

## Section 3.4 Multiple Forms of Quadratic Functions

- Write the equation of each quadratic function in factored form. Then, find the  $x$ -intercepts, the  $y$ -intercept, the coordinates of the vertex, and the equation of the axis of symmetry. Sketch the graph.
  - $y = x^2 - 9x + 14$
  - $y = -2x^2 + 4x + 6$
  - $y = 2x^2 + x$
  - $y = -3x^2 + 12x - 12$
- For each function, find the  $x$ -intercepts, the  $y$ -intercept, the coordinates of the vertex, and the equation of the axis of symmetry. Sketch a graph of the function. Round answers to the nearest hundredth, if necessary.
  - $y = 0.9x^2 + 2.1x - 5.7$
  - $y = -\frac{1}{2}x^2 + \frac{3}{4}x - \frac{1}{8}$
  - $y = -2.7x^2 - 1.5x + \frac{19}{5}$
- For each quadratic function, find the  $x$ -intercept(s) and the coordinates of the vertex. Indicate the intervals on which the function is positive or negative, and increasing or decreasing. If necessary, sketch a graph to help visualize the function.
  - $y = x^2 + 6x + 8$
  - $y = -3x^2 - 4x - 1$
  - $y = -16x^2 + 2x + 18$
  - $y = (4x - 6)^2$
  - $y = -25x^2 - 20x - 4$
- A dolphin jumps out of the water as part of a trick. The height,  $h$  metres, of the dolphin above the water is modelled by  $h(t) = -t^2 + 4t - 3$ , where  $t$  is the time the dolphin takes to complete the trick, in seconds.
  - How long does it take the dolphin to reach the surface of the water?
  - How long is the dolphin above the surface of the water?
  - What is the maximum height reached by the dolphin?
  - After 4 s, how far is the dolphin below the surface of the water?
- The arch in a bridge is modelled by the quadratic equation  $h(d) = -0.8d^2 + 4.8d + 12.8$ , where  $h$  is the height in metres of the arch above the ground and  $d$  is the horizontal distance in metres from one end of the bridge.
  - What is the maximum height of the arch?
  - What is the horizontal distance between the points where the arch touches the ground?
  - If a 1.8 m tall person is standing at the origin (0, 0), how much higher is the arch than the person's head?