Sharyland ISD
Study Guide

Precal
Semester 2

Student Name: _____

Student ID: _____

Name: _____ **Class:** _____ **Date:** _____ **ID: A**

Precal B CBE Study Guide

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Which is the equation of the parabola that has a vertex at the origin and a focus at (3, 0)?

a. $y = \frac{1}{12}x^2$

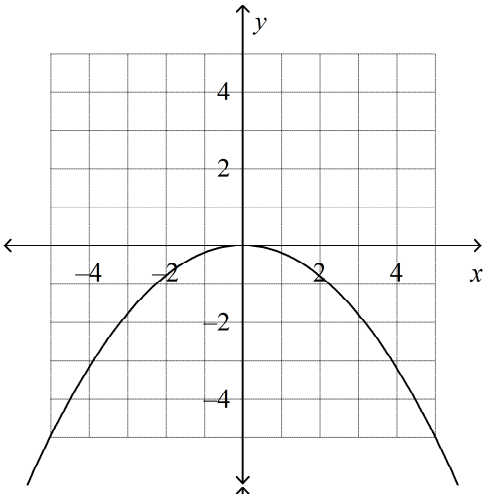
b. $y = -\frac{1}{12}x^2$

c. $x = -\frac{1}{12}y^2$

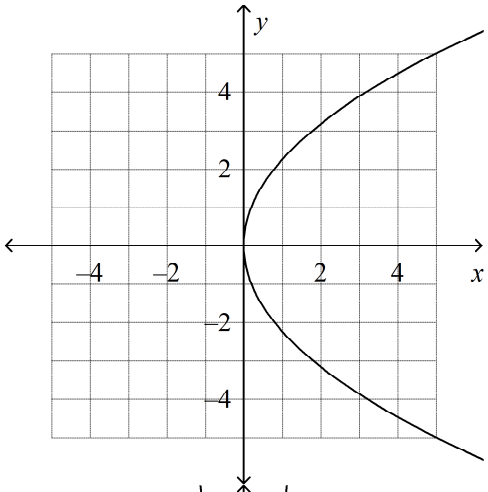
d. $x = \frac{1}{12}y^2$

____ 2. Graph $x = \frac{1}{5}y^2$.

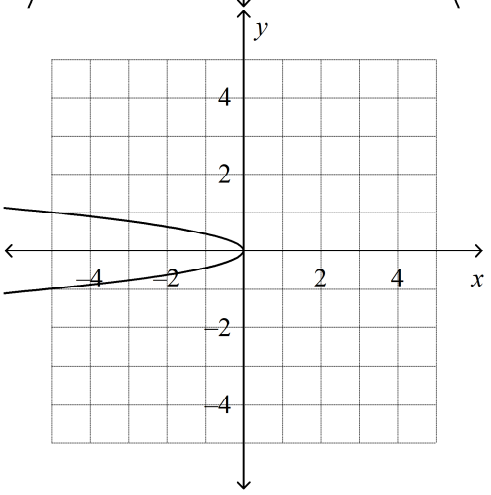
a.



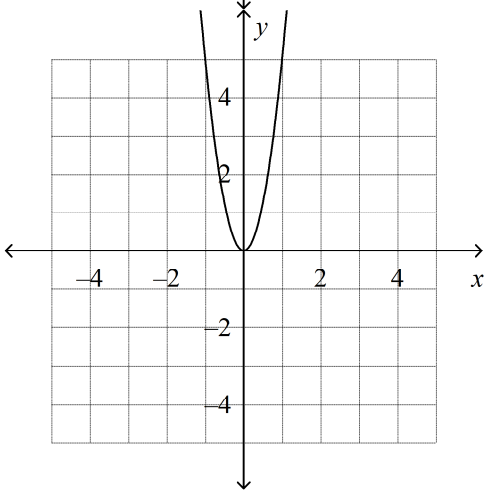
c.



b.



d.



Find the standard form of the equation of the specified ellipse.

____ 3. Vertices58$(0, \pm 3)$; Foci58 $(\pm 4, 0)$

a. $\frac{x^2}{9} + \frac{y^2}{25} = 1$

b. $\frac{x^2}{9} + \frac{y^2}{25} = 4$

c. $\frac{x^2}{25} + \frac{y^2}{9} = 1$

d. $\frac{x^2}{25} + \frac{y^2}{9} = 4$

Find the vertices, foci, and the equations of the asymptotes of the hyperbola.

____ 4. $\frac{x^2}{36} - \frac{y^2}{49} = 1$

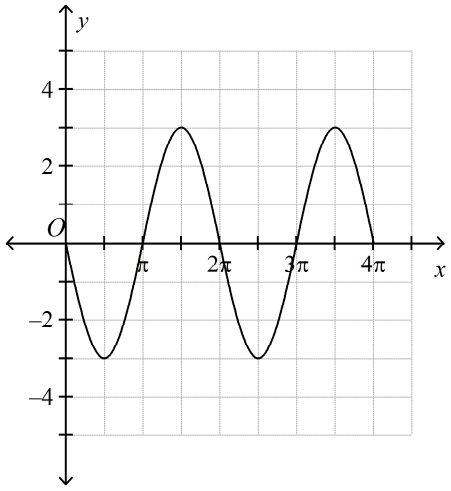
a. Vertices58 $(0, \pm 6)$; Foci58 $\left(0, \pm \sqrt{85}\right)$; Asymptotes58 $y = \pm \frac{7}{6}x$

b. Vertices58 $\left(\pm \frac{36}{49}, 0\right)$; Foci58 $\left(0, \pm \sqrt{85}\right)$; Asymptotes58 $x = \pm \frac{6}{7}y$

c. Vertices58 $(\pm 6, 0)$; Foci58 $\left(\pm\sqrt{85}, 0\right)$; Asymptotes58 $y = \pm \frac{7}{6}x$

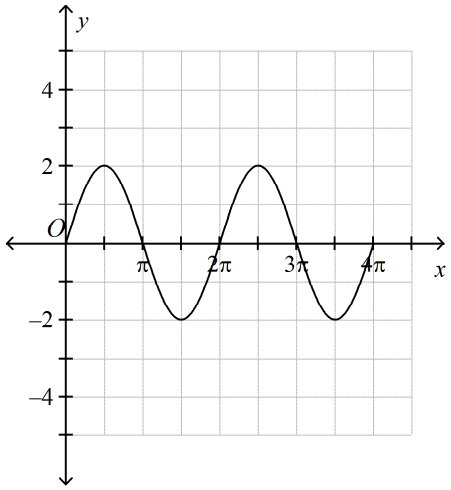
d. Vertices58 $\left(0, \pm \frac{36}{49}\right)$; Foci58 $\left(\pm\sqrt{85}, 0\right)$; Asymptotes58 $x = \pm \frac{6}{7}y$

____ 5. Which periodic function is shown in the graph?



a. $y = 3\sin(x)$
b. None correct
c. $y = -\cos(3x + \pi)$
d. $y = \sin(x) - 3$
e. $y = -3\sin(x + \pi)$

____ 6. Which periodic function is shown in the graph?



a. $y = 2\cos(x + \pi)$
b. $y = -2\sin(x + \pi)$
c. $y = 2\sin(x)$
d. $y = -\sin(2x + \pi)$
e. None correct

____ 7. Which expression is equivalent to $\sin(\theta - \pi)$?

a. $-\cos\theta$
b. $\sin\theta$
c. $-\sin\theta$
d. $\cos\theta$

Identify the expression that completes the equation so that it is an identity.

____ 8. $\frac{1+\cos u}{\sin u}+\frac{\sin u}{1+\cos u}=$

a. $2\csc u$ b. $-2\sin u$ c. $2+\cos u$ d. 0

____ 9. Which expression is equivalent to $\cos(\theta+\pi)$?

a. $\sin\theta$
b. $\cos\theta$
c. $-\sin\theta$
d. $-\cos\theta$

Find all solutions of the equation in the interval $[0, 2\pi)$.

____ 10. $3\sin 2x-\frac{3}{2}\sqrt{3}=0$

a. $\frac{\pi}{6}, \frac{\pi}{3}$
b. $\frac{\pi}{6}, \frac{\pi}{3}, \frac{7\pi}{6}, \frac{4\pi}{3}$
c. $\frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{7\pi}{6}, \frac{4\pi}{3}$
d. $\frac{\pi}{6}, \frac{\pi}{3}, \frac{7\pi}{6}$

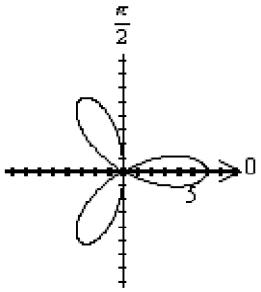
____ 11. $2\sec^2\frac{x}{2}+5\sec\frac{x}{2}+2=0$

a. $\frac{4\pi}{3}$
b. 0
c. 2π
d. $\frac{\pi}{3}, \frac{5\pi}{3}$

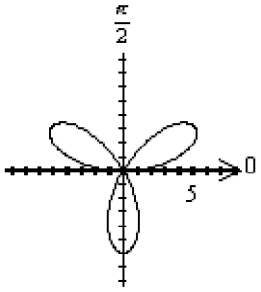
Identify the graph of the polar equation.

____ 12. $r = 6 \cos 3\theta, \quad 0 \le \theta \le 2\pi$

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



b.



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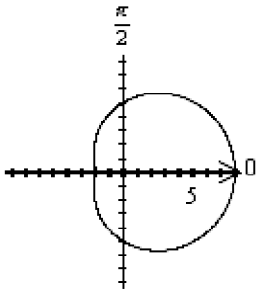


d.

____ 13. Find a vector equivalent to the vector $\overrightarrow{AB}$ with its initial point at the origin and find the magnitude of the vector. $A = (2,-5), B = (-1,3)$

a. $\langle 3,8 \rangle, \sqrt{73} \approx 8.544$

b. $\langle -3,8 \rangle, \sqrt{73} \approx 8.544$

c. $\langle -1,8 \rangle, \sqrt{65} \approx 8.0623$

d. $\langle 1,8 \rangle, \sqrt{65} \approx 8.0623$

____ 14. Find a vector equivalent to the vector $\overrightarrow{AB}$ with its initial point at the origin and find the magnitude of the vector. $A = (-3,-2), B = (1,4)$

a. $\langle -4,-6 \rangle, \sqrt{52} \approx 7.2111$

b. $\langle 2,6 \rangle, \sqrt{40} \approx 6.3246$

c. $\langle 4,6 \rangle, \sqrt{52} \approx 7.2111$

d. $\langle -2,6 \rangle, \sqrt{40} \approx 6.3246$

____ 15. Which is the rule of a function g whose graph is the graph of $f(x) = \csc x$ stretched vertically by a factor of 2 and shifted 3 units to the left and down 4 units.

a. $g(x) = \frac{1}{2}\csc(x-3)+4$

b. $g(x) = \frac{1}{2}\csc(x+3)-4$

c. $g(x) = 2\csc(x-3)-4$

d. $g(x) = 2\csc(x+3)-4$

____ 16. Which is the rule of a function g whose graph is the graph of $f(x) = \csc x$ is compressed vertically by a factor of $\frac{1}{2}$ and shifted 3 units to the left and up 4 units.

a. $g(x) = \frac{1}{2}\csc(x-3)-4$

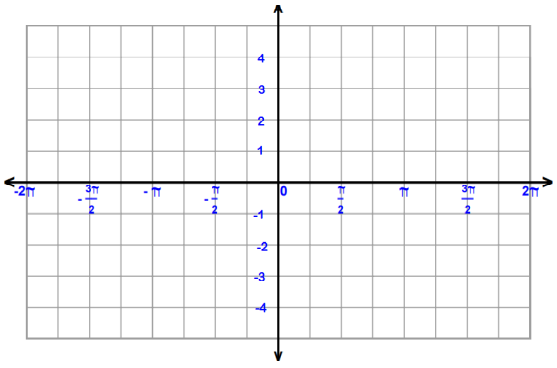
b. $g(x) = \frac{1}{2}\csc(x+3)+4$

c. $g(x) = 2\csc(x-3)-4$

d. $g(x) = 2\csc(x+3)-4$

Short Answer

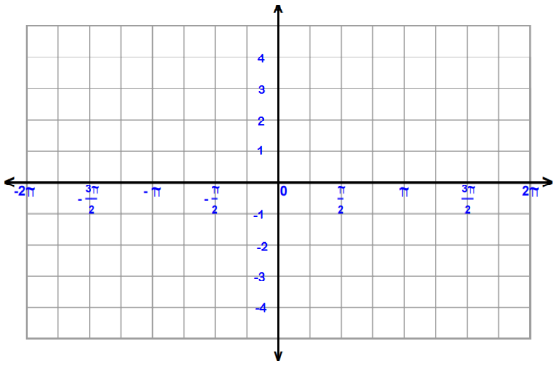
17. Graph $f(t) = \cot t$.



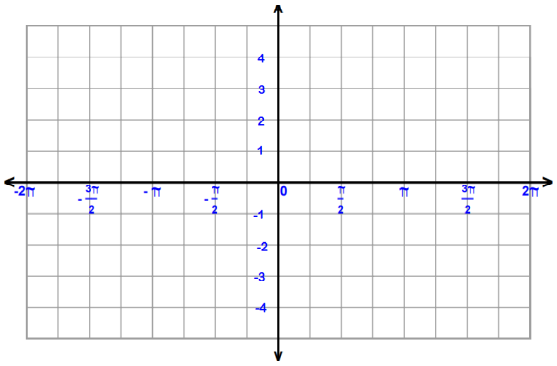
18. Find all the exact t-values for which $\cos t = \frac{\sqrt{2}}{2}$.

19. Find all the exact t-values for which $\cos t = -\frac{\sqrt{3}}{2}$.

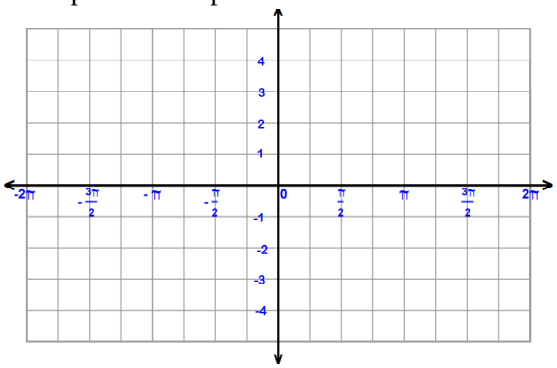
20. Graph $f(t) = 2\tan t$.



21. Graph $f(t) = \sec t$.



22. Graph $g(x) = 2\sin 4x$. Identify the amplitude and period.

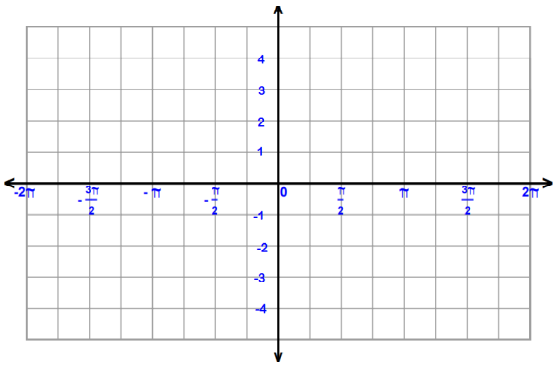


23. What are the amplitude, period, and phase shift of the given function?

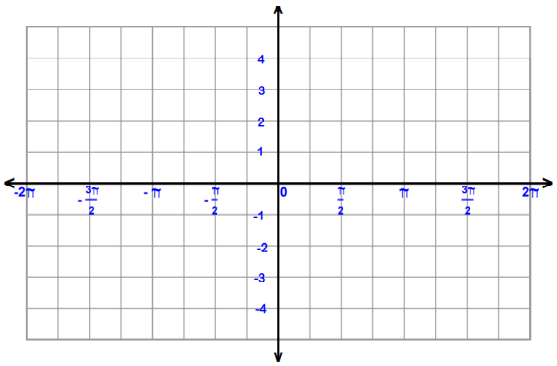
$f(t) = \frac{2}{3}\cos(4t + 3\pi)$

24. Identify the graph of the given function.

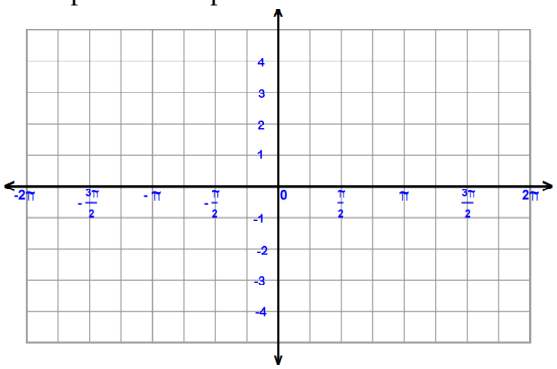
$f(t) = 4\sin(-3t)$



25. Identify the graph of the given function.
$f(t) = 5\sin 3t$



26. Graph $g(x) = 3\sin 2x$. Identify the amplitude and period.



27. Find the period of $f(x) = \tan\frac{1}{5}x$.

28. For the function $f(x) = -\frac{1}{2}\cos(3t + 3\pi) - 3$, identify:

a. the amplitude.
b. the period.
c. the phase shift.
d. the vertical shift.

29. For the function $f(t) = \frac{1}{2}\cos\left(\frac{t}{2} - 3\pi\right)$, identify:

    a. the amplitude.
    b. the phase shift.
    c. the period.

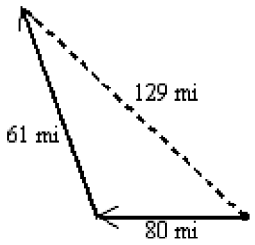
30. Prove the identity $\sin(\pi - \theta) = \sin\theta$.

31. Use half-angle identities to find the exact value of $\cos\frac{\pi}{12}$.

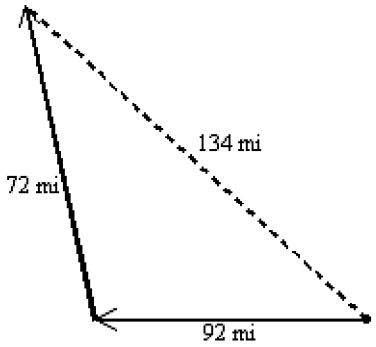
    Find all solutions of the equation in the interval $[0, 2\pi)$.

32. $4\cos^2 2x - 3 = 0$

33. A ship travels due west for 80 miles. It then travels in a northern direction for 61 miles and ends up 129 miles from its original position. How many degrees did it turn when it changed direction? Round your answer to the nearest tenth.



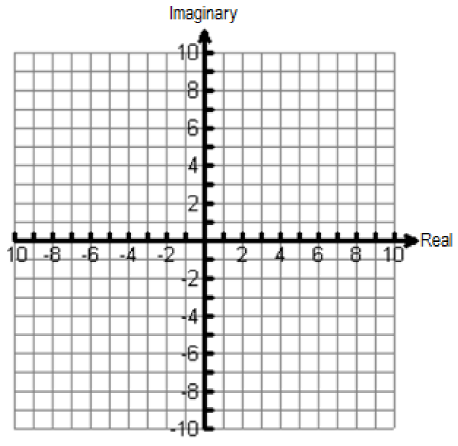
34. A ship travels due west for 92 miles. It then travels in a northern direction for 72 miles and ends up 134 miles from its original position. How many degrees did it turn when it changed direction? Round your answer to the nearest tenth.



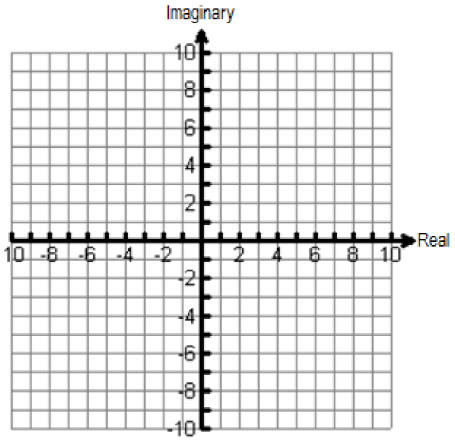
35. Given a triangle with $a = 17$, $A = 43°$, and $B = 30°$, find c. Round to the nearest tenth.

36. Find the area of the triangle ABC under the given conditions. Round to the nearest tenth.
$A = 59°$, $b = 9$ feet, and $c = 4$ feet

37. Graph $4 + 2i$ on the complex plane.



38. Find the absolute value of $-7 - 9i$.



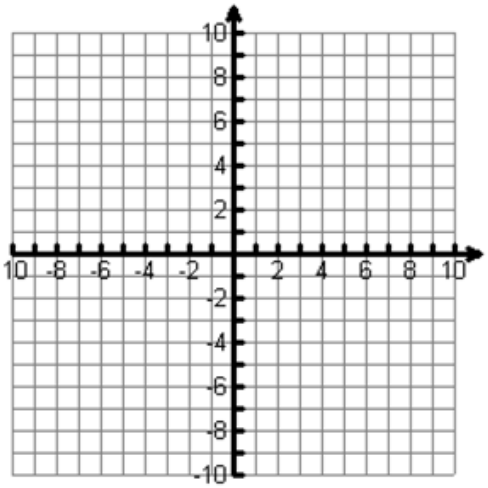
39. Find the absolute value of the complex number i^7.

40. Find the absolute value of the complex number i^{20}.

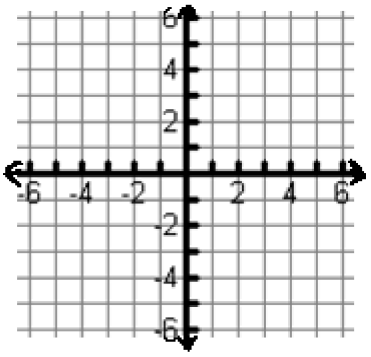
41. Express the number in polar form.
$-2 + 2\sqrt{3}i$

42. Express the complex number in trigonometric form.
$-4 + 4\sqrt{3}i$

43. Graph $25x^2 + 36y^2 = 900$.



44. Graph $4x^2 - 9y^2 = 36$.

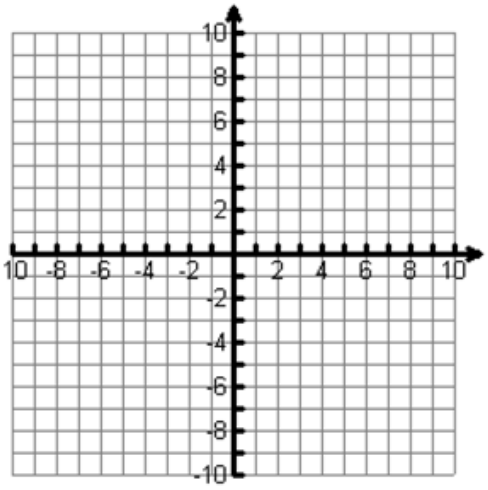


45. Write an equation of an ellipse with center (1, -4), horizontal major axis of length 10, and minor axis of length 4.

46. A lamp standing near a wall throws an arc of light in the shape of a conic section. Suppose the edge of the light can be represented by the equation $3y^2 - 2y - 4x^2 + 2x - 8 = 0$. Identify the shape of the edge of the light.

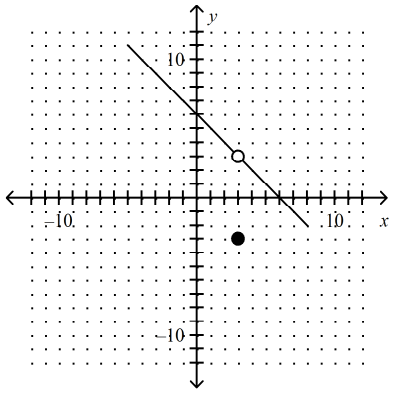
47. The equation $4x^2 + 6x - 5y^2 + 2 = 0$ represents ____? .

48. Sketch the graph of the polar equation $r = \dfrac{9}{5 - 4\cos\theta}$.

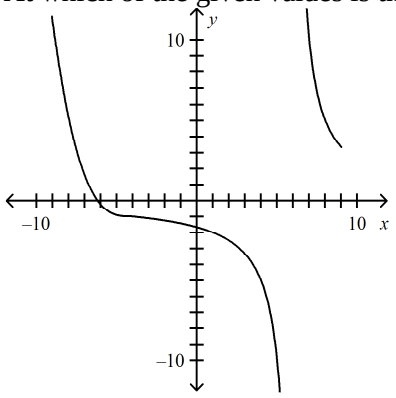


49. Use the graph of the function *f* to determine the given limit.

$\lim\limits_{x \to 3} f(x)$



50. At which of the given values is the graph discontinuous?

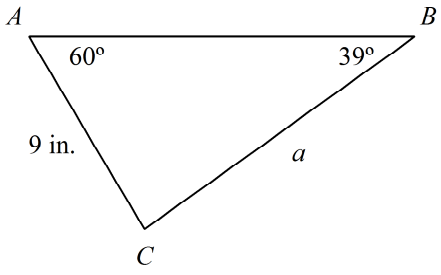


51. Determine all numbers at which the function is continuous.

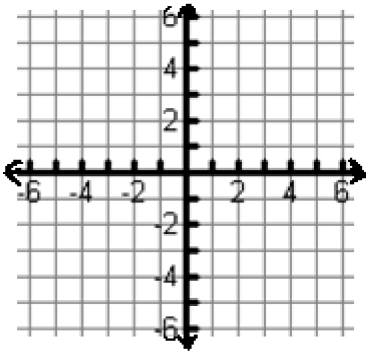
$$f(x) = \begin{cases} \dfrac{x^2 - 12x + 32}{x^2 - 3x - 4} & \text{if } x \neq 4 \\ -\dfrac{4}{5} & \text{if } x = 4 \end{cases}$$

52. Find the exact value of $\cos\left(\dfrac{-5\pi}{12}\right)$.

53. How long is side *a* to the nearest tenth of an inch?

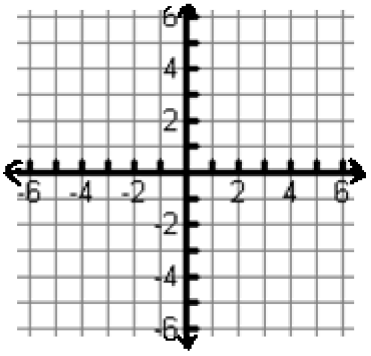


54. Find the foci of the ellipse with the equation $18x^2 + 36y^2 = 648$. Graph the ellipse.



Graph the conic section.

55. $9x^2 - 4y^2 = 36$



Find the equations of the asymptotes of the hyperbola.

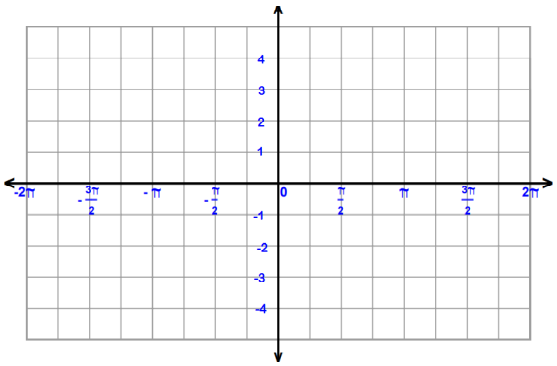
56. $36y^2 - 25x^2 - 900 = 0$

57. Find the exact value of $\sin\left(\frac{13\pi}{12}\right)$.

Name: _____ **ID: A**

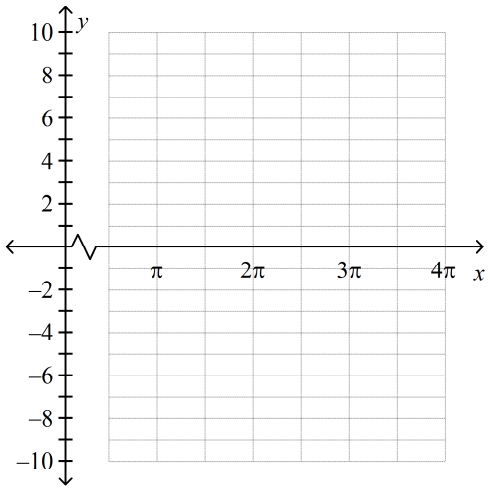
Problem

58. Graph $f(t) = 4\sin t + 1$.



59. Graph the periodic function. Determine the domain and range. Identify the period and amplitude.

$y = 5\sin(x) - 2$



60. Prove the identity: $\dfrac{\sin 2x}{2\cos^2 x} = \tan x$

61. Prove the cofunction identity $\cos\left(\dfrac{\pi}{2} - x\right) = \sin x$.

62. Graph the polar equation $r = 5 - 4\cos\theta$ for $0 \le \theta \le 2\pi$.

63. Use half-angle identities to find the exact value of $\sin 15° = \sin \frac{\pi}{12}$.

64. Use half-angle identities to find the exact value of $\cos 165° = \cos \frac{11\pi}{12}$.

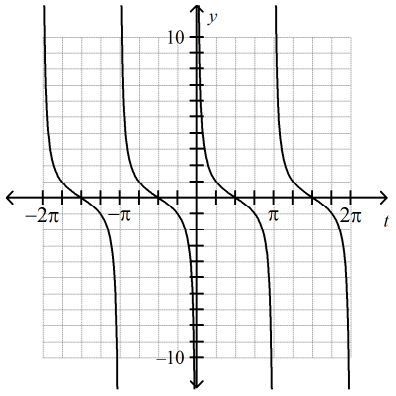
Precal B CBE Study Guide
Answer Section

MULTIPLE CHOICE

1. ANS: D STA: TX TEKS 2A.5B | TX TEKS 2A.5C | TX TEKS 2A.5D | TX TEKS 2A.5E
2. ANS: C STA: TX TEKS 2A.5B | TX TEKS 2A.5C | TX TEKS 2A.5D | TX TEKS 2A.5E
3. ANS: C STA: TX TEKS PRE.P.1.A
4. ANS: C STA: TX TEKS PRE.P.1.E
5. ANS: B
6. ANS: C
7. ANS: C
8. ANS: A STA: TX TEKS PRE.P.2.C
9. ANS: D
10. ANS: B STA: TX TEKS PRE.P.2.B | TX TEKS PRE.P.2.C
11. ANS: A STA: TX TEKS PRE.P.2.B | TX TEKS PRE.P.2.C
12. ANS: B STA: TX TEKS PRE.P.1.A
13. ANS: B
14. ANS: C
15. ANS: D
16. ANS: B

SHORT ANSWER

17. ANS:



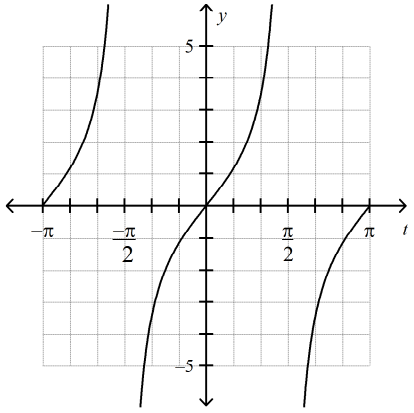
18. ANS:

$\pm\frac{\pi}{4} + n\pi$, n is an integer

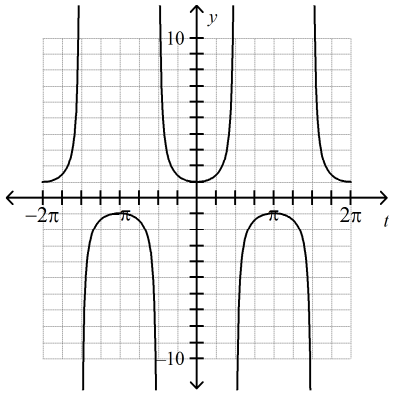
19. ANS:

$\pm\frac{5\pi}{6} + n\pi$, n is an integer

20. ANS:

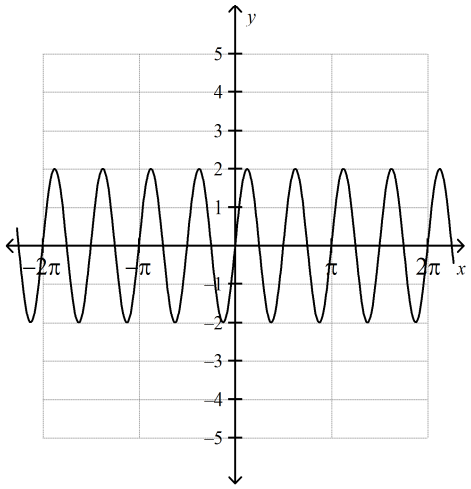


21. ANS:



22. ANS:

amplitude = 2; period = $\frac{1}{2}\pi$



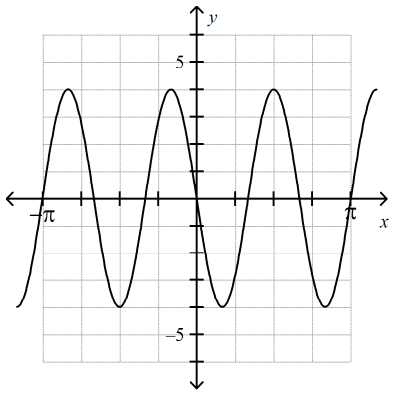
23. ANS:

amplitude: $\frac{2}{3}$

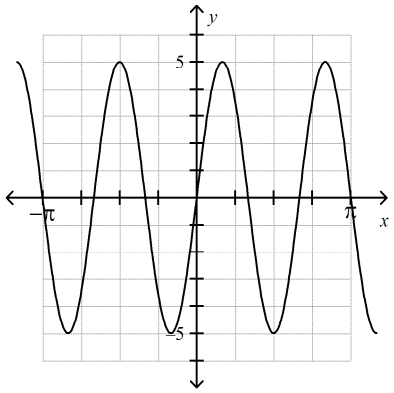
phase shift: $-\frac{3}{4}\pi$

period: $\frac{1}{2}\pi$

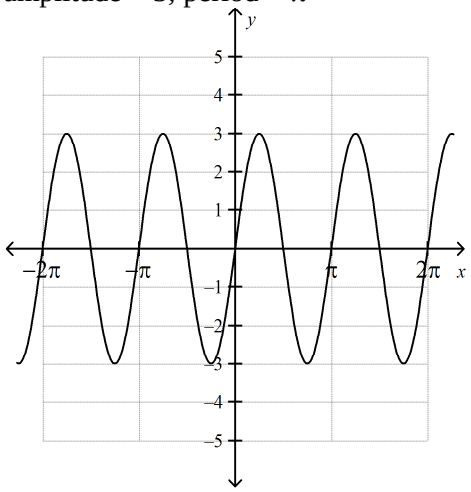
24. ANS:



25. ANS:



26. ANS:
amplitude = 3; period = π



27. ANS:
5π

28. ANS:
a. amplitude: $\frac{1}{2}$; period: $\frac{2}{3}\pi$; phase shift: π; vertical shift: –3

29. ANS:
a. $\frac{1}{2}$ b. 6π c. 4π

30. ANS:

$$\begin{aligned} \sin(\pi-\theta) &= (\sin\pi)(\cos\theta)-(\cos\pi)(\sin\theta) && \text{Apply the identity for } \sin(A-B). \\ &= (0)(\cos\theta)-(-1)(\sin\theta) && \text{Evaluate.} \\ &= \sin\theta && \text{Simplify.} \end{aligned}$$

31. ANS:

$$\frac{\sqrt{2+\sqrt{3}}}{2}$$

32. ANS:

$$\frac{\pi}{12}, \frac{5\pi}{12}, \frac{7\pi}{12}, \frac{11\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}$$

STA: TX TEKS PRE.P.2.B | TX TEKS PRE.P.2.C

33. ANS:
48.1°

STA: TX TEKS PRE.P.3.B | TX TEKS PRE.P.3.E

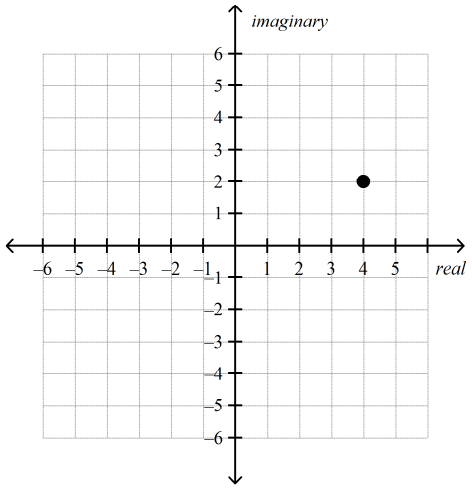
34. ANS:
71°

STA: TX TEKS PRE.P.3.B | TX TEKS PRE.P.3.E

35. ANS:
$c \approx 23.8$

36. ANS:
$\approx 15.4 \text{ ft}^2$

37. ANS:



38. ANS:
$\sqrt{130}$

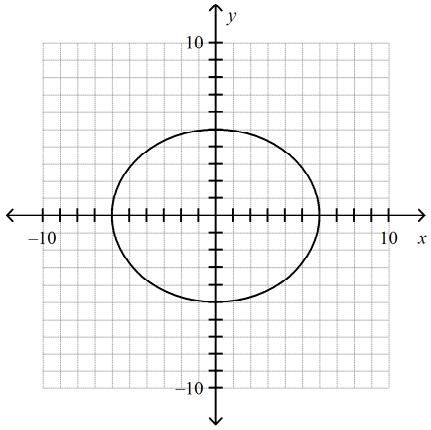
39. ANS:
1

40. ANS:
1

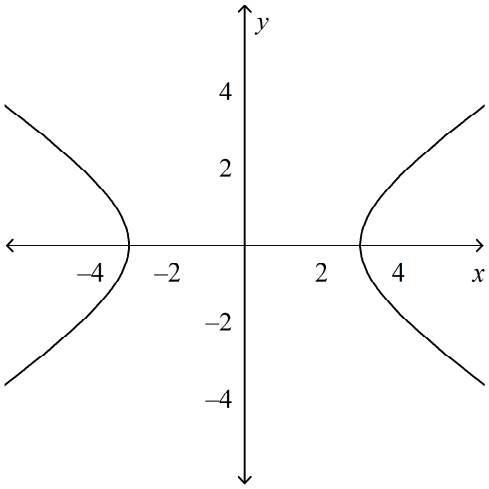
41. ANS:
$4\left(\cos\ \frac{2\pi}{3} + i\ \sin\ \frac{2\pi}{3}\right)$

42. ANS:
$8(\cos\ 120° + i \sin\ 120°)$

43. ANS:



44. ANS:



STA: TX TEKS 2A.5B | TX TEKS 2A.5D

45. ANS:
$\frac{(x-1)^2}{25} + \frac{(y+4)^2}{4} = 1$

STA: 2A.5(B)

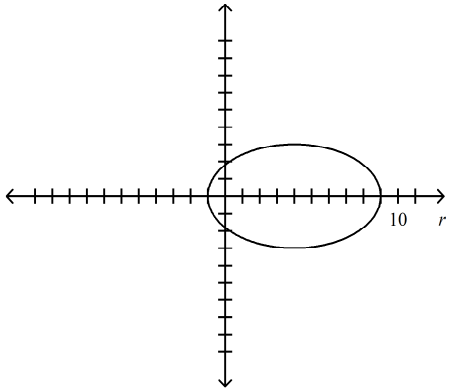
46. ANS:
hyberbola

STA: 2A.5(D)

47. ANS:
an ellipse

STA: 2A.5(D)

48. ANS:



49. ANS:
3

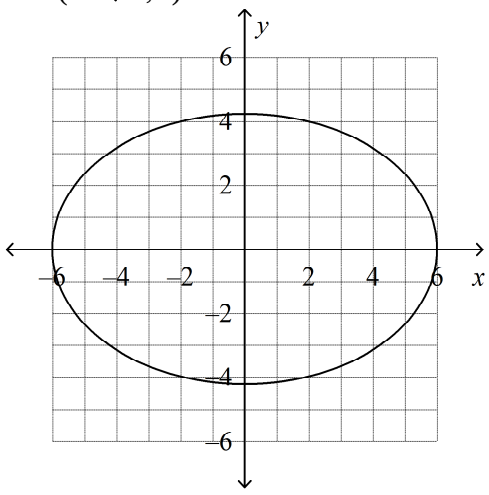
50. ANS:
6

51. ANS:
continuous at every real number except $x = -1$

52. ANS:
$\frac{\sqrt{6} - \sqrt{2}}{4}$

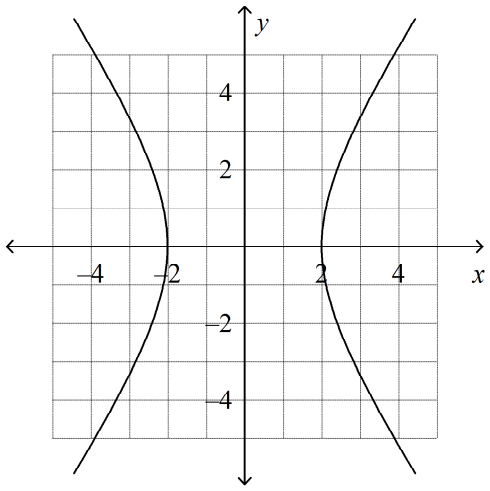
53. ANS:
12.4 in.

54. ANS:
foci $(\pm 3\sqrt{2}, 0)$



STA: TX TEKS 2A.5B | TX TEKS 2A.5D

55. ANS:



STA: TX TEKS 2A.5B | TX TEKS 2A.5D

56. ANS:

Asymptotes58 $y = \pm \frac{5}{6} x$

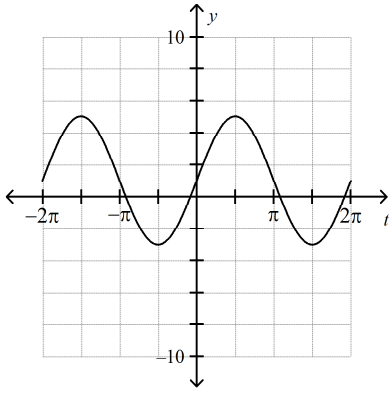
STA: TX TEKS PRE.P.1.E

57. ANS:

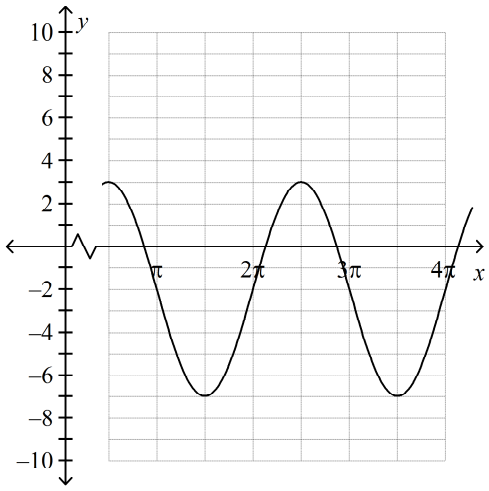
$\frac{\sqrt{2} - \sqrt{6}}{4}$

PROBLEM

58. ANS:



59. ANS:



Domain: All real numbers; Range: $-7 \le x \le 3$; Amplitude: 5; Period: 2π

60. ANS:

$$\frac{\sin 2x}{2\cos^2 x} = \frac{2\sin x \cos x}{2\cos x \cos x} = \frac{\sin x}{\cos x} = \tan x$$

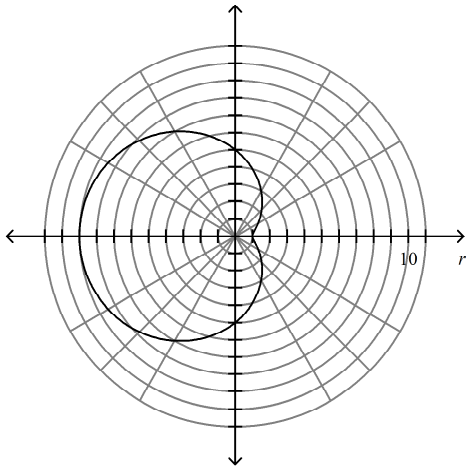
61. ANS:

Solution

Using the formula for $\cos(u - v)$, you have

$$\cos\left(\frac{\pi}{2} - x\right) = \cos\frac{\pi}{2}\cos x + \sin\frac{\pi}{2}\sin x$$
$$= (0)(\cos x) + (1)(\sin x)$$
$$= \sin x.$$

62. ANS:



63. ANS:

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

64. ANS:
$$-\frac{\sqrt{2+\sqrt{3}}}{2}$$