

Show all work. Include a free body diagram when it will be helpful (at your discretion).

1. State Newton's:
 - a) First Law
 - b) Second Law
 - c) Third Law
2. What additional step(s) have we now added to our problem solving process?
3. A 16 kg object experiences a 3.2 m/s^2 acceleration. What is the net force acting on the object?
4. An object experiences a 5 m/s^2 acceleration when it is acted upon by a 300 N force. What is the object's mass?
5. A 300 gram arrow is shot by William Tell through an apple that is 8 cm thick. If the arrow enters the apple at with a velocity of 30 m/s and leaves the apple at 25 m/s in the same direction, what force was applied by the apple that slowed the arrow down?
6. A 20 kg mass is pulled horizontally by a 250 N force, but only experiences an acceleration of 3 m/s^2 . Solve for the second horizontal force than acts on the object.
7. A 10 kg block is lifted by an applied force of 150 N. What is its acceleration?
8. A 200 N block is lifted by an applied force of 400 N. What is its acceleration?
9. The maximum acceleration of a given elevator is $.75 \text{ m/s}^2$. What is the apparent weight of a 65 kg person in the elevator when the elevator
 - a) STARTS moving up
 - b) STOPS moving up
 - c) STARTS moving down
 - d) STOPS moving down
10. A sign in an elevator states that the maximum occupancy is 20 persons. Suppose that the safety engineers assume the mass of the average rider is 75 kg. The elevator itself has a mass of 500 kg. The cable supporting the elevator can tolerate a maximum force of 30,000 N. What is the greatest acceleration that the elevator's motor can produce without snapping the cable?