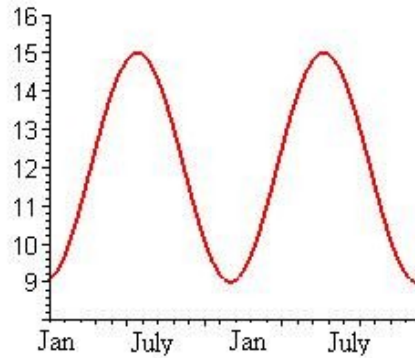


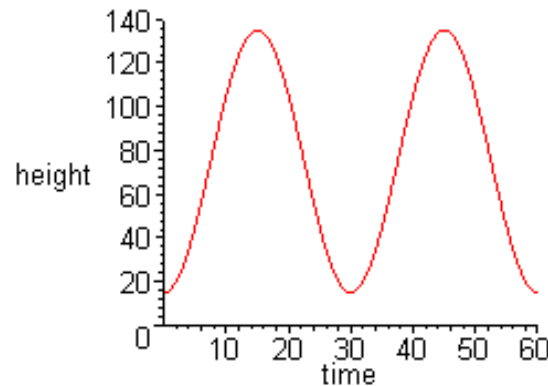
11: Periodic Functions --- Answers

1. Periodic behavior is repetitious, exponential functions are not.
2. For some inputs there is more than one output.
3. Answers will vary. Some examples the height of tides, length of daylight, or sound waves.
4.
 - a) 3
 - b) i. $f(10) = 4$; ii. $f(11) = 0$; iii. $f(16) = 4$; iv. $f(18) = 2$.
5. 1

6. $y = S(d)$ is a periodic function because although the amount of daylight is less in the winter and more in the summer, this same pattern repeats itself every year. Thus the period is 1 year.
7. There are 12 hours of daylight on the spring and fall equinoxes. These occur around March 21 and September 21.



8.
 - a) No
 - b) Yes
 - c) Yes
 - d) No
9. The amplitude would be 4" instead of 6".
10. The horizontal position repeats when the swinger goes all the way forward *and* back. The vertical position repeats with each swing forward *or* back.
11. Pushing the swing harder would give make it swing farther back and forth (as well as up and down). Thus, the amplitude would increase.
12. The period is 30 minutes and the amplitude is 60 m.



13.
 - a) It is periodic because every 8 seconds the graph of his distance will repeat itself.
 - b) 8 seconds
 - c) 4 feet.
14. A circle with radius of 1.

15. If x is the distance on a unit circle from $(1, 0)$ to a point P , then $\sin x$ is the vertical position of P .

16. If x is the distance on a unit circle from $(1, 0)$ to a point P , then $\cos x$ is the horizontal position of P .

17.

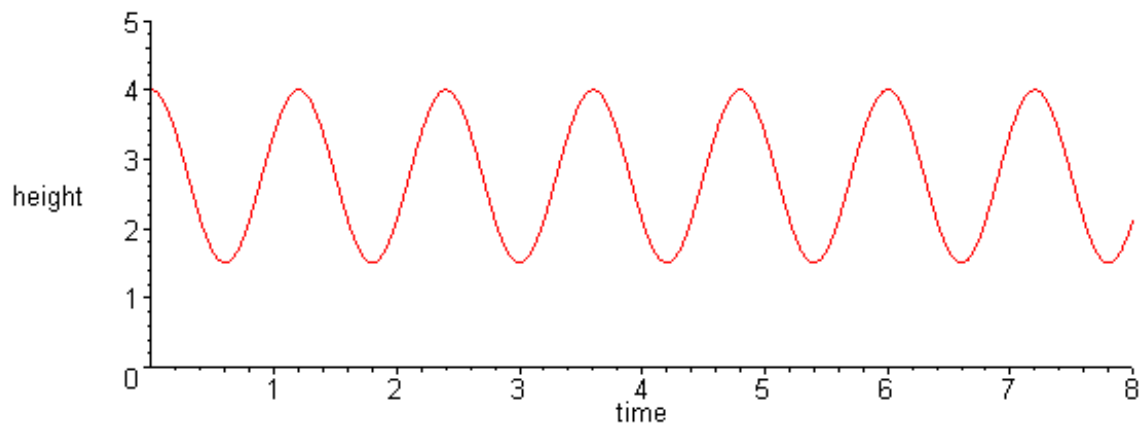
- a) 0.95
- b) 1
- c) 0.6
- d) -0.4
- e) -0.5
- f) 0.9

18.

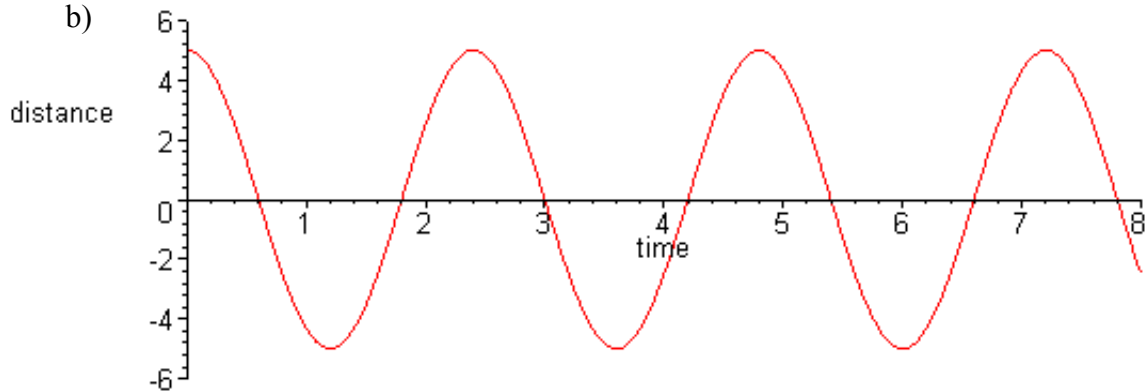
- a) $y = \sin x$
- b) $y = 2^x$
- c) $y = 2x$
- d) $y = \log x$

19.

a)



b)



20.

