

April 15, 2013

Graded Group Problem #3

You have a summer job working at a company developing systems to safely lower large loads down ramps. Your team is investigating a magnetic system by modeling it in the laboratory. The safety system is a conducting bar that slides on two parallel conducting rails that run down the ramp. The bar is perpendicular to the rails and is in contact with them. At the bottom of the ramp, the two rails are connected together. The bar slides down the rails through a vertical uniform magnetic field. The magnetic field is supposed to cause the bar to slide down the ramp at a constant velocity even when friction between the bar and the rails is negligible. Before setting up the laboratory model, your task is to calculate the constant velocity of the bar sliding down the ramp on rails in a vertical magnetic field as a function of the mass of the bar, the strength of the magnetic field, the angle of the ramp from the horizontal, the length of the bar which is the same as the distance between the tracks, and the resistance of the bar. Assume that all of the other conductors in the system have a much smaller resistance than the bar.

NOTE:

Use a *Group Problem Solving Guide* to answer this problem.

Clearly indicate your names as well as your lab time.