Algebra II Honors Quadratics Test **Review Sheet** Name Key

Describe the transformation of the graph of the parent quadratic function.

a. $f(x) = -3(x+6)^2 - 4$ → ① horizontal shift left 6 units ② vertical stretch by factor of 3 ③ translate up 4 units ④ reflect across x-axis

b. $g(x) = \frac{1}{3}x^2 + 2$ → ① vertical shrink by factor of $\frac{1}{3}$ → ② vertical translation by 2 units up

c. $g(x) = \frac{1}{3}(x+1)^2$ ① horizontal shift left 1 unit → ② vertical shrink by factor of $\frac{1}{3}$

2. Write a rule for g described by the transformations of the graph of f.

a. $f(x) = x^2$; vertical shrink by a factor of $\frac{1}{2}$ and a reflection in the $y$-axis, followed by a translation 2 units left

a) $h(x) = \frac{1}{2}x^2$
$h(x) = \frac{1}{2}(-x)^2$
$g(x) = \frac{1}{2}(x+2)^2$

b. $f(x) = x^2$; vertical stretch by a factor of 2 and a reflection in the $x$-axis, followed by a translation 3 units down

b) $h(x) = 2x^2$
$h(x) = -2x^2 \rightarrow g(x) = -2x^2 - 3$

c. $f(x) = x^2$; vertical shrink by a factor of $\frac{1}{2}$, followed by a translation 3 units left

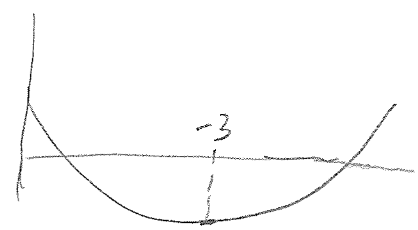
c) $h(x) = \frac{1}{2}x^2 \rightarrow g(x) = \frac{1}{2}(x+3)^2$

3. State the intervals in which the function is increasing and decreasing.

$f(x) = \frac{1}{2}x^2 + 3x + 7$

vertex: $h = \frac{-3}{2(\frac{1}{2})}$

$h = -3$

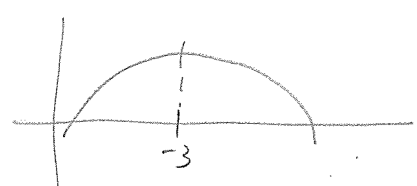



Increasing interval: $(-3, \infty)$ decreasing interval $(-\infty, -3)$

4. State the intervals in which the function is increasing and decreasing.

$y = -x^2 - 6x$ Vertex: $h = \frac{6}{2(-1)}$

$h = -3$




Increasing interval: $(-\infty, -3)$ decreasing interval $(-3, \infty)$

5. Write the quadratic function in standard form.

a. vertex $(-2, 9)$ and passes through point $(1, -9)$

h k   x y

$y = a(x-h)^2 + k$

$-9 = a(1+2)^2 + 9$

$\frac{-18}{9} = a$

$-2 = a$

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

$y = -2(x^2 + 4x + 4) + 9$

$= -2x^2 - 8x - 8 + 9$

$y = -2x^2 - 8x + 1$

b. vertex $(-1, 0)$ and passes through point $(-3, -12)$

h k   x y

$-12 = a(-3+1)^2 + 0$

$-12 = 4a$

$a = -3$

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

$= -3(x^2 + 2x + 1)$ →

$y = -3x^2 - 6x - 3$

6. Graph the function. Label critical points and the axis of symmetry.

a. $y = 1.5x^2 - 6x + 3$

vertex

$h = \frac{6}{2(1.5)}$

$h = 2$

$k = 6 - 12 + 3$

$k = -3$

$(2, -3)$

y-int $= (0, 3)$

sym pt $= (4, 3)$

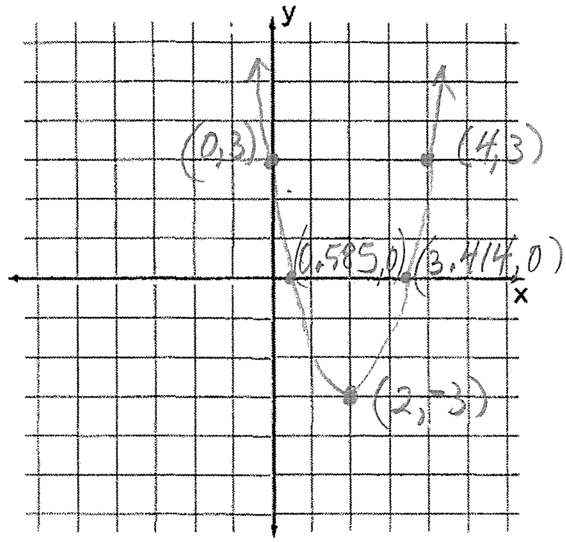
x-int $= \frac{6 \pm \sqrt{36 - 4(1.5)(3)}}{3}$

$= 2 \pm \frac{\sqrt{18}}{3}$

$= 2 \pm \sqrt{2}$ → $\approx 3.414$, $\approx 0.585$

$\sqrt{18} = \sqrt{9 \cdot 2}$

$3\sqrt{2}$




b. $h(x) = \frac{1}{2}(x-2)^2 - 1$

vertex $(2, -1)$

y-int $(0, 1)$

$h(0) = \frac{1}{2}(4) - 1$

$= 1$

sym pt $(4, 1)$

x-intercepts:

$0 = \frac{1}{2}(x-2)^2 - 1$

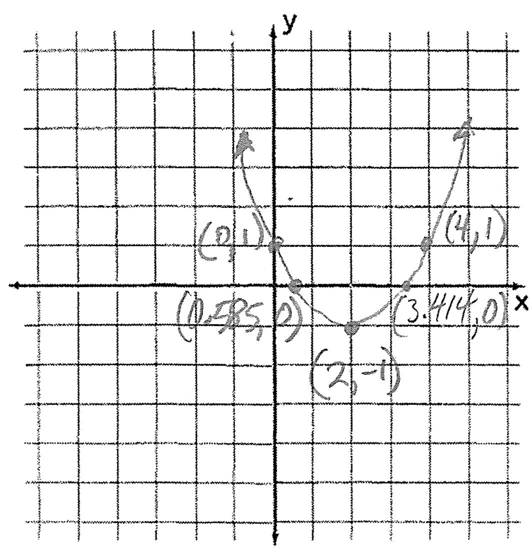
$1 = \frac{1}{2}(x-2)^2$

$2 = (x-2)^2$

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

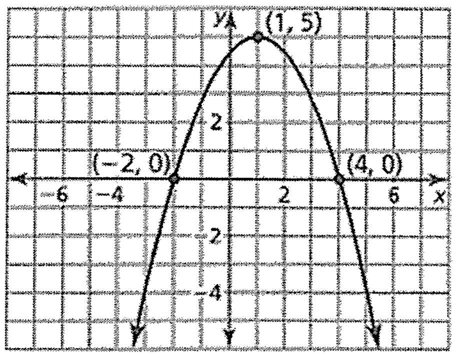
$2 \pm \sqrt{2} = x$

$\approx 3.414$   $\approx 0.585$



Advanced Algebra II Honors Quadratics Test **Review Sheet** Name___________________

7. Use the parabola shown.




a) vertex (1,5) pt (4,0)

$0 = a(4-1)^2+5$

$-\frac{5}{9} = a \rightarrow y = -\frac{5}{9}(x-1)^2+5$

b) $y = -\frac{5}{9}(x^2-2x+1)+5$

$= -\frac{5}{9}x^2 + \frac{10}{9}x - \frac{5}{9} + 5 \rightarrow 4\frac{4}{9}$

$y = -\frac{5}{9}x^2 + \frac{10}{9}x + \frac{40}{9}$

**a.** Write an equation of the parabola in vertex form.

**b.** Expand the equation in part (a) to the form $y = ax^2 + bx + c$.

**c.** Write an equation of the parabola in intercept form. → $y = -\frac{5}{9}(x+2)(x-4)$

**d.** Expand the equation in part (c) to the form $y = ax^2 + bx + c$. $= -\frac{5}{9}(x^2-2x-8)$

$y = -\frac{5}{9}x^2 + \frac{10}{9}x + \frac{40}{9}$

8. **MODELING WITH MATHEMATICS** A baseball is thrown up in the air. The table shows the heights $y$ (in feet) of the baseball after $x$ seconds. Write an equation for the path of the baseball. Find the height of the baseball after 5 seconds.

| Time, $x$ | 0 | 2 | 4 | 6 |
|---|---|---|---|---|
| Baseball height, $y$ | 6 | 22 | 22 | 6 |

Given 3 points:

$c = 6$

$4a + 2b + c = 22 \rightarrow 4a + 2b = 16 \rightarrow -8a - 4b = -32$

$16a + 4b + c = 22$

$-8a - 4b = -32$

$16a + 4b = 16$

$8a = -16$

$a = -2$

$4(-2) + 2b + 6 = 22$

$2b = 24$

$b = 12$

EQ: $-2x^2 + 12x + 6 = f(x)$

$16 = f(5)$

16 feet at 5 sec.

9. **MODELING WITH MATHEMATICS** The table shows the distances $y$ a motorcyclist is from home after $x$ hours.

| Time (hours), $x$ | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| Distance (miles), $y$ | 0 | 45 | 90 | 135 |

**a.** Determine what type of function you can use to model the data. Explain your reasoning.

**b.** Write and evaluate a function to determine the distance the motorcyclist is from home after 6 hours.

a) linear EQ: $r^2 = 1$

quad. EQ: $r^2 = 1$

Both can be used but we'll do quad. for practice.

b) $a + b + c = 45 \rightarrow -a - b - c = -45$

$4a + 2b + c = 90 \rightarrow 4a + 2b + c = 90$

$9a + 3b + c = 135$

$3a + b = 45 \rightarrow -6a - 2b = -90$

$-a - b - c = -45$

$8a + 2b = 90$

$8a + 2b = 90$

$2a = 0$

$a = 0$

$b = 45$ ⟹

(9) continued.....

So $c=0$

$y=0x^2+45x+0$

$y=45x$

6hrs: $y=45(6)$

$y=270$

270 miles