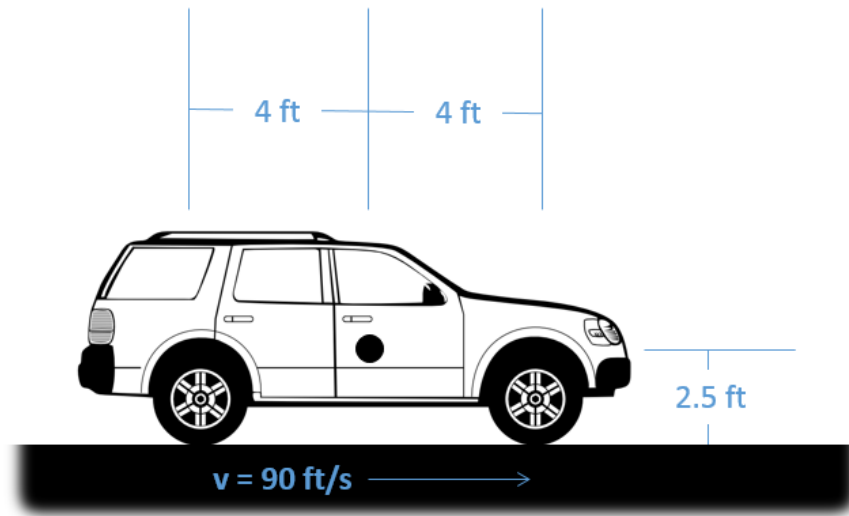


Chapter 12 Homework Problems

Problem 12.1

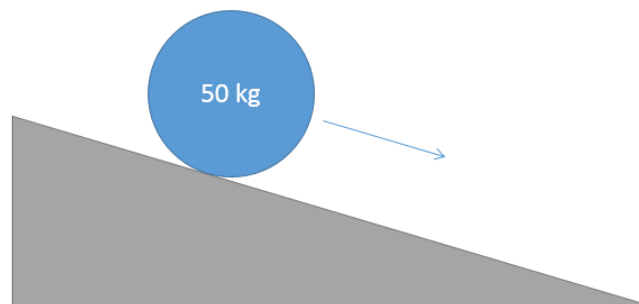
The SUV shown below has an initial velocity of 90 ft/s. It slams on its brakes, coming to a stop over a 300 ft distance. If the car has a weight of 3500 lbs and as center of mass as shown below, what are the normal forces at the front wheels? What are the normal forces at the back wheels?



(Solution: $F_{NR} = 1291.4 \text{ lbs}$, $F_{NF} = 2208.6 \text{ lbs}$)

Problem 12.2

A 50 kg barrel with a diameter of .75 meters is placed on a 20° slope. Assuming the barrel rolls without slipping, what will the acceleration of the center of mass of the barrel be?

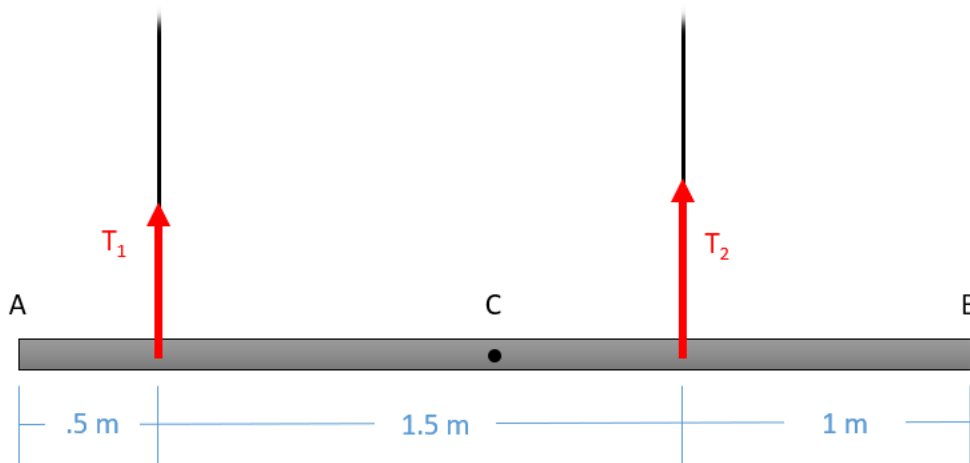


(Solution: $a_x = 2.24 \text{ m/s}^2$)

Problem 12.3

A 3-meter-long 25 kg beam is supported by two cables as shown below. You can treat the beam as a slender rod. Assume we want the left end of the beam at A to remain as a constant height while the right end of the beam at B to accelerate upwards at a rate of 1 m/s^2 .

- What is the rate of acceleration of the center of the beam and the rate of angular acceleration for the beam?
- What will T_1 and T_2 need to be to achieve these accelerations?



(Solution: $a_{cy} = .5 \text{ m/s}^2$, $\alpha = .333 \text{ rad/s}^2$, $T_1 = 81.75 \text{ N}$, $T_2 = 176 \text{ N}$)