

Newton's Laws of Motion

Subject: Physics | Grade: Grade 10

Objective:

To verify Newton's Second Law of Motion ($F=ma$) by observing the relationship between Force, Mass, and Acceleration.

Materials:

Dynamics Trolley
Runway/Track
Ticker Timer and Tape
Power Supply (AC)
Slotted Weights
Pulley and String
Balance

Procedure:

1. Set up the runway with the pulley at one end. Compensate for friction by tilting the track slightly.
2. Attach a string to the trolley, pass it over the pulley, and hang a weight hanger.
3. Thread the ticker tape through the timer attached to the back of the trolley.
4. Release the trolley and switch on the timer simultaneously.
5. Analyze the ticker tape to calculate acceleration.
6. Repeat by increasing the hanging mass (Force) while keeping the total mass constant (transfer mass from trolley to hanger).
7. Plot a graph of Force vs Acceleration.

Discussion Questions:

1. State Newton's Second Law of Motion.
2. Describe the relationship between Force and Acceleration observed.
3. What does the gradient of the F vs a graph represent?
4. Why is it important to compensate for friction?