c$

5. Graph:

- The graph of a quadratic equation is a parabola. The direction of the parabola (upward or downward) depends on the sign of the leading coefficient a .
- The axis of symmetry of the parabola is a vertical line passing through the vertex.

6. Applications:

- Quadratic equations are widely used in various fields, including physics, engineering, economics, and computer science.
- They describe many natural phenomena, such as projectile motion, the shape of satellite dishes, and the pricing of products based on supply and demand.

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