

# Data Sheet

## Procedure

- 1 Calculate the velocity of the marble as it hits the surface of the flour. Enter your calculations in the data table below.
- 2 Make a graph with Velocity (meters/second) on the y-axis and Energy (depth in centimeters) on the x-axis. Plot the velocity and depth data you have entered into the table below.
- 3 Draw a smooth curve or line through as many points as possible. Be sure to start drawing your line at the origin 0,0.
- 4 Square your velocity values and enter them in your data table. Draw a new graph with Velocity<sup>2</sup> (meters<sup>2</sup>/second<sup>2</sup>) on the y-axis and Energy (depth in centimeters) on the x-axis. Plot the velocity<sup>2</sup> and depth data from the table below.
- 5 Draw a smooth line through as many of the points as possible, passing your line above or below points that do not line up exactly. Start your line at the origin 0,0.
- 6 Answer the questions below.

## Questions

Write your answers on a separate sheet of paper.

- 1 What is the shape of your Velocity vs. Energy graph?
- 2 What is the shape of your Velocity<sup>2</sup> vs. Energy graph?
- 3 If a straight line on a graph indicates a direct relationship, is energy (measured by depth) directly proportional to velocity or velocity squared?
- 4 Explain why Albert Einstein wrote  $E = mc^2$  instead of  $E = mc$ .

## Velocity vs. Energy Data Table

Distance (cm)	$v$ (m/sec)	$v^2$ (m <sup>2</sup> /sec <sup>2</sup> )	Depth (cm)
0			
10			
25			
50			
100			

