Problem 9.1

A car with a mass of 1100 kg traveling at 50 km/hr locks up its brakes, stopping over a distance of 18 meters. If the same car were to lock up its brakes when traveling 80 km/hr how far would you expect the car to slide before coming to a stop? (Hint: assume the same friction force in both cases)

(Solution: d = 46.06 m)

Problem 9.2

A 2500 lb car traveling 60 mph (88 ft/s) impacts a highway crash barrier as shown below. If the barrier were designed to exert the following force over the 40 ft distance of the barrier, how far would you expect the car to travel after impacting the barrier?

(Solution: without holes: $d = 25.03\ ft$)

Problem 9.3

The Duquesne Incline transports passengers up a 30.5 degree slope. If a fully loaded car has a mass of 5500 kg, what power is required to maintain an uphill speed of 10 km/hr?
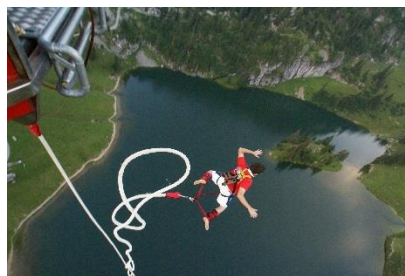

 (Solution: P = 76.13 kW)

Problem 9.4

A bungee jumper with a weight of 150 lbs uses a bungee with an unstretched length of 60 ft.

a) Assuming no air resistance, what will the jumper's velocity be just before the bungee starts to stretch?
b) If the bungee jumper falls a maximum distance of 150 ft, what is the spring constant of the bungee?


(Solution: v = 62.16 ft/s, k = 5.55 lbs/ft)

Problem 9.5

An 1100 kg truck is being used to raise a 100 kg box using the setup shown below. When the box is at a height of 3m, the box has a velocity of 1 m/s.

a) How far did the truck travel to lift the box this high? (This is a dependent motion problem)
b) What is the velocity of the truck at this time?
c) What is the work that the truck has done over this time?
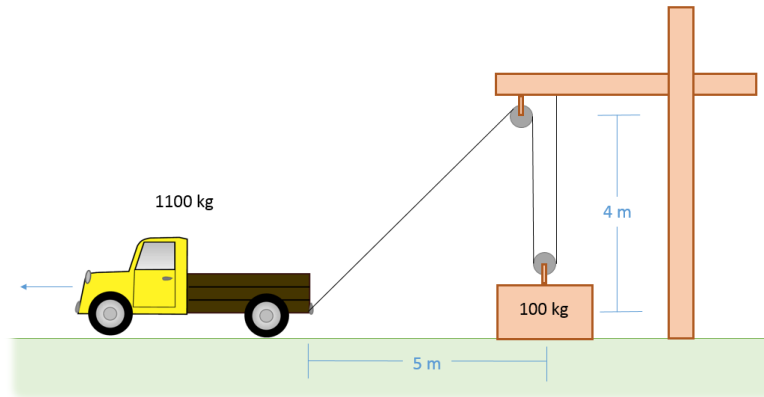
(Solution: distance traveled = 6.7 m, truck speed = 2.12 m/s, work done: 5464.92 J)