*AAT

Semester 2 Final Review (Ch. 6-11)

Name: Key

Write the letter for the correct answer in the blank at the right of each question.

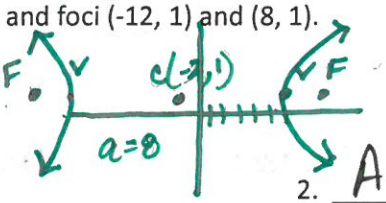
1. Find the center and radius of the circle with equation $x^2 + (y-4)^2 = 9$.

   A. (0,4); 9 B. (4, 0); 3 C. (-4, 0); 9 D. (0, 4); 3 1. D.

2. Write an equation for the hyperbola with vertices (-10, 1) and (6, 1) and foci (-12, 1) and (8, 1).

   A. $\frac{(x+2)^2}{64} - \frac{(y-1)^2}{36} = 1$ B. $\frac{(x-2)^2}{36} - \frac{(y+1)^2}{64} = 1$

   C. $\frac{(x-2)^2}{64} - \frac{(y+1)^2}{36} = 1$ D. $\frac{(x+2)^2}{36} - \frac{(y-1)^2}{64} = 1$

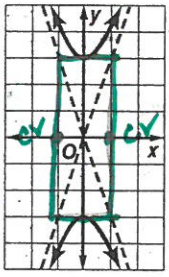
   

   2. A.

3. Which equation is graphed at the right?

   A. $x^2 - 9y^2 = 9$ B. $9y^2 - x^2 = 9$

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

   3. D.

4. Write the equation $x^2 - 2x + y^2 + 4y = 11$ in standard form.

   A. $(x-1)^2 + (y+2)^2 = 16$ B. $(x+1)^2 + (y-2)^2 = 16$

   C. $\frac{(x+1)^2}{1} + \frac{(y-2)^2}{4} = 1$ D. $\frac{(x-1)^2}{4} - \frac{(y-1)^2}{4} = 1$

   $x^2-2x+1 + y^2+4y+4 = 11+5$
   $(x-1)^2 + (y+2)^2 = 16$

   4. A.

5. Write the equation $4x^2 + 24x - y + 34 = 0$ in standard form.

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

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

   $4x^2+24y = y-34$
   $4(x^2+6x+9) = y-34+36$
   $4(x+3)^2 = y+2$
   $4(x+3)^2 - 2 = y$

   5. C.

6. What is the graph of $4x^2 = y^2 + 8y + 32$?

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

   $4x^2 \ominus y^2$

   6. D.

7. The graph of which equation is a circle?

   A. $5x^2 + 10x = 9 + 5y^2$ B. $5x^2 - 10x = 9 - 5y^2$

   C. $5x^2 + 5x + y^2 = 9$ D. $5x^2 + 10x + 5y = 9$

   $5x^2-10x \quad +5y^2 = 9$
   $5(x^2-2x+1) + 5y^2 = 9+5$
   $\frac{5(x-1)^2}{14} + \frac{5y^2}{14} = \frac{14}{14}$
   $\frac{(x-1)^2}{\frac{14}{5}} + \frac{y^2}{\frac{14}{5}} = 1$

   same

   7. B.

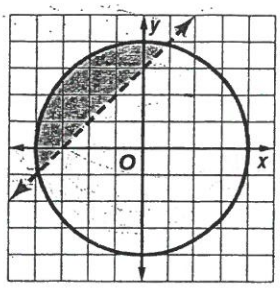
$\sqrt{y^2} = \sqrt{16 - x^2}$

$y = \pm\sqrt{16 - x^2}$ — circle — line

8. Solve the system of equations by graphing $x^2 + y^2 = 16$ and $y = -x + 4$.

A. $(4, 0), (0, -4)$ B. $(0, -4), (-4, 0)$ C. $(-4, 0), (0, -4)$ D. $(0, 4), (4, 0)$ 8. D.

9. Which system of inequalities is graphed at the right?



A. $x^2 + y^2 \le 16$
$x - y > -3$

B. $x^2 + y^2 \le 16$
$x - y < -3$

C. $x^2 + y^2 \ge 16$
$x - y > -3$

D. $x^2 + y^2 \ge 16$
$x - y < -3$

9. B.

Find the exact solution(s) of each system of equations for questions 10 & 11.

circle parabola

10. $x^2 + y^2 = 25$ and $9y = 4x^2$ $\quad x^2 = \frac{9}{4}y$

$4\left(\frac{9}{4}y + y^2 = 25\right)$ $\quad 4y^2 + 9y - 100 = 0$

$9y + 4y^2 = 100$ $\quad y = 4, y = -6.25$ $\quad x = \pm 3$

A. $(4, 3), (-4, 3)$ B. $(3, 4), (3, -4)$ C. $(4, 3), (4, -3)$ D. $(3, 4), (-3, 4)$ 10. D.

parabola line

11. $y = x^2 + 1$ and $y = 2x$

$x^2 + 1 = 2x$

$x^2 - 2x + 1 = 0$ $\quad (x-1)(x-1) = 0$ $\quad x = 1; y = 2$

A. $(1, 2), (-1, 2)$ B. $(-1, 2)$ C. $(1, 2)$ D. $(-1, 2), (0, 2)$ 11. C.

12. Write the equation of the parabola $y = 2x^2 - 8x + 1$ in standard form.

$y - 1 = 2(x^2 - 4x + 4)$

$+8$

$x = a(y-0)^2 + 2$

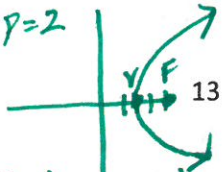
A. $y = 2(x - 2)^2 + 9$ B. $y = (x - 4)^2 - 15$

$y + 7 = 2(x-2)^2$

$y = 2(x-2)^2 - 7$

C. $y = 2(x - 2)^2 - 7$ D. $y = 2(x - 4)^2 - 15$ 12. C.

$p = 2$



13. Write an equation for the parabola with focus $(4, 0)$ and vertex $(2, 0)$.

$2 = \frac{1}{4a}$; $a = \frac{1}{8}$

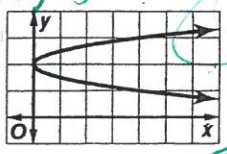
A. $x = \frac{1}{8}y^2 + 2$ B. $x = -\frac{1}{8}y^2 - 2$ C. $y = \frac{1}{8}x^2 - 2$ D. $y = -\frac{1}{8}x^2 + 2$ 13. A.

$x = \frac{1}{8}y^2 + 2$

14. Which equation is graphed at the right?

graph

$x = 4(y^2 - 4y + 4)$ $\quad x = 4(y-2)^2$; $\sqrt{\frac{x}{4}} = \sqrt{(y-2)^2}$ $\quad 2 \pm \sqrt{\frac{x}{4}} = y$



A. $y = 4x^2 - 16x + 16$ B. $x = 4y^2 - 16y + 16$

C. $y = \frac{1}{4}x^2 - x + 1$ D. $x = \frac{1}{4}y^2 - y + 1$ 14. B.

$\frac{1}{4}(y^2 - 4y + 4)$ $\quad x = \frac{1}{4}(y-2)^2$; $\sqrt{4x} = \sqrt{(y-2)^2}$ $\quad 2 \pm \sqrt{4x} = y$

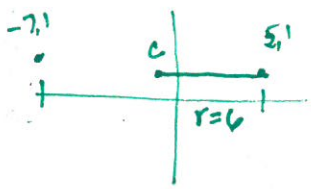
15. Write an equation for a circle if the endpoints of a diameter are at (-7, 1) and (5, 1).

A. $x^2 + (y - 1)^2 = 6$ B. $(x + 1)^2 + (y - 1)^2 = 36$

C. $(x - 1)^2 + y^2 = 6$ D. $(x - 1)^2 + (y + 1)^2 = 36$ 15. B.

$M\left(\frac{-7+5}{2}, \frac{1+1}{2}\right)$

$\left(\frac{-2}{2}, \frac{2}{2}\right) = (-1, 1)C$



16. Which is the equation of a circle with center (2, 0) and radius 2 units?

A. $x^2 + y^2 + 4x = 0$ B. $x^2 + y^2 - 4x = 0$

C. $x^2 + y^2 - 4y = 0$ D. $x^2 + y^2 + 4y = 0$

$(x-2)^2 + y^2 = 4$

$x^2 - 4x + y^2 = 0$

$(x^2 - 4x + 4) + y^2 = 4$

16. B.

17. Write an equation for an ellipse if the endpoints of the major axis are at $(-1, 5)$ and $(-1, -3)$ and the endpoints of the minor axis are at $(-4, 1)$ and $(2, 1)$.

A. $\frac{(y+1)^2}{16} + \frac{(x-1)^2}{9} = 1$ B. $\frac{(x+1)^2}{16} + \frac{(y+1)^2}{9} = 1$

C. $\frac{(x-1)^2}{16} + \frac{(y+1)^2}{9} = 1$ D. $\frac{(y-1)^2}{16} + \frac{(x+1)^2}{9} = 1$

6, $-1=h$

$2b = 6$

$b = 3$

8, $k=1$

$2a = 8$

$a = 4$

17. D.

18. Which is the equation of an ellipse with center $(1, -2)$ and a vertical major axis?

A. $\frac{(y-2)^2}{9} + \frac{(x+1)^2}{4} = 1$ B. $\frac{(x+1)^2}{9} + \frac{(y-2)^2}{4} = 1$

C. $\frac{(y+2)^2}{9} + \frac{(x-1)^2}{4} = 1$ D. $\frac{(x-1)^2}{9} + \frac{(y+2)^2}{4} = 1$

18. C.

19. Find the 20th term of the arithmetic sequence in which $a_1 = 5$ and $d = 4$.

A. 81 B. 85 C. 96 D. 105

$a_{20} = a_1 + (n-1)d$

$= 5 + (20-1)4$

$= 5 + 76$

19. A.

20. Write an equation for the *n*th term of the arithmetic sequence $-7, -2, 3, 8, \ldots$.

A. $a_n = n + 5$ B. $a_n = 5n - 12$

C. $a_n = -7n + 12$ D. $a_n = -7(n + 5)$

$a_n = -7 + (n-1)5$

$= -7 + 5n - 5$

$= 5n - 12$

20. B.

21. Find the two arithmetic means between 6 and 30.

A. 12, 24 B. 14, 22 C. 12, 18 D. 18, 18

6, —, —, 30

21. B.

22. Find S_n for the arithmetic series in which $a_1 = 3, d = \frac{1}{2}$, and $a_n = \frac{17}{2}$.

A. 27 B. 54 C. $\frac{139}{2}$ D. 69

$a_{14} = 6 + (4-1)d$

$30 = 6 + 3d$

$24 = 3d$

$8 = d$

$S_n = \frac{n}{2}(a_1 + a_n)$

$= \frac{12}{2}\left(3 + \frac{17}{2}\right) = 6\left(\frac{23}{2}\right) = 69$

$3, \frac{7}{2}, \frac{8}{2}, \frac{9}{2}, \frac{10}{2}, \frac{11}{2}, \frac{12}{2}, \frac{13}{2}, \frac{14}{2}, \frac{15}{2}, \frac{16}{2}, \frac{17}{2}$

22. D.

23. Find $\sum_{n=18}^{22} (50 - 2n)$.

A. 20 B. 40 C. 50 D. 100

-or- $\frac{17}{2} = 3 + (n-1)\frac{1}{2}$

23. C.

$a_6 = a_1 r^{n-1}$
$= 4 \cdot 3^{6-1}$

24. Find the sixth term of the geometric sequence for which $a_1 = 4$ and $r = 3$.

A. 247 B. 972 C. 733 D. 2916 24. B.

25. Write an equation for the nth term of the geometric sequence $-10, 5, -\frac{5}{2}, \ldots$.

$a_n = -10 \cdot \frac{-1}{2}^{n-1}$

A. $a_n = -10\left(\frac{1}{2}\right)^{n-1}$ B. $a_n = 10\left(-\frac{1}{2}\right)^{n-1}$

C. $a_n = -10\left(-\frac{1}{2}\right)^{n-1}$ D. $a_n = -10\left(-\frac{1}{2}\right)^{-n-1}$ 25. C

26. Find four geometric means between 486 and 2. 486, —, —, —, —, 2

A. 162, 54, 18, 6 B. 389.2, 292.4, 195.6, 98.8

C. 242, 121, 81, 16 D. $\pm 162, 54, \pm 18, 6$

$2 = 486 r^5$
$\frac{1}{243} = r^5$
$\frac{1}{3} = r$

26. A.

27. Find the sum of the geometric series $81 - 27 + 9 - \cdots$ to 6 terms.

$S_n = a_1 \frac{1-r^n}{1-r}$

A. $-\frac{1}{3}$ B. 121 C. 4941 D. $\frac{182}{3}$ 27. D.

$= 81 \frac{1-(-\frac{1}{3})^6}{1-(-\frac{1}{3})} = 81 \frac{(\frac{728}{729})}{(\frac{4}{3})} = \frac{182}{3}$

28. Find $\sum_{n=1}^{7} 4(-3)^{n-1}$.

A. -2186 B. 2188 C. -728 D. 2916 28. B.

29. Find a_1 in a geometric series for which $S_n = 210, r = -2$, and $n = 6$.

$S_n = a_1 \frac{1-r^n}{1-r}$
$210 = a_1 \frac{1-(-2)^6}{1-(-2)}$
$210 = a_1 \cdot \frac{-63}{3}$
$\frac{210}{-21} = \frac{-21a_1}{-21}$
$-10 = a_1$

A. 10 B. -10 C. $\frac{1}{10}$ D. $\frac{10}{3}$ 29. B.

For Questions 30 and 31, find the sum of each infinite geometric series, if it exists.

30. $\sum_{n=1}^{\infty} 10\left(\frac{1}{5}\right)^{n-1}$

$S = \frac{a_1}{1-r} = \frac{10}{1-(\frac{1}{5})} = \frac{10}{\frac{4}{5}} = 10 \cdot \frac{5}{4} = \frac{50}{4} = \frac{25}{2}$

A. $\frac{25}{3}$ B. 8 C. $\frac{25}{2}$ D. does not exist 30. C

31. $5 + 4 + \frac{16}{5} + \cdots$

A. 20 B. 25 C. $\frac{25}{4}$ D. does not exist 31. B

$S = \frac{a_1}{1-r} = \frac{5}{1-\frac{4}{5}} = \frac{5}{\frac{1}{5}} = 25$

$a_2 = 2(-1)+1 = -1$
$a_3 = 2(-1)+2 = 0$
$a_4 = 2(0)+3 = 3$
$a_5 = 2(3)+4 = 10$

32. Find the fifth term of the sequence in which $a_1 = -1$ and $a_{n+1} = 2a_n + n$.

A. -1 B. 25 C. 3 D. 10 32. D.

33. Use Pascal's triangle to expand $(m-n)^5$.

A. $m^5 - 4m^4n + 6m^3n^2 + (-6m^2n^3) + 4mn^4 - n^5$
B. $m^5 + 5m^4n - 10m^3n^2 + 10m^2n^3 - 5mn^4 + n^5$
C. $m^5 + 4m^4n - 6m^3n^2 + 6m^2n^3 - 4mn^4 + n^5$
D. $m^5 - 5m^4n + 10m^3n^2 - 10m^2n^3 + 5mn^4 - n^5$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

33. D.

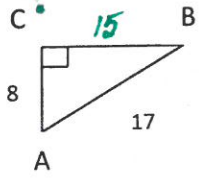
34. Use the Binomial Theorem to find the third term in the expansion of $(x+3y)^6$.

A. $15x^4y^2$ B. $135x^4y^2$ C. $540x^3y^3$ D. $20x^3y^3$ 34. B.

$x^6 + \binom{6}{1}x^5(3y)^1 + \binom{6}{2}x^4(3y)^2$
$15x^4 \cdot 9y^2$
$135x^4y^2$

35. Find the value of csc *A*.

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

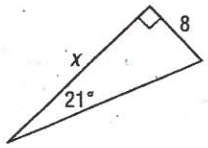


$\sin A = \frac{15}{17}$

35. B.

36. Which equation can be used to find *x*?

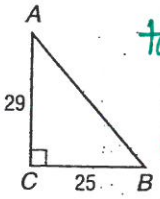
A. $\sin 21° = \frac{8}{x}$ B. $\tan 21° = \frac{x}{8}$ C. $\tan 21° = \frac{8}{x}$ D. $\sin 21° = \frac{x}{8}$



36. C.

37. Find *A* to the nearest degree.

A. 49° B. 37° C. 41° D. 53°



$\tan A = \frac{25}{29}$
$A = \tan^{-1}\left(\frac{25}{29}\right)$

37. C.

38. Rewrite $\frac{2\pi}{9}$ radians in degree measure.

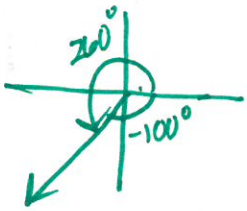
$\frac{2\pi}{9} \cdot \frac{180}{\pi}$

A. 20° B. 80° C. 40° D. $\frac{40°}{\pi}$ 38. C.

39. Which angle is coterminal with an angle in standard position measuring $-\frac{5\pi}{9}$?

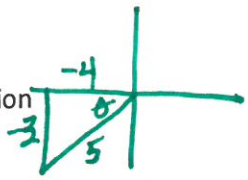
A. $\frac{13\pi}{9}$ B. $\frac{5\pi}{9}$ C. $\frac{23\pi}{9}$ D. $\frac{10\pi}{9}$ 39. A.

$\frac{-5\pi}{9} = -100°$



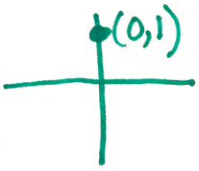
$260° \cdot \frac{\pi}{180} = \frac{13\pi}{9}$

40. Find the exact value of $\sin\theta$ if the terminal side of θ in standard position contains the point $(-4, -3)$.



A. $-\frac{4}{5}$ B. $-\frac{3}{5}$ C. $\frac{3}{5}$ D. $\frac{4}{5}$ 40. B.

41. Find the exact value of $\cot 450°$. $\frac{0}{1}=0$

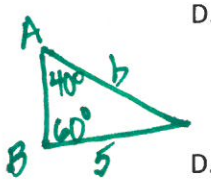


A. 0 B. undefined C. 1 D. -1 41. A.

42. Find the exact value of $\cos\left(-\frac{\pi}{4}\right)$.

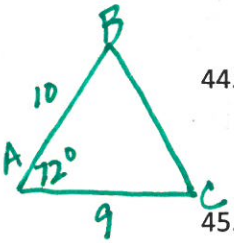
A. $\frac{\sqrt{2}}{2}$ B. $-\frac{\sqrt{2}}{2}$ C. $\frac{\sqrt{3}}{2}$ D. $-\frac{\sqrt{3}}{2}$ 42. A.

43. In $\triangle ABC$, $A = 40°$, $B = 60°$, and $a = 5$. Find b.



$\frac{\sin 40}{5} = \frac{\sin 60}{b}$

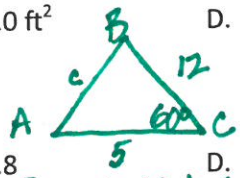
A. 6.4 B. 7.5 C. 6.7 D. 3.7 43. C.



44. Find the area of $\triangle ABC$ if $A = 72°$, $b = 9$ feet and $c = 10$ feet. $\frac{1}{2}(10)(9)\sin 72°$

A. 85.6 ft^2 B. 42.8 ft^2 C. 45.0 ft^2 D. 13.9 ft^2 44. B.

45. In $\triangle ABC$, $C = 60°$, $a = 12$, and $b = 5$. Find c.



A. 109.0 B. 10.4 C. 11.8 D. 15.1 45. B.

$c^2 = 12^2 + 5^2 - 2(12)(5)\cos 60°$

46. Which triangle should be solved by beginning with the Law of Cosines?

A. $A = 115°$, $a = 19$, $b = 13$ B. $A = 62°$, $B = 15°$, $b = 10$ No Side-Angle pair

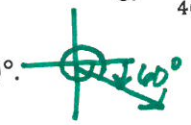
C. $B = 48°$, $a = 22$, $b = 5$ D. $A = 50°$, $b = 20$, $c = 18$ 46. D.

cos sin

47. $P\left(-\frac{9}{41}, \frac{40}{41}\right)$ is located on the unit circle. Find $\sin\theta$.

A. $\frac{40}{41}$ B. $-\frac{9}{41}$ C. $-\frac{9}{40}$ D. $-\frac{40}{9}$ 47. A.

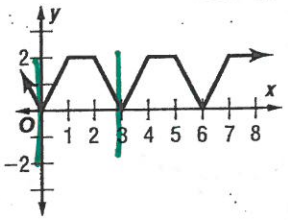
48. Find the exact value of $\cos(-420)°$.



$\frac{1}{2}$

A. $-\frac{1}{2}$ B. $\frac{1}{2}$ C. $\frac{\sqrt{3}}{2}$ D. $-\frac{\sqrt{3}}{2}$ 48. B.

49. Determine the period of the function.



A. 2 B. 3

C. 6 D. 1 49. B.

50. Write the equation $\sin y = x$ in the form of an inverse function.

A. $y = \text{Sin}^{-1}x$ B. $x = \text{Sin}^{-1}y$ C. $y = \sin^{-1}x$ D. $y = \text{Sin}\, x$ 50. A.

$x = \text{Sin}\, y$

51. Solve $y = \text{Arcsin}\ \frac{1}{2}$. $y = \text{Sin}^{-1}\left(\frac{1}{2}\right)$

A. $-\frac{5\pi}{6}$ B. $\frac{5\pi}{6}$ C. $-\frac{\pi}{6}$ D. $\frac{\pi}{6}$ 51. D.

52. Find the value of $\text{Sin}^{-1}\left(-\frac{1}{2}\right)$.

A. $-30°$ B. $30°$ C. $150°$ D. $330°$ 52. A.

53. Find the value of $\tan\left(\text{Tan}^{-1}\frac{1}{2}\right)$.

A. -1 B. 1 C. $\frac{1}{2}$ D. $-\frac{1}{2}$ 53. C.

54. Find the amplitude of $y = 8\sin 2\theta$.

A. 2 B. π C. 8 D. 4 54. C.

55. Find the period of $y = \tan 3\theta$. $\frac{\pi}{b} = \frac{\pi}{3}$

A. $\frac{2\pi}{3}$ B. $\frac{\pi}{3}$ C. 3π D. 6π 55. B.

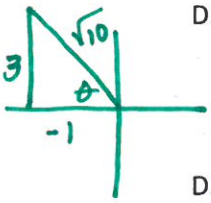
56. Find the phase shift of $y = \cos\left(\theta + \frac{2\pi}{5}\right)$. $P.S. = -\frac{c}{b} = \frac{-\frac{2\pi}{5}}{1}$

A. $\frac{\pi}{5}$ B. $\frac{2\pi}{5}$ C. $-\frac{\pi}{5}$ D. $-\frac{2\pi}{5}$ 56. D.

57. Find the vertical shift of $y = 3\csc\theta - 5$.

A. -3 B. -5 C. 5 D. 3 57. B.

58. Find $\csc\theta$ if $\cot\theta = \frac{1}{3}$ and $90° < \theta < 180°$.

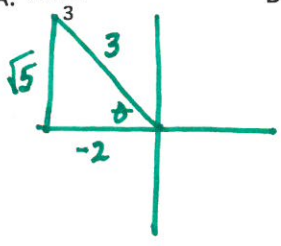


$\text{Sin}\,\theta = \frac{3}{\sqrt{10}}$

A. $-\frac{2\sqrt{2}}{3}$ B. $\frac{2\sqrt{2}}{3}$ C. $\frac{\sqrt{10}}{3}$ D. $-\frac{\sqrt{10}}{3}$ 58. C.

59. Find $\sin\theta$ if $\cos\theta = -\frac{2}{3}$ and $90° < \theta < 180°$.

A. $-\frac{\sqrt{5}}{3}$ B. $\frac{\sqrt{5}}{3}$ C. $-\frac{\sqrt{13}}{3}$ D. $\frac{\sqrt{13}}{3}$ 59. B.



60. Simplify $\frac{1-\cos^2\theta}{\tan^2\theta}$.

A. $-\cos^2\theta$ B. $\sec^2\theta$ C. $\cos^2\theta$ D. $\sin^2\theta$ 60. C

61. Simplify $-5(\cot^2\theta - \csc^2\theta)$.

A. 5 B. -5 C. $-5\csc^2\theta$ D. $5\sec^2\theta$ 61. A

62. Which expression is *not* equivalent to 1?

A. $\sin^2\theta + \cot^2\theta \sin^2\theta$ B. $\frac{\sin^2\theta}{1-\cos\theta} - \cos\theta$

C. $\sec^2\theta + \tan^2\theta$ D. $\frac{\cot^2\theta \sin^2\theta}{\cos^2\theta}$ 62. C

63. Which expression is equivalent to $\tan\theta - \frac{\sec\theta}{\sin\theta}$?

A. $-\cot\theta$ B. $\cot\theta$ C. $\tan\theta - \cot\theta$ D. $\tan\theta - \sec^2\theta$ 63. A

64. Find the exact value of cos 375°.

A. $\frac{\sqrt{6}-\sqrt{2}}{4}$ B. $\frac{\sqrt{6}+\sqrt{2}}{4}$ C. $\frac{\sqrt{2}-\sqrt{6}}{4}$ D. $-\frac{\sqrt{2}-\sqrt{6}}{4}$ 64. B

65. Which expression is equivalent to $\cos\left(\theta + \frac{\pi}{2}\right)$?

A. $\cos\theta$ B. $-\cos\theta$ C. $\sin\theta$ D. $-\sin\theta$ 65. D

66. Find the exact value of $\sin 2\theta$ if $\cos\theta = -\frac{\sqrt{5}}{3}$ and $180° < \theta < 270°$.

A. $-\frac{1}{9}$ B. $-\frac{4\sqrt{5}}{9}$ C. $\frac{1}{9}$ D. $\frac{4\sqrt{5}}{9}$ 66. D

67. Find the exact value of $\sin\frac{\theta}{2}$ if $\cos\theta = \frac{2}{3}$ and $270° < \theta < 360°$.

A. $\frac{1}{3}$ B. $-\frac{1}{3}$ C. $\frac{\sqrt{6}}{6}$ D. $-\frac{\sqrt{6}}{6}$ 67. C

68. Find the exact value of cos 105° by using a half-angle formula.

A. $\frac{\sqrt{2-\sqrt{3}}}{2}$ B. $-\frac{\sqrt{2-\sqrt{3}}}{2}$ C. $-\frac{\sqrt{2+\sqrt{3}}}{2}$ D. $\frac{\sqrt{2+\sqrt{3}}}{2}$ 68. B

69. Find the solutions of $\sin 2\theta = \cos\theta$ if $\theta° \le \theta < 180°$.

A. 30°, 90° B. 30°, 150° C. 30°, 90°, 150° D. 0°, 90°, 150° 69. C

70. **BIOLOGY** An insect population P in a certain area fluctuates with the seasons. It is estimated that $P = 17{,}000 + 4500 \sin \frac{\pi t}{52}$, where t is given in weeks. Determine the number of weeks it would take for the population to initially reach 20,000.

A. 12 weeks B. 692 weeks C. 38 weeks D. 42 weeks

70. A.

$Y_1 = 20{,}000$

$Y_2 = 17000 + 4500 \sin((\pi x)/52)$