

Rutherford Simulation Activity

Background Information:

The idea that the atom has a nucleus is the result of experiments conducted by a scientist named Ernest Rutherford. Rutherford used a special tube to shoot positively charged particles called alpha particles at a thin sheet of gold foil. Most of the alpha particles went straight through the gold foil, but a FEW bounced back or were deflected away. This was quite a surprise. As Rutherford is quoted as saying, "It would be like shooting a cannon ball at a piece of tissue paper and have it bounce back.

From these experiments Rutherford was able to conclude two concepts:

- 1) The deflected particles must have hit "something" that was ALSO positively charged to allow them to be deflected.
- 2) Because most of the positively charged particles went straight through the gold foil, the positive area of the atom must be VERY small compared to the rest of the atom.

Purpose:

Your task will be to determine what the underside of your piece of cardboard looks like (without looking!) using only a marble. You should be able to determine the approximate shape and size.

Procedure:

- 1) Collect a cardboard with a shaped objects underneath. DO NOT LOOK AT THE WOOD OR FEEL FOR THE SHAPE.
- 2) After reading the instructions to the END, tape this piece paper with the graph side up, to the middle of your cardboard.
- 3) Without looking under your board, roll your marble from all sides towards the middle of the board. Trace the path your marble takes each trial. You will need to be very accurate in your collection of the data and run LOTS of trials.
- 4) The data collection should result in a map of the underside of the cardboard. I will be checking your data to make sure that it supports your conclusions! Be sure to run enough trials so that you are NOT guessing about ANY of the areas beneath the cardboard. If your data doesn't support your conclusion-- I will assume you "peeked!"

What you need to turn in at the conclusion of this activity:

- 1) A detailed and organized map of the underside of your cardboard, labeled with the number of the board you used. (back of this paper)
- 2) A paragraph about how this activity specifically relates to Ernest Rutherford's experiment. What was the marble representing in the activity? What does the block represent? What charges are present? Why did the marble "bounce" off the wood block??