

Exemplar: Algebra 2, Semester 2, Problem 2

Determine whether the function  $f(x) = 0.25(x - 15)^2 + 150$  has a maximum or a minimum value. Find that value

Since the function is in the vertex form of a quadratic equation, the vertex of the parabola is  $(h, k)$  or in this case  $(15, 150)$ . The sign of the leading coefficient tells whether a parabola opens up or down. If the leading coefficient is positive, the parabola opens up and the vertex is a minimum. If the leading coefficient is negative, then it opens down and the vertex is a maximum.

In this function the leading coefficient is positive 0.25, thus the vertex is a **minimum point**.

The y-coordinate ( $k$ ) of the vertex gives us the maximum or minimum value of the function. Thus, the **minimum value** of the function is 150.

Write the equation of a parabola with a vertex at  $(3, 2)$ . Write the axis of symmetry and coordinates of two other points on the graph. (Answers will vary)

For example:  $y = 2(x - 3)^2 + 2$

The axis of symmetry is the vertical line through the vertex of this graph. Therefore, the line  $x=3$  is the axis of symmetry.

To find other points on graph, substitute any real number for  $x$  and solve for  $y$ .

$$y = 2(x - 3)^2 + 2$$

$$y = 2(0 - 3)^2 + 2; x = 0$$

$$y = 20; (0, 20)$$

$$y = 2(10 - 3)^2 + 2; x = 10$$

$$y = 100; (10, 100)$$