

Lab 6: Galilean Relativity

Purpose

In this lab, you will learn about Galilean relativity.

Directions

In this lab, after the pre-lab, you'll do the worksheet below. Once you get it checked out, you'll get a camera and permission to film your own short film (~5 min) demonstrating Galilean relativity to someone unfamiliar with the concept.

Step 1: Worksheet

A friend of yours is standing on a high bridge over a stream. On a signal, she drops a ball. In each case, I will describe how you are moving relative to your friend. Draw a picture showing how you'd see the ball fall in each case. Remember that there are two aspects to this motion: the shape of the trajectory as it falls *and* how fast it is going at each point. (You can illustrate the latter by showing the ball's position after 1 sec, 2 sec, 3 sec, etc.) These drawings are approximations, so make them as clear as you can, but you shouldn't worry about making the shapes or locations of the ball exact.

Case 1: You're at rest (relative to the bridge) in your boat under the bridge

Case 2: You're moving past the bridge in your boat at constant speed

Case 3: You're moving past the bridge in your boat at constant acceleration

Case 4: You start on the bridge beside your friend. At the moment the ball is dropped, you step off the bridge.

Case 5: You've got a jet-pack on and are accelerating upwards, past your friend, the bridge, and the ball.

Part 2: Film

For this part, you'll get a camera. It's up to you to decide how to demonstrate Galilean relativity. A demo of some sort is recommended and you may want to consider using the wonder of cameras to film things more than once or from multiple observers.

At the end of the lab period, we'll view all of the films. The film will be your checkout, along with this worksheet. We will focus our assessment of the films on the quality of the demo and explanation rather than on your cinematography, although we do encourage you to make something you want to share with friends and family!