Basketball Blaster

Materials

Basketball, 3¾″ diameter
Marble, glass 14-mm
Ping Pong ball
Rubber ball, small
Rubber ball, large
Meter stick
Support stand
Support stand buret clamp

Safety Precautions

Wear safety glasses or chemical splash goggles. The goal is to launch the various balls vertically, but the launch direction will be random and may occasionally be at angles or horizontal. Be sure nearby students are wearing eye protection before performing the double-ball drop.

Procedure

1. Obtain a support stand, buret clamp, and a meter stick.
2. Set up the support stand and meter stick as shown in Figure 3.
3. Obtain the various balls.
4. For each ball drop, the release height will be 20 cm from the tabletop to the bottom of the lowest ball.
5. Start with the mini basketball.
6. Line up the bottom of the basketball with the 20-cm mark on the meter stick.
7. Drop the basketball from 20 cm and observe and measure the rebound height. Perform three or four trials and record the highest rebound height of the basketball for each trial in Data Table 1.
8. Repeat steps 6–7 for the four remaining balls.
9. Now, perform the double-ball drop experiments.
10. Obtain the basketball and marble.
11. Hold the marble on top of the basketball as shown in Figure 4. The marble should be nearly touching the basketball. Be sure the centers of the balls are aligned vertically.
12. Hold the bottom of the basketball 20 cm above the tabletop.
13. Release both balls at the same time and observe the flight of the rebounding marble.
14. Practice steps 11–13, adjusting the ball holds and ball drop processes accordingly, until the marble launches nearly straight up along the path of the meter stick. It may take four or five attempts to obtain vertical marble rebounds that are repeatable. *Note:* During practice drops (and all ball drops), be prepared to chase down stray balls that may be launched at random angles.

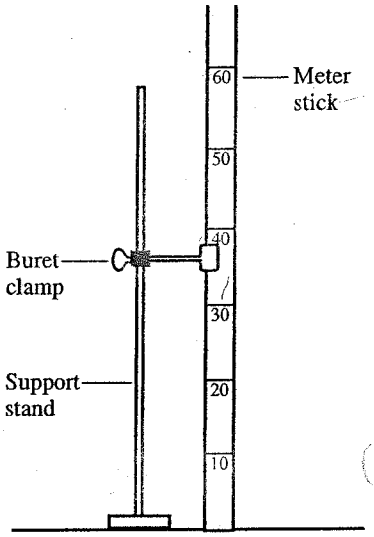

Figure 3.

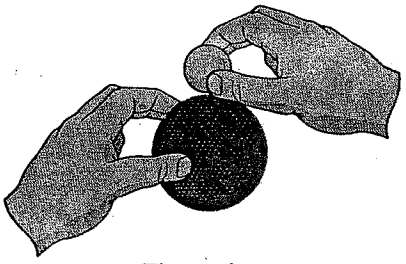

Figure 4.

15. Once two or three vertical rebounds are successfully completed, repeat steps 11–13 to obtain quantifiable data for a total of three to four trials. Measure and record the maximum rebound height of the marble for each "successful" trial in Data Table 2. A "successful" trial is one in which the marble launches nearly straight up along the meter stick. *Note:* Even after becoming proficient in generating successful vertical rebounds, not every trial will respond as expected. Be patient and work slowly to obtain quality results. Overall, it may take 10 ball drops to obtain three measurable heights.
16. Repeat steps 10–15 for the various top and bottom ball combinations given in Data Table 2. Record at least three quality data trials for each ball combination.
17. Experiment with other ball combinations as directed by the instructor. Record the ball and height data in Data Table 2.

Disposal

Consult with the instructor for proper storage procedures.

Name: _____

Basketball Blaster Student Worksheet

Data Table 1

Ball	Release Height	Maximum Rebound Height				
		Trial 1	Trial 2	Trial 3	Trail 4	Average
Basketball	20 cm					
Rubber ball, small	20 cm					
Rubber ball, large	20 cm					
Ping Pong ball	20 cm					
Marble, glass	20 cm					

Data Table 2

Bottom Ball	Top Ball	Release Height	Maximum Launch Height of the Top Ball				
			Trial 1	Trial 2	Trial 3	Trial 4	Average
Basketball	Marble	20 cm					
Basketball	Ping Pong ball	20 cm					
Basketball	Rubber ball, small	20 cm					
Basketball	Rubber ball, large	20 cm					
Rubber ball, large	Marble	20 cm					
Rubber ball, large	Ping Pong ball	20 cm					
Rubber ball, large	Rubber ball, small	20 cm					
Rubber ball, large	Basketball	20 cm					
		20 cm					
		20 cm					
		20 cm					
		20 cm					

Post-lab Questions:

1. How do the rebound heights of the top balls in the double-ball drop experiments compare to the rebound heights of these same balls in the single-ball drop experiments?

2. Which ball launched to the greatest height? Explain WHY this ball launched highest.

3. How did the rebound heights of the basketball in the double-ball drop experiments compare to the rebound heights of this ball in the single-ball drop experiments?

4. Think about your answer to question three. In both the double-ball drop experiments and the single-ball drop experiments, the basketball was dropped from the same height – 20 cm. This means that the basketball had the same amount of potential energy in both experiments. So WHY didn't the ball have the same rebound height in both experiments?

. In order for the top balls in the double-ball drop experiments to move so much faster and farther than they do in the single-drop experiments, they must have more kinetic energy? Where do they get this "extra" energy?

6. Imagine dropping a soccer ball. The first bounce will be highest, and each bounce after that will be lower until the ball stops bouncing. It seems as if the energy of the ball has been destroyed. But according to the Law of Conservation of Energy, this is impossible. What is happening to the energy of the ball?