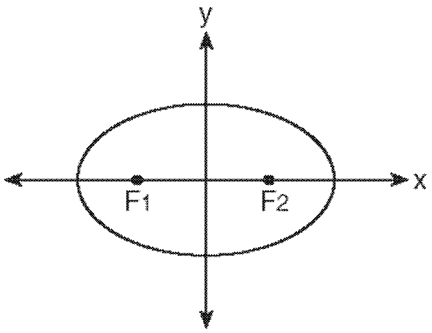
Precalc Review 3

Name: _____ **Date:** _____

1. If the graph of the equation $2x^2 - y^2 = 8$ passes through point $(6, k)$, find the positive value of k.

2. The accompanying diagram shows the elliptical orbit of a planet. The foci of the elliptical orbit are F_1 and F_2.

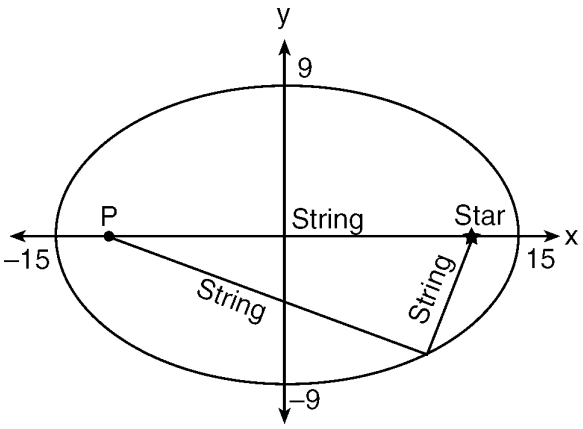


If a, b, and c are all positive and $a \neq b \neq c$, which equation could represent the path of the planet?

A. $ax^2 - by^2 = c^2$ B. $ax^2 + by^2 = c^2$

C. $y = ax^2 + c^2$ D. $x^2 + y^2 = c^2$

3. The accompanying diagram shows the construction of a model of an elliptical orbit of a planet traveling around a star. Point P and the center of the star represent the foci of the orbit.



Which equation could represent the relation shown?

A. $\frac{x^2}{81} + \frac{y^2}{225} = 1$ B. $\frac{x^2}{225} + \frac{y^2}{81} = 1$

C. $\frac{x^2}{15} + \frac{y^2}{9} = 1$ D. $\frac{x^2}{15} - \frac{y^2}{9} = 1$

4. A designer who is planning to install an elliptical mirror is laying out the design on a coordinate grid. Which equation could represent the elliptical mirror?

A. $x^2 = 144 + 36y^2$ B. $x^2 + y^2 = 144$

C. $x^2 + 4y^2 = 144$ D. $y = 4y^2 + 144$

5. An object orbiting a planet travels in a path represented by the equation $3(y + 1)^2 + 5(x + 4)^2 = 15$. In which type of pattern does the object travel?

A. hyperbola B. ellipse C. circle D. parabola

6. Which is an equation of the circle whose center is $(0, 4)$ and whose radius is 3?

A. $x^2 + (y - 4)^2 = 3$ B. $x^2 + (y - 4)^2 = 9$

C. $(x - 4)^2 + (y - 3)^2 = 0$ D. $(x - 4)^2 + y^2 = 9$

7. Write the coordinates of the center of the circle whose equations is $(x + 7)^2 + (y - 3)^2 = 25$.

8. The value of $2(\arcsin 1)$ is

A. 0 B. $\frac{1}{2}$ C. π D. $\frac{\pi}{2}$

9. Find the value of $\arcsin\left(\frac{1}{2}\right) + \arccos\left(\frac{\sqrt{2}}{2}\right)$.

10. The value of $\arcsin(\frac{1}{2}) + \arctan(1)$ is

A. 120° B. 105° C. 90° D. 75°

11. The expression $\arccos \frac{1}{2}$ is equal to

A. 30° B. 45° C. 60° D. 90°

12. What is the value of $\sin(\arctan 1)$?

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

13. What is the value of $\cos\left(\arcsin \frac{\sqrt{3}}{2}\right)$?

14. Find $\tan(\arcsin \frac{5}{13})$

15. What is the smallest positive value of x that satisfies $x = \arccos \frac{1}{2}$?

16. What is the value of $\cos(\arctan \frac{\sqrt{7}}{3})$?

A. $\frac{3}{4}$ B. $\frac{3}{16}$ C. $\frac{3\sqrt{7}}{7}$ D. $\frac{\sqrt{7}}{4}$

17. The value of $\cos\left(\arctan \frac{8}{15}\right)$ is

A. $\frac{8}{17}$ B. $-\frac{8}{17}$ C. $\frac{15}{17}$ D. $\frac{\sqrt{161}}{15}$

18. Evaluate: $\arcsin(\cos 60^\circ)$

19. What is the value of $\csc\left(\arcsin \frac{3}{4}\right)$?

A. $\frac{3}{4}$ B. $\frac{4}{3}$ C. $\frac{\sqrt{7}}{4}$ D. $\frac{4}{\sqrt{7}}$

20. In which interval of $f(x) = \cos(x)$ is the inverse also a function?

A. $-\frac{\pi}{2} < x < \frac{\pi}{2}$ B. $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$

C. $0 \le x \le \pi$ D. $\frac{\pi}{2} \le x \le \frac{3\pi}{2}$

21. The expression $\sin 240^\circ$ is equivalent to

A. $\sin 60^\circ$ B. $\cos 60^\circ$ C. $-\sin 60^\circ$ D. $-\cos 60^\circ$

22. $\cos 280^\circ$ is equivalent to

A. $-\sin 80^\circ$ B. $-\cos 80^\circ$ C. $\cos 10^\circ$ D. $\cos 80^\circ$

23. Which expression is equivalent to $\sin 200^\circ$?

A. $-\sin 20^\circ$ B. $\cos 20^\circ$ C. $\cos 70^\circ$ D. $-\sin 70^\circ$

24. Express $\sin(-230^\circ)$ as a function of a positive acute angle.

25. The expression $\cos 40^\circ \cos 10^\circ + \sin 40^\circ \sin 10^\circ$ is equivalent to

A. $\cos 30^\circ$ B. $\cos 50^\circ$ C. $\sin 30^\circ$ D. $\sin 50^\circ$

26. Express $\sin 150^\circ$ as a function of a positive acute angle.

27. If $\sin A = \frac{4}{5}$, $\tan B = \frac{5}{12}$, and A and B are first quadrant angles, what is the value of $\sin(A + B)$?

A. $\frac{63}{65}$ B. $-\frac{33}{65}$ C. $\frac{33}{65}$ D. $-\frac{63}{65}$

28. If $\cos x = \frac{12}{13}$ and $\sin y = \frac{4}{5}$, then $\sin(x - y)$ equals

A. $\frac{72}{65}$ B. $\frac{56}{65}$ C. $-\frac{16}{65}$ D. $-\frac{33}{65}$

29. If $\tan A = \frac{2}{3}$ and $\tan B = \frac{1}{2}$, what is the value of $\tan(A + B)$?

A. $\frac{1}{8}$ B. $\frac{7}{8}$ C. $\frac{1}{4}$ D. $\frac{7}{4}$

30. If $\sin A = \frac{4}{5}$, $\tan B = \frac{5}{12}$, and angles A and B are in Quadrant I, what is the value of $\sin(A + B)$?

A. $\frac{63}{65}$ B. $-\frac{63}{65}$ C. $\frac{33}{65}$ D. $-\frac{33}{65}$

31. If θ is a positive acute angle and $\sin 2\theta = \frac{\sqrt{3}}{2}$, then $(\cos\theta + \sin\theta)^2$ equals

A. 1 B. $1 + \frac{\sqrt{3}}{2}$ C. 30° D. 60°

32. The value of $\cos 64^\circ \cos 26^\circ - \sin 64^\circ \sin 26^\circ$ is

A. 1 B. $\frac{1}{2}$ C. $\frac{\sqrt{3}}{2}$ D. 0

33. Evaluate: $\sin 300^\circ \cos 90^\circ + \cos 300^\circ \sin 90^\circ$

34. The expression $\sin 50^\circ \cos 40^\circ + \cos 50^\circ \sin 40^\circ$ is equivalent to

A. $\sin 10^\circ$ B. $\cos 10^\circ$ C. $\sin 90^\circ$ D. $\cos 90^\circ$

35. The expression $2 \sin 30^\circ \cos 30^\circ$ has the same value as

A. $\sin 15^\circ$ B. $\cos 60^\circ$ C. $\sin 60^\circ$ D. $\cos 15^\circ$

36. If $\sin A = \frac{2}{3}$, find $\cos 2A$.

37. If $\cos\theta = \frac{1}{8}$, the positive value of $\sin\frac{\theta}{2}$ is

A. $\frac{3}{2}$ B. $\frac{\sqrt{7}}{4}$ C. $\frac{9}{16}$ D. $\frac{3}{4}$

38. If $\sin\theta = \frac{\sqrt{5}}{3}$, then $\cos 2\theta$ equals

A. $\frac{1}{3}$ B. $-\frac{1}{3}$ C. $\frac{1}{9}$ D. $-\frac{1}{9}$

39. If x is a positive acute angle and $\sin x = \frac{1}{2}$, what is $\sin 2x$?

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

40. The expression $\frac{\sec\theta}{\csc\theta}$ is equivalent to

A. $\sin\theta$ B. $\cos\theta$ C. $\frac{\sin\theta}{\cos\theta}$ D. $\frac{\cos\theta}{\sin\theta}$

41. The expression $\cos(\pi - x)$ is equivalent to

A. $\sin x$ B. $-\sin x$ C. $\cos x$ D. $-\cos x$

42. The expression $\frac{\sin^2 x + \cos^2 x}{\sin x}$ is equivalent to

A. $\csc x$ B. $\sec x$

C. $\sin x \cot x$ D. $\sin x \cos x \cot x$

43. The expression $\cos y(\csc y - \sec y)$ is equivalent to

A. $\cot y - 1$ B. $\tan y - 1$ C. $1 - \tan y$ D. $-\cos y$

44. The expression $\frac{1}{1-\cos A} + \frac{1}{1+\cos A}$ is equivalent to

A. $\frac{2}{1-\cos A}$ B. $\frac{2}{1-\cos^2 A}$

C. $\frac{2}{1+\cos A}$ D. $\frac{2\cos A}{1-\cos^2 A}$

45. The expression $\frac{\cos^2 x + \sin^2 x}{\sin x}$ is equivalent to

A. $\sin x$ B. $\cos x$ C. $\sec x$ D. $\csc x$

46. The expression $(1+\cos x)(1-\cos x)$ is equivalent to

A. 1 B. $\sec^2 x$ C. $\sin^2 x$ D. $\csc^2 x$

47. The expression $1 - \sec x$ is equivalent to

A. $-\tan x$ B. $\frac{\cos x - 1}{\cos x}$ C. $\frac{\sin x - 1}{\sin x}$ D. $\frac{\tan x}{\sec x - 1}$

48. The expression $\frac{1+\cos 2x}{\sin 2x}$ is equivalent to

A. $\tan x$ B. $\cot x$ C. $-\sin x$ D. $-\cos x$

49. The expression $\frac{\sin 2x}{\sin(-x)}$ is equivalent to

A. $-2\sin x$ B. $2\sin x$ C. $-2\cos x$ D. $2\cos x$

50. The expression $\sin 2A - 2\sin A$ is equivalent to

A. $(\sin A)(\sin A - 2)$ B. $(2\sin A)(\sin A - 1)$

C. $(\sin A)(2\cos A - 1)$ D. $(2\sin A)(\cos A - 1)$

51. What is the amplitude of the graph of the equation $y = 2\cos 3x$?

A. $\frac{2\pi}{3}$ B. 2 C. 3 D. 6π

52. What is the period of the graph of the equation $y = 3\cos 2x$?

A. π B. 2 C. 3 D. 2π

53. What is the maximum value of y for the equation $y = 1 + 3\sin x$?

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

54. What is the range of the function $y = 3\sin x$?

A. $y \geq 0$ B. $-1 \leq y \leq 1$

C. $y \leq 3$ D. $-3 \leq y \leq 3$

55. The graph of which equation has the same amplitude as the graph of the equation $y = 2\cos x$?

A. $y = \sin 2x$ B. $y = \frac{1}{2}\cos 2x$

C. $y = 2\tan x$ D. $y = 2\sin x$

56. Which of the statements below are true about the graph of $y = \cos\theta$?

I. Domain: all real numbers

II. Range: $-1 \leq y \leq 1$

III. Period: 2π

A. I only B. II only

C. III only D. I, II, and III

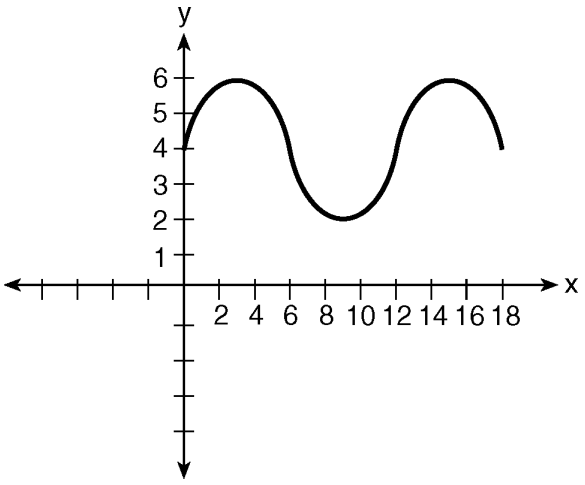
57. Which number is *not* an element of the range of $y = \sin x$?

A. 1 B. 2 C. -1 D. 0

58. A certain radio wave travels in a path represented by the equation $y = 5\sin 2x$. What is the period of this wave?

A. 5 B. 2 C. π D. 2π

59. What is the amplitude of the function shown in the accompanying graph?

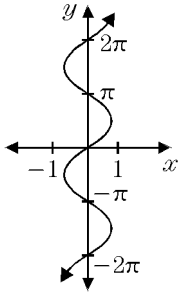


A. 1.5 B. 2 C. 6 D. 12

60. Which is an equation of the given graph?

A. $y = \arcsin x$ B. $y = \arccos x$

C. $y = \sec x$ D. $y = \csc x$



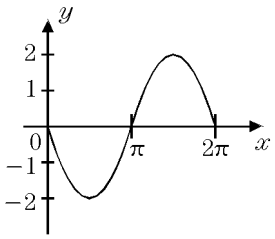
61. Which is an equation of the graph shown?

A. $y = \sin 2x$

B. $y = -\sin 2x$

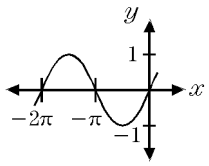
C. $y = -2\sin x$

D. $y = 2\sin x$

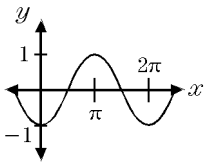


62. Which is the graph of the equation $y = -\sin x$?

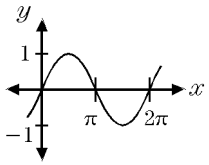
A.



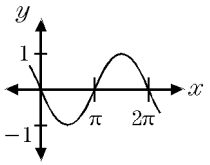
B.



C.



D.



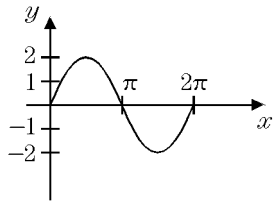
63. Which is an equation of the graph shown below?

A. $y = \sin 2x$

B. $y = 2\cos x$

C. $y = \cos 2x$

D. $y = 2\sin x$



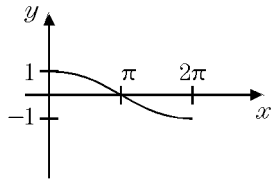
64. Which is an equation of the graph shown below?

A. $y = \cos \frac{1}{2}x$

B. $y = \cos 2x$

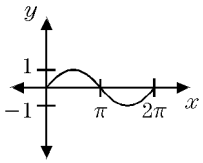
C. $y = \sin \frac{1}{2}x$

D. $y = \sin 2x$

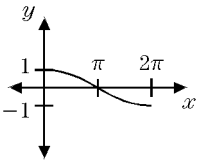


65. Which graph represents the equation $y = \frac{1}{2}\cos x$?

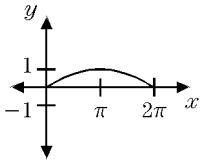
A.



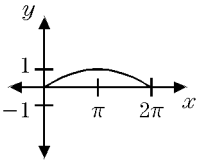
B.



C.



D.



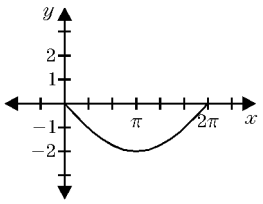
66. Which equation is represented by the accompanying graph?

A. $y = -2\sin \frac{1}{2}x$

B. $y = -\frac{1}{2}\sin 2x$

C. $y = \frac{1}{2}\sin 2x$

D. $y = 2\sin \frac{1}{2}x$



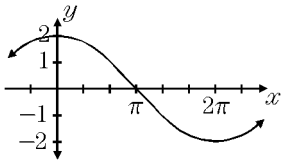
67. Which equation is represented in the accompanying graph?

A. $y = 2\cos 2x$

B. $y = \frac{1}{2}\cos 2x$

C. $y = 2\cos \frac{1}{2}x$

D. $y = \frac{1}{2}\cos \frac{1}{2}x$



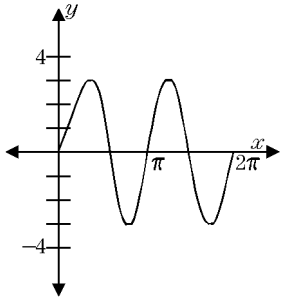
68. Which equation is represented by the graph in the accompanying diagram?

A. $y = 3\sin 2x$

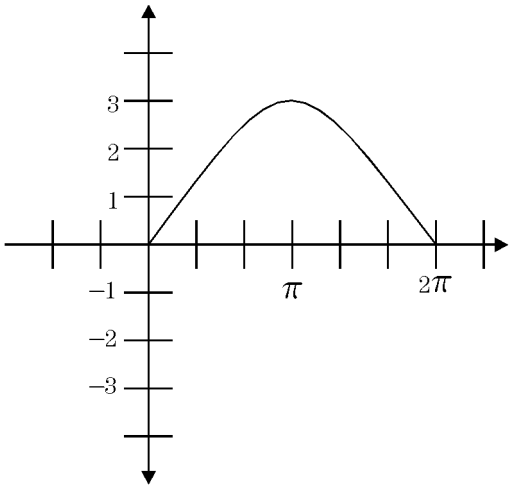
B. $y = 2\sin 3x$

C. $y = 3\sin x$

D. $y = 2\sin 4x$



69. Which equation is represented by the graph in the accompanying diagram?



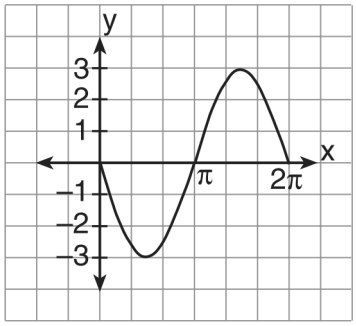
A. $y = 3\sin 2x$

B. $y = 3\sin \frac{1}{2}x$

C. $y = 2\sin 3x$

D. $y = \frac{1}{2}\sin 3x$

70. Which equation is represented on the accompanying graph?



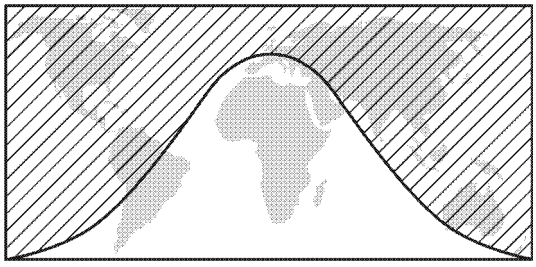
A. $y = 3\sin x$

B. $y = -3\sin x$

C. $y = 3\cos x$

D. $y = -\sin 3x$

71. The shaded portion of the accompanying map indicates areas of night, and the unshaded portion indicates areas of daylight at a particular moment in time.



Which type of function best represents the curve that divides the area of night from the area of daylight?

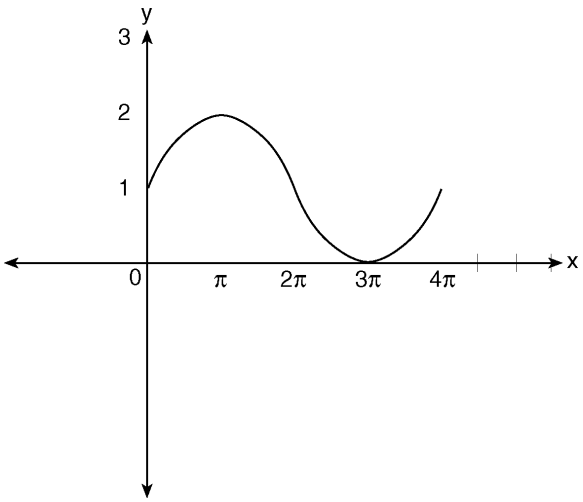
A. quadratic

B. cosine

C. tangent

D. logarithmic

72. In physics class, Eva noticed the pattern shown in the accompanying diagram on an oscilloscope.



Which equation best represents the pattern shown on this oscilloscope?

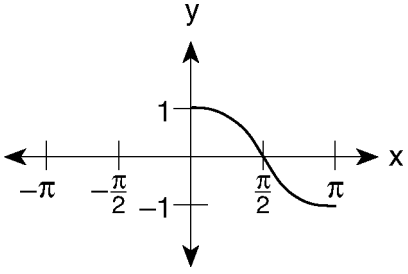
A. $y = \sin(\frac{1}{2}x) + 1$

B. $y = \sin x + 1$

C. $y = 2\sin x + 1$

D. $y = 2\sin(-\frac{1}{2}x) + 1$

73. Which equation is represented by the accompanying graph?



A. $y = \cos x$

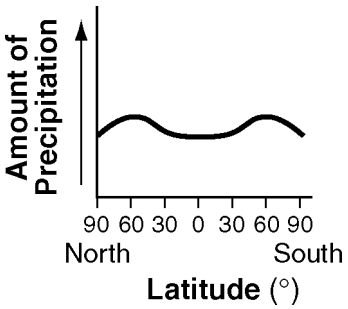
B. $y = \cos \frac{1}{2}x$

C. $y = \cos 2x$

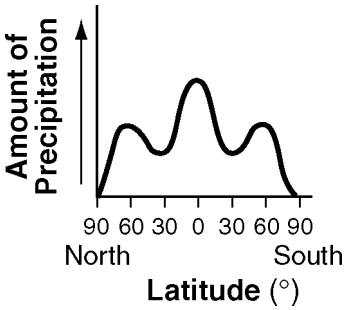
D. $y = \frac{1}{2}\cos x$

74. The graphs below show the average annual precipitation received at different latitudes on Earth. Which graph is a translated cosine curve?

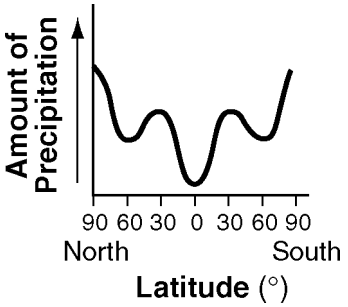
A.



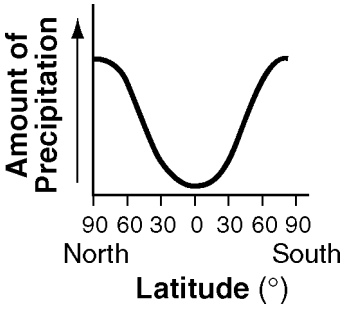
B.



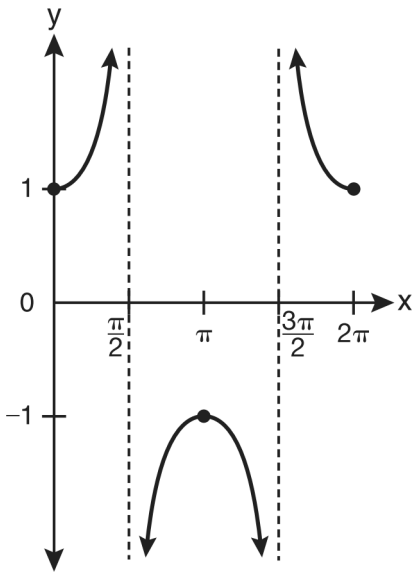
C.



D.

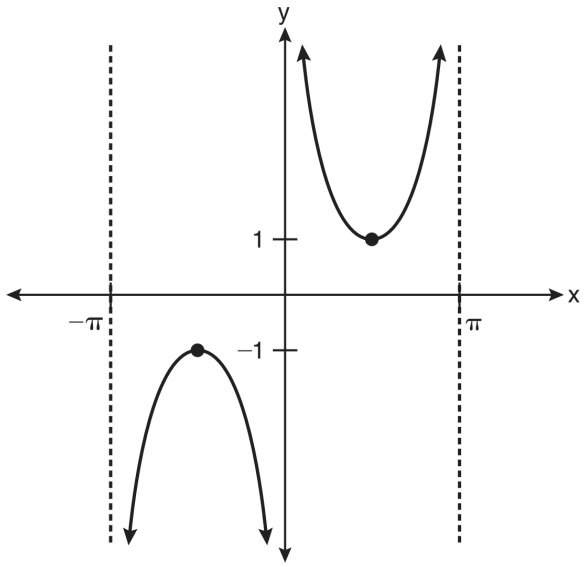


75. Which equation is represented by the graph below?



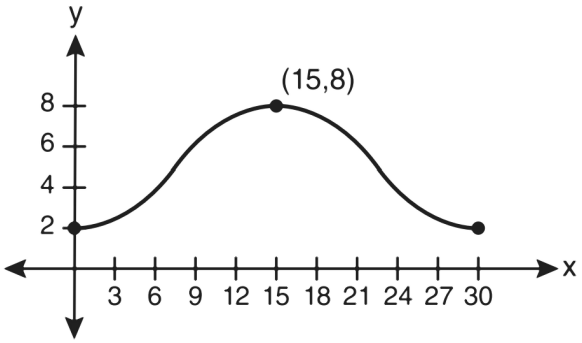
A. $y = \cot x$ B. $y = \csc x$ C. $y = \sec x$ D. $y = \tan x$

76. Which equation is sketched in the diagram below?



A. $y = \csc x$ B. $y = \sec x$ C. $y = \cot x$ D. $y = \tan x$

77. Which equation is graphed in the diagram below?



A. $y = 3\cos\left(\frac{\pi}{30}x\right) + 8$ B. $y = 3\cos\left(\frac{\pi}{15}x\right) + 5$

C. $y = -3\cos\left(\frac{\pi}{30}x\right) + 8$ D. $y = -3\cos\left(\frac{\pi}{15}x\right) + 5$

78. What is the total number of solutions for the equation $3\tan^2 A + \tan A - 2 = 0$ in the interval $0 \le A \le \pi$?

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

79. Find, to the *nearest degree*, all values of x in the interval $0^\circ \le x < 360^\circ$ that satisfy the equation $2\tan^2 x - 5\tan x - 1 = 0$. [*Show or explain the procedure used to obtain your answer.*]

80. Find, to the *nearest degree*, all values of x in the interval $0^\circ \le x < 360^\circ$ that satisfy the equation $3\cos 2x + \sin x - 1 = 0$. [*Show or explain the procedure used to obtain your answer.*]

81. Find, to the *nearest degree*, all values of x in the interval $0^\circ \le x < 360^\circ$ that satisfy the equation $3 + \tan^2 x = 5\tan x$. [*Show or explain the procedure used to obtain your answer.*]

82. Find, to the *nearest degree*, all values of x in the interval $0^\circ \le x < 360^\circ$ that satisfy the equation $6\cos^2 x + 2 = 0$. [*Show or explain the procedure used to obtain your answer.*]

83. If $\sin 2A = \cos 3A$, then $m\angle A$ is

A. $1\frac{1}{2}$ B. 5 C. 18 D. 36

84. Find to the *nearest degree*, all values of θ in the interval $0^\circ \le \theta < 360^\circ$ that satisfy the equation $2\sin^2\theta + 2\cos\theta - 1 = 0$.

85. What is one solution of the equation $(\sin x + \cos x)^2 = 2$?

A. $\frac{\pi}{4}$ B. $\frac{\pi}{3}$ C. $\frac{\pi}{2}$ D. 0

86. In $\triangle ABC$, $\sin A = \frac{1}{2}$, $\sin C = \frac{1}{3}$, and $a = 12$. Find the length of side c.

87. In $\triangle ABC$, $\cos C = -0.2$, $a = 8$, and $b = 10$. Find the length of side c.

88. In triangle ABC, $a = 5$, $b = 7$, and $c = 8$. The measure of $\angle B$ is

A. 30° B. 60° C. 120° D. 150°

89. In $\triangle ABC$, $a = 6$, $b = 5$, and $c = 8$. Cos$A$ equals

A. $\frac{75}{80}$ B. $\frac{53}{80}$ C. $-\frac{3}{80}$ D. $\frac{53}{60}$

90. In $\triangle ABC$, $a = 6$, $b = 7$, and $m\angle B = 30$. Find $\sin A$.

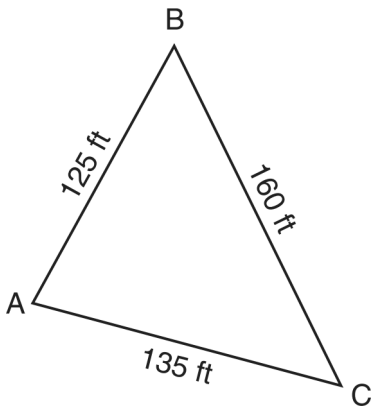
91. In $\triangle DEF$ if $d = \sqrt{3}$, $e = 4$, and $m\angle F = 30$, the length of f is

A. 7 B. $\sqrt{17}$ C. $\sqrt{7}$ D. $\sqrt{3}$

92. In $\triangle ABC$, $m\angle C = 30$ and $a = 24$. If the area of the triangle is 42, what is the length of side b?

93. In $\triangle ABC$, $AC = 18$, $BC = 10$, and $\cos C = \frac{1}{2}$. Find the area of $\triangle ABC$ to the nearest tenth of a square unit.

94. The accompanying diagram shows a triangular plot of land located in Moira's garden.



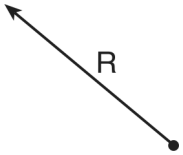
Find the area of the plot of land, and round your answer to the *nearest hundred square feet.*

95. Jack is planting a triangular rose garden. The lengths of two sides of the plot are 8 feet and 12 feet, and the angle between them is 87°. Which expression could be used to find the area of this garden?

A. $8 \cdot 12 \cdot \sin 87^\circ$ B. $8 \cdot 12 \cdot \cos 87^\circ$

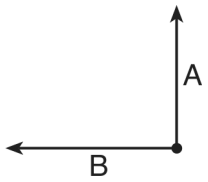
C. $\frac{1}{2} \cdot 8 \cdot 12 \cdot \cos 87^\circ 12$ D. $\frac{1}{2} \cdot 8 \cdot 12 \cdot \sin 87^\circ 12$

96. The accompanying diagram shows a resultant force vector, R.



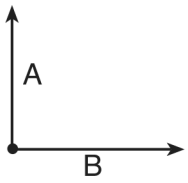
Which diagram best represents the pair of component force vectors, A and B, that combined to produce the resultant force vector R?

A.

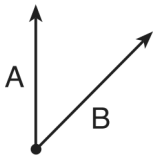


B.

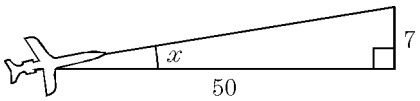
C.



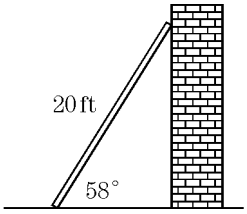
D.



97. In the accompanying diagram, the slope of the ascent of an aircraft is $\frac{7}{50}$. Find $m\angle x$, the angle of elevation, to the nearest degree.



98. A 20-foot ladder is leaning against a wall. The foot of the ladder makes an angle of 58° with the ground. Find, to the *nearest foot*, the vertical distance from the top of the ladder to the ground.



99. Two forces of 14 and 30 act on a body forming an obtuse angle with each other. If the resultant force has a magnitude of 20, find the angle between the two forces to the *nearest degree*. [*Show or explain the procedure used to obtain your answer.*]

100. Two forces act on a body to produce a resultant force of 70 pounds. One of the forces is 50 pounds and forms an angle of $67^\circ 40'$ with the resultant force. Find, to the *nearest pound*, the magnitude of the other force. [*Show or explain the procedure used to obtain your answer.*]

Precalc Review 3 05/28/2013

1.
Answer: 8

2.
Answer: B

3.
Answer: B

4.
Answer: C

5.
Answer: B

6.
Answer: B

7.
Answer: $(-7, 3)$

8.
Answer: C

9.
Answer: 75°

10.
Answer: D

11.
Answer: C

12.
Answer: B

13.
Answer: $\frac{1}{2}$

14.
Answer: $\frac{5}{12}$

15.
Answer: 60° or $\frac{\pi}{3}$

16.
Answer: A

17.
Answer: C

18.
Answer: 30°

19.
Answer: B

20.
Answer: C

21.
Answer: C

22.
Answer: D

23.
Answer: A

24.
Answer: $\sin 50^\circ$ or $\cos 40^\circ$

25.
Answer: A

26.
Answer: $\sin 30^\circ$ or $\cos 60^\circ$

27.
Answer: A

28.
Answer: D

29.
Answer: D

30.
Answer: A

31.
Answer: B

32.
Answer: D

33.
Answer: $\frac{1}{2}$

34.
Answer: C

35.
Answer: C

36.
Answer: $\frac{1}{9}$

37.
Answer: B

38.
Answer: D

39.
Answer: D

40.
Answer: C

41.
Answer: D

42.
Answer: A

43.
Answer: A

44.
Answer: B

45.
Answer: D

46.
Answer: C

47.
Answer: B

48.
Answer: B

49.
Answer: C

50.
Answer: D

51.
Answer: B

52.
Answer: A

53.
Answer: D

54.
Answer: D

55.
Answer: D

56.
Answer: D

57.
Answer: B

58.
Answer: C

59.
Answer: B

60.
Answer: A

61.
Answer: C

62.
Answer: D

63.
Answer: D

64.
Answer: A

65.
Answer: D

66.
Answer: A

67.
Answer: C

68.
Answer: A

69.
Answer: B

70.
Answer: B

71.
Answer: B

72.
Answer: A

73.
Answer: A

74.
Answer: D

75.
Answer: C

76.
Answer: A

77.
Answer: D

78.
Answer: B

79.
Answer: 70, 169, 250, 349

80.
Answer: 42°, 138°, 210°, 330°

81.
Answer: 35°, 77°, 215°, 257°

82.
Answer: 48, 60, 300, 312

83.
Answer: C

84.
Answer: 111 and 249

85.
Answer: A

86.
Answer: 8

87.
Answer: 14

88.
Answer: B

89.
Answer: B

90.
Answer: $\frac{3}{7}$

91.
Answer: C

92.
Answer: 7

93.
Answer: 77.9

94.
Answer: 8,200

95.
Answer: D

96.
Answer: A

97.
Answer: 8

98.
Answer: 17

99.
Answer: 146°

100.
Answer: 69