

## Examples and Exercises

KEY

\*No Calculator\*

1. Find (if possible), the zeros of the following quadratic functions.

(a)  $f(x) = x^2 + 5x - 14$

$$x = -7 \text{ and } 2$$

(b)  $g(x) = x^2 + 1$

$$x^2 + 1 \neq 0$$

or

$$x = \frac{\pm \sqrt{-4}}{2}, \text{ No real zeros}$$

2. For each of the following, complete the square in order to find the vertex.

(a)  $y = x^2 - 40x + 1$

$$y = (x - 20)^2 - 399$$

$(20, -399)$  vertex

(b)  $y = 2x^2 + 12x + 3$

$$y = 2(x + 3)^2 - 15$$

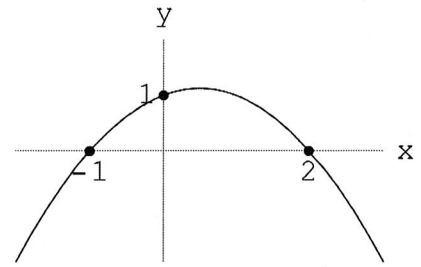
$(-3, -15)$  vertex

3. A parabola has its vertex at the point  $(2, 3)$  and goes through the point  $(6, 11)$ . Find a formula for the parabola.

$$y = \frac{1}{2}(x - 2)^2 + 3$$

4. Find a formula for the quadratic function shown below. Also find the vertex of the function.

$$y = -\frac{1}{2}(x+1)(x-2)$$



$$y = -\frac{1}{2}(x^2 - x - 2)$$

$$y = -\frac{1}{2}x^2 + \frac{1}{2}x + 1$$

Complete the square

$$y = -\frac{1}{2}\left(x - \frac{1}{2}\right)^2 + \frac{9}{8}$$

$\left(\frac{1}{2}, \frac{9}{8}\right)$  vertex

5. A tomato is thrown vertically into the air at time  $t = 0$ . Its height,  $d(t)$  (in feet), above the ground at time  $t$  (in seconds) is given by  $d(t) = -16t^2 + 48t$ .

- (a) Find  $t$  when  $d(t) = 0$ . What is happening to the tomato the first time that  $d(t) = 0$ ? The second time?

$t = 0$  is the 1st time  $d(t) = 0$ , when the tomato is 1st thrown into the air

$t = 3$  is the 2nd time  $d(t) = 0$ , when the tomato returns to ground

- (b) When does the tomato reach its maximum height? How high is the tomato's maximum height?

$$d(t) = -16\left(t - \frac{3}{2}\right)^2 + 36$$

$\left(\frac{3}{2}, 36\right)$  vertex

At  $t = 1.5$  secs, the maximum height of tomato is reached, 36 ft.