

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

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## The First Law of Motion Lab

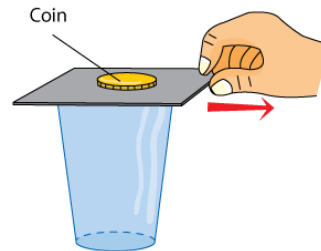
### Astronomy

**Introduction:** Stated as such, “*A body continues at rest or in uniform motion in a straight line unless acted on by some force.*” Newton’s first law of motion is a leading factor in understanding the world that is gravity. Is gravity really magic? Let’s see if we can defy it with some common eye catching tricks!

#### Slick Move - Just a Penny

Materials:

- cup
- 5 pennies
- index card
- a film case



Procedure:

1. Gather materials.
2. Find a clean spot on the lab table with your partner and place the cup in the center of the table. Pennies could fly at certain times, so make sure that if they do, they are easily retrievable.
3. Place the index card flat on the top of the cup and then place a penny on top of the index card.
4. Predict what will happen when you pull the index card slowly.
5. Slowly pull the index card across the surface of the cup and describe what happens to the penny.
6. Now place the index card and penny back on top of the cup opening. With a quick motion, flick the corner of the index card laterally and record what happened below. Did it result the same way when the index card was pulled slowly? Explain.
7. Now replace the index card on the cup and rather than one penny, place all five flat on the index card. Predict what will happen below.
8. With a good flick, try to move the index card without moving the pennies from their location. Was this easier or harder than only using one penny? Explain.

9. Replace the index card on the cup, but this time place the film casing upside down in the center of the index card and place a penny on top. Predict what will happen when the index card is flicked.
  
10. With a quick flick, try to remove both the film casing and the index card and drop the penny into the cup. Was this easier or harder than the other two set-ups? Explain.
  
11. Think back. How many attempts did it take you and your partner to defy common forces with each of the setups? Which took the least amount of attempts and which took the most? Chart them in a data table below. (Hint: For you and your partner plus the three setups and an average between the two of you for each setup, of course, this table should be a 3x3 plus labels on both sides and a title.) Be neat and legible!

### Stacking King – Possibly...

Materials:

- 6 pennies

Procedure:

1. Gather pennies.
2. Stack 5 pennies in a clean stack and place the last one flat on the table with about an inch or two between it and the stack. Try to flick the penny and replace the bottom one on the stack with the one that you flicked without knocking over the stack. Can you do it? Identify what type of force that required, how many attempts it took to achieve it, and what the difficulty is with this trick below. Be sure to be detailed!



### Catch! – Maybe...

Materials:

- 5 pennies



Procedure:

1. Gather pennies and find a spot in the classroom where no one is around. Pennies can definitely fly on this one.
2. Taking turns and using your dominant arm (for the simple sake of everyone's safety) and stack the 5 pennies on the bottom side of your elbow.
3. With a quick snap of your arm, try to catch the stack of pennies without the stack coming undone or falling to the ground. Can you do it? How many attempts did it take? Is speed a factor? Explain in detail.

### Overall Analysis

*Each response shall be a minimum of 4 sentences for full credit! Be detailed and legible!*

1. Describe what the first law of motion states.
2. How are speed and velocity key factors in the first law of motion? How does that affect the result of the procedures and setups in these "magic tricks"?
3. Name and describe several ways in which the first law of motion contradicts what Aristotle stated about natural and violent motion.