

RBHS Honors Geometry Summer Assignment

Note to potential honors math student: One of the key characteristics of an honors student is perseverance. When attempting a difficult assignment an honors student will **NOT** give up. If you have any questions regarding this assignment, please contact Mr. Deem at rdeem@powayusd.com or Ms. Nellos at anellos@powayusd.com.

*This assignment will **NOT** be collected, but it is expected that you have mastered most of the 1st year Algebra topics and you will be tested on them within the 1st week of school. Do as many problems necessary to ensure that you are ready for the beginning of the school year.*

*****Calculators are **NOT** permitted when completing this assignment.*****

Instructions: In order to receive full credit, you must show all relevant work on a separate sheet of paper. Your work should be neat, organized, and easy to follow. Give exact answers. (Leave all answers in reduced radical or rational form unless otherwise instructed.)

#1 - 10: Use the following to make substitutions and simplify.

$$a = -9, b = -6, c = -3, d = -1, e = 2, f = 4, g = 6, h = 8, k = 12$$

Example: $bc - hd$
 $(-6)(-3) - (8)(-1)$
 $18 - (-8)$
 26

1. $\frac{k}{f} - c$

2. $2f + k - g + e$

3. $k \bullet f \div g \bullet e$

4. $\frac{3(b-f)}{c^2 - (e-d)}$

5. $\frac{e}{a} + \frac{d}{g}$

6. $-f^2 - c^2 + b^2$

7. $\frac{-(k-c)(be)}{c^2 f (f-d)}$

8. $\frac{-a}{bc} + \frac{2g - 3e + f}{k \div g + c \bullet d}$

9. $\frac{a^3 b^4 (abc)^5 e^{-1}}{a^4 c (ab^2 c)^4 e}$

10. $[|b+c| - (b+c)] \div [-|a-b|]$

#11 - 36: Solve each equation. Put answers in solution set notation.

Example 1:

$$\frac{1}{2}x - \frac{2}{3} = \frac{5}{6}\left(2x - \frac{18}{5}\right)$$

$$6\left(\frac{1}{2}x - \frac{2}{3}\right) = \left(\frac{5}{6}\left(2x - \frac{18}{5}\right)\right)6$$

$$3x - 4 = 5\left(2x - \frac{18}{5}\right)$$

$$3x - 4 = 10x - 18$$

$$14 = 7x$$

$$2 = x$$

$$\{x \mid x = 2\} \text{ or } \{2\}$$

Example 2:

$$|2x+3| - 8 = -1$$

$$|2x+3| = 7$$

2 equations:

$$2x+3 = 7 \quad \text{or} \quad -(2x+3) = 7$$

$$2x = 4$$

$$x = 2$$

$$2x+3 = -7$$

$$2x = -10$$

$$x = -5$$

$$\{x \mid x = -5, 2\} \text{ or } \{-5, 2\}$$

Example 3:

$$2x^2 + 40 = 21x$$

$$2x^2 - 21x + 40 = 0$$

$$(2x-5)(x-8) = 0$$

$$2x-5=0 \quad x-8=0$$

$$2x=5 \quad x=8$$

$$x = \frac{5}{2}$$

$$\left\{ \frac{5}{2}, 8 \right\}$$

Example 4:

$$x^2 - 8x + 2 = 0 \text{ (does not factor)}$$

$$a=1 \quad b=-8 \quad c=2$$

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(2)}}{2(1)}$$

$$x = \frac{8 \pm \sqrt{64-8}}{2}$$

$$x = \frac{8 \pm \sqrt{56}}{2}$$

$$x = \frac{8 \pm 2\sqrt{14}}{2}$$

$$x = 4 \pm \sqrt{14}$$

$$\{4 \pm \sqrt{14}\}$$

Example 5:

$$\frac{xy+3x}{v-w} = z$$

$$x(y+3) = z(v-w)$$

$$x = \frac{vz-wz}{y+3}$$

$$\left\{ \frac{vz-wz}{y+3} \right\}$$

11. $3x - 4(x-2) = 7$

12. $\frac{2}{3}\left(6x + \frac{9}{2}\right) = 8x - 15$

13. $\frac{1}{4}x - \frac{2x}{3} - \frac{3}{2} = \frac{1}{6} + \frac{x}{12} - \frac{5}{6}x$

14. $(x+3)(x-4) = (2x^2 - 3x - 7) - (x^2 - x - 3)$

15. $4(2x-7) - 3(1-2x) = (2x-1)(x+1) - x(2x-1)$

16. $\frac{12x-3}{3} = 2(2x+0.5)$

17. $0.25x - 0.\bar{3} = 0.5x - 1.\bar{6}$

18. $|x-4| = 7$

19. $|2x+7| - 5 = 6$

20. $7 - |4x+2| = 1$

21. $|5x-13| + 6x = 3(2x-1)$

22. $x+5 = |x-3| + 1$

23. $|3x+5| - 2x = 9 - x$

24. $2|x-1| = 2x - 10$

25. $x^2 - 4 = 4$

26. $(x+1)^2 = 100$

27. $x^2 + x = 56$

28. $x^2 - 6x + 9 = 10$

29. $2x^2 = 3x - 2$

30. $x^2 - 3x - 9 = 0$

31. $(x+5)(x-2) = 3x - x(2x-1)$

32. $(2x-1)^2 - (x-2)^2 = x-3$

33. $\frac{3x}{y} + z = w$

34. $\frac{7y}{x(z+1)} - 2w = 3w$

35. $\frac{1}{x} + \frac{y}{x} = 5$

36. $\frac{5(x-1) - y(x+1)}{z+2} = z-2$

37 – 49: Solve each inequality: Put answers in solution set notation and graph on a number line.

Example 1:

$$-3 \leq 2x+1 \leq 11 \quad \text{change to 2 inequalities}$$

$$-3 \leq 2x+1 \quad \text{and} \quad 2x+1 \leq 11$$

$$-4 \leq 2x \quad \text{and} \quad 2x \leq 10$$

$$-2 \leq x \quad \text{and} \quad x \leq 5$$

$$\{x \mid -2 \leq x \leq 5\}$$



“and” means intersection of the inequalities

Example 2:

$$|1-2x| > 3 \text{ change to 2 inequalities}$$

$$1-2x > 3 \quad \text{or} \quad -(1-2x) > 3$$

$$-2x > 2 \quad \text{or} \quad 1-2x < -3 \quad \text{change ineq.}$$

$$x < -1 \quad \text{change ineq.} \quad \text{or} \quad -2x < -4$$

$$x > 2 \quad \text{change ineq.}$$

interval test (choose values to test in the intervals created by the values -1 and 2)

$$x = -2$$

$$x = 0$$

$$x = 3$$

$$|1-2(-2)| > 3$$

$$|1-2(0)| > 3$$

$$|1-2(3)| > 3$$

$$|1-(-4)| > 3$$

$$|1-0| > 3$$

$$|1-6| > 3$$

$$|5| > 3$$

$$|1| > 3$$

$$|-5| > 3$$

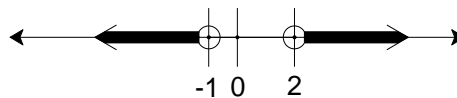
true

false

true

$$\{x \mid x < -1 \text{ or } x > 2\}$$

“or” means
union of the
inequalities



37. $2x+7 > 3$ 38. $5+x > 2x-1$ 39. $3x-5(x+2) \geq -4$ 40. $3(2-3x)+5 \leq 2(6-5x)$

41. $-2 > 3x+7$ or $7-5x \leq -13$ 42. $5x+12 < 7x$ or $3+x > 2$

43. $7x+12 \geq 5$ and $4x-9 \leq 7$ 44. $-5 < 3x+1 < 13$ 45. $-2 \leq 2x+8 \leq 3x$

46. $|x+2| > 7$ 47. $|3x-6| \leq 18$ 48. $|7x-11|+12 < 10$ 49. $|2x+4|-3 \geq x+3$

50 - 68: Factor completely. Circle your answers.

Example 1:

$$3x^4y - 3x^3y^3 + 6x^2y^2 - 3x^2y$$

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

Example 2:

$$2a^2 - 32$$

$$= 2(a^2 - 16)$$

$$= 2(a+4)(a-4)$$

Example 3:

$$15 - 2x - x^2$$

$$= -1(x^2 + 2x - 15)$$

$$= -1(x+5)(x-3)$$

Example 4:

$$14x^3 - 38x^2 + 20x$$

$$= 2x(7x^2 - 19x + 10)$$

$$= 2x(7x-5)(x-2)$$

50. $4x^3y^2 - 8x^2y^3 + 12xy^4$ 51. $5(x+y)+5(y+1)$ 52. $y(x+3)-z(x+3)$

53. $x^2 - 25$ 54. $x^4 - 16$ 55. $x^2 - 8x + 15$ 56. $x^2 + 5x - 24$

57. $4x^2 - 25y^2$ 58. $x^2 + 3xy + 2y^2$ 59. $3x^2 - 10x - 8$ 60. $25x^2 + 20x + 4$

61. $2x^3 - 4x^2 - 48x$ 62. $27 - 3y^2$ 63. $6x^2y + 3xy - 9y$ 64. $20 + x - x^2$

65. $6x^2 + 11x - 10$ 66. $y(x^2 - 1) + 3(x^2 - 1)$ 67. $2x^2 + xy - 6y^2$ 68. $5x^3y - 20xy$

#69 – 78: Find an equation of a line, in standard form, satisfying the given conditions.

In high school, a different, more efficient method is used to find the equation of a line by using the point-slope formula: $(y - y_1) = m(x - x_1)$

Example 1: $m = \frac{1}{3}$, containing the point $(-2, 5)$

$$\frac{y-5}{x-(-2)} = \frac{1}{3}$$

$$x+2 = 3y-15$$

$$x-3y = -17$$

Example 2: containing the points $(3, -8)$ and $(-4, -3)$

$$m = \frac{-3 - (-8)}{-4 - 3}$$

$$m = -\frac{5}{7}$$

$$\frac{y - (-8)}{x - 3} = \frac{5}{-7}$$

$$5x - 15 = -7y - 56$$

$$5x + 7y = -41$$

69. Passes through the point $(2, -3)$, $m = -\frac{2}{3}$. 70. Contains the points $(7, -1)$ and $(-3, -2)$.
71. Contains $(-2, 7)$, parallel to: $y = 3x - 7$. 72. Contains $(0, 7)$, parallel to: $3x + 5y = 15$.
73. Contains $(6, -7)$, perpendicular to: $y = \frac{2}{5}x + 8$ 74. Contains $(-1, -4)$, perpendicular to: $4x - y = 12$.
75. Contains $(3, 7)$, perpendicular to: $y = -4$ 76. Contains the y-intercept of: $3x - 2y = 8$ and $m = 0$.
77. Vertical line through the midpoint of AB; $A(-3, 9), B(-11, -3)$
78. Passes through the intersection of: $x = 3$ and $y = -4$, parallel to $\frac{x}{2} = \frac{1}{6}y + \frac{2}{3}$.

#79 - 90: Graph each. Label the x-intercept, y-intercept and vertex; all that apply.

Ex. 1:

Graph: $6y - 2x = 18$

$6y = 2x + 18$

$y = \frac{1}{3}x + 3$

$m = \frac{1}{3}$, the slope is $\frac{1}{3}$, up 1, right 3.

$y = mx + b$

$m = \frac{1}{3}, b = 3$

OR find the x-intercept and the y-intercept to graph:

$x = 0$ $y = 0$

$6y - 2(0) = 18$ $6(0) - 2x = 18$

$6y = 18$ $-2x = 18$

$y = 3$ $x = -9$

$(0, 3)$ $(-9, 0)$

Sketch the line.

$b = 3$, the y-intercept is 3, the graph crosses the y-axis at $(0, 3)$.

Ex. 2:

Graph:

$$y = 2x^2 + 4x + 2$$

$$x = \frac{-4}{2(2)} = \frac{-4}{4} = -1$$

axis of symmetry: $x = -1$

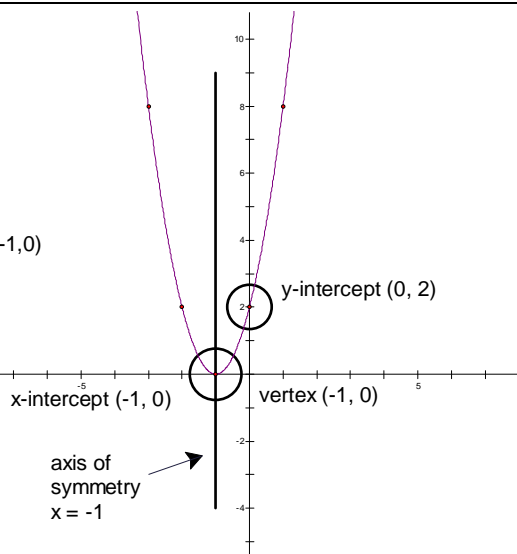
$$y = 2(-1)^2 + 4(-1) + 2$$

$$y = 2 + (-4) + 2$$

$$y = 0$$

vertex $(-1, 0)$

x	$y = 2x^2 + 4x + 2$	y
-3	$2(-3)^2 + 4(-3) + 2$	8
-2	$2(-2)^2 + 4(-2) + 2$	2
-1	vertex	0
0	$2(0)^2 + 4(0) + 2$	2
1	$2(1)^2 + 4(1) + 2$	8



79. $y = -x$

80. $y = 3x - 2$

81. $2x - y = 5$

82. $3(2x - 4y) = 6(x - 2y) + x - 2$

83. $3x + 4y = 10$

84. $y = \frac{3}{2}x - 4$

85. $y = x^2 - 4$

86. $y = (x - 3)^2$

87. $y = 3 - 2x^2$

88. $y = x^2 + 2x - 15$

89. $y = -x^2 + 7x - 6$

90. $y = 2x^2 - 8x + 7$

#91 - 110: Simplify each:

Example 1:

$$\begin{aligned} & (x^3 y^{-4} z^5)^2 (x^5 y z^5)^{-2} \\ &= \frac{x^6 y^{-8} z^{10}}{(x^5 y z^5)^2} \\ &= \frac{x^6 y^{-8} z^{10}}{x^{10} y^2 z^{10}} \\ &= \frac{1}{x^4 y^{10}} \end{aligned}$$

Example 2:

$$\begin{aligned} & (5d^{-5} e^{-4} f^2 g^0)^{-3} (3d^{-2} e f^3 g^{-4})^2 \\ &= (5^{-3} d^{15} e^{12} f^{-6} g^0) (9d^{-4} e^2 f^6 g^{-8}) \\ &= \frac{9}{125} d^{11} e^{14} f^0 g^{-8} \\ &= \frac{9d^{11} e^{14}}{125g^8} \end{aligned}$$

Example 3:

$$\begin{aligned} & \frac{2}{3} \sqrt{108} \\ &= \frac{2}{3} \sqrt{4 \cdot 9 \cdot 3} \\ &= \frac{2}{3} \sqrt{4} \sqrt{9} \sqrt{3} \\ &= \frac{2}{3} \cdot 2 \cdot 3 \sqrt{3} \\ &= 4\sqrt{3} \end{aligned}$$

Example 4:

$$\begin{aligned} & \sqrt{72} - 2\sqrt{24} + \frac{1}{3}\sqrt{18} \\ &= \sqrt{36} \sqrt{2} - 2\sqrt{4} \sqrt{6} + \frac{1}{3}\sqrt{9} \sqrt{2} \\ &= 6\sqrt{2} - 4\sqrt{6} + \sqrt{2} \\ &= 7\sqrt{2} - 4\sqrt{6} \end{aligned}$$

$$91. (2x^2)^3 \quad 92. x^2y^2 \cdot 3x^3y^4 \cdot (2x^4y^5)^2 \quad 93. \frac{xy^2z^3}{x^5yz^5} \quad 94. \frac{(3x^3y^2)^2}{(6xy^3)(x^5y^4)}$$

$$95. \frac{(x^3y^{-2}z^4)^{-3}}{x^{-2}y(xy^3z^5)} \quad 96. \frac{(y^2z^3)^4(2x^{-1}y)^{-2}}{x^2y^6z^{12}} \quad 97. \sqrt{20} \quad 98. \sqrt{125}$$

$$99. 3\sqrt{28} \quad 100. 2\sqrt{8} \cdot \sqrt{12} \quad 101. \frac{2}{\sqrt{2}} \quad 102. \sqrt{45} \cdot \frac{9}{\sqrt{5}}$$

$$103. (5\sqrt{2})^2 \quad 104. -4\sqrt{2} \cdot \sqrt{24} \quad 105. \sqrt{\frac{1}{2}} \left(\sqrt{\frac{8}{5}} + \sqrt{2} \right) \quad 106. \sqrt{8} - \sqrt{18} + \sqrt{32}$$

$$107. \frac{\sqrt{3}}{3} + \frac{2}{\sqrt{3}} + \frac{\sqrt{27}}{\sqrt{9}} \quad 108. \sqrt{\frac{27}{8}} \quad 109. \frac{8}{\sqrt{40}} \cdot \sqrt{\frac{200}{27}} \quad 110. 2\sqrt{2} + \sqrt{12} + 2\sqrt{48} - \sqrt{50}$$

#111 - 116: Simplify each:

Example 1:

$$\begin{aligned} & \frac{x^2 - 2x - 3}{2x^2 - 18} \div \frac{x^2 - 6x - 7}{x^2 - 4x - 21} \\ &= \frac{x^2 - 2x - 3}{2x^2 - 18} \cdot \frac{x^2 - 4x - 21}{x^2 - 6x - 7} \\ &= \frac{(x+1)(x-3)}{2(x-3)(x+3)} \cdot \frac{(x-7)(x+3)}{(x-7)(x+1)} \\ &= \frac{1}{2} \end{aligned}$$

Example 2:

$$\begin{aligned} & \frac{1-2x}{x} - \frac{x+3}{2x} + \frac{2x-4}{4x^2} \\ &= \frac{4x(1-2x)}{4x^2} - \frac{2x(x+3)}{4x^2} + \frac{2x-4}{4x^2} \\ &= \frac{4x - 8x^2 - 2x^2 - 6x + 2x - 4}{4x^2} \\ &= \frac{-10x^2 - 4}{4x^2} \\ &= \frac{2(-5x^2 - 2)}{4x^2} \\ &= \frac{-5x^2 - 2}{2x^2} \end{aligned}$$

$$111. \frac{2x^2 - 18}{4x^2 + 24x + 36}$$

$$112. \frac{12x^2}{4x^2 - 4} \cdot \frac{2x^2 + x - 1}{6x^2 - 3x}$$

$$113. \frac{x^2 - y^2}{x^2 - xy} \div \frac{3x^2 + 2xy - y^2}{3x^2 - xy}$$

$$114. \frac{x+1}{2y^2} + \frac{x-1}{4y}$$

$$115. \frac{1}{3x} - \frac{2}{x-2} + \frac{x^2 + 5x - 2}{3x^2 - 6x}$$

$$116. \frac{5-x}{x-5} - \frac{x-y}{y-x} - \frac{2y-2}{1-y}$$

#117 - 122: Solve each system of equations: Put answers in solution set notation.

Example 1:

$$\begin{cases} y = 3x - 11 \\ x + 5y = 9 \end{cases}$$
$$x + 5(3x - 11) = 9$$
$$x + 15x - 55 = 9$$
$$16x = 64$$
$$x = 4$$
$$y = 3x - 11$$
$$y = 3(4) - 11$$
$$y = 12 - 11$$
$$y = 1$$
$$\{(4, 1)\}$$

Example 2:

$$\begin{cases} 5x - 3y = -34 \\ 2x + 7y = -30 \end{cases}$$
$$7(5x - 3y = -34) \rightarrow 35x - 21y = -238$$
$$3(2x + 7y = -30) \rightarrow 6x + 21y = -90$$
$$41x = -328$$
$$x = -8$$
$$2x + 7y = -30$$
$$2(-8) + 7y = -30$$
$$-16 + 7y = -30$$
$$7y = -14$$
$$y = -2$$
$$\{(-8, -2)\}$$

117. $\begin{cases} y - 4 = 2x \\ 2x + 3y = 4 \end{cases}$

118. $\begin{cases} 5x + 2y = 9 \\ 3x + 31 = 4y \end{cases}$

119. $\begin{cases} \frac{1}{2}y = x + 2 \\ x = 12 - 3y \end{cases}$

120. $\begin{cases} 3x + 5y = -3 \\ 2x - 3y = 17 \end{cases}$

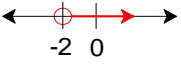
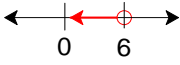

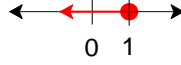
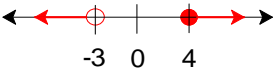

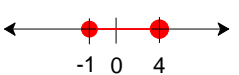
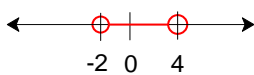
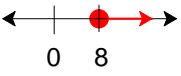
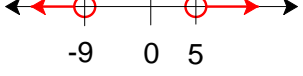
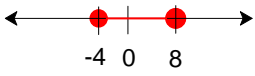
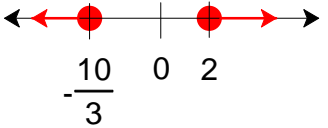
121. $\begin{cases} 2x + y = 2x - 2 \\ 3x - 2y = 7 \end{cases}$

122. $\begin{cases} y = |x| \\ y = \frac{1}{2}x + 6 \end{cases}$

Answers to Honors Geometry Summer Assignment

1. 6 2. 16 3. 16 4. -5 5. $-\frac{7}{18}$ 6. 11 7. 1 8. $\frac{5}{2}$ 9. $-\frac{3}{2}$ 10. -6
-

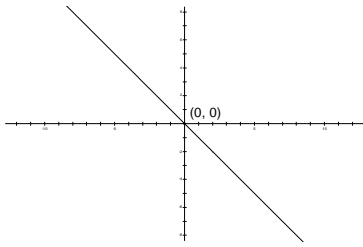
11. {1} 12. $\left\{\frac{9}{2}\right\}$ 13. {5} 14. {8} 15. $\left\{\frac{5}{2}\right\}$ 16. { } 17. $\left\{\frac{16}{3}\right\}$
 18. {-3,11} 19. {-9,2} 20. {-2,1} 21. { } 22. $\left\{-\frac{1}{2}\right\}$ 23. $\left\{-\frac{7}{2},2\right\}$ 24. { }
 25. $\{\pm 2\sqrt{2}\}$ 26. {-11,9} 27. {-8,7} 28. $\{3\pm\sqrt{10}\}$ 29. { } 30. $\left\{\frac{3\pm 3\sqrt{5}}{2}\right\}$
 31. $\left\{-\frac{5}{3},2\right\}$ 32. $\left\{0,\frac{1}{3}\right\}$ 33. $\left\{\frac{y(w-z)}{3}\right\}$ 34. $\left\{\frac{7y}{5w(z+1)}\right\}$ 35. $\left\{\frac{1+y}{5}\right\}$ 36. $\left\{\frac{z^2+y+1}{5-y}\right\}$
-

37. $\{x|x > -2\}$ 38. $\{x|x < 6\}$ 39. $\{x|x \leq -3\}$ 40. $\{x|x \leq 1\}$




 41. $\{x|x < -3 \text{ or } x \geq 4\}$ 42. $\{x|x > -1\}$ 43. $\{x|-1 \leq x \leq 4\}$ 44. $\{x|-2 < x < 4\}$




 45. $\{x|x \geq 8\}$ 46. $\{x|x < -9 \text{ or } x > 5\}$ 47. $\{x|-4 \leq x \leq 8\}$ 48. { }



 49. $\left\{x|x \leq -\frac{10}{3} \text{ or } x \geq 2\right\}$

-

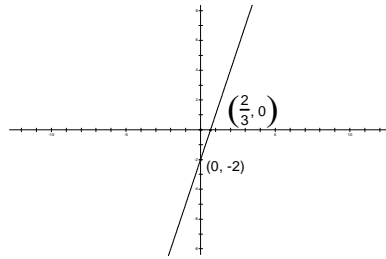
50. $4xy^2(x^2 - 2xy + 3y^2)$ 51. $5(x+2y+1)$ 52. $(x+3)(y-z)$ 53. $(x+5)(x-5)$
 54. $(x^2+4)(x+2)(x-2)$ 55. $(x-3)(x-5)$ 56. $(x+8)(x-3)$ 57. $(2x+5y)(2x-5y)$
 58. $(x+2y)(x+y)$ 59. $(3x+2)(x-4)$ 60. $(5x+2)^2$ 61. $2x(x-6)(x+4)$
 62. $3(3+y)(3-y)$ 63. $3y(2x+3)(x-1)$ 64. $-(x-5)(x+4)$
 65. $(3x-2)(2x+5)$ 66. $(x+1)(x-1)(y+3)$ 67. $(2x-3y)(x+2y)$
 68. $5xy(x+2)(x-2)$
-

69. $2x+3y=-5$ 70. $x-10y=17$ 71. $3x-y=-13$ 72. $3x+5y=35$
 73. $5x+2y=16$ 74. $x+4y=-17$ 75. $x=3$ 76. $y=-4$ 77. $x=-7$
 78. $3x-y=13$

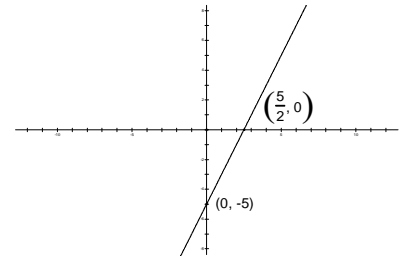
79.



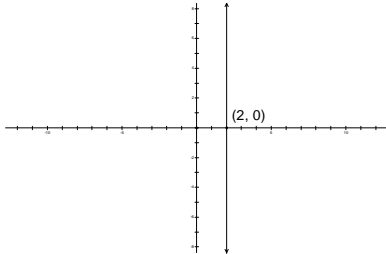
80.



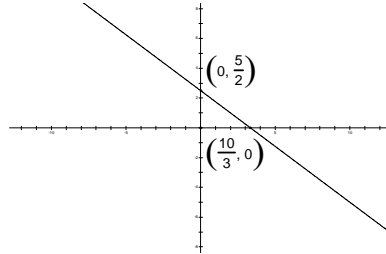
81.



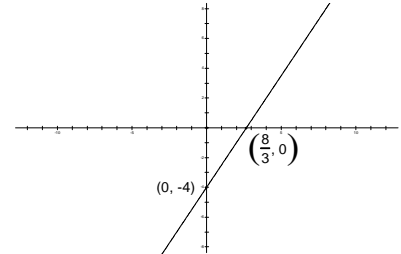
82.



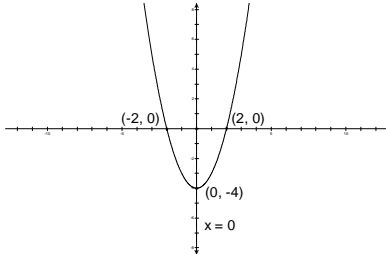
83.



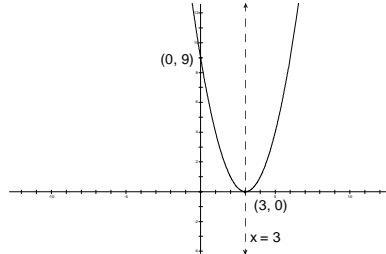
84.



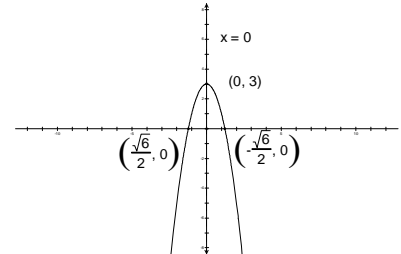
85.



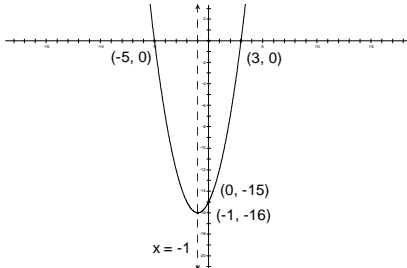
86.



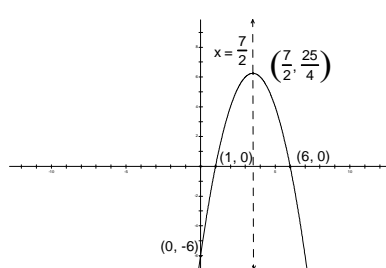
87.



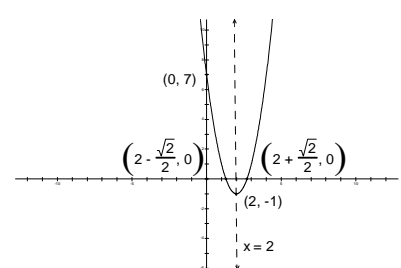
88.



89.



90.



91. $8x^6$

92. $12x^{13}y^{16}$

93. $\frac{y}{x^4z^2}$

94. $\frac{3}{2y^3}$

95. $\frac{y^2}{x^8z^{17}}$

96. $\frac{1}{4}$

97. $2\sqrt{5}$

98. $5\sqrt{5}$

99. $6\sqrt{7}$

100. $8\sqrt{6}$

101. $\sqrt{2}$

102. 27

103. 50

104. $-16\sqrt{3}$

105. $\frac{5+2\sqrt{5}}{5}$

106. $3\sqrt{2}$

107. $2\sqrt{3}$

108. $\frac{3\sqrt{6}}{4}$

109. $\frac{8\sqrt{15}}{9}$

110. $-3\sqrt{2}+10\sqrt{3}$

111. $\frac{x-3}{2(x+3)}$

112. $\frac{x}{x-1}$

113. 1

114. $\frac{2x+2+xy-y}{4y^2}$

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

116. 2

117. $\{(-1, 2)\}$

118. $\{(-1, 7)\}$

119. $\{(0, 4)\}$

120. $\{(4, -3)\}$

121. $\{(1, -2)\}$

122. $\{(-4, 4), (12, 12)\}$

123. $\{ \}$

124. $\{(x, y) | (x, y) \in 2x+3y=-15\}$