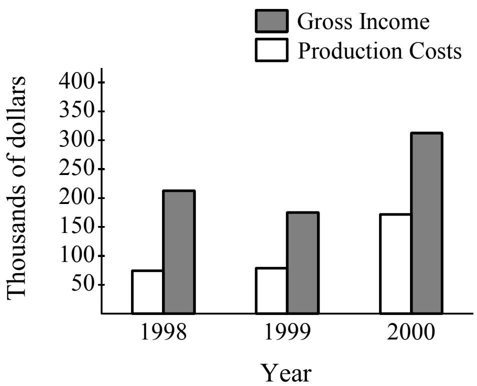
1. Determine the quadrant in which $(x,\ y)$ is located so that the conditions are satisfied.
   $x<0$ and $y=4$

   [A] Quadrant I [B] Quadrant II [C] Quadrant III [D] Quadrant IV

2. Find the coordinates of the point that is located 3 units to the right of the y-axis and 2 units below the x-axis.

3. The double bar graph shows the production costs and gross income (in thousands) for a company. Approximate the percent of gross income that goes to production costs for each year.



   [A] $1998\approx 45\%$ $1999\approx 55\%$ $2000\approx 65\%$ [B] $1998\approx 35\%$ $1999\approx 45\%$ $2000\approx 55\%$

   [C] $1998\approx 25\%$ $1999\approx 30\%$ $2000\approx 35\%$ [D] $1998\approx 55\%$ $1999\approx 65\%$ $2000\approx 75\%$

4. The table shows the amount of time several students spent watching TV and their test grades.

Weekly TV (h)	6	12	18	24	30	36
Grade (%)	87.5	82.5	67.5	72.5	57.5	52.5

   Graph the ordered pairs and make a statement about the trend that can be seen.

Find the distance between the points.

5. $(2,\ 1),\ \ (6,\ -2)$ [A] $\sqrt{65}\approx 8.06$ [B] 25 [C] 65 [D] 5

6. $(2,\ 3)$ and $(-1,\ 3)$

7. Verify that the triangle with vertices $V(0,\ 0)$, $W\left(\sqrt{3},\ -1\right)$, and $X\left(\sqrt{3},\ 1\right)$ is an equilateral triangle.

8. The diameter of a circle joins the points $C(-8,\ 4)$ and $D(1,\ 5)$. Find the coordinates of the center of the circle.

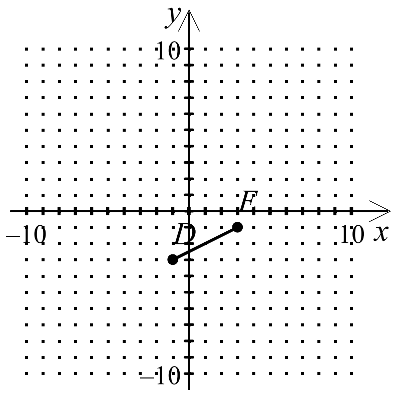
   [A] $\left(4\frac{1}{2},\ -1\frac{1}{2}\right)$ [B] $(-8,\ 5)$ [C] $\left(2\frac{1}{2},\ -2\right)$ [D] $\left(-3\frac{1}{2},\ 4\frac{1}{2}\right)$

9. Find the midpoint of the line segment connecting $(1,\ 15)$ and $(8,\ -18)$.

[A] $(9,\ -3)$ [B] $(-9,\ 3)$ [C] $\left(-\frac{7}{2},\ \frac{33}{2}\right)$ [D] $\left(\frac{9}{2},\ -\frac{3}{2}\right)$

10. $M(-1,\ -5)$ is the midpoint of $\overline{RS}$. If S has coordinates $(4,\ 4)$, find the coordinates of R.

11. Find the midpoint of the line segment connecting the two points. Then show that the midpoint is the same distance from each point.



12. Find the standard form of the equation of the specified circle.
Center: $(2,\ 3)$; Radius: 4

[A] $(x-2)^2+(y-3)^2=16$ [B] $(x+2)^2+(y+3)^2=4$

[C] $(x+2)^2-(y+3)^2=4$ [D] $(x-2)^2+(y+3)^2=16$

13. Find the center and radius of the circle.
$(x-5)^2+(y+8)^2=25$

14. Find the standard form of the equation of the specified circle.
Endpoints of a diameter: $(-6,\ 5),\ (8,\ 5)$

15. Find the center and radius of the circle.
$x^2+y^2=121$

[A] Center: $(11,\ 0)$ Radius $=11$ [B] Center: $(0,\ 0)$ Radius $=11$ [C] Center: $(0,\ 121)$ Radius $=11$ [D] Center: $(0,\ 0)$ Radius $=121$

16. Determine whether each point lies on the graph of the equation.
$y=-3x^2-\frac{1}{5}$ (a) $\left(-4,\ -\frac{241}{5}\right)$ (b) $\left(1,\ -\frac{14}{5}\right)$

[A] (a) No (b) No [B] (a) Yes (b) No [C] (a) Yes (b) Yes [D] (a) No (b) Yes

Complete the table. Use the resulting solution points to sketch the graph of the equation.

17. $y = x^2 - 2$

x	-3	-2	-1	0	1	2	3
y							

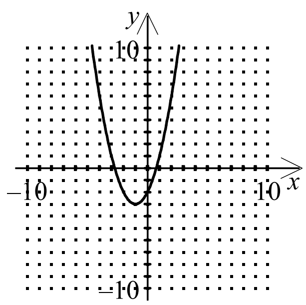
18. $-8x + y = 6$

x	-2	-1	0	1	2
y					

Use a graphing utility to graph the equation. Approximate any x- or y-intercepts of the graph.

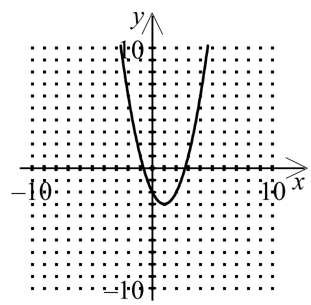
19. $y = -x^2 + 2x + 2$

[A]



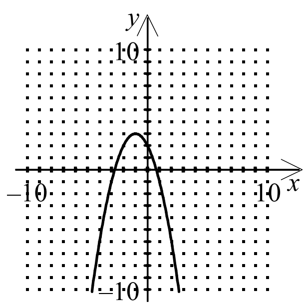
Intercepts: $(-2.732,\ 0)$, $(0.732,\ 0)$, $(0,\ -2)$

[B]



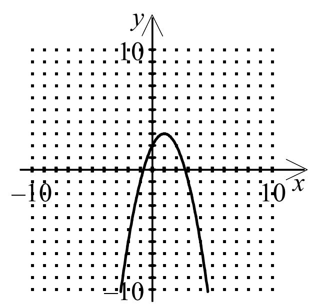
Intercepts: $(-0.732,\ 0)$, $(2.732,\ 0)$, $(0,\ -2)$

[C]



Intercepts: $(-2.732,\ 0)$, $(0.732,\ 0)$, $(0,\ 2)$

[D]

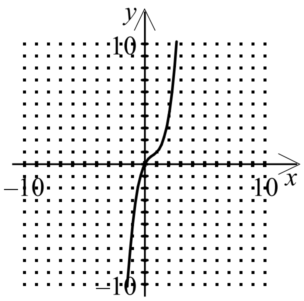


Intercepts: $(-0.732,\ 0)$, $(2.732,\ 0)$, $(0,\ 2)$

Use a graphing utility to graph the equation. Approximate any x- or y-intercepts of the graph.

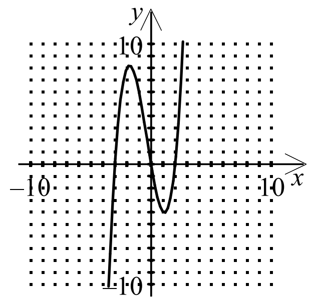
20. $y = x^3 - x^2 + 4x$

[A]



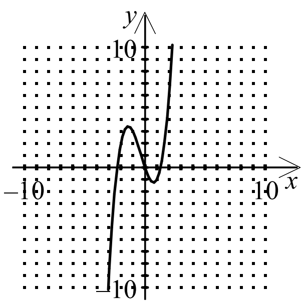
Intercept: $(0,\ 0)$

[B]



Intercepts: $(-3,\ 0),\ (2,\ 0),\ (0,\ 0)$

[C]



Intercepts: $(-2.303,\ 0),\ (1.303,\ 0),\ (0,\ 0)$

[D] None of these

21. $y = |\, x - 2\, | - 2$

22. Solve for y and use a graphing utility to graph each of the resulting equations in the same viewing window. Adjust the viewing window so that a circle really does appear circular.
$(x+4)^2 + (y+2)^2 = 16$

23. An arrow shot into the air is modeled by the equation
$y = 160t - 16t^2$
where y is the number of feet the arrow is above ground t seconds after it is released. Graph the equation to find what period of time the arrow is above 336 feet.

[A] Between 6 and 14 seconds

[B] Between 3 and 14 seconds

[C] Between 3 and 4 seconds

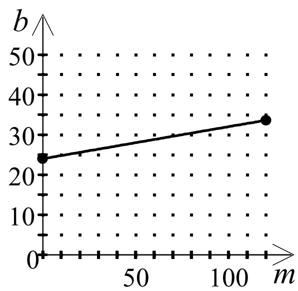
[D] Between 3 and 7 seconds

24. A monthly phone bill b is given by

$b = 31 + 0.13m$

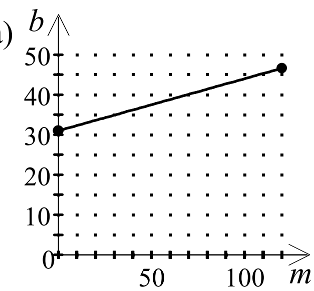
where \$31 is the service fee and \$0.13 is the cost per minute m of long distance calls.
(a) Identify the graph of this equation for up to and including 120 minutes of long distance calls made in one month.
(b) Estimate the bill if 95 minutes of long distance calls are made.

[A] (a)



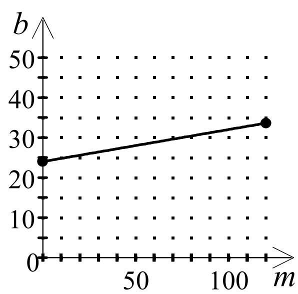
(b) \$44.85

[B] (a)



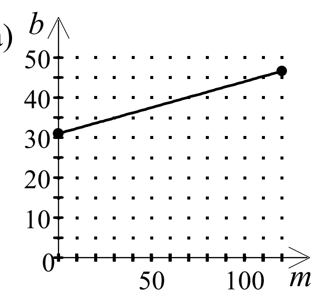
(b) \$44.85

[C] (a)



(b) \$43.35

[D] (a)



(b) \$43.35

25. A model for the demand for saws is

$d = -5p^2 + 290p - 40$

where d is the number of saws a manufacturer can sell at a price of p dollars each. Use a graphing utility to graph the equation. Then find the price that results in the maximum demand for saws.

[A] \$29 [B] \$58 [C] \$4 [D] None of these

26. You own a silk-screening business that prints designs on T-shirts. The model for the average cost per T-shirt is

$\overline{A} = \dfrac{2.50x + 500}{x}$

where x is the number of shirts in the production run, \$500 is the one time charge for creating the design and purchasing the supplies, and \$2.50 is the cost of each plain T-shirt. Sketch a graph of the equation and find the average cost per T-shirt for a production run of 550 shirts.

27. The height of a diver jumping from a diving platform is about

$h = -16.1t^2 + 11t + 28.4$

where h is the height of the diver in feet above the water and t is the time measured in seconds, when diving from a platform about 28.4 feet above the water with an initial upward velocity of 11 ft/sec.
(a) Sketch a graph the equation from $t = 0.0$ to $t = 2.0$.
(b) After how many seconds is her height above the water 8 feet? Round your answer to the nearest tenth of a second.
(c) After how many seconds is the diver's height above the water 36 feet? Round your answer to the nearest tenth of a second.

Find the slope of the line passing through the pair of points.

28. $(-4,\ -4),\ (-8,\ 3)$ [A] $\frac{1}{12}$ [B] $-\frac{4}{7}$ [C] 2 [D] $-\frac{7}{4}$

29. $(7,\ -3),\ (-3,\ -3)$ [A] 0 [B] $\frac{3}{5}$ [C] $-\frac{5}{2}$ [D] Undefined

30. $(8,\ -8),\ (3,\ 1)$

31. Plot the points and find the slope of the line passing through the pair of points.
$\left(-\frac{1}{10},\ \frac{8}{5}\right),\ \left(-\frac{11}{7},\ -\frac{10}{3}\right)$

Find the general form of the equation of the line that passes through the given points. Use the equation to find two other points on the line.

32. $(0.9,\ -4.8),\ (14.9,\ 1.2)$

[A] $70x+300y+81=0;\ (30.9,\ -11.8),\ (-29.1,\ 2.2)$

[B] $-700x+300y+207=0;\ (30.9,\ 65.2),\ (-29.1,\ -74.8)$

[C] $30x-70y-363=0;\ (70.9,\ 25.2),\ (-69.1,\ -34.8)$ [D] $300x+70y+309=0;\ (-6.1,\ 25.2),\ (7.9,\ -34.8)$

33. $(-5,\ 5),\ (-11,\ 13)$

[A] $3x+4y-5=0;\ (-1,\ 2),\ (-9,\ 8)$ [B] $-3x+4y-35=0;\ (-1,\ 8),\ (-9,\ 2)$

[C] $4x+3y+5=0;\ (-8,\ 9),\ (-2,\ 1)$ [D] $4x-3y+35=0;\ (-2,\ 9),\ (-8,\ 1)$

Find the general form of the equation of the line that passes through the given point and has the indicated slope.

34. $(3,\ 4),\ m=0$

35. $(-5.3,\ -1.4),\ m=-\frac{3}{4}$

36. Sketch the graph of the equation.
$y=-\frac{1}{2}x+7$

37. For the given equation (a) determine the slope and the y-intercept of the line algebraically, (b) sketch the line by hand, and (c) use a graphing utility to verify your answers to parts (a) and (b).
$-3x-4y=-2$

38. Find the equation in slope-intercept form and identify the slope and the y-intercept.
$3x+5y=5$

[A] $y=-3x+\frac{5}{3}$; $m=-3$; Intercept: $\left(0,\ \frac{5}{3}\right)$

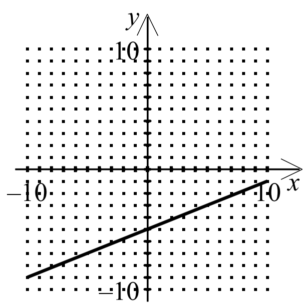
[B] $y=-\frac{3}{5}x+1$; $m=-\frac{3}{5}$; Intercept: $(0,\ 1)$

[C] $y=\frac{3}{5}x-\frac{3}{5}$; $m=\frac{5}{3}$; Intercept: $\left(0,\ \frac{5}{3}\right)$

[D] Given in slope-intercept form; $m=5$; Intercept: $(0,\ -5)$

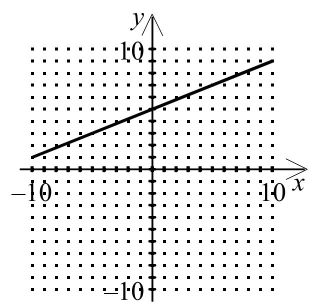
39. Find the slope-intercept form of the equation and its graph.
$-4x+10y=50$

[A]



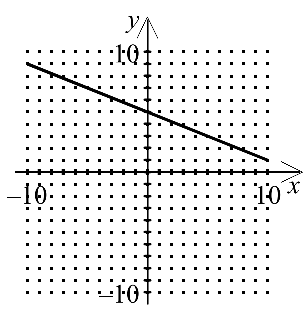
$y=\frac{2}{5}x-5$

[B]



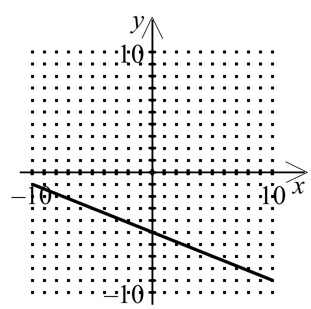
$y=\frac{2}{5}x+5$

[C]



$y=-\frac{2}{5}x+5$

[D]



$y=-\frac{2}{5}x-5$

40. Determine whether the lines L_1 and L_2 passing through the pair of points are parallel, perpendicular, or neither.
L_1: $(-2,\ 9)$, $(-1,\ 6)$
L_2: $(-3,\ 6)$, $(0,\ 7)$

41. Find the slope-intercept form of the equation of the line that passes through the point $(-3,\ -2)$ and is perpendicular to the line $-3x-7y=-7$.

42. Determine whether the graphs of the equations are parallel, perpendicular, or neither.
$-4x+y=0$
$-x-4y=-6$

[A] Parallel [B] Perpendicular [C] Neither

43. Find the slope-intercept form of the equation of the line through the point $(-9,\ -2)$, parallel to the line $7x+3y=4$.

[A] $y=\frac{7}{3}x-23$ [B] $y=-\frac{7}{3}x+\frac{1}{23}$ [C] $y=-\frac{3}{7}x+\frac{1}{23}$ [D] $y=-\frac{7}{3}x-23$

44. Find the slope-intercept form of the equation of the line through the point $(-9,\ -6)$, perpendicular to the graph of $y=-1\frac{1}{4}x-\frac{7}{10}$.

[A] $x=-1\frac{1}{4}y+1\frac{1}{5}$ [B] $y=\frac{4}{5}x+1\frac{1}{5}$ [C] $y=-1\frac{1}{4}x+1\frac{1}{5}$ [D] $x=\frac{4}{5}y+1\frac{1}{5}$

Find the solution to the equation.

45. $1\frac{1}{4}c-28=32$

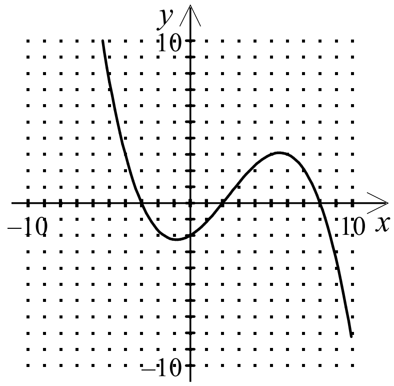
46. $-9(x+2)+3x=-4x-5$

47. $3(x-2)+4=4(x-4)+4$ [A] 10 [B] –6 [C] 2 [D] –22

48. $2=3(x-4)+1-2x$ [A] 13 [B] 7 [C] 15 [D] 5

49. $0.2(-1.67-4x)=-0.3x$ [A] 3.04 [B] –0.67 [C] 0.67 [D] –0.09

50. Identify the x- and y-intercepts.



[A] x-intercept: $(0,\ 2)$
y-intercepts: $(-3,\ 0),\ (2,\ 0),\ (8,\ 0)$

[B] x-intercept: $(0,\ -2)$
y-intercepts: $(-3,\ 0),\ (2,\ 0),\ (8,\ 0)$

[C] x-intercepts: $(-3,\ 0),\ (2,\ 0),\ (8,\ 0)$
y-intercept: $(0,\ -2)$

[D] x-intercepts: $(-3,\ 0),\ (2,\ 0),\ (-8,\ 0)$
y-intercept: $(0,\ 2)$

51. Identify the x- and y-intercepts of the graph of the equation.
$-3x-8y=5$

[A] x-intercept: $\left(-\frac{5}{3},\ 0\right)$
y-intercept: $\left(0,\ -\frac{5}{8}\right)$

[B] x-intercept: $\left(-\frac{3}{5},\ 0\right)$
y-intercept: $\left(0,\ -\frac{8}{5}\right)$

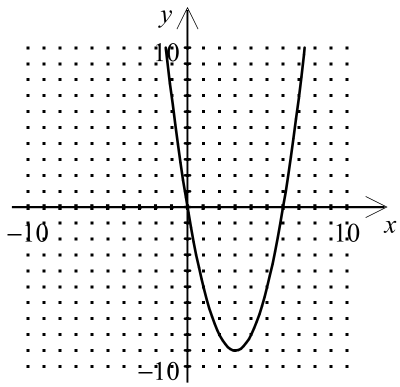
[C] x-intercept: $\left(-\frac{8}{5},\ 0\right)$
y-intercept: $\left(0,\ -\frac{3}{5}\right)$

[D] x-intercept: $\left(-\frac{5}{8},\ 0\right)$
y-intercept: $\left(0,\ -\frac{5}{3}\right)$

52. Use a graphing utility to graph the equation and find the x- and y-intercepts.
$y=\frac{8}{7}x-4$

53. Find the x- and y-intercepts of the graph of the equation.

$y = -6x + x^2$



Use a graphing utility to approximate the solution(s) to the equation.

54. $2(x+3)^2 - 2 = 0$

55. $9 + x^2 = -6x$

56. Use a graphing utility to approximate any points of intersection of the graphs of the equations. Verify your results algebraically.

$y = x + 5$

$y = 2x$

Determine the point(s) of intersection algebraically. Then verify your result numerically by creating a table of values for each equation.

57. $y = 3x^2$

$y = -3x^2 + 384$

58. $y = -2(x+2)^2 + 2$

$y = -26x + 34$

[A] $(-4,\ -70),\ (5,\ 96)$ [B] $(4,\ -70),\ (5,\ -96)$ [C] $(-4,\ -70),\ (5,\ -96)$ [D] $(4,\ -70),\ (-5,\ 96)$

59. Use a graphing utility to approximate any points of intersection of the graphs of the equations. Verify your results algebraically.

$y = -5 - x$

$y = 2x + 7$

[A] $(12,\ -17)$ [B] $\left(-\frac{5}{3},\ -\frac{10}{3}\right)$ [C] $\left(-\frac{7}{3},\ \frac{7}{3}\right)$ [D] $(-4,\ -1)$

Solve.

60. $x^4 - 11x^2 + 28 = 0$

61. $64x^3 - 27 = 0$

62. $x^4 - 36x^2 = 0$ [A] ± 36 [B] $0,\ \pm 6$ [C] $\pm\frac{1}{36}$ [D] $0,\ \pm\frac{1}{6}$

63. $x^4 - 81x^2 + 412 = 16x^2 - 884$ [A] $9,\ 4$ [B] $\pm 9,\ \pm 4$ [C] $81,\ 16$ [D] $-81,\ -16$

64. $\frac{2}{x^2 - 1} - \frac{1}{x - 1} = 1$

65. $\sqrt{x + 7} + \sqrt{x} = 2$

66. $\sqrt[3]{x - 9} = -3$ [A] $-18, 36$ [B] 18 [C] 36 [D] -18

67. $-\frac{12}{x} + \frac{12}{x + 1} = -2$ [A] $-2,\ 3$ [B] $-3,\ 2$ [C] 2 [D] 3

68. $\left|\frac{7}{3}x + 2\right| + 6 = 12$ [A] $\frac{60}{7},\ \frac{24}{7}$ [B] $\frac{28}{3},\ -\frac{60}{7}$ [C] $\frac{12}{7},\ -\frac{24}{7}$ [D] $\frac{24}{7},\ -\frac{56}{3}$

Solve the inequality.

69. $-1 \le \frac{3 - 2x}{3} < 3$

70. $3x - 7x + 15 > 2x - (19 - 8x)$

71. $\frac{10}{9} - \frac{1}{3}x + \frac{8}{9} \le 5x - \frac{4}{3}$ [A] $x \ge \frac{5}{8}$ [B] $x \le \frac{5}{8}$ [C] $x \ge \frac{5}{7}$ [D] None of these

Solve the inequality.

72. $-\dfrac{x-7}{4} \geq 3$ [A] $x \geq -5$ [B] $x \leq -5$ [C] $x \leq -19$ [D] $x \geq -19$

73. $|2-5x|-5 < 3$ [A] $x > -\dfrac{4}{5},\ x < 0$ [B] $0 < x < -\dfrac{4}{5}$ [C] $-\dfrac{6}{5} < x < 2$ [D] $x > 2,\ x < -\dfrac{6}{5}$

74. Two local ranchers are bragging about their ability to use fencing sparingly. Bob says that he was once able to fence in a rectangular pasture of 9800 square feet with only 400 feet of fencing. Susan says that she was once able to fence in a rectangular pasture of 14,300 square feet with only 480 feet of fencing. Which of the following can you conclude?

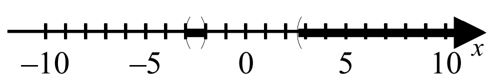
[A] Both are lying. [B] Only Susan is lying. [C] Only Bob is lying. [D] Neither is lying.

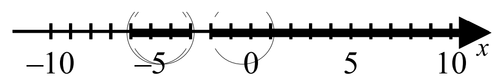
75. Solve the inequality: $\dfrac{(x-6)(x+2)}{x-4} \geq 0$

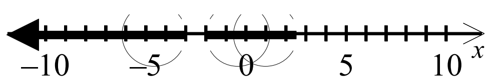
[A] $x \leq -2$ [B] $-2 \leq x \leq 4$ [C] $x \geq 6,\ -2 \leq x < 4$ [D] $x \geq 6$

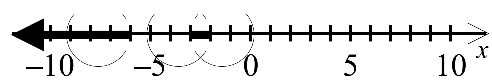
76. Which is the graph of the solution of the inequality?

$\dfrac{4}{n+2} - \dfrac{3}{n+3} < 0$

[A] 

[B] 

[C] 

[D] 

77. A garden is to have a perimeter of 72 feet and its area must be at least 320 square feet. Within what bounds must the length of the garden lie?

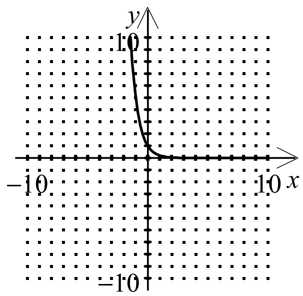
78. Evaluate the expression. Round the result to three decimal places.

$4^{-3.1}$

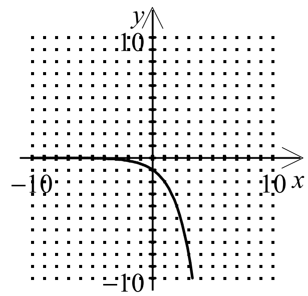
Identify the graph of the function.

79. $f(x) = \left(\frac{1}{5}\right)^x$

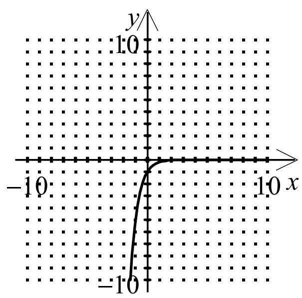
[A]



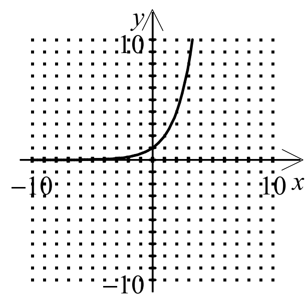
[B]



[C]

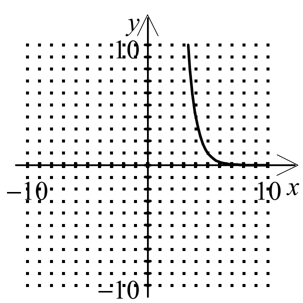


[D]

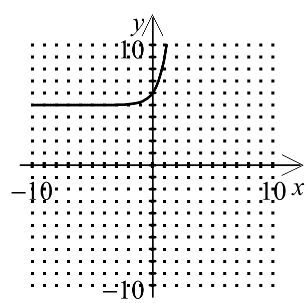


80. $f(x) = 4^x + 5$

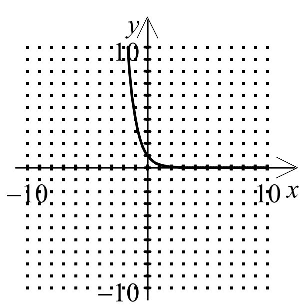
[A]



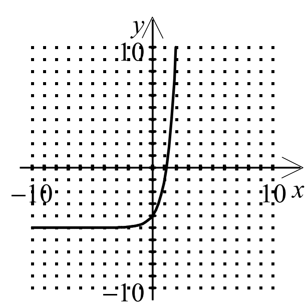
[B]



[C]



[D]



81. Evaluate the expression. Round the result to three decimal places.

$0.3^{-5/3}$

82. The total amount in a savings account with interest that is compounded yearly is

$$A = P(1+r)^t$$

where A is the amount in an account at the end of an investment period, P is the principal amount invested, r is the interest rate, and t is the time of the investment in years. To the nearest whole percent find the interest rate at which \$1900 grows to at least \$2424 in 2 years.

Sketch the graph of the function.

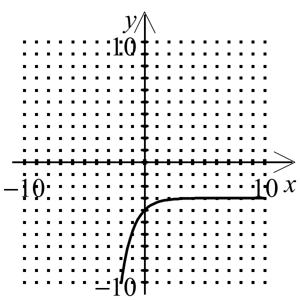
83. $f(x) = (2)^{x-3} + 4$

84. $f(x) = \left(\dfrac{4}{3}\right)^x$

85. Identify the graph of the function.

$$f(x) = -3 - e^x$$

[A]



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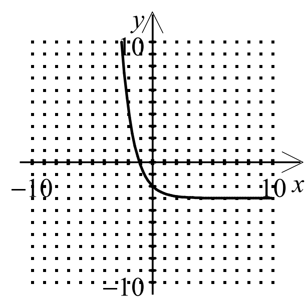
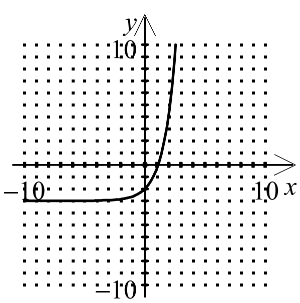
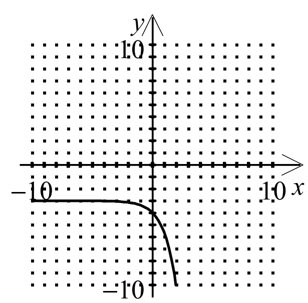


[C]



[D]



86. Evaluate the expression. [A] 6.808 [B] 3.333 [C] 0.147 [D] 6.004

$$3 + e^{-1.1}$$

87. Evaluate the expression. Round the answer to three decimal places.

$$\frac{3}{2}e^{1.5}$$

88. Identify the logarithmic equation written in exponential form.

$$\log_{1024} 256 = \frac{4}{5}$$

[A] $1024^{4/5} = 256$ [B] $256^{4/5} = 1024$ [C] $\left(\frac{4}{5}\right)^{1024} = 256$ [D] $\left(\frac{4}{5}\right)^{256} = 1024$

89. In 2000, the population of a country was estimated at 4 million. For any subsequent year the population $P(t)$ in millions is

$$P(t) = \frac{240}{5 + 54.99e^{-0.0208t}}$$

where t is the number of years since 2000. Use a graphing calculator to estimate the population in 2014.

[A] 5,206,000 [B] 5,304,000 [C] 5,111,000 [D] 5,255,000

90. Evaluate the expression without using a calculator.

$\log_{10} 1000$

91. Write the exponential equation in logarithmic form.

$3^8 = 6561$

92. Identify the logarithmic equation written in exponential form.

$$\log_{32} 8 = \frac{3}{5}$$

[A] $\left(\frac{3}{5}\right)^{32} = 8$ [B] $\left(\frac{3}{5}\right)^{8} = 32$ [C] $32^{3/5} = 8$ [D] $8^{3/5} = 32$

93. Evaluate the expression without using a calculator. [A] 6 [B] $\frac{1}{6}$ [C] 243 [D] $\frac{1}{243}$

$\log_3 729$

Sketch the graph of the function.

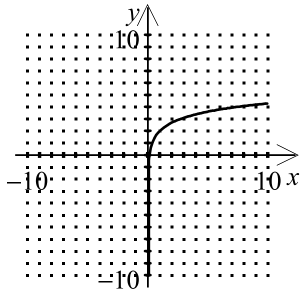
94. $f(x) = \log_5 x$

95. $f(x) = \ln(4 - x)$

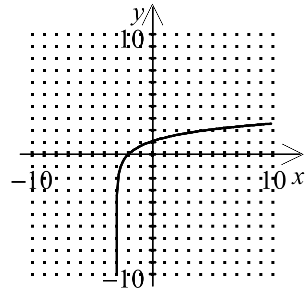
96. Identify the graph of the logarithmic function.

$f(x) = 2 + \ln(x+3)$

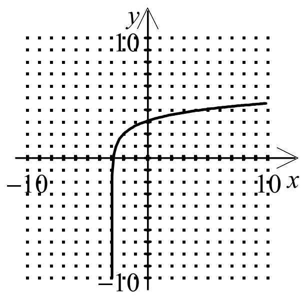
[A]



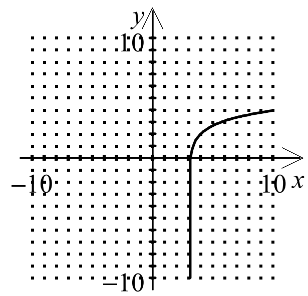
[B]



[C]



[D]



97. Use a calculator to evaluate the logarithm. Round to three decimal places.

$\ln\left(5+\sqrt{5}\right)$

98. Sketch the graph of the logarithmic function.

$f(x) = -3\ln x - 2$

99. The magnitude of an earthquake is

$M = \dfrac{2}{3}\log_{10}\dfrac{E}{10^{11.8}}$

where E is the energy released. If an earthquake released nine times as much energy as an earlier quake that released $10^{22.9}$ ergs of energy, find the magnitude of the newer quake to the nearest tenth.

100. A company with loud machines must cut its sound intensity to 88% of its original level. If the loudness of a sound β measured in decibels is

$\beta = 10\log_{10}\dfrac{100}{I_0}$

where I_0 is the percent of the original level to which the sound must be reduced, by how many decibels must the loudness be reduced?

Evaluate the logarithm using the change-of-base formula.

101. $\log_6 723$ [A] 4.904 [B] 3.674 [C] 39.500 [D] 1.097

Evaluate the logarithm using the change-of-base formula.

102. $\log_8 \frac{3}{5}$ [A] –1.062 [B] –0.064 [C] –0.246 [D] –4.087

103. Evaluate the logarithm using the change-of-base formula. Find the value to three decimal places.
$\log_{1/5} 25$

104. Which is the logarithm rewritten as a ratio of natural logarithms?
$\log_x \frac{1}{2}$

[A] $\dfrac{\ln x}{\ln \frac{1}{2}}$ [B] $\ln x - \ln \frac{1}{2}$ [C] $\dfrac{\ln \frac{1}{2}}{\ln x}$ [D] $\ln\left(\dfrac{\frac{1}{2}}{x}\right)$

105. Use the change-of-base formula to rewrite the logarithm as a ratio of logarithms. Then use a graphing utility to sketch the graph.
$f(x) = \log_{1/4} x$

106. Identify the expression that is equivalent to the given logarithmic expression.
$\log_b \sqrt{\frac{58}{69}}$

[A] $\frac{1}{2}(\log_b 58 + \log_b 69)$ [B] $\sqrt{\log_b 58 - \log_b 69}$ [C] $\log_b \frac{1}{2}(58 - 69)$ [D] $\frac{1}{2}(\log_b 58 - \log_b 69)$

107. Indicate whether the following statement is true or false. If it is false, correct the statement.
$\log_{10} \frac{10}{9} = \log_{10} 10 + \log_{10} 9$

108. Find the value of the expression without using a calculator.
$\log_7 7 + \log_7 343 - \log_7 2401$

Use the properties of logarithms to expand the expression. (Assume all variables are positive.)

109. $\log_b \sqrt[5]{\dfrac{x^9 y^2}{z^7}}$

[A] $\dfrac{9}{5}\log_b x + \dfrac{5}{2}\log_b y - \dfrac{5}{7}\log_b z$

[B] $\dfrac{9}{5}\log_b x + \dfrac{2}{5}\log_b y - \dfrac{7}{5}\log_b z$

[C] $\dfrac{4}{5}\log_b (x + y - z)$

[D] $\sqrt[5]{\dfrac{18(\log_b x)(\log_b y)}{7\log_b z}}$

110. $\log_a \dfrac{8xy^4}{z^4}$

111. Condense the expression to the logarithm of a single quantity.
$\left[5\log_5(x+6) + 4\log_5(x+7)\right] - \dfrac{1}{2}\log_5 x$

Solve for *x*.

112. $\ln x - \ln 10 = 0$ [A] $10e$ [B] $\ln 10$ [C] 10 [D] e^{10}

113. $e^x = 4$

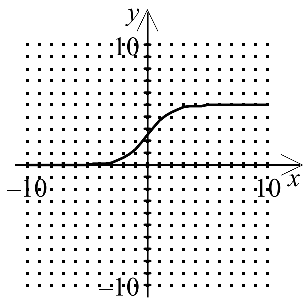
114. Find the time required for an investment of $2000 to double if the interest rate of 11% is compounded continuously.

[A] 12.60 years [B] 3.15 years [C] 4.20 years [D] 6.30 years

115. The amount of power generated by a satellite's power supply is
$P = 50e^{-t/300}$
where P is the power in watts and t is the time in days. For how many days will 26 watts of power be available? Round to the nearest whole day.

116. Identify the graph of a logistic growth model of a function.

[A]



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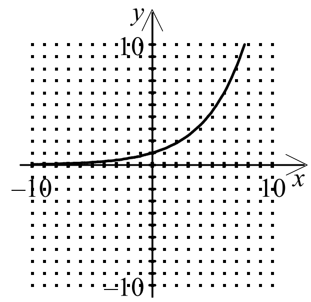
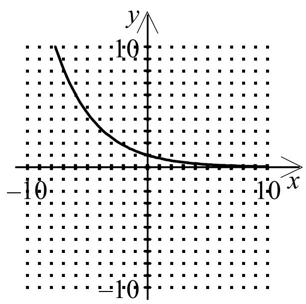
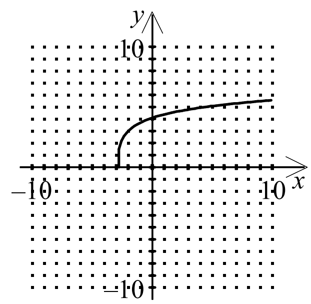


[C]



[D]



117. Sketch the graph of $y = 2 + 3\ln x$.

118. The population of a bacteria culture with an initial population of 3500 being treated with a new antibiotic can be modeled by

$N = 3500e^{-0.3t}$

where N is the number of bacteria present and t is the time in hours since the treatment began. In how many hours will the culture have a count of 875? Round the answer to the nearest tenth.

119. A new car with a purchase price of \$30,000 has a value of \$18,000 three years later.

(a) Write the straight-line model $V = mt + b$.

(b) Write the exponential model $V = ae^{kt}$.

(c) Find the book values of the car after four years using each model.

(d) Interpret the meaning of the slope in the straight-line model.