

LAB: Money Momentum

NAME: _____

DATE: _____

PERIOD: _____

Objectives:

- This lab will show how momentum affects real objects.
- The students will also come to understand that momentum is a property related to an objects mass and velocity and that it can be transferred from one object to another which will be demonstrated in this lab.

Problem: What happens to the two objects when one object collides with another in different simulations of movement?

Hypothesis: 

Materials: Meter Stick 
Penny
Quarter
Nickel

Procedure:

1. Using a flat surface and the meter stick, place the penny so that its midpoint is at the 10cm line. Then place the nickel so that its midpoint is at the 0cm line.
2. Push the nickel so that it slides and hits the penny. Do not slide it too hard. Be careful not to knock the coins on the floor. The nickel must slide on its own until it hits the penny.
3. When you have finished this collision answer question 1 and all of its parts in the question area.
4. Now put the penny next to the meter stick so that its midpoint is at the 0cm line. Then place the nickel so that its midpoint is at the 10cm line.
5. Slide the penny so that it hits the nickel and answer question 2 and all of its parts in the question area.

Questions

1. Answer the following questions
 - A. Did the nickel stop when it hit the penny? 
 - B. Did the penny move after being hit by the nickel? If so did it move the same distance as the nickel?
 - C. Did the penny move with the same velocity as the nickel? Was its velocity higher or lower?
 - D. Is the penny more or less massive than the nickel? Explain your answer.
2. Answer the following questions?
 - A. Did the nickel move after the penny hit it?
 - B. Did the penny keep moving after hitting the nickel? 
 - C. Did the nickel move as far as the penny?
 - D. By looking at them which one had the higher velocity, the penny or the nickel?
 - E. If the momentum of the coins is the same, why are the velocities different? ($p = m \times v$)
 - F. If you do the first steps with a penny and a quarter will the penny move more or less after the collision than it did with nickel?
 - G. If you do the 4th and 5th steps with a penny and a quarter will the quarter move?
3. In experiment 1 what happens when the nickel hits the penny if:
 - A. The nickel has a mass of 0.015kg and a velocity of 0.3 m/s, what is its momentum?
 - B. When it transfers its momentum to the penny what is the momentum of the penny?
 - C. If the penny has a mass of 0.005kg what is its velocity with the given momentum?
4. In experiment 2 when the penny hits the nickel:
 - A. If the penny has a mass of 0.005kg and a velocity of 0.4m/s, what is its momentum?

B. When the penny transfers its momentum to the nickel, what is its momentum?

C. What is the mass of a nickel with the above momentum if its final velocity is 0.1 m/s?

Conclusion: 

- Based on the data that was taken and the graph, explain what you saw with the skaters and how it related to your hypothesis.
