PHYS 1301W.4

Group Problem

7 November 2013

One day, while coming back from lunch at the high school where you teach physics, you encounter the aftermath of a collision in the school hallways. Eye witnesses report that one of your honors students, Alice, was jogging up the north hallway when she was hit on her left by a freshman named Bob running in perpendicularly from the west hallway. In the collision, Bob (displaying admirable presence of mind) caught Alice before she could be knocked over and held her steady until the pair skidded to a stop.

From the skid marks left on the recently-waxed floor by the Bob's shoes, you observe that the two students skidded for 3.6 feet at an angle of 18 degrees north of east. After a little bit of pestering, the school nurse informs you that Alice weighs a mere 120 lbs and Bob the slightly heftier 150 lbs. From a recent research paper, you find that the coefficient of kinetic friction for a rubber shoe sole skidding on waxed linoleum is 0.35. Lastly, you recall, from your days at university, that gravitational accleration is given as $g = 32.2\ \mathrm{ft/s^2}$. With this information you calculate the speed of each student.

How fast was each student going when the collision occured? More importantly, if the speed limit in all school hallways is a sedate 5 mph, who gets detention?