

Parabola

- ⇒ A parabola is a U-shaped curve that is drawn for a quadratic function, $fx = ax^2 + bx + c$
- ⇒ The graph of parabola is downward (or opens down)
- ⇒ when the value of 'a' is less than 0, $a < 0$.
- ⇒ The graph of parabola is upward (or opens up)
- ⇒ when the value of 'a' is more than 0, $a > 0$.
- ⇒ Hence, the direction of parabola is determined by sign of coefficient 'a'

Vertex:-

⇒ The vertex of parabola will represent the maximum and minimum point of parabola.

Axis of Symmetry:-

⇒ The axis of symmetry of parabola always passes through its vertex and is parallel to y-axis.

Y-Intercept - The point which the parabola graph passes through y-axis is called y-intercept

X-Intercept. The points at which the parabola graph passes through the x-axis, are called x-intercept.

Standard form of parabola Equation:-

⇒ The equation of parabola can be expressed in two different ways

1. Standard form 2. Vertex form.

$$f(x) = y = ax^2 + bx + c$$

Here, $a > 0$, $a < 0$

$$f(x) = y = a(x-h)^2 + k$$

Here, (h, k) is vertex point

Example: Draw a graph for the equation $y = 2x^2 + x + 1$

Solution,

The given equation is $y = 2x^2 + x + 1$

Here, $a = 2$, $b = 1$ and $c = 1$

It needs to find the vertex now

$$x = -b/(2a), \quad x = -1/(2/2)$$

$$x = -1/4, \quad x = -0.25$$

Now putting $x = -0.25$ in the equation $y = 2x^2 + x + 1$

$$y = 2(-0.25)^2 + (-0.25) + 1$$

$$y = 2(0.0625) - 0.25 + 1, \quad y = 0.125 - 0.25 + 1$$

$$y = 0.875$$

Now putting the different values for x

$$\text{when } x = 1 \Rightarrow y = 2x^2 + x + 1 \Rightarrow y = 2(1)^2 + 1 + 1 \Rightarrow y = 2 + 1 + 1$$
$$y = 4$$

$$\text{when } x = 2 \Rightarrow y = 2(2)^2 + 2 + 1 \Rightarrow y = 2(4) + 2 + 1 \Rightarrow y = 8 + 2 + 1$$
$$y = 11$$

$$\text{when } x = 3 \Rightarrow y = 2(3)^2 + 3 + 1 \Rightarrow y = 2(9) + 3 + 1 \Rightarrow y = 18 + 3 + 1$$
$$y = 22$$

$$\text{when } x = -1, \Rightarrow y = 2(-1)^2 - 1 + 1 \Rightarrow y = 2 - 1 + 1 \Rightarrow y = 2$$

$$\text{when } x = -2 \Rightarrow y = 2(-2)^2 - 2 + 1 \Rightarrow y = 8 - 2 + 1 \Rightarrow y = 7$$

x	1	2	3	-1	-2	-3
y	4	11	22	2	7	16

