Algebra 2 Flight Quadratics *Extension* Name:_____ Period:____

**Directions**
1st choose to make an object fly upwards (this could be a paper airplane, punted, kicked hit or thrown ball, etc.)
2nd clearly identify and measure the approximate initial height of the object just prior to being sent into motion.
3rd use a stop watch to record the time that the ball is in the air (start timing immediately after the foot makes contact with the ball and stop timing when the ball hits the ground.

**Part 1** – Record the initial starting height and flight time in the space provided.

Description of object in flight:

Starting Height (feet): Flight Time (seconds):

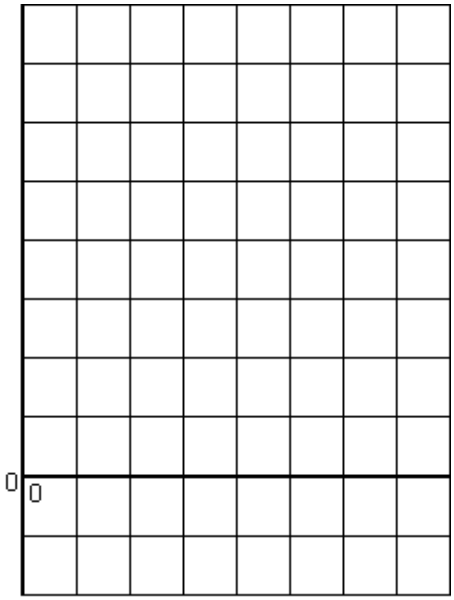
**Part 2** – Choose TWO of the kicks. The function $\boldsymbol{h(t)= -16(t)^2 + v_i(t) + h_i}$ can be used to calculate the height of any object in flight on earth. In the function above
$\boldsymbol{h(t)}$ represents the height $h$ (in feet) as a function of the time $t$ (in seconds)
$\boldsymbol{-16(t)^2}$ represents gravity pulling the object downward (-16 feet per second per second)
$\boldsymbol{v_i(t)}$ represents the initial velocity $v_i$ per unit of time $t$ (this is read as feet per second)
$\boldsymbol{h_i}$ represents the initial height $h_i$ in feet

Use the function and data to solve for the initial velocity of the flight of your object. Record your reasoning, results and explanations in the space provided.

**Part 3** – Substitute the initial velocity back into the functions so that each function will show how to calculate the height $h$ as a function of time $t$. Record the functions below.

**Part 4** – Use each function to calculate table values for at least 5 table values. Then use those values to make a graph with appropriate x and y scales. Label each axis.

| Time | | | | | |
|---|---|---|---|---|---|
| Height | | | | | |




CCSS: N-Q.1, N-Q.2, N-Q.3, A-SSE.1a, A-SSE.1b, A-CED.1, A-CED.2, A-CED.3, A-REI.1, A-REI.2, A-REI.3, A-REI.4b, A-REI.7, A-REI.10, A-REI.11, F.IF.1, F-IF.2, F-IF.4, F-IF.5, F-IF.7a, F-BF.1a, S-ID.6

Algebra 2 Flight Quadratics *Extension* Name:_____ Period:____

**For Part 5 and Part 6** Recall that for a quadratic function in the form $y = ax^2 + bx + c$ the quadratic formula $x = \frac{-b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$ can help calculate the vertex and any intercepts.

**Part 5** – Use the table, graph, quadratic formula and technology to help calculate the maximum height that your object reached and time when each of those heights were reached. Record your reasoning, results and explanations in the space provided.

**Part 6** – Choose to measure your height in feet or use Mr. Klee's height of 6.25 feet. Use the table, graph, quadratic formula and technology to help calculate the times that your object was at or over this height. Record your reasoning, results and explanations in the space provided.

CCSS: N-Q.1, N-Q.2, N-Q.3, A-SSE.1a, A-SSE.1b, A-CED.1, A-CED.2, A-CED.3, A-REI.1, A-REI.2, A-REI.3, A-REI.4b, A-REI.7, A-REI.10, A-REI.11, F.IF.1, F-IF.2, F-IF.4, F-IF.5, F-IF.7a, F-BF.1a, S-ID.6