1. A car of mass M travels at a constant speed v on a straight, flat, horizontal stretch of road. Ignore air resistance. Draw a free body diagram for the car and determine the magnitudes of the forces in it.

2. A car of mass M travels at a constant speed on a straight, flat, horizontal stretch of road. Do not ignore air resistance. Draw a free body diagram for the car and determine the magnitudes of the forces in it.

3. A 70 kg man jumps out of an airplane wearing a parachute. He falls (ignore air resistance on the man) for three seconds and then opens the parachute. The parachute slows the man's speed to 4 m/s in 5 seconds after which he floats to the ground at a constant speed of 4 m/s.

   Draw a free body diagram for the man before he opens the 'chute and determine the sizes of all forces in your diagram.

4. For the system in the previous problem, draw a free body diagram for the man after opening the ‘chute but before his speed stabilizes and determine the sizes of all forces in your diagram

5. For the system in the previous problem, draw a free body diagram for the man after his velocity becomes constant and determine the sizes of all forces in your diagram

6. Draw a free body diagram for the system consisting of the man and the parachute for the previous three cases.

7. A train accelerates at a constant rate of $a = 3\ {}^{m}/_{s^2}$ in a constant direction along a region of perfectly smooth, horizontal track. In the train, a bowling ball with a mass of 6 kg hangs from a 2 meter long piece of string attached to the ceiling. What angle does the string make with respect to the vertical direction?

8. A 100 kg man stands in an elevator. The elevator is capable of accelerating at $a = 0.7\ {}^{m}/_{s^2}$ either up or down. Draw a free body diagram and determine the sizes of each of the forces in it for the cases of:

   a) The elevator is not moving.

   b) The elevator is accelerating upward and moving upward.

   c) The elevator is moving at a constant speed upward.

   d) The elevator is moving upward but accelerating downward.

   e) The elevator is accelerating downward and moving downward.

   f) The elevator is moving downward at a constant speed.

   g) The elevator is moving downward but accelerating upward.