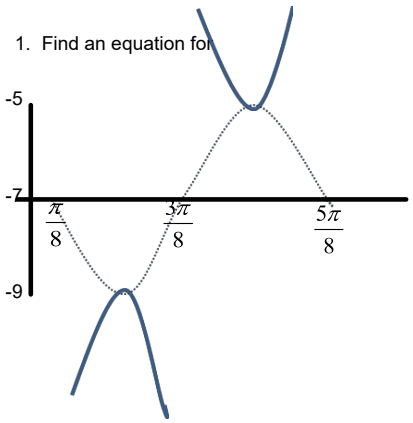
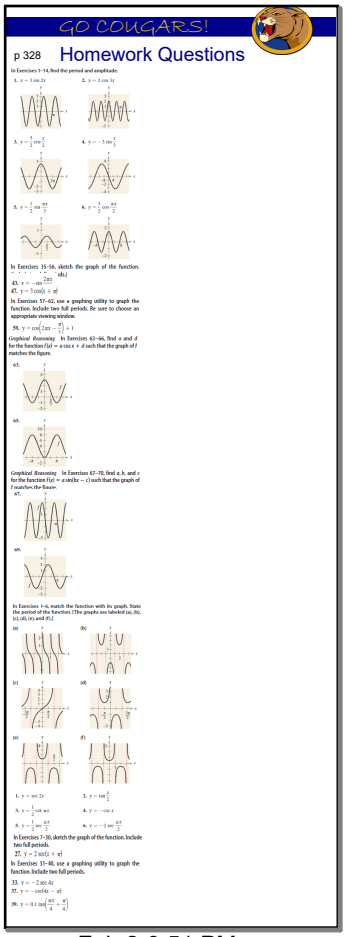
Warm up

1. Find an equation for



$y = -2\csc\left(4\left(x-\frac{\pi}{8}\right)\right)-7$

May 6-6:59 AM



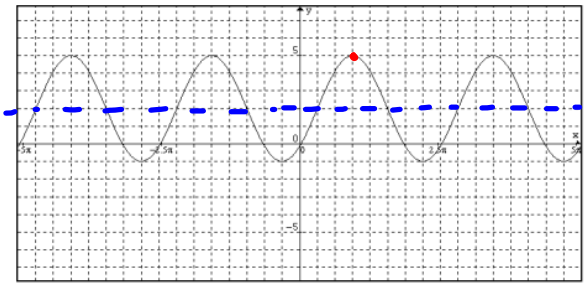
Feb 2-9:51 PM

Notes in WB p 58

1. Simple harmonic motions are motions that are periodic in nature such as oscillations of a pendulum, the orbit of a satellite, the vibrations of a tuning fork, etc., which can be described by sine or cosine curves. The graph indicates the depth of the water off a certain pier in Port Aransas, Texas, beginning at noon, March 19th.

Note: t = hours after noon on March 19th tscl = 1

y = depth of water in meters yscl = 1



y=2

amp 3

$b=\frac{\pi}{4}$

$\frac{2\pi}{b}=8$

$8b=2\pi$

$b=\frac{2\pi}{8}=\frac{\pi}{4}$

1. At what time and date is the first high tide? 3pm March 19

The second high tide? 11pm March 19

The first low tide? 7pm March 19

2. How long does it take the tide to complete one cycle? 8 hours

3. How much of the cycle is completed in one hour? 1/8

3. Write an equation in terms of sine: $y=3\sin(\frac{\pi}{4}(x-1))+2$

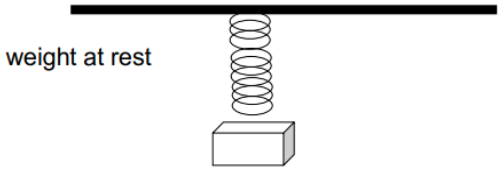
4. Write an equation in terms of cosine: $y=3\cos(\frac{\pi}{4}(x-3))+2$

5. What is the depth of the tide at midnight March 19? 4 meters

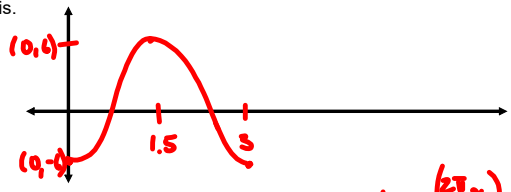
6. At what time is the depth of the tide 1-meter? 12:30 pm

Feb 4-5:54 AM

2. A weight is at rest hanging from a spring. It is then pulled down 6 cm and released. The weight oscillates up and down, completing one cycle every 3 seconds.



a) Make a sketch of the curve. Include three points and label each axis.



amp 6 flip

$\frac{2\pi}{b}=3$

$\frac{2\pi}{3}=b$

b) Write an equation to describe the curve: $y=-6\cos(\frac{2\pi}{3}x)$

c) Determine the position of the weight at 1.5 seconds: 6cm

d) Use the graph to find the time when y = 3.5 for the first time: 1.047 sec

e) What does the 3.5 represent? position of weight

$\frac{3.5}{-6}=\frac{-6\cos(\frac{2\pi}{3}x)}{-6}$

$-.58=\cos\frac{2\pi}{3}x$

$\frac{3}{2\pi}(\cos^{-1}(-.58)=\frac{2\pi}{3}x)$

$x=1.047$ sec

$Y_1=3.5$

$Y_2=-6\cos(\frac{2\pi}{3}x)$

Feb 4-6:00 AM

HOMEWORK

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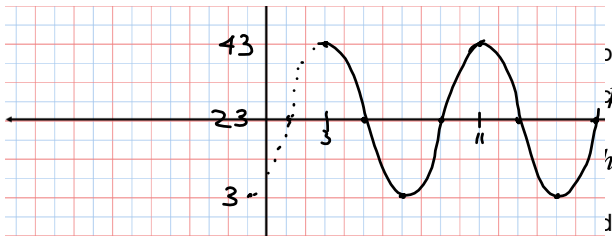
Workbook p 62-63 1-5

Aug 29-6:38 AM

Sinusoidal Worksheet #1

a. 

b. 3 feet

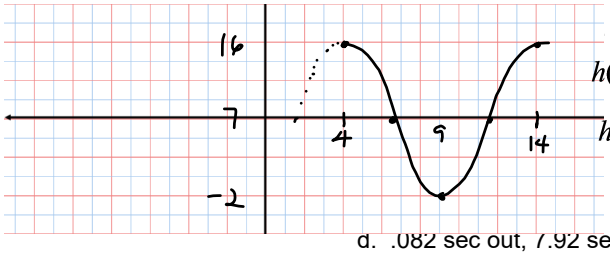
c. $h(t) = 20\cos(\frac{\pi}{4}(t-3)) + 23$

$h(t) = 20\sin(\frac{\pi}{4}(t-1)) + 23$

d. i. 8.86 ft, ii. 33 ft

iii. 23 ft, iv. 8.86 ft

e. 5.32 ft

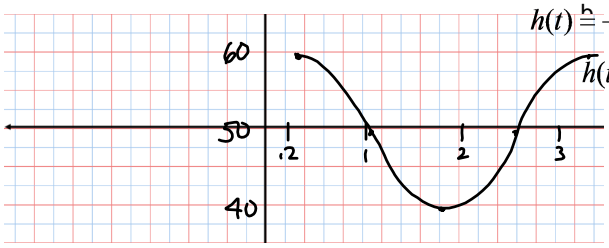
a. 

c. $h(t) = 9\sin(\frac{\pi}{5}(t-1.5)) + 7$

$h(t) = 9\cos(\frac{\pi}{5}(t-4)) + 7$

d. i. 14.28 ft, ii. 4.22 ft

e. .082 sec out, 7.92 sec in, 10.08 sec out

a. 

b. $h(t) = -10\sin(\frac{2\pi}{3}(t-1.05)) + 50$

$h(t) = 10\cos(\frac{2\pi}{3}(t-.3)) + 50$

c. 43.31 cm

d. 58.09 cm e. .52 sec

May 9-5:59 AM

Sinusoidal Worksheet #2 (answers of equations may vary)

1.

2a. 5 ft below equilibrium

b. 5 ft above equilibrium

c. $y = 5\cos\frac{7\pi}{6}$ = 4.33 above equilibrium

3. $y = 20\sin(2\pi x) + 160$

4a. 12.5

b. 53.5

c. $y = 12.5\sin(\frac{\pi}{6}(x-4)) + 53.5$

$y = -12.5\cos\left(\frac{\pi}{6}(x-1)\right) + 53.5$

d. 42.7

5a. 6.5

b. 0.5

c. 6/5 or 1.2 sec

d. 2 ft

6. $y = 2\cos\left(\frac{\pi}{5}(x-2.5)\right)$

7a. 1.72

b. 2.27

c. 12.3 hr

d.

$y = -1.72\sin\left(\frac{20\pi}{123}(x-3.11)\right) + 2.27$

$y = 1.72\cos\left(\frac{20\pi}{123}(x-.05)\right) + 2.27$

e. 3.97 ft at noon

8. $V(t) = 120\sin\frac{\pi}{30}t$

Apr 13-6:36 AM

2. Evaluate:

a. $\tan(\arcsin(-1))$

b. $\sec\left(\arctan\frac{2}{5}\right)$

c. $\sin\left(\cos^{-1} - \frac{x}{3}\right)$

3. State the range

a. $\tan^{-1} x$

b. $arc\sec x$

c. $\sin^{-1} x$

Feb 4-5:49 AM

GO COUGARS!

Homework Questions

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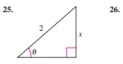
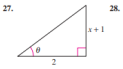
Library of Parent Functions **In Exercises 1–9, find the exact value of each expression without using a calculator.**

1. (a) $\arcsin\frac{1}{2}$ (b) $\arcsin 0$
2. (a) $\arccos\frac{1}{2}$ (b) $\arccos 0$
3. (a) $\arcsin 1$ (b) $\arccos 1$
4. (a) $\arctan 1$ (b) $\arctan 0$
5. (a) $\arctan\frac{\sqrt{3}}{3}$ (b) $\arctan(-1)$
6. (a) $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ (b) $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$
7. (a) $\arctan(-\sqrt{3})$ (b) $\arctan\sqrt{3}$
8. (a) $\arccos\left(-\frac{1}{2}\right)$ (b) $\arcsin\frac{\sqrt{2}}{2}$
9. (a) $\sin^{-1}\frac{\sqrt{3}}{2}$ (b) $\tan^{-1}\left(-\frac{\sqrt{3}}{3}\right)$

In Exercises 25–28, find the length of the third side of the triangle in terms of x. Then find θ in terms x for all three inverse trigonometric functions.

25. 

26. 

27. 

28. 

In Exercises 29–46, use the properties of inverse functions to find the exact value of the expression.

29. $\sin(\arcsin 0.7)$
30. $\tan(\arctan 35)$
31. $\cos[\arccos(-0.3)]$
32. $\sin[\arcsin(-0.1)]$
33. $\arcsin(\sin 3\pi)$
34. $\arccos\left(\cos\frac{7\pi}{2}\right)$
35. $\tan^{-1}\left(\tan\frac{11\pi}{6}\right)$
36. $\sin^{-1}\left(\sin\frac{7\pi}{4}\right)$
37. $\sin^{-1}\left(\sin\frac{5\pi}{2}\right)$
38. $\cos^{-1}\left(\cos\frac{3\pi}{2}\right)$
39. $\sin^{-1}\left(\tan\frac{5\pi}{4}\right)$
40. $\cos^{-1}\left(\tan\frac{3\pi}{4}\right)$
41. $\tan(\arcsin 0)$
42. $\cos[\arctan(-1)]$
43. $\sin(\arctan 1)$
44. $\sin[\arctan(-1)]$
45. $\arcsin\left[\cos\left(-\frac{\pi}{6}\right)\right]$
46. $\arccos\left[\sin\left(-\frac{\pi}{6}\right)\right]$

In Exercises 47–54, find the exact value of the expression. Use a graphing utility to verify your result. (*Hint:* Make a sketch of a right triangle.)

47. $\sin(\arctan\frac{2}{3})$
48. $\sec(\arcsin\frac{5}{7})$
49. $\cos(\arcsin\frac{24}{25})$
50. $\csc[\arctan(-\frac{12}{5})]$
51. $\sec[\arctan(-\frac{1}{3})]$
52. $\tan[\arcsin(-\frac{1}{2})]$
53. $\sin[\arccos(-\frac{1}{3})]$
54. $\cot(\arctan\frac{5}{2})$

In Exercises 55–62, write an algebraic expression that is equivalent to the expression. (*Hint:* Sketch a right triangle, as demonstrated in Example 7.)

55. $\cot(\arctan x)$
56. $\sin(\arctan x)$
57. $\sin[\arccos(x+2)]$
58. $\sec[\arcsin(x-1)]$
59. $\tan\left(\arccos\frac{x}{5}\right)$
60. $\cot\left(\arctan\frac{4}{x}\right)$
61. $\csc\left(\arctan\frac{x}{\sqrt{7}}\right)$
62. $\cos\left(\arcsin\frac{x-h}{r}\right)$

Feb 2-9:51 PM