Name: ______________________________________ Date: __________

Student Handout Part 1:
Follow the Bouncing Ball

In 1965, the Super Ball made its debut in toy stores. Its claim to fame was that it bounced better than other balls, a simple idea that sold millions. You can watch a commercial from the early 1960s.

Many things that were once popular experience a comeback. Perhaps there is an opportunity here for some entrepreneur, interested in making money? Also, the quality of a ball's bounce is often a key selling point for many different types of balls such as: basket balls, tennis balls, golf balls, bowling balls… OK, not bowling balls.

1. Let's make use of your team's quantitative talents to become experts at the bounce of a ball. Maybe Wham-O will hire us as consultants? Before beginning experimentation, your teams should do some "brainstorming." Identify attributes of a ball and bouncing a ball that you can observe or measure. Sort these factors into two categories, those that are related to the bounce and those that are not related to the bounce. Write your list below.

2. From your list of items identify at least two that you suspect may have a functional relationship and identify which you consider the independent and which you consider the dependent variable in that functional relationship.

Check with your Facilitator #1

1. Let's call the maximum height a ball reaches on the first bounce, after it has been dropped, the "rebound height". Since you will initially have only one ball to experiment with, which of the factors you have identified do you think will have an effect on the rebound height? Sketch a graph to illustrate your prediction of the functional relationship. Be sure to label the axis on your sketch to reflect the independent and dependent variable.

2. Get a measuring device and a ball for testing. Perform experiments to get a good variety of data for analysis. Organize and record your data in a table below. Be sure everyone on your team also has the data stored in list on their calculator and can generate a scatter plot of the information.

3. Does there appear to be a pattern to the data? How does the scatter plot compare to the sketch you made in (1) above? Based on your scatter plot what functional model do you think will best represent the relationship between the two variables you are experimenting with? Explain your reasoning.

4. Use your calculator to generate your chosen functional model for the data and record the result here.

Check with your Facilitator #2

1. What is the correlation coefficient, *r*, for your model and what does it tell you about how well your model represents the data you collected?

2. Based on your model for your ball, what would the rebound height be if the ball were dropped from a height of 3 yards? Show work.

3. How high would you have to drop the ball from to have it rebound to a height of 40 cm? Show work.

4. If it were ten degrees hotter, do you think your function would need to be modified? Explain your reasoning.

5. If we could change only the color of the ball, do you think your function would need to be modified? Explain your reasoning.

6. Compare your team's mathematical model to that of all groups in the class and establish a ranking of all the balls being tested from best bouncer to worst based on the functions established by each group. Explain the reasoning behind saying one ball bounces better than another.

Check with your Facilitator #3