Finding the Best Model

The following data are from an activity in which students filled different sized circular lids with puffed cereal. Students recorded the number of cereal puffs that filled a circular lid of a particular diameter.

Lid diameter (cm)	9	4.1	7.7	5.5	11	1.8	15.5	6.5	5.3	13.5	8.4
# of cereal puffs	39	12	29	18	57	1.5	123	24	15	88	35

1. Open the document, ***Best Model***.

2. The data from the table is in the first two columns in the *Lists & Spreadsheet* Column A - **diameter** and Column B - **cerealpuffs**.

3. Press (ctrl) ▶ to go to the *Data & Statistics* page. Graph **diameter** vs. **cerealpuffs**.
   - Press (tab) and select **diameter** for the horizontal axis.
   - Press (tab) again and select **cerealpuffs** for the vertical axis.

Describe this scatterplot.

4. Press (menu), *Analyze*, *Show Regression (a + bx)*.

How well does the regression fit the data - To determine the best fit we need to look at the graph of the residuals.

5. Press (ctrl) ▶ to go to the *Data & Statistics* page. Graph **diameter** vs. **stat.resid**.

Using the residual plot, comment on the fit of the least squares regression line of the number of cereal puffs on diameter.

6. Press ctrl ▶ to go to the next page. This page is divided into 4 regions.
    - The upper left corner contains the same graph of **diameter vs. # of cereal puffs**.
    - The upper right corner contains the graph of **diameter vs. cereal_power.** Using the slider **power** in the lower left corner, you can adjust the *root* of the number of cereal puffs, which corresponds to a power of the diameter.
    - Also contained in the lower left corner is the *coefficient of determination*.
    - The lower right corner contains the graph of the residuals for **diameter vs. cereal_power**.

7. Adjust the root of the response variable using the slider.

What happens to the graph of <u>diameter</u> vs.<u>cereal_power</u> as the power is increased?

What happens to value of r^2?

Once you have adjusted the slider so that the data are "straight", describe the graph of the residuals.

What power provides the best model for this data?

Write the equation of the least squares regression line based on the best model. Interpret the slope in context.

Transform the model to put the predicted number of cereal puffs in terms of the power of diameter.