# Physics 160 Written Homework - Chapter 4.

## 1 Newton's Second Law

As part of a safety test, an eighteen wheeler is being shot down a track by a rocket into a solid concrete wall. The truck is fully loaded, for a total weight of 95,000lbs. If the truck hits the wall at 80mph and causes a deformation of .1m in the wall before coming to a halt:

a. Draw two free body diagrams, one of the truck and the other of the wall, during the crash.

b. What is the average acceleration of the truck during the collision?

c. What is the average force on the truck during the collision?

## 2 Newton's Third Law

An $80kg$ man is strapped into the seat of a $200kg$ roller coaster car. The car travels down the first hill of the track at an angle of $65°$ below the horizontal. Assume that the car and man move down the track with no friction.

a. Draw two free body diagrams, one of the car and the other of the man.

b. For each force in your free body diagrams, identify the object that its third law force pair is acting on, and briefly explain why.