

CSUC Spring Term 2020 Physics 204A [Portfolio Problem for Week 14:](#)

Due Monday, May 4, by Noon on our class Blackboard site: 202-PHYS204A-05-4569

Dear Class: This is the sixth (and Week14) Portfolio Problem Set. These are classic Statics Problems. Both emphasize universal equations of “NON-motion”. What has to be true? Draw lots of pictures! Don't rush! The answer to the first one is really surprising – and you will have learned a ton about problem solving! This is an open book and unlimited time exercise.

I. Knocking Over a Post (...or a tent pole!)

One end of a post weighing 400 N and with height h rests on a rough horizontal surface with $\mu_s = 0.30$.

The upper end is held by a rope fastened to the surface and making an angle of 36.9° with the post. A

(a) If the force F is applied at the midpoint of the post, what is the largest value it can have without causing the post to slip? (b) How large can the force be without causing the post to slip if its point of application is $6/10$ of the way from the ground to the top of the post? (c) Show that if the point of application of the force is too high, the post cannot be made to slip, no matter how great the force. Find the critical height for the point of application.

II. Watch Out for Ladders!

Two ladders, 4.00 m and 3.00 m long, are hinged at point A and tied together by a horizontal rope 0.90 m above the floor (Fig. P11.96). The ladders weigh 480 N and 360 N, respectively, and the center of gravity of each is at its center. Assume that the floor is freshly waxed and frictionless. (a) Find the upward force at the bottom of each ladder. (b) Find the tension in the rope. (c) Find the magnitude of the force one ladder exerts on the other at point A. (d) If an 800-N painter stands at point A, find the tension in the horizontal rope.

