Performance-Based Assessment

FORM A HYPOTHESIS

1. Answers may vary. Sample answer: The coin would go flying off the cup, too.
2. Answers may vary. Sample answer: The coin would slide off the card and fall into the cup.

ANALYZE THE RESULTS

1. After the card went flying, the coin fell into the cup.
2. The coin stayed on top of the card as the card was slowly removed from the cup.

DRAW CONCLUSIONS

3. The force of the coin's weight, as a function of gravity, was balanced by the force of the cup supporting the card and the coin.
4. The force of friction between the coin and the card and the horizontal force on the card were involved.
5. Newton's first law of motion states that matter resists any change in motion. The coin did not move until the card supporting it over the cup was gone. Inertia made the coin stay in the same place. Gravity caused it to fall into the cup.

Inertia-Rama!

ANALYZE THE RESULTS

1. The liquid inside the raw egg sloshes, it doesn't spin smoothly as the hard-boiled egg does

DRAW CONCLUSIONS

2. When you stop the eggs, the hardboiled egg stops as a whole, while the shell of the raw egg can be stopped and the liquid inside keeps spinning.

ANALYZE THE RESULTS

1. The coin remains at rest, so when the card is removed quickly, there is not enough friction to move the coin. So, the coin falls into the cup when the card is removed.

DRAW CONCLUSIONS

2. When you pull slowly, there is enough time for the friction between the card and the coin to move the coin. So, the coin remains on the card.

ANALYZE THE RESULTS

1. The mass tends to stay at rest. A gentle pull exerts a small force over a longer time and moves the mass, but a hard pull breaks the thread before the mass moves.

DRAW CONCLUSIONS

2. It is just as hard to catch the bowling ball as it is to throw the bowling ball because the bowling ball has the same inertia in both cases.
3. Accept all reasonable answers that take into account the added inertia of the objects in the backpack. Sample answer: Starting and stopping will be harder because the extra mass increases your inertia. In addition, the books in the backpack act as the liquid inside a raw egg does. As you bounce up, they resist your upward movement. As you bounce down, they are still moving upward.

Penny Projectile Motion

PROCEDURE

3. The penny that was knocked off the table with the ruler was in projectile motion. The pennies should land at the same time because they have the same acceleration due to gravity. The horizontal motion does not affect the vertical motion.

First Law Skateboard

PROCEDURE

2. The soda can should fall over after the push.
4. The can should fall over when the skateboard is stopped.
5. In step 2, the skateboard and the can were at rest. When you pushed the skateboard with an unbalanced force, the skateboard started to move. But, no unbalanced force acted on the can, so it fell over backward when the skateboard moved under it. In step 4, the skateboard was stopped by an unbalanced force. But no unbalanced force acted on the can, so it remained in motion and fell over forward.