Net Force Particle Model:
Elevator Lab

The elevator in the main building at John Burroughs School is not raised and lowered with cables. Instead, it rides on a giant piston that extends four stories into the ground. In today's activity you will look at how the forces change on you as you ride in the elevator.

Prep: Read the following questions **before** going over to the elevator, and note the observations you need to make:

1. At what times in the motion of the elevator does the bathroom scale show your weight (or the weight of the person standing on the scale)?
Make a mental note of the scale reading.

2. At what times in the motion does the scale show a value **greater than** your weight?
Make a mental note of the scale reading.

3. At what times in the motion does the scale show a value **less than** your weight?
Make a mental note of the scale reading.

Experiment: Take the bathroom scales with you and take a ride in the elevator. Have someone stand on the bathroom scale that doesn't mind revealing his or her weight to others. Observe and remember the forces for numbers 1, 2 and 3 above.

Data/Observations: When you return to the classroom record your observations.

	Force in pounds	Force in Newtons (1 pound = 4.5 Newtons)
Scale reading at rest:	________________	________________
Maximum scale reading:	________________	________________
Minimum scale reading:	________________	________________

Label the following as **equal** to, **greater** than, or **less** than the scale reading at rest.
______________ At rest at the bottom
______________ Starting to go up
______________ Going up at constant speed
______________ Slowing to stop at the top
______________ Stopped at the top
______________ Starting to go down
______________ Going down at constant speed.
______________ Slowing to stop at the bottom.
Calculate the mass of the person on the scale in kilograms: ______________________

Force Analysis: Draw a quantitative force diagram for the passenger in each of the following situations during the elevator ride. Label the forces in Newtons. To the right of each diagram draw a **velocity** and **acceleration** vector that describes the motion of person in the elevator. Calculate the net force and the acceleration of the person.

1. At rest at the bottom Quantitative force diagram velocity vector: acceleration vector: net force = acceleration =	**2. Starting to go up** Quantitative force diagram velocity vector: acceleration vector: net force = acceleration =
3. Going up at constant speed Quantitative force diagram velocity vector: acceleration vector: net force = acceleration =	**4. Slowing to stop at the top** Quantitative force diagram velocity vector: acceleration vector: net force = acceleration =

5. Stopped at the top Quantitative force diagram velocity vector: acceleration vector: net force = acceleration =	**6. Starting to go down** Quantitative force diagram velocity vector: acceleration vector: net force = acceleration =
7. Going down at constant speed. Quantitative force diagram velocity vector: acceleration vector: net force = acceleration =	**8. Slowing to stop at the bottom.** Quantitative force diagram velocity vector: acceleration vector: net force = acceleration =

9. How do the upward accelerations compare to the downward accelerations? Explain why.