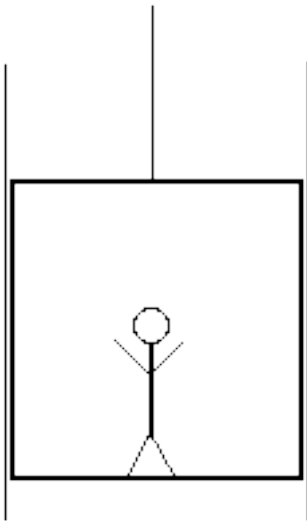


# Net Force Particle Model Worksheet 1: Force Diagrams and Net Force

1. An elevator is moving up at a constant velocity of 2.5 m/s, as illustrated in the diagram below:  
The passenger has a mass of 85 kg.



a. Construct a force diagram for the passenger.

b. Calculate the force the floor exerts on the passenger.

2. The elevator now accelerates upward at  $2.0 \text{ m/s}^2$ .

a. Construct a force diagram for the passenger.

b. Write an equation for the vertical forces on the passenger.

c. Calculate the force the floor exerts on the passenger.

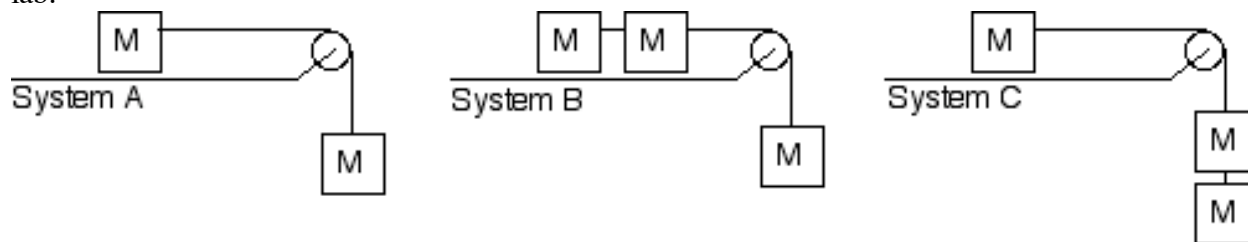
3. Upon reaching the top of the building, the elevator accelerates downward at  $3.0 \text{ m/s}^2$ .
- Construct a force diagram for the passenger.
  - Write an equation for the vertical forces on the passenger.
  - Calculate the force the floor exerts on the passenger.
4. While descending in the elevator, the cable suddenly breaks. How big is the force on the passenger by the floor? Explain your answer.
- 5.
- A  $70 \text{ kg}$  skydiver jumps out of an airplane. Immediately after jumping, how large is the skydiver's acceleration?
  - Upon reaching a downward velocity of  $100 \text{ miles per hour}$ ,  $300 \text{ Newtons}$  of drag resist the diver's motion. Draw a force diagram for the skydiver. How large is the skydiver's acceleration?

6. a. Draw a force diagram for a 900 kg car that exerts 5000 N of traction force on a level road while being opposed by 1000 Newtons of friction and drag forces combined.

b. Write a net force equation for the car.

c. Calculate the acceleration of the car.

7. The three modified Atwood's machines shown below have blocks of mass  $M$  on a frictionless surface and hanging from a string. When the blocks are released, they accelerate as they did in our lab.



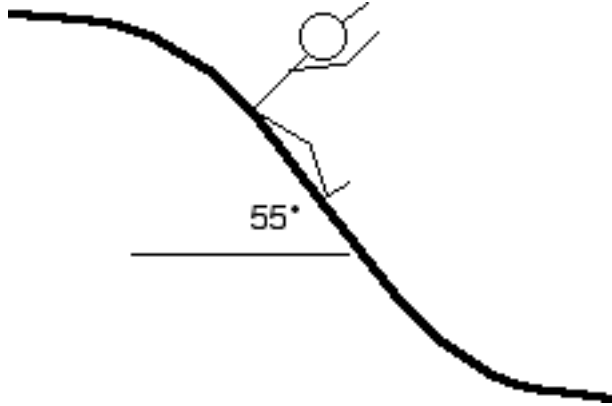
a. Which system has the greatest net force? Explain how you know.

b. Which system has the least inertia? Explain how you know.

c. Determine the acceleration for each system.

8. A child takes a trip down a slide.

a. Draw a quantitative force diagram for the 30kg child. The frictional force is 160 Newtons.



b. Write an equation for the forces on the child parallel to the slide and find the net force on the child.

c. Calculate child's acceleration.