JAN 1997

1. Convert 256° to radians.

   A. 2.23 B. 3.39 C. 4.47 D. 8.93

2. Determine the period of the function $f(x) = 3\sin 4x + 1$.

   A. $\frac{\pi}{2}$ B. $\frac{2\pi}{2}$ C. 6π D. 8π

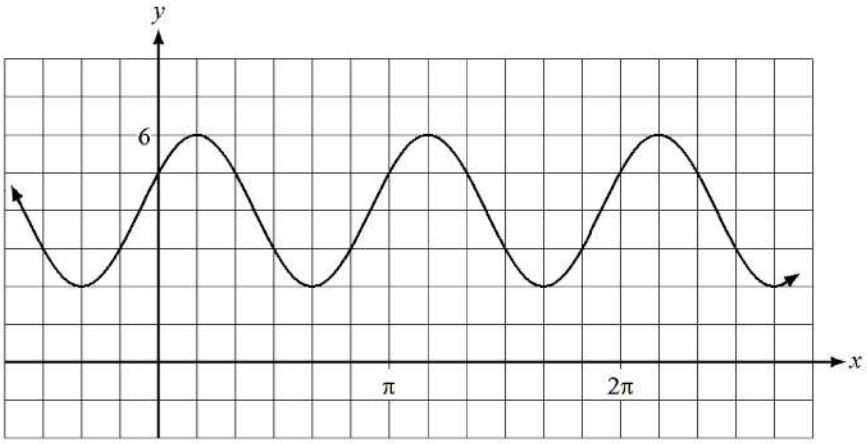
3. If the point $(-4, 2)$ lies on the terminal arm of an angle θ in standard position, determine the exact value of $\csc\theta$.

   A. $-\sqrt{5}$ B. $-\frac{\sqrt{5}}{2}$ C. $\frac{\sqrt{5}}{2}$ D. $\sqrt{5}$

4. Solve: $2\cot x + 3 = 0$, where $0 \le x < 2\pi$

   A. 0.59, 3.73 B. 0.98, 4.12 C. 2.16, 5.30 D. 2.55, 5.70

5. Which equation describes the following graph?



   A. $2\cos 2\left(x - \frac{\pi}{6}\right) + 4$ B. $2\cos 2\left(x + \frac{\pi}{6}\right) + 4$

   C. $2\cos 2\left(x + \frac{\pi}{6}\right) + 2$ D. $2\cos 2\left(x - \frac{\pi}{6}\right) + 2$

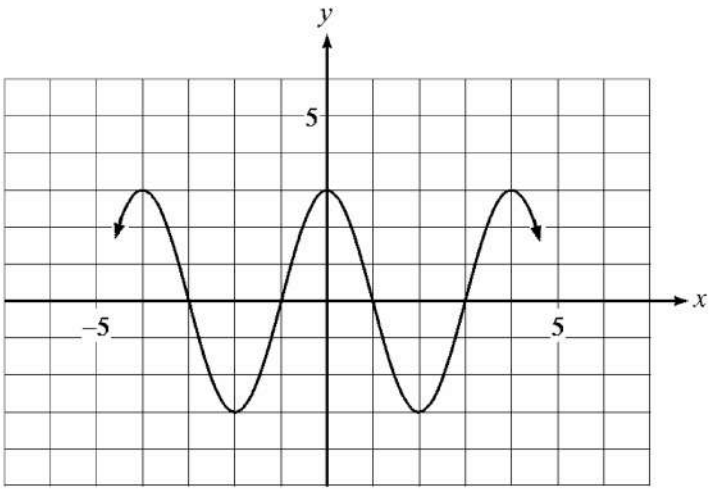
JUN 1997

6. Convert $\frac{5\pi}{6}$ radians to degrees.

A. 108° B. 150° C. 216° D. 300°

7. Determine the period of the trigonometric function graphed below:

A. 2
B. 3
C. 4
D. 6



8. Evaluate sec 0.156 to 3 decimal places.

A. 0.992 B. 1.012 C. 1.414 D. 6.436

9. Given two functions, $f(x) = \sin\left(x - \frac{\pi}{4}\right)$ and $g(x) = \cos(x - a)$, determine the smallest positive value for a so that the graphs are identical.

A. $\frac{\pi}{4}$ B. $\frac{\pi}{2}$ C. $\frac{3\pi}{4}$ D. $\frac{5\pi}{4}$

JAN 1998

10. Convert 162° to radian measure.

A. 0.90 B. 2.83 C. 508.94 D. 9281.92

11. Determine the amplitude of the graph of: $y = -2\cos 3x$

A. -2 B. 2 C. 3 D. $\frac{2\pi}{3}$

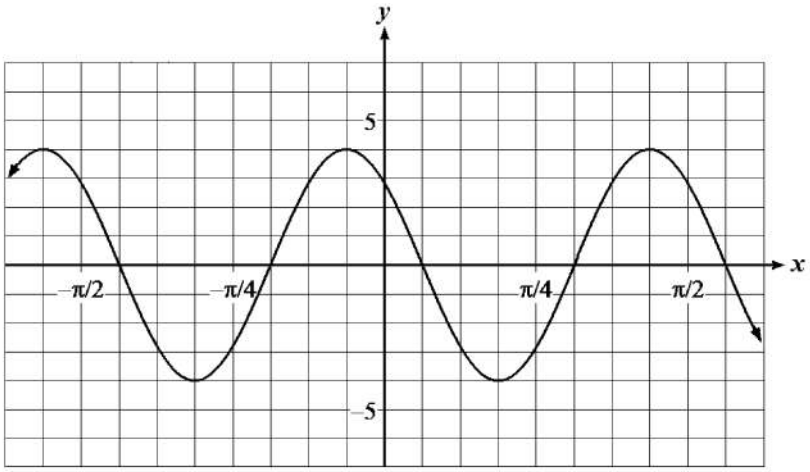
12. Evaluate: $\csc 1.2$

A. 0.67 B. 0.74 C. 1.07 D. 2.76

13. If $\sin x = \frac{3}{4}$, determine the smallest positive angle x, in radians.

A. 0.68 B. 0.72 C. 0.85 D. 1.47

14. Which equation describes the following graph?



A. $y = -4\sin 4\left(x - \frac{\pi}{16}\right)$ B. $y = 4\sin 4\left(x - \frac{\pi}{16}\right)$

C. $y = 4\sin 4\left(x - \frac{3\pi}{16}\right)$ D. $y = -4\sin 4\left(x + \frac{3\pi}{16}\right)$

15. If $\sin\theta = a$ and $0 \le \theta \le \frac{\pi}{2}$, determine an expression for: $\cos(\pi + \theta)$

A. $1 - a$ B. $a - 1$ C. $\sqrt{1 - a^2}$ D. $-\sqrt{1 - a^2}$

JUN 1998

16. Convert 4 radians to degrees.

A. 13° B. 115° C. 229° D. 720°

17. Determine the amplitude of the graph of $y = -4\cos 2x$.

A. -4 B. 2 C. 4 D. 8

18. Solve: $3\cos x + 2 = 0,\ 0 \le x < 2\pi$

A. 0.84, 2.30 B. 0.84, 5.44 C. 2.30, 3.98 D. 2.36, 3.93

19. Evaluate: $\sec\frac{3\pi}{8}$

A. 0.75 B. 1.08 C. 1.18 D. 2.61

20. Determine the number of asymptotes of $y = \tan x$ over the interval $-2\pi \le x \le 2\pi$.

A. 2 B. 4 C. 6 D. 8

21. Find the period of the function which has a minimum point at $\left(\frac{\pi}{3}, 1\right)$ and its nearest maximum point to the right at $\left(\frac{2\pi}{3}, 5\right)$.

A. $\frac{\pi}{3}$ B. $\frac{2\pi}{3}$ C. $\frac{4\pi}{3}$ D. 2π

JAN 1999

22. Convert 322° to radians.

A. 0.66 B. 2.81 C. 5.62 D. 11.24

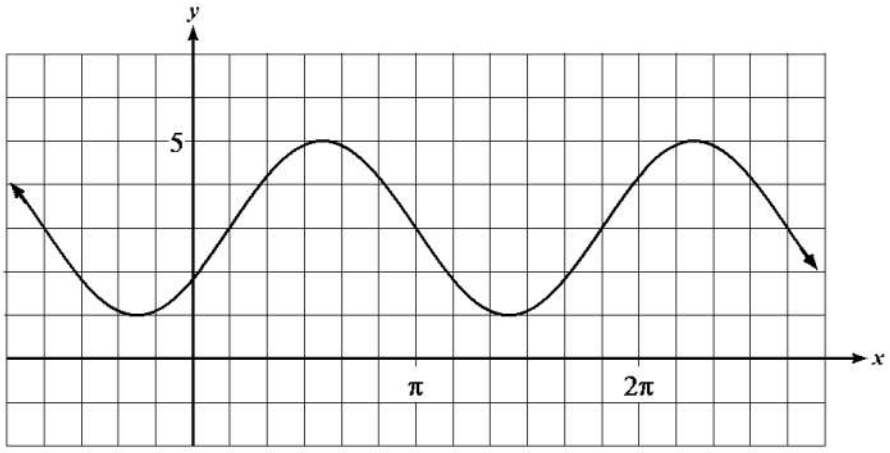
23. Which expression is equivalent to $2\csc\frac{\pi}{7}$?

A. $2\sin\frac{7}{\pi}$ B. $\frac{1}{2\sin\frac{\pi}{7}}$ C. $\frac{2}{\sin\frac{7}{\pi}}$ D. $\frac{2}{\sin\frac{\pi}{7}}$

24. Solve: $3\tan x + \sqrt{15} = 0$, where $0 \le x < 2\pi$

A. 0.91, 4.05 B. 2.23, 4.05 C. 2.23, 5.37 D. 4.05, 5.37

25. Determine the amplitude of the sine function shown.



A. 2 B. 3 C. 4 D. 5

26. Determine the period of the sine function shown in the graph above.

A. $\frac{5\pi}{6}$ B. π C. $\frac{5\pi}{3}$ D. $\frac{11\pi}{6}$

27. If $\sec\theta = -\frac{5}{3}$ and angle θ terminates in quadrant III, which point must be on the terminal arm of θ?

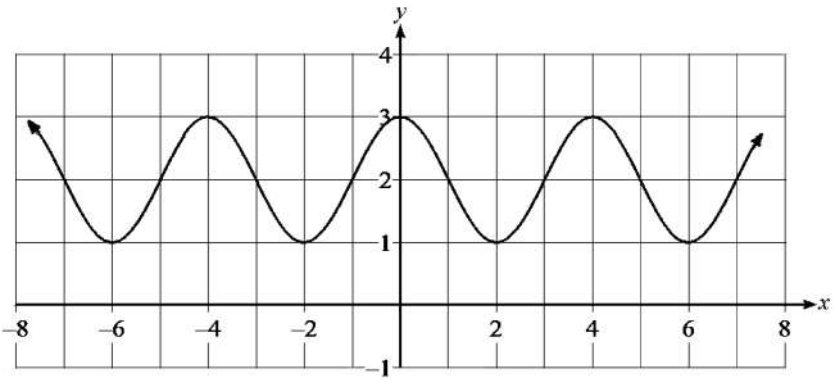
A. $(-6, -10)$ B. $(-10, -6)$ C. $(-8, -6)$ D. $(-6, -8)$

JUN 1999

28. Convert 200° to radians.

A. 2.83 B. 3.49 C. 3.83 D. 4.49

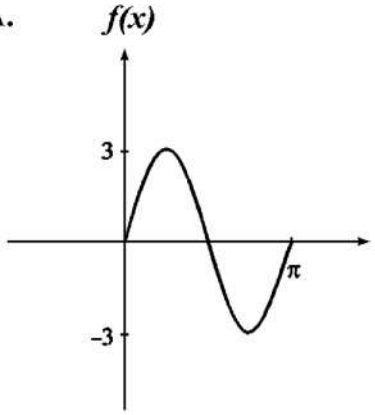
29. Determine the period of the trigonometric function shown.



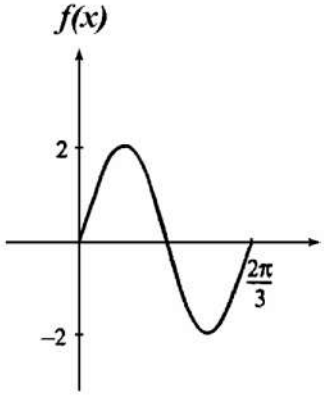
A. 1 B. 2 C. 3 D. 4

30. Which of the following shows one period of the graph of $f(x) = 2\sin 3x$?

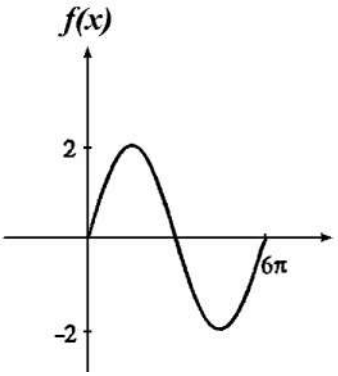
A.



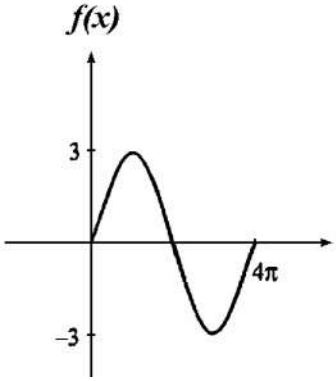
B.



C.



D.



31. If $\cos\theta = \frac{5}{13}$, where θ is in quadrant IV, determine the value of $\cot\theta$.

A. $-\frac{12}{5}$ B. $-\frac{5}{12}$ C. $\frac{5}{12}$ D. $\frac{12}{5}$

32. Evaluate: $\sec\frac{2\pi}{5}$

A. 0.70 B. 1.05 C. 1.43 D. 3.24

33. The range of the trigonometric function $y = a\cos x + b$ is $-2 \le y \le 8$. Determine the value of b.

A. 3 B. 5 C. 6 D. 10

JAN 2000

34. Convert 5 radians to degrees.

A. 0.09° B. 286.48° C. 291.39° D. 318.31°

35. Evaluate: $\cot 4.47$

A. -0.24 B. 0.23 C. 0.25 D. 4.04

36. Determine the maximum value of the function $y = 3\cos 2x - 4$.

A. -2 B. -1 C. 3 D. 7

37. Determine $\csc\theta$ if $(-10, 24)$ lies on the terminal arm of angle θ in standard position.

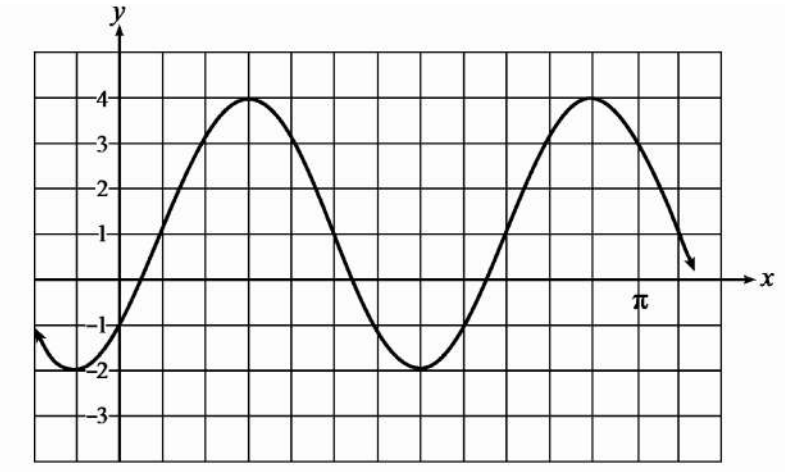
A. $-\frac{13}{5}$ B. $-\frac{13}{12}$ C. $\frac{13}{12}$ D. $\frac{13}{5}$

38. A sine curve has a zero at -2. The nearest zero to the right is at 3. A maximum point is located between these zeros. If the range of the function is $-1 \le y \le 1$, determine an equation of this function.

A. $y = \sin\frac{\pi}{5}(x-2)$ B. $y = \sin\frac{2\pi}{5}(x-2)$ C. $y = \sin\frac{2\pi}{5}(x+2)$ D. $y = \sin\frac{\pi}{5}(x+2)$

JUN 2000

The equation of the graph shown is $y = a\cos[b(x - c)] + d$, where a, b, c, and d are all positive.



39. In the graph above, determine the value of d.

A. 1 B. 2 C. 3 D. 4

40. In the graph above, determine the value of a.

A. 1 B. 2 C. 3 D. 4

41. In the graph above, determine the value of b.

A. $\frac{2}{3}$ B. 3 C. 4 D. 8

42. Evaluate: $\csc\frac{2\pi}{7}$

A. −1.00 B. 0.90 C. 1.28 D. 1.60

43. Convert 3 radians to degrees.

A. 150° B. 172° C. 180° D. 540°

44. Solve: $\cot\theta = -3,\ 0 \le \theta < 2\pi$

A. 2.34, 5.48 B. 2.80, 5.94 C. 2.82, 5.94 D. 2.82, 5.96

45. The height of a piston in an engine can be determined by the function $h = 20\sin\left[\frac{\pi t}{0.025}\right] + 20$, where height, h, is in centimetres, and time, t, is in seconds.
Determine the period of this function.

A. 0.025 B. 0.05 C. 0.25 D. 0.5

JAN 2001

46. Convert 210° to radians.

A. $\frac{7\pi}{12}$ B. $\frac{6\pi}{7}$ C. $\frac{7\pi}{6}$ D. $\frac{12\pi}{7}$

47. Determine the phase shift of the function $y = 4\cos 2\left(x - \frac{\pi}{4}\right) + 5$.

A. $\frac{\pi}{4}$ to the right B. $\frac{\pi}{2}$ to the right C. $\frac{\pi}{4}$ to the left D. $\frac{\pi}{2}$ to the left

48. Solve: $\tan x = 3.2,\ 0 \le x < 2\pi$

A. 0.06, 3.20 B. 1.27, 1.87 C. 1.27, 4.41 D. 1.87, 5.02

49. If the point $(-7, -24)$ is on the terminal arm of angle θ in standard position, determine the value of $\csc\theta$.

A. $-\frac{25}{7}$ B. $-\frac{25}{24}$ C. $\frac{7}{25}$ D. $\frac{24}{25}$

50. A sine function has a maximum point at (4, 32) and the nearest minimum point to the right is (16, 18). Determine an equation for this function.

A. $y = 7\sin\left[\frac{\pi}{6}(x-4)\right] + 25$ B. $y = 7\sin\left[\frac{\pi}{6}(x+4)\right] + 25$

C. $y = 7\sin\left[\frac{\pi}{12}(x-2)\right] + 25$ D. $y = 7\sin\left[\frac{\pi}{12}(x+2)\right] + 25$

51. Which expression below is equivalent to $2\cot\frac{\pi}{5}$?

A. $2\tan\frac{\pi}{5}$ B. $\frac{1}{2\tan\frac{5}{\pi}}$ C. $\frac{2}{\tan\frac{5}{\pi}}$ D. $\frac{2}{\tan\frac{\pi}{5}}$

JUN 2001

52. Convert 2.1 radians to degrees.

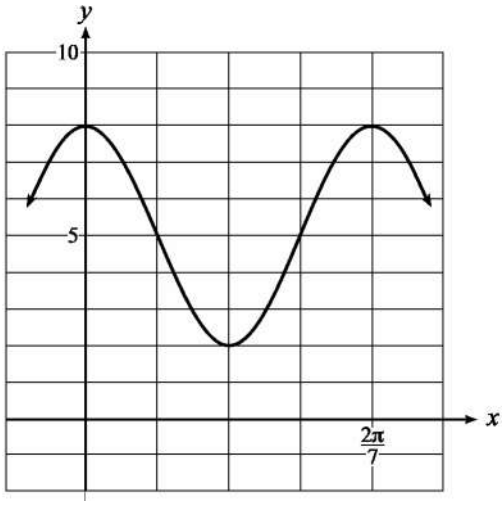
A. 60.16° B. 120.32° C. 126.35° D. 240.64°

53. Solve: $\tan\theta = -1.25,\ 0 \le \theta < 2\pi$

A. 0.90, 4.04 B. 2.25, 5.39 C. 2.25, 6.15 D. 3.01, 6.15

54. Determine an equation of the cosine function shown.

A. $y = 3\cos 7x + 2$
B. $y = 3\cos 7x + 5$
C. $y = 6\cos 7x + 5$
D. $y = 8\cos 7x + 2$



55. A and B are complementary angles. If $\sin A = \frac{3}{5}$, find the value of $\sec B$.

A. $\frac{3}{5}$ B. $\frac{4}{5}$ C. $\frac{5}{4}$ D. $\frac{5}{3}$

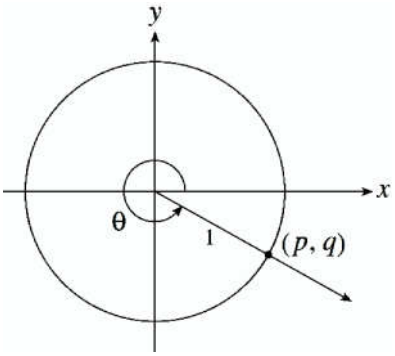
SAMPLE 2001

56. Convert 150° to radians.

A. $\frac{2\pi}{3}$ B. $\frac{3\pi}{2}$ C. $\frac{5\pi}{6}$ D. $\frac{6\pi}{5}$

57. If the diagram below shows a unit circle, determine $\cos\theta$.

A. p
B. q
C. $-p$
D. $-q$



58. Determine the period of the function $y = \tan\frac{\pi}{5}x$.

A. 5 B. 10 C. $\frac{\pi}{5}$ D. $\frac{\pi}{10}$

59. Solve: $\sqrt{3} + 2\sin x = 0,\ 0 \le x < 2\pi$

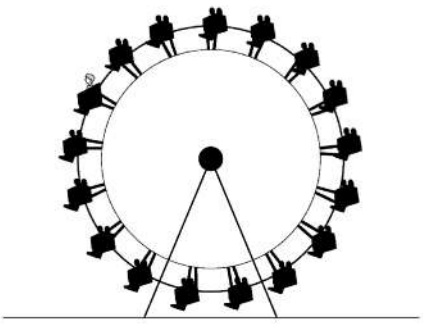
A. $\frac{\pi}{3}, \frac{2\pi}{3}$ B. $\frac{4\pi}{3}, \frac{5\pi}{3}$ C. $\frac{\pi}{6}, \frac{5\pi}{6}$ D. $\frac{7\pi}{6}, \frac{11\pi}{6}$

60. In the function $y = a\sin(x - c) + d$ where a, c, and d are positive constants, determine the range of the new function formed if a is doubled.

A. $d - \frac{a}{2} \le y \le d + \frac{a}{2}$
B. $d - 2a \le y \le d + 2a$
C. $-d - \frac{a}{2} \le y \le -d + \frac{a}{2}$
D. $-d - 2a \le y \le -d + 2a$

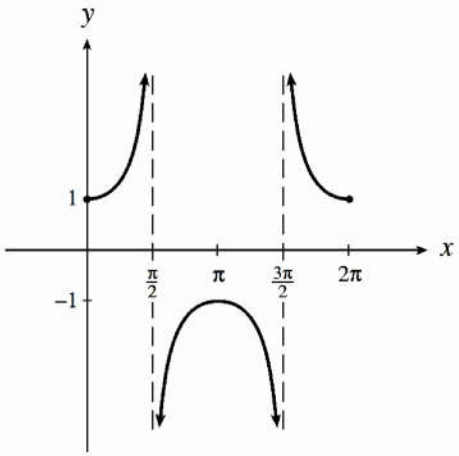
61. The Ferris wheel shown in the diagram has a radius of 16 m and its centre is 18 m above the ground. It rotates once every 60 s. Ethan gets on the Ferris wheel at its lowest point and then the wheel starts to rotate. How long does it take Ethan to reach 29 m above the ground for the first time?

A. 11.12 *s*
B. 22.24 *s*
C. 23.92 *s*
D. 37.76 *s*

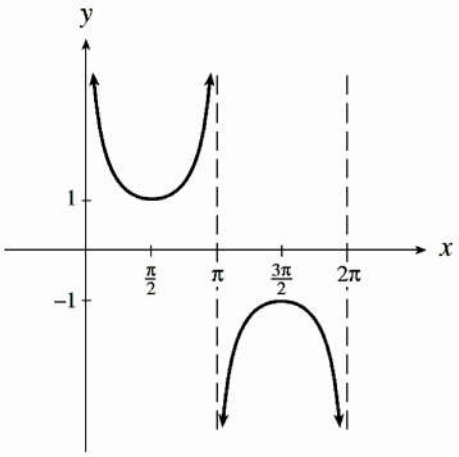


62. Which graph best represents $y = \sec x,\ 0 \le x \le 2\pi$?

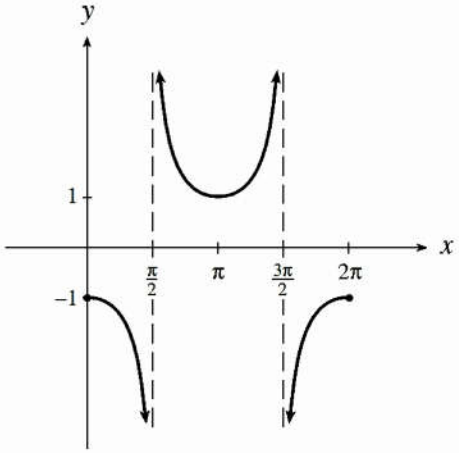
A.



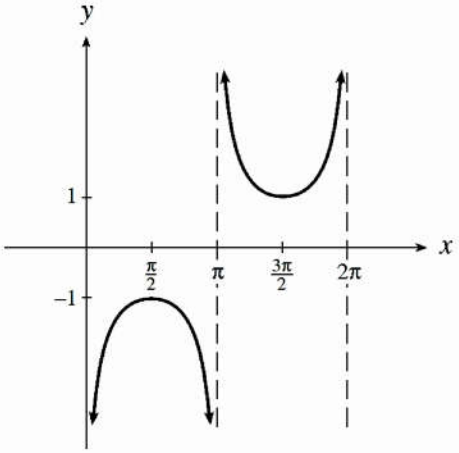
B.



C.



D.



JAN 2002

63. Convert 5.3 radians to degrees.

A. 0.09° B. 0.18° C. 151.83° D. 303.67°

64. Determine the period of $y = 6\cos\frac{2\pi}{15}x + 8$.

A. $\frac{2}{15}$ B. $\frac{15}{2}$ C. 15 D. 30

65. Determine the exact value of $\tan\frac{5\pi}{6}$.

A. $-\frac{\sqrt{3}}{2}$ B. $-\frac{1}{\sqrt{3}}$ C. $\frac{1}{\sqrt{3}}$ D. $\frac{\sqrt{3}}{2}$

66. The point $P(m, n)$ is the intersection point of the terminal arm of angle θ in standard position and the unit circle $x^2 + y^2 = 1$. Which expression represents $\sin\theta$?

A. m B. n C. $\frac{m}{n}$ D. $\frac{n}{m}$

67. Which of the following is an asymptote of $y = \sec x$?

A. $x = 0$ B. $x = \frac{\pi}{4}$ C. $x = \frac{\pi}{2}$ D. $x = \pi$

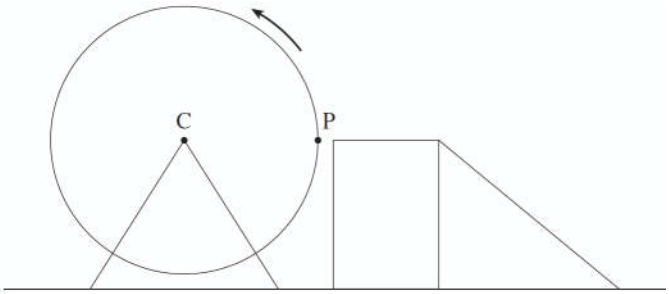
68. A Ferris wheel has a radius of 18 metres and a centre C which is 20 metres above the ground. It rotates once every 32 seconds in the direction shown in the diagram. A platform allows a passenger to get on the Ferris wheel at a point P which is 20 metres above the ground. If the ride begins at point P, when the time $t = 0$ seconds, determine a sine function that gives the passenger's height, h, in metres, above the ground as a function of t.

A. $h(t) = 18\sin\left[\frac{\pi}{16}t\right] + 20$

B. $h(t) = 18\sin\left[\frac{\pi}{32}t\right] + 20$

C. $h(t) = 20\sin\left[\frac{\pi}{16}t\right] + 18$

D. $h(t) = 20\sin\left[\frac{\pi}{32}t\right] + 18$



APR 2002

69. Determine the period of $y = \tan x$.

A. 1 radian B. $\frac{\pi}{2}$ radians C. π radians D. 2π radians

70. Given a circle with radius 10 cm, calculate the length of arc which contains a sector angle of 2 radians.

A. 5π cm B. 10π cm C. 10 cm D. 20 cm

71. Find the exact value of $\tan\theta = \frac{5\pi}{3}$.

A. $-\sqrt{3}$ B. $-\frac{1}{\sqrt{3}}$ C. $\frac{1}{\sqrt{3}}$ D. $\sqrt{3}$

72. Determine the maximum value of the function $f(x) = a\cos x + d$, where $a > 0$ and $d > 0$.

A. a B. $d - a$ C. $a + d$ D. $2a + d$

73. The terminal arm of angle θ in standard position passes through point (m, n) where $m > 0$, $n > 0$. Determine the value of $\sin(\pi + \theta)$.

A. $\frac{-n}{\sqrt{m^2 + n^2}}$ B. $\frac{-m}{\sqrt{m^2 + n^2}}$ C. $\frac{n}{\sqrt{m^2 + n^2}}$ D. $\frac{m}{\sqrt{m^2 + n^2}}$

74. A wheel of radius 30 cm has its centre 36 cm above the ground. It rotates once every 12 seconds. Determine an equation for the height, h, above the ground of a point on the wheel at time t seconds if this point has a minimum height at $t = 0$ seconds.

A. $h = -30\cos\left[\frac{\pi}{12}t\right] + 6$ B. $h = -30\cos\left[\frac{\pi}{6}t\right] + 6$

C. $h = -30\cos\left[\frac{\pi}{12}t\right] + 36$ D. $h = -30\cos\left[\frac{\pi}{6}t\right] + 36$

JUN 2002

75. Convert 210° to radians.

A. 1.83 B. 2.69 C. 3.49 D. 3.67

76. Determine the exact value of $\sec\frac{7\pi}{4}$.

A. $-\sqrt{2}$ B. $-\frac{1}{\sqrt{2}}$ C. $\frac{1}{\sqrt{2}}$ D. $\sqrt{2}$

77. Determine the period of the function $y = 3\cos 4x$.

A. $\frac{\pi}{2}$ B. $\frac{2\pi}{3}$ C. 6π D. 8π

78. Determine the range of the function $y = -2\sin 3x + 4$.

A. $-6 \le y \le -2$ B. $-2 \le y \le 2$ C. $0 \le y \le 4$ D. $2 \le y \le 6$

79. Solve: $2\cos x + \sqrt{3} = 0,\ 0 \le x < 2\pi$

A. $\frac{5\pi}{6}, \frac{7\pi}{6}$ B. $\frac{4\pi}{3}, \frac{5\pi}{3}$ C. $\frac{2\pi}{3}, \frac{4\pi}{3}$ D. $\frac{7\pi}{6}, \frac{11\pi}{6}$

80. The function $h(t) = 3.9\sin[0.16\pi(t-3)] + 6.5$ gives the depth of water, h metres, at any time, t hours, during a certain day. A cruise ship needs at least 8 metres of water to dock safely. Use the graph of the function to estimate the number of hours in the 24 hour interval starting at $t = 0$ during which the cruise ship can dock safely.

A. 3.79 B. 4.68 C. 7.57 D. 9.36

AUG 2002

81. Determine the amplitude of $y = -5\sin\pi(x-3) + 4$.

A. -5 B. 3 C. 4 D. 5

82. Convert 135° to radians.

A. 1.18 B. 1.92 C. 2.36 D. 4.71

83. Determine the period of $y = \tan 4x$.

A. $\frac{\pi}{4}$ B. $\frac{\pi}{2}$ C. 2π D. 4π

84. Determine the exact value of $\sec\frac{11\pi}{6}$.

A. -2 B. 2 C. $-\frac{2}{\sqrt{3}}$ D. $\frac{2}{\sqrt{3}}$

85. Solve: $\sqrt{2}\sin x + 1 = 0,\ 0 \le x < 2\pi.$

A. $\frac{\pi}{4}, \frac{3\pi}{4}$ B. $\frac{\pi}{4}, \frac{7\pi}{4}$ C. $\frac{3\pi}{4}, \frac{5\pi}{4}$ D. $\frac{5\pi}{4}, \frac{7\pi}{4}$