

2014 Oak Park Back to School Packet for incoming 12th graders.
Please show all work in the space provided for each question.

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 1. Which equation is the slope-intercept form of the equation $2x + 8y = 35$?
- a. $8y = 35 - 2x$
 - b. $y = -\frac{1}{4}x + \frac{35}{8}$
 - c. $x = \frac{35 - 8y}{2}$
 - d. $y = \frac{35 - 2x}{8}$
- _____ 2. What is the inverse of the function $f(x) = 8x + 3$?
- a. $f^{-1}(x) = \frac{x+3}{8}$
 - b. $f^{-1}(x) = \frac{x-3}{8}$
 - c. $f^{-1}(x) = \frac{1}{8x+3}$
 - d. $f^{-1}(x) = \frac{1}{-8x-3}$
- _____ 3. If the graph of the line $y = x$ is shifted up by 2 units, what would be the equation of the new line?
- a. $y = \frac{1}{2}x$
 - b. $y = \frac{1}{2}x + 2$
 - c. $y = \frac{1}{2}x - 2$
 - d. $y = x + 2$
- _____ 4. When are two lines parallel?
- a. When both lines have a deflection
 - b. When both lines have the same x -intercept
 - c. When both lines have the same y -intercept
 - d. When both lines have the same slope

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_____ 5. The function $f(x) = |x - 7|$ is an example of what type of function?

- a. Absolute Value Function
- b. Linear Function
- c. Linear Inequality
- d. Inequality Function

_____ 6. What is the point of intersection of the equations in this system?

$$\begin{cases} y = 4x - 11 \\ y = -2x + 7 \end{cases}$$

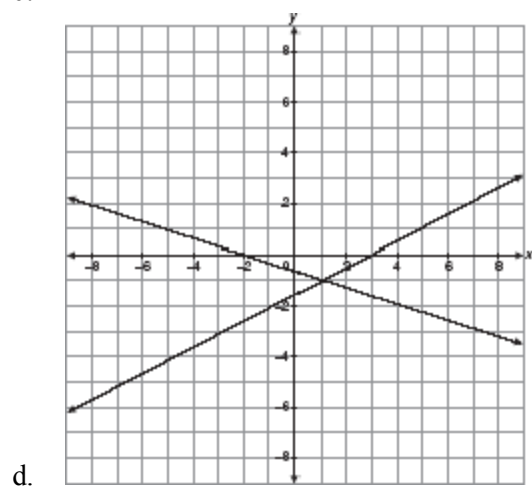
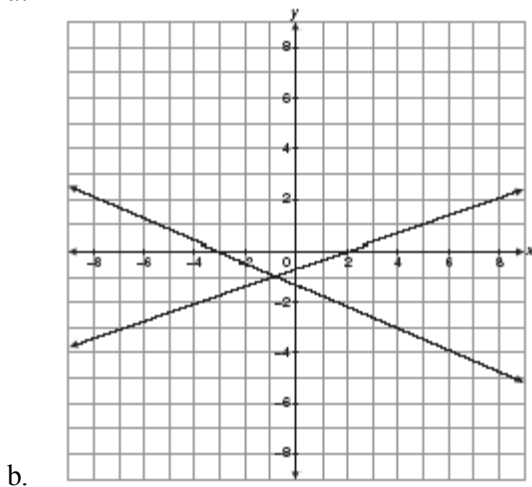
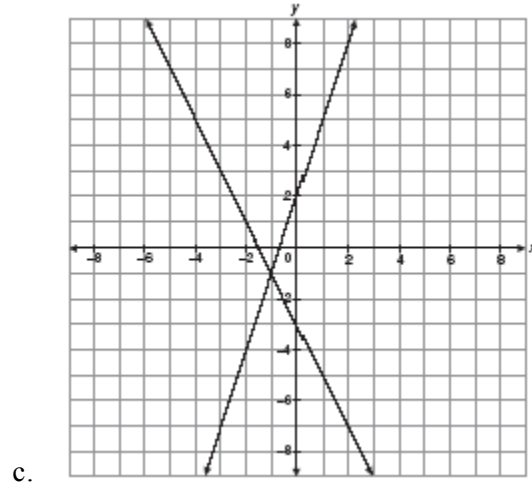
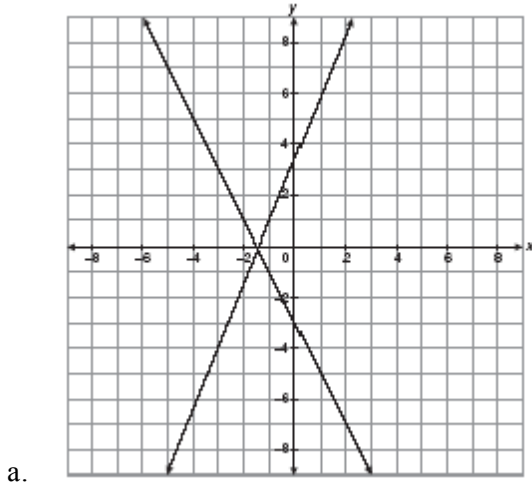
- a. (1, 3)
- b. (3, 1)
- c. (2, 4)
- d. (4, 2)

_____ 7. What is the value of the determinant $\begin{vmatrix} 3 & 2 \\ 7 & 1 \end{vmatrix}$?

- a. -11
- b. -1
- c. 14
- d. 17

_____ 8. Which graph represents the following system of equations?

$$\begin{cases} y = -2x - 3 \\ y = 3x + 2 \end{cases}$$



_____ 9. What point represents the solution to the following system of equations?

$$\begin{cases} -\frac{2}{3}x + y = -2 \\ x + \frac{3}{2}y = 9 \end{cases}$$

- a. (2, 3)
- b. (3, 2)
- c. (2, 6)
- d. (6, 2)

_____ 10. What ordered pair satisfies both inequalities?

$$\begin{cases} y \geq 3x - 4 \\ y \geq 2x + 3 \end{cases}$$

- a. (1, 1)
- b. (3, 9)
- c. (2, -5)
- d. (4, 3)

_____ 11. Which of the following ordered triples is the solution to the system of equations?

$$\begin{cases} 2x + 2y - z = 8 \\ 3x - 2y + 3z = 2 \\ 2x + 4y - z = 12 \end{cases}$$

- a. (2, 2, -1)
- b. (2, 2, 0)
- c. (5, 0, 2)
- d. (5, 2, 2)

_____ 12. The length of a field is 12 meters more than its width. Which expression represents the area of the field if w is the width of the field?

- a. $w - 12$
- b. $w + 12$
- c. $w^2 + 12$
- d. $w^2 + 12w$

_____ 13. Which quadratic function is represented by the data in the table?

x	y
-2	22
0	0
1	-5
3	-3

- a. $y = x^2 + 5x - 2$
- b. $y = 2x^2 - 7x$
- c. $y = 2x^2 + 9$
- d. $y = x^2 + x$

_____ 14. Which is the factored form of $6x^2 - 13x + 5$?

- a. $(3x + 5)(2x + 1)$
- b. $(3x - 5)(2x - 1)$
- c. $(6x - 1)(x + 5)$
- d. $(6x + 5)(x - 1)$

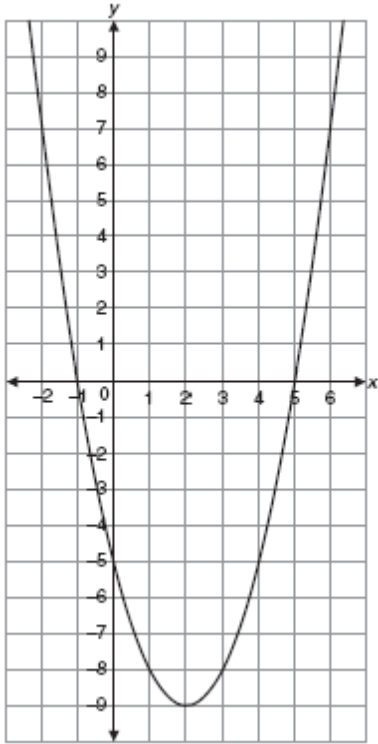
_____ 15. Which equation could you use to solve $0 = 4x^2 - 3x - 2$?

- a. $x = \frac{-3 \pm \sqrt{3^2 - 4(4)(2)}}{2(4)}$
- b. $x = \frac{-3 \pm \sqrt{(-3)^2 - 4(4)(2)}}{2(4)}$
- c. $x = \frac{3 \pm \sqrt{(-3)^2 - 4(-4)(2)}}{2(4)}$
- d. $x = \frac{3 \pm \sqrt{(-3)^2 - 4(4)(-2)}}{2(4)}$

_____ 16. The height of a soccer ball t seconds after it is kicked vertically is defined by the equation $s = -16t^2 + 60t$. How high will the ball be after 2 seconds?

- a. 56 feet
- b. 88 feet
- c. 184 feet
- d. 1144 feet

_____ 17. This graph represents which of the following equations?



- a. $y = (x - 2)^2$
- b. $y = (x + 1)(x - 5)$
- c. $y = (x - 1)(x + 5)$
- d. $y = (x + 5)(x - 4)$

_____ 18. Which of the following is the solution to the equation $x^2 - 1 = 0$?

- a. $x = 1$
- b. $x = -1$
- c. $x = \pm 1$
- d. No real solution

_____ 19. What is the square of $4 - 7i$?

- a. $33 + 56i$
- b. $-33 + 56i$
- c. $-33 - 56i$
- d. $33 - 56i$

- _____ 20. Calculate the difference: $(6i + 7) - (5 + 4i)$.
- a. $1 + 3i$
 - b. $1 - 3i$
 - c. $2 - 2i$
 - d. $2 + 2i$
- _____ 21. What is equal to i^5 ?
- a. i
 - b. $-i$
 - c. 1
 - d. -1
- _____ 22. Calculate $\sqrt{-9}$.
- a. $3i$
 - b. $-3i$
 - c. 3
 - d. -3
- _____ 23. What is the sum of the polynomials $6x^3 - 2x^4 + 9$ and $-2x^4 + 3x + 3$?
- a. $4x^7 + x^5 + 3x + 12$
 - b. $-4x^4 + 6x^3 + 3x + 12$
 - c. $4x^3 + x^4 + 3x + 12$
 - d. $4x + x^3 + 3x + 12$
- _____ 24. What is the difference when you subtract $5x^2 + 3x + 2x^5$ from $3x^3 + 4x^5 + 5x^4$?
- a. $-2x + x^4 + 3x$
 - b. $-2x^3 + x^5 + 3x^4$
 - c. $2x^5 + 5x^4 + 3x^3 - 5x^2 - 3x$
 - d. $6x^5 + 5x^4 + 3x^3 + 5x^2 + 3x$
- _____ 25. Which are the zeros of the function $f(x) = x^2 + 3x - 10$?
- a. $2, -5$
 - b. $5, -2$
 - c. $3, -10$
 - d. $10, -3$

_____ 26. Which is equal to $\frac{g(x)}{r(x)}$, if $g(x) = 3x^3 - 2x^2 + 5x + 1$ and $r(x) = x - 2$?

a. $3x^2 + 4x + 13 + \frac{27}{x-2}$

b. $3x^2 + x + 5 + \frac{1}{x-2}$

c. $3x^2 + 10x + 3 + \frac{25}{x-2}$

d. $3x^2 + 6x + 8 + \frac{2}{x-2}$

_____ 27. Which expression is equivalent to $\left(\frac{3x^3y^5}{2x^4y^2}\right)^4$?

a. $\frac{3y^3}{2x}$

b. $\frac{3xy^2}{2}$

c. $\frac{81y^{12}}{16x^4}$

d. $\frac{81y^3}{16x}$

_____ 28. Which answer is equal to $343^{\frac{2}{3}}$?

a. 7

b. 49

c. $228\frac{2}{3}$

d. $13072\frac{1}{9}$

_____ 29. Which is equivalent to $\log_5 2 + 4 \log_5 x - 3 \log_5 y$?

- a. $\log_5 \frac{8x}{3y}$
- b. $\log_5 (2 + x^4 - y^3)$
- c. $7 \log_5 2xy$
- d. $\log_5 \frac{2x^4}{y^3}$

_____ 30. Which expression is equal to $\left(\frac{2x^{11}}{3y^{-4}}\right)^0$?

- a. 0
- b. 1
- c. $\left(\frac{2x^{11}}{3y^{-4}}\right)$
- d. $\left(\frac{2x^{11}y^4}{3}\right)$

_____ 31. Which expression is equivalent to $\sqrt[9]{a^2b}$?

- a. $a^{18}b^9$
- b. $a^{11}b^{10}$
- c. $a^{\frac{2}{9}}b^{\frac{1}{9}}$
- d. $a^{\frac{9}{2}}b^9$

_____ 32. Calculate: $\frac{3x^2y}{4xy^3} \div \frac{3xy}{2x^2y}$.

- a. $\frac{x^2}{2y^2}$
- b. $\frac{2x}{y^2}$
- c. $\frac{2x^2}{y}$
- d. $\frac{2xy}{3}$

_____ 33. Calculate: $\frac{16x^3 - 4x}{3x + 12} \div \frac{4x - 2}{9x^2 - 144}$.

a. $\frac{4x(2x + 1)}{x + 4}, x \neq -4$

b. $\frac{2(2x + 1)(x - 4)}{x + 4}, x \neq -4$

c. $4x^3 - 16x^2 - 8$

d. $6x(2x + 1)(x - 4)$

_____ 34. Simplify: $-\sqrt{x^{16}}$.

a. x^4

b. $\pm x^8$

c. x^8

d. $-x^8$

_____ 35. Calculate the sum: $(2 + 4i) + (7 + 11i)$.

a. $9 - 15i$

b. $9 + 15i$

c. 24

d. $24i$

_____ 36. Which equation is equivalent to $\log_5 x = 3$?

a. $5^3 = x$

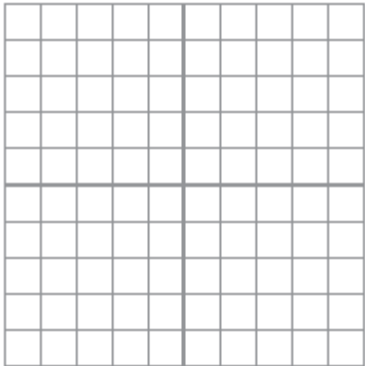
b. $3^5 = x$

c. $x^3 = 5$

d. $x^5 = 3$

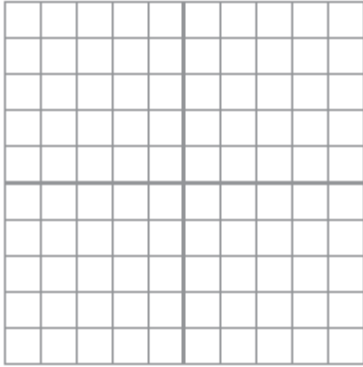
Short Answer**Each answer is graded on the following rubric.****4 pts - completely correct****3 pts - minor error(s)****2 pts - little understanding but work shown****1 pt - attempted problem with minimal understanding 0 pts - no response**

37. Graph the equation $y = -2x + 2$.



38. Determine the equation of the line in SLOPE-INTERCEPT FORM that passes through the points (4,6) and (1,3).
39. Determine the equation of the line that is PERPENDICULAR to the line $y = 2x + 5$ and passes through the point (8, 4).
40. Determine the INVERSE of the function $f(x) = -5x$.
41. Solve $2(3x - 4) = -10$
42. Find the x - and y -intercepts and the slope of $4x - 12y = 28$.
43. Determine the equation of the line that is PARALLEL to the line $y = 8x + 6$ and passes through the point $(-4, -3)$.
44. What is the slope of the line that passes through the points (10, 5) and (6, 2)?

45. a. Graph the equation $y = 3x$.



- b. If the graph of $y = 3x$ is shifted up 5 units, write the equation of the new graph, and graph the new equation on the same coordinate plane.
46. Determine the equation of the line that passes through the points $(-2, -5)$ and $(-3, -6)$.
47. What is the slope of the line that passes through the points $(10, -5)$ and $(-6, -2)$?
48. Use any method to find the point of intersection for the system of linear equations.

$$\begin{cases} 4x - 7y = -6 \\ y = -x + 4 \end{cases}$$

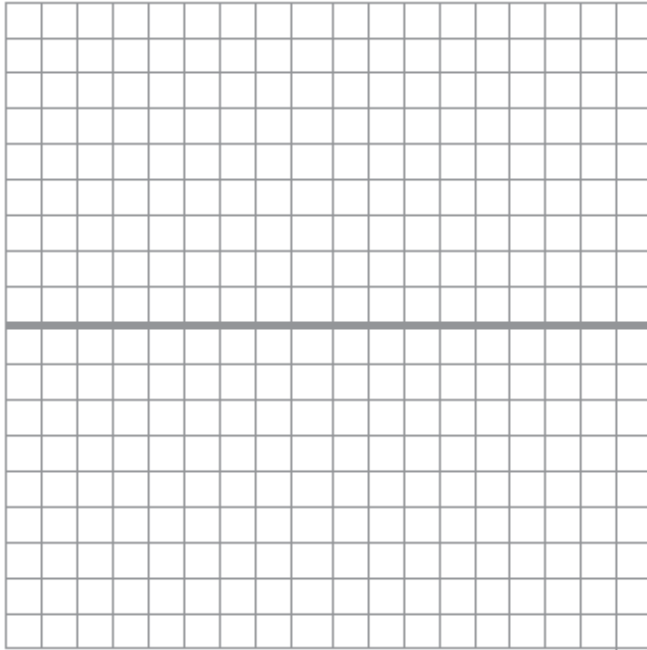
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49. Graph the following system of linear equations. Then find the point of intersection.

$$\begin{cases} y = 3x - 5 \\ y = -5x + 3 \end{cases}$$

Point of intersection =



50. For the following systems, choose a method for solving and find its solution,

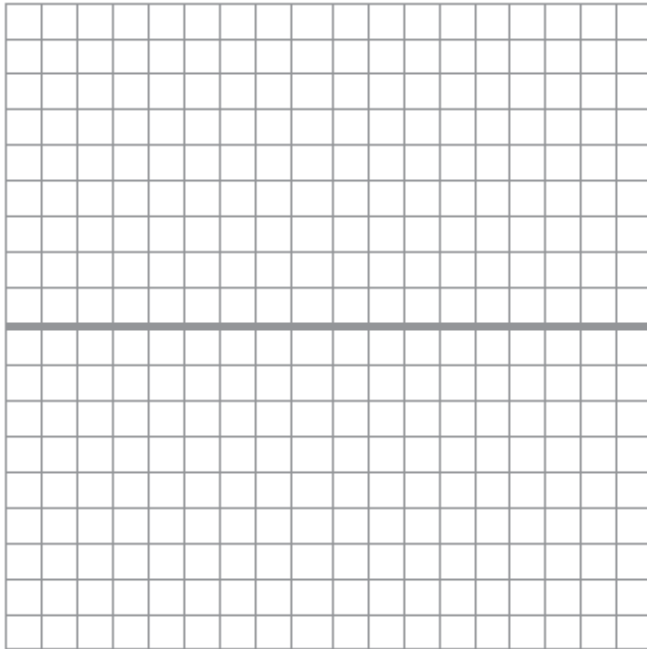
$$\begin{cases} 4x - y = 3 \\ y = -5x + 15 \end{cases}$$

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51. Graph the following system of linear inequalities to determine the solution set. Shade the solution region appropriately.

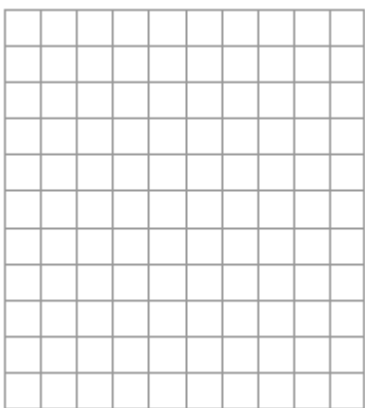
$$\begin{cases} y \leq -3x \\ y > 5x + 8 \end{cases}$$



52. For the following problems, use the function $y = x^2 - 9$.

a. Complete the table and graph the function.

x	y
0	
1	
-2	
3	
-4	



b. Identify the vertex. c. Find the axis of symmetry. d. Find the x - and y -intercepts.

53. Multiply: $(4x + 5)(x + 2)$.

54. Factor : $3x^2 + 7x - 20$

55. The height of a golf ball t seconds after it is hit is defined by the equation $s = -16t^2 + 100t$.

How high will the golf ball be after 3 seconds?

56. Multiply: $(x - 3)(3x - 2)$.

57. Solve by factoring: $5x^2 + 25x = 0$.

58. Multiply.

a. $(x - 8)(x + 6)$

b. $(4x - 7)(9x - 8)$

c. $(6x + 1)^2$

59. Solve by factoring: $8x^2 - 72 = 0$.

60. Multiply. **a.** $(x-6)(x+8)$

b. $(5x-3)(3x+5)$

61. Solve using the quadratic formula: $3x^2 + 10x - 12 = 0$.

62. Simplify: $81^{\frac{3}{4}}$.

63. Solve the equation.

$$x^2 + 6x + 15 = 0$$

64. Solve the equation.

$$x^2 + 10x + 35 = 0$$

65. Calculate the product: $(3 + 2i)(5 - 3i)$.

66. Simplify: $5[3 + 2(x - 5) + (8 + 3x)] - 6$.

67. Calculate the quotient: $\frac{15 + 4i}{2 - 3i}$.

68. Calculate the product: $(4 + 3i)(2 + 8i)$.

69. Calculate the quotient: $\frac{13 + 2i}{4 + 5i}$. REMEMBER: use the conjugate.

70. Solve using long division: $x - 5 \overline{) 3x^2 - 17x + 10}$.

71. Solve using long division: $x - 3 \overline{) 4x^2 - 11x - 3}$.

72. Solve using synthetic division: $\frac{x^4 - 3x^3 + 6x + 14}{x - 2}$.

73. Determine the zeros of the polynomial: $f(x) = x^3 + 9x$.

74. Complete the table for this function: $f(x) = -3x^3 + 2x^2 + 5x - 6$.

x	$f(x)$
1	
2	
3	

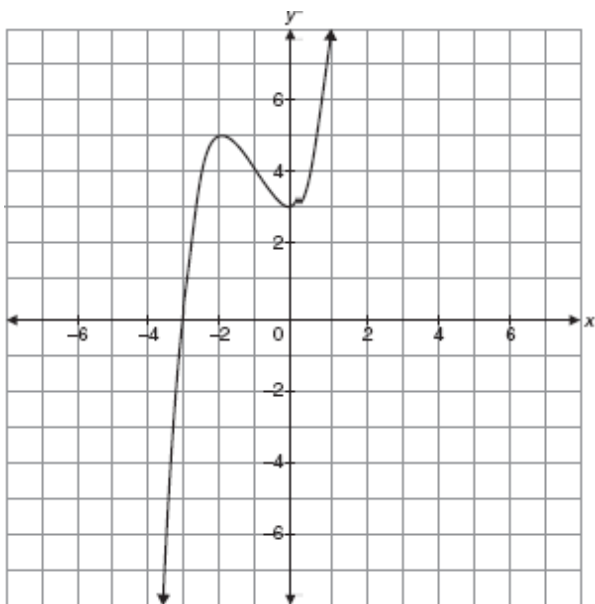
75. For $f(x) = -3x^2(x-4)^2(x+1)$, calculate the zeros and the multiplicity of each zero and determine in which quadrants $f(x)$ starts and ends.

Zeros and multiplicity of each:

Starts in which quadrant:

Ends in which quadrant:

76. Identify the following for the function sketched here. If a requested value does not exist, explain why.



a. Domain b. Range c. Real zeros d. Rel mins) e. Relative maximum(s)

77. Simplify to a single log: $10 \log y - 2 \log x + 6 \log z$.

78. Simplify the following expression using the properties of exponents and eliminating negative exponents:

$$\left(5x^{-2}y^{\frac{1}{3}}\right)^{-3} \left(16^{-\frac{3}{4}}x^{-1}y\right)^2.$$

79. Simplify to a single logarithmic function:
- $2(\ln x - \ln 5) + (\ln 7 - \ln x)$
- .

80. Calculate the following sum. (Make sure to list the restrictions for the denominators.)

$$\frac{3}{x+2} + \frac{5}{x-3}$$

81. Calculate the product:
- $\frac{4x^2y^3}{12x^3y^2} \cdot \frac{3ab^2}{9a^2b}$
- .

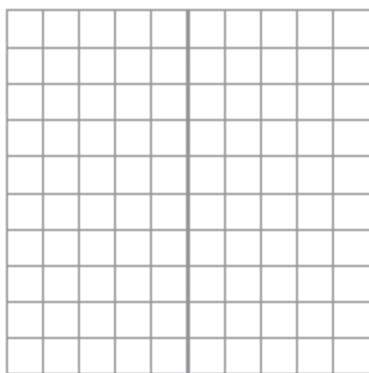
82. Solve the rational equation:
- $\frac{3}{x} - 4 = 7$
- .

83. Solve the rational equation:
- $\frac{2}{x} - 6 = \frac{3}{x}$
- .

84. Simplify the following rational expression. (Make sure to list the restrictions for the denominator.)

$$\frac{6x^2 - 30x + 24}{x - 4}$$

85. Graph the function:
- $f(x) = \frac{3}{x+2}$
- .



- What is the domain of this function? Range?
- What are its asymptotes?
- Describe the graph's "end behavior."

86. Simplify each radical .

a. $\sqrt{27y^2}$

b. $\sqrt{32x^4y^8}$

87. Simplify each expression.

a. $4\sqrt{16x^2}$

b. $1.8\sqrt{x} - 3.6\sqrt{x} + 4.1\sqrt{x} + 7.3\sqrt{x}$

c. $3.9\sqrt{x} + 4.3\sqrt{x} + 8.7\sqrt{8}$

d. $3\sqrt{y} + 9\sqrt{y} - 5\sqrt{y}$

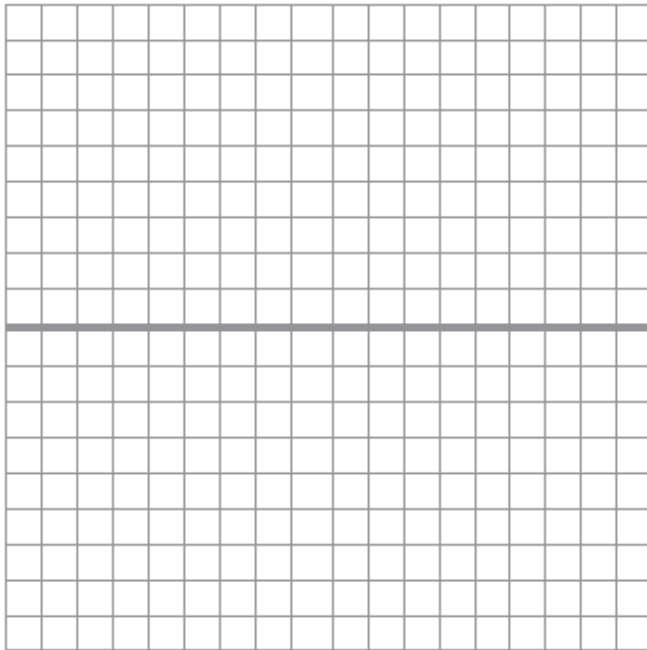
e. $(3\sqrt{16x^3})(6\sqrt{25x})$

f. $(4\sqrt{x^4y^2})(4^3\sqrt{x^4y^2})$

88. Graph the equations. Then find the point of intersection.

$$\begin{cases} y = 4x + 1 \\ y = -2x + 7 \end{cases}$$

Point of intersection =



89. Determine the point of intersection for the system of linear equations.

$$\begin{cases} 2x - 5y = 1 \\ y = -2x + 7 \end{cases}$$

90. Factor each polynomial.

a. $2x^2 + 3x - 5$

b. $4x^2 - 8x + 4$

c. $9x^2 - 121$

91. Solve by factoring: $12x^2 + 7x - 12 = 0$.

92. Solve using the quadratic formula: $-2x^2 - 6x + 9 = 0$.

93. Multiply: $(5x - 2)(3x + 2)$.

94. Solve by factoring: $3x^2 + 19x - 40 = 0$.

95. Solve using the quadratic formula: $x^2 + 4x - 3 = 0$.

96. Calculate the difference: $(6 + 3i) - (4 + 5i)$.

97. Solve using synthetic division: $\frac{x^4 + 2x^3 - 5x - 9}{x - 2}$.

98. Simplify to a single log: $7 \log z + 9 \log y - 2 \log x$.

99. Simplify the following expression using the properties of exponents: $\left(\frac{4x^3y^8}{7x^8y^4}\right)^2 \cdot \left(\frac{2x^9y}{x^5y^6}\right)\left(\frac{1}{x}\right)^4$.

100. Simplify the following expression using the properties of exponents and eliminating negative exponents:

$$\left(9^{\frac{1}{2}}x^{-5}\right)^3$$

101. Solve the following equation.

$$2 \log x = 4$$

102. Simplify the following expression using the properties of exponents and eliminating negative exponents:

$$\left(5x^{-1}y\right)^{-3}\left(81^{-\frac{1}{4}}x^{-2}y^{\frac{3}{2}}\right)^2.$$

103. Solve the following equation.

$$3 \log x = 6$$

104. Calculate the product: $\frac{6x^2y}{15xy^4} \cdot \frac{14a^2b^3}{21a^5b}$.

105. Calculate the following sum. (Make sure to list the restrictions for the denominators.)

$$\frac{5}{x-2} + \frac{3}{x-3}$$

106. Simplify the following rational expression. (Make sure to list the restrictions for the denominator.)

$$\frac{x^3 - 2x^2 - 8x}{x^2 - 4x}$$

107. Determine the root of each expression.

a. $\sqrt{25x^{10}y^2}$

b. $\sqrt{9x^4y^6z^8}$

108. Simplify each expression.

a. $2\sqrt{y} + 7\sqrt{y} - 3\sqrt{y}$

b. $y\sqrt{2000}$

c. $(9\sqrt{x})(7\sqrt{x})$