Name _____ (Key) Date _____ Class _____

LESSON 2-1

Practice C

Using Transformations to Graph Quadratic Functions

The height that a baseball reaches when it is thrown can be modeled by the function $h(t) = -16(t - 1.5)^2 + 36$.

1. What is the shape of the ball's path?

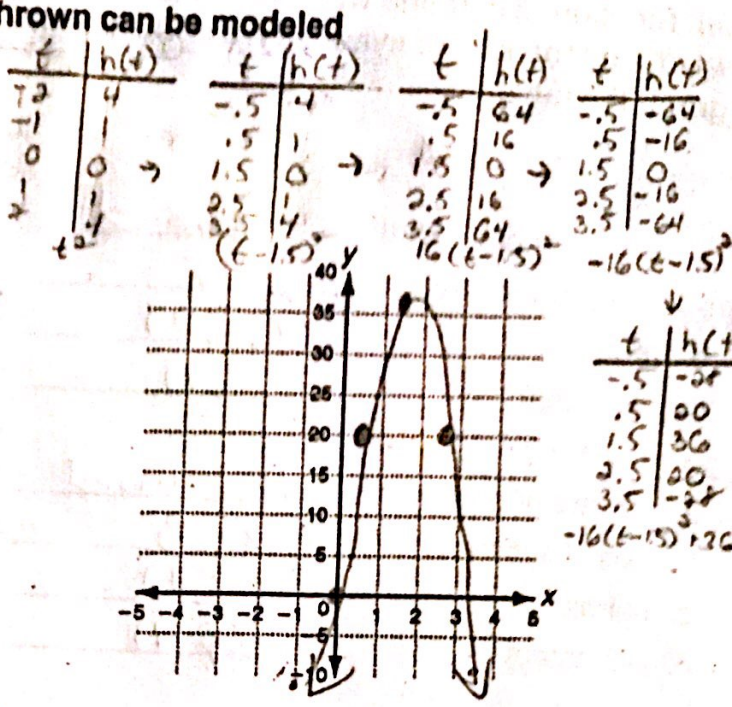
Parabolic

2. What happens to the ball between $t = 0$ and $t = 1.5$ seconds?

The ball is moving up

3. Describe the transformation of h from the the parent function $f(t) = t^2$.
   - Horizontal translation right 1.5
   - Vertical stretch by a factor of 16
   - Reflection over the x-axis
   - Vertical translation up 36 units

4. Draw a graph of the baseball's path.



Answer the following questions about functions and transformations.

5. Circle the function that produces the widest parabola.

$f(x) = 2x^2 - 4$ $\quad$ $g(x) = -\frac{1}{5}x^2 + 2$ $\quad$ $h(x) = 2(x - 1)^2$

Vertical compression by 1/5 pushes towards the x-axis

6. Transform the function $m(x) = -3(x + 1)^2 + 4$ so that its vertex is located at (0, 0). Write the transformed function.

Vertex now = (-1, 4)

- Horizontal shift right 1
- Vertical shift down 4

$m(x-1) \rightarrow m(x-1)-4 \rightarrow -3((x-1)+1)^2+4-4 = -3(x)^2$

7. Describe the difference and similarity between these two functions: $f(x) = x^2 - 1$ and $f(x) = (x - 1)^2$.
   - Both have parent function of x^2 (quadratic)
   - Both have domain $(-\infty, \infty)$
   - x^2-1 has a vertical shift down 1 while $(x-1)^2$ has a horizontal shift
   - Range for x^2-1 is $[-1, \infty)$. Range for $(x-1)^2$ is $[0, \infty)$

Solve.

8. During a flu epidemic last year, a public health official determined that the number of students infected by the flu virus could be approximated by the function $f(t) = -(t - 23)^2 + 625$, where t is the number of days after infection. This year there is a new virus that can be approximated by $f(t) = -(t - 25)^2 + 625$. What kind of transformation describes the change between last year and this year?

Horizontal shift right 2 units