Lesson 2.1.1

2-1. See the "Suggested Lesson Activity" for expected student responses.

c. Students should mention that when the length of the radius is zero, the mass is zero.

d. A quadratic equation of the form $y = ax^2$ will go through the origin and makes physical sense.

e. Equations will vary.

f. Answers will vary, but students should use their equation from part (e) to predict the mass.

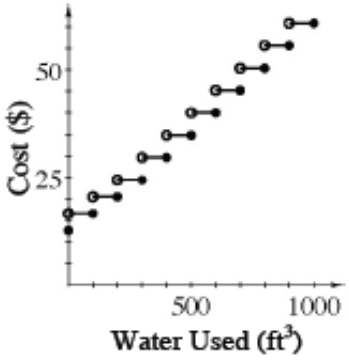
2-2. See below:

a. For the data, the input cannot be negative, but for the function it can. The range for both is the same, but is limited by the domain in the case of the lab.

b. The equation is a valid model only when x (the radius) is greater than or equal to zero.

2-4. See below:

a. See graph below.



b. Yes, for every possible amount of water usage, there is only one possible cost.

c. Domain: 0 to 1,000 cubic feet; range: discrete values including: \$12.70, \$16.60, \$20.50, \$24.40, \$29.60, \$34.80, \$40, \$45.20, \$50.40, \$55.60, \$60.80

2-5. See below:

a. Smallest: 2; Largest: none

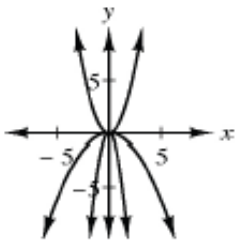
b. Smallest: 0; Largest: none

c. Smallest: –3; Largest: none

d. Smallest: none; Largest: 0

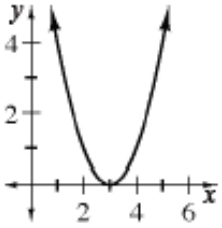
e. At the vertex

2-6. The negative coefficient causes parabolas to open downward, without changing the vertex. See graph below.



2-7. See below:

a. Parabola with vertex (3, 0), see graph below.



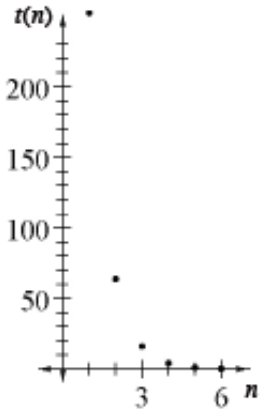
b. Shifted to the right three units.

2-8. See below:

a. 4, 1, 0.25; $t(n) = 256(0.25)^n$

b. They get smaller, but are never negative.

c. See graph below. They get very close to zero.



d. The domain is n integers greater than or equal to zero. The domain of the function is all real numbers.

2-9. See below:

a. $y = -\frac{2}{3}x - 4$

b. $y = 2$

c. $x = 2$

d. $y = \frac{2}{3}x - \frac{8}{3}$

2-10. $n = 24$; $\sqrt{650} = 5\sqrt{26}$