Algebra 2 Pre-AP Name_____

Fall 2015 Final Exam Review

Date_____ Period____

Unit 2: Inverse Functions

Find the inverse of each function.

1) $g(x) = x + 5$

$g^{-1}(x) = x - 5$

2) $f(x) = 3x - 5$

$f^{-1}(x) = \frac{1}{3}x + \frac{5}{3}$

3) $g(x) = 5x - 25$

$g^{-1}(x) = 5 + \frac{1}{5}x$

4) $g(x) = 3x + 15$

$x = 3y + 15$

$-15 \quad -15$

$\frac{x - 15}{3} = \frac{3y}{3}$

$y = \frac{x-15}{3} = \frac{1}{3}x - \frac{15}{3}$

$g^{-1}(x) = \frac{1}{3}x - 5$

5) $f(x) = -x - 5$

$f^{-1}(x) = -x - 5$

6) $g(x) = 2 + \frac{3}{4}x$

$g^{-1}(x) = \frac{4}{3}x - \frac{8}{3}$

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

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

$\sqrt[3]{\frac{x}{-2}} = \sqrt[3]{(y+1)^3}$

$\sqrt[3]{\frac{x}{-2}} = y + 1$

$-1 \quad -1$

$f^{-1}(x)$ $y = \sqrt[3]{\frac{x}{-2}} - 1$

8) $g(x) = (x+2)^3 - 2$

$g^{-1}(x) = \sqrt[3]{x+2} - 2$

9) $f(x) = 2(x+2)^3$

$\frac{x}{2} = \frac{2(y+2)^3}{2}$

$\sqrt[3]{\frac{x}{2}} = \sqrt[3]{(y+2)^3}$

$\sqrt[3]{\frac{x}{2}} = y + 2$

$-2 \quad -2$

$f^{-1}(x)$ $y = \sqrt[3]{\frac{x}{2}} - 2$

10) $f(x) = \sqrt[3]{x-1} + 1$

$f^{-1}(x) = (x-1)^3 + 1$

11) $f(x) = -2 + 2x^3$

$f^{-1}(x) = \sqrt[3]{\frac{x+2}{2}}$

12) $g(x) = (x+1)^5 + 1$

$g^{-1}(x) = \sqrt[5]{x-1} - 1$

State if the given functions are inverses.

13) $f(n) = -2n - 8$

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

Yes

14) $h(x) = 2x + 3$

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

Yes

$h(f(x)) \stackrel{?}{=} f(h(x))$

$2\left(\frac{1}{2}x - \frac{3}{2}\right) + 3 \quad \frac{1}{2}(2x+3) - \frac{3}{2}$

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

$x \quad x$

yes

15) $f(x) = x^5 + 2$
$g(x) = -(x-1)^3$

No

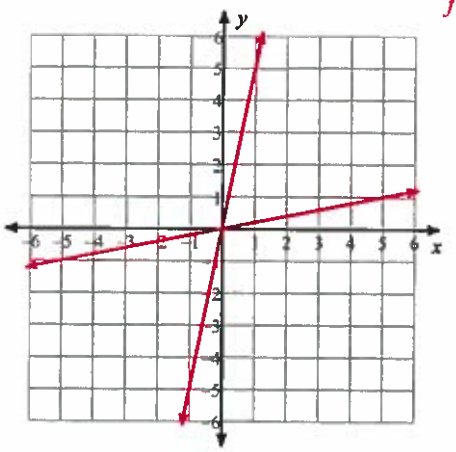
16) $f(x) = x^3 - 3$
$g(x) = \sqrt[3]{x+3}$

Yes

Find the inverse of each function. Then graph the function and its inverse.

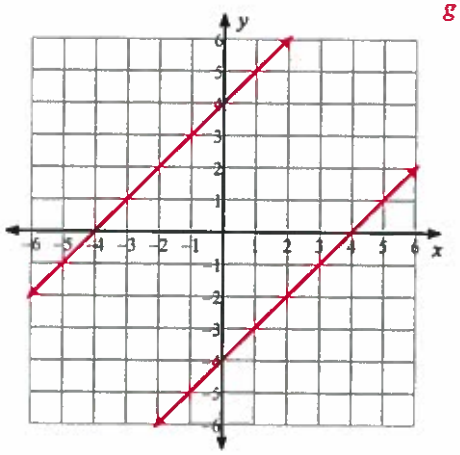
17) $f(n) = \frac{1}{5}n$

$f^{-1}(n) = 5n$



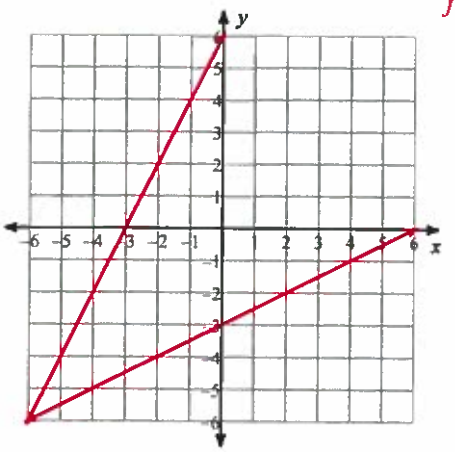
18) $g(n) = n - 4$

$g^{-1}(n) = n + 4$



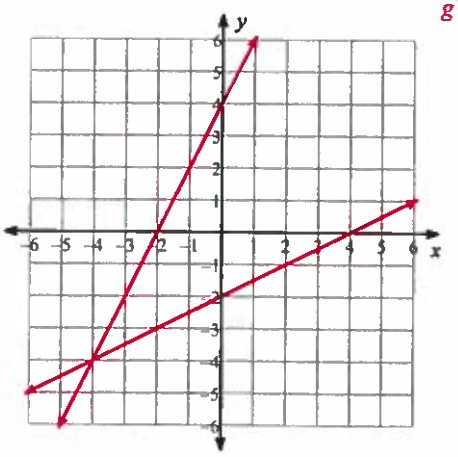
19) $f(x) = \frac{-6+x}{2}$

$f^{-1}(x) = 2x + 6$



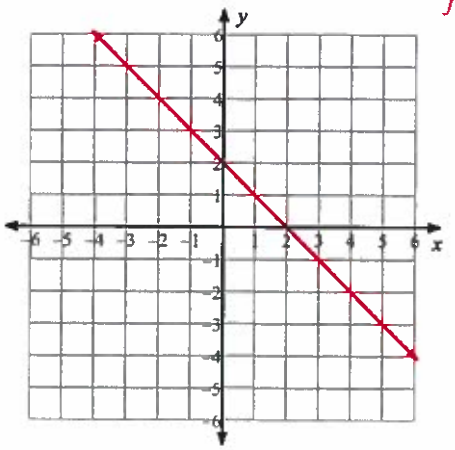
20) $g(x) = -2 + \frac{1}{2}x$

$g^{-1}(x) = 2x + 4$



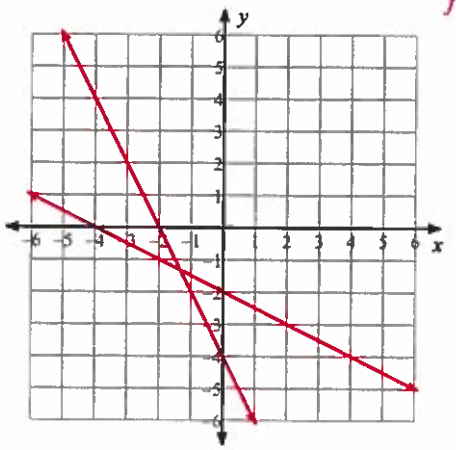
21) $f(x) = -x + 2$

$f^{-1}(x) = -x + 2$



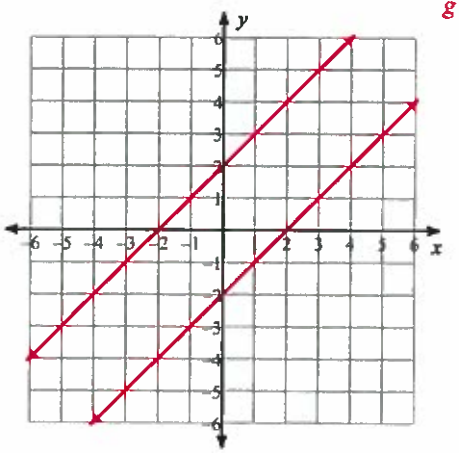
22) $f(n) = -\frac{1}{2}n - 2$

$f^{-1}(n) = -2n - 4$



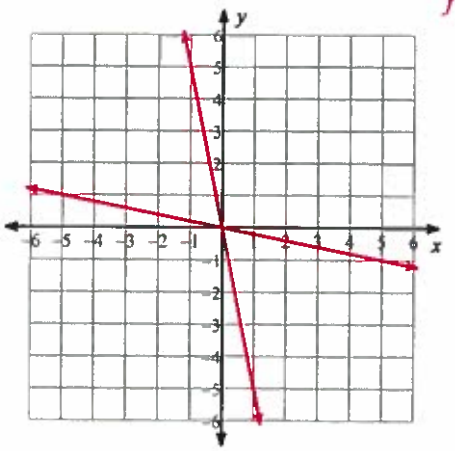
23) $g(x) = x + 2$

$g^{-1}(x) = x - 2$



24) $f(x) = -5x$

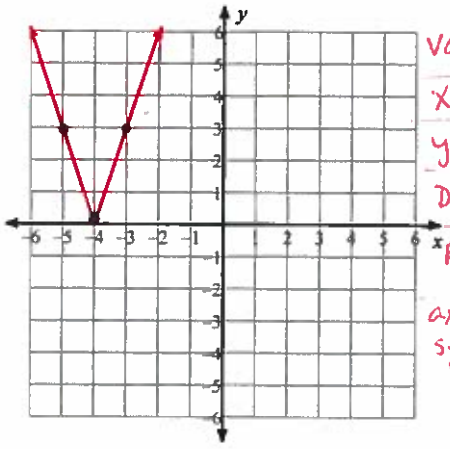
$f^{-1}(x) = -\frac{x}{5}$



Unit 3: Absolute Value Functions

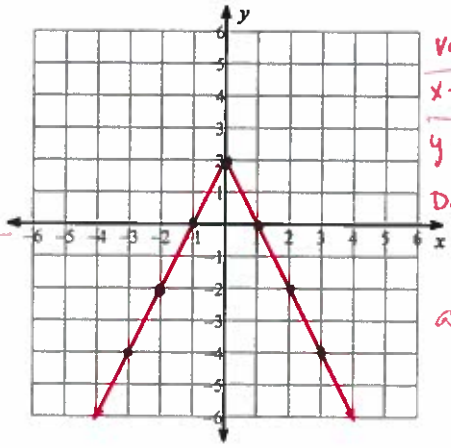
Graph each equation. State the vertex, intercepts, domain, range, and axis of symmetry for each graph.

25) $y = 3|x+4|$



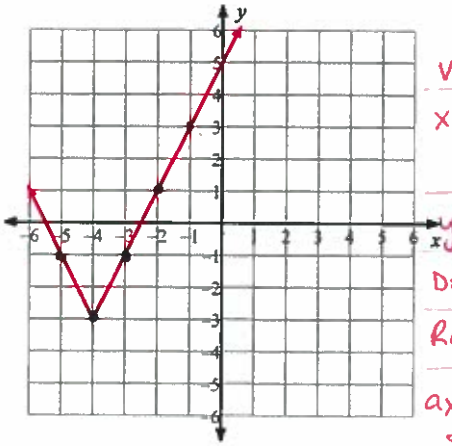
vertex: (-4,0)
x-int: (-4,0)
y-int: (0,12)
Domain: $(-\infty,\infty)$
Range: $[0,\infty)$
axis of sym: $x = -4$

26) $y = -2|x| + 2$



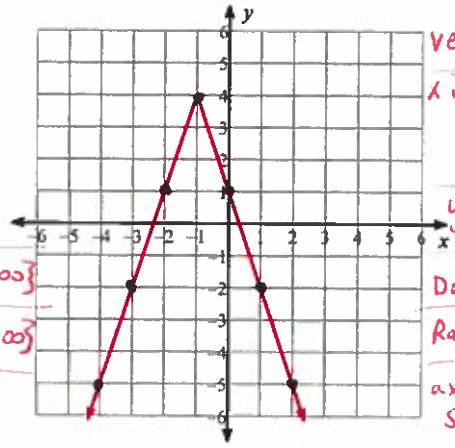
vertex: (0,2)
x-int: (-1,0) (1,0)
y-int: (0,2)
Domain: $(-\infty,\infty)$
Range: $(-\infty,2]$
axis of sym: $x = 0$

27) $y = 2|x+4| - 3$



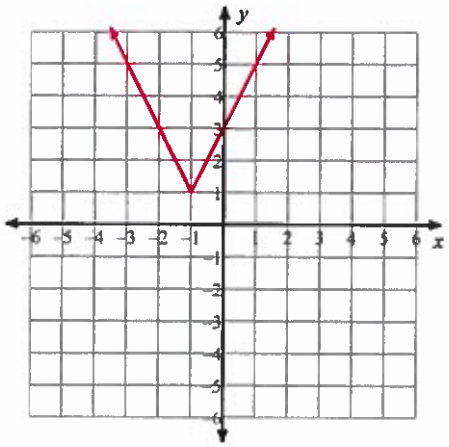
vertex: (-4,-3)
x-int: (-5.5,0) (-2.5,0)
y-int: (0,5)
Domain: $\{x \mid -\infty < x < \infty\}$
Range: $\{y \mid -3 \le y < \infty\}$
axis of Sym: $x = -4$

28) $y = -3|x+1| + 4$

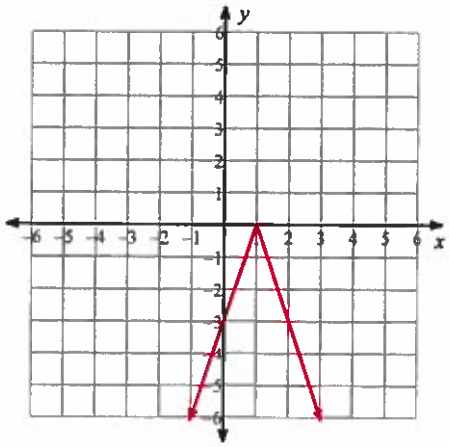


vertex: (-1,4)
x-int: $(-2\frac{1}{3},0)$ $(\frac{1}{3},0)$
y-int: (0,1)
Domain: $\{x \mid -\infty < x < \infty\}$
Range: $\{y \mid -\infty < y \le 4\}$
axis of Sym: $x = -1$

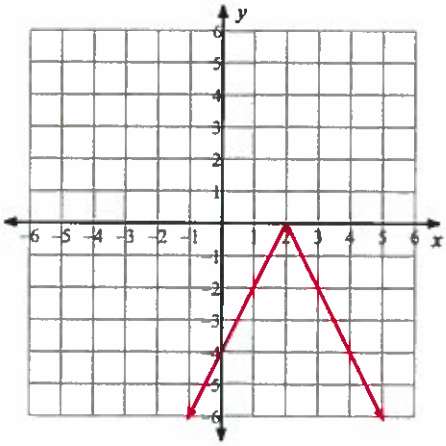
29) $y = 2|x + 1| + 1$



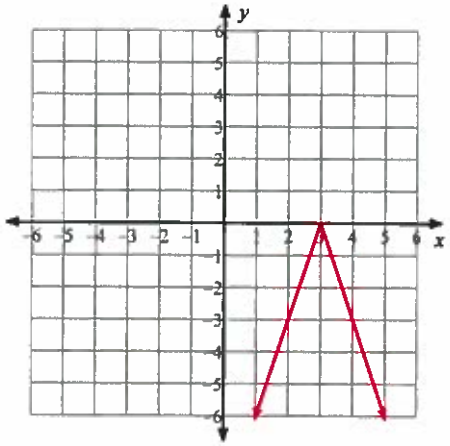
30) $y = -3|x - 1|$



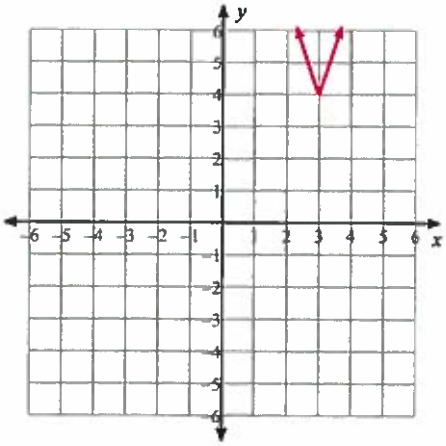
31) $y = -2|x - 2|$



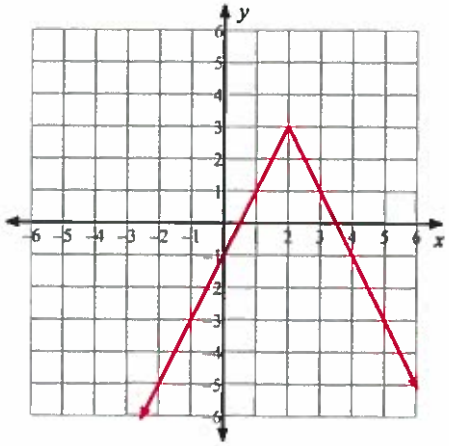
32) $y = -3|x - 3|$



33) $y = 3|x - 3| + 4$



34) $y = -2|x - 2| + 3$



Solve each equation.

35) $|8x+5|-4=73$

$\{9, -\frac{41}{4}\}$ ✓

$|8x+5|-4=73$
$+4 \quad +4$
$|8x+5|=77$

$8x+5=77$ or $8x+5=-77$
$-5 \quad -5 \qquad -5 \quad -5$
$\frac{8x}{8}=\frac{72}{8} \qquad \frac{8x}{8}=\frac{-82}{8}$
$x=9 \qquad x=-\frac{82}{8}=-\frac{41}{4}$

36) $|-3n-5|+9=13$

$\{-3, -\frac{1}{3}\}$

37) $-9|10r+6|=-54$

$\{0, -\frac{6}{5}\}$

these are being multiplied, so to undo multiplication divide by -9.

38) $|8r-6|-6=20$

$\{4, -\frac{5}{2}\}$

39) $-7+|p+4|=-5$

$\{-2, -6\}$

40) $|5+n|+2=12$

$\{5, -15\}$

Solve each inequality. (3.4) in notes

41) $-5|10a+4| \geq -30$

$|10a+4| \leq 6$

$-1 \leq a \leq \frac{1}{5}$

when you divide by a negative # you flip the inequality!

42) $3|10+10a| \leq 60$

$3|10+10a| \leq 60$
$\frac{3}{3} \qquad \frac{3}{3}$
$|10+10a| \leq 20$
set up
$-20 \leq 10+10a \leq 20$
$-10 \quad -10 \quad -10$
$-30 \leq 10a \leq 10$
$\frac{10}{10} \quad \frac{10}{10} \quad \frac{10}{10}$
$-3 \leq a \leq 1$

43) $|-10-2b|+3>13$

$|-10-2b|+3>13$
$-3 \quad -3$
$|-10-2b|>10$
set up
$-10-2b>10$ OR $-10-2b<-10$
$+10 \quad +10 \qquad +10 \quad +10$
$-2b>20 \qquad -2b<0$
$\frac{-2}{-2} \quad \frac{-2}{-2} \qquad \frac{-2}{-2}$ flip inequality
flip inequality
$b<-10$ OR $b>0$

$b<-10$ or $b>0$

44) $|5n+5|-6 \leq 24$

$-7 \leq n \leq 5$

45) $|4k+10|-4 \geq 10$

$k \geq 1$ or $k \leq -6$

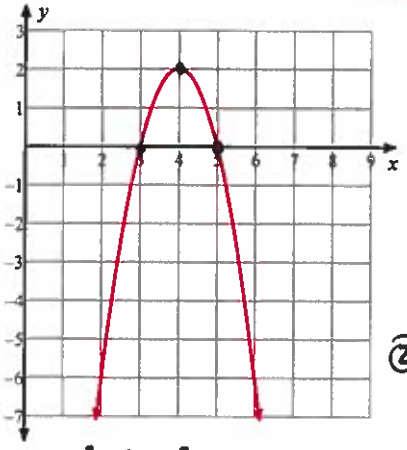
46) $|a-7|-1<5$

$1<a<13$

Unit 4: Quadratic Applications

Given the graph, state the vertex, equation of axis of symmetry, y-intercept, and the roots/solutions/zeros/x-intercepts of each graph. Then state the equation of the graph in standard form.

47) $y = -2x^2 + 16x - 30$



① Make tbl

x	y
4	2
3	0
5	0

(vertex)
(root)
(root)

② Make a list

stat → edit

L1	L2
4	2
3	0
5	0

③ Regression

(STAT) → CALC → QuadReg → ENTER

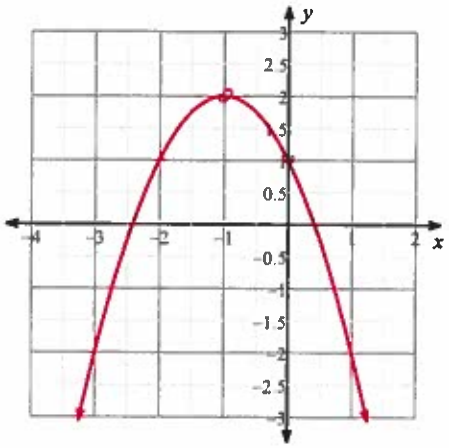
$ax^2 + bx^2 + c$

$a = -2$

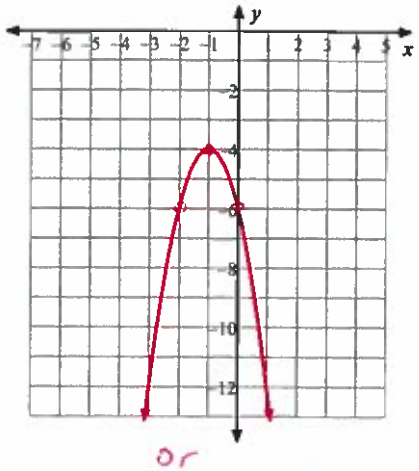
$b = 14$

$c = -30$

48) $y = -x^2 - 2x + 1$ or vertex $y = -(x+1)^2 + 2$

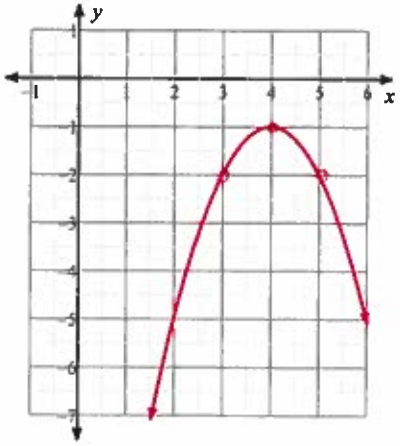


49) $y = -2x^2 - 4x - 6$



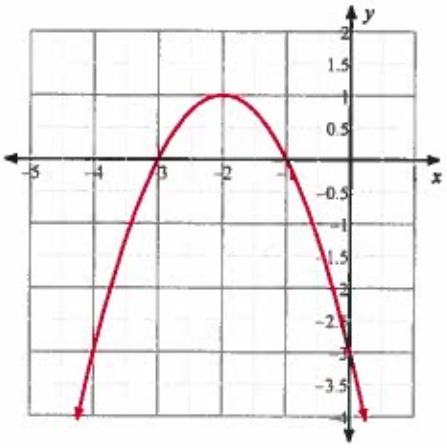
or $y = -2(x+1)^2 - 4$

50) $y = -x^2 + 8x - 17$

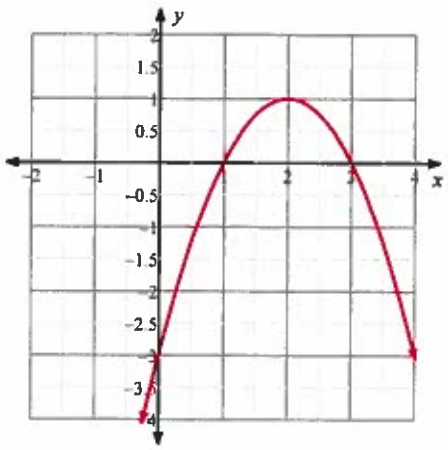


$y = -(x-4)^2 - 1$

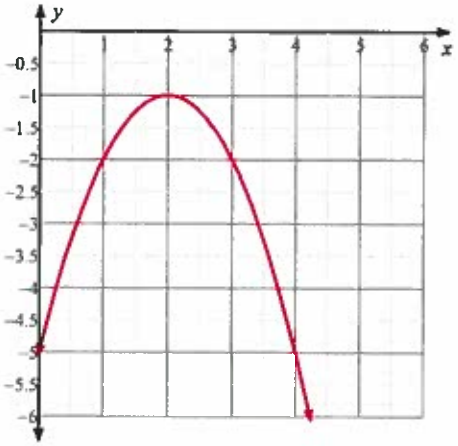
51) $y = -x^2 - 4x - 3$



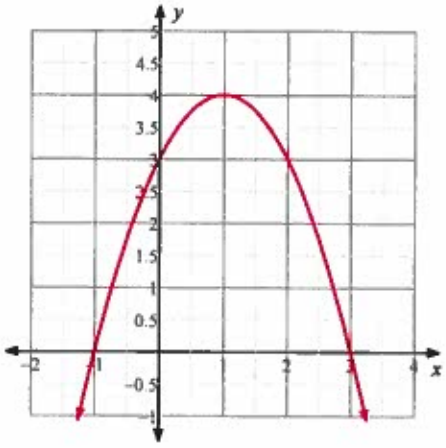
52) $y = -x^2 + 4x - 3$



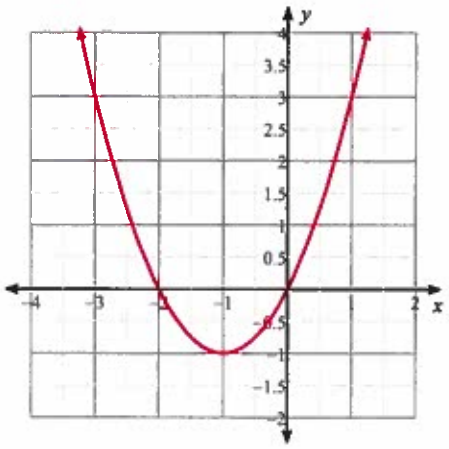
53) $y = -x^2 + 4x - 5$



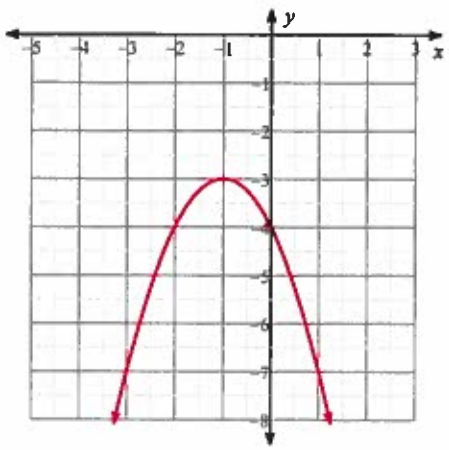
54) $y = -x^2 + 2x + 3$



55) $y = x^2 + 2x$

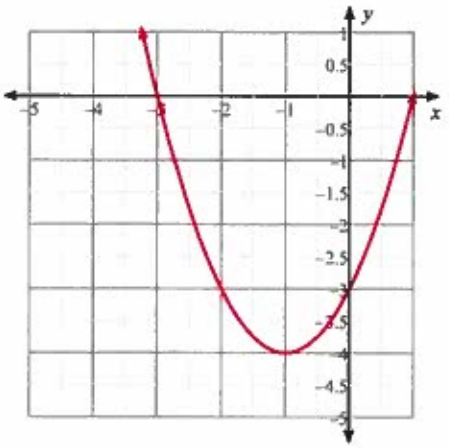


56) $y = -x^2 - 2x - 4$

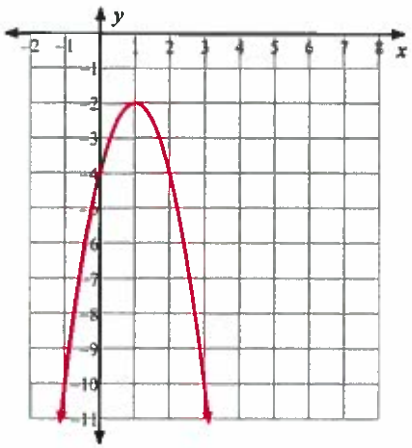


START VERTEX FORM

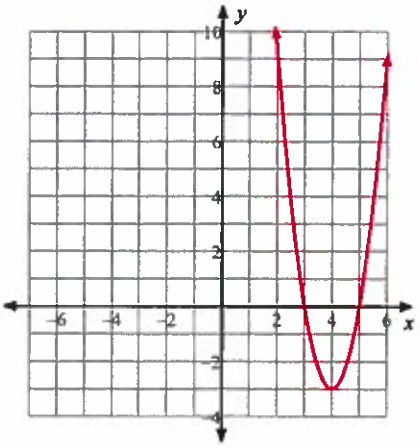
57) $y = (x + 1)^2 - 4$



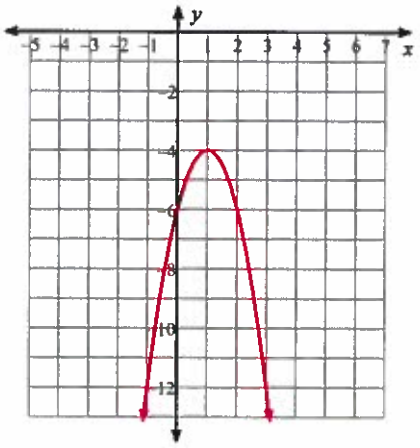
58) $y = -2(x - 1)^2 - 2$



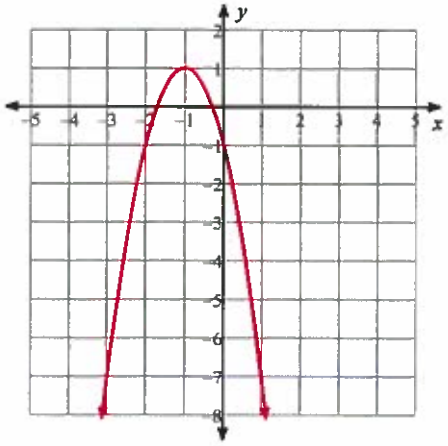
59) $y = 3(x-4)^2 - 3$



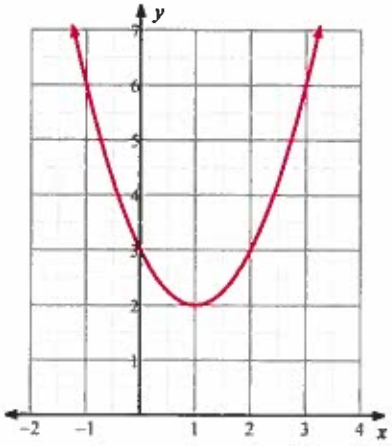
60) $y = -2(x-1)^2 - 4$



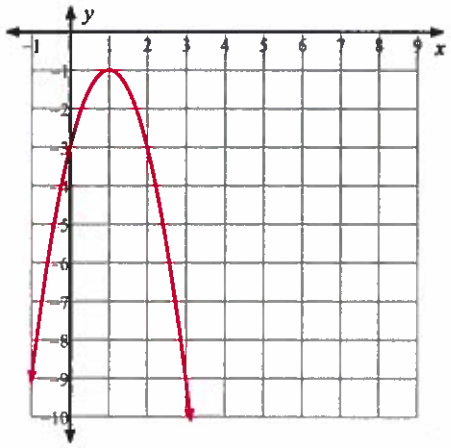
61) $y = -2(x+1)^2 + 1$



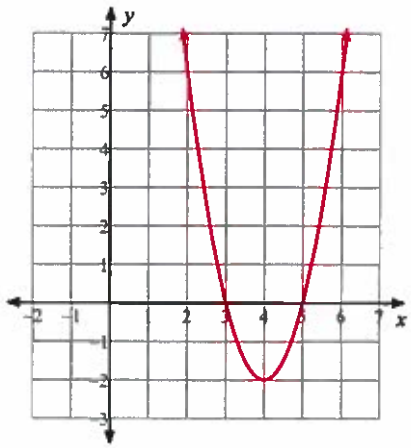
62) $y = (x-1)^2 + 2$



63) $y = -2(x-1)^2 - 1$



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



~~Solve each equation by completing the square~~. (Transform equation from standard form to vertex form.) SEE WORK at the end

65) $x^2 - 14x + 40 = 0$

~~{10, 4}~~ $y = (x-7)^2 - 9$

66) $10p^2 + 20p - 80 = 0$

~~{2, -4}~~ $y = 10(x+1)^2 - 90$

67) $k^2 - 4k - 21 = 0$

~~{7, -3}~~ $y = (x-2)^2 - 25$

68) $10n^2 - 20n - 30 = 0$

~~{3, -1}~~ $y = 10(x-1)^2 - 40$

69) $8p^2 + 16p + 6 = 0$

~~$\left\{-\frac{1}{2}, -\frac{3}{2}\right\}$~~ $y = 8(x+1)^2 - 2$

70) $2n^2 - 12n - 80 = 0$

~~{10, -4}~~ $y = 2(x-3)^2 - 98$

71) $k^2 - 8k - 48 = 0$

~~{12, -4}~~ $y = (x-4)^2 - 64$

72) $p^2 + 4p - 32 = 0$

~~{4, -8}~~ $y = (x+1)^2 - 36$

73) $n^2 - 18n + 17 = 0$

$\{17, 1\}$

74) $x^2 - 4x + 3 = 0$

$\{3, 1\}$

Unit 5: Solving Quadratics

Simplify.

75) $(-2 - 4i) + (4 + i)$

$2 - 3i$

76) $(-7 - 5i) - (-2 - 8i)$

$-5 + 3i$

77) $(4 + 4i) + (4 + 6i)$

$8 + 10i$

78) $(3i) + (-3 + 6i) - (i)$

$-3 + 8i$

79) $(-4 - 7i) + (4 + 2i)$

$-5i$

80) $(2i) - (2i) + (-6 - 4i)$

$-6 - 4i$

81) $(-2 + 3i)^2$

$-5 - 12i$

82) $(-1 + 4i)(-5 - 5i)$

$25 - 15i$

83) $(-5 + i)(6 + 6i)$

$-36 - 24i$

84) $(6 - 2i)(8 - 6i)$

$36 - 52i$

85) $(-7 - 2i)^2$

$45 + 28i$

86) $(5 + 4i)(-5 + 8i)$

$-57 + 20i$

87) $\sqrt{392}$

$14\sqrt{2}$

88) $\sqrt{8}$

$2\sqrt{2}$

89) $\sqrt{-48} = i\sqrt{48} = 2 \cdot 2 \cdot i\sqrt{3}$ $4i\sqrt{3}$

90) $\sqrt{63}$ $3\sqrt{7}$

91) $\sqrt{150}$ $5\sqrt{6}$

92) $\sqrt{-12} = 2i\sqrt{3}$

93) $\sqrt{-210} = i\sqrt{210}$

94) $\sqrt{72}$ $6\sqrt{2}$

95) $\sqrt{-32} = 4i\sqrt{2}$

96) $\sqrt{105}$ $\sqrt{105}$

97) $\sqrt{512}$ $16\sqrt{2}$

98) $\sqrt{-144} = 12i$

Solve each equation by factoring.

99) $n^2 - 9 = 0$ $\{-3, 3\}$ $(n-3)(n+3)$

100) $v^2 - 10v + 21 = 0$ $\{3, 7\}$ $(v-7)(v-3)$

101) $n^2 - 2n - 8 = 0$ $\{-2, 4\}$ $(n-4)(n+2)$

102) $v^2 + 9v + 14 = 0$ $\{-2, -7\}$ $(v+7)(v+2)$

103) $n^2 + n - 56 = 0$ $\{7, -8\}$ $(n+8)(n-7)$

104) $x^2 - 16x + 64 = 0$ $\{8\}$ $(x-8)(x-8)$

105) $r^2 - 12r + 32 = 0$

$\{8, 4\}$ $(r-8)(r-4)$

106) $p^2 - 6p - 16 = 0$

$\{8, -2\}$ $(p-8)(p+2)$

107) $n^2 + n - 20 = 0$

$\{4, -5\}$ $(n-5)(n+4)$

108) $n^2 - 15n + 56 = 0$

$\{8, 7\}$ $(n-8)(n-7)$

109) $5x^2 + 3x - 8 = 0$

$\left\{-\frac{8}{5}, 1\right\}$ $(5x+8)(x-1)$

110) $8k^2 + 46k - 12 = 0$

$\left\{\frac{1}{4}, -6\right\}$ $(4x-1)(x+6)$

111) $7n^2 + 24n - 16 = 0$

$\left\{\frac{4}{7}, -4\right\}$ $(7n-4)(n+4)$

112) $12x^2 - 102x + 180 = 0$

$\left\{\frac{5}{2}, 6\right\}$ $(2x-5)(x-6)$

113) $5x^2 + 7x = 0$

$\left\{-\frac{7}{5}, 0\right\}$ $x(5x+7)$

114) $7n^2 - 39n + 20 = 0$

$\left\{\frac{4}{7}, 5\right\}$ $(7n-4)(n-5)$

115) $6n^2 - 41n - 7 = 0$

$\left\{-\frac{1}{6}, 7\right\}$ $(6n+1)(n-7)$

116) $7n^2 + 5n = 0$

$\left\{-\frac{5}{7}, 0\right\}$ $n(7n+5)$

117) $7b^2 + 6b - 16 = 0$

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

118) $5x^2 - 9x - 2 = 0$

$\left\{-\frac{1}{5}, 2\right\}$ $(5x+1)(x-2)$

Solve each equation with the quadratic formula.

119) $b^2 - 49 = 0$

$\{7, -7\}$

120) $4m^2 + 6m - 4 = 0$

$\left\{\frac{1}{2}, -2\right\}$

121) $6r^2 - r - 51 = 0$

$\left\{3, -\frac{17}{6}\right\}$

122) $2a^2 + 8a - 24 = 0$

$\{2, -6\}$

123) $x^2 - 10x - 8 = 0$

$\left\{5 + \sqrt{33}, 5 - \sqrt{33}\right\}$

124) $n^2 + 7n + 11 = 0$

$\left\{\frac{-7 + \sqrt{5}}{2}, \frac{-7 - \sqrt{5}}{2}\right\}$

125) $2b^2 + 7b - 7 = 0$

$\left\{\frac{-7 + \sqrt{105}}{4}, \frac{-7 - \sqrt{105}}{4}\right\}$

126) $12r^2 - 6r - 11 = 0$

$\left\{\frac{3 + \sqrt{141}}{12}, \frac{3 - \sqrt{141}}{12}\right\}$

127) $-5b^2 - 4b - 7 = 0$

$\left\{\frac{-2 - i\sqrt{31}}{5}, \frac{-2 + i\sqrt{31}}{5}\right\}$

128) $2x^2 - 2x + 9 = 0$

$\left\{\frac{1 + i\sqrt{17}}{2}, \frac{1 - i\sqrt{17}}{2}\right\}$

129) $2n^2 + n + 5 = 0$

$\left\{\frac{-1 + i\sqrt{39}}{4}, \frac{-1 - i\sqrt{39}}{4}\right\}$

130) $10a^2 + 5 = 0$

$\left\{\frac{i\sqrt{2}}{2}, -\frac{i\sqrt{2}}{2}\right\}$

65) $x^2 - 14x + 40 = 0$

$-40 \quad -40$

$x^2 - 14x + 49 = -40 + 49$

$\left(\frac{b}{2a}\right)^2 \quad \left(\frac{-14}{2(1)}\right)^2 \quad (-7)^2 \quad 49$

$(x-7)(x-7) = 9$

$(x-7)^2 = 9$

$-9 \quad -9$

$y = (x-7)^2 - 9$

66) $10p^2 + 20p - 80 = 0$

$+80 \quad +80$

$\left(\frac{20}{20}\right)^2 \quad \left(\frac{20}{20}\right)^2 \quad (1)^2 \quad 1$

$\frac{10p^2}{10} + \frac{20p}{10} = 80$

$10(p^2 + 2p + 1) = 80 + 10(1)$

$10(p+1)^2 = 90$

$-90 \quad -90$

$y = 10(p+1)^2 - 90$