Algebra Hour ____ Name _____

Lab Activity: Exponential Ball Bounce

We are going to use our graphing calculators and a CBR (Calculator Based Ranger) to see the rebound height of a rubber playground ball. Using the CBR, we are going to drop the ball and get a graph of the height of the ball bounces vs. time for 6-8 bounces.

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.

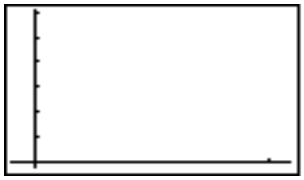
Think it through:

Think about this experiment for a bit and answer the following questions:

1) What is the independent variable in this experiment? _____

2) What is the dependent variable in this experiment? _____

3) Predict the graph of your data. Sketch your prediction in the space provided making sure to label the axes and indicate the independent and dependent variables.



Running the experiment:

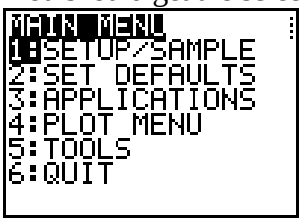
Make a mark by each step as you complete the lab.

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

____2) Hook the CBR to the graphing calculator pressing the graph link cords in firmly.

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

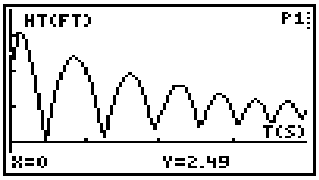
____4) You should get the screen like the one below on your calculator.



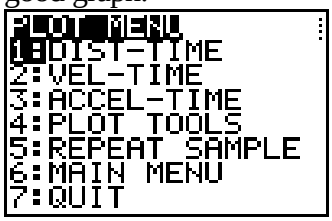
____5) Press **#3** for **APPLICATIONS**.

____6) Press #**3** for **BALL BOUNCE** and **select FEET.**

____7) Follow the directions on the graphing calculator and when you are ready, hold the CBR 5-6 ft above the floor. One of you hold the ball 1.5 feet below the CBR and drop the ball when the other presses **ENTER/TRIGGER**. You should get a graph that looks like the one below:

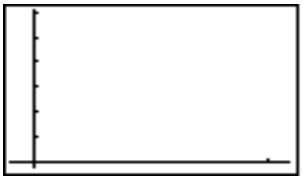


- If you do not get one that looks like that, press **ENTER** and **#5** to keep repeating the experiment until you get a good graph:



____8) Show your final graph to me before you go to the next step.

____9) Once you have a good graph, sketch a graph of your results. Make an accurate graph as possible.



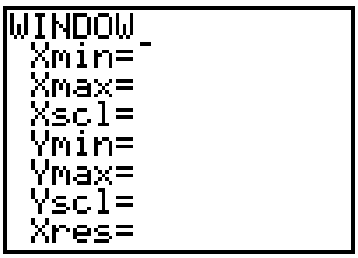
____10) Describe any differences between the graph of your results and the graph of your prediction.

____11) Press **ENTER** and **#7** to **QUIT** the **RANGER** program.

____12) Press **GRAPH** and the **TRACE** button to find the height of each bounce. Record your data in the table below:

Bounce Number	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Height (ft)											

____13) Enter the data above into your lists by pressing **STAT** and **ENTER**. Clear L_3 and L_4. Enter the Bounce Number data into L_3 and the Height data into L_4. Turn your **STATPLOTS** on by pressing **2nd, Y=, ENTER** and highlighting **ON.** Make the Xlist: L_3 and the Ylist: L_4. Choose an appropriate WINDOW and enter your values for the window in the box provided. Press **GRAPH** and sketch your graph on the grid on the next page:



____14) Now we need the equation of our graph. Press **STAT** and ➜ to **CALC**, press **#0** for **ExpReg**. 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 **ExpReg L_3,L_4** on the home screen Press **ENTER**. Fill out your values for "a", "b", and R^2 in the space below:

ExpReg
$y=a*b^x$
a=
b=
R^2=

____15) Put the **numbers** for "a" and "b" into the equation $y = a*b^x$ in the space provided:

y = _____

____16) To graph our new equation, press **Y=, VARS, #5, ➜➜, ENTER**, and **GRAPH.**

Questions:

1) a) Look at the values carefully, what does the value of "a" represent? _____

b) What does the value of "b" represent? _____

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

3) What percent did the ball rebound in relation to its original height?

4) Do you think every ball has the same rebound percentage? Explain.

5) What would happen if you ran the experiment using a super ball? A basketball? Explain

____19)