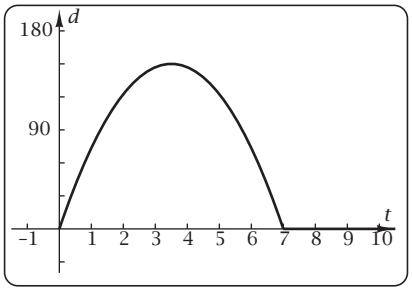
Solutions for the Explorations

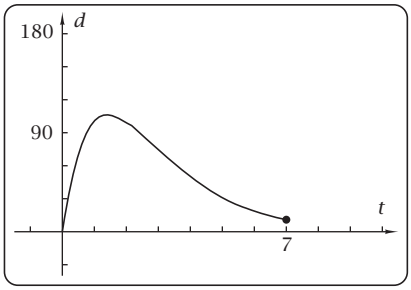
Chapter 1

Exploration 1-1a

1. Such a graph might look like this:



2. $d = 200t \cdot 2^{-t}$:



3.

t	*d*
0	0.0°
1	100.0°
2	100.0°
3	75.0°
4	50.0°
5	31.3°
6	18.8°
7	10.9°
8	6.3°
9	3.5°
10	2.0°

4. Door appears to be opening. The graph of d shows that d was less than 100° before $t = 1$ s and greater than 100° after $t = 1$ s.

5. Average Rate = (change in value)/(Time)
   $= (200(1.1) \cdot 2^{-1.1} - 200(1) \cdot 2^{-1})/(1.1 - 1)$
   $\approx (102.6° - 100°)/0.1$ s
   $= 26°/s$
   This number is greater than zero, which shows that the door is still opening because d is increasing.

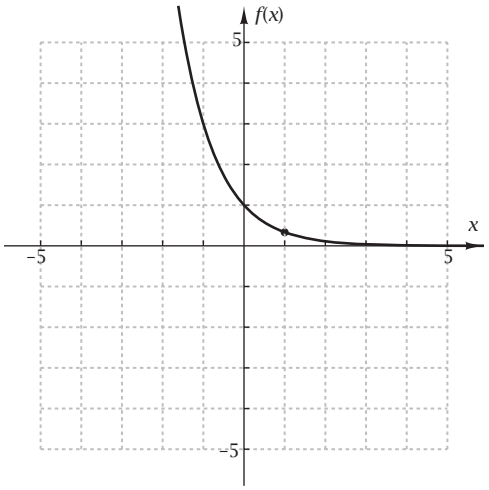
6. Average rate for time interval [1, 1.01] ≈ 30°/s.
   Average rate for time interval [1, 1.001] ≈ 31°/s.
   Average rate for time interval [1, 1.0000001] ≈ 31°/s.
   The average rate seems to be approaching 30.68°/s ≈ 31°/s!

7. Answers will vary.

8. The example in Section 1-1 is the same as this Exploration!

Exploration 1-2a

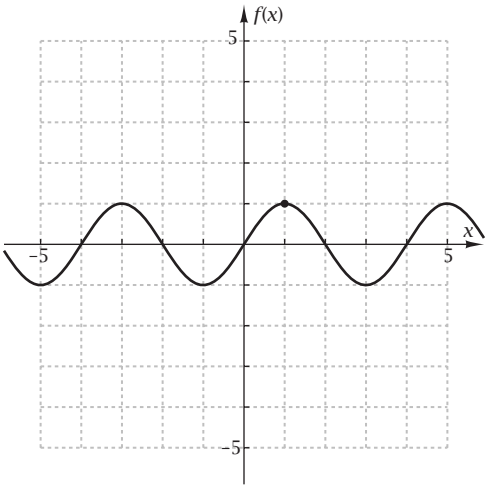
1. a. $f(x) = 3^{-x}$:



   b. Grapher confirms sketch.

   c. Decreasing slowly

2. a. $f(x) = \sin \frac{\pi}{2}x$:



   b. Grapher confirms sketch.

   c. Not changing