

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Hour: \_\_\_\_\_

### Momentum: Bouncing Balls

**Problem:** Which ball will have the best elastic collision and on which surface?

**Hypothesis:**

**Materials:** Tennis ball, bouncy ball, wiffle ball, meter stick, stop watch, balance, peg board

**Procedure:**

1. Determine the mass in kilograms of each ball and record it on the data sheet.
2. Drop each ball from a distance of 1 meter onto the surface (surface 1: tile floor, surface 2: wood table, surface 3: pegboard) and record how high it bounces in meters (example: 0.46 meters).
3. Note whether the ball and surface showed more of an elastic or inelastic collision. If the ball bounces up more than .5 meters, then it is more elastic. If it bounces up less than .5 meters, then it is more inelastic.
4. Repeat steps 1, 2 and 3 for the two other surfaces.
5. Calculate the velocity for each ball right before it bounces.  $V = gt$
6. Calculate the momentum for each ball right before it bounces.  $p = mv$

Velocity of tennis ball: \_\_\_\_\_ momentum of tennis ball: \_\_\_\_\_

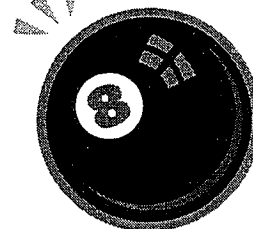
Velocity of bouncy ball: \_\_\_\_\_ momentum of bouncy ball: \_\_\_\_\_

Velocity of wiffle ball: \_\_\_\_\_ momentum of wiffle ball: \_\_\_\_\_

**Conclusion:** Which ball had the best elastic collision and on which surface? Was your hypothesis correct or incorrect? How do you know? What does having the best elastic collision mean? Did the ball with the best elastic collision also have the greatest momentum? Explain what you learned as a result of doing this lab!

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Lesson 3, Bouncing Balls Activity (for High School) – Bouncing Balls Worksheet



### Data

Ball Types:

Surface Types:

Ball 1: \_\_\_\_\_

Surface 1: \_\_\_\_\_

Ball 2: \_\_\_\_\_

Surface 2: \_\_\_\_\_

Ball 3: \_\_\_\_\_

Surface 3: \_\_\_\_\_

1. Based on the **Height** of the bounce for each ball, is the collision more elastic or inelastic? Fill in the table accordingly.

Case	Ball	Surface	Mass of Ball (kg)	Bounce Height (m)	Elastic or Inelastic

**Questions:**

1. Why were the velocities of all of the balls approximately the same?
2. Which ball had the greatest momentum? Why was it bigger than the momentum for the other balls?
3. Why didn't the balls bounce back up to their original height? Where did some of their momentum go?
4. What would happen if the collisions were perfectly elastic?
5. Out of the three balls, which one would you least like to be hit by? Why did you choose this ball?