

Rutherford's Discovery

Background:

In this activity, you and your partner will use the methods pioneered by Ernest Rutherford in the early 1900s and still used by particle physicists in their accelerator experiments today. These methods enable scientists to identify the characteristics of particles that they cannot actually see. You will learn how precise your measurements must be when you can't see what you are studying.

Gathering Data:

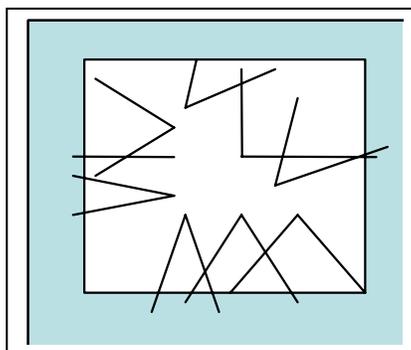
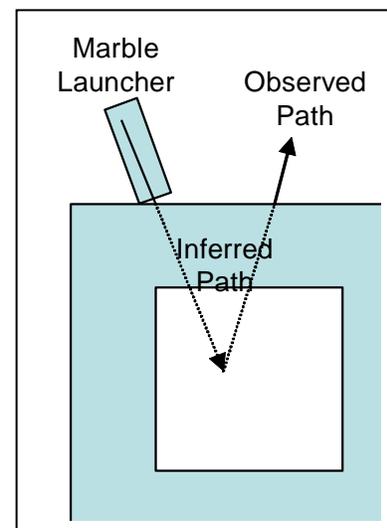
There are large boards set up under which, a flat shape has been placed.

Your job is to identify the shape without ever seeing it. You can only roll marbles against the hidden object and observe the deflected paths that the marbles take. Your team will have ten minutes to "observe" a shape.

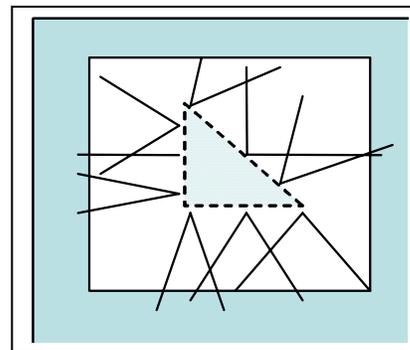
Place a piece of paper on top of the board for sketching the paths of the marbles. This is your data sheet. You will observe the marble as it enters the board and leaves, but you can only infer where it went while under the board.

Trace the incoming path and the outgoing path backward until they meet. This is your interaction point. Continue to launch your marble to probe all sides of the mysterious shape.

Your data sheet should look similar to the one below. You will then analyze this information to determine the object's actual shape. Connect your interaction points to find the edges of your mystery shape.



Draw a picture of the shape studied



small of each you in the

space below, and answer the following questions.

Mystery Shape 1	Mystery Shape 2

Questions:

1. Can you tell the size of the object as well as its shape?
2. How could you find out whether the shape has features that are small compared to the size of your marbles?
3. Without looking, how can you be sure of your conclusions?
4. What was the purpose of Rutherford's scattering experiment?
5. In relation to Rutherford's experiment, what do the marbles represent?
6. What do the boards represent?
7. Why are you not allowed to look under the cardboard?