

Name _____ Section _____

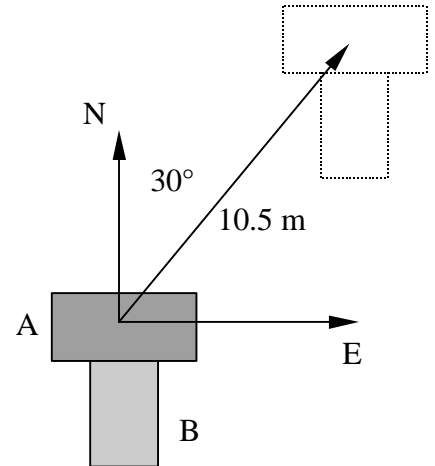
ES201
Examination II
October 15, 1996

Problem	Score
1	/30
2	/30
3	/40
Total	/100

Show all work for credit
AND
Turn in your signed help sheet

Car A is traveling east and car B is traveling north when they collide in an intersection. After the impact the cars remain stuck together and travel for 10.5 meters in a direction of 30 degrees east of north as shown in the figure. The mass of A is 1800 kg and the mass of B is 2100 kg. The coefficient of friction between the tires of the cars and the pavement is 0.75. Find:

- the velocity of the cars immediately after the collision
- the velocity of the cars immediately before the collision

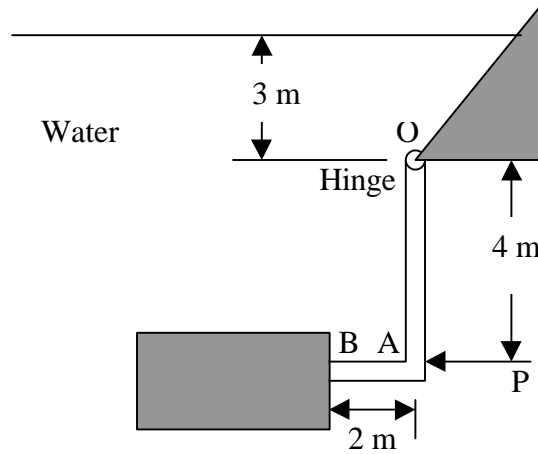


Name _____
ES201 Examination II

Problem 2

30 pts
Oct. 15, 1996

The rigid gate, OAB, is hinged at O and rests against a rigid support at B. What minimum horizontal force, P, is required to hold the gate closed if its width is 3 m? Neglect the weight of the gate and friction at the hinge. The back of the gate is exposed to atmosphere. $\gamma_{H_2O} = 9.81 \text{ kN/m}^3$



A completely filled barrel and its contents have a combined mass of 160 kg. A cylinder C is connected to the barrel at a height $h = 0.6$ m as shown in the figure.

- Assuming that the barrel does not slide, what is the mass of C required to cause the barrel to tip?
- Assuming the barrel does not tip, what is the mass of C required to cause the barrel to slide given $\mu_s = 0.48$?
- From part a) and b) is clear that the barrel will slide before tipping. Assuming the barrel is sliding and $\mu_k = 0.40$, what is the maximum value for the mass of C so the barrel will not tip?

