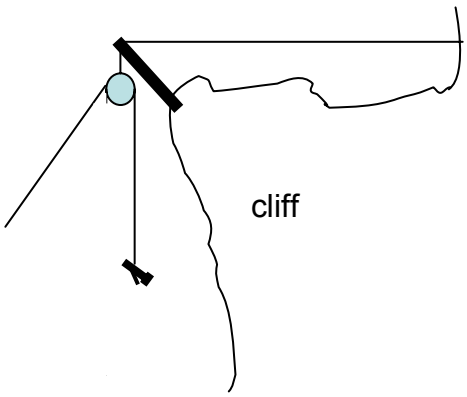
PH 203 Phase-Line Writ 3, Fall 03 **Name**_____
Lesson 36 / 50 Marks / 30 minutes **Section**_____**, C Hour**
AUTHORIZED REFERENCES: Calculator, Physics Reference Card

Wt. **No.**

35 1. SSG Hai Engel is using a rope and pulley to move his mortar equipment to the top of a small cliff. His men pull the rope at an angle of 32.2° with respect to the vertical, and give the mortar system (mass 36.4 kg) an acceleration of 0.149 m/s^2 upward. The pulley is improvised from a tire rim and can be modeled as a disk of radius 29.2 cm and mass 10.5 kg. Calculate the force the soldiers must apply to the rope to create the acceleration given.



$T = 363N$

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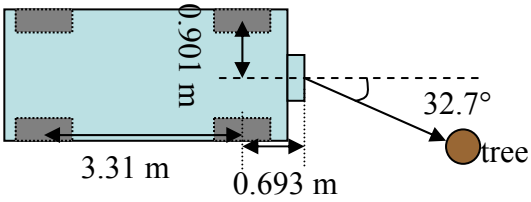
15 2. While conducting training in Pinõn Canyon, Colorado, you get the right rear wheel of your HMMWV stuck in a mud hole. In an attempt to extricate your vehicle, you run your winch cable horizontally to a stout tree. The tree is at a 32.7° angle to the right front of the vehicle and 12 m away from the truck. The winch is mounted 0.693 m forward of the center of the front wheels and centered on the bumper. From center to center the front and rear wheels are 3.31 m apart, and the left and right wheels are 1.82 m apart. When the winch is started, the cable has a tension of 1280 N in it. Calculate the torque exerted by the winch about a vertical axis through the right, rear tire.



$$\tau = 3740 N \cdot m$$

Bonus (5 Marks): Your platoon is testing an experimental snorkel device that is carried on thebustle rack of your M2 Bradley Fighting Vehicles. The moment of inertia ofthe turret of an M2 Bradley about its axis of rotation is 1180 kg·m^2. The snorkel can best be modeled as a solid cylinder with a diameter of 60.9 cm, a length of 148 cm, and a weight of 312 N. The snorkel is mounted to the turret as in the diagram below. Calculate the moment of inertia of the loaded turret about its axis of rotation.

$$I = 1250 kg \cdot m^2$$