

## Elevator Homework Problems Worksheet

1. An elevator is moving up at a constant velocity of 2.5 m/s. Inside the elevator is a passenger that has a mass of 85 kg. Assume  $g = -10 \text{ m/s}^2$ .
  - a. Draw a force diagram for the PASSENGER, not the elevator.
  
  
  
  
  
  
  
  
  
  
  - b. Write the  $\sum F$  in terms of  $F_N$  and  $F_g$ .
  - c. Calculate force gravity in Newtons.  $F_g = mg$
  - d. Calculate the  $F_N$  using Newton's 2<sup>nd</sup> Law  $\sum F = ma$ . Use substitution.
  
  
  
  
  
  
  
  
  
  
  - e. What is the apparent weight of the passenger in Newtons? Units of g-force?
  
  
  
  
  
  
  
  
  
  
2. An elevator is moving up with a constant acceleration of +2 m/s/s. Inside the elevator is a passenger that has a mass of 85 kg. Assume  $g = -10 \text{ m/s}^2$ .
  - a. Draw a force diagram for the PASSENGER, not the elevator.
  
  
  
  
  
  
  
  
  
  
  - b. Write the  $\sum F$  in terms of  $F_N$  and  $F_g$ .
  - c. Calculate force gravity in Newtons.  $F_g = mg$
  - d. Calculate the  $F_N$  using Newton's 2<sup>nd</sup> Law  $\sum F = ma$ . Use substitution.
  
  
  
  
  
  
  
  
  
  
  - e. What is the apparent weight of the passenger in Newtons? Units of g-force?

3. An elevator is moving down at a constant acceleration of  $-3 \text{ m/s}^2$ . Inside the elevator is a passenger that has a mass of  $85 \text{ kg}$ . Assume  $g = 10 \text{ m/s}^2$ .
- Draw a force diagram for the PASSENGER, not the elevator.
  - Write the  $\sum F$  in terms of  $F_N$  and  $F_g$ .
  - Calculate force gravity in Newtons.  $F_g = mg$
  - Calculate the  $F_N$  using Newton's 2<sup>nd</sup> Law  $\sum F = ma$ . Use substitution.
  - What is the apparent weight of the passenger in Newtons? Units of g-force?