**Bouncing Balls**

In this experiment you will drop a ball and let it bounce several times. When a ball bounces up and down, the maximum height it reaches decreases from bounce to bounce. You will collect data for the maximum height on each bounce. This experiment will be used to discover the relationship between the maximum height and the number of bounces for a bouncing ball.

**Set-up**: Each group will need at least three students; one to drop the ball, one to read the bounce heights, and one to record the bounce heights. Each group will perform the same experiment of dropping a ball from the same height and measuring the maximum height of the ball. Use a smooth rubber ball and a flat hard surface to bounce.

To make the measurements, tape a yardstick or a meter stick to a wall. Start by releasing the ball at a height of 6 feet (72 inches) or 2 meters (200 cm).

Try to read the height of each bounce at eye level, using the top of the ball to determine the bounce height. You may need to perform the experiment several times to get the feel of it and to collect accurate data. Increase the starting height if you are unable to get at least 5 bounces.

**Note**: This experiment may also be performed with a CBR to measure the height of each bounce. See you teacher for instructions if you select this option.

1. Record the measurements in the table 2. Plot the data in the graph below.

below. Measure the bounce height in Label and scale the axes.

inches or centimeters.

|  |  |
| --- | --- |
| **Bounce number**  **(*x*)** | **Bounce height measured**  **(*y*)** |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |

1. Which type of function, linear or exponential, would be a better model for these data? Justify your choice.
2. Find an equation that models the relationship between the number of bounces and the maximum height of each bounce.
3. According to your equation, what would be the height of the ball on the 10th bounce?
4. If we increased the height from which the ball is dropped, which parameter in the equation do you think would be changed? Why?
5. Test your prediction in question 6 by starting at a different height. Record your results in the table.

|  |  |
| --- | --- |
| **Bounce number (*x*)** | **Bounce height measured**  **(*y*)** |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |

1. Plot the data from question 7 in the graph below. Label and scale the axes.



1. If we used a ball that is more bouncy or less bouncy, which parameter in the equation do you think would be changed? Why?
2. Test your prediction in question 9 by using a different ball. Record your results in the table.

|  |  |
| --- | --- |
| **Bounce number (*x*)** | **Bounce height measured**  **(*y*)** |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |

1. Plot the data from question 10 in the graph below. Label and scale the axes.

