Math 141
Exam 2 Preparation Ch.2.1 to 2.8 v01
NO BOOK/ NO NOTES/YES CALCUATOR
Dressler Winter 2016

Name_____

Find the slope of the line passing through the pair of points or state that the slope is undefined.

1) (–1, –7) and (6, –3) 1) _____

2) (–3, 9) and (–5, –5) 2) _____

3) (–5, –6) and (–5, –9) 3) _____

4) (9, 1) and (9, –9) 4) _____

5) (8, 6) and (–3, 6) 5) _____

6) (9, 1) and (4, 1) 6) _____

Find the midpoint of the line segment with the given end points.

7) (–9, –3) and (–5, 8) 7) _____

8) (0, 4) and (4, 3) 8) _____

9) (3, –2) and (–1, 4) 9) _____

10) $\left(-\frac{9}{4}, \frac{2}{3}\right)$ and $\left(-\frac{1}{2}, 2\right)$ 10) _____

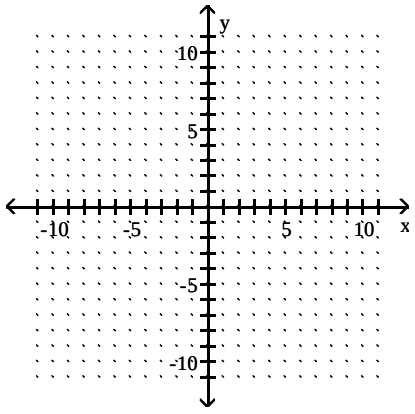
11) $\left(\frac{3}{5}, \frac{9}{4}\right)$ and $\left(\frac{1}{5}, -\frac{7}{4}\right)$ 11) _____

12) $(9\sqrt{6}, 8\sqrt{5})$ and $(14\sqrt{6}, 13\sqrt{5})$ 12) _____

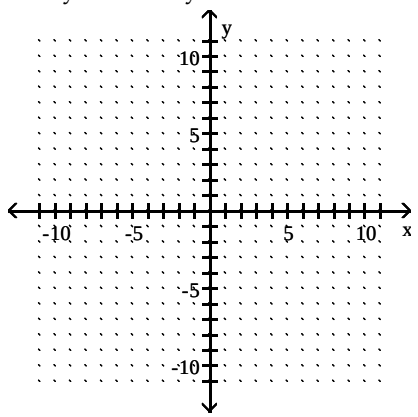
13) $(4\sqrt{7}, 2\sqrt{2})$ and $(7\sqrt{7}, 5\sqrt{2})$ 13) _____

Complete the square and write the equation in standard form. Then give the center and radius of the circle and graph the equation.

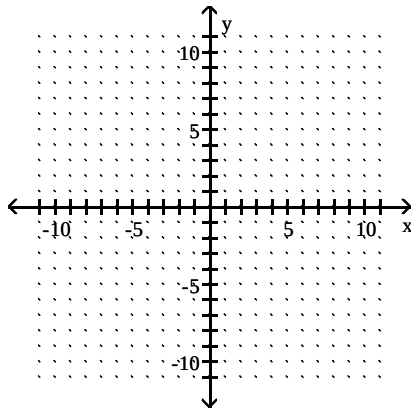
14) $x^2 + y^2 - 4x + 12y + 24 = 0$ 14) _____



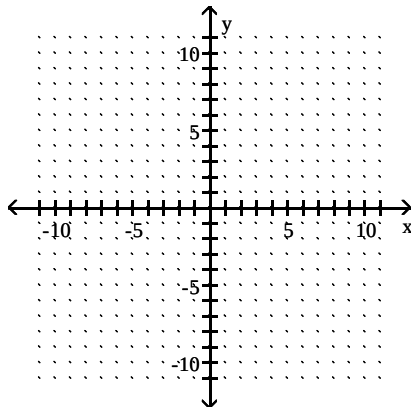
15) $x^2 + y^2 - 2x + 8y - 19 = 0$ 15) _____



16) $x^2 + y^2 + 8x - 4y - 16 = 0$ 16) _____

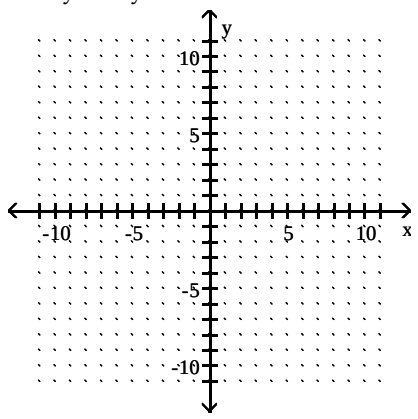


17) $x^2 + y^2 + 2x - 2y - 23 = 0$ 17) _____



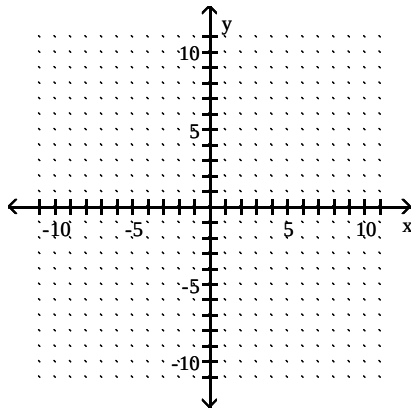
18) $x^2 + y^2 + 8y - 9 = 0$

18) _____



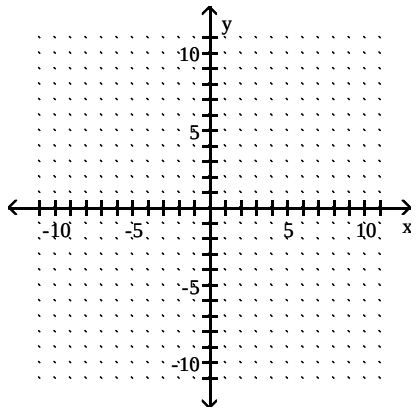
19) $x^2 + y^2 + 14y + 45 = 0$

19) _____

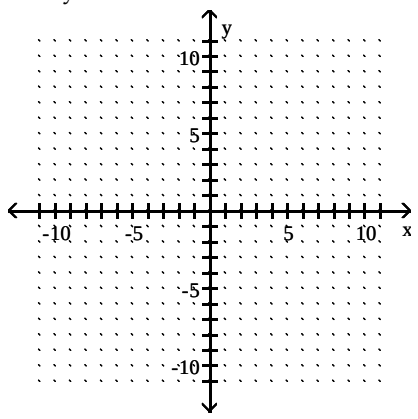


20) $x^2 + y^2 + 2x - 80 = 0$

20) _____



21) $x^2 + y^2 - 10x + 24 = 0$ 21) _____



Decide whether the relation is a function.

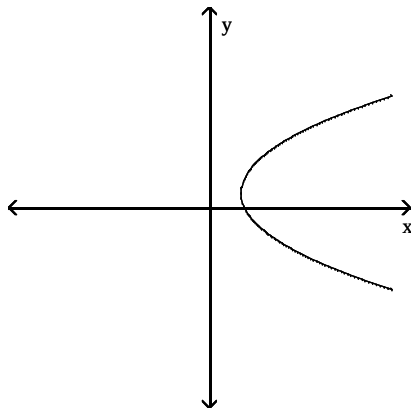
22) {(–2, 2), (1, –7), (5, –2), (8, –7), (11, –9)} 22) _____

23) {(–4, 1), (–3, –4), (1, 7), (1, 1)} 23) _____

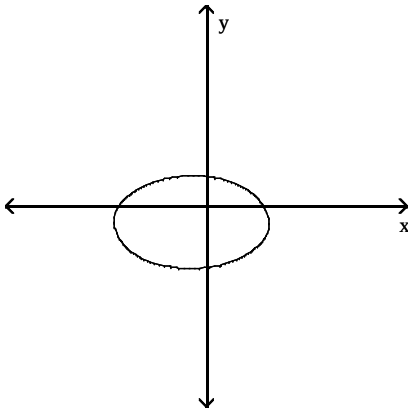
24) {(–5, 3), (–3, 5), (4, 2), (8, 3)} 24) _____

Use the vertical line test on the graph to determine if y is a function of x.

25) 25) _____



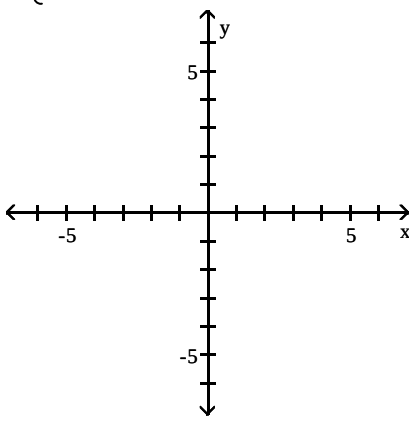
26) 26) _____



Graph the function.

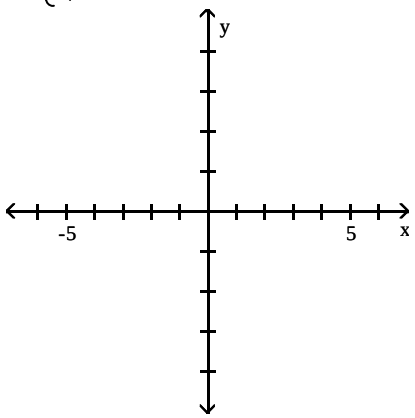
27) 27) _____

$$f(x) = \begin{cases} -x + 3 & \text{if } x < 2 \\ 2x - 3 & \text{if } x \geq 2 \end{cases}$$



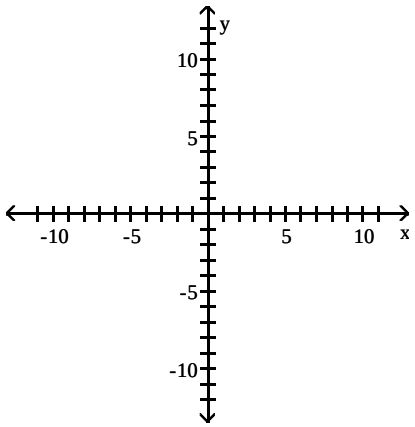
28) 28) _____

$$f(x) = \begin{cases} -x + 2 & x < 0 \\ \sqrt{x} + 3 & x \geq 0 \end{cases}$$



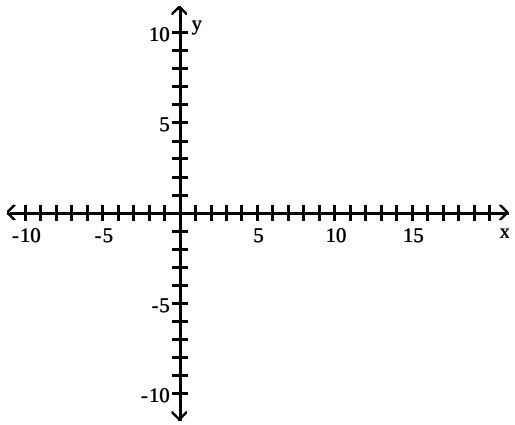
29) 29) _____

$$f(x) = \begin{cases} x + 3 & \text{if } -9 \leq x < 2 \\ -9 & \text{if } x = 2 \\ -x + 4 & \text{if } x > 2 \end{cases}$$



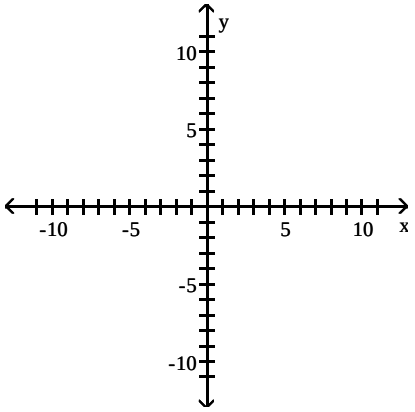
30) 30) _____

$$f(x) = \begin{cases} 1 & \text{if } -2 \le x < 5 \\ |x| & \text{if } 5 \le x < 8 \\ \sqrt{x} & \text{if } 8 \le x \le 11 \end{cases}$$

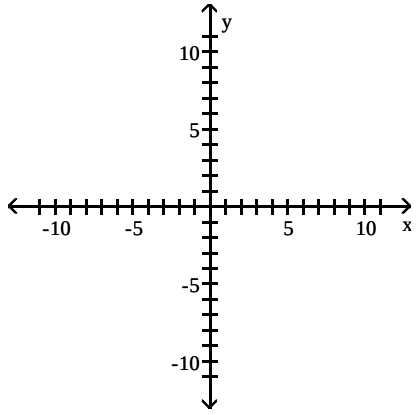


Graph the function by starting with the graph of the basic function and then using the techniques of shifting, compressing, stretching, and/or reflecting.

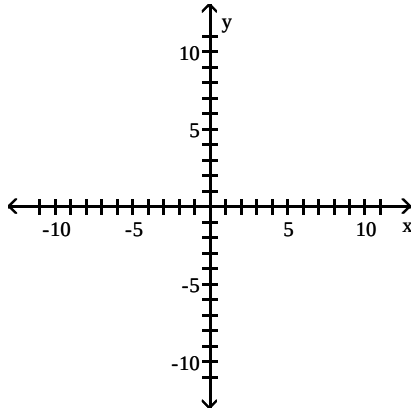
31) $f(x) = (x + 3)^3 - 5$ 31) _____



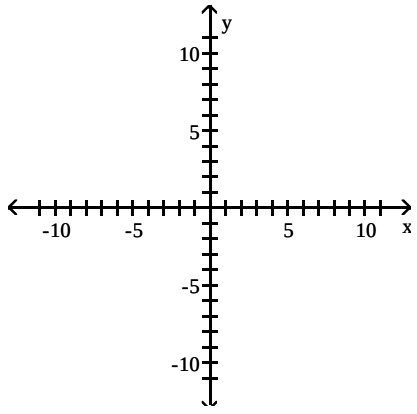
32) $f(x) = (x + 1)^3 - 2$ 32) _____



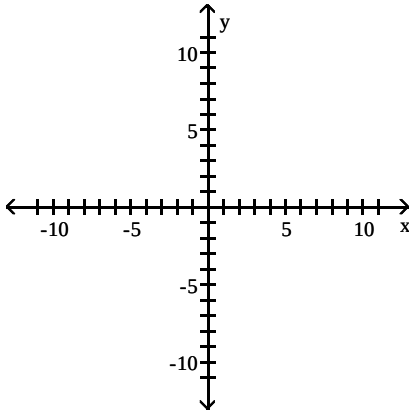
33) $f(x) = \sqrt{x} + 3$ 33) _____



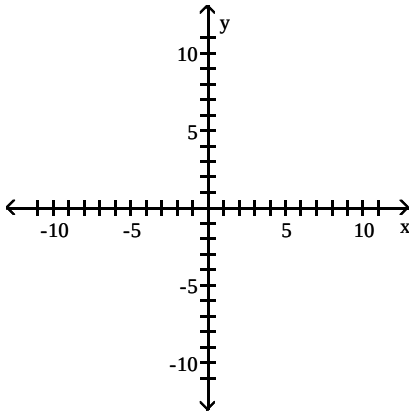
34) $f(x) = \sqrt{x} - 5$ 34) _____



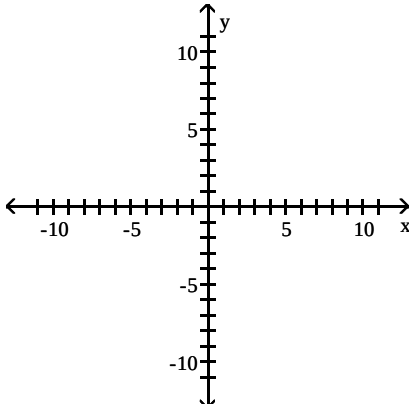
35) $f(x) = \sqrt{x - 5} - 6$ 35) _____



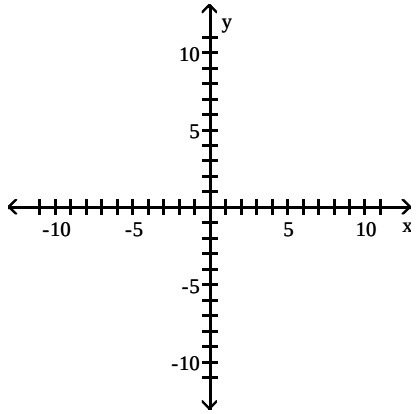
36) $f(x) = \sqrt{x + 3} - 2$ 36) _____



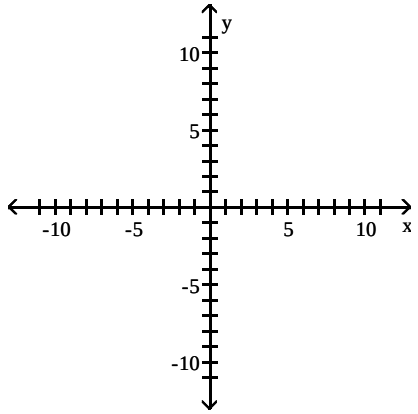
37) $f(x) = |x| - 3$ 37) _____



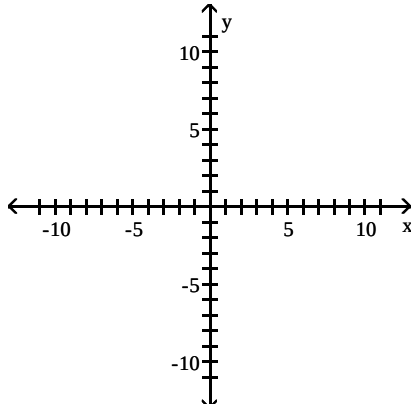
38) $f(x) = |x| - 4$ 38) _____



39) $f(x) = |x - 1| + 6$ 39) _____



40) $f(x) = |x + 7| + 4$ 40) _____



For the given functions f and g, find the requested function and state its domain.

41) $f(x) = 9x - 9;\ g(x) = 3x - 8$
Find $f - g$. 41) _____

42) $f(x) = 6x - 8;\ g(x) = 2x - 4$
Find $f - g$. 42) _____

43) $f(x) = 2x - 4;\ g(x) = 4x + 7$
Find $f \cdot g$. 43) _____

44) $f(x) = 9x - 4;\ g(x) = 3x - 9$
Find $f \cdot g$. 44) _____

45) $f(x) = 4x + 1;\ g(x) = 3x - 2$
Find $\frac{f}{g}$. 45) _____

46) $f(x) = 2x + 3;\ g(x) = 4x - 5$
Find $\frac{f}{g}$. 46) _____

47) $f(x) = x - 9;\ g(x) = 4x^2$
Find $f + g$. 47) _____

48) $f(x) = x + 3;\ g(x) = 6x^2$
Find $f + g$. 48) _____

Find the composite function for the given functions and state the domain.

49) $g \circ f$ for $f(x) = \frac{8}{x}$ and $g(x) = 9x^5$ 49) _____

50) $g \circ f$ for $f(x) = x^3 + 3$ and $g(x) = \sqrt[3]{x - 3}$ 50) _____

51) $f \circ g \circ h$ for $f(x) = \sqrt{x}$, $g(x) = \frac{x}{5}$, and $h(x) = 5x + 10$ 51) _____

52) $f \circ g \circ h$ for $f(x) = \sqrt{x}$, $g(x) = \frac{x}{2}$, and $h(x) = 2x + 4$ 52) _____

53) $h \circ g \circ f$ for $f(x) = \sqrt{x}$, $g(x) = \frac{x}{4}$, and $h(x) = 4x + 16$ 53) _____

54) $h \circ g \circ f$ for $f(x) = \sqrt{x}$, $g(x) = \frac{x}{2}$, and $h(x) = 2x + 8$ 54) _____

Find the domain of the composite function $f \circ g$.

55) $f(x) = 8x + 64$, $g(x) = x + 1$ 55) _____

56) $f(x) = 5x + 50$, $g(x) = x + 2$ 56) _____

57) $f(x) = \frac{3}{x + 9}$, $g(x) = \frac{54}{x}$ 57) _____

58) $f(x) = \frac{8}{x + 10}$, $g(x) = \frac{20}{x}$ 58) _____

59) $f(x) = 5x + 15$; $g(x) = \sqrt{x}$ 59) _____

60) $f(x) = 2x + 10$; $g(x) = \sqrt{x}$ 60) _____

Solve the problem.

61) At Allied Electronics, production has begun on the X–15 Computer Chip. The total revenue function is given by $R(x) = 60x - 0.3x^2$ and the total profit function is given by $P(x) = -0.3x^2 + 48x - 15$, where x represents the number of boxes of computer chips produced. The total cost function, C(x), is such that $C(x) = R(x) - P(x)$. Find C(x). 61) _____

62) At Allied Electronics, production has begun on the X–15 Computer Chip. The total revenue function is given by $R(x) = 43x - 0.3x^2$ and the total profit function is given by $P(x) = -0.3x^2 + 41x - 9$, where x represents the number of boxes of computer chips produced. The total cost function, C(x), is such that $C(x) = R(x) - P(x)$. Find C(x). 62) _____

63) At Allied Electronics, production has begun on the X–15 Computer Chip. The total cost function is given by $C(x) = 5x + 13$ and the total profit function is given by $P(x) = -0.3x^2 + 36x - 13$, where x represents the number of boxes of computer chips produced. The total revenue function, R(x), is such that $R(x) = C(x) + P(x)$. Find R(x). 63) _____

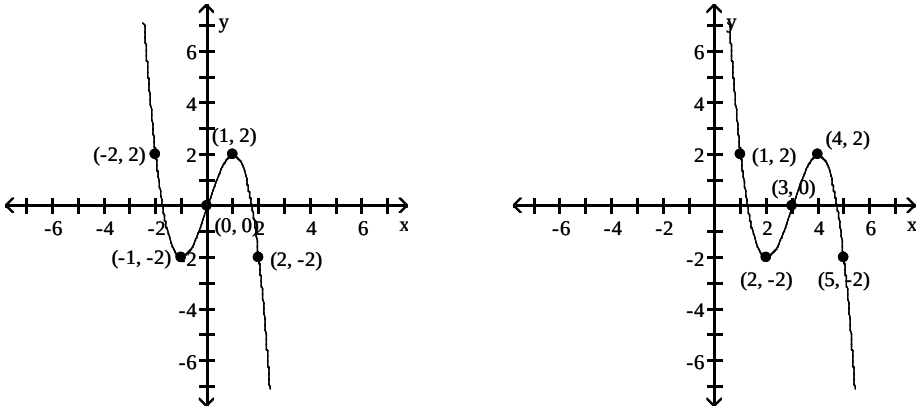
64) At Allied Electronics, production has begun on the X–15 Computer Chip. The total cost function is given by $C(x) = 6x + 10$ and the total profit function is given by $P(x) = -0.3x^2 + 49x - 10$, where x represents the number of boxes of computer chips produced. The total revenue function, R(x), is such that $R(x) = C(x) + P(x)$. Find R(x). 64) _____

65) A stone is thrown into a pond. A circular ripple is spreading over the pond in such a way that the radius is increasing at the rate of 2.9 feet per second. Find a function, r(t), for the radius in terms of t. Find a function, A(r), for the area of the ripple in terms of r. Find $(A \circ r)(t)$. 65) _____

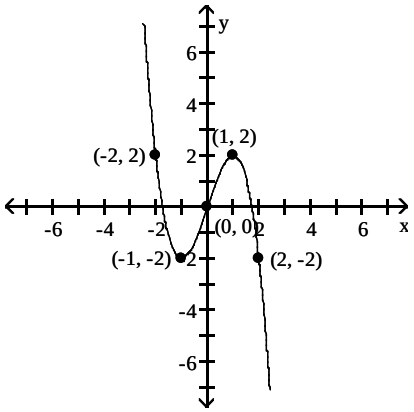
66) A stone is thrown into a pond. A circular ripple is spreading over the pond in such a way that the radius is increasing at the rate of 2.5 feet per second. Find a function, r(t), for the radius in terms of t. Find a function, A(r), for the area of the ripple in terms of r. Find $(A \circ r)(t)$. 66) _____

Given the graph of the function f(x), find a formula for g(x) in terms of f.

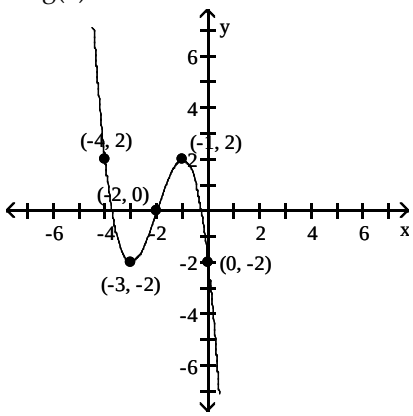
67) f(x) g(x) 67) _____



68) f(x)

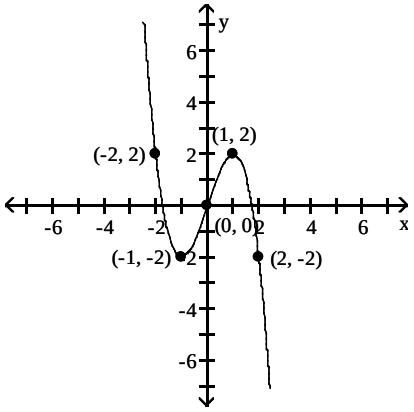


g(x)

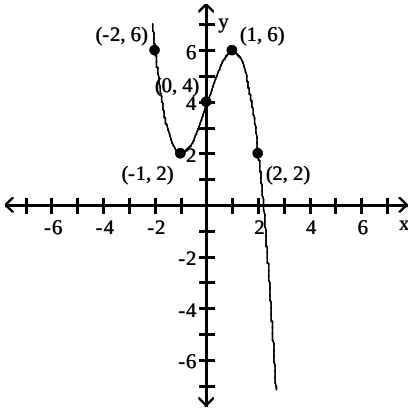


68) _____

69) f(x)

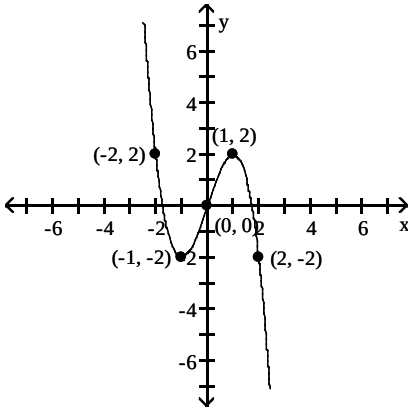


g(x)

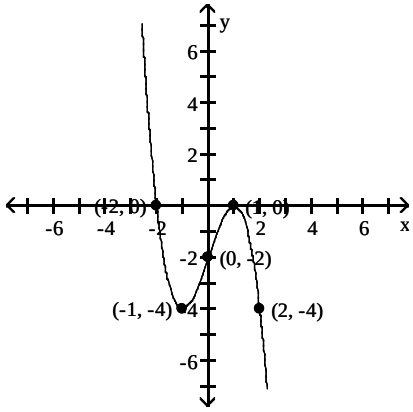


69) _____

70) f(x)

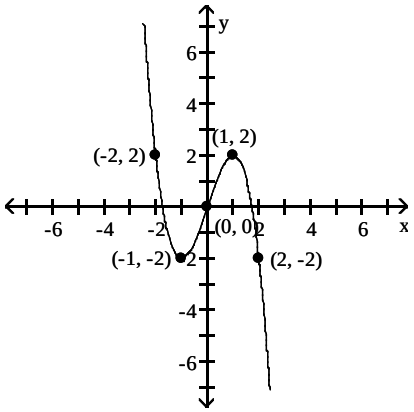


g(x)

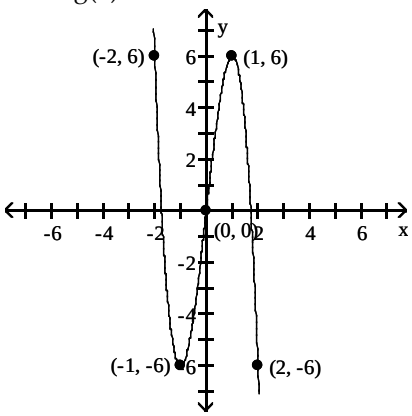


70) _____

71) f(x)



g(x)



71) _____

Determine whether the given function is even, odd, or neither.

72) $f(x) = x^3 - 5x$ 72) _____

73) $f(x) = x^3 - 3x$ 73) _____

74) $f(x) = 4x^2 + x^4$ 74) _____

75) $f(x) = 2x^2 + x^4$ 75) _____

76) $f(x) = x^4 - x^3$ 76) _____

77) $f(x) = x^3 - x^2$ 77) _____

78) $f(x) = -5x^5 + x^3$ 78) _____

79) $f(x) = -4x^5 + x^3$ 79) _____

80) $f(x) = x^3 + x^2 - 4$ 80) _____

81) $f(x) = x^3 + x^2 + 2$ 81) _____

Simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$ and $\frac{f(x) - f(a)}{x - a}$ for the following function.

82) $f(x) = 8x - 3$ 82) _____

83) $f(x) = 3x - 4$ 83) _____

84) $f(x) = 7x - 4$ 84) _____

85) $f(x) = 5x^2 + 7x + 1$ 85) _____

86) $f(x) = 5x^2 + 9x - 5$ 86) _____

87) $f(x) = 2x^2 + 7x + 1$ 87) _____

Write an equation that expresses the relationship. Use k as the constant of variation.

88) c varies inversely as f. 88) _____

89) x varies inversely as h. 89) _____

Determine the constant of variation for the stated condition.

90) g varies inversely as f, and $g = 6$ when $f = 12$. 90) _____

91) g varies inversely as f, and $g = 7$ when $f = 15$. 91) _____

Use the four–step procedure to solve the variation problem.

92) x varies inversely as v. $x = 16$ when $v = 8$. Find x when $v = 64$. 92) _____

93) x varies inversely as v. $x = 40$ when $v = 4$. Find x when $v = 32$. 93) _____

94) When the temperature stays the same, the volume of a gas varies inversely as the pressure of the gas. If a balloon is filled with 285 cubic inches of a gas at a pressure of 14 pounds per square inch, find the new pressure of the gas if the volume is decreased to 57 cubic inches. 94) _____

95) When the temperature stays the same, the volume of a gas varies inversely as the pressure of the gas. If a balloon is filled with 135 cubic inches of a gas at a pressure of 14 pounds per square inch, find the new pressure of the gas if the volume is decreased to 45 cubic inches. 95) _____

96) The amount of time it takes a swimmer to swim a race varies inversely as the average speed of the swimmer. A swimmer finishes a race in 37.5 seconds with an average speed of 4 feet per second. Find the average speed of the swimmer if it takes 50 seconds to finish the race. 96) _____

97) The amount of time it takes a swimmer to swim a race varies inversely as the average speed of the swimmer. A swimmer finishes a race in 25 seconds with an average speed of 6 feet per second. Find the average speed of the swimmer if it takes 50 seconds to finish the race. 97) _____

98) If the force acting on an object stays the same, then the acceleration of the object varies inversely as its mass. If an object with a mass of 24 kilograms accelerates at a rate of 2 meters per second per second by a force, find the rate of acceleration of an object with a mass of 8 kilograms that is pulled by the same force. 98) _____

99) If the force acting on an object stays the same, then the acceleration of the object varies inversely as its mass. If an object with a mass of 16 kilograms accelerates at a rate of 5 meters per second per second by a force, find the rate of acceleration of an object with a mass of 4 kilograms that is pulled by the same force. 99) _____

100) If the voltage in an electric circuit is held constant, the current varies inversely as the resistance. If the current is 200 milliamperes when the resistance is 5 ohms, find the current when the resistance is 20 ohms. 100) _____

101) If the voltage in an electric circuit is held constant, the current varies inversely as the resistance. If the current is 420 milliamperes when the resistance is 2 ohms, find the current when the resistance is 12 ohms. 101) _____

102) While traveling at a constant speed in a car, the centrifugal acceleration passengers feel while the car is turning varies inversely as the radius of the turn. If the passengers feel an acceleration of 8 feet per second per second when the radius of the turn is 60 feet, find the acceleration the passengers feel when the radius of the turn is 120 feet. 102) _____

103) While traveling at a constant speed in a car, the centrifugal acceleration passengers feel while the car is turning varies inversely as the radius of the turn. If the passengers feel an acceleration of 16 feet per second per second when the radius of the turn is 70 feet, find the acceleration the passengers feel when the radius of the turn is 280 feet. 103) _____

1) $\frac{4}{7}$

2) 7

3) undefined

4) undefined

5) 0

6) 0

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

8) $\left(2, \frac{7}{2}\right)$

9) $(1, 1)$

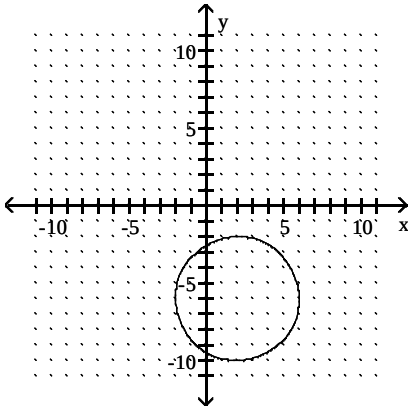
10) $\left(-\frac{11}{8}, \frac{4}{3}\right)$

11) $\left(\frac{2}{5}, \frac{1}{4}\right)$

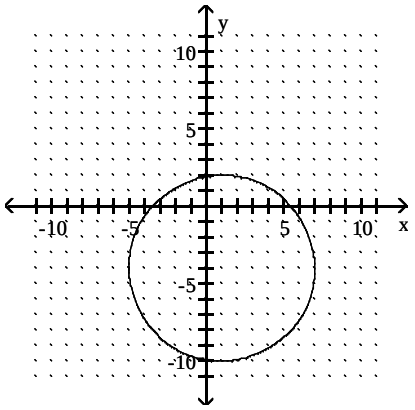
12) $\left(\frac{23\sqrt{6}}{2}, \frac{21\sqrt{5}}{2}\right)$

13) $\left(\frac{11\sqrt{7}}{2}, \frac{7\sqrt{2}}{2}\right)$

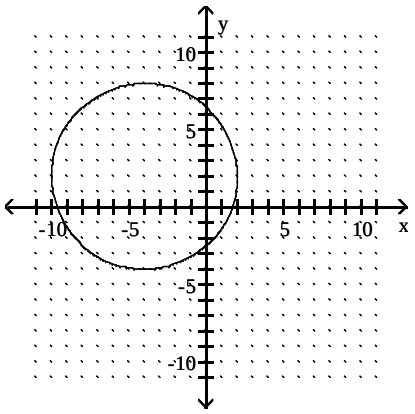
14) $(x-2)^2 + (y+6)^2 = 16$
center $(2, -6)$, $r = 4$



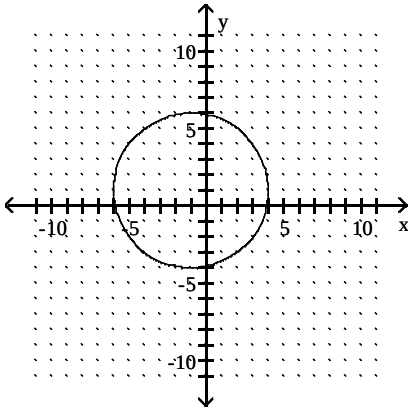
15) $(x-1)^2 + (y+4)^2 = 36$
center $(1, -4)$, $r = 6$



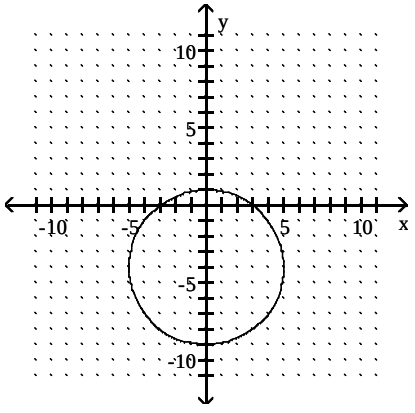
16) $(x + 4)^2 + (y - 2)^2 = 36$
center $(-4, 2)$, $r = 6$



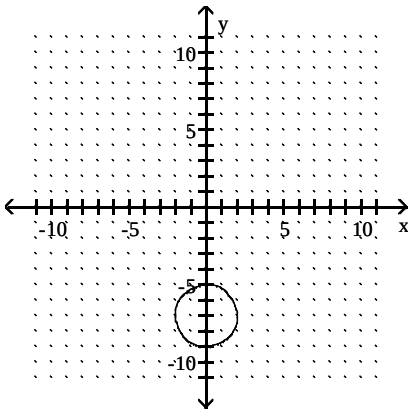
17) $(x + 1)^2 + (y - 1)^2 = 25$
center $(-1, 1)$, $r = 5$



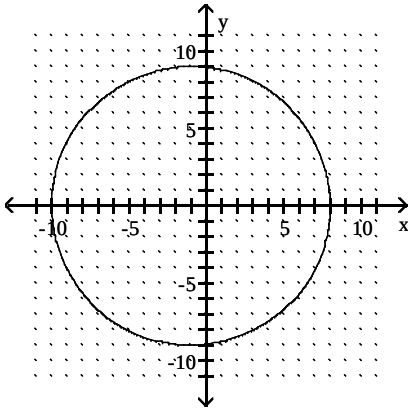
18) $x^2 + (y + 4)^2 = 25$
center $(0, -4)$, $r = 5$



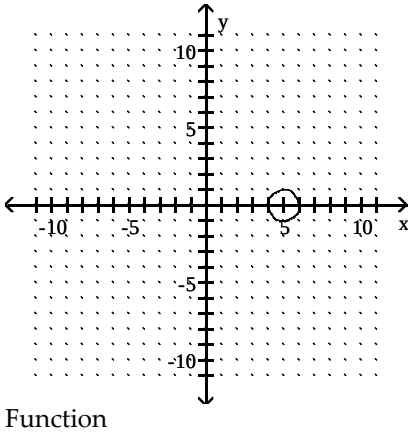
19) $x^2 + (y + 7)^2 = 4$
center $(0, -7)$, $r = 2$



20) $(x + 1)^2 + y^2 = 81$
center $(-1, 0)$, $r = 9$

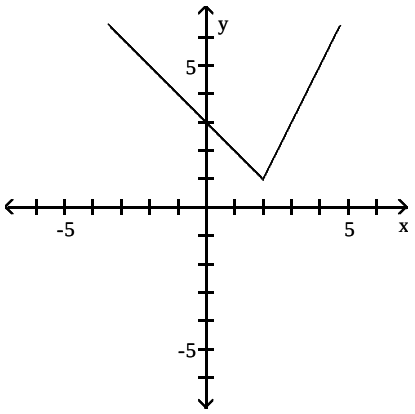


21) $(x - 5)^2 + y^2 = 1$
center $(5, 0)$, $r = 1$

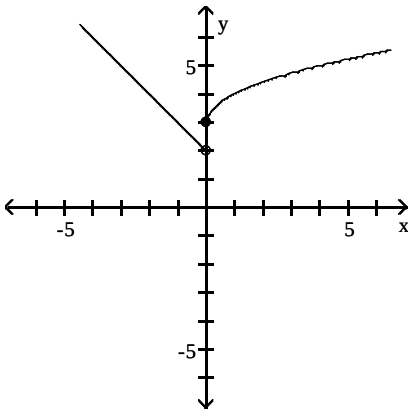


22) Function
23) Not a function
24) Function
25) Not a function
26) Not a function

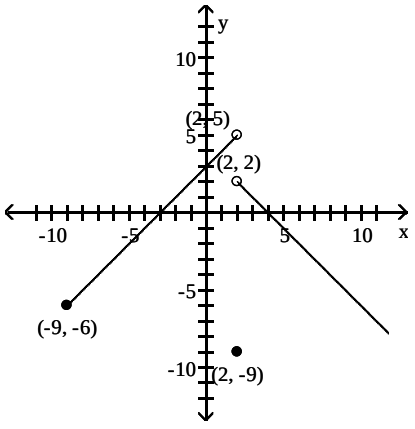
27)



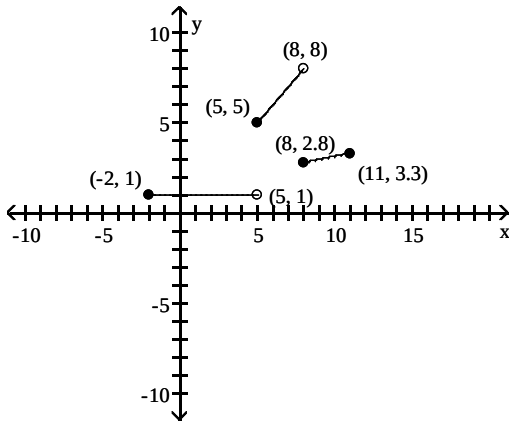
28)



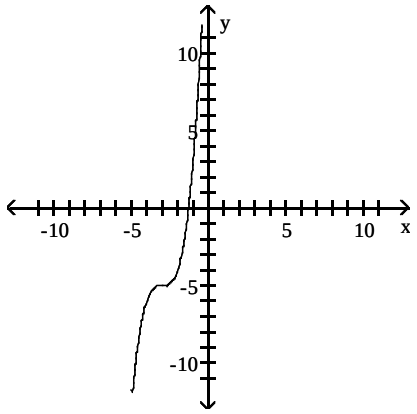
29)



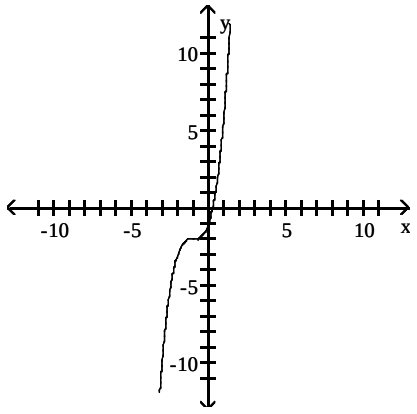
30)


y
x
10
5
-5
-10
-10
-5
5
10
15
(8, 8)
(5, 5)
(8, 2.8)
(11, 3.3)
(-2, 1)
(5, 1)

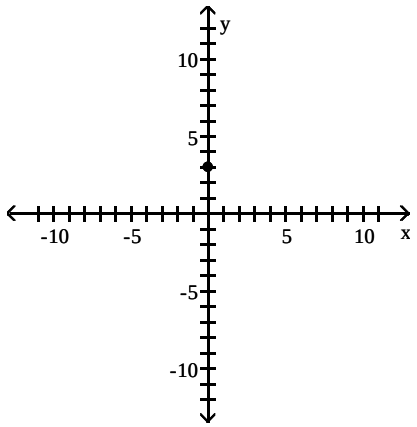
31)


y
x
10
5
-5
-10
-10
-5
5
10

32)


y
x
10
5
-5
-10
-10
-5
5
10

33)



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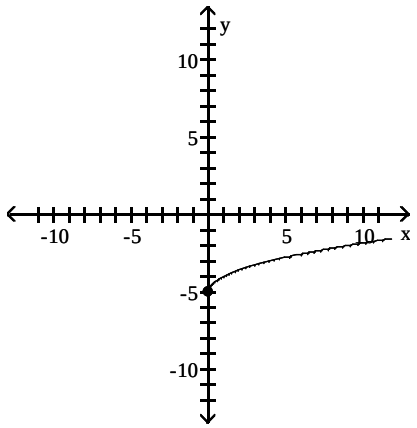
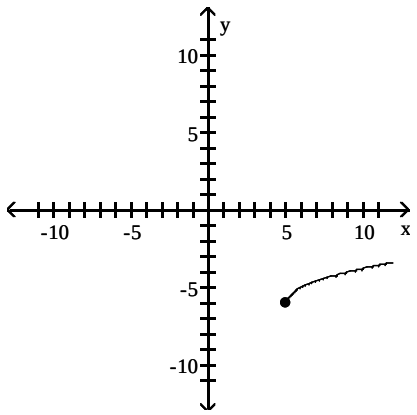
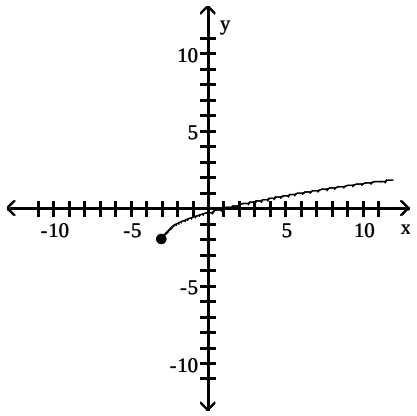


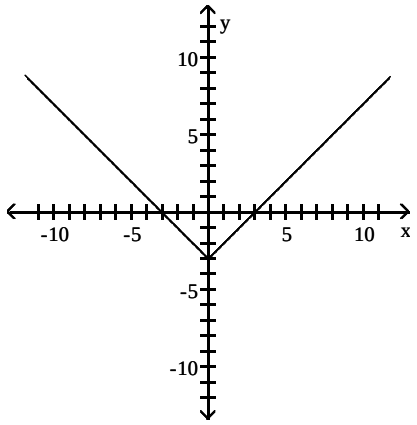
35)



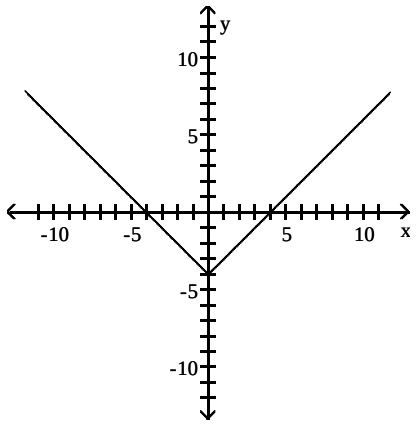
36)



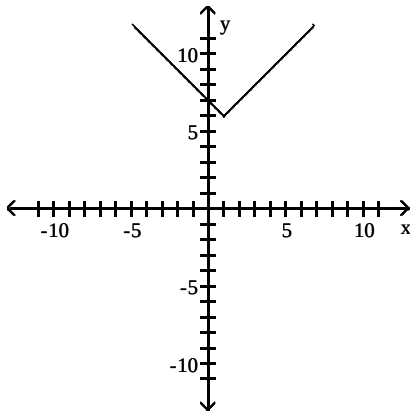
37)



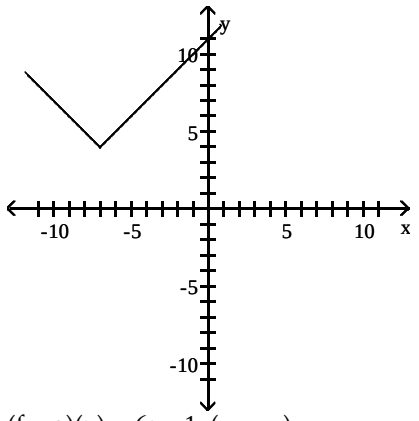
38)



39)



40)



41) $(f - g)(x) = 6x - 1$; $(-\infty, \infty)$

42) $(f - g)(x) = 4x - 4$; $(-\infty, \infty)$

43) $(f \cdot g)(x) = 8x^2 - 2x - 28$; $(-\infty, \infty)$

44) $(f \cdot g)(x) = 27x^2 - 93x + 36$; $(-\infty, \infty)$

45) $\left(\frac{f}{g}\right)(x) = \frac{4x + 1}{3x - 2}$; $\left(-\infty, \frac{2}{3}\right)$ or $\left(\frac{2}{3}, \infty\right)$

46) $\left(\frac{f}{g}\right)(x) = \frac{2x + 3}{4x - 5}$; $\left(-\infty, \frac{5}{4}\right)$ or $\left(\frac{5}{4}, \infty\right)$

47) $(f + g)(x) = 4x^2 + x - 9$; $(-\infty, \infty)$

48) $(f + g)(x) = 6x^2 + x + 3$; $(-\infty, \infty)$

49) $\frac{294,912}{x^5}$

50) x

51) $\sqrt{x + 2}$

52) $\sqrt{x + 2}$

53) $\sqrt{x} + 16$

54) $\sqrt{x} + 8$

55) $(-\infty, \infty)$

56) $(-\infty, \infty)$

57) $(-\infty, -6)$ or $(-6, 0)$ or $(0, \infty)$

58) $(-\infty, -2)$ or $(-2, 0)$ or $(0, \infty)$

59) $[0, \infty)$

60) $[0, \infty)$
61) $C(x) = 12x + 15$
62) $C(x) = 2x + 9$
63) $R(x) = 41x - 0.3x^2$
64) $R(x) = 55x - 0.3x^2$
65) $(A \circ r)(t) = 8.41\pi t^2$
66) $(A \circ r)(t) = 6.25\pi t^2$
67) $g(x) = f(x - 3)$
68) $g(x) = f(x + 2)$
69) $g(x) = f(x) + 4$
70) $g(x) = f(x) - 2$
71) $g(x) = 3f(x)$
72) Odd
73) Odd
74) Even
75) Even
76) Neither
77) Neither
78) Odd
79) Odd
80) Neither
81) Neither
82) 8
83) 3
84) 7
85) $10x + 5h + 7$
86) $10x + 5h + 9$
87) $4x + 2h + 7$
88) $c = \frac{k}{f}$
89) $x = \frac{k}{h}$
90) $k = 72$
91) $k = 105$
92) $x = 2$
93) $x = 5$
94) 70 pounds per square inch
95) 42 pounds per square inch
96) 3 feet per second
97) 3 feet per second
98) 6 meters per second per second
99) 20 meters per second per second
100) 50 milliamperes
101) 70 milliamperes
102) 4 feet per second per second
103) 4 feet per second per second