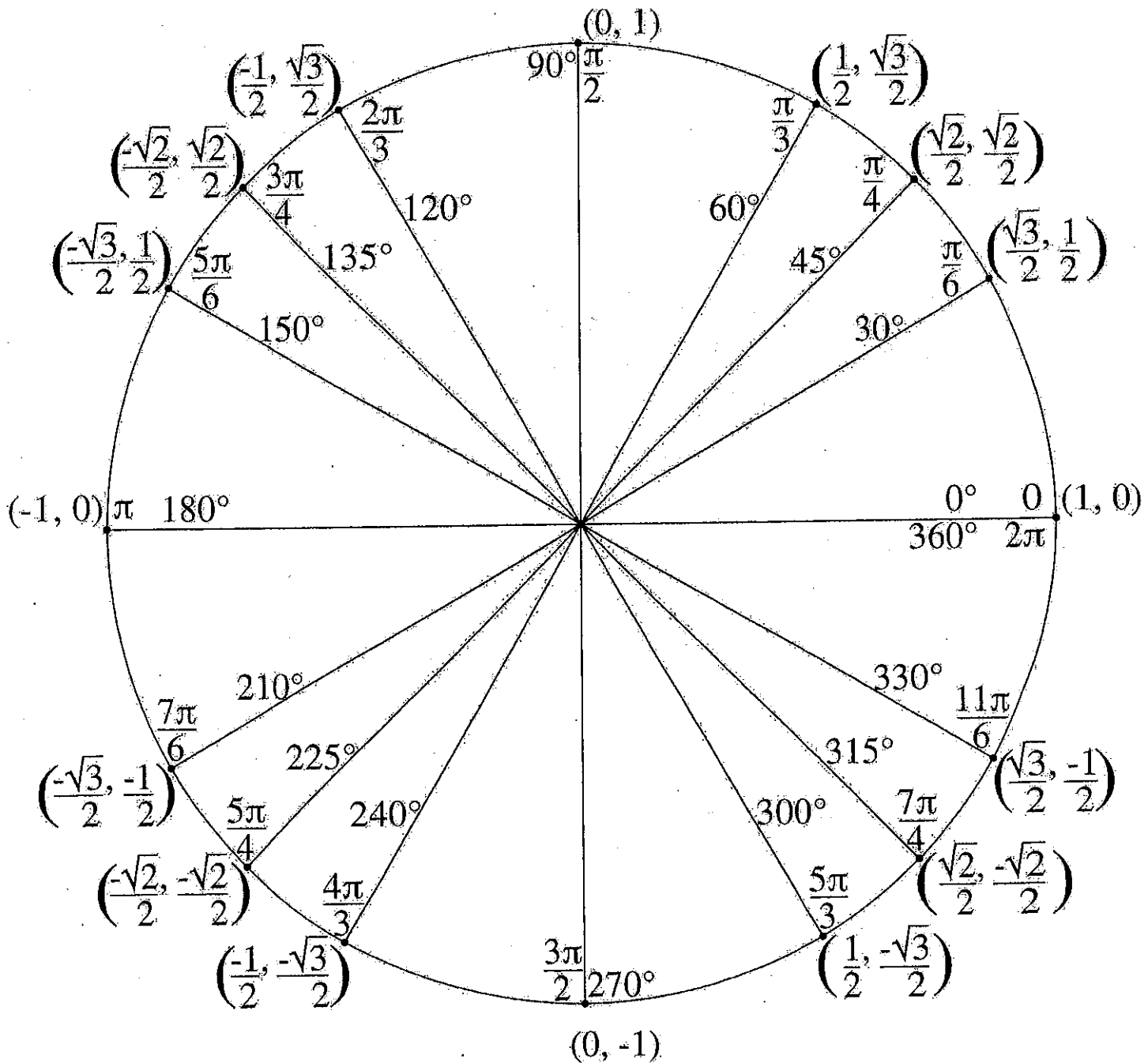


Algebra II

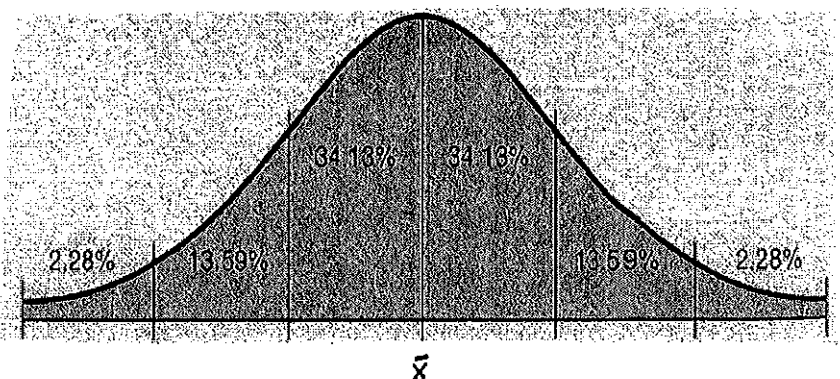
Final

Form A

The Unit Circle



Normal Distribution Curve



1. $4|x + 3| = 20$
 A. {2} B. {-8} C. {2, -8} D. \emptyset

2. $|m + 8| > 3$
 A. $\{m \mid -11 < m < -5\}$ B. $\{m \mid m < -5 \text{ or } m > 5\}$
 C. $\{m \mid m < -11 \text{ or } m > -5\}$ D. \emptyset

3. $|2x - 5| \leq 9$
 A. $\{x \mid -4 \leq x \leq 14\}$ B. $\{x \mid -2 \leq x \leq 7\}$
 C. $\{x \mid x \leq -2 \text{ or } x \geq 7\}$ D. all real numbers

4. A parking garage charges \$2 for the first hour and \$1 for each additional hour. Fran has \$7.50 to spend for parking. What is the greatest number of hours Fran can park?
 A. 3 B. 5 C. 6 D. 7

5. Find the slope of the line that passes through (2, 6) and (-7, 8).
 A. $-\frac{5}{2}$ B. $-\frac{2}{5}$ C. $-\frac{2}{9}$ D. $-\frac{9}{2}$

6. Write an equation in slope-intercept form for the line that has a slope of -4 and passes through (1, 2).
 A. $y = -2x + 4$ B. $y = -4x + 6$ C. $y = -4x + 2$ D. $y = -4x + 9$

7. Find the range of the relation $\{(-2, 3), (-1, 3), (-1, 5)\}$. Then determine whether the relation is a function.
 A. $\{-2, -1\}$; function B. $\{-2, -1\}$; not a function
 C. $\{3, 5\}$; function D. $\{3, 5\}$; not a function

8. Identify the range of $y = |x| - 4$.
 A. $\{x \mid x \geq 4\}$ B. $\{y \mid y \geq -4\}$
 C. $\{y \mid y \geq 0\}$ D. all real numbers

9. Jamie is 4 years younger than her brother. Five years from now, the sum of their ages will be 32. Find Jamie's present age.
 A. 9 B. 10 C. 13 D. 14

A

10. For Questions

, solve each system of equations.

$$5x + 2y = 1$$

$$y = 1 - 3x$$

A. $(1, -2)$

B. $(1, 2)$

C. $(0, \frac{1}{2})$

D. $(-2, 1)$

11.

Which system of inequalities is graphed?

A. $y > -1$

$$y \geq -2x + 1$$

C. $y \geq -1$

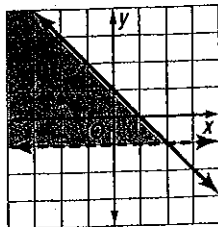
$$y \geq -2x + 1$$

B. $y > -1$

$$y \leq -2x + 1$$

D. $y > -1$

$$y < -2x + 1$$



12.

For Question 11, use the following information. A college arena sells tickets to students and to the public. Student tickets are \$8 each and general public tickets are \$32 each. The college reserves at least 5000 tickets for students. The arena seats 18,000.

Let s represent the number of student tickets and p represent the number of general public tickets. Which system of inequalities represents the number of tickets sold?

A. $s \geq 0, p \geq 0, s + p \leq 18,000$

C. $s \geq 8, p \geq 32, s + p \geq 40$

B. $s \geq 5000, p \geq 0, s + p \leq 18,000$

D. $s \geq 0, p \geq 0, s + p \geq 18,000$

13.

Which quadratic function has its vertex at $(-2, 7)$ and opens down?

A. $y = -3(x + 2)^2 + 7$

C. $y = -12(x + 2)^2 - 7$

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

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

14.

Write $y = x^2 + 4x - 1$ in vertex form.

A. $y = (x - 2)^2 + 5$

C. $y = (x + 2)^2 - 1$

B. $y = (x + 2)^2 - 5$

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

15.

Write an equation for the parabola whose vertex is at $(-8, 4)$ and passes through $(-6, -2)$.

A. $y = -\frac{3}{2}(x + 8)^2 + 4$

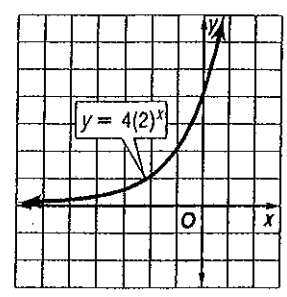
C. $y = \frac{3}{2}(x + 6)^2 - 2$

B. $y = -\frac{1}{4}(x + 8)^2 + 4$

D. $y = -\frac{3}{2}(x - 8)^2 + 4$

16. Find the domain and range of the function whose graph is shown.

- A. $D = \{x \mid x > 0\}$; $R = \{y \mid y > 0\}$
- B. $D = \{x \mid x \text{ is any real number.}\}$; $R = \{y \mid y > 0\}$
- C. $D = \{x \mid x > 0\}$; $R = \{y \mid y \text{ is any real number.}\}$
- D. $D = \{x \mid x \text{ is any real number.}\}$; $R = \{y \mid y < 0\}$



17. The graph of which exponential function passes through the points (0, 4) and (1, 24)?

- A. $y = 4(6)^x$
- B. $y = 3(8)^x$
- C. $y = 2(2)^x$
- D. $y = 10(3)^x$

18. Which function represents exponential growth?

- A. $y = 9\left(\frac{1}{3}\right)^x$
- B. $y = 4x^4$
- C. $y = 12\left(\frac{1}{5}\right)^x$
- D. $y = 10(2)^x$

19. Write the equation $\log_{12} 144 = 2$ in exponential form.

- A. $144^2 = 12$
- B. $12^2 = 144$
- C. $2^{12} = 144$
- D. $144^{12} = 2$

20. Solve $\log_3 n = 2$.

- A. 6
- B. 5
- C. 8
- D. 9

21. Evaluate $\log_2 8$.

- A. 3
- B. 4
- C. 16
- D. 64

22. **AUTOMOBILES** Lydia bought a car for \$20,000. It is expected to depreciate at a rate of 10% per year. What will be the value of the car in 2 years? Use $y = a(1 - r)^t$ and round to the nearest dollar.

- A. \$16,200
- B. \$16,000
- C. \$19,980
- D. \$18,050

23. Solve $6^{3n} = 43^{5n-4}$. Round to four decimal places.
A. 1.1202 B. -1.9005 C. -0.2800 D. 2.1418
24. Solve $4 + 3e^{5x} = 27$.
A. 0.4074 B. 0.4394 C. 2.0369 D. 0.1769
25. Solve $4^x = 20$. Round to four decimal places.
A. 0.4628 B. 1.5214 C. 0.6990 D. 2.1610
26. Solve $\log_6 10 + \log_6 x = \log_6 40$.
A. 180 B. 4 C. 5 D. 30
27. ART Martin bought a painting for \$5,000. It is expected to appreciate at 4% per year. How much will the painting be worth in 6 years? Use $y = a(1+r)^t$ and round to the nearest cent.
A. \$6200.00 B. \$5360.38 C. \$37,647.68 D. \$6326.60
28. Solve $\ln 3x = 1$.
A. 20.0855 B. 0.3333 C. 0.9061 D. 8.1548
29. Write the equation $4^3 = 64$ in logarithmic form.
A. $\log_4 3 = 64$ B. $\log_3 4 = 64$ C. $\log_{64} 4 = 3$ D. $\log_4 64 = 3$

30. The graph of $f(x) = -2x^2 + x$ opens _____ and has a _____ value.
- A. down; maximum B. down; minimum
C. up; maximum D. up; minimum

For Question _____, solve each equation by factoring.

31. $x^2 - 3x - 10 = 0$
- A. $\{-5, 2\}$ B. $\{-2, -5\}$ C. $\{-2, 5\}$ D. $\{-10, 1\}$

32. Which quadratic equation has roots -2 and 3 ?
- A. $x^2 + x + 6 = 0$ B. $x^2 - x - 6 = 0$
C. $x^2 - 6x + 1 = 0$ D. $x^2 + x - 6 = 0$

For Question _____, use the value of the discriminant to determine the number and type of roots for each equation.

33. $x^2 - 3x + 7 = 0$
- A. 2 complex roots B. 2 real, irrational roots
C. 2 real, rational roots D. 1 real, rational root

34. Find the exact solutions to $x^2 - 3x + 1 = 0$ by using the Quadratic Formula.
- A. $\frac{-3 \pm \sqrt{5}}{2}$ B. $\frac{3 \pm \sqrt{13}}{2}$ C. $\frac{-3 \pm \sqrt{13}}{2}$ D. $\frac{3 \pm \sqrt{5}}{2}$

35. What is the vertex of $y = 2(x - 3)^2 + 6$?
- A. $(-3, -6)$ B. $(3, -6)$ C. $(-3, 6)$ D. $(3, 6)$

36. Which quadratic function has its vertex at $(2, 3)$ and passes through $(1, 0)$?
- A. $y = 2(x - 2)^2 + 3$ B. $y = -3(x + 2)^2 + 3$
C. $y = -3(x - 2)^2 + 3$ D. $y = 2(x - 2)^2 - 3$

A

37. Which is *not* a root of the equation $x^3 - x^2 - 10x - 8 = 0$?
 A. 1 B. 4 C. -2 D. -1

38. Write a polynomial function of least degree with integral coefficients whose zeros include 4 and $2i$.
 A. $f(x) = x^2 + 4$ B. $f(x) = x^3 - 4x^2 + 4x - 16$
 C. $f(x) = x^3 + 4x^2 + 4x + 16$ D. $f(x) = x^3 - 4x^2 - 4x + 16$

39. Which represents the correct synthetic division of $(x^2 - 4x + 7) \div (x - 2)$?
 A.
$$\begin{array}{r|rrrr} -2 & 1 & -4 & 7 & \\ & & -2 & 12 & \\ \hline & 1 & -6 & 19 & \end{array}$$

 B.
$$\begin{array}{r|rrrr} 2 & 1 & -4 & 7 & \\ & & 2 & 4 & \\ \hline & 1 & -2 & 11 & \end{array}$$

 C.
$$\begin{array}{r|rrrr} -2 & 1 & -4 & 7 & \\ & & -2 & -16 & \\ \hline & 1 & 8 & -9 & \end{array}$$

 D.
$$\begin{array}{r|rrrr} 2 & 1 & -4 & 7 & \\ & & 2 & -4 & \\ \hline & 1 & -2 & 3 & \end{array}$$

For Questions 40-44, use $f(x) = x + 5$ and $g(x) = 2x$.

40. Find $(f + g)(x)$.
 A. $3x + 5$ B. $x + 5$ C. $2x + 10$ D. $2x^2 + 5$

41. Find $(f \cdot g)(x)$.
 A. $2x^2 + 5$ B. $3x^2 + 10x$ C. $2x^2 + 10x$ D. $2x + 10$

42. If $f(x) = 3x + 7$ and $g(x) = 2x - 5$, find $g[f(-3)]$.
 A. -26 B. -9 C. -1 D. 10

43. If $f(x) = x^2$ and $g(x) = 3x - 1$ find $[g \circ f](x)$.
 A. $x^2 + 3x - 1$ B. $9x^2 - 1$
 C. $9x^2 - 6x + 1$ D. $3x^2 - 1$

44. Find the inverse of $g(x) = -3x$.
 A. $g^{-1}(x) = x + 1$ B. $g^{-1}(x) = -3x - 3$
 C. $g^{-1}(x) = x - 1$ D. $g^{-1}(x) = -\frac{1}{3}x$



45. For what value(s) of m is the expression $\frac{m^2 - 2m + 1}{2m^2 + m - 3}$ undefined?
 A. $-\frac{3}{2}, 0, 1$ B. $-1, \frac{3}{2}$ C. $-\frac{3}{2}, 1$ D. $\frac{3}{2}$

46. Solve $\frac{x}{x-2} = \frac{7}{5}$.
 A. -7 B. 5 C. 7 D. $-\frac{5}{7}$

47. Solve $\frac{n}{n-4} + n = \frac{12-4n}{n-4}$.
 A. $-4, 3$ B. $-3, 4$ C. -4 D. 3

Simplify each expression.

48. $\frac{24mn}{18m^2}$
 A. $\frac{3m}{4n}$ B. $\frac{4mn}{3}$ C. $\frac{4n}{3m}$ D. $\frac{4}{3}$

49. $\frac{10}{pq} + \frac{4}{q}$
 A. $\frac{10+4p}{pq^2}$ B. $\frac{14}{q(p+1)}$ C. $\frac{10p+4}{pq}$ D. $\frac{10+4p}{pq}$

50. $\frac{\frac{3m^2-12}{4m^2+8m}}{\frac{6m-12}{8m^2+16m}}$
 A. $\frac{9(m-2)}{16m^2(m+2)}$ B. $\frac{m(m^2-4)}{m-2}$ C. $m+2$ D. $\frac{4(m+2)}{3}$

51. $\frac{y}{x^2-y^2} \div \frac{y^2}{x-y}$
 A. $\frac{1}{y(x+y)}$ B. $\frac{y^3}{x^3-x^2y-xy^2+y^3}$ C. $\frac{x+y}{y}$ D. $\frac{1}{y(x-y)}$

52. $\frac{6a + 12}{5} \cdot \frac{10}{a + 2}$

A. 12

B. 24

C. $12a + 12$

D. $24a$

53. $\frac{c^2 - c - 20}{c^2 - 6c + 5} \div \frac{c^2 - 16}{3c - 3}$

A. $\frac{3}{c - 4}$

B. $\frac{3}{c + 4}$

C. $\frac{c + 4}{3}$

D. $\frac{c - 4}{3}$

54. $\frac{x^2 + 5x + 4}{x^2 + 2x + 1} \cdot \frac{2x + 2}{x + 4}$

A. $\frac{1}{2}$

B. 2

C. $\frac{(x + 4)^2}{2(x + 1)^2}$

D. $\frac{x + 4}{2(x + 1)}$

55. $\frac{4}{k + 1} + \frac{9}{2(k + 1)}$

A. $\frac{13}{2(k + 1)}$

B. $\frac{17}{2(k + 1)}$

C. $\frac{11}{k + 1}$

D. $\frac{8}{9}$

56. $\frac{1}{5} - \frac{3}{4w} + \frac{3}{10w}$

A. $\frac{4w - 21}{20w}$

B. $\frac{4w - 9}{20w}$

C. $\frac{1}{20w}$

D. $-\frac{1}{4w}$

57. $\frac{6n}{n^2 - 9} - \frac{3}{n + 3}$

A. $\frac{3}{n + 3}$

B. $\frac{3}{n - 3}$

C. $\frac{6n - 3}{n^2 - n + 12}$

D. $\frac{6n - 3}{n^2 - 9}$

58. $\frac{\frac{m^2}{5n^3}}{\frac{m}{n^2}}$

A. $5mn$

B. $\frac{m}{5n}$

C. $\frac{1}{5}mn$

D. $\frac{m^2}{n}$

Unit 5

59. Use a calculator to approximate $\sqrt{224}$ to three decimal places.
- A. 15.0 B. 14.97 C. 14.966 D. 14.967

60. Simplify $\sqrt{48}$.
- A. $16\sqrt{3}$ B. $4\sqrt{3}$ C. 6 D. $4\sqrt{6}$

61. Solve $\sqrt{3x+4} = 5$.
- A. -7 B. 7 C. 21 D. $\frac{25}{3}$

62. Which of the following represents a shift of the graph $y = \sqrt{x}$ down two units and left seven units?

A. $y = \sqrt{x-2} + 7$

B. $y = \sqrt{x+7} - 2$

C. $y = \sqrt{x-7} + 2$

D. $y = \sqrt{x-2} - 7$

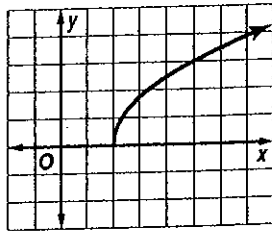
63. State the domain and range of the function graphed.

A. D: $x > 2$, R: $y > 0$

B. D: $x < 2$, R: $y > 0$

C. D: $x \geq 2$, R: $y < 0$

D. D: $x \geq 2$, R: $y \geq 0$



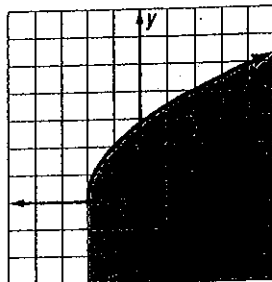
64. Which inequality is graphed?

A. $y \leq \sqrt{4x+8}$

B. $y > \sqrt{4x+8}$

C. $y < \sqrt{4x+8}$

D. $y \geq \sqrt{4x+8}$



65. A correct step in the solution of the equation $(5z - 1)^{\frac{1}{3}} - 3 = 1$ is _____.

A. $5z - 1 = 4^{\frac{1}{3}}$

B. $(5z - 1) - 27 = 1$

C. $(5z - 1) - 9 = 3$

D. $5z - 1 = 64$

A

66. A correct step in the solution of the equation $(2m + 1)^{\frac{1}{4}} - 2 = 1$ is _____.
- A. $(2m + 1) - 16 = 1$ B. $2m + 1 = 81$
C. $(2m + 1)^{\frac{1}{4}} = 1$ D. $2m + 1 = 3^4$

67. Simplify $(15 - 13i) - (-1 + 17i)$.
- A. $16 - 30i$ B. $16 + 4i$ C. $16 + 30i$ D. 46

68. Simplify $\frac{1 + 2i}{2 - 3i}$.
- A. $\frac{8}{7} + \frac{1}{7}i$ B. $\frac{8}{7} + i$ C. $-4 + 7i$ D. $-\frac{4}{13} + \frac{7}{13}i$

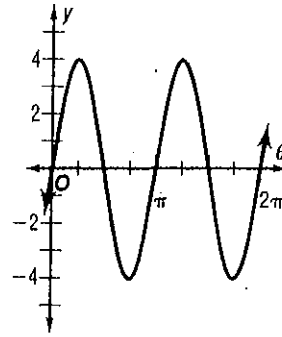
69. Simplify $(4 - 12i) - (-8 + 4i)$.
- A. $12 - 8$ B. 28 C. $12 - 16i$ D. $12 + 16i$

70. Simplify $\frac{4 - 2i}{7 + 3i}$.
- A. $\frac{11}{29} - \frac{13}{29}i$ B. $\frac{11}{29} - \frac{14}{29}i$ C. $\frac{13}{29} - \frac{17}{29}i$ D. $\frac{17}{29} - \frac{13}{29}i$

71. Simplify $(5 + 2i)(1 + 3i)$.
- A. $5 + 6i$ B. -1 C. $-1 + 17i$ D. $11 + 17i$

72. **ELECTRICITY** The total impedance of a series circuit is the sum of the impedances of all parts of the circuit. A technician determined that the impedance of the first part of a particular circuit was $2 + 5j$ ohms. The impedance of the remaining part of the circuit was $3 - 2j$ ohms. What was the total impedance of the circuit?
- A. $5 + 3j$ ohms B. $5 + 7j$ ohms
C. $-1 + 7j$ ohms D. $16 + 11j$ ohms

Use the graph shown at the right.



73.

Find the period of the function.

- A. 4 B. 2π
 C. π D. 2

74.

Find the amplitude of the function.

- A. 4 B. 8
 C. π D. $\frac{\pi}{4}$

75.

Which function is a translation of $y = \sin \theta$ by 3 units up?

- A. $y = 3 \sin \theta$ B. $y = \sin(\theta + 3)$ C. $y = \sin \theta + 3$ D. $y = \sin 3\theta$

76.

Which function is a translation of $y = \cos \theta$ by $\frac{\pi}{4}$ units down and π units to the left?

- A. $y = -\frac{\pi}{4} \cos \pi \theta$ C. $y = \cos(\theta + \pi) - \frac{\pi}{4}$
 B. $y = \cos\left(\theta - \frac{\pi}{4}\right) + \pi$ D. $y = \pi \cos\left(-\frac{\pi}{4}\theta\right)$

77.

Which could be the measure of an angle θ where $\sin \theta$ is $-\frac{\sqrt{3}}{2}$?

- A. -330° B. 240° C. 60° D. 150°

78.

Which angle measure is equivalent to $\frac{4\pi}{3}$ radians?

- A. 60° B. 120° C. 135° D. 240°

79.

Which function is a phase shift of $y = \cos \theta$ by 3 units to the right?

- A. $y = 3 \cos \theta$ B. $y = \cos \theta - 3$ C. $y = \cos(\theta - 3)$ D. $y = \cos 3\theta$

A

80. Find the exact value of $\cos 135^\circ$.

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

81. Which value is *not* defined?

- A. $\tan \pi$
- B. $\tan\left(-\frac{\pi}{2}\right)$
- C. $\tan\left(\frac{2\pi}{3}\right)$
- D. $\tan(-2\pi)$

82. What is the exact value of $\tan\left(\frac{3\pi}{4}\right)$?

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

83. Find the exact value of $\sec -\frac{2\pi}{3}$.

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

84. Find the exact value of $\cot \frac{3\pi}{4}$.

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

85. Find the exact value of $\sin \pi$.

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

86. Find the exact value of $\csc \frac{5\pi}{3}$.

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

87. A blue die and a red die are tossed. What is the probability that a 6 will appear on both dice?

- A. $\frac{1}{18}$
- B. $\frac{1}{36}$
- C. $\frac{1}{2}$
- D. $\frac{1}{11}$

88. **CAR SALES** The mean stay of a car on a lot before being sold is 21 days, with a standard deviation of 3 days. The lengths of stay are normally distributed. What percent of the cars are sold after having been on the lot between 18 and 24 days?

- A. 95%
- B. 34%
- C. 68%
- D. 5%

89. What is the standard deviation for the normal distribution shown at the right?



- A. 60
- B. 120
- C. 360
- D. 676

90. A coin is tossed 5 times. Find $P(5 \text{ tails})$.

- A. $\frac{1}{5}$
- B. $\frac{1}{10}$
- C. $\frac{1}{16}$
- D. $\frac{1}{32}$

91. A bag contains 6 cherry, 8 strawberry, and 9 grape-flavored candies. What is the probability of selecting a cherry or a grape flavored candy?

- A. $\frac{15}{23}$
- B. $\frac{14}{23}$
- C. $\frac{17}{23}$
- D. $\frac{54}{529}$

92. **COMMUTERS** Which group should be surveyed to determine how people commute to work in order to produce a random sample?

- A. students in your school
- B. people passing through a toll booth on a given day
- C. people in your state whose last name begins with S
- D. people whose annual income is greater than \$1,000,000

A

Record Low Temperatures in Honolulu, HI (°F)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
52	53	55	56	60	65	66	67	66	61	57	54

Source: www.weather.com

93. Which measure of central tendency is *not* a good representation of the data?
 A. mean B. mode C. median D. middle

94. Find the variance of the temperatures.
 A. 28.4 B. 5.3 C. 59.3 D. 340.7

95. Find the standard deviation of the temperatures.
 A. 52°F B. 5.3°F C. 5.6°F D. 28.4°F

96. The mean number of pairs of shoes sold daily by a shoe store is 36, with a standard deviation of 3. On what percent of days would you expect the store to sell from 33 to 42 pairs of shoes?
 A. 13.5% B. 50% C. 68% D. 81.5%

97. A die is rolled. What is the probability of rolling a 6 or a number greater than 4?
 A. $\frac{2}{3}$ B. $\frac{1}{2}$ C. $\frac{1}{6}$ D. $\frac{1}{3}$

98. A card is drawn from a deck of cards. What is the probability of drawing a club or a face card? (*Hint: A face card is a jack, queen, or king.*)
 A. $\frac{25}{52}$ B. $\frac{3}{13}$ C. $\frac{11}{26}$ D. $\frac{7}{13}$

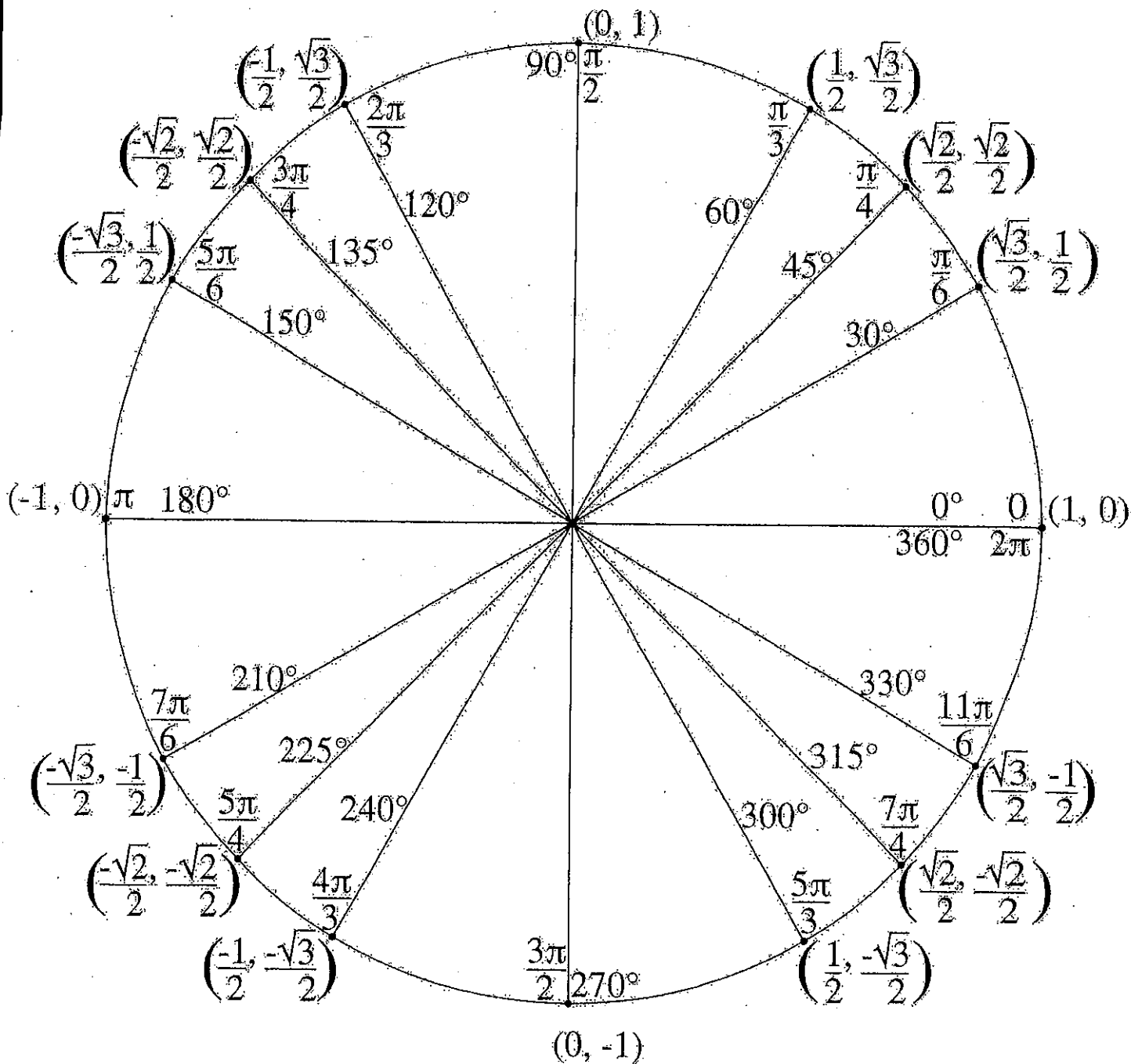
use the data set {10, 12, 12, 14, 22}.

99. Find the mean.
 A. 17.5 B. 14 C. 70 D. 13

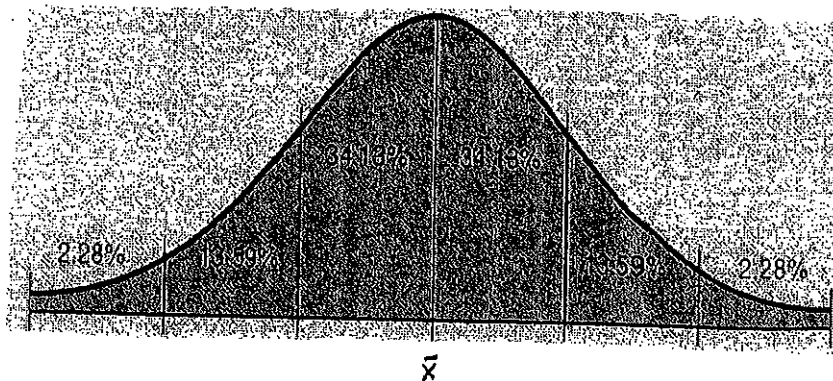
100. Which is a characteristic of a biased survey question?
 A. It is about a controversial issue. B. It produces inaccurate results.
 C. It is about a well-known person. D. It is about a very unpopular person.

**Algebra II
Honors/IB
Final
Form A**

The Unit Circle



Normal Distribution Curve



unit 1

(4)

1. $|m + 8| > 3$
A. $\{m \mid -11 < m < -5\}$
C. $\{m \mid m < -11 \text{ or } m > -5\}$
B. $\{m \mid m < -5 \text{ or } m > 5\}$
D. \emptyset
2. $|2x - 5| \leq 9$
A. $\{x \mid -4 \leq x \leq 14\}$
C. $\{x \mid x \leq -2 \text{ or } x \geq 7\}$
B. $\{x \mid -2 \leq x \leq 7\}$
D. all real numbers
3. A parking garage charges \$2 for the first hour and \$1 for each additional hour. Fran has \$7.50 to spend for parking. What is the greatest number of hours Fran can park?
A. 3 B. 5 C. 6 D. 7
4. Write an equation in slope-intercept form for the line that passes through (1, -2) and (3, 7).
A. $y = \frac{9}{2}x - \frac{13}{2}$ B. $y = \frac{9}{2}x - \frac{57}{2}$ C. $y = \frac{2}{9}x + \frac{13}{9}$ D. $y = \frac{2}{9}x - \frac{19}{3}$
5. Jamie is 4 years younger than her brother. Five years from now, the sum of their ages will be 32. Find Jamie's present age.
A. 9 B. 10 C. 13 D. 14
6. Identify the range of $y = |x| - 4$.
A. $\{x \mid x \geq 4\}$ B. $\{y \mid y \geq -4\}$
C. $\{y \mid y \geq 0\}$ D. all real numbers
7. Which quadratic function has its vertex at (-2, 7) and opens down?
A. $y = -3(x + 2)^2 + 7$ B. $y = (x - 2)^2 + 7$
C. $y = -12(x + 2)^2 - 7$ D. $y = -2(x - 2)^2 + 7$
8. Write $y = x^2 + 4x - 1$ in vertex form.
A. $y = (x - 2)^2 + 5$ B. $y = (x + 2)^2 - 5$
C. $y = (x + 2)^2 - 1$ D. $y = (x + 2)^2 + 3$
9. Write an equation for the parabola whose vertex is at (-8, 4) and passes through (-6, -2).
A. $y = -\frac{3}{2}(x + 8)^2 + 4$ B. $y = -\frac{1}{4}(x + 8)^2 + 4$
C. $y = \frac{3}{2}(x + 6)^2 - 2$ D. $y = -\frac{3}{2}(x - 8)^2 + 4$

(A)

For Questions 10-11, solve each system of equations.

10. $5x + 2y = 1$
 $y = 1 - 3x$

- A. $(1, -2)$ B. $(1, 2)$
C. $(0, \frac{1}{2})$ D. $(-2, 1)$

11. Which system of inequalities is graphed?

- A. $y > -1$ B. $y > -1$
 $y \geq -2x + 1$ $y \leq -2x + 1$
C. $y \geq -1$ D. $y > -1$
 $y \geq -2x + 1$ $y < -2x + 1$



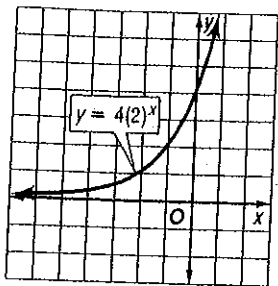
For Question 12, use the following information. A college arena sells tickets to students and to the public. Student tickets are \$8 each and general public tickets are \$32 each. The college reserves at least 5000 tickets for students. The arena seats 18,000.

12. Let s represent the number of student tickets and p represent the number of general public tickets. Which system of inequalities represents the number of tickets sold?

- A. $s \geq 0, p \geq 0, s + p \leq 18,000$ B. $s \geq 5000, p \geq 0, s + p \leq 18,000$
C. $s \geq 8, p \geq 32, s + p \geq 40$ D. $s \geq 0, p \geq 0, s + p \geq 18,000$

13. Find the domain and range of the function whose graph is shown.

- A. $D = \{x \mid x > 0\}; R = \{y \mid y > 0\}$
- B. $D = \{x \mid x \text{ is any real number.}\}; R = \{y \mid y > 0\}$
- C. $D = \{x \mid x > 0\}; R = \{y \mid y \text{ is any real number.}\}$
- D. $D = \{x \mid x \text{ is any real number.}\}; R = \{y \mid y < 0\}$



14. Which function represents exponential growth?

- A. $y = 9\left(\frac{1}{3}\right)^x$
- B. $y = 4x^4$
- C. $y = 12\left(\frac{1}{5}\right)^x$
- D. $y = 10(2)^x$

15. The graph of which exponential function passes through the points (0, 4) and (1, 24)?

- A. $y = 4(6)^x$
- B. $y = 3(8)^x$
- C. $y = 2(2)^x$
- D. $y = 10(3)^x$

16. Write the equation $4^3 = 64$ in logarithmic form.

- A. $\log_4 3 = 64$
- B. $\log_3 4 = 64$
- C. $\log_{64} 4 = 3$
- D. $\log_4 64 = 3$

17. Write the equation $\log_{12} 144 = 2$ in exponential form.

- A. $144^2 = 12$
- B. $12^2 = 144$
- C. $2^{12} = 144$
- D. $144^{12} = 2$

18. Evaluate $\log_2 8$.

- A. 3
- B. 4
- C. 16
- D. 64

19. Solve $\log_6 10 + \log_6 x = \log_6 40$.

- A. 180
- B. 4
- C. 5
- D. 30

20. Solve $4 + 3e^{5x} = 27$.

- A. 0.4074
- B. 0.4394
- C. 2.0369
- D. 0.1769

Solve $\ln 3x = 1$.

- A. 20.0855
- B. 0.3333
- C. 0.9061
- D. 8.1548

AUTOMOBILES Lydia bought a car for \$20,000. It is expected to depreciate at a rate of 10% per year. What will be the value of the car in 2 years? Use $y = a(1 - r)^t$ and round to the nearest dollar.

- A. \$16,200
- B. \$16,000
- C. \$19,980
- D. \$18,050

ART Martin bought a painting for \$5,000. It is expected to appreciate at 4% per year. How much will the painting be worth in 6 years? Use $y = a(1 + r)^t$ and round to the nearest cent.

- A. \$6200.00
- B. \$5360.38
- C. \$37,647.68
- D. \$6326.60

24. The graph of $f(x) = -2x^2 + x$ opens _____ and has a _____ value.

A. down; maximum

B. down; minimum

C. up; maximum

D. up; minimum

25. Which quadratic equation has roots -2 and 3 ?

A. $x^2 + x + 6 = 0$

B. $x^2 - x - 6 = 0$

C. $x^2 - 6x + 1 = 0$

D. $x^2 + x - 6 = 0$

26. What is the vertex of $y = 2(x - 3)^2 + 6$?

A. $(-3, -6)$

B. $(3, -6)$

C. $(-3, 6)$

D. $(3, 6)$

27. Which quadratic function has its vertex at $(2, 3)$ and passes through $(1, 0)$?

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

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

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

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

28. Find the exact solutions to $x^2 - 3x + 1 = 0$ by using the Quadratic Formula.

A. $\frac{-3 \pm \sqrt{5}}{2}$

B. $\frac{3 \pm \sqrt{13}}{2}$

C. $\frac{-3 \pm \sqrt{13}}{2}$

D. $\frac{3 \pm \sqrt{5}}{2}$

29. Write a polynomial function of least degree with integral coefficients whose zeros include 4 and $2i$.

A. $f(x) = x^2 + 4$

B. $f(x) = x^3 - 4x^2 + 4x - 16$

C. $f(x) = x^3 + 4x^2 + 4x + 16$

D. $f(x) = x^3 - 4x^2 - 4x + 16$

30. Which represents the correct synthetic division of $(x^2 - 4x + 7) \div (x - 2)$?

A.
$$\begin{array}{r|rrr} -2 & 1 & -4 & 7 \\ & & -2 & 12 \\ \hline & 1 & -6 & 19 \end{array}$$

B.
$$\begin{array}{r|rrr} 2 & 1 & -4 & 7 \\ & & 2 & 4 \\ \hline & 1 & -2 & 11 \end{array}$$

C.
$$\begin{array}{r|rrr} -2 & 1 & -4 & 7 \\ & & -2 & -16 \\ \hline & 1 & 8 & -9 \end{array}$$

D.
$$\begin{array}{r|rrr} 2 & 1 & -4 & 7 \\ & & 2 & -4 \\ \hline & 1 & -2 & 3 \end{array}$$

For Questions 31-32, use $f(x) = x + 5$ and $g(x) = 2x$.

31. Find $(f + g)(x)$.

- A. $3x + 5$ B. $x + 5$ C. $2x + 10$ D. $2x^2 + 5$

32. Find $(f \cdot g)(x)$.

- A. $2x^2 + 5$ B. $3x^2 + 10x$ C. $2x^2 + 10x$ D. $2x + 10$

33. If $f(x) = 3x + 7$ and $g(x) = 2x - 5$, find $g[f(-3)]$.

- A. -26 B. -9 C. -1 D. 10

34. If $f(x) = x^2$ and $g(x) = 3x - 1$ find $[g \circ f](x)$.

- A. $x^2 + 3x - 1$ B. $9x^2 - 1$
C. $9x^2 - 6x + 1$ D. $3x^2 - 1$

35. Find the inverse of $g(x) = -3x$.

- A. $g^{-1}(x) = x + 1$ B. $g^{-1}(x) = -3x - 3$
C. $g^{-1}(x) = x - 1$ D. $g^{-1}(x) = -\frac{1}{3}x$

36. For what value(s) of m is the expression $\frac{m^2 - 2m + 1}{2m^2 + m - 3}$ undefined?

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

37. Solve $\frac{n}{n-4} + n = \frac{12-4n}{n-4}$.

- A. $-4, 3$ B. $-3, 4$ C. -4 D. 3

Simplify each expression.

38. $\frac{x^2 + 5x + 4}{x^2 + 2x + 1} \cdot \frac{2x + 2}{x + 4}$

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

39. $\frac{24mn}{18m^2}$

- A. $\frac{3m}{4n}$ B. $\frac{4mn}{3}$ C. $\frac{4n}{3m}$ D. $\frac{4}{3}$

40. $\frac{\frac{3m^2 - 12}{4m^2 + 8m}}{\frac{6m - 12}{8m^2 + 16m}}$

- A. $\frac{9(m-2)}{16m^2(m+2)}$ B. $\frac{m(m^2-4)}{m-2}$ C. $m+2$ D. $\frac{4(m+2)}{3}$

41. $\frac{6a+12}{5} \cdot \frac{10}{a+2}$

- A. 12 B. 24 C. $12a+12$ D. $24a$

(A)

42. $\frac{\frac{m^2}{5n^3}}{\frac{m}{n^2}}$

A. $5mn$

B. $\frac{m}{5n}$

C. $\frac{1}{5}mn$

D. $\frac{m^2}{n}$

43. $\frac{y}{x^2 - y^2} \div \frac{y^2}{x - y}$

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

B. $\frac{y^3}{x^3 - x^2y - xy^2 + y^3}$

C. $\frac{x + y}{y}$

D. $\frac{1}{y(x - y)}$

44. $\frac{4}{k + 1} + \frac{9}{2(k + 1)}$

A. $\frac{13}{2(k + 1)}$

B. $\frac{17}{2(k + 1)}$

C. $\frac{11}{k + 1}$

D. $\frac{8}{9}$

45. $\frac{c^2 - c - 20}{c^2 - 6c + 5} \div \frac{c^2 - 16}{3c - 3}$

A. $\frac{3}{c - 4}$

B. $\frac{3}{c + 4}$

C. $\frac{c + 4}{3}$

D. $\frac{c - 4}{3}$

46. $\frac{6n}{n^2 - 9} - \frac{3}{n + 3}$

A. $\frac{3}{n + 3}$

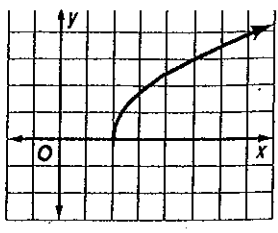
B. $\frac{3}{n - 3}$

C. $\frac{6n - 3}{n^2 - n + 12}$

D. $\frac{6n - 3}{n^2 - 9}$

Unit 5
47.

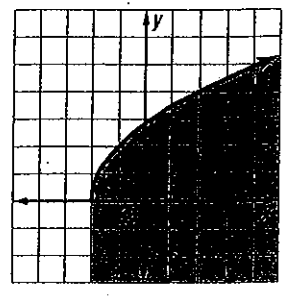
- State the domain and range of the function graphed.
- A. D: $x > 2$, R: $y > 0$
 - B. D: $x < 2$, R: $y > 0$
 - C. D: $x \geq 2$, R: $y < 0$
 - D. D: $x \geq 2$, R: $y \geq 0$



A

48. Which inequality is graphed?

- A. $y \leq \sqrt{4x + 8}$
- B. $y > \sqrt{4x + 8}$
- C. $y < \sqrt{4x + 8}$
- D. $y \geq \sqrt{4x + 8}$



49. Which of the following represents a shift of the graph $y = \sqrt{x}$ down two units and left seven units?

- A. $y = \sqrt{x - 2} + 7$
- B. $y = \sqrt{x + 7} - 2$
- C. $y = \sqrt{x - 7} + 2$
- D. $y = \sqrt{x - 2} - 7$

50. Use a calculator to approximate $\sqrt{224}$ to three decimal places.

- A. 15.0
- B. 14.97
- C. 14.966
- D. 14.967

51. Simplify $\sqrt{48}$.

- A. $16\sqrt{3}$
- B. $4\sqrt{3}$
- C. 6
- D. $4\sqrt{6}$

52. Solve $\sqrt{3x + 4} = 5$.

- A. -7
- B. 7
- C. 21
- D. $\frac{25}{3}$

53. A correct step in the solution of the equation $(2m + 1)^{\frac{1}{4}} - 2 = 1$ is _____.

- A. $(2m + 1) - 16 = 1$
- B. $2m + 1 = 81$
- C. $(2m + 1)^{\frac{1}{4}} = 1$
- D. $2m + 1 = 3^4$

A

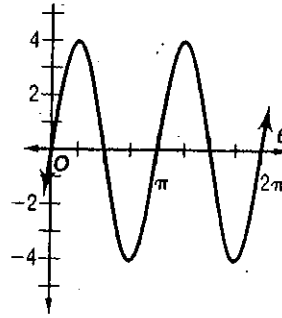
54. Simplify $(4 - 12i) - (-8 + 4i)$.
A. $12 - 8$ B. 28 C. $12 - 16i$ D. $12 + 16i$

55. Simplify $\frac{4 - 2i}{7 + 3i}$.
A. $\frac{11}{29} - \frac{13i}{29}$ B. $\frac{11}{29} - \frac{14i}{29}$ C. $\frac{13}{29} - \frac{17i}{29}$ D. $\frac{17}{29} - \frac{13i}{29}$

56. Simplify $(5 + 2i)(1 + 3i)$.
A. $5 + 6i$ B. -1 C. $-1 + 17i$ D. $11 + 17i$

57. **ELECTRICITY** The total impedance of a series circuit is the sum of the impedances of all parts of the circuit. A technician determined that the impedance of the first part of a particular circuit was $2 + 5j$ ohms. The impedance of the remaining part of the circuit was $3 - 2j$ ohms. What was the total impedance of the circuit?
A. $5 + 3j$ ohms B. $5 + 7j$ ohms
C. $-1 + 7j$ ohms D. $16 + 11j$ ohms

Use the graph shown at the right.



58. Find the period of the function.

- A. 4
- B. 2π
- C. π
- D. 2

59. Find the amplitude of the function.

- A. 4
- B. 8
- C. π
- D. $\frac{\pi}{4}$

60. Which function is a translation of $y = \cos \theta$ by $\frac{\pi}{4}$ units down and π units to the left?

$y = -\frac{\pi}{4} \cos \pi \theta$

$y = \cos(\theta + \pi) - \frac{\pi}{4}$

$y = \cos\left(\theta - \frac{\pi}{4}\right) + \pi$

$y = \pi \cos\left(-\frac{\pi}{4}\theta\right)$

61. Which angle measure is equivalent to $\frac{4\pi}{3}$ radians?

60°

120°

135°

240°

62. Which could be the measure of an angle θ where $\sin \theta$ is $-\frac{\sqrt{3}}{2}$?

-330°

240°

60°

150°

63. What is the exact value of $\tan\left(\frac{3\pi}{4}\right)$?

1

$\frac{\sqrt{2}}{2}$

-1

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

A

64. Find the exact value of $\cos 135^\circ$.

A. $\frac{\sqrt{2}}{2}$

B. $\frac{1}{2}$

C. $-\frac{1}{2}$

D. $-\frac{\sqrt{2}}{2}$

65. Find the exact value of $\sec -\frac{2\pi}{3}$.

A. $-\frac{1}{2}$

C. $\frac{\sqrt{3}}{2}$

B. -2

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

66. Find the exact value of $\cot \frac{3\pi}{4}$.

A. $-\frac{\sqrt{2}}{2}$

B. $\frac{\sqrt{2}}{2}$

C. 1

D. -1

67. Find the exact value of $\sin \pi$.

A. -1

B. 0

C. undefined

D. 1

68. Find the exact value of $\csc \frac{5\pi}{3}$.

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

B. $\frac{2\sqrt{3}}{3}$

C. $\frac{2}{\sqrt{3}}$

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

69. A coin is tossed 5 times. Find $P(5 \text{ tails})$.

- A. $\frac{1}{5}$ B. $\frac{1}{10}$ C. $\frac{1}{16}$ D. $\frac{1}{32}$

70. A bag contains 6 cherry, 8 strawberry, and 9 grape-flavored candies. What is the probability of selecting a cherry or a grape flavored candy?

- A. $\frac{15}{23}$ B. $\frac{14}{23}$ C. $\frac{17}{23}$ D. $\frac{54}{529}$

71. A card is drawn from a deck of cards. What is the probability of drawing a club or a face card? (*Hint: A face card is a jack, queen, or king.*)

- A. $\frac{25}{52}$ B. $\frac{3}{13}$ C. $\frac{11}{26}$ D. $\frac{7}{13}$

72. **COMMUTERS** Which group should be surveyed to determine how people commute to work in order to produce a random sample?

- A. students in your school
- B. people passing through a toll booth on a given day
- C. people in your state whose last name begins with S
- D. people whose annual income is greater than \$1,000,000

73. A die is rolled. What is the probability of rolling a 6 or a number greater than 4?

- A. $\frac{2}{3}$ B. $\frac{1}{2}$ C. $\frac{1}{6}$ D. $\frac{1}{3}$

74. The mean number of pairs of shoes sold daily by a shoe store is 36, with a standard deviation of 3. On what percent of days would you expect the store to sell from 33 to 42 pairs of shoes?

- 13.5% 50% 68% 81.5%

A

75.

use the data set {10, 12, 12, 14, 22}.

Find the mean.

- A. 17.5 B. 14 C. 70 D. 13

Record Low Temperatures in Honolulu, HI (°F)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
52	53	55	56	60	65	66	67	66	61	57	54

Source: www.weather.com

76.

Which measure of central tendency is *not* a good representation of the data?

- A. mean B. mode C. median D. middle

77.

Find the standard deviation of the temperatures.

- A. 52°F B. 5.3°F C. 5.6°F D. 28.4°F

78.

Find the variance of the temperatures.

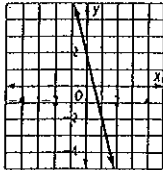
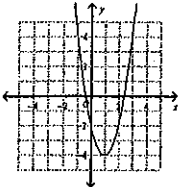
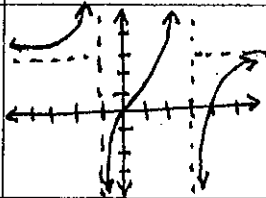
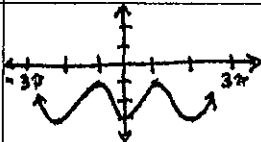
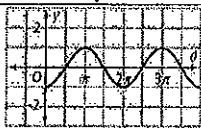
- A. 28.4 B. 5.3 C. 59.3 D. 340.7

79.

Which is a characteristic of a biased survey question?

- It is about a controversial issue. It produces inaccurate results.
 It is about a well-known person. It is about a very unpopular person.

Performance Task: Fill in the missing portions of the chart below. (10 points)

Function	Graph	Equation	Transformations et al.	Domain / Range
Linear		(in slope-intercept form)	Slope (M) steepness has: increased/decreased B value: up/down	Domain: Range:
Absolute Value		$f(x) = -\frac{1}{2} x + 3 - 1$	Transformations:	Domain: Range:
Quadratic		Standard Form: Vertex Form:	Transformations:	Domain: Range:
Cubic		$y = x^3 - 4x^2 + 25x - 100$	Degree: # of real roots: Even / odd	Domain: Range:
Exponential		$y = 2^{x+1} + 3$	Transformations: Horizontal Asymptote:	Domain: Range:
Logarithmic		$y = -\log(x - 2)$	Transformations: Vertical Asymptote:	Domain: Range:
Rational		$f(x) = \frac{3x^2 - 12x}{x^2 - 2x - 3}$	Undefined values:	Domain: $x \neq$ Range: all real #'s
Radical		$y = \sqrt{x + 3} - 2$	Transformations:	Domain: Range:
Sine		$y = \sin\left(x + \frac{3\pi}{2}\right) - 2$	Transformations:	Domain: Range:
Cosine		$y = \cos(x - \pi)$	Transformations:	Domain: Range:

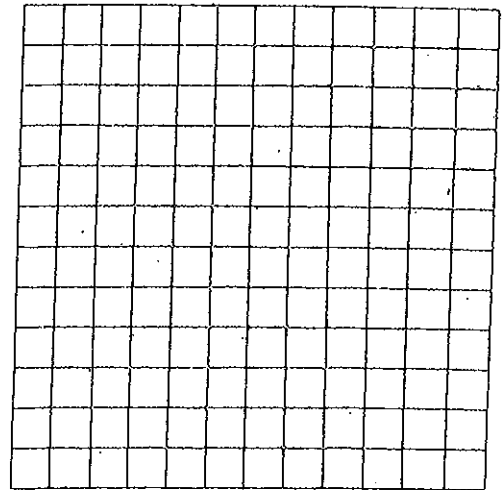
Performance Task: 1.0 points

A clothing company makes jackets and pants. Each jacket requires 1 hour of cutting and 4 hours of sewing. Each pair of pants requires 2 hours of cutting and 2 hours of sewing. The total time per day available for cutting is 20 hours and for sewing is 32 hours. If the profit on a jacket is \$14 and the profit on a pair of pants is \$8, what is the number of each that should be made each day to maximize the profit?

Step 1 – Define your variables. (1 points)

Step 2 – Write a system of inequalities. (2 points)

Step 3 – Graph each inequality and shade appropriately. (2 points)



Step 4 – Find the vertices. (2 points)

Step 5 – Plug the vertices into the function. (2 points)

Step 6 – State your answer. (1 points)

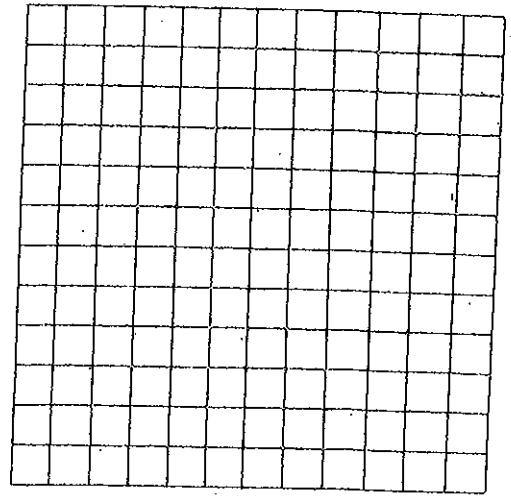
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Step 5 – Plug the vertices into the function. (2 points)

Step 6 – State your answer. (1 points)