Lab 2-5: 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.cmbl."*
3. Double-click on the column marked "Velocity" and in the equation, change the "0.1" to the actual diameter of your raquetball (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. (Yes, Logger Pro labels it "velocity" but it is in fact calculating speed.)

Data:

Speed of ball just before hitting the table	
Speed of ball just after hitting the table	
Time ball was in contact with the table	

Conclusions:

1. What was the acceleration (magnitude and direction) of the racquetball as it fell? How do you know?

2. During the bounce, what was the change in <u>velocity</u> of the ball? Give the magnitude as well as the direction.

3. What was the acceleration of the ball while it was in contact with the table and bouncing? Give the magnitude as well as the direction.

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

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5. Why was it wrong to just subtract the two speeds to answer question 2 above?

6. You got your data from the column marked "Velocity." This is actually incorrect for two reasons. What should the column have been marked? Explain your answer.