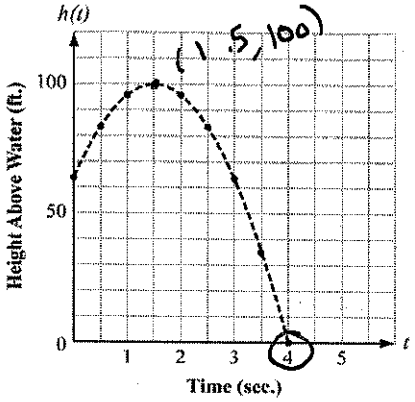
Name: _____ Date: _____

NOTES: Quadratic Applications Modeled in the Real World

Philip is standing on a rock ledge 64 feet above a lake, and he tosses a rock with a velocity of 48 feet per second. This graph and table represent the height above the water, $h(t)$, as a function of time, t, in seconds after Philip releases the rock.



Time t	Height $h(t)$
0	64
1	96
2	96
3	64

1. What is the maximum height of the rock? 100 FT

2. After how many seconds does the rock change direction in the air?
   1.5 SECONDS
   CHANGE DIRECTIONS IS THE VERTEX POINT

3. When does the rock hit the surface of the lake? 4 SECONDS
   What is this point on the graph called? THE ZERO

4. Identify the vertex and the axis of symmetry. (1.5, 100) $x = 1.5$
   What do these represent in our story?
   WHERE THE ROCK CHANGES FROM INCREASING TO DECREASING

5. At 1 sec, how high is the rock? 96 FT
   At 2 sec, how high is the rock? 96 FT
   Why are these the same?
   AT 1 SECOND THE ROCK IS GOING UP. AT 2 SECONDS THE ROCK IS GOING DOWN.

2. A rocket carrying fireworks is launched from a hill 80 feet above a lake. The rocket will fall into lake after exploding at its maximum height. The rocket's height above the surface of the lake is given by **$h = -16t^2 + 64t + 80$**.

a. What is the height of the rocket after 1.5 seconds?

PLUG IN 1.5 FOR t!

$-16(1.5)^2 + 64(1.5) + 80$

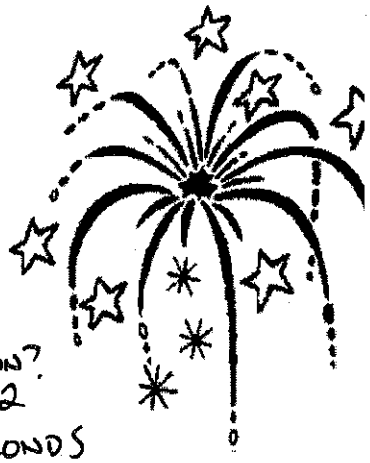
140 FT

b. What is the maximum height reached by the rocket?

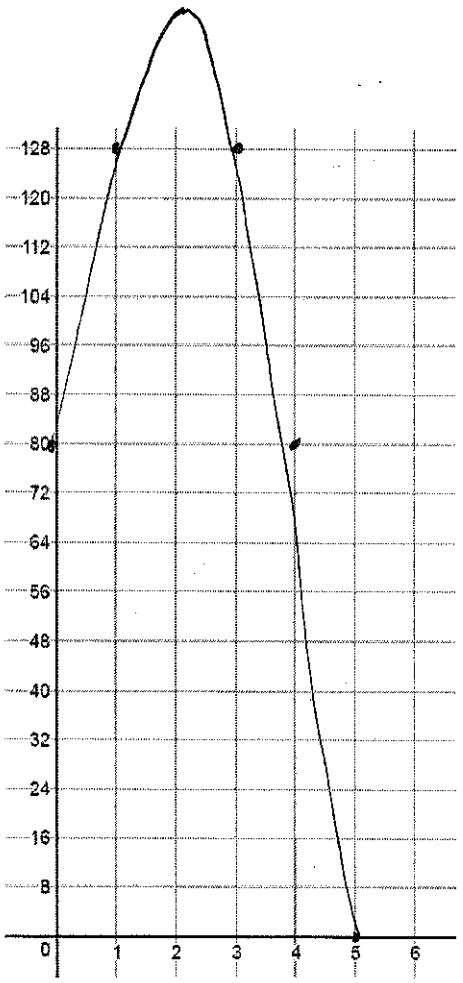
144 FT

c. How long will it take for the rocket to hit 128 feet?

AT 1 SECOND (THEN AGAIN AT 3 SECONDS)



d. After how many seconds after it is launched will the rocket hit the lake? 5 SECONDS!



e. WHEN WILL THE ROCKET START TO COME BACK DOWN? AT 2 SECONDS

X	Y
0	80
1	128
2	144
3	128
4	80
5	0