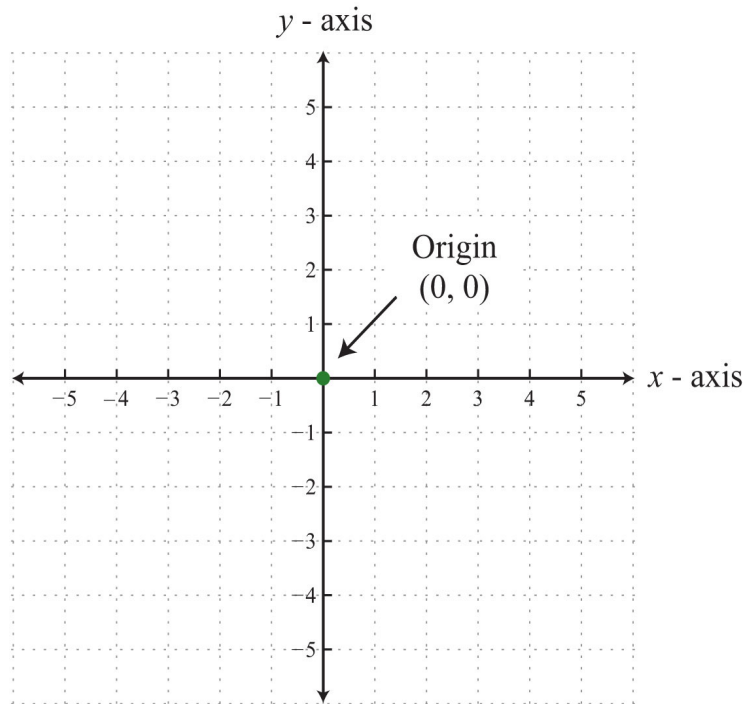
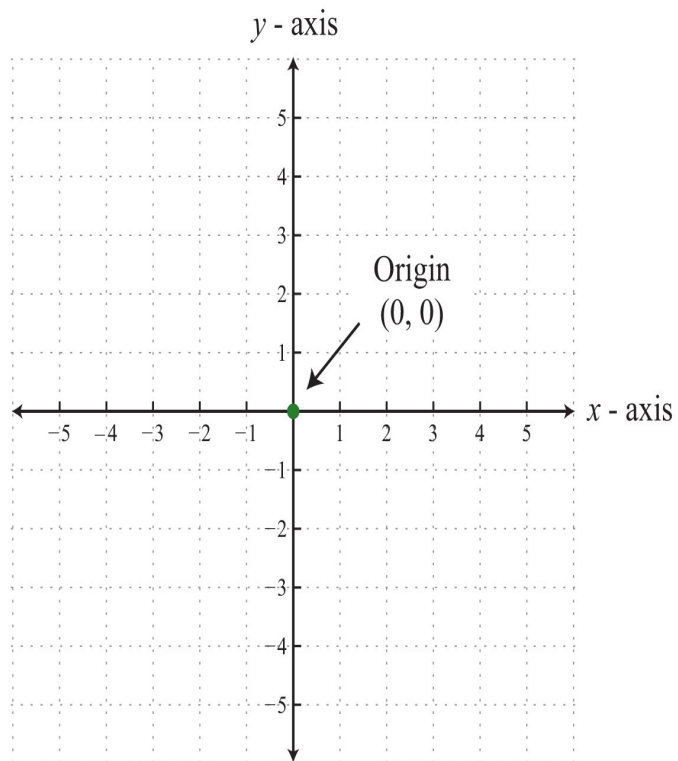


7.2

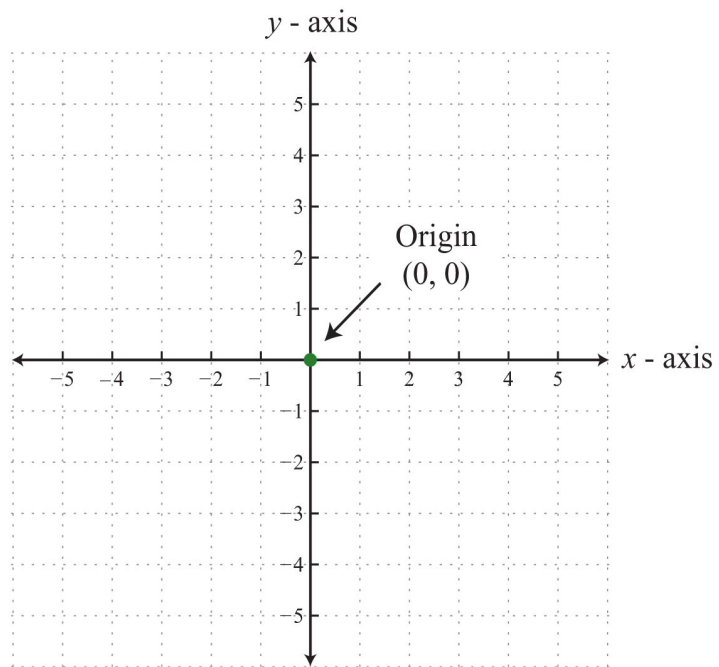
Q. What do you mean by a linear function algebraically and graphically?



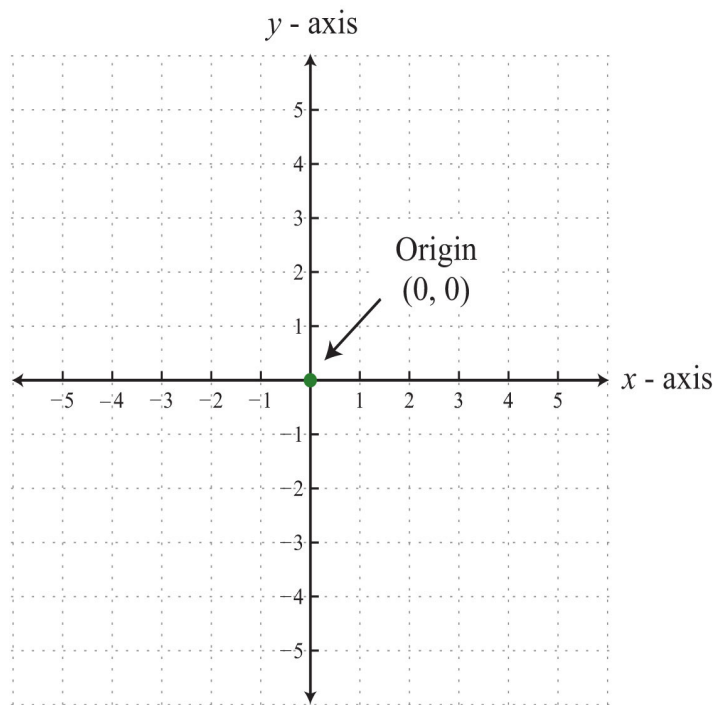
Q. What do you mean by a quadratic function algebraically and graphically?



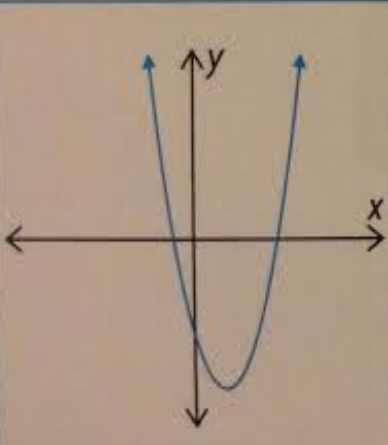
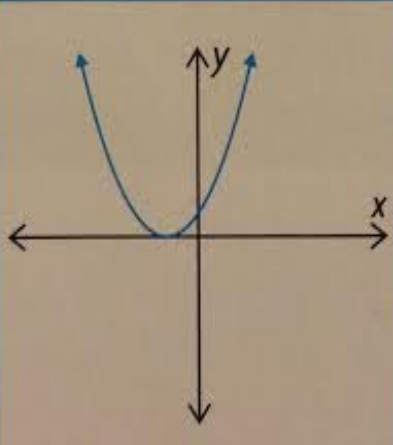
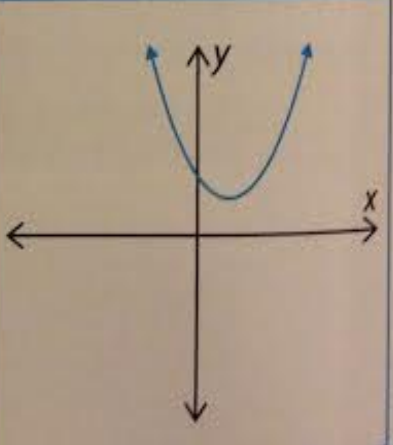
Q. What do you mean by a zero of a linear function?



Q. What do you mean by the zeros of a quadratic function?



- A parabola may have zero, one, or two x -intercepts, depending on the location of the vertex and the direction in which the parabola opens. By examining the vertex form of the quadratic function, it is possible to determine the number of zeros, and therefore the number of x -intercepts.

Two x -intercepts	One x -intercept	No x -intercepts
		

In this topic, we will learn to graph a quadratic function when it is given in its vertex form.

Key Idea

- The vertex form of the equation of a quadratic function is written as follows:

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

The graph of the function can be sketched more easily using this form.

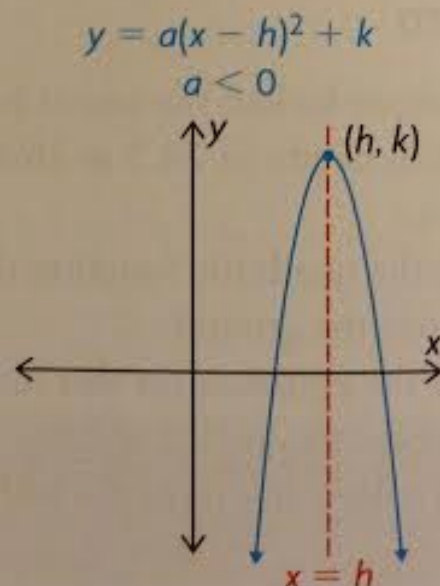
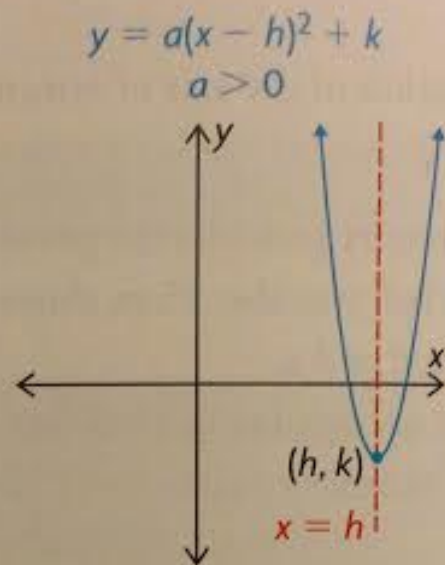
Need to Know

- A quadratic function that is written in vertex form,

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

has the following characteristics:

- The vertex of the parabola has the coordinates (h, k) .
- The equation of the axis of symmetry of the parabola is $x = h$.
- The parabola opens upward when $a > 0$, and the function has a minimum value of k when $x = h$.
- The parabola opens downward when $a < 0$, and the function has a maximum value of k when $x = h$.



In the following example, we will learn to graph a quadratic function by using its vertex form.

Ex. Sketch the graph of the given function: $f(x) = 2(x - 3)^2 - 4$.

Step. 1. Identify values of 'a', 'h' and 'k' by comparing the given function with the vertex form,

Given function : $f(x) = 2(x - 3)^2 - 4$

Vertex form : $f(x) = a(x - h)^2 + k$

Therefore, $a = 2$, $h = 3$, $k = -4$

Step. 2. Identify vertex and the direction of the parabola:

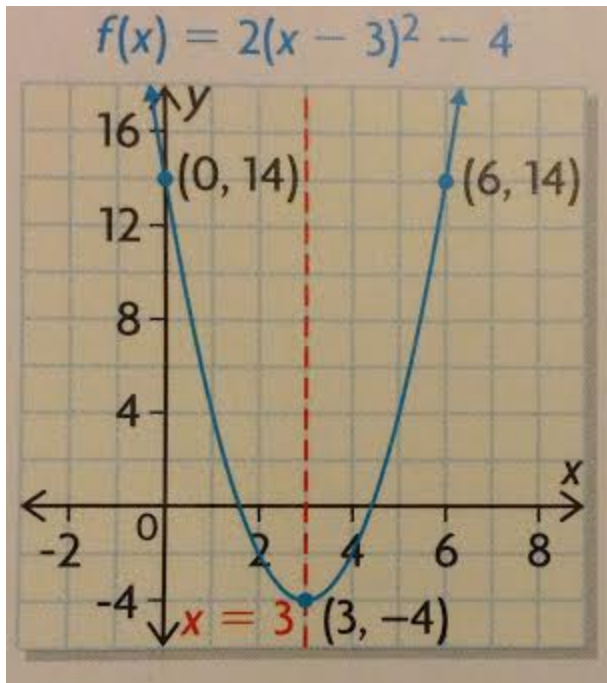
Vertex : $(h, k) = (3, -4)$

As ' $a = 2 = +ve$ ', the direction of the parabola is upwards.

Step. 3. Determine 'x' and 'y' intercepts:

<p>To determine 'x' intercept:</p> <p>Plug-in $y=0$ in the equation, and solve for 'x'</p> $y = 2(x - 3)^2 - 4$ $0 = 2(x - 3)^2 - 4$ $4 = 2(x - 3)^2$ $2 = (x - 3)^2$ $\pm \sqrt{2} = (x - 3)$ $\pm 1.414 = x - 3$ $1.414 = x - 3 \qquad - 1.414 = x - 3$ $4.414 = x \qquad 1.586 = x$ $x = 4.414 \qquad x = 1.586$ <p>'x' intercepts (4.414, 0) and (1.586, 0)</p>	<p>To determine 'y' intercept:</p> <p>Plug-in $x=0$ in the equation, and solve for 'y'</p> $y = 2(x - 3)^2 - 4$ $y = 2(0 - 3)^2 - 4$ $y = 2(-3)^2 - 4$ $y = 2(9) - 4$ $y = 18 - 4$ $y = 14$ <p>'y' intercept (0, 14)</p>
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Step. 4. Sketch the graph using vertex, x/y intercepts and axis of symmetry.



Zeros : $x = 1.586$ and $x = 4.414$