

Newton's Equation of Motion

Name: _____ T.A. _____

Partners: _____

Course Number: _____ Section Number: _____ Date: _____



1. Conceptual Discussion (Please discuss with your group member.)

- **Question 1**

How do you describe “acceleration” in your words? What does “more acceleration” mean?

- **Question 2**

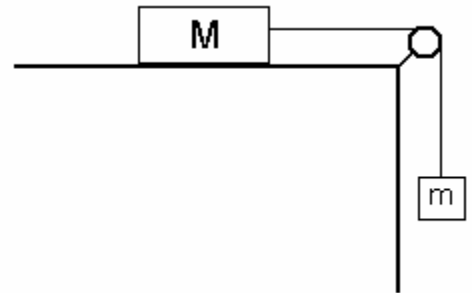
According to Newton, what is the definition of force? (Discuss this qualitatively.)

- **Question 3**

From Newton's equation of motion, $F = ma$, if you exert more force, how will the acceleration be changed? What will happen if you change the mass of the moving object?

2. Experiment

- Mass of large glider: _____ (kg)
- Mass of small glider: _____ (kg)
- Gravitational Acceleration: _____ (m/s^2)



① Keep the mass M and change m

Case #	Mass M (kg)	Mass m (kg)	Time between photo gates (s)

② Keep the mass m and change M

Case #	Mass M (kg)	Mass m (kg)	Time between photo gates (s)

Conclusion and Discussion

From the experiment①: If the hanging mass is increased, how is the acceleration of the glider changed? Does the result agree with $F=ma$?

From the experiment②: If the mass of glider is increased, how is the acceleration of the glider changed? Does the result agree with $F=ma$?

Note: The external force in this experiment is due to gravitational acceleration, $F=mg$.

Procedure for Newton's Equation of Motion

1. Weigh the two air track gliders with a balance.
2. To begin, choose the heavier of the two gliders and the 10g mass provided. Situate the glider at the end of the track away from the wheel and run the string the length of the track. Thread the string over the top of the wheel, and hang the 10g mass from the loop so it hangs over the side of the table.
3. Next, while holding the glider in place, turn on the air pump.
4. In Science Workshop, while still holding the glider, click RECORD button in the upper left hand corner. Then release the glider and allow it to accelerate down the track. But you must click the STOP button before the hanging mass reaches the ground on the other side.