

Lab 2-6: The Acceleration of a Bouncing Ball

Purpose: To determine the acceleration of a racquetball while it is bouncing.

Materials: 1 racquetball 1 photogate 1 stand 1 clamp

Procedure:

1. Arrange the photogate so that the light beam is just above the top of the ball when the ball is on the table.
2. Start Logger Pro and open up the file "*Experiments / Probes & Sensors / Photogates / Bounce.xml*."
3. Double-click on the column marked "Velocity" and in the equation, change the "0.1" to the actual diameter of your racquetball (which is 0.057 meters.)
4. Click on the "Collect" button, and then carefully drop the racquetball so that it falls in the beam of the photogate and catch it so that it only bounces once. Please make sure to not drop the ball on the photogate.
5. Record the speeds and time in the data table below.

Data:

<i>Speed of ball just before hitting the table</i>	
<i>Speed of ball just after hitting the table</i>	
<i>Time ball was in contact with the table</i>	

Conclusions:

1. What was the acceleration of the racquetball as it fell? How do you know?

2. How did Logger Pro calculate the speeds of the ball?

3. What was the change in velocity of the ball? Give the magnitude as well as the direction.

4. What was the acceleration of the ball while it was in contact with the table and bouncing?

5. How many times greater than gravity was the acceleration during the bounce?

6. Why was it wrong to just subtract the two speeds to answer question 3 above?