

ALGEBRA 1 3302 FINAL EXAM REVIEW

Name Key

Date 6/10/13

ABSOLUTE VALUE REVIEW

Solve the following equations:

1. $-|x| = -8$
 $|x| = 8$
 $x = \pm 8$

2. $|3x - 4| = 8$
 $3x - 4 = 8$ $3x - 4 = -8$
 $3x = 12$ $3x = -4$
 $x = 4$ $x = -4/3$

3. $|2x + 4| = 12$
 $|2x + 4| = 4$
 $2x + 4 = 4$ $2x + 4 = -4$
 $2x = 0$ $2x = -8$
 $x = 0$ $x = -4$

4. $|x + 6| - 8 = -8$
 $|x + 6| = 0$
 $x + 6 = 0$
 $x = -6$

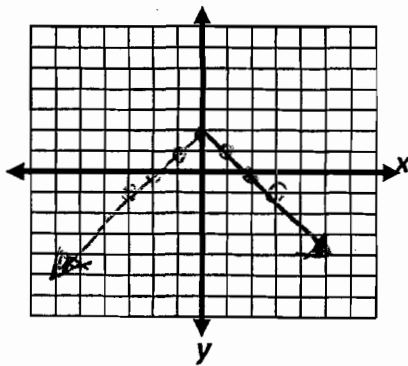
5. $|2 - 6x| = -8$
 $|2 - 6x| = -8$
 no soln

6. $-3|2x - 6| - 2 = -8$
 $|2x - 6| = 2$
 $2x - 6 = 2$ $2x - 6 = -2$
 $x = 4$ or 2

Graph the functions. Show at least five points on the graph.

List the vertex point, minimum or maximum value, domain & range, and x & y intercepts.

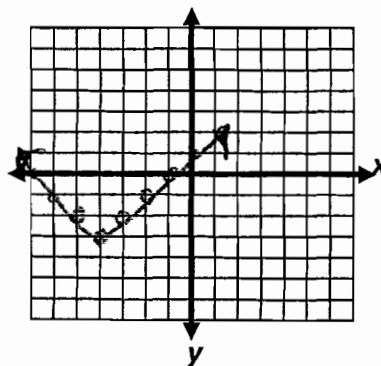
7. $f(x) = -|x| + 2$ *opens down*



Vertex (0, 2)

Min or (Max) 2
(y-value)

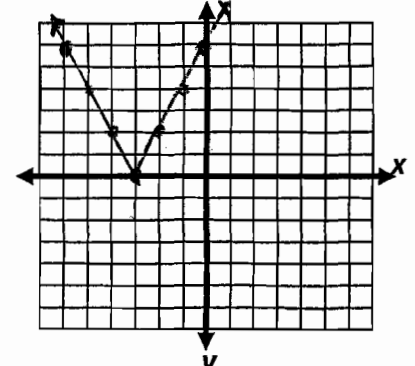
8. $f(x) = |x + 4| - 3$



Vertex (-4, -3)

Min or (Max) -3
(y-value)

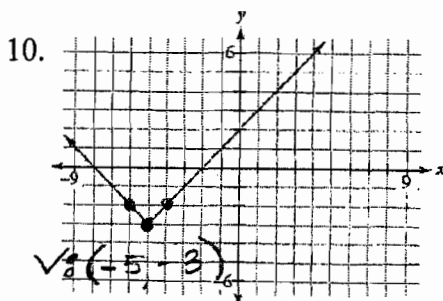
9. $f(x) = 2|x + 3|$



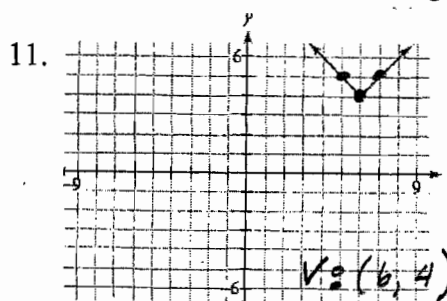
Vertex (-3, 0)

Min or (Max) 0

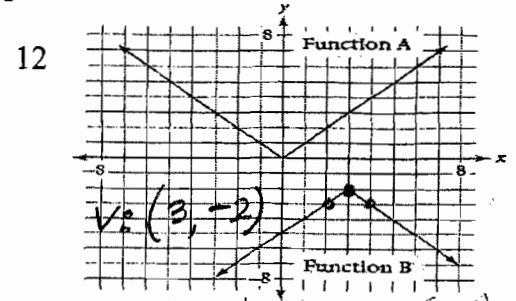
Identify the vertex and write the absolute value equation of the graph shown.



$y = |x + 5| - 3$
 $y = |x + 5| - 3$



$y = |x - 6| + 4$



Function B: $f(x) = -|x - 3| - 2$

FUNCTION NOTATION REVIEW:

Given the following functions: $f(x) = 2|x + 3|$ and $g(x) = 3x - 7$

Evaluate for the given values.

13. $f(6)$

$$\begin{aligned} f(6) &= 2|6 + 3| \\ &= 2|9| \\ &= 2(9) \\ &= 18 \end{aligned}$$

14. $f(-2)$

$$\begin{aligned} f(-2) &= 2|-2 + 3| \\ &= 2|1| \\ &= 2(1) \\ &= 2 \end{aligned}$$

15. x , when $f(x) = 10$

$$\begin{aligned} 10 &= 2|x + 3| \\ \frac{10}{2} &= \frac{2|x + 3|}{2} \\ 5 &= |x + 3| \end{aligned} \quad x = 2, -8$$

18. x , when $g(x) = 8$

$$\begin{aligned} 8 &= 3x - 7 \\ +7 & \quad +7 \\ 15 &= 3x \\ \frac{15}{3} &= \frac{3x}{3} \end{aligned} \quad x = 5$$

16. $g(2)$

$$\begin{aligned} g(2) &= 3(2) - 7 \\ &= 6 - 7 \\ &= -1 \end{aligned}$$

17. $g(-3)$

$$\begin{aligned} g(-3) &= 3(-3) - 7 \\ &= -9 - 7 \\ &= -16 \end{aligned}$$

Use this graph of $y = f(x)$ to answer 19-25.

19. Find $f(0)$ $(0, 2)$

$$f(0) = 2$$

20. Find $f(3)$ $(3, 4)$

$$f(3) = 4$$

21. Explain the real world meaning of $f(6) = 8$.

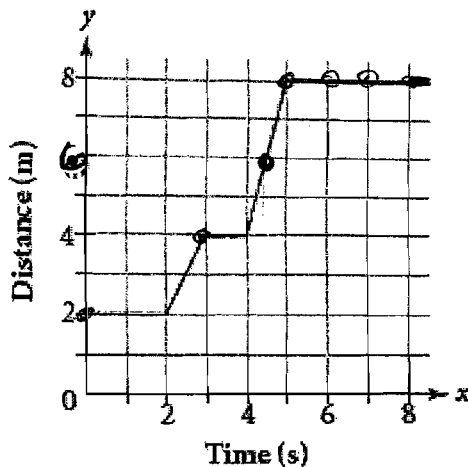
At a time of 6 seconds, the distance is 8 meters.

22. For what x -values does $f(x) = 8$ ($y = 8$)

$$5 \leq x \leq 8$$

23. Use function notation to represent the distance at 6 meters.

$$f(4.5) = 6$$



24. What are the independent and dependent variables?

I = Time (s)

D = Distance (m)

25. $D: \{ 0 \leq x \leq 8 \}$

$R: \{ 2 \leq y \leq 8 \}$

What domain & range are shown in the graph?

POLYNOMIAL REVIEW:

Simplify.

26. $(4n - 3n^2 + 8) + (3n^2 + 4n + 6)$ $8n + 14$

27. $(3r^3 + 6s) - (5r - 7s)$ $3r^3 - 5r + 13s$

28. $(a^3 - 5a^2 + b - 2) - (3a^3 + 5a - b + 2)$

$a^3 - 5a^2 + b - 2 - 3a^3 - 5a + b - 2$ $-2a^3 - 5a^2 - 5a + 2b - 4$

Find the product.

29. $(2x)(x+4)$

$2x^2 + 8x$

30. $(2x-y)(2x+y)$

$4x^2 + 2xy - 2xy - y^2$

$4x^2 - y^2$

31. $(p+4)(p^2+4p-5)$

$p^3 + 4p^2 - 5p + 4p^2 + 16p - 20$
 $p^3 + 8p^2 + 11p - 20$

32. $(3x+1)(3x-1)$

$9x^2 - 3x + 3x - 1$

$9x^2 - 1$

33. $(5m-6)^2 = (5m-6)(5m-6)$

$25m^2 - 30m - 30m + 36$

$25m^2 - 60m + 36$

34. $-3(2x-3)(x+5)$

$-3(2x^2 + 10x - 3x - 15)$

$-3(2x^2 + 7x - 15)$

$-6x^2 - 21x + 45$

Completely FACTOR the Expression.

$ax^2 + bx + c$ $(+)(+)$

35. $x^2 + 7x + 6$

$(x+6)(x+1)$

$ax^2 - bx + c$ $(-)(-)$

36. $x^2 - 13x + 36$

$(x-9)(x-4)$

$ax^2 + bx - c$ $(+)(-)$

37. $x^2 - 5x - 24$

$(x-8)(x+3)$

Remember to Remove a GCF first!

38. $x^3 + 3x^2 + 2x$

$x(x^2 + 3x + 2)$

$x(x+2)(x+1)$

39. $x^4 - 2x^3 - 35x^2$

$x^2(x^2 - 2x - 35)$

$x^2(x-7)(x+5)$

40. $\frac{2x^3}{3x} - \frac{16x^2}{2x} + \frac{24x}{2x}$

$2x(x^2 - 8x + 12)$

$2x(x-6)(x-2)$

$2x(x-6)(x-2)$

Some look tricky, but remember your perfect squares!

41. $x^2 - 49$

$(x+7)(x-7)$

42. $4x^2 - 25$

$(2x+5)(2x-5)$

43. $100 - 81x^2$

$(10+9x)(10-9x)$

44. $x^2 - 16x + 64$

$(x-8)(x-8)$

45. $a^2 + 10ab + 25b^2$

$(a+5b)(a+5b)$

46. $4x^2 - 20xy + 25y^2$

$(2x-5y)(2x-5y)$

$$47. 8x^2 + 2x - 3$$

	$4x$	3	
$2x$	$8x^2$	$6x$	
-1	$-4x$	-3	

$P: -24x^2$
 $S: 2x$

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

$$48. 10x^2 + 17x + 6$$

	$5x$	6	
$2x$	$10x^2$	$12x$	
1	$5x$	6	

$P: 60x^2$
 $S: 17x$

$$(5x + 6)(2x + 1)$$

$$49. 4x^2 - 3x - 7$$

	$4x$	-7	
x	$4x^2$	$-7x$	
-1	$4x$	-7	

$P: -28x^2$
 $S: -3x$

$$(4x - 7)(x + 1)$$

Solve. (Solve means to find the value of x . Factor and then set the factors equal to zero)

$$50. x(2x-1)(3x+5)=0$$

$$x=0 \quad 2x-1=0 \quad 3x+5=0$$

$$x=0 \quad x=1/2 \quad x=-5/3$$

$$51. x^2 - 10x + 24 = 0$$

$$(x-6)(x-4)=0$$

$$x=6, 4$$

$$52. 25x^2 - 1 = 0$$

$$(5x+1)(5x-1)=0$$

$$5x+1=0 \quad 5x-1=0$$

$$x=\pm 1/5$$

$$53. y^2 - 81 = 0$$

$$(y-9)(y+9)=0$$

$$y=\pm 9$$

$$54. 3x^2 - 15 = -12x$$

$$3x^2 + 12x - 15 = 0$$

$$3(x^2 + 4x - 5) = 0$$

$$3(x+5)(x-1) = 0$$

$$x = -5, 1$$

$$55. 18x^2 + 4x = 21$$

$$18x^2 + 4x - 21 = 0$$

56. The profits of a company are found by subtracting the company's costs from its revenue. If a company's cost can be modeled by $18x + 85,000$ and its revenue can be modeled by $3x^2 + 32x + 210,000$, what is an expression for the profit?

$$P = R - C$$

$$C = 18x + 85,000$$

$$R = 3x^2 + 32x + 210,000$$

$$P = 3x^2 + 32x + 210,000 - (18x + 85,000)$$

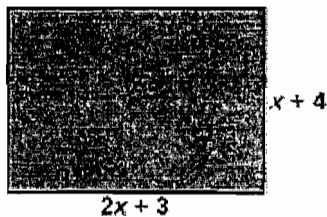
$$P = 3x^2 + 14x + 125,000$$

57. Write $x^2(x+2) - 3x(x+2) + 2(x+7)$ as a simplified polynomial. Show your work.

$$x^3 + 2x^2 - 3x^2 - 6x + 2x + 14$$

$$x^3 - x^2 - 4x + 14$$

58. Below is a diagram of a garden that is being built.



Determine the area of the garden in terms of x .

Write your answer as a trinomial.

$$(x+4)(2x+3) = 2x^2 + 3x + 8x + 12$$

$$2x^2 + 11x + 12$$

If the gardener decides to increase the length and width by a scale factor of 4, what will be the new area?

$$(4x+16)(8x+12) = 32x^2 + 176x + 192$$

59. A rectangle has an area given by $A = x^2 + 7x + 12$. Find possible expressions for the length and width of the rectangle.

$$x^2 + 7x + 12 \quad x+3$$

$$x+4$$

$$(x+3)(x+4)$$

QUADRATIC REVIEW:

Solve for the exact solution.

60. $x^2 - 9 = 16$
 $+9 \quad +9$

$x^2 = 25$

$x = \pm 5$

63. $\frac{2(x-11)^2}{2} = \frac{98}{2}$

$(x-11)^2 = 49$

$x-11 = 7$ or $x-11 = -7$

$x = 18, 4$

61. $4x^2 + 9 = 27$
 $+9 \quad +9$

$\frac{4x^2}{4} = \frac{36}{4}$

$x^2 = 9$

$x^2 = -16$

no real soln

$x = \pm 3$

62. $(x+3)^2 - 8 = 17$
 $+8 \quad +8$

$(x+3)^2 = 25$

$x+3 = 5$ or $x+3 = -5$

$x = 2, -8$

65. $\frac{(x-2)^2}{-4} + 4 = 11$
 $-4 \quad -4$

$(x-2)^2 = 7$

$x-2 = \sqrt{7}$ or $x-2 = -\sqrt{7}$

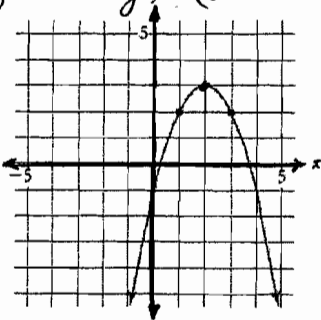
$x = 2 \pm \sqrt{7}$

Write the equation of each parabola graphed.

66. Vertex Form: $y = -(x-2)^2 + 3$

General Form: $y = -(x-2)(x-2) + 3$

$y = -x^2 + 4x - 1$

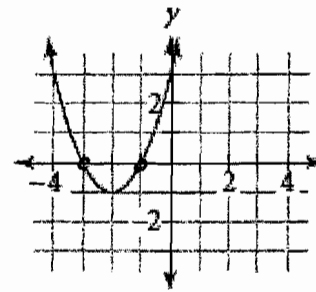


v: (2, 3)

(2, 3)

67. Factored Form: $y = (x+1)(x+3)$

General Form: $y = x^2 + 4x + 3$



Roots: -1, -3

Rewrite the equations in Factored Form. Identify the x-intercepts of the graph of the function.

68. $y = x^2 - 6x + 8$

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

x-ints: (4, 0) & (2, 0)

69. $y = x^2 - 12x + 36$

$y = (x-6)(x-6)$

x-ints: (6, 0)

70. $y = x^2 - 16$

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

x-ints: (-4, 0) & (4, 0)

Rewrite the equations in Standard Form.

71. $y = (x-2)(x+4)$

$y = x^2 + 2x - 8$

middle of roots

72. $y = 2(x-1)^2 - 6$

$y = 2(x-1)(x-1) - 6$

$y = 2(x^2 - 2x + 1) - 6$

$y = 2x^2 - 4x - 4$

73. $y = (x-6)(x+6)$

$y = x^2 - 36$

Identify the vertex of the following quadratics.

74. $y = (x-1)(x+5)$

Roots: 1, -5

arg = $\frac{1 + (-5)}{2} = -2$ (plug it in)

75. $y = (x-2)(x-8)$

Roots: 2, 8

Arg: 5
 $y = (5-2)(5-8)$

$y = (x-9)(x-3)$

76. $y = x^2 - 12x + 27$

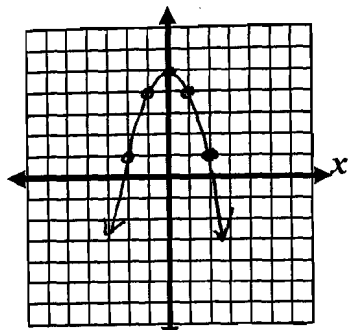
Roots: 9, 3

Arg: 6
 $\dots = -9$

Graph the quadratic functions. Label the vertex and line of symmetry.
Plot at least four other points on the graph.

77. $f(x) = -x^2 + 5$

x	y
2	1
1	4
0	5
1	4
2	1

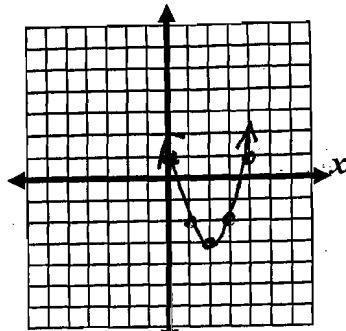


Vertex $(0, 5)$

Line of symmetry $x = 0$

78. $f(x) = (x - 2)^2 - 3$

x	y
0	1
1	-2
2	-3
3	-2
4	1

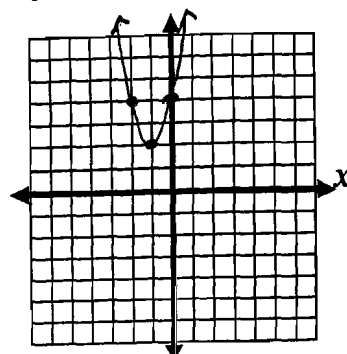


Vertex $(2, -3)$

Line of symmetry $x = 2$

79. $f(x) = 2(x + 1)^2 + 2$

x	y
-3	10
-2	4
-1	2
0	4
1	10



Vertex $(-1, 2)$

LOS: $x = -1$

Apply Quadratic Models.

80. The height of a ball dropped from the top of a building is modeled by $h(t) = -16t^2 + 576$, where t is in seconds and h is in feet.

A. What is $h(3)$?

$$h(3) = -16(3)^2 + 576$$

$$= -16(9) + 576 = 432 \text{ ft}$$

B. What is the real world meaning of the answer to 80A?

at 3 seconds, the ball is 432 ft from the ground.

C. At what time, does $h(t) = 176$

$$176 = -16t^2 + 576$$

$$-576 \quad -576 \quad \text{height}$$

$$-400 = -16t^2$$

$$\frac{-400}{-16} = \frac{-16t^2}{-16}$$

$$25 = t^2$$

$$t = 5$$

D. At what time is the ball on the ground?

height = 0 when ball on ground.

$$0 = -16t^2 + 576$$

$$t = 6$$

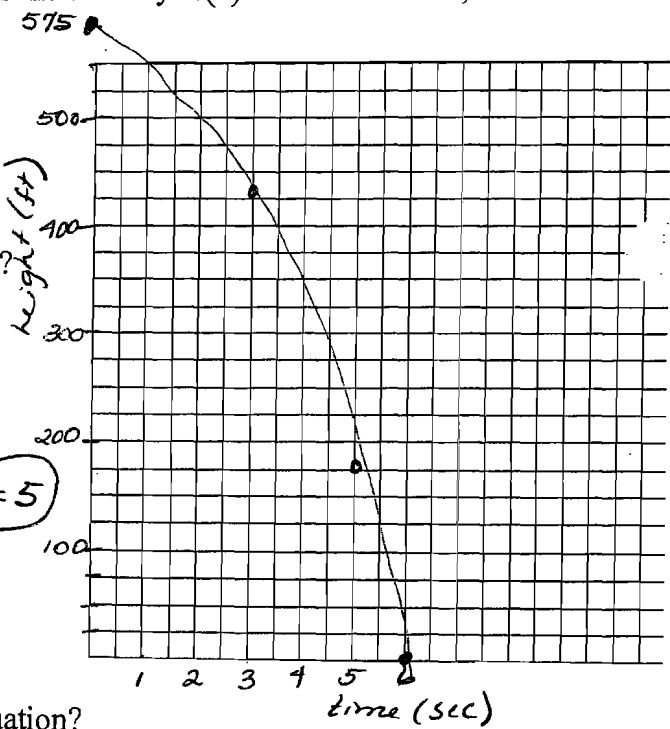
E. What domain and range values make sense in this situation?

D: $0 \leq x \leq 6$

R: $0 \leq y \leq 576$

F. Graph the function for the domain and range described in 80E. Be sure to label the axis.

- $(0, 576)$
- $(3, 432)$
- $(5, 176)$
- $(6, 0)$



RADICALS REVIEW

List the first 20 perfect squares:

Simplify each radical expression:

81. $\sqrt{20}$

$$\sqrt{4 \cdot 5}$$

$$\textcircled{2\sqrt{5}}$$

82. $\sqrt{96}$

$$\sqrt{16 \cdot 6}$$

$$\textcircled{4\sqrt{6}}$$

83.) $7\sqrt{75}$

$$7 \cdot \sqrt{25 \cdot 3}$$

$$7(5)\sqrt{3}$$

$$\textcircled{35\sqrt{3}}$$

84. $\sqrt{400x^2}$

$$\textcircled{20x}$$

85. $\sqrt{108x^3z}$

$$\sqrt{36 \cdot 3 \cdot \frac{x^2}{x} \cdot x \cdot z}$$

$$\textcircled{6x\sqrt{3xz}}$$

86.) $10\sqrt{52x^2y^3z}$

$$10\sqrt{4 \cdot 13 \cdot x^2 \cdot y^2 \cdot yz}$$

$$10(2)\sqrt{13} \cdot x \cdot y \sqrt{yz}$$

$$\textcircled{20xy\sqrt{13yz}}$$

Simplify the radical expression

87. $\sqrt{5} + \sqrt{5} + \sqrt{2}$

$$\textcircled{2\sqrt{5} + \sqrt{2}}$$

88. $(9\sqrt{5})(4\sqrt{2})$

$$\textcircled{36\sqrt{10}}$$

89. $(5\sqrt{2}) + 4\sqrt{3} - \sqrt{2} + 10\sqrt{3}$

$$\textcircled{4\sqrt{2} + 14\sqrt{3}}$$

90. $(9\sqrt{5})^2 = (9\sqrt{5})(9\sqrt{5})$

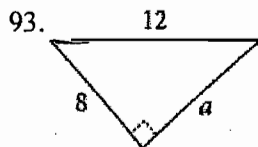
$$81(5) = 81\sqrt{25}$$

$$\textcircled{405}$$

91. $\frac{\sqrt{98}}{\sqrt{7}} = \sqrt{14}$

92. $\frac{6\sqrt{15}}{\sqrt{3}} = \textcircled{6\sqrt{5}}$

Find the exact length of the third side of each right triangle. All measurements are in centimeters.

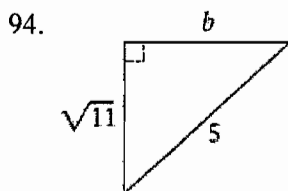


$$12^2 = a^2 + 8^2$$

$$144 = a^2 + 64$$

$$a^2 = 80$$

$$a = \sqrt{80} = \sqrt{16 \cdot 5}$$

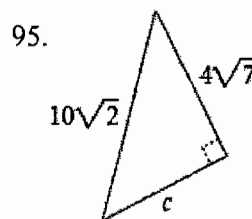


$$5^2 = (\sqrt{11})^2 + b^2$$

$$25 = 11 + b^2$$

$$b^2 = 14$$

$$\textcircled{b = \sqrt{14}}$$



$$(10\sqrt{2})^2 = (4\sqrt{7})^2 + c^2$$

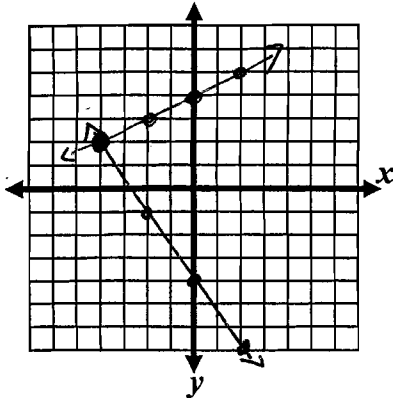
$$100(2) = 16(7) + c^2$$

$$200 = 112 + c^2$$

SYSTEMS OF EQUATIONS REVIEW

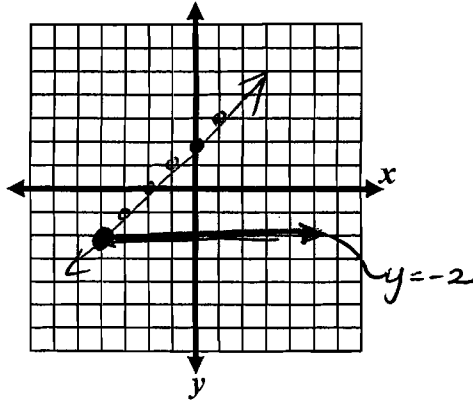
Find the solution to the system of equations by graphing.

96. $y = -\frac{3}{2}x - 4$ (slope) $y = \frac{1}{2}x + 4$



Solution $(-4, 2)$

97. $y = x + 2$ (slope = 1) $y = -2$ (slope)

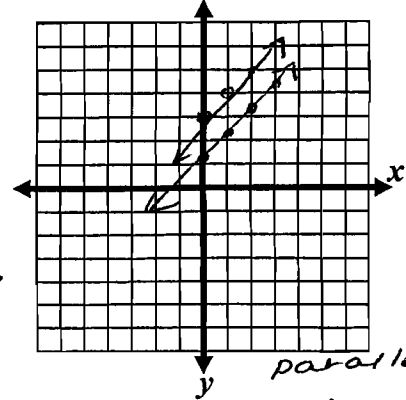


Solution $(-4, -2)$

$3x + 3y = 4$
 $+3x$ $+3x$

$\frac{3y}{3} = \frac{4 + 3x}{3}$
 $y = \frac{4}{3} + x$

98. $-3x + 3y = 4$
 $-x + y = 3$
 $y = 3 + x$



Solution (no soln)

Solve the system of equations using substitution.

99. $4x + 3y = 31$
 $y = 2x + 7$
 $4x + 3(2x + 7) = 31$
 $4x + 6x + 21 = 31$
 $10x = 10$
 $x = 1$
 $y = 2(1) + 7 = 9$
 $(1, 9)$

100. $-2x + 2y = 8$
 $-x + y = 4$
 $y = 4 + x$
 $-2x + 2(4 + x) = 8$
 $-2x + 8 + 2x = 8$
 $8 = 8$
inf. soln

101. $-2x + y = -3$
 $5x - 2y = 4$
 $y = -3 + 2x$
 $5x - 2(-3 + 2x) = 4$
 $5x + 6 - 4x = 4$
 $x + 6 = 4$
 $x = -2$
 $y = -3 + 2(-2) = -7$
 $(-2, -7)$

Solve each system of equations using elimination.

102. $3x + 3y = -6$
 $x + 2y = 6$
 $-3(x + 2y) = -18$
 $-3x - 6y = -18$
 $3x + 3y = -6$

 $-3y = -24$
 $y = 8$
 $x + 2(8) = 6$
 $x + 16 = 6$
 $x = -10$
 $(-10, 8)$

103. $3x - 9y = 2$
 $2x + 3y = -12$
 $6x + 9y = -36$

 $9x = -34$
 $x = -34/9$
 $3(-34/9) - 9y = 2$
 $-34/3 - 9y = 2$
 $-9y = 40/3$
 $y = -40/27$
 $(-34/9, -40/27)$

104. $5x - 4y = -30$
 $2x + 3y = -12$
 $10x - 8y = -60$
 $-10x - 15y = 60$

 $-23y = 0$
 $y = 0$
 $5x - 4(0) = -30$
 $5x = -30$
 $x = -6$
 $(-6, 0)$

105. Your math teacher tells you that next week's test is worth 100 points and contains 38 problems. Each problem is worth either 5 points or 2 points. How many problems are worth 5 points? 2 points?

$x = \# \text{ worth } 5 \text{ pts}$
 $y = \# \text{ worth } 2 \text{ pts}$
 $x + y = 38$
 $5x + 2y = 100$

$3x = 24$
 $x = 8$
 $y = 30$

**8 worth 5
30 worth 2**

106. Consider the table below. A salesman rents a car for two trips from the same rental company. The rental company charges a daily fee plus a charge for each mile driven. The table below shows the cost of each trip. How much did the company charge per day and per mile?

$D = \text{cost per day}$
 $M = \text{cost per miles}$

$$2D + 275M = 140.75$$

$$-2(1D + 95M = 59.75)$$

$$2D + 275M = 140.75$$

$$-2D - 190M = -119.50$$

$$85M = 21.25 \quad M = 0.25 \quad D = 36$$

Trip	Time	Distance Traveled	Cost
First Trip	2 days	275 miles	\$140.75
Second Trip	1 day	95 miles	\$59.75

$$D + 95(.25) = 59.75$$

Charge \$36 + 25¢ per mile

107. Rayson scored 1480 combined in Math & Verbal on his SATs. His math score was 560 less than twice his verbal score. What did he score in math and verbal?

$M = \text{Math Score}$
 $V = \text{verbal Score}$

$$M = 2V - 560 \quad M + V = 1480$$

$$2V - 560 + V = 1480$$

$$3V = 2040$$

$$V = 680$$

$$M = 800$$

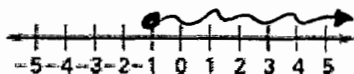
INEQUALITIES REVIEW

Solve & Graph the following Inequalities:

108. $-x - 3 \geq -10x - 12$
 $+10x + 3 \quad +10x + 3$

$$9x \geq -9$$

$$x \geq -1$$



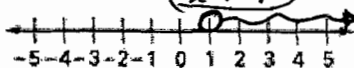
109. $-5(x-2) - 2x < 3$
 $-5x + 10 - 2x < 3$

$$-7x + 10 < 3$$

$$-10 \quad -10$$

$$-7x < -7$$

$$x > 1$$

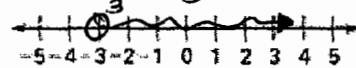


110. $-4 < 3(x+2) - 1$
 $-4 < 3x + 6 - 1$

$$-4 < 3x + 5$$

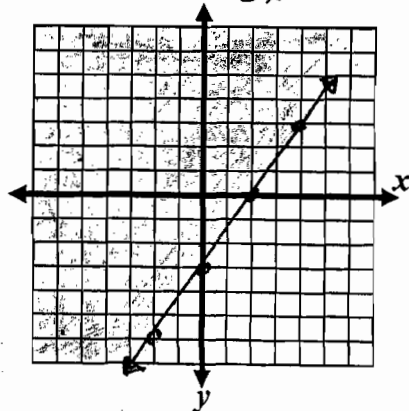
$$-5 \quad -5$$

$$-9 < \frac{3x}{3} \quad (-3 < x) \text{ or } x > -3$$

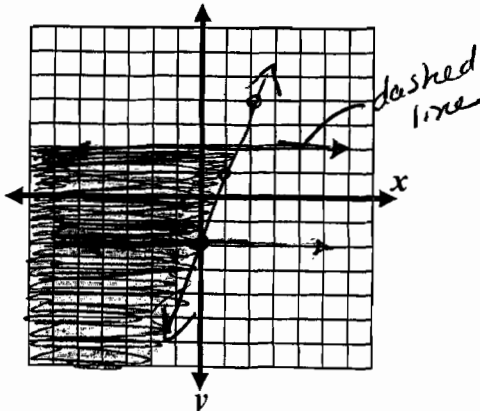


Graph the Inequalities or System of Inequalities:

111. $3x - 2y \leq 6$
 $-3x \quad -3x \quad y \geq -3 + \frac{3}{2}x$



112. $\begin{cases} y < 2 \\ y \geq 3x - 2 \end{cases}$



113. $\begin{cases} 3x + 2y > 12 \\ 2x - y \leq 6 \end{cases}$
 $2y > 12 - 3x$
 $y > 6 - \frac{3}{2}x$
 $-y \leq 6 - 2x$
 $y \geq -6 + 2x$

