

## Section 5.8 Exercises

For each function, find each of the following:

- direction the parabola opens (i.e., up or down)
- does the function have a maximum or a minimum?
- coordinates of the vertex
- equation of the axis of symmetry
- maximum or minimum value
- y intercept
- x intercept(s), if any

Then use all of the information to sketch the graph of the function.

- $f(x) = x^2 + 4x + 3$
- $f(x) = x^2 + 6x + 5$
- $f(x) = x^2 + 4x + 4$
- $f(x) = x^2 - 8x + 16$
- $f(x) = 9 - x^2$
- $f(x) = x^2 + 3$
- $f(x) = -x^2 - 5x + 1$
- $f(x) = -x^2 + 3x - 2$
- $f(x) = 2x^2 - 8x - 1$
- $f(x) = 3x^2 + 12x + 2$
- $f(x) = 2 - 3x - 4x^2$
- $f(x) = 7 - x - 3x^2$

Find the coordinates of the vertex in each problem and use that information to solve the problems.

- A rocket is launched upwards with initial velocity 64 feet per second. The equation for its height is given by the function  $h(t) = -16t^2 + 64t$ .
  - Find the time at which the rocket reaches its maximum height.
  - Find the maximum height of the rocket.

- The daily profit that a company experiences when selling  $x$  of their product is

$$P(x) = 300 + 100x - 0.2x^2.$$

- How many units of the product should they sell to maximize profit?
- What is the maximum profit?

For each problem, write a function. Then use it to answer the question.

- Suppose you want to create a rectangular garden in your back yard using 45 meters of fencing. You can use one side of your garage as one side of the garden, so you will not need any fencing along that side. Find the dimensions of the garden that will give the maximum area. What is the maximum area?
- Suppose you want to create a rectangular garden in your back yard using 300 feet of fencing. You can use one side of your garage as one side of the garden, so you will not need any fencing along that side. Find the dimensions of the garden that will give the maximum area. What is the maximum area?