**ELEVATOR LAB**

 Fill in the chart for each situation. Remember that up is positive, down is negative.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Sign of Velocity** | **Sign of Acceleration** | **Rider Feels (Light, Normal, or Heavy)** | **Normal Force Reading (N)** | **FBD** |
| At rest on the 2nd floor |  |  |  |  |  |
| Moving Down, Speeding Up |  |  |  |  |  |
| Constant Velocity Down |  |  |  |  |  |
| Moving Down, Slowing Down |  |  |  |  |  |
| At rest on the 1st floor |  |  |  |  |  |
| Moving Up, Speeding Up |  |  |  | N/A |  |
| Constant Velocity Up |  |  |  | N/A |  |
| Moving Up, Slowing Down |  |  |  | N/A |  |
| At rest on the 2nd floor |  |  |  | N/A |  |

1. Based on the data we generated,

* Label this set of axes, and draw the rider’s data.
* Label where the elevator was **Still, Constant Velocity, Speeding Up, and Slowing Down**.
* Label on your drawn graph where the rider: **Feels normal, feels heavy, feels light..**

2. Draw a FBD for the person at rest. According to your data, what is the normal force acting on the person when they are at rest? Calculate the person’s mass (in kilograms) using your FBD and ∑F = ma.

3. Draw a FBD for the person while the elevator is accelerating downwards from rest. According to your data, what is the normal force acting on the person during this time? Calculate the person’s acceleration using your FBD and ∑F = ma.

4. Draw a FBD for the person while the elevator is accelerating upwards as it approaches the bottom floor. According to your data, what is the normal force acting on the person during this time? Calculate the person’s acceleration using your FBD and ∑F = ma.

**Bonus 1:** (a)How many g’s of acceleration did the person experience while the elevator was accelerating downwards from rest? (b) How many g’s of acceleration did the person experience while the elevator was accelerating upwards as it approached the bottom floor?

**Bonus 2:** Explain what you observed with the spring scales during the elevator’s trip from the second floor down to the first floor. How does the inertia of the hanging mass affect the tension in the spring scale?