Finding equations based on dropping a Bouncing ball

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Goal: Students will investigate linear equations using hands-on materials

Objectives: Determine how high the ball rebounds after the first bounce, THEN Find the rate of change, and graph the results

Initial Question:

- How will increasing or decreasing the initial height of the bouncing ball affect the rebound height?

- Will the rebound height bounce back at a constant rate or will it increase/decrease as the initial height increases/decreases?

Hypothesis:

As you increase the height of the initial drop height, the higher the rebound height will go.

Materials!

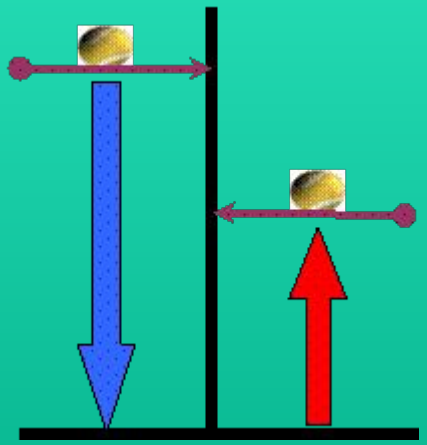
- Ruler
- Bouncy Ball
- Pencil
- Calculator

The Experiment

Procedure

1. One group member WILL release the ball and others should determine the height of the rebound.

Initial Drop height



Rebound Height

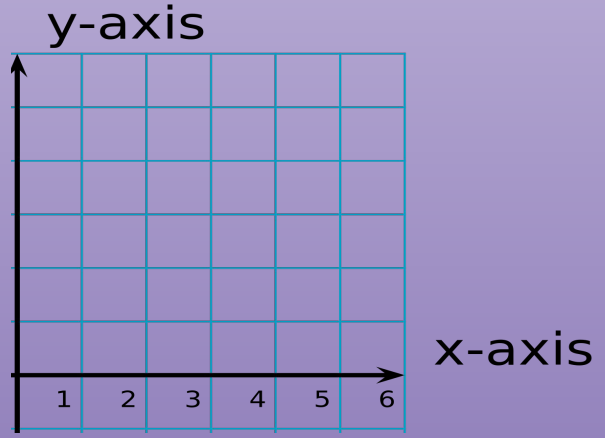
2. Record a table of falling heights and corresponding rebound heights for at least Four different falling heights. Include the value 0 as one of the drop heights. In this case, you do not need to measure the rebound height since it is obviously also 0.

Procedure Cont.

Create a table Similar to this:

Drop height (in)	Rebound Height (In)
0	0

3. Then, plot your data on a graph, where falling height is the input (horizontal) value and rebound height is the output (vertical) value. Plot the Drop Height and the Rebound Height and Clearly label the axes with units measured used.



Procedure Cont.

4. Next, we are going to find the rate of change based on the points you just placed on the graph. We are going to take our first and second points together to find their rate of change, and then third and fourth points.

$$Rate\ of\ change = \frac{y_2 - y_1}{x_2 - x_1}$$

- So in this case, The rate of change is found by dividing the difference in Rebound Heights between the two points by the difference in Drop Heights between the same two points.

Procedure cont.

5. Once you find the rate of change, we can finally come up with a linear equation in slope-intercept form!!

What we need to do:

Take our rate of change, which will be our slope in this case. Then take one set of coordinates used to create this specific rate of change and plug it into the slope-intercept form $Y = MX + B$.

THEN PLOT YOUR NEW EQUATIONS ON THE GRAPH!!!

Conclusions

- The aim of of this experiment was to determine how much changing the height puts affect on the rebound height.
- As we can see from our results, the higher the height released, the higher the rebound was in correspondence to it.
- The difference between the initial drop height and the rebound height began to increase as the height increased.