Unit 8 Day 18 HW Quadratics Study Guide

Name: KEY

Problems marked with ** indicate you MAY use a calculator

(#1-2) draw an accurate graph (with at least five key points) and find the following:

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

Axis of Symmetry: $x = 1$ $x = \frac{-2}{2(-1)} = 1$

Vertex: (1, 4) MAX or MIN $y = -(1)^2 + 2(1) + 3$

direction of graph: ↓ $y = -1 + 2 + 3$

range: $(-\infty, 4]$ or $y \le 4$ $y = 4$

y-intercept (0, 3)

x-intercept (−1, 0) & (3, 0)

End Behavior: $x \to -\infty,\ y \to -\infty$; $x \to \infty,\ y \to -\infty$

Increasing interval: $(-\infty, 1]$

Decreasing interval: $[1, \infty)$

2) $y = 2x^2 + 12x + 10$

Axis of Symmetry: $x = -3$ $x = \frac{-12}{2(2)} = -3$

Vertex: (−3, −8) MAX or MIN

direction of graph: ↑ $y = 2(-3)^2 + 12(-3) + 10$

range: $[-8, \infty)$ or $y \ge -8$ $y = 2(9) - 36 + 10$

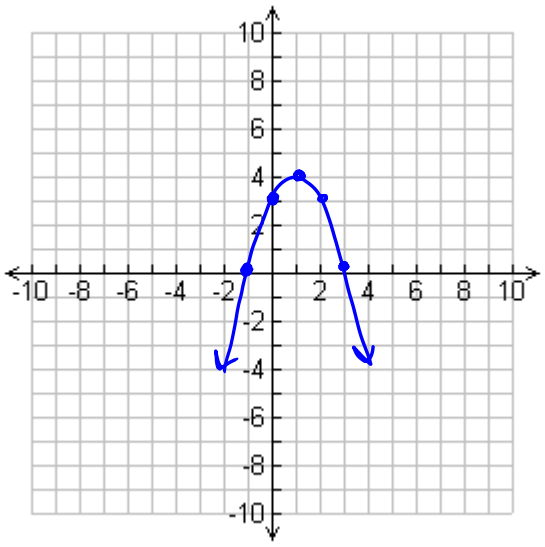
y-intercept (0, 10) $y = 18 - 36 + 10$

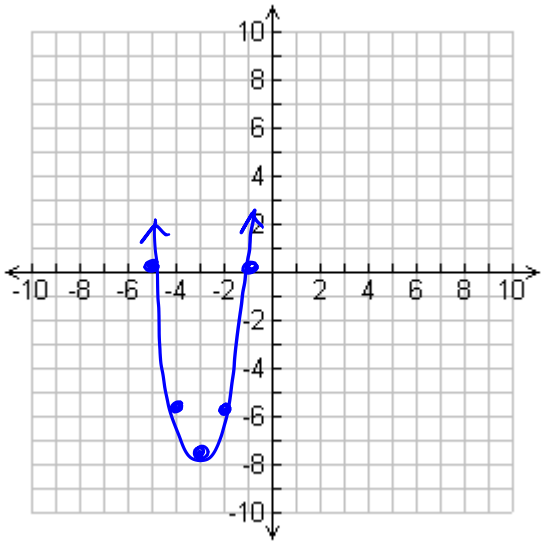
x-intercept (−5, 0) & (−1, 0) $y = -8$

End Behavior: $x \to -\infty,\ y \to \infty$; $x \to \infty,\ y \to \infty$

Increasing interval: $[-3, \infty)$

Decreasing interval: $(-\infty, -3]$





3) What is the difference between the axis of symmetry and the vertex of a parabola?

↑ imaginary line that divides the graph in half

↑ maximum or minimum point on a parabola

4) What is another name for a solution?

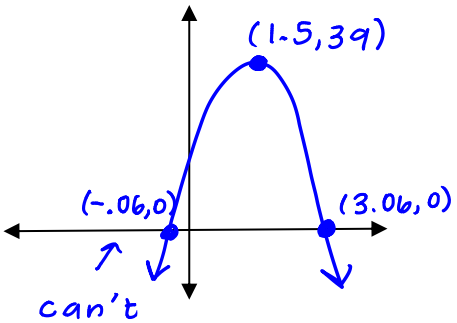
zero, x-intercept, root

5) **A baseball player hits a ball into the air with an initial velocity of 48 feet per second. The batter swings the bat at an initial height of 3 feet. Its height is represented by the equation: $h(t) = -16t^2 + v_o t + h_o$ where *t* represents the time the ball has traveled in seconds, and *h* represents the height of the ball in feet. *Round any answers to the nearest tenth.*

a) Write the vertical motion equation that represents this situation:

$h(t) = -16t^2 + 48t + 3$

b) Graph the equation on your calculator and sketch it.



c) After how many seconds does the baseball reach its maximum height?

1.5sec (x-coord. of vertex)

* or use vertex formula

d) What is the maximum height?

39 ft (y-coord. of vertex)

WINDOW
Xmin=-10
Xmax=10
Xscl=1
Ymin=-10
Ymax=100
Yscl=10
Xres=

as long as you can see both x-int's & the vertex, any window is fine :)

e) After how many seconds does the baseball hit the ground? h(t) = 0

$0 = -16t^2 + 48t + 3$

3.06sec

x-intercepts!

* or use quadratic formula!

6) ** Find the x-intercepts of each quadratic equation by factoring or using the Quadratic Formula.

a) $2x^2 - 10x = 12$

$2x^2 - 10x - 12 = 0$

$2(x^2 - 5x - 6) = 0$

$2(x - 6)(x + 1) = 0$

$x - 6 = 0$ $\quad x + 1 = 0$

$x = 6$ $\quad x = -1$

b) $-8x - 1 + 4x^2 = 0$

$4x^2 - 8x - 1 = 0$

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

$x = \frac{8 \pm \sqrt{64 + 16}}{8} = \frac{8 \pm \sqrt{80}}{8}$

$x \approx 2.12, -.12$

7) Use the discriminant to determine the number of solutions (and their nature) of each quadratic equation below.

a) $x^2 + 3 = -4x$

$x^2 + 4x + 3 = 0$

$b^2 - 4ac$

$(4)^2 - 4(1)(3)$

$16 - 12$

4 $\Rightarrow$ 2 rational solutions

b) $2x^2 - 5x = -6$

$2x^2 - 5x + 6 = 0$

$(-5)^2 - 4(2)(6)$

$25 - 48$

-23 $\Rightarrow$ 0 real solutions

c) $-x^2 = -2x + 1$

$-x^2 + 2x - 1 = 0$

$(2)^2 - 4(-1)(-1)$

$4 - 4$

0 $\Rightarrow$ 1 real solution

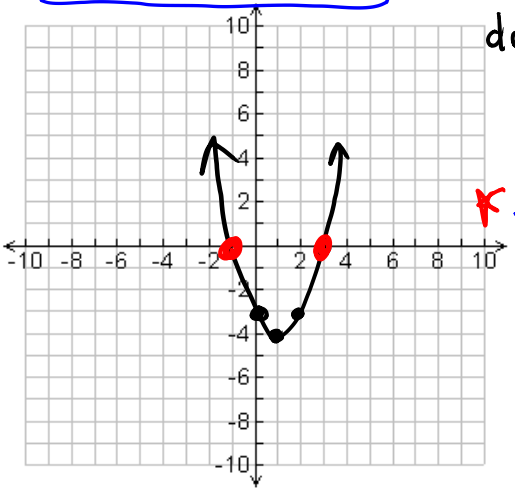
8) Use completing the square to transform the equations in standard form to vertex form. Then graph the quadratic using your knowledge of transformations.

a) $y = x^2 - 2x - 3$

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

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

right 1, down 4



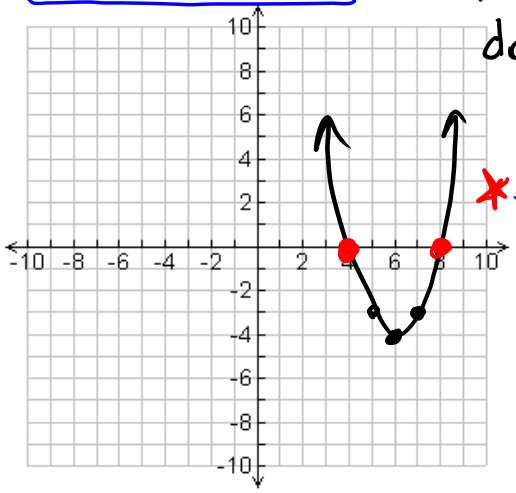
solutions: $x = -1$, $x = 3$

b) $y = x^2 - 12x + 32$

$y = (x^2 - 12x + \underline{36}) + 32 - \underline{36}$

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

right 6, down 4



solutions: $x = 4$, $x = 8$

9) ** Solve using square roots.

a) $-5x^2 + 500 = 0$

$-500 \quad -500$

$\frac{-5x^2}{-5} = \frac{-500}{-5}$

$\sqrt{x^2} = \sqrt{100}$ $\quad x = \pm 10$

b) $3x^2 - 75 = 0$

$+75 \quad +75$

$\frac{3x^2}{3} = \frac{75}{3}$

$\sqrt{x^2} = \sqrt{25}$

$x = \pm 5$

c) $-2x^2 + 48 = 0$

$-48 \quad -48$

$\frac{-2x^2}{-2} = \frac{-48}{-2}$

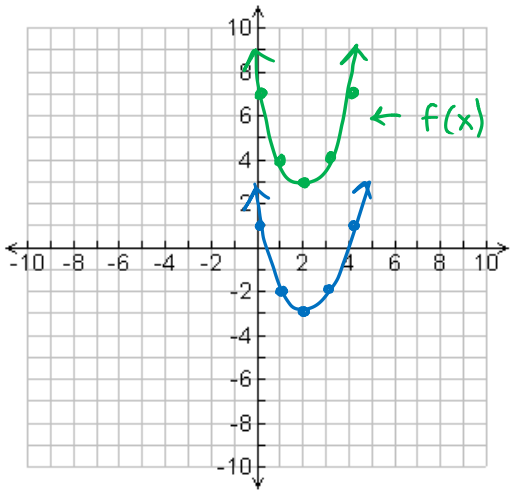
$\sqrt{x^2} = \sqrt{24}$

$x = \pm 4.90$

10) If $f(x) = (x-2)^2 - 3$, graph $h(x) = f(x) + 6$ on the same coordinate plane.

up 6

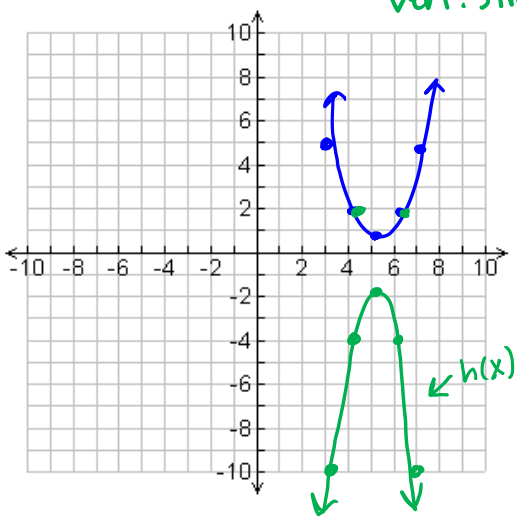
right 2, down 3



11) If $f(x) = (x-5)^2 + 1$, graph $h(x) = -2f(x)$ on the same coordinate plane.

reflect over x-axis, vert. stretch by 2

right 5, up 1



x	y
3	~~5~~ ~~-5~~ -10
4	~~2~~ ~~-2~~ -4
5	~~1~~ ~~-1~~ -2
6	~~2~~ ~~-2~~ -4
7	~~5~~ ~~-5~~ -10