Experimental Design I

This is a middle-school level activity, but play along with me anyway! We will be developing expertise in experimental design over the next few weeks, before I turn you loose with some environmental experiments. You’ll get this handout after we do the activity.

Elastic Spheroidal Objects, aka Bouncy Balls: Initial Design

Please form a group where you don’t already know anybody. Two or three students per group.

I have a collection of elastic spheres of assorted sizes and compositions. A useful activity would be to devise a classification scheme for these spheres, but we can skip that for now. Have someone from your group pick four different spheres.

I want to know which type of sphere bounces the best (the sphere must be released from rest). Before you do anything, discuss with your group what you mean by “best bounce.” Don’t bounce anything yet!

Get ready, get set…

Wait! What do we mean by best? Let’s discuss.
Advantages and disadvantages of each criterion?

Technical Stuff

Discuss: question, independent variable, dependent variable, hypothesis.

Experiment

Formulate a hypothesis and test it. We will share the results before moving on to the next step. Why do you think I had you do this experiment?

Discussion

I guided you towards an experiment to determine which type of sphere bounces the best. Is there anything other than type (or composition) of sphere that might affect the bounce? Make a list.

Modified Experiment

Think of a new experiment you could do that uses elastic spheres. Write a testable question for the new experiment.

Write a hypothesis for your testable question.

Identify your independent variable, your dependent variable, and constants.
If there is time, you will get to carry out and report on your new experiment.

Why did we do this experiment?

**Discussion**

Did the modified experiment change the performance of your spheres? Are you sure the change you made caused the change in performance? Is there anything outside of your control that might have affected the bounce? What could we do to see if that was the case?

**Analysis and Conclusions**

Analyze data. Mean of quantitative data, mode of qualitative data.

**Reflection**

Things you should have learned about: variables (independent, dependent, “constants”); hypotheses; modifying an experiment to improve it; analysis of both qualitative and quantitative data.