Review for Quads Test #2 **Name:** Key

1) Given $y = x^2 - 5x + 6$, complete the following:

(a) Find the y-intercept, vertex and axis of symmetry. y-int $(0, 6)$ vertex$(\frac{5}{2}, -\frac{1}{4})$

$x = \frac{5}{2(1)} = \frac{5}{2} = \frac{5}{2}$ AOS: $x = 5/2$

$y = (5/2)^2 - 5(5/2) + 6 = -1/4$

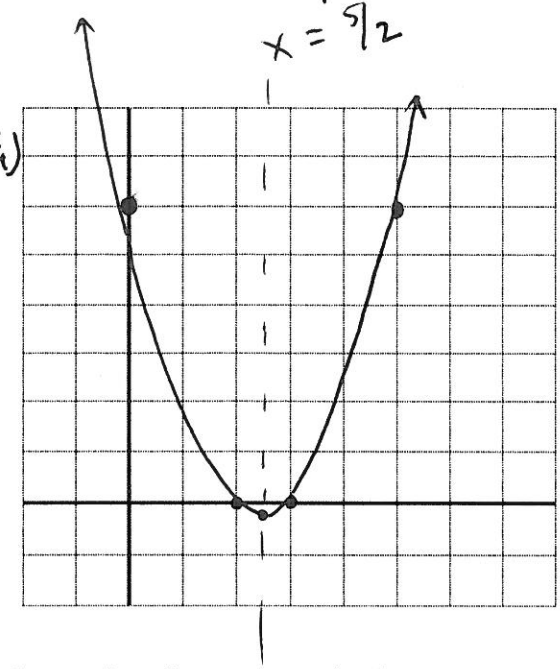
(b) Convert to intercept form using factoring and state the x-intercepts.

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

$0 = (x-2)(x-3)$

$x = 2 \quad x = 3$

(c) Sketch the graph on the axes provided to the right. Be sure to include 5 points on the graph.



2) Factor each polynomial completely. Show your work. Remember that you can check your answers!

(a) $3x^2 + 8x - 35$

$(3x - 7)(x + 5)$

(b) $42x^2 - 36x$

$6x(7x - 6)$

(c) $4x^2 + 14x - 8$

$2(2x^2 + 7x - 4)$

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

(d) $20x^2 - 45$

$5(4x^2 - 9)$

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

3) Using what you know about the different forms of quadratic functions, write a quadratic function that satisfies the given information.

(a) Vertex: (1, -6)

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

(b) Zeros: (-5, 0) & (2, 0)

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

(c) y-intercept: (0, -9)

$y = x^2 + x - 9$

4) The function $h(x) = -16x^2 + 64x + 100$ models the height, h, of a ball thrown and the distance, x, the ball travels horizontally.

(a) At what horizontal distance will the ball reach its maximum height?

$x = \frac{-b}{2a}$

$= -64/2(-16)$

$x = \frac{-64}{-32}$

$\boxed{x = 2}$

(b) What is the maximum height of the ball?

$h(2) = -16(2)^2 + 64(2) + 100$

$= -16(4) + 64(2) + 100$

$\boxed{h(2) = 164}$

(c) What is the horizontal distance the ball traveled when it hit the ground?

$0 = -16x^2 + 64x + 100$

$x = \frac{4 + \sqrt{41}}{2}$

(d) A laser beam is pointed from a platform 30 feet above the ground and follows the path $h(x) = 10x + 30$. Will the laser beam hit the ball? Solve algebraically and explain your answer in a complete sentence.

$10x + 30 = -16x^2 + 64x + 100$

$0 = -16x^2 + 54x + 70$

$0 = -(16x^2 - 54x - 70)$

$0 = (2x + 2)(8x - 35)$

$x = -1 \quad x = 35/8$

yes! At 35/8 units horizontally, the laser will hit the ball.

5) Convert the following quadratic equations into standard form.

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

$y = 2(4x^2 + 3x - 24x - 18)$

$\boxed{y = 8x^2 - 42x - 36}$

(b) $y = 5(x+2)^2 - 5$

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

$y = 5x^2 + 20x + 20 - 5$

$\boxed{y = 5x^2 + 20x + 15}$

6) Convert each equation from standard form into vertex form.

(a) $y = x^2 - 10x - 15$

$y = (x^2 - 10x + \_\_) - 15$

$y = (x-5)^2 - 15 - 25$

$\boxed{y = (x-5)^2 - 40}$

(b) $y = -2x^2 + 18x - 13.5$

$y = -2(x - 4.5)^2 + 27$

7) Convert each equation from standard form into intercept form.

(a) $y = x^2 - 6x - 27$

$\boxed{y = (x-9)(x+3)}$

(b) $y = -2x^2 - 24x - 70$

$y = -2(x^2 + 12x + 35)$

$\boxed{y = -2(x+5)(x+7)}$

8) Determine the number and type of solution for each equation. Then determine the number of x-intercepts. Then, solve each equation.

(a) $x^2 - 6x - 10 = 0$

(b) $3x^2 = -27$

(c) $2x^2 + 9x - 11 = 0$

(d) $3x^2 + x + 7 = 3$

(e) $-4(x-2)^2 = 32$

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

9) Simplify each radical expression. There should be NO decimals in your answer.

(a) $\sqrt{300} = \sqrt{100 \cdot 3}$
$= 10\sqrt{3}$

(b) $\sqrt{-108} = \sqrt{108}\,i$
$\sqrt{3 \cdot 36}\,i$
$6\sqrt{3}\,i$

(c) $2\sqrt{80}$ $2\sqrt{16 \cdot 5}$
$2 \cdot 4\sqrt{5}$
$8\sqrt{5}$

(d) $-4\sqrt{-81}$ $-4\sqrt{81}\,i$
$-4(9)i$
$-36i$

(e) $3\sqrt{-27}$ $3\sqrt{27}\,i$
$3\sqrt{9 \cdot 3}\,i$
$3 \cdot 3\sqrt{3}\,i = 9\sqrt{3}\,i$

10) The revenue for a sporting event can be modeled by $= -20t^2 + 200t$, where t is the ticket price in dollars. The cost for the event can be modeled by $y = 20t - 720$. Determine what the theatre group should charge per ticket to break even.

$-20t^2 + 200t = 20t - 720$

$-20t^2 + 180t + 720 = 0$

$-20(t^2 - 9t - 36) = 0$

$-20(t-12)(t+3) = 0$

$t = 12 \qquad t = -3$

The group should charge \$12 to break even!

6b. $y = -2x^2 + 18x - 13.5$

$y = -2(x^2 - 9x + \_\_\_) - 13.5$

$-40.5 + y = -2(x^2 - 9x + 20.25) - 13.5$

$-40.5 + y = -2(x - 4.5)^2 - 13.5$

$\boxed{y = -2(x - 4.5)^2 + 27}$

8. a. $x^2-6x-10=0$

Discriminant: $(-6)^2-4(1)(-10)$

$= 36+40$

$= 76$

2 real soln | 2 x-int

$x^2-6x-10=0$

$$x = \frac{6 \pm \sqrt{(-6)^2-4(1)(-10)}}{2(1)}$$

$$x = \frac{6 \pm \sqrt{76}}{2}$$

$$x = \frac{6 \pm \sqrt{4 \cdot 19}}{2}$$

$$x = \frac{6 \pm 2\sqrt{19}}{2}$$

$$\boxed{x = 3 \pm \sqrt{19}}$$

b. $3x^2=-27$

$3x^2+27=0$

D: $0^2-4(3)(27)$

$= -324$

2 imag. soln | 0 x-int

$3x^2=-27$

$x^2=-9$

$x=\pm\sqrt{-9}$

$x=\pm\sqrt{9}\,i$

$$\boxed{x=\pm 3i}$$

c. $2x^2+9x-11=0$

D: $9^2-4(2)(-11)$

$=81+88$

$=169$

2 real soln | 2 xint.

$2x^2+9x-11=0$

$x=\frac{-9\pm\sqrt{9^2-4(2)(-11)}}{2(2)}$

$x=\frac{-9\pm\sqrt{169}}{4}$

$x=\frac{-9\pm13}{4}$

$x=\frac{-9+13}{4}$ $\quad$ $x=\frac{-9-13}{4}$

$x=1$ $\quad$ $x=\frac{-22}{4}$

$x=-\frac{11}{2}$

d. $3x^2+x+7=3$

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

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

$=1-48$

$=-47$

2 imag. soln | 0 x-int.

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

$x=\frac{-1\pm\sqrt{1^2-4(3)(4)}}{2(3)}$

$x=\frac{-1\pm\sqrt{-47}}{6}$

$\boxed{x=\frac{-1\pm\sqrt{47}i}{6}}$

e. $-4(x-2)^2=32$

$-4(x^2-4x+4)=32$

$-4x^2+16x-16=32$

$-4x^2+16x-48=0$

D: $(16)^2-4(-4)(-48)$

$=-512$

2 imag. soln | no x-int!

$(x-2)^2=-8$

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

$x-2=\pm\sqrt{8}\,i$

$x-2=\pm2\sqrt{2}\,i$

$\boxed{x=2\pm2\sqrt{2}\,i}$

f. $2x^2 + 3x = -x^2 - 4x - 5$

$3x^2 + 7x + 5 = 0$

$D: (7)^2 - 4(3)(5)$

$49 - 60$

-11

2 imag. soln | 0 - x int.

$3x^2 + 7x + 5 = 0$

$$x = \frac{-7 \pm \sqrt{49 - 4(3)(5)}}{2(3)}$$

$$x = \frac{-7 \pm \sqrt{-11}}{6}$$

$$\boxed{x = \frac{-7 \pm \sqrt{11}\, i}{6}}$$