

## Chapter 6 Solutions

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### Section 6.1 – Arcs and Sectors

16.  $\frac{3\pi}{4}$

17.  $\frac{7\pi}{6}$

18.  $\frac{5\pi}{3}$

19.  $-\frac{5\pi}{2}$

20.  $-\frac{5\pi}{12}$

21.  $\frac{125\pi}{18}$

22.  $105^\circ$

23.  $660^\circ$

24.  $974.0^\circ$

25.  $-200.5^\circ$

26.  $-29.0^\circ$

27.  $1002.7^\circ$

28.  $-\frac{\sqrt{3}}{2}$

29.  $\frac{\sqrt{3}}{3}$

30.  $-\frac{\sqrt{2}}{2}$

31.  $-\frac{1}{2}$

32.  $-\sqrt{3}$

33.  $-\frac{\sqrt{3}}{2}$

34. 29.3 cm

35. 18.3 cm

36. 36.7 cm

37. 68.9 cm

38. 12.0 cm

39. 78.2 cm

42. 13.6 cm

43.  $65.4 \text{ u}^2$

44.  $380.1 \text{ u}^2$

45.  $9.6 \text{ u}^2$

50. a) 48.4 mm  
b)  $2757.8 \text{ mm}^2$

53. a) 7.9 ft  
b) 2.5 radians or  $143.2^\circ$

55.  $26.3^\circ$

58. a) 11.8 ft  
b)  $206.3^\circ$

62.  $21.3 \text{ in}^2$

63. no solution

64. 172.7 yds

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### Section 6.2

13. 18.8 radians
15. 82.9 radians
17. 381.4 radians
19. 1.3 rad/sec
21. 9.0 rad/sec
23. 39.3 rad/sec
25. 0.1 rad/sec
27. 811.7 rev/min
29. 109.6 ft/sec
31. 4021.6 in/sec
33. 18014.0 mm/min
34. a) 20 rpm  
b) 10.5 in/sec
35. a) 3.1 mm/s  
b) 0.05 mm/s  
c) 0.003 mm/s
36. a) 5.6 ft/s  
b) 31 sec
37. a) 7.1 ft/s  
b) 9.9 ft  
c) 4 ft/s
38. a) light child: 1.2 rad/s; heavy child: 1.2 rad/s  
b) light child: 11.0 ft/s; heavy child: 7.3 ft/s
39. a) 2017 revs  
b) 14.7 mph
44. 47.5 cm<sup>2</sup>
45. 31.68 cm<sup>2</sup>
46. 35.349°

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### Section 6.3

5. yes; period = 4

6. 0

7. 1

8.  $\frac{3\pi}{2} + 2\pi n$

11. neither; period does not equal  $2\pi$

13. yes; 6

14. no

15. yes; 20

16. no

17. no

18. no

19. 1

20. 0

21. 0

22. 1

23. -1

24. -1

25. -1

26. -1

27.  $\pi + 2\pi n$

28.  $\frac{\pi}{2} + 2\pi n$

29.  $\frac{\pi}{2} + \pi n$

30.  $\theta + 2\pi n$

37.  $y = \cos(x)$ ; student must have explanation

38. neither

39.  $y = \sin(x)$ ; student must have explanation

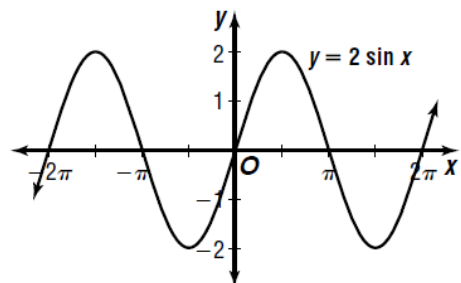
52. a)  $\pi n$

b) 2

c) -2

d)  $2\pi$

e)



f) it was stretched vertically

57. 52.4 rads/sec

58.  $-85.9^\circ$

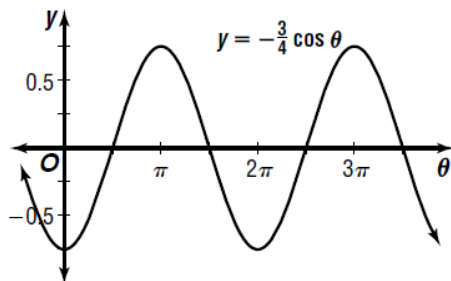
59.  $45^\circ, 135^\circ$

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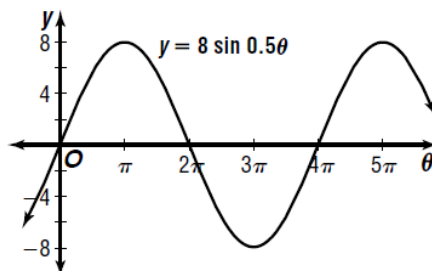
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### Section 6.4 – Amp and Period

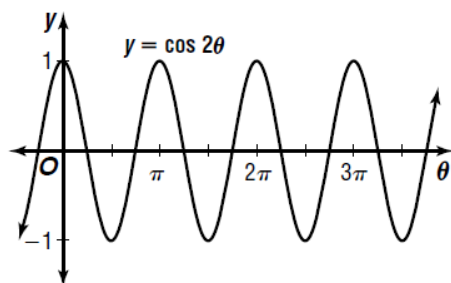
18. Amp =  $\frac{3}{4}$



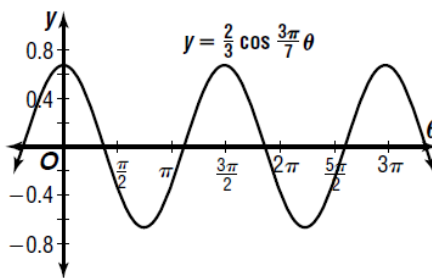
26. Amp = 8; Period =  $4\pi$



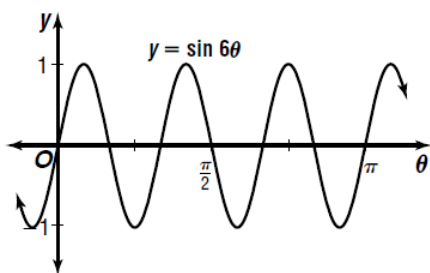
20. Period =  $\pi$



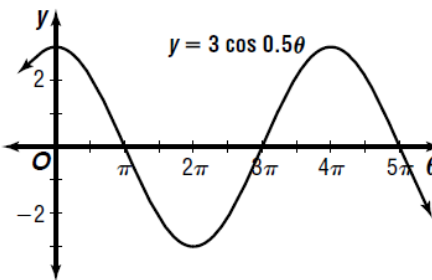
28. Amp =  $\frac{2}{3}$ ; Period =  $\frac{14}{3}$



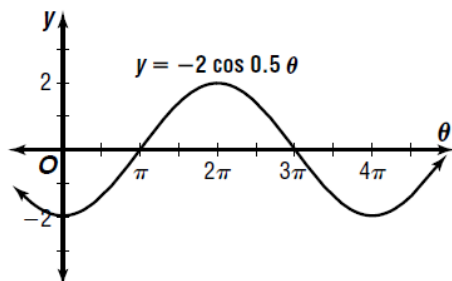
22. Period =  $\frac{\pi}{3}$



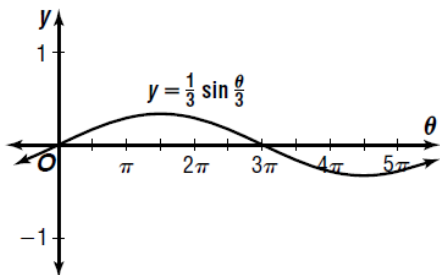
30. Amp = 2; Period =  $4\pi$



24. Amp = 2; Period =  $4\pi$



32. Amp =  $\frac{1}{3}$ ; Period =  $6\pi$

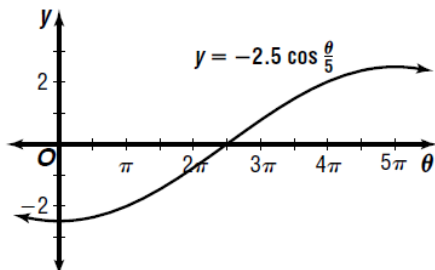


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### Section 6.4 – continued

34. Amp = 2.5; Period =  $10\pi$



36.  $y = \pm 0.4 \sin \frac{\theta}{4}$

38.  $y = \pm \frac{1}{4} \sin 6\theta$

40.  $y = \pm 4.5 \sin \frac{8}{5}\theta$

42.  $y = \pm 5 \cos \theta$

44.  $y = \pm 7.5 \cos \frac{\theta}{3}$

46.  $y = \pm \frac{2}{5} \cos \frac{10}{3}\theta$

48.  $y = 0.5 \sin 2\theta$

50.  $y = -3 \cos \theta$

52.  $y = -1.5 \sin \frac{\theta}{2}$

62. 0

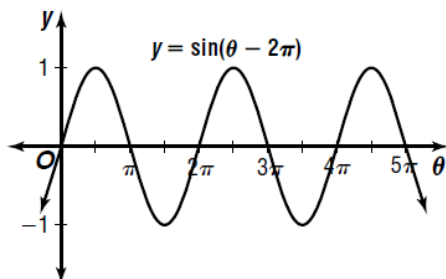
64. 11.5 in

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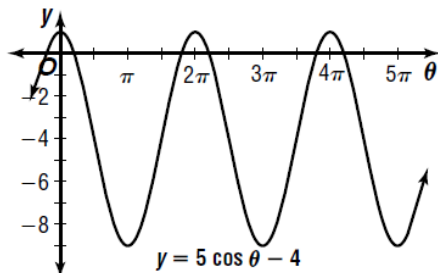
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### Section 6.5 – Trig Translations

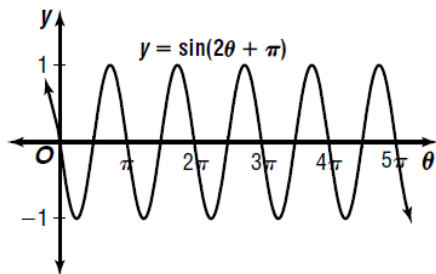
14. Amp = 1; Period =  $2\pi$ ; PS =  $2\pi$



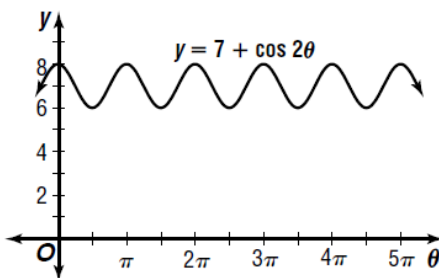
18. Amp = 5; Period =  $2\pi$ ; VS =  $-4$



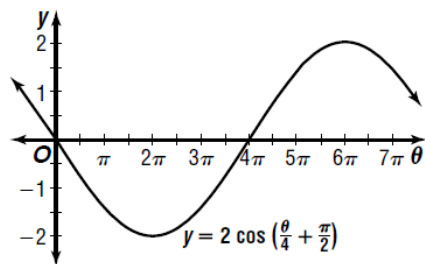
15. Amp = 1; Period =  $\pi$ ; PS =  $-\frac{\pi}{2}$



19. Amp = 1; Period =  $\pi$ ; VS = 7

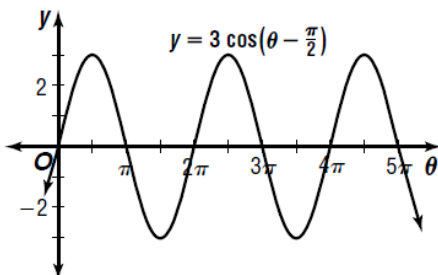


16. Amp = 2; Period =  $8\pi$ ; PS =  $-2\pi$

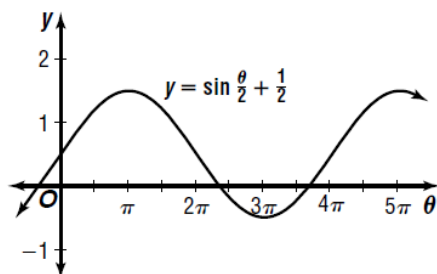


20. PS =  $2\pi$ ; VS =  $-3$

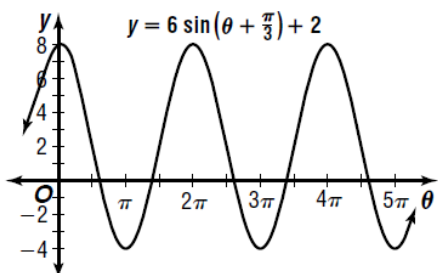
21. Amp = 3; Period =  $2\pi$ ; PS =  $\frac{\pi}{2}$ ;



17. Amp = 1; Period =  $4\pi$ ; VS =  $\frac{1}{2}$



22. Amp = 6; Period =  $2\pi$ ; PS =  $-\frac{\pi}{3}$ ; VS = 2

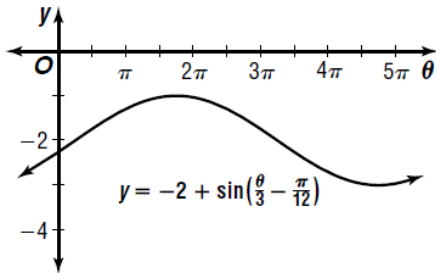


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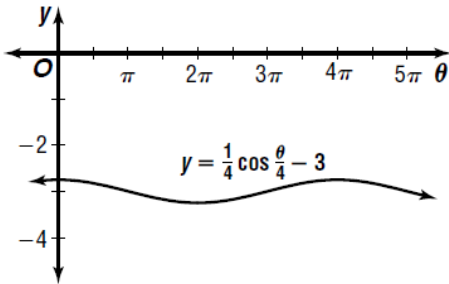
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### Section 6.5 – continued

23. Amp = 1; Period =  $6\pi$ ; PS =  $\frac{\pi}{4}$ ; VS = -2



25. Amp =  $\frac{1}{4}$ ; Period =  $4\pi$ ; VS = -3



28.  $y = \pm 7 \sin\left(\frac{2}{3}\theta - \frac{2\pi}{3}\right) - 7$

29.  $y = \pm 50 \sin\left(\frac{8}{3}\theta - \frac{4\pi}{3}\right) - 25$

30.  $y = \pm \frac{3}{4} \sin(10\theta - 10\pi) + \frac{1}{4}$

31.  $y \pm 3.5 \cos(4\theta - \pi) + 7$

32.  $y = \pm \frac{4}{5} \cos(12\theta - 4\pi) + \frac{7}{5}$

34.  $y = -2 \cos\left(\frac{\theta}{2}\right) - 1$

35.  $y = 0.5 \sin 2\theta + 3$

41. a) 3000 and 1000  
 b) 15000 and 5000  
 c) see graph  
 d) months 3 and 15  
 e) months 0, 12, and 24

f) when the sheep are at a max, the wolf pop will increase.

43. a) 4 ft  
 b)  $t = 25$   
 c) 20 sec  
 d)  $h = 21 \sin\left(\frac{\pi t}{10}\right) + 25$   
 e) 5 sec  
 f) 25 ft

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### Section 6.6 – Real World Data

4. a) 5 units below mid  
b) 5 units above mid  
c)  $y = -4.33$

5.  $y = 30 \sin(2\pi t) + 10$

6. a)  $A = 12.5^\circ$   
b)  $h = 53.5^\circ$   
c) 12 months  
d)  $y = -12.5 \cos\left(\frac{\pi}{6}t - 0.5\right) + 53.5$   
e)  $42.8^\circ$   
f)  $53.2^\circ$

7. a) 0.5  
b)  $\frac{1}{330}$

8. a) 6.5 units  
b) 0.5 units  
c)  $\frac{6}{5}$   
d) 2 unites

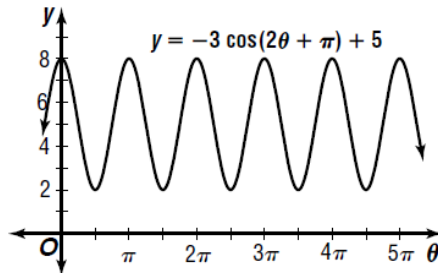
9. a) 1200  
b) 232  
c) no  
d) January 1, 1971  
e) next min: July 1, 1973  
f) student should have work for current year

10.  $y = 2 \cos\left(\frac{\pi}{5}t\right)$

13. a)  $4^\circ$   
b)  $771^\circ$   
c) 12 months  
d)  $y = -4 \cos\left(\frac{\pi}{6}t - 0.5\right) + 77$   
e) about  $80.4^\circ$   
f) about  $79.1^\circ$

19.  $y = 120 \sin\left(\frac{\pi}{30}t\right)$

21. Amp = 3; Period =  $\pi$ ; PS =  $-\frac{\pi}{2}$ ; VS = 5



22.  $2\pi n$

23.  $\frac{40\pi}{9}$



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### Section 6.7 – Graph other Trig

13. 0

50.  $\frac{\sqrt{3}}{2}$

14. 0

51. 685 units<sup>2</sup>

15. undefined

16. -1

17. -1

18. undefined

19. undefined

20. 0

21.  $\pi n$ ; where  $n$  is an integer

22.  $\pi n$ ; where  $n$  is an even integer

23.  $\frac{3\pi}{2} + 2\pi n$ ; where  $n$  is an integer

24.  $\frac{\pi}{4} + \pi n$ ; where  $n$  is an integer

25.  $-\frac{\pi}{4} + \pi n$ ; where  $n$  is an integer

26.  $\frac{3\pi}{4} + \pi n$ ; where  $n$  is an integer

27.  $\frac{\pi}{2}n$ ; where  $n$  is an odd integer

28.  $\pi n$ ; where  $n$  is an integer

32.  $x = \cos t$ ;  $y = \sin t$

36.  $x = t$ ;  $y = t^2 - 4t + 7$

37.  $y = t$ ;  $x = t^2 + 2t - 1$

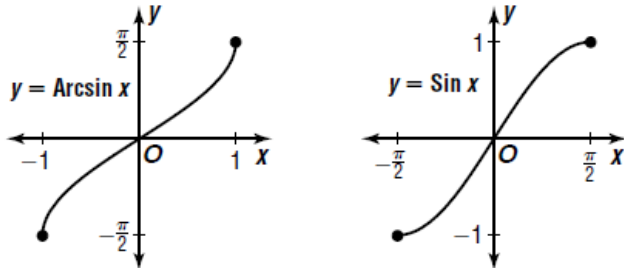
43.  $x = 6 \sin t$ ;  $y = 6 \sin t$

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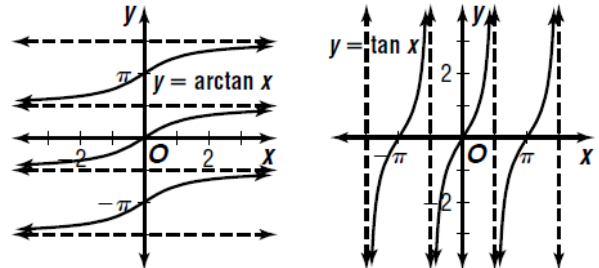
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### Section 6.8 – Inverses (day 1)

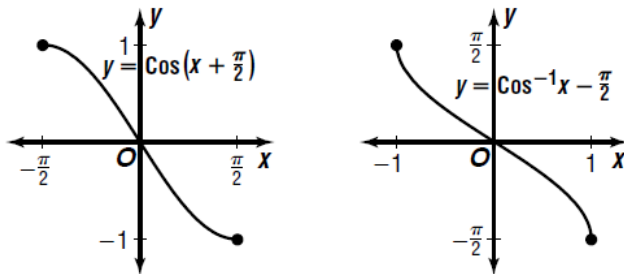
6.  $y = \text{Arcsin}(x); y = \text{Sin}(x)$



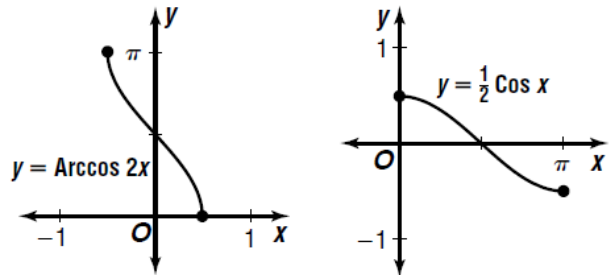
16.  $y = \arctan(x); y = \tan x$



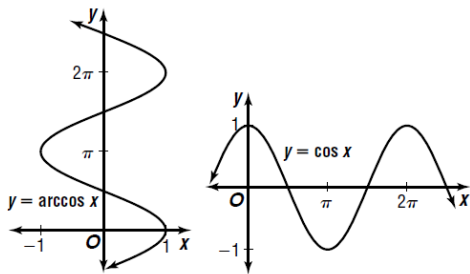
7.  $y = \text{Arccos}(x) - \frac{\pi}{2}; y = \text{Cos}(x + \frac{\pi}{2})$



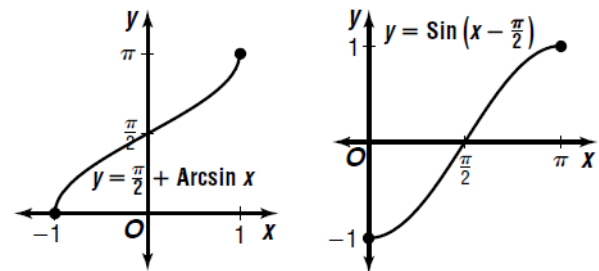
17.  $y = \text{Arccos}(2x); y = \frac{1}{2} \text{Cos}(x)$



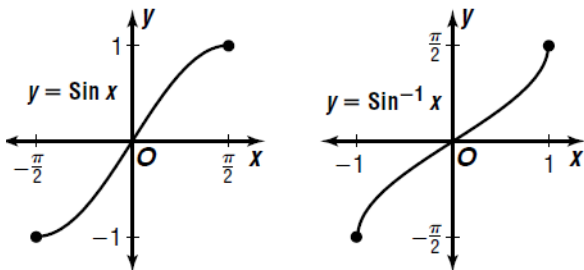
14.  $y = \arccos(x); y = \cos(x)$



18.  $y = \frac{\pi}{2} + \text{Arcsin}(x); y = \text{Sin}(x - \frac{\pi}{2})$



15.  $y = \text{Sin}(x); y = \text{Arcsin}(x)$



19.  $y = \tan\left(\frac{x}{2}\right); y = 2\arctan(x)$

39. April and October

53.  $27x^3 - 1; 3x^3 - 3$

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### Section 6.8 – Inverses (day 2)

8.  $\frac{\pi}{4}$

49. 54.4 units

9.  $\frac{\sqrt{2}}{2}$

50.  $30^\circ$

10.  $\frac{\sqrt{2}}{2}$

22. 0

23.  $\frac{\pi}{2}$

24.  $\frac{\pi}{6}$

25.  $\frac{\pi}{2}$

26. 1

27.  $\frac{1}{2}$

28.  $\frac{\sqrt{2}}{2}$

29.  $-\frac{1}{2}$

30.  $\frac{1}{2}$

31. No

46.  $\pi n$ ; where  $n$  is an integer

47.  $y = \pm \sin\left(\frac{2}{3}\theta + \frac{2}{3}\pi\right) - 8$

48.

