

Physics 1210
Homework 4 Written-out Problems

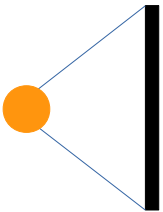
1.

Your friend calls you, they are stuck in the snow on Mount Jelm in their 500 kg truck! You have an 800 kg 4WD truck and when you get to your friend you see that the grade of the road is 30 degrees downhill to him and beyond. You hope you can pull him out because you have new winter tires. However, as you try to tow the car, both vehicles start to slide down the slope, the small truck below yours. The coefficient of kinetic friction between your truck tires and the road is $\mu_k = 0.35$ and for the small truck is $\mu_k = 0.25$.

- a) What is the acceleration of the vehicles?
- b) What is the tension in the tow rope?
- c) What would happen qualitatively (words) and quantitatively (acceleration value) if instead your truck had been positioned below the small truck with no rope to connect them and they both started to slide?

2.

You work for Power Company of Wyoming as a site tester for the Chokecherry and Sierra Madre Wind Energy Project. To do your job, you design a giant anemometer as seen in the diagram below to place and test the variability and average intensity of the wind. The mass of the single anemometer cup is 2.5 kg and each support cord is 125 cm long coming out from the top and bottom of a 2 m center pole around which the system turns. At some wind speed, you measure the tension in the top cord as 80 N.



- a) What is the tension in the bottom cord?
- b) How many times is the anemometer cup spinning around each minute?
- c) What tension would you measure on the upper string if the system is spinning at exactly the rev/min necessary for the lower cord to go slack?
- d) What is the value of the rev/min required in part c?