

## Physics 20

# Elevator Lab

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### **Purpose**

The goal of this lab is to measure the acceleration of an actual elevator as it rises and as it descends (most often these will be two different values). The acceleration of elevators as they move up or go down is very important to the designers of elevators: people want to be able to travel on the elevators as quickly as possible, but if the elevator accelerates too much they will feel sick.

### **Procedure**

You are responsible for coming up with a procedure that will work, although I will try to point you in the right direction if you ask for clarification:

1. Acceleration only happens at the **start** and **end** of your trip. During the middle of your trip you will be traveling at a fairly constant velocity.
2. We want *two* separate acceleration
  - as you are moving upwards and speeding up
  - as you are moving downwards and speeding up.
3. Choose an elevator that travels quite a distance (a lot of floors). Probably an elevator in a tall office building or apartment building will work best.
4. Make sure that your parents/guardians know where you are going and what you are doing... you might even want to invite them along (they could be your “test subject”)
5. If you are in a building that has an information desk, security, etc. ask for permission before you do the experiment. I’m sure that if you explain to the person that you are doing this for a physics lab, and that you will not ride up and down on the elevator more than necessary, they will be ok with you doing it. Probably about three measurements will be enough.
6. Bring a regular bathroom scale with you. Weigh yourself before getting onto the elevator. Then get in the elevator, and while standing on the scale, go up or down (or do a combination). Record your maximum/minimum weight as shown on the scale while you are accelerating.



Based on the example we did in the notes for elevators, you should be able to see a way to use these measurements to calculate the acceleration of the elevator.

You will find that using a spreadsheet to perform your Analysis can make this lab much easier to do.