

The Level Air Track

Teacher's Notes

Main Topic	Forces
Subtopic	Newton's Laws
Learning Level	High
Technology Level	Mid
Activity Type	Student

Description: Basic air track lab using photogates to verify Newton's First Law.

Required Equipment	Air track, 1 glider, 2 photogates, ruler or meterstick
Optional Equipment	Computer

Educational Objectives

- Describe the motion of a glider on a level air track, and relate the motion to Newton's Laws.

Concept Overview

In this simple lab using an Air Track, students will quantitatively observe the motion of a glider when the track is as level. They will observe that its velocity is constant from one end to the other, demonstrating that the glider has no net force on it.

Lab Tips

The most simple type of photogate is needed for this lab. It need only measure the time that the beam is blocked and display the time. Students can quickly determine that the velocity is the same by examining the data.

This lab is a good introduction to the air track/photogate system.

The Level Air Track

Name: _____

Class: _____

Goal:

Observe and describe the motion of a glider on a level air track.

Materials:

Air track, 1 glider, 2 photogates, ruler or meterstick

Procedure:

1. Turn on the air blower. Place a glider in the center of the track. If the glider starts to slide on its own, adjust the track's feet until it is perfectly level and the glider does not move when put down.
2. Arrange two photogates at least half the track length apart, so that the glider flag triggers the gates when it passes through.
3. Measure and record the length of the part of the glider that passes through the photogate, in cm. _____
4. Place the glider at one end of the track and gently push it so that it passes through both photogates. Record the times reported by the gates:
 - a. Gate 1: _____
 - b. Gate 2: _____
5. Calculate the speed of the glider as it passed through each gate by dividing the length in #3 by the times in #4.
 - a. Gate 1: _____
 - b. Gate 2: _____
6. How did the glider's speed change as it traveled on the track?

7. What do you know about the net force on the glider?

8. List forces that act on the glider after it is pushed. Describe any details you know about how these forces relate to one another. (Are any equal?)

9. Which force is minimized by using the air track in this experiment?

10. List forces that act on a car traveling at constant velocity. Describe any details you know about how these forces relate to one another.

11. Explain how Newton's First Law relates to the results of this experiment.

