Algebra Playing Card _____ Hour ____ Name _____

Lab Activity #2: Parabola Ball Toss

We are going to use our graphing calculators and a CBR (Calculator Based Ranger). We are going to toss a ball in the air and get a graph of the height of the ball vs. the time the ball is in the air.

Note: This lab is worth 30 pts. You will be assessed on how well you work together, how cooperative you are, how you help one another out, and how well you communicate

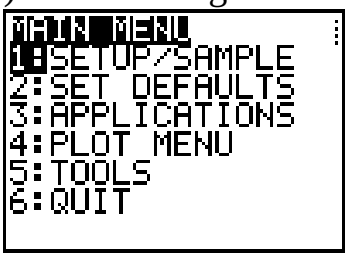
Make a mark by each step as you complete the lab.

____1) Get a TI-83 graphing calculator with the piece of tape on it, a yellow ball, a graph link cord, and a CBR. Write your playing card and hour on the piece of tape on your calculator.

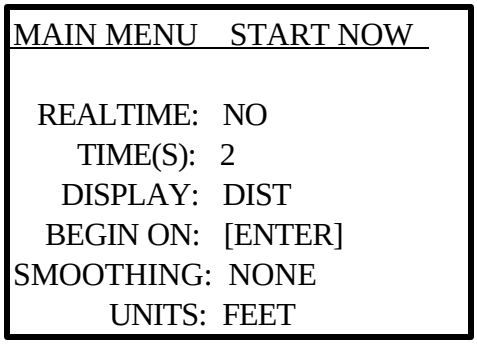
____2) Hook the CBR to the graphing calculator and set both on a desk.

____3) You have to run a program to get the data. Press **PRGM** and highlight the program **RANGER.** Press **ENTER** twice.

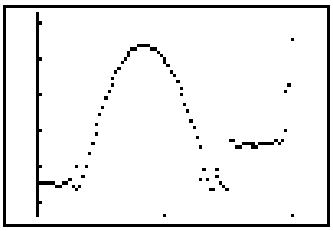
____4) You should get the screen like the one below on your calculator.



____5) Press **#1** to **SETUP**. Setup the CBR as follows by using your arrow keys to move down the menu and pressing **ENTER** to change the units to **FEET**. When you are finished setting up, move the cursor back up to **START NOW** and press **ENTER**.



____6) Follow the directions on the graphing calculator and when you are ready, one of you hold the ball 1.5 feet above the CBR and toss the ball straight up when the other presses **ENTER**. You should get a graph that looks like the one below:

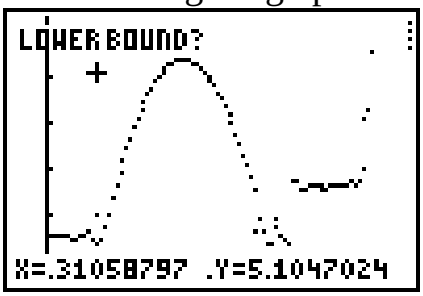


- If you don't get one that looks like that, press **ENTER** and **#5** to keep repeating the experiment until you get a good graph:

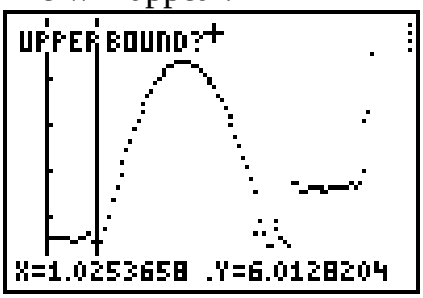
____Show your final graph to me before you go to the next step.

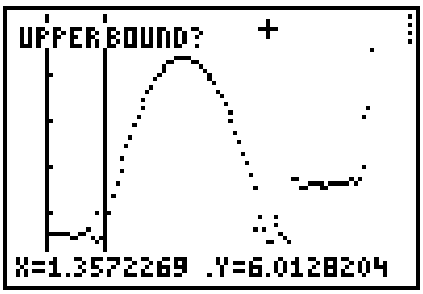
____7) Once you have a good graph, press **ENTER** and **#7** to **QUIT** the program.

____8) Now we have to cut out the material that is in front and back of the parabola on the graph. Press **PRGM** and highlight the program **SELECT** and press **ENTER** three times. You should get a graph that looks like the one below:



The program asks you to mark the lower bound of the parabola, you have to move the cross hair cursor until it lines up with the lowest point on the parabola. Press **ENTER** and a vertical line will appear:

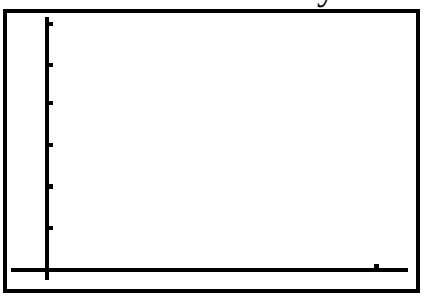


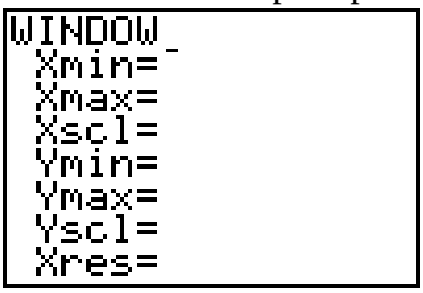


The program then asks you for the upper bound. You have to move the cursor to the lowest data point at the end of the parabola and press **ENTER**. A vertical line will appear at this point and then it will say **ANALYZING...**

____9) A clean parabola will appear. Show me your parabola before you go to the next step.

____10) Sketch a picture of the graph on the grid below. Press **WINDOW** and use the values to label the scales of your axes. Write down the values in the space provided.





____11) Now we need the equation of our graph. Press **STAT** and ➜ to **CALC**, press **#5** for **QuadReg**. The data is stored in L_3 and L_4 so press 2nd 3 (for L_3), then a "**,**" (which is above the 7 key), then 2nd 4 (for L_4). You should have QuadReg L_3,L_4 on the home screen Press **ENTER**. Fill out your values for "a", "b", "c", and R^2 in the space below:

QuadReg
$y=ax^2 + bx + c$
a=
b=
c=
R^2=

____12) Put the **numbers** for "a", "b", and "c" into the equation $y = ax^2 + bx + c$ in the space provided:
y = _____

____13) To graph our new equation, press **Y=, VARS, #5, ➜➜, ENTER**, and **GRAPH.**

____14) a) Look at the values carefully, what does the value of "a" represent? _____
(Remember, we are tossing a ball into the air)
b) What does the value of "b" represent? _____
c) What does the value of "c" represent? _____

____15) The value of R^2 represents the percent of data that the equation goes through. How well did our equation go through the data? _____

____16) How high did the ball go? _____

____17) How many seconds was the ball in the air? _____