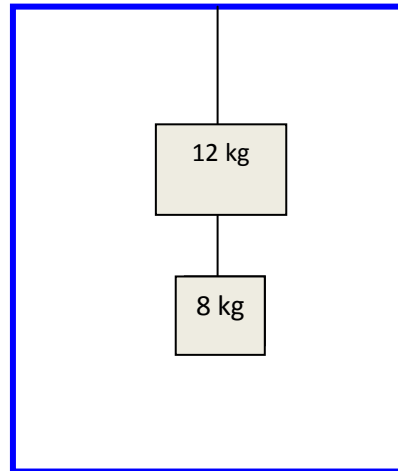


Newton's Laws **Elevator Problems** **Homework Answers**

1. A 70.0 kg man is riding an elevator **up** 5 stories.
 - a. Draw a free body diagram of the man.
 - b. What is the man's weight? **686 N**
 - c. If he accelerates at 1.87 m/s^2 on the way up, what is his apparent weight? **816.9 N**
 - d. If he slows down with an acceleration of -2.14 m/s^2 to stop at his floor, what is his apparent weight? **536.2 N**
2. A 47.5 kg woman is riding an elevator **down** 3 stories.
 - a. Draw a free body diagram of the woman.
 - b. What is the woman's weight? **465.5 N**
 - c. If her apparent weight as the elevator begins moving down is 390 N what is her acceleration? **-1.589 m/s²**
 - d. If her apparent weight as the elevator is slowing down is 500 N, what is her acceleration? **+0.726 m/s²**
3. A 8.0 kg mass and a 12.0 kg mass are hanging from the ceiling of an elevator as shown below.
 - a. Draw a free body diagram for each box.
 - b. If the elevator is at rest, what is the tension in the top string? **196 N**
 - c. If the elevator is accelerating upward at 1.0 m/s^2 , what is the tension in the bottom string? **86.4 N**
 - d. If the strings can withstand a maximum of 300 N, what is the maximum acceleration the elevator can have before one breaks? **5.2 m/s²**



4. A two 10 kg masses are hanging from the ceiling of an elevator as shown below.
 - a. Draw a free body diagram for each box.
 - b. If the elevator is at rest, what is the tension in each of the strings? **98 N in each of the strings**
 - c. If the elevator has an acceleration of -1.5 m/s^2 , find the force of tension in the bottom string. **83 N**
 - d. How would the elevator have to accelerate or decelerate for the bottom string to have 25 N of tension? **-7.3 m/s²**

