

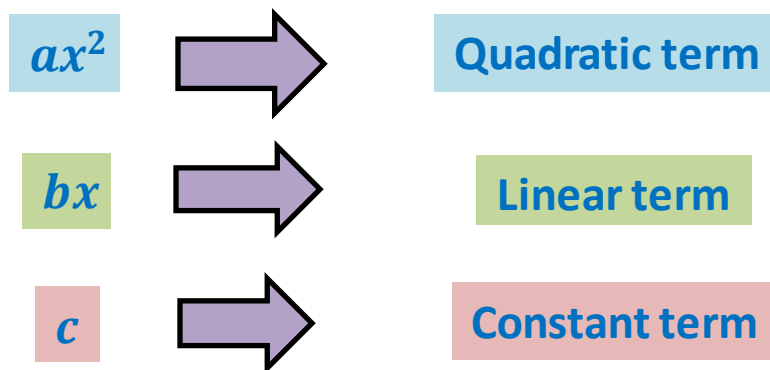
Quadratic Graphs and Their Properties

 Guided Notes

A **quadratic** equation is of the form:

$$ax^2 + bx + c$$

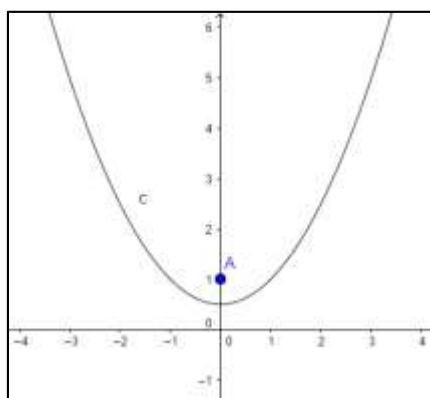
Where, $a \neq 0$.



Graph of a quadratic Equation

The graph of a quadratic equation is a U-shaped parabola.

To graph the quadratic equations, we can find the ordered pairs i.e. the pair of x, y values satisfying the quadratic equation.



Parabola

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Problem 1: What is the graph of $y = \frac{1}{2}x^2 + 2$?

Properties of Quadratic Graphs

Consider the quadratic equation $(x) = ax^2 + bx + c$, $a \neq 0$.

Axis of Symmetry is the line that divides the parabola into parts that are mirror images of each other.

Mathematically, it is given as:

$$x = -\frac{b}{2a}$$

Vertex of the parabola is the point which intersects the axis of symmetry of the parabola.

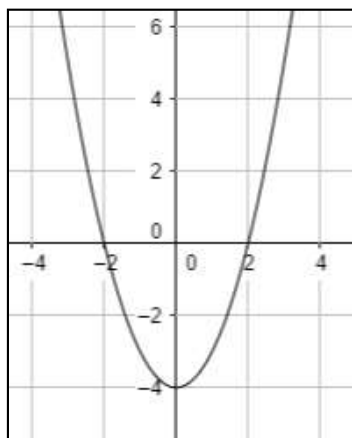
Mathematically, its coordinates are given as:

$$\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$$

Quadratic Graphs and Their Properties Guided Notes

- **Maximum** of a quadratic equation is a point where the graph has the maximum value. In the equation $y = ax^2$, if $a < 0$, the graph **opens downwards** and the maximum is the vertex of the graph.
- **Minimum** of a quadratic equation is a point where the graph has the minimum value. In the equation $y = ax^2$, if $a > 0$, the graph **opens upwards** and the maximum is the vertex of the graph.
- In the equation $y = ax^2$, the larger the numeric value of a , the narrower is the graph of the equation, and the smaller the numeric value of a , the wider is the graph of the equation.

Problem 2: Identify the vertex of the graph. Also tell whether it is a maximum or a minimum.



Problem 3: What is the domain and range of the function $y = 5x^2 - 3$?