

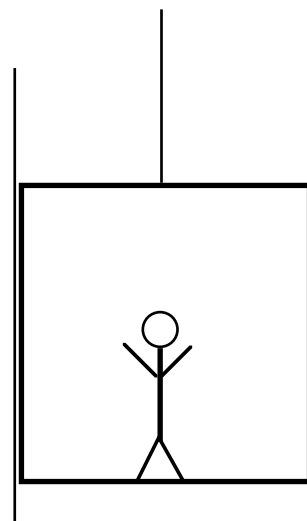
# Unit 4, More About Forces

## Worksheet 5, Elevator Problems

Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

1. An elevator is moving up at a constant velocity of 2.5 m/s, as illustrated in the diagram below: The man has a mass of 85. kg.
  - a. Construct a force diagram for the man.
  - b. How large is the force that the floor exerts on the man?



2. The elevator now accelerates upward at  $2.0 \text{ m/s}^2$ .
  - a. Construct a new force diagram for the man.
  - b. How much force does the floor now exert on the man?

3. Upon reaching the top of the building, the elevator accelerates downward at  $3.0 \text{ m/s}^2$ .
  - a. Construct a force diagram for the man.
  - b. How much force does the floor now exert on the man?

4. While descending in the elevator, the cable suddenly breaks. What is the force of the floor on the man?

5. Consider the situation where a person that has a mass of 68 kg is descending in an elevator at a constant velocity of 4.0 m/s. At some time "t", the elevator starts to slow to a stop at the rate of 2.0 m/s<sup>2</sup>.
- Construct a qualitative motion map indicating the relative positions, velocities and accelerations of the elevator as it descends.
  - Construct **quantitative** force diagrams (include magnitudes) for the person in the elevator as it descends at (a) constant speed and (b) during its period of acceleration.
  - If the person in the elevator were standing on a bathroom scale calibrated in newtons, what would the scale read while the elevator was (a) descending at constant speed and (b) while slowing to a stop? Please explain your answers.