

REVIEW for FINAL

Intermediate Algebra Form 1102

Work these problems on separate paper.
Answers are provided.

1. Solve: $-7(y + 3) \geq -5$
2. Solve & express answer using i :
 $x^2 + 5x + 8 = 0$
- 3A. Find the LCD (least common denominator) for:
 $\frac{1}{8y}$, $\frac{1}{4y^2}$ and $\frac{1}{y^3}$
- 3B. Find $\log_3 81$
4. A kennel owner has an 80 foot roll of fencing to make a rectangular kennel. The kennel should be 6 feet longer than it is wide. Find the dimensions of the kennel. Show equation.
5. Solve the system:
 $2x - 9y = 1$
 $5x + 6y = 12$
6. Factor by grouping:
 $x^2y - xy - 2ax + 2a$
7. The rodent population in our city is currently estimated at 30,000. If it grows at the rate of 8.5% per year, when will the population reach 100,000? Use $P = P_0e^{kt}$, where P = population, P_0 = initial population, t = years, k = rate of change in decimal form.

8. Solve for x (to the nearest two decimal places):

$$3^{x+2} = 15$$

9. Factor completely:

$$48w^3 - 75wz^2$$

10. Solve for x and use complex number form if needed:

$$x^2 + x + 3 = 0$$

Use $y = -x^2 + 2x + 3$ to work the following two problems:

- 11A. Find the vertex.
- 11B. Sketch the graph.
12. Simplify to $a + bi$ form:
 $\frac{4 - 3i}{3 - 2i}$
13. Find the slope of the line whose equation is: $4x + 7y = 11$
14. Solve for x and check for extraneous solutions:
 $\sqrt{3x+1} + x = 9$
15. One painter can paint a room in 5 hours. Another painter can finish the job in 8 hours. How long will it take them if they work together? Round to the nearest two places. Show equation.
16. Simplify: $\sqrt[3]{128a^6b^4}$

17. Simplify:

$$\frac{3w^2}{w^2 - 25} \cdot \frac{w^2 - 2w - 15}{9w^2 + 27w}$$
18. In a grassy park in the shape of a rectangle, dogs are wearing a diagonal path from the gate in one corner to the opposite corner. One side of the park is 16 feet longer than the other side. The diagonal path is 80 feet long. What are the dimensions of the park? Show equation.
19. Find the inverse of the function $y = f(x)$ given by: $13 - 7x = 3y$
20. If $f(x) = 5x + 2$ and $g(x) = 3x^2 - 7$, find $f(g(x))$

Use $2x + 3y = 6$ to work the following two problems:

- 21A. Sketch the graph.
- 21B. Find the slope.
22. Solve for x and check for extraneous solutions:

$$\frac{3}{x + 1} - \frac{x - 2}{2} = \frac{x - 2}{x + 1}$$
23. Complete the square to find the center and radius of the circle with equation:

$$x^2 + 8x + y^2 + 2y = -13$$
24. Find an equation for the line passing through points $(-2, 11)$ and $(1, 13)$
25. Solve for x: $5 > 3x - 4 > -19$

26. Write as a sum or difference of logs: $\log\left(\frac{\sqrt[3]{x}}{y^4 z^2}\right)$
27. Simplify and write the answer without negative exponents:

$$\left(\frac{7k^{-3}m^2}{k^6m^{-8}}\right)^4$$
28. Find the value of $f(-5)$ for the function:

$$f(x) = 12x^2 + 19x - 21$$
29. Solve for x and check for extraneous solutions:

$$\log_2 x + \log_2(x + 2) = 3$$
30. Debra needs 8000 liters of a 35% solution of hydrogen chloride. How many liters of a 40% solution and how many liters of a 20% solution will she use? Show equation(s).
31. Find x: $\log_2 x = -5$
32. Write this expression with a fractional exponent as a radical expression:

$$w^{\frac{4}{7}}$$
33. A pilot can fly a plane 600 miles with the wind in the same time she can fly 450 miles against the wind. If the speed of the wind is 25 mph, what is the rate of the plane in still air? Show equation.

34. Solve for t in the literal equation:

$$A = P(1 + rt)$$

35. Add and simplify your final answer:

$$\frac{4}{x-1} + \frac{4x}{x^2 - 3x + 2}$$

36. Simplify the complex fraction:

$$\frac{\frac{1}{a} + \frac{1}{2}}{\frac{1}{2} - \frac{2}{a^2}}$$

37. Divide:

$$\frac{2x^3 - 13x^2 + 9x + 16}{x - 5}$$

38. Simplify the rational expression:

$$\frac{2x^2 - 12x}{6x^2 - 32x - 24}$$

39. Simplify: $\sqrt{112} + \sqrt{63} - 2\sqrt{7}$

40. Multiply and simplify:

$$(\sqrt{3} - 4)^2$$

41. Multiply and simplify:

$$\sqrt{2x^3y} \sqrt{32x^2y}$$

42. Solve by addition:

$$2x + y = 4$$

$$3x - 4y = 17$$

43. Solve by substitution:

$$x - 3y = 7$$

$$y = x - 5$$

44. Factor :

$$6x^2 + x - 15$$

45. Factor:

$$16x^2 - 49$$

46. Factor:

$$15x^2y^3 + 20x^2y - 45xy^2$$

47. Solve for x:

$$4x^2 + 8x - 5 = 0$$

48. Solve for x: $\sqrt{x+2} - 3 = 6$

49. Simplify the radical:

$$\sqrt{432x^{11}y^6}$$

50. Solve for x: $e^{3x} = 5$

51. Solve for x:

$$\log_3(x - 7) = 2$$

52. Find the inverse of the function:

$$f(x) = \sqrt[3]{x+4}$$

53. What is the definition of a function?

54. Multiply the complex numbers:

$$(3 - 4i)(1 + 2i)$$

55. Divide using long division:

$$x + 2 \overline{)x^2 + 8x + 6}$$

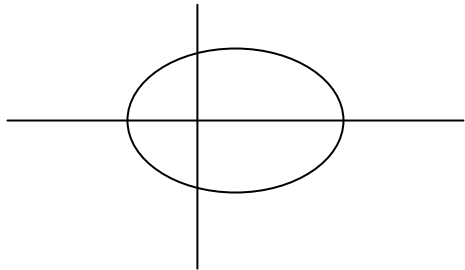
56. Divide using synthetic division:

$$\frac{x^3 - 2x^2 + 4x - 3}{x - 3}$$

57. Write the equation of a line parallel to the y-axis and passing through the point (5, 3).

58. Determine whether the lines are parallel, perpendicular or neither, if their equations are:
 $3x - 2y = 6$ and $4x + 6y = 6$

59. Determine whether or not the graph can be that of a function:



60. Find the equation of a line passing through the point (-4, 5) and parallel to the line with equation $x - 3y = 7$.

61. Graph the inequality $2x + y > 6$.

62. A local band charges a fixed fee of \$300 plus \$25 per hour for performing at a wedding. Write a linear equation for the total cost, C , in terms of the number of hours, h , that they play.

63. Find the slope of the line through the points (7, -3) and (-5, 1).

64. Use the relation to answer the questions:
 $\{(1, -3), (2, 6), (3, -9), (4, 12), (1, 20)\}$
(a) State the domain and range of the relation.
(b) Decide whether or not the relation is a function.

65. Find the x-intercept and the y-intercept of the line:
 $6x - 4y = 12$

66. Solve the system of equations:
 $2x - y = 4$
 $6x - 3y = 10$

67. For $f(x) = x^2 + 3x$ and $g(x) = x - 2$ find $f(g(x))$.

68. Using the definition $pH = -\log[H^+]$ where $[H^+]$ is the hydrogen ion concentration, find the pH of coffee with a hydrogen ion concentration of:
 $[H^+] = 5 \times 10^{-6}$

69. Using the definition in #68, find the hydrogen ion concentration of lemonade having a pH of 3.5

70. The average score on a test for a group of students retested after t weeks is given by:
 $S(t) = 81 - 6\ln(t + 1)$. Find the average score on the retests after 10 weeks.

71. Write the equation for a circle with center (-3, 2) and radius 5.

72. Multiply and simplify:
 $3x^2(x - 4)^2$

73. Simplify:
 $5x^2 - 8x + 2 - (x^2 - 4x) + 10x - 3(4 + x)$

74. Solve for x :
 $2x - 3(x + 2) = 4(5 - x) + 7$

75. Find the vertex of the parabola with equation: $y = x^2 + 4x + 10$
76. Find the minimum value of the function: $f(x) = x^2 - 2x + 4$
77. Simplify: $((6 - \sqrt{-8}) - (4 - \sqrt{-32}))$
78. Solve this system of linear equations:
- $$\begin{cases} x + y + 2z = 6 \\ 2x + y - z = -4 \\ x - 2y + z = 0 \end{cases}$$
79. For a play, 360 tickets were sold. Reserved seat tickets sold for \$12 each, and general admission tickets sold for \$8 each. Receipts from the sale totaled \$3,340. Find the number of general admission tickets sold. Show equation(s).
80. Write $4 \ln x + 2 \ln y - 3 \ln z$ as a single logarithm with coefficient of 1.
81. Evaluate: $27^{\frac{2}{3}}$
82. Solve for x : $2^{-x+6} = 32^x$
83. $A = A_0 e^{-0.5t}$ is the equation that gives the decay of a radioactive substance. The amount of the substance at the beginning is A_0 , and the amount after t years is A . Find the half-life (time for half of the substance to decay) correct to the nearest thousandth.
84. A plane took 1 hour longer to travel 560 miles on the first portion of a flight than it took to fly 480 miles on the second portion. The speed of the plane was the same for both portions. What was the flying time for the second portion of the trip? Show equation(s).
85. An inlet pipe can fill a tank in 12 hours. An outlet pipe can drain the same tank in 48 hours. How long will it take to fill the tank if both valves are open at the same time? Show equation.
86. The width of a garden is 2 ft less than its length. The area of the garden is 80 ft^2 . Find the length and width of the garden. Show equation.
87. Elena throws a ball into the air from a building. The equation $h = -16t^2 + 32t + 48$ gives the height h of the ball t seconds after it is thrown. When does the ball hit the ground?
88. We need a 20% antifreeze solution in the truck. We already have 8 liters of 10% solution. How many liters of a 60% solution must we add to get what we need?
89. Graph the following equation:
 $y = (x - 3)^2 + 2$
90. Graph the following equation:
 $y = x^2 - 4$

91. Find the equation of the circle given the following: Center at $(-3, 0)$ and radius 9

92. Find the center and radius of the circle with equation:

$$(x + 3)^2 + (y - 1)^2 = 16$$

93. Graph the following by finding the center and radius:

$$9x^2 + 9y^2 = 144$$

94. Graph the following function:

$$y = 2^{x-1}$$

95. Graph the following function:

$$y = e^{2x}$$

96. Graph the following function:

$$y = \log_{10} x$$

97. Graph the following function:

$$y = \log_3(x + 1)$$

98. Given the function:

$$g = \{(-1,2), (0,3), (1,2)\}$$

(a) Find the inverse of the function.

(b) Is the inverse a function?

99. Given that $f(x) = \frac{7 - 4x}{6}$

find the inverse.

100. Given the function:

$$g = \{(-3,7), (0,4), (2,5), (4,1)\}$$

(a) Is this a one-to-one function?

(b) Is the inverse a function?

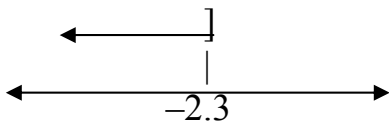
101. Simplify and write the answer without negative exponents:

$$\frac{(5x^2 y^{-3})^{-2}}{5(x^{-2} y^3)^3}$$

ANSWERS REVIEW FINAL
INTERM. ALGEBRA Form 1102

1. $y \leq -\frac{16}{7}$
 or $(-\infty, -\frac{16}{7}]$

or



2. $\frac{-5}{2} \pm \frac{\sqrt{7}}{2} i$

3A. $8y^3$

3B. 4

4. 17 ft by 23 ft
 $80 = 2(w + 6) + 2w$

5. $x = 2, \quad y = \frac{1}{3}$

6. $(xy - 2a)(x - 1)$

7. about 14 years

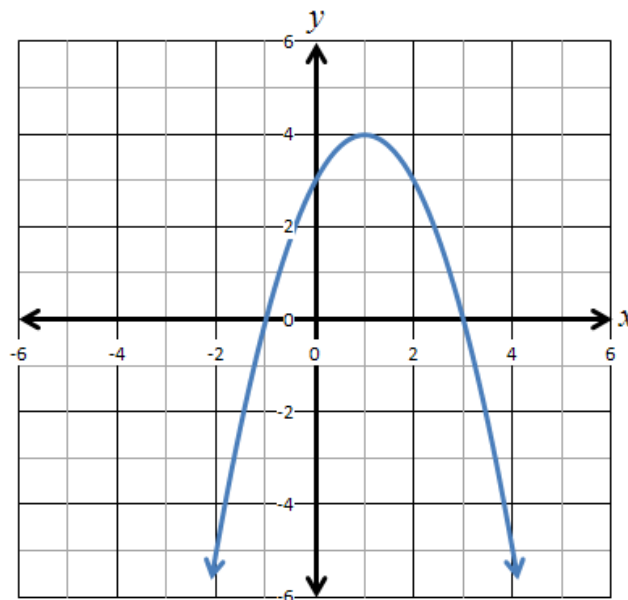
8. 0.46

9. $3w(4w + 5z)(4w - 5z)$

10. $\frac{-1}{2} \pm \frac{\sqrt{11}}{2} i$

11A. vertex (1,4)

11B. $\frac{x|y}{1|4}$
 $\frac{0|3}{2|3}$
 $\frac{3|0}{-1|0}$



12. $\frac{18}{13} - \frac{1}{13} i$

13. $\frac{-4}{7}$

14. 5

15. $\frac{40}{13}$ or $3\frac{1}{13}$ or 3.08 hours

16. $4a^2b \sqrt[3]{2b}$

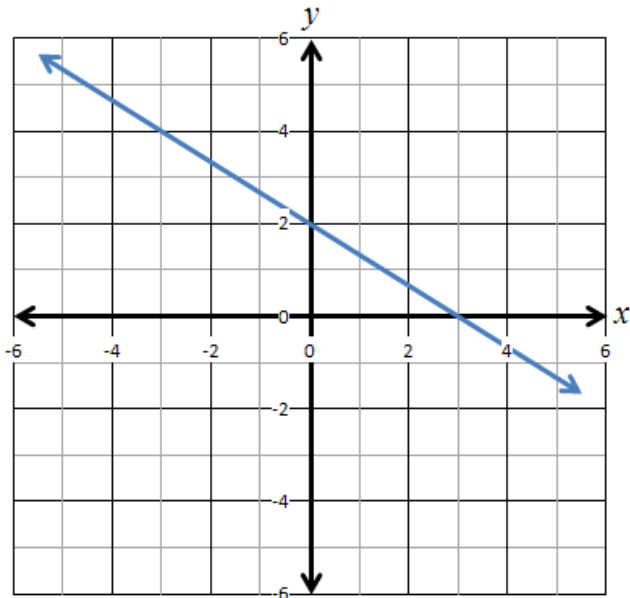
17. $\frac{w}{3(w + 5)}$

18. 64 ft by 48 ft
 $x^2 + (x + 16)^2 = 80^2$

19. $y = \frac{13 - 3x}{7}$

20. $15x^2 - 33$

21A.
$$\begin{array}{r} \underline{x|y} \\ 0|2 \\ 3|0 \\ 6|-2 \end{array}$$



21B. $m = \frac{\text{rise}}{\text{run}} = \frac{-2}{3}$

22. -4 or 3

23. center $(-4, -1)$
radius 2

24. $y = \frac{2x}{3} + \frac{37}{3}$

25. $-5 < x < 3$

26. $\frac{1}{3} \log x - 4 \log y - 2 \log z$

27. $\frac{7^4 m^{40}}{k^{36}}$

28. 184

29. $x = 2$

30. 6000 liters of 40%,
2000 liters of 20%
 $x + y = 8000$
 $.40x + .20y = .35(8000)$

31. $\frac{1}{32}$

32. $\sqrt[7]{w^4}$

33. 175 mph

34. $t = \frac{A - P}{rP}$

35. $\frac{8}{x - 2}$

36. $\frac{a}{a - 2}$

37. $2x^2 - 3x - 6 + \frac{-14}{x - 5}$

38. $\frac{x}{3x + 2}$

39. $5\sqrt{7}$

40. $19 - 8\sqrt{3}$

41. $8x^2y\sqrt{x}$

42. (3, -2)

43. (4, -1)

44. $(3x + 5)(2x - 3)$

45. $(4x + 7)(4x - 7)$

46. $5xy(3xy^2 + 4x - 9y)$

47. $\frac{1}{2}, \frac{-5}{2}$

48. 79

49. $12x^5y^3\sqrt{3x}$

50. 0.536

51. 16

52. $f^{-1}(x) = x^3 - 4$

53. Solution: A function is a rule that assigns to each input value “x” from the domain, exactly one output value “y” from the range.

54. $11 + 2i$

55. $x + 6 + \frac{-6}{x + 6}$ or $x + 6$ R -6

56. $x^2 + x + 7 + \frac{18}{x - 3}$

or $x^2 + x + 7$ R 18

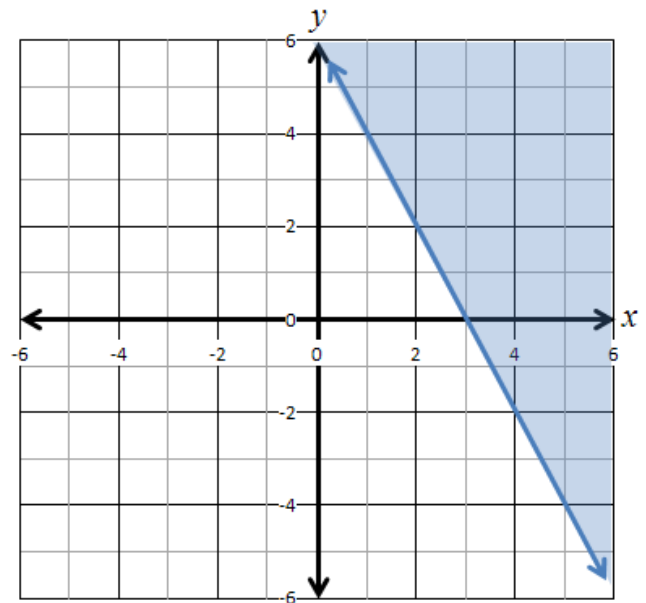
57. $x = 5$

58. perpendicular

59. No, it fails the vertical line test.

60. $x - 3y = -19$

61.



62. $C = 25h + 300$

63. $m = -\frac{1}{3}$

64. (a) Dom = {1, 2, 3, 4}

Range = {-3, 6, -9, 12, 20}

(b) Not a function.

65. x-int: (2, 0) y-int: (0, -3)

66. Inconsistent – no solution

67. $x^2 - x - 2$

68. 5.301

69. 3.2×10^{-4}

70. 66.6

71. $(x+3)^2 + (y-2)^2 = 25$

72. $3x^4 - 24x^3 + 48x^2$

73. $4x^2 + 3x - 10$

74. $x = 11$

75. $(-2, 6)$

76. 3

77. $2 + 2i\sqrt{2}$

78. $(-1, 1, 3)$

79. 245
 $8x + 12(360 - x) = 3340$

80. $\ln \frac{x^4 y^2}{z^3}$

81. 9

82. 1

83. About 1.386 yr

84. $\frac{560}{t+1} = \frac{480}{t}$ and $t = 6$ hr.

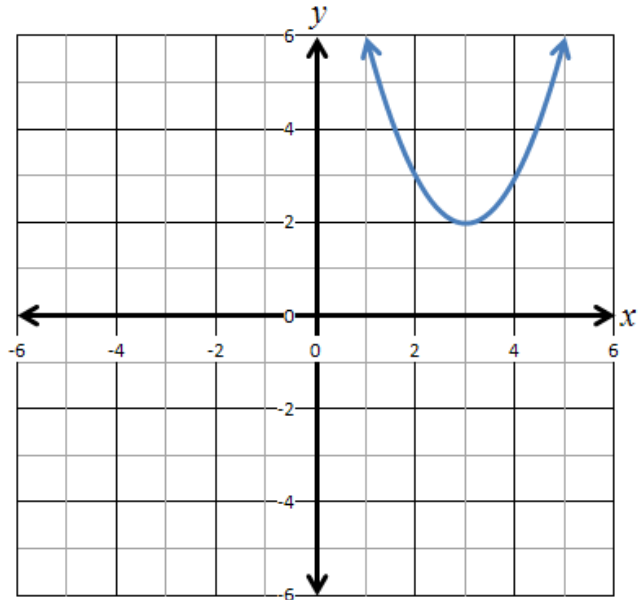
85. $\frac{1}{12} - \frac{1}{48} = \frac{1}{x}$ and $x = 16$ hr

86. $80 = l(l - 2)$
length = 10 ft, width = 8 ft

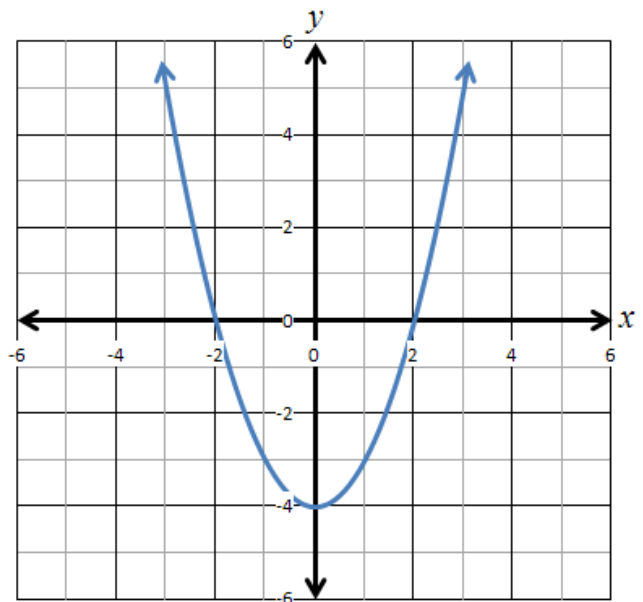
87. $-16t^2 + 32t + 48 = 0$
 $t = 3$ sec

88. $.10(8) + .60(x) = .20(x+8)$
 $x = 2$ liters of 60% antifreeze

89.



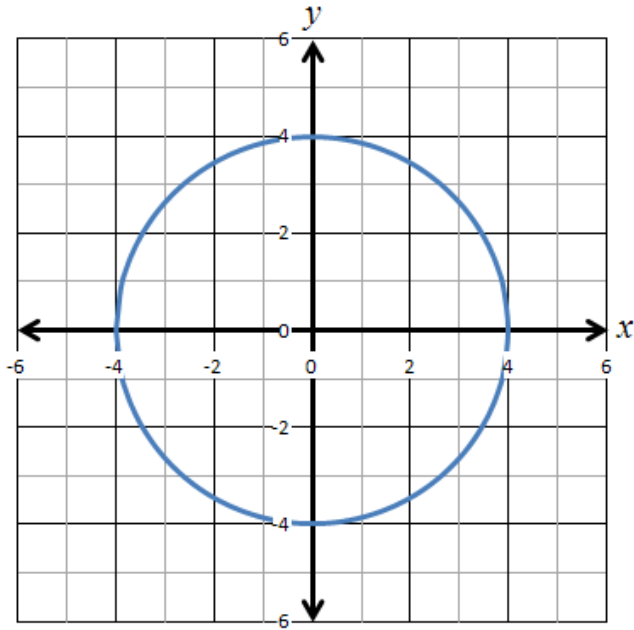
90.



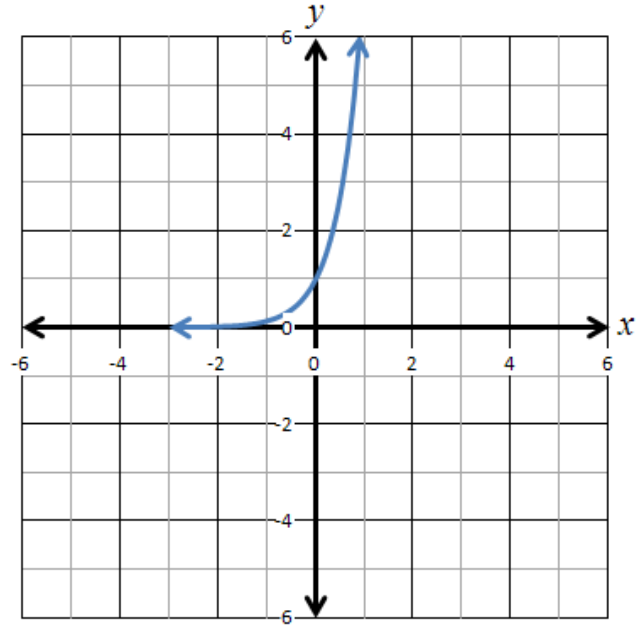
91. $(x + 3)^2 + y^2 = 81$

92. center $(-3, 1)$, radius 4

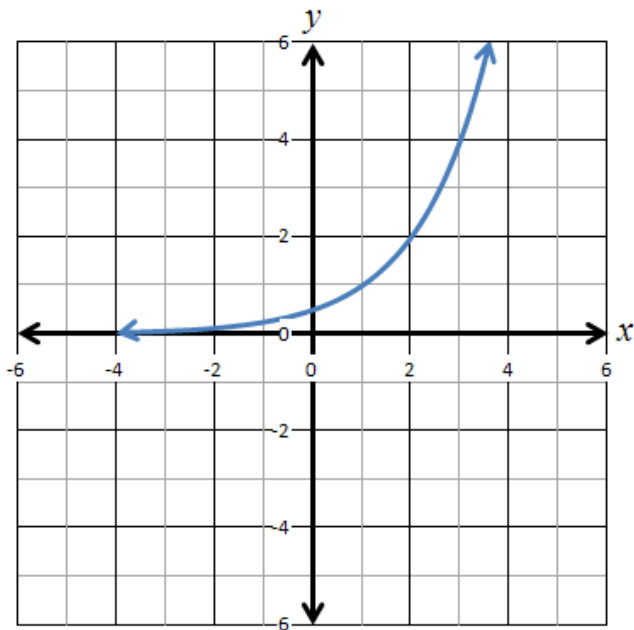
93. Center: $(0,0)$, radius: 4



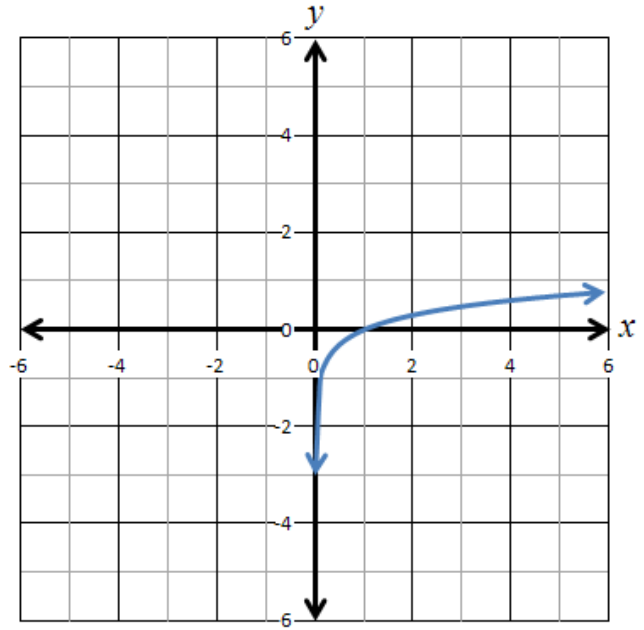
95.



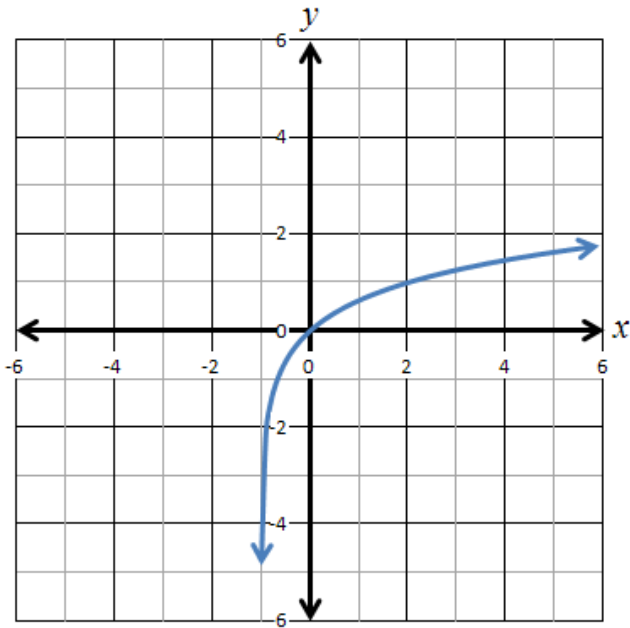
94.



96.



97.



98. (a) inverse = $\{(2,-1), (3,0), (2,1)\}$

(b) not a function

99. $\text{inv } f = f^{-1}(x) = \frac{7 - 6x}{4}$

100. (a) yes, one-to-one

(b) yes. Inverse is a function

101. $\frac{x^2}{5^3 y^3}$