

1.

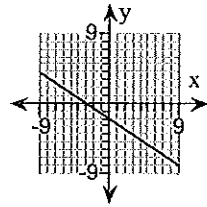
Find the intercepts and then graph the line.

7b

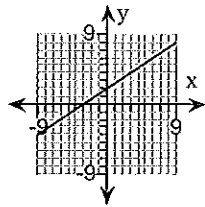
$$2x + 3y = -6$$

☐ A.

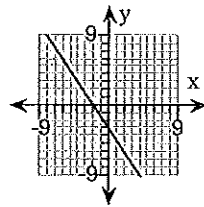
x-intercept: $(-3, 0)$;
y-intercept: $(0, -2)$

☐ B.

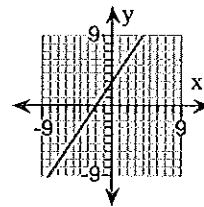
x-intercept: $(-3, 0)$;
y-intercept: $(0, 2)$

☐ C.

x-intercept: $(-2, 0)$;
y-intercept: $(0, -3)$

☐ D.

x-intercept: $(-2, 0)$;
y-intercept: $(0, 3)$



2.

Find the distance between the pair of points. Give an exact answer, and where appropriate, an approximation to three decimal places.

$(-2, 10)$ and $(-7, 17)$

☐ A. $\sqrt{24}$, 4.899☐ B. $\sqrt{12}$, 3.464☐ C. $\sqrt{148}$, 12.166☐ D. $\sqrt{74}$, 8.602

3.

Find an equation for the circle.

Endpoints of a diameter $(-4, -2)$, $(-4, 2)$

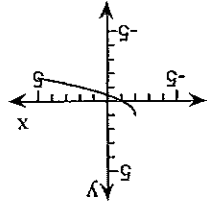
☐ A. $x^2 + (y + 2)^2 = 16$ ☐ B. $(x + 4)^2 + y^2 = 2$ ☐ C. $(x + 4)^2 + y^2 = 4$ ☐ D. $(x + 2)^2 + y^2 = 16$

4.

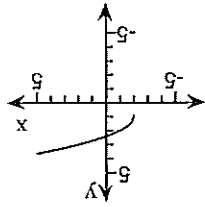
Graph the function.

$$f(x) = \sqrt{x+2} + 1$$

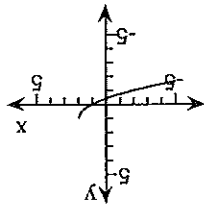
☐ A.



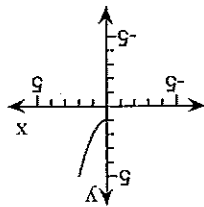
☐ B.



☐ C.



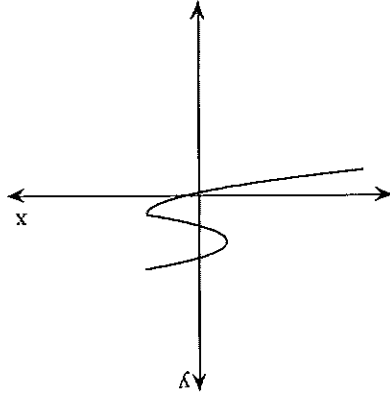
☐ D.



5.

Determine whether the graph is the graph of a function.

☐ Yes ☐ No



6.

The mathematical model $C = 800x + 40,000$ represents the cost in dollars a company has in manufacturing x items during a month. How many items were produced if costs reached \$280,000?

☐ A. 400 items

☐ B. 279,200 items

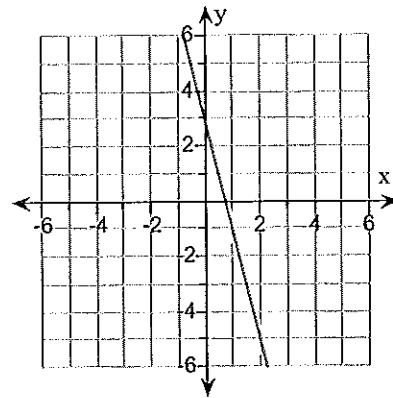
☐ C. 300 items

☐ D. 250 items

7. Marty's Tee Shirt & Jacket Company is to produce a new line of jackets with a embroidery of a Great Pyrenees dog on the front. There are fixed costs of \$590 to set up for production, and variable costs of \$29 per jacket. Write an equation that can be used to determine the total cost, $C(x)$, encountered by Marty's Company in producing x jackets, and use the equation to find the total cost of producing 77 jackets.

- ☐ A. \$2,835
☐ B. \$2,815
☐ C. \$2,803
☐ D. \$2,823

8. Write an equation in slope-intercept form for the line shown.



- ☐ A. $y = 4x - 3$
☐ B. $y = -4x - 3$
☐ C. $y = -4x + 3$
☐ D. $y = 4x + 3$

9. Write a slope-intercept equation for a line with the given characteristics.

Passes through $(-6, 2)$ and $(9, -9)$

- ☐ A. $y = -\frac{11}{15}x + -\frac{12}{5}$
☐ B. $y = \frac{11}{15}x + -\frac{12}{5}$
☐ C. $y = -\frac{4}{9}x + -5$
☐ D. $y = \frac{4}{9}x + -5$

10.

Write a slope-intercept equation for a line passing through the given point that is parallel to the given line. Then write a second equation for a line passing through the given point that is perpendicular to the given line.

$(4, -5); 8x + 7y = 5$

The equation of the parallel line is $y = \square$.

(Simplify your answer. Type your answer in slope-intercept form. Use integers or fractions for any numbers in the expression.)

The equation of the perpendicular line is $y = \square$.

(Simplify your answer. Type your answer in slope-intercept form. Use integers or fractions for any number in the expression.)

11.

The average cost of a 1 minute commercial on a leading network channel was \$173,000 in the fall of 1999. This was a 9% decrease from the cost a year earlier. What was the cost of a 1 minute commercial on the channel in the fall of 1998?

- ☐ A. \$190,110
- ☐ B. \$155,700
- ☐ C. \$1,557
- ☐ D. \$86,500

12.

Determine intervals on which the function is increasing, decreasing, and constant.

On what intervals is the function increasing?

- ☐ A. $(-5, -1)$ and $(7, 8)$

- ☐ B. $(1, 8)$

- ☐ C. $(-9, -5)$ and $(1, 8)$

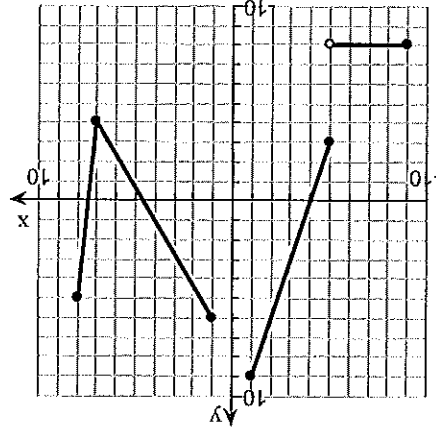
- ☐ D. $(-5, -1)$

On what interval is the function decreasing?

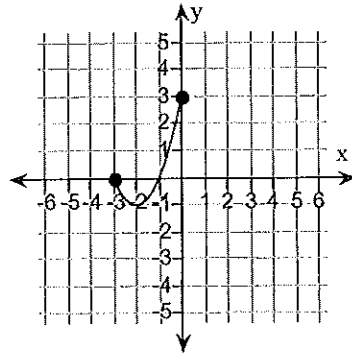
,)

On what interval is the function constant?

,)



13. Determine the domain and range of the function.



- ☐ A. domain: $[0,3]$; range: $(-\infty,3]$
☐ B. domain: $[-1,3]$; range: $[-3,0]$
☐ C. domain: $[-3,0]$; range: $[-1,3]$
☐ D. domain: $(-\infty,3]$; range: $[0,3]$

14. For the pair of functions, find the indicated sum, difference, product, or quotient.

$$f(x) = 5x^2 - 3, \quad g(x) = x - 3$$

Find $(f - g)(-5)$.

- ☐ A. -116
☐ B. 130
☐ C. 116
☐ D. 144

15. For the pair of functions, find the indicated sum, difference, product, or quotient.

$$f(x) = 6x + 8, \quad g(x) = 3x + 2$$

Find $(fg)(x)$.

- ☐ A. $18x^2 + 36x + 16$
☐ B. $18x^2 + 16$
☐ C. $9x^2 + 36x + 1$
☐ D. $18x^2 + x + 16$

16. For the pair of functions, find the indicated domain.

$$f(x) = 2x - 5, g(x) = \sqrt{x + 6}$$

Find the domain of $f \div g$.

☐ A. $(-6, 6)$

☐ B. $(-6, \infty)$

☐ C. $[6, \infty)$

☐ D. $[0, \infty)$

17. Find the requested function value.

$$f(x) = 9x + 6, g(x) = -3x^2 - 8x + 7$$

Find $(g \circ f)(6)$.

☐ A. -525

☐ B. $-11,273$

☐ C. -653

☐ D. $-1,335$

18. For the pair of functions, find the indicated composition.

$$f(x) = x^3 + 6x^2 + 4x + 6, g(x) = x - 1$$

Find $(f \circ g)(x)$.

☐ A. $x^3 + 8x^2 - 25x - 20$

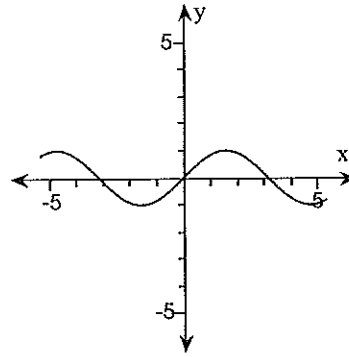
☐ B. $x^3 + 3x^2 - 5x + 7$

☐ C. $x^3 + 6x^2 + 4$

☐ D. $x^3 + 6x^2 + 4x + 25$

19.

Determine if the graph is symmetric with respect to x-axis, y-axis, and/or the origin.



- ☐ A. x-axis
- ☐ B. no symmetry
- ☐ C. y-axis
- ☐ D. origin

20.

Determine algebraically whether the graph is symmetric with respect to the x-axis, the y-axis, and the origin.

$$y = 3x^2 + 3$$

- ☐ A. x-axis only
- ☐ B. Origin only
- ☐ C. y-axis only
- ☐ D. x-axis, y-axis, origin

The graph of $y = -\frac{1}{4}|x - 2| + 4$ can be obtained from the graph of $y = |x|$ by which transformations?

What is the horizontal shift?

☐ A. 4 units to the right

☐ B. 2 units to the left

☐ C. 4 units to the left

☐ D. 2 units to the right

By what factor is the graph stretched or shrunk vertically and how is it reflected?

☐ A. shrunk vertically by a factor of $\frac{1}{4}$; reflected over the y-axis

☐ B. stretched vertically by a factor of 4; reflected over the x-axis

☐ C. stretched vertically by a factor of 4; reflected over the y-axis

☐ D. shrunk vertically by a factor of $\frac{1}{4}$; reflected over the x-axis

What is the vertical shift?

☐ A. 4 units downward

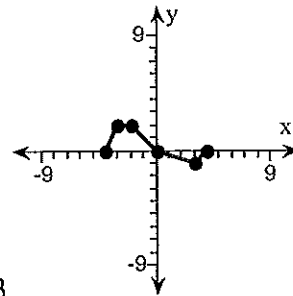
☐ B. 2 units upward

☐ C. 2 units downward

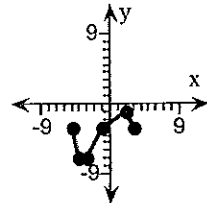
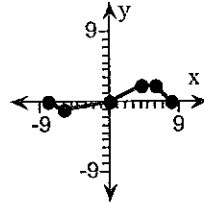
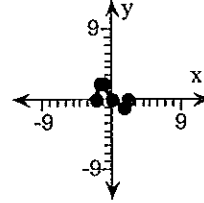
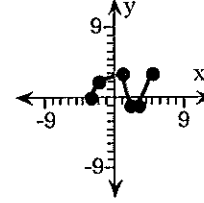
☐ D. 4 units upward

22.

A graph of $y = f(x)$ follows. No formula for f is given. Graph the given equation.



$$y = -2f(x+1) - 3$$

☐ A.

☐ B.

☐ C.

☐ D.


23.

The weight W of an object on the Moon varies directly as the weight E on earth. A person who weighs 190 lb on earth weighs 38 lb on the Moon. How much would a 111-lb person weigh on the Moon? Round to one decimal place as necessary.

☐ A. 339.0 lb

☐ B. 0.2 lb

☐ C. 22.2 lb

☐ D. 555.0 lb

24.

The pitch P of a musical tone varies inversely as its wavelength W . One tone has a pitch of 369 vibrations per second and a wavelength of 9 ft. Find the wavelength of another tone that has a pitch of 238 vibrations per second. Round to two decimal places.

☐ A. 5.80 ft

☐ B. 13.95 ft

☐ C. 0.07 ft

☐ D. 12.39 ft

25. Simplify. Write your answers in the form of $a + bi$, where a and b are real numbers.

$$\frac{6 + i}{-8 - 5i}$$

○ A. $-\frac{53}{89}$

○ B. $-\frac{53}{22} - \frac{89}{22}i$

○ C. $\frac{22}{89}i$

○ D. $-\frac{53}{22} + \frac{89}{22}i$

26. Use the quadratic formula to find the exact solutions.

$$x^2 + 35 = 5x$$

○ A. $\frac{5}{2} \pm \frac{2}{5}i$

○ B. $0, 5$

○ C. $\frac{5}{2} \pm \frac{\sqrt{115}}{2}i$

○ D. $-5, 5$

27. Use the quadratic formula to find the exact solutions.

$$4t^2 - 7t = 1$$

○ A. $\frac{7 \pm \sqrt{65}}{8}$

○ B. $\frac{7}{8} \pm \frac{\sqrt{65}}{8}i$

○ C. $\frac{-7 \pm \sqrt{65}}{8}$

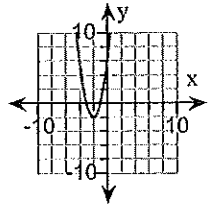
○ D. $-\frac{7}{8} \pm \frac{\sqrt{65}}{8}i$

28. Your company uses the quadratic model $y = -11x^2 + 350x$ to represent how many units (y) of a new product will be sold (x) weeks after its release. How many units can you expect to sell in week 14?
- ☐ A. 2,744 units
- ☐ B. 4,746 units
- ☐ C. 7,056 units
- ☐ D. 5,054 units

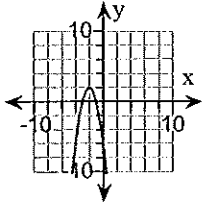
29. Match the equation to the correct graph.

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

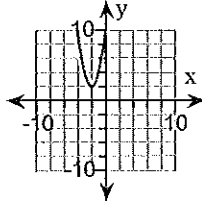
☐ A.



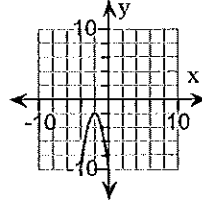
☐ B.



☐ C.



☐ D.



For the function $f(x) = -4x^2 - 12x + 5$, find the vertex, determine whether there is a maximum or minimum value and find that value, find the range, and find the intervals on which the function is increasing and decreasing.

What is the vertex?

(Type an ordered pair. Simplify your answer.)

Is there a maximum or a minimum?

☐ Maximum ☐ Minimum

What is the maximum value?

(Simplify your answer.)

What is the range?

☐ A. $\left[-\frac{3}{2}, \infty\right)$

☐ C. $(-\infty, 14]$

☐ B. $[14, \infty)$

☐ D. $\left(-\infty, -\frac{3}{2}\right]$

On what intervals is the function increasing and decreasing?

☐ increasing on $\left(-\frac{3}{2}, \infty\right)$, decreasing on $\left(-\infty, -\frac{3}{2}\right)$

☐ increasing on $\left(-\infty, -\frac{3}{2}\right)$, decreasing on $\left(-\frac{3}{2}, \infty\right)$

Aki's Bicycle Designs has determined that when x hundred bicycles are built, the average cost per bicycle is given by $C(x) = 0.1x^2 - 0.5x + 4.493$, where $C(x)$ is in hundreds of dollars. How many bicycles should the shop build to minimize the average cost per bicycle?

The shop should build bicycles.

32.

A projectile is thrown upward so that its distance above the ground after t seconds is $h(t) = -16t^2 + 532t$. After how many seconds does it reach its maximum height?

- ☐ A. 38 sec
- ☐ B. 28.5 sec
- ☐ C. 17 sec
- ☐ D. 9 sec

33.

Solve.

$$\frac{9x}{x-9} - \frac{4}{x} = \frac{36}{x^2-9x}$$

- ☐ A. $\frac{2}{9}, -\frac{2}{9}$
- ☐ B. $\frac{4}{9}$
- ☐ C. $\frac{9}{4}$
- ☐ D. $\frac{4}{9}, -\frac{4}{9}$

34.

Solve.

$$x = \sqrt{x+13} + 7$$

- ☐ A. 12
- ☐ B. 3, 12
- ☐ C. -9
- ☐ D. 3

Solve.

$$\left| \frac{4x - 1}{5} \right| > 6$$

☐ A. $\left(-\frac{29}{31}, \frac{4}{4} \right)$

☐ B. $\left(-\infty, -\frac{29}{31} \right) \cup \left(\frac{4}{4}, \infty \right)$

☐ C. $\left(-\infty, -\frac{35}{4} \right) \cup \left(\frac{31}{4}, \infty \right)$

☐ D. $\left(-\frac{35}{4}, \frac{31}{4} \right)$

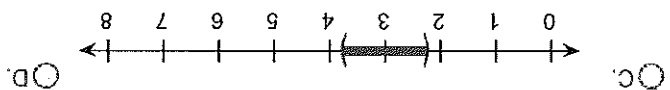
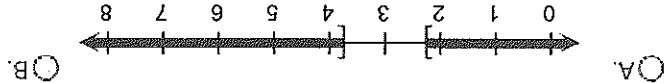
Solve the following inequality and graph the solution set.

$$|12 - 4x| \leq 3$$

The solution set is .

(Simplify your answer. Type your answer in interval notation.)

Choose the correct graph of the solution set.



Find the zeros of the polynomial function and state the multiplicity of each.

$$f(x) = -5x^2(x - 7)(x + 2)^3$$

☐ A. -2, multiplicity 3; 0, multiplicity 2; 7, multiplicity 1

☐ B. -2, multiplicity 3; 7, multiplicity 1

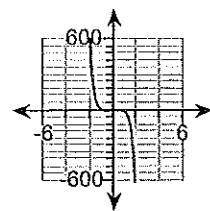
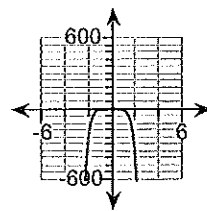
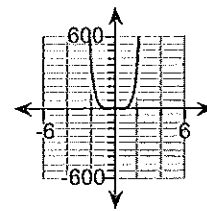
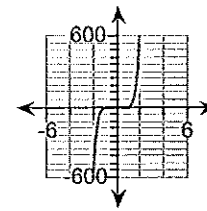
☐ C. -2, multiplicity 1; 2, multiplicity 1; 7, multiplicity 1

☐ D. -2, multiplicity 3; 0, multiplicity 2; 2, multiplicity 1; 7, multiplicity 1

38.

Use the leading-term test to match the function with the correct graph.

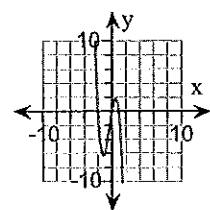
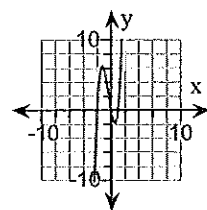
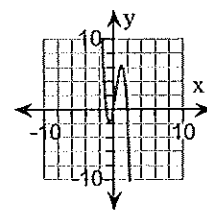
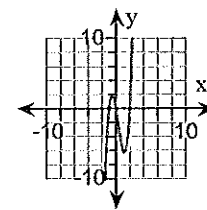
$$f(x) = -0.6x^6 - x^5 + 5x^4 - 3x^3 - 6x^2 + x - 3$$

☐ A.☐ B.☐ C.☐ D.

39.

Graph the function.

$$f(x) = 3x(x - 1)(x + 2)$$

☐ A.☐ B.☐ C.☐ D.

40.

State the domain of the rational function.

$$f(x) = \frac{x^2 + 5x - 14}{x^2 - 2x - 8}$$

☐ A. $(-\infty, 4) \cup (4, \infty)$ ☐ B. $(-\infty, -2) \cup (-2, 4) \cup (4, \infty)$ ☐ C. $(-\infty, -4) \cup (-4, 2) \cup (2, \infty)$ ☐ D. $(-\infty, \infty)$

41. Find the vertical asymptote(s) of the graph of the given function.

$$f(x) = \frac{x^2 + 2x - 8}{x^2 - 4x - 12}$$

- ☐ A. $x = 2, x = -6$
☐ B. $x = -2, x = 6$
☐ C. $x = 6$
☐ D. $y = -2, y = 6$

42. Find the horizontal asymptote, if any, of the rational function.

$$f(x) = \frac{4 - x^2}{x^2 + 7x + 9}$$

- ☐ A. $y = 1$
☐ B. $y = 0$
☐ C. $y = -1$
☐ D. None

43. Graph the function, showing all asymptotes (those that do not correspond to an axis) as dashed lines. List the x-and y-intercepts.

$$f(x) = \frac{x - 4}{x + 5}$$

☐ A.
 x-intercept: $(4, 0)$;
 y-intercept: $\left(0, -\frac{4}{5}\right)$;

☐ B.
 x-intercept: $(4, 0)$;
 y-intercept: $\left(0, \frac{4}{5}\right)$;

☐ C.
 x-intercept: $(4, 0)$;
 y-intercept: $\left(0, \frac{4}{5}\right)$;

☐ D.
 x-intercept: $(4, 0)$;
 y-intercept: $\left(0, -\frac{4}{5}\right)$;

44. For the function $g(x) = \frac{x-1}{x+8}$, solve $g(x) > 0$.

- ☐ A. $(-\infty, -8)$
- ☐ B. $(1, \infty)$
- ☐ C. $(-8, 1)$
- ☐ D. $(-\infty, -8) \cup (1, \infty)$

45. Solve the given inequality.

$$x^2 - 3x - 28 < 0$$

- ☐ A. $(-\infty, -4)$
- ☐ B. $(-4, 7)$
- ☐ C. $(7, \infty)$
- ☐ D. $(-\infty, -4) \cup (7, \infty)$

46. Solve the given inequality.

$$(x-4)(x+2) \geq 0$$

- ☐ A. $(-\infty, -4] \cup [2, \infty)$
- ☐ B. $(4, -2)$
- ☐ C. $(-\infty, -2] \cup [4, \infty)$
- ☐ D. $(4, \infty)$

47. Using the horizontal-line test, determine whether the function is one-to-one. ☐ Yes ☐ No	Using the horizontal-line test, determine whether the function is one-to-one. ☐ Yes ☐ No
	$f(x) = \frac{x^2 - 4}{8}$

49. Determine whether the given function is one-to-one. If it is one-to-one, find a formula for the inverse.

$$f(x) = \frac{x-10}{x-5}$$

☐ A. $f^{-1}(x) = \frac{x+10}{-5+x}$

☐ B. $f^{-1}(x) = \frac{5x-1}{x-10}$

☐ C. $f^{-1}(x) = \frac{5x-10}{x-1}$

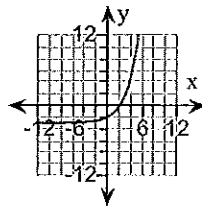
☐ D. $f^{-1}(x) = \frac{-5x-10}{x-1}$

50. Graph the function. Describe its position relative to the graph of the indicated basic function.

$$f(x) = e^{2x} - 3; \text{ relative to } f(x) = e^x$$

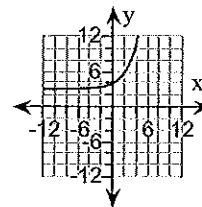
☐ A.

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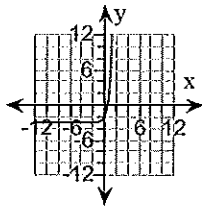
☐ B.

Stretched horizontally;
moved down 3 unit(s)



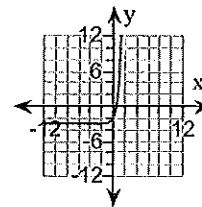
☐ C.

Shrunk horizontally;
moved down 3 unit(s)



☐ D.

Shrunk horizontally;
moved up 3 unit(s)



51. Find the value of the expression.

☐ A. $\frac{1}{2}$

☐ B. 3

☐ C. -2

☐ D. 6

52. Graph the function. Describe its position relative to the graph of the indicated basic function.

$f(x) = \ln x - 5$; relative to $f(x) = \ln x$

- ☐ A. Moved right 5 units
- ☐ B. Moved down 5 units
- ☐ C. Moved up 5 units
- ☐ D. Moved down 5 units

53. Express in terms of sums and differences of logarithms.

$$\log \frac{6x^2}{y^5}$$

- ☐ A. $\log 6 + (\log x)^2 - (\log y)^5$
- ☐ B. $\log 6 \cdot 2 \log x - 5 \log y$
- ☐ C. $\log 6 + 2 \log x - 5 \log y$
- ☐ D. $\log (6 + x^2 - y^5)$

54. Express as a single logarithm and, if possible, simplify.

$$\frac{1}{2} \log_a x + 3 \log_a y - 3 \log_a x$$

- ☐ A. $\log_a x^5 y^3$
- ☐ B. $\log_a \sqrt{x} y^3$
- ☐ C. $\log_a \left(\frac{y^3}{x^{5/2}} \right)$
- ☐ D. $\log_a x^3 y^3$

55. Solve the exponential equation.

$$5^{(8-2x)} = 625$$

- ☐ A. -2
- ☐ B. 4
- ☐ C. 125
- ☐ D. 2

56. Solve the logarithmic equation.

$$\log_3(4x - 6) = 1$$

- ☐ A. $\frac{\log_3 1 + 6}{4}$
- ☐ B. $\frac{9}{4}$
- ☐ C. 5
- ☐ D. $\frac{9}{7}$

57. How long will it take for \$8,700 to grow to \$20,700 at an interest rate of 3.8% if the interest is compounded continuously? Round the number of years to the nearest hundredth.

☐ A. 2,281.08 yr

☐ B. 0.23 yr

☐ C. 2.28 yr

☐ D. 22.81 yr

58. A lake is stocked with 452 fish of a new variety. The size of the lake, the availability of food, and the number of other fish restrict growth in the lake to a limiting value of 2,825. The population of fish in the lake after time t , in months, is given by the function $P(t) = \frac{2,825}{1 + 4.54e^{-0.32t}}$. Find the population after 5 month(s).

☐ A. 1,464

☐ B. 1,474

☐ C. 1,489

☐ D. 1,484