

ENERGY CONVERSIONS IN A BOUNCING BALL

SKILLS: Hypothesize • Observe • Record • Data • Infer • Interpret Data • Generalize

PROBLEM:

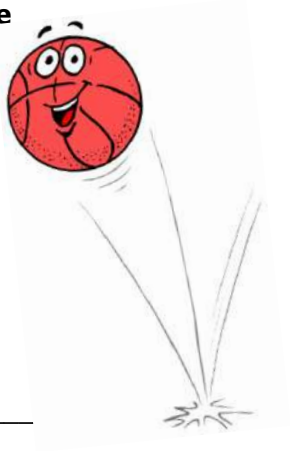
How does energy change its form in a bouncing ball?

GOALS:

In this investigation, you will observe a bouncing ball to study energy conversions.

HYPOTHESIS:

Carefully read the investigation ***before*** stating your hypothesis.



PRE-LAB PREPARATION:

In your own words, state the law of conversion of energy.

MATERIALS:

1. tennis ball
2. meter stick

PROCEDURE:

1. **Observe:** Work with a partner.
 - a. Have your partner hold a meter stick vertically, with the zero end on the floor, and in such a way that it can be read easily.
 - b. Hold a tennis ball in front of the meter stick at **30 cm** above the floor.
 - c. Let the ball drop to the floor.
 - d. Measure how high it moves back upward on its first bounce and record this information in **Data Table 5.1**
2. **Record data.** Repeat Step 1 three more times at the same height, average the results and record the data in **Data Table 5.1.**
3. Repeat steps 1 and 2, but this time drop the ball from a height of **60 cm** above the floor.
4. Repeat steps 1 and 2, dropping the ball from a height of **90 cm**.
5. Drop the ball from a height of 1 m and let it keep bouncing. Observe four bounces instead of only one and record the height of each bounce in **Data Table 5.2.**

DATA RECORD:**DATA TABLE 5.1** *Bounce Height of a Ball Dropped From Various Heights*

Initial Height	Height of Bounce (cm)				
Above Floor (cm)	Trial 1	Trial 2	Trial 3	Trial 4	Average
30					
60					
90					

DATA TABLE 5.2 *Bounce Height of a Ball Dropped From 1 Meter*

Bounce	Height of Bounce (cm)
1.	
2.	
3.	
4.	

OBSERVATIONS:

1. Did the ball bounce highest when dropped from **30**, **60**, or **90** cm? From which height did it bounce the least high?

2. How does the bounce height of a ball compare to the height from which it was dropped?

3. What did you notice about the four bounces of the ball that was dropped from 1 m?

ANALYSIS:

1. What kind of energy does the ball have just before it is released?

2. What kind of energy does the ball have just as it is striking the floor?

3. What happens to the ball's kinetic energy (**KE**) and potential energy (**PE**) as it falls?

4. What happens to the ball's **KE** and **PE** as it bounces back upward?

5. **INFER:** If 100% of the ball's **KE** were converted back to **PE**, how high would it bounce?

6. **INTERPRET DATA:** Other than **KE** being converted into **PE**, what other energy conversions did you observe or infer when you bounced the ball? How can you tell?
7. What is true about the total amount of energy, in all forms, in the system you studied?
(**Note:** In this case, the system includes the room?)

CONCLUSIONS

1. **Generalize:** What energy conversions occur when a ball is bouncing?
2. Imagine that you own a chain of toy stores. An inventor claims to have developed a new kind of ball, called *Rocketball*, that bounces better than anything already on the market. He wants you to buy Rocketballs and sell them at your stores. He sends you data, which is summarized in **Data Table 5.3**. He claims the data is from actual scientific tests done with Rocketballs.

Data Table 5.3 *Rocketball Bounce Heights in Centimeters*

Original Bounce Height	Average Height of Bounce 1	Average Height of Bounce 2	Average Height of Bounce 3
200	215	217	190
100	110	102	95
50	60	48	49

Analyze the inventor's data. Write him a brief letter identifying **at least three specific pieces of data** on bounce height that you know cannot be correct. Explain how you can tell that the data are inaccurate on the basis of data you collected during this investigation and on the law of conservation of energy.

