Match the graph with its corresponding function.

1) A) \( g(x) = 2\sqrt[3]{-x} \)  
   B) \( g(x) = \sqrt[3]{x} \)  
   C) \( g(x) = \sqrt[3]{x - 2} \)  
   D) \( g(x) = \sqrt[3]{-x + 2} \)

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Answer the question.

2) How can the graph of \( g(x) = \frac{1}{x + 3} - 2 \) be obtained from the graph of \( f(x) = \frac{1}{x} \)?

3) How can the graph of \( g(x) = -\sqrt{x + 10} \) be obtained from the graph of \( f(x) = \sqrt{x} \)?

Assume the functions are one-to-one. Find the requested inverse.

4) \[
\begin{array}{c|cccc}
   x & -8 & -7 & -5 & 3 \\
   f(x) & -6 & -5 & -3 & 5 \\
\end{array}
\]  
\[
\begin{array}{c|cccc}
   x & -6 & -5 & -3 & 5 \\
   g(x) & -11 & -9 & -5 & 19 \\
\end{array}
\]

\[
(f^{-1} \circ g^{-1})(-11) = \]

Compute \( \frac{f(x + h) - f(x)}{h} \) (\( h \neq 0 \)) for the given function.

5) \( f(x) = 4 - 10x^3 \)

6) \( f(x) = \frac{1}{9x} \)

Determine whether the equation defines \( y \) as a function of \( x \).

7) \( x = y^3 \)

8) \( x = | -9y | \)
Determine whether the given function is even, odd, or neither. Justify your answer.

9) \( f(x) = 6x^4 + 5x + 4 \)

10) \( f(x) = \frac{x}{x^2 + 2} \)

Determine whether the given function is one-to-one. If it is one-to-one, find its inverse.

11) \( f(x) = 5x^2 + 6, x \geq 0 \)

12) \( f(x) = \sqrt{x - 4} \)

13) \( f(x) = 7x + 6 \)

Determine whether the given points are collinear.

14) \((-5, 11), (-3, 5), (2, -2)\)

Determine whether the pair of lines is parallel, perpendicular, or neither.

15) \(3x - 6y = 10 \)
\(12x + 8y = 10 \)

16) \(9x + 3y = 12 \)
\(27x + 9y = 39 \)

Evaluate the expression.

17) \((g \circ g)(7)\) when \( f(x) = 4x - 5 \) and \( g(x) = 3x^2 - 4 \)

18) \((g \circ f)(-23)\) when \( f(x) = \frac{x - 1}{8} \) and \( g(x) = 4x + 7 \).

Find an equation in slope-intercept form for the nonvertical lines. Write the vertical lines in the form \( x = h \).

19) Passing through \((6, 1)\) and \((6, 5)\)

20) Passing through \((7, 2)\) and \((-3, 2)\)

21) Passing through \((2, 0)\) and \((-2, 7)\)

Find the center-radius form of the equation of a circle that satisfies the given conditions.

22) Center \((5, 22)\); touching the \(x\)-axis

23) Diameter with endpoints \((-5, 3)\) and \((-5, -3)\)

Find the composite function for the given functions. Simplify your answer as much as possible.

24) \( g \circ f \) for \( f(x) = x^5 + 9 \) and \( g(x) = \sqrt[5]{x - 9} \)

25) \( f \circ g \) for \( f(x) = \sqrt[5]{x + 7} \) and \( g(x) = 8x - 11 \)
26) \( f \circ g \text{ for } f(x) = \frac{7}{x - 4} \) and \( g(x) = \frac{2}{5x} \)  

Find the coordinates of the midpoint of the line segment PQ.  
27) P(-1, 6), Q(-9, -6)  

Find the domain of the composite function \( f \circ g \).  
28) \( f(x) = \sqrt{x}, \ g(x) = 5x + 5 \)  

29) \( f(x) = \frac{1}{x - 5}, \ g(x) = \sqrt{x + 3} \)  

Find the domain of the function.  
30) \( H(x) = \frac{x}{\sqrt{x - 2}} \)  

31) \( f(x) = \frac{x^4 - 3x^3 + 6}{3x^2 - 10x - 25} \)  

Find the given value.  
32) Find \( (f \cdot g)(4) \) when \( f(x) = \frac{x}{x^2 + 7x + 10} \) and \( g(x) = x + 1 \).  

33) Find \( (f - g)(-3) \) when \( f(x) = x + 3 \) and \( g(x) = \sqrt{x - 7} \)  

Find the intervals over which the given function is increasing, is decreasing, or is constant.  
34) \( f(x) = 5x^2 + 3 \)  

Find the inverse of the relation.  
35) \[
\begin{array}{c|ccc}
   x & -2 & 2 & 9 \\
\hline
   f(x) & 2 & -2 & 0 \\
\end{array}
\]  

36) \{(-9, -3), (-9, 3), (-1, 5), (1, -5)\}  

Find the requested value.  
37) Find \( f(-8) \) for  
\[ f(x) = \begin{cases} 
   4x + 1, & \text{if } x < 8 \\
   8x & \text{if } 8 \leq x \leq 11 \\
   8 - 2x & \text{if } x > 11 \end{cases} \]  

Find the \( x \)- and \( y \)-intercepts of the graph of the equation.  
38) \( y = \sqrt{64 - x^2} \)  

39) \( y = x^2 + 9x + 14 \)
For the given functions $f$ and $g$, find the requested function and state its domain.

40) $f(x) = \sqrt{x} + 9; \quad g(x) = \frac{2}{x}$

Find $f \cdot g$.

41) $f(x) = \sqrt{x}; \quad g(x) = 3x - 7$

Find $\frac{f}{g}$.

Graph the function $y = g(x)$, given the graph of $y = f(x)$.

42) $g(x) = -\frac{1}{2}f(x)$

Graph the function.

43) $f(x) = \begin{cases} 2x^2 & \text{if } x \leq -1 \\ 2 & \text{if } -1 < x < 1 \\ 2x+1 & \text{if } x \geq 1 \end{cases}$
Graph the pair of functions on the same coordinate plane. Use a dashed line for \( g(x) \).

44) \( f(x) = x^2 \), \( g(x) = -3(x + 4)^2 + 3 \)

Identify the triangle \( PQR \) as isosceles, equilateral, right, or scalene.

45) \( P(20, -20), Q(-20, 20), R(-20\sqrt{3}, -20\sqrt{3}) \)

46) \( P(-3, -2), Q(-1, 2), R(1, 1) \)

Provide an appropriate response.

47) A line passes through the points \((9, 5)\) and \((6, 5)\). The equation of this line is \(?\). The slope of the line is \(?\).

48) Find all the points having an \( x \)-coordinate of 9 whose distance from the point \((3, -2)\) is 10.

Solve the problem.

49) Marty’s Tee Shirt & Jacket Company is to produce a new line of jackets with an embroidery of a Great Pyrenees dog on the front. There are fixed costs of \$520\) to set up for production, and variable costs of \$46\) per jacket. Write an equation that can be used to determine the total cost, \( C \), encountered by Marty’s Company in producing \( x \) jackets, and use the equation to find the total cost of producing 127 jackets.

50) To convert a temperature from degrees Celsius to degrees Fahrenheit, you multiply the temperature in degrees Celsius by 1.8 and then add 32 to the result. Find a linear equation to convert from degrees Celsius to degrees Fahrenheit.

Specify the center and radius of the circle.

51) \( 9x^2 - 9x + 9y^2 + 9y - 7 = 0 \)

52) \( x^2 + y^2 - 18x - 6y + 86 = 0 \)

53) \( \left(x - \frac{5}{6}\right)^2 + \left(y - \frac{1}{4}\right)^2 = \frac{11}{4} \)

Test the equation for symmetry with respect to the \( x \)-axis, the \( y \)-axis, and the origin.

54) \( y = -9x^4 + 6x + 4 \)
55) \( x^2 + xy^2 = 4 \)

Use the given conditions to find an equation in slope-intercept form of each of the nonvertical lines. Write vertical lines in the form \( x = h \).

56) Perpendicular to \(-5x + 4y = 6\); passing through \((-2, -1)\)

57) Parallel to \(7x - 9y = 39\); passing through \((3, 5)\)

Use the graph of the function to find the following: a. the domain and range of the function; b. the intercepts, if any; c. the intervals on which the function is increasing, decreasing, or is constant; d. whether the function is even, odd, or neither.

58) 

Using the horizontal-line test, determine whether the function is one-to-one.

59) 

Write a linear function \( f \) that has the indicated values.

60) \( f(7) = 0, f(-2) = -7 \)

Write an equation for a function whose graph fits the given description.

61) The graph of \( f(x) = x^2 \) is shifted 3 units to the left. This graph is then vertically stretched by a factor of 6 and reflected across the \( x \)-axis. Finally, the graph is shifted 8 units downward.
62) The graph of \( f(x) = |x| \) is reflected across the y-axis. This graph is then vertically stretched by a factor of 6.4. Finally, the graph is shifted 4 units downward.

Write the x- and y-intercepts of the graph.

63)
Answer Key
Testname: MAC1105_2009_SUM_SAMPLEEXAM2

1) D
2) Shift it 3 units to the left and 2 units down.
3) Shift 10 units to the left. Reflect it across the x-axis.
4) -8
5) -10(3x^2 + 3xh + h^2)
6) \(-\frac{1}{9x(x+h)}\)
7) Yes
8) No
9) Neither
10) Odd
11) \(f^{-1}(x) = \sqrt{\frac{x-6}{5}}\)
12) \(f^{-1}(x) = x^2 + 4, x \geq 0\)
13) \(f^{-1}(x) = \frac{x-6}{7}\)
14) No
15) Neither
16) Parallel
17) 61,343
18) -5
19) x = 6
20) y = 2
21) \(y = -\frac{7}{4}x + \frac{7}{2}\)
22) \((x - 5)^2 + (y - 22)^2 = 484\)
23) \((x + 5)^2 + y^2 = 9\)
24) x
25) \(2\sqrt{2x - 1}\)
26) \(-\frac{35x}{2 - 20x}\)
27) \((-5, 0]\)
28) \([-1, \infty)\)
29) \([-3, 22) \cup (22, \infty)\)
30) \((2, \infty)\)
31) \([(-\infty, -\frac{5}{3}] \cup \left(-\frac{5}{3}, 5\right) \cup (5, \infty)\)
32) \(\frac{10}{27}\)
33) Does not exist
34) decreasing on \((-\infty, 0)\); increasing on \((0, \infty)\)
35) \([2, -2), (-2, 2), (0, 9), (0, -9)]\)
36) \([(-3, 9), (3, -9), (5, -1), (-5, 1)]\)
37) -31
38) x-intercepts: -8, 8; y-intercept: 8
39) x-intercepts: -2, -7; y-intercept: 14
40) \((f \cdot g)(x) = \frac{2\sqrt{x} + 9}{x}; [-9, 0) \cup (0, \infty)\)

41) \(\left( \frac{f}{g} \right)(x) = \frac{\sqrt[3]{x}}{3x - 7}; \left[0, \frac{7}{3}\right) \cup \left(\frac{7}{3}, \infty\right)\)

42)

43)

44)

45) Equilateral
46) Right
47) \(y = 5; 0\)
48) \((9, 6), (9, -10)\)
49) $6362
50) F = 1.8c + 32
51) Center: \( \left( \frac{1}{2}, -\frac{1}{2} \right) \); radius: \( \frac{\sqrt{46}}{6} \)
52) Center: \((9, 3)\); radius: 2
53) Center: \( \left( \frac{5}{6}, \frac{1}{4} \right) \); radius: \( \frac{\sqrt{11}}{2} \)
54) No symmetry
55) x-axis only
56) \( y = -\frac{4}{5}x - \frac{13}{5} \)
57) \( y = \frac{7}{9}x + \frac{8}{3} \)
58) a. Domain: \([-2, \infty)\); Range: \([-2, \infty)\)
    b. x-intercepts: \(-\frac{3}{2}, 2, 4\); y-intercept: 2
    c. increasing on \((-2, -1)\), constant on \((-1, 1)\), decreasing on \((1, 3)\), increasing on \((3, \infty)\)
    d. Neither even nor odd.
59) not one-to-one
60) \( f(x) = \frac{7}{9}x - \frac{49}{9} \)
61) \( y = -6(x + 3)^2 - 8 \)
62) \( f(x) = 6.4|x - 4| - 4 \)
63) x-intercepts: 4, -4; y-intercept: -4