Set #3 - for Wednesday January 29

Read RHK Ch. 9; Ch. 10; Ch. 17: 17.1-17.3
K&K Ch. 6: 6.1-6.7; Ch. 7: 7.1-7.3; Ch. 8: 8.1-8.3
Feynman Ch. 20

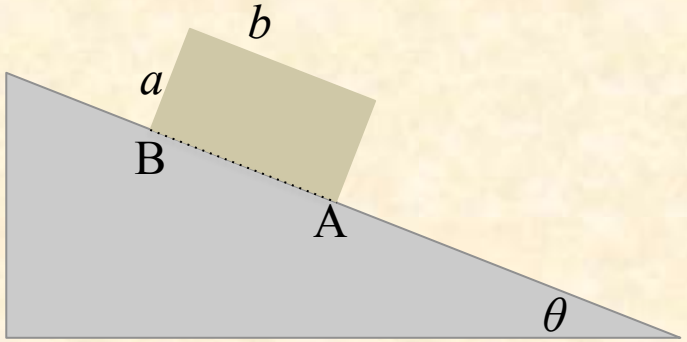
Solve

From RHK	**Ch. 9**	Exercises 39;	Problems 6, 23
	Ch. 10	Exercises 8, 13	
	Ch. 12	Exercises 14	
From K&K	**Ch. 6**	Problem 6.10, 6.14, 6.27 **Extra Credit:** 6.6	

Problem 1. A uniform box is at rest on the incline plane with angle θ. Assume that there is big enough fiction, so the box does not slide.

1-1. At what distance from corner A on the segment AB is the normal force applied?

1-2 What is the value of critical angle when the box will turn over.



Problem 2. A solid cylinder, a thin-walled cylindrical shell, a solid sphere and a thin-walled spherical shell are all rolled down an inclined plane sloped at an angle θ. The masses and radii of these objects are not necessarily the same. There is no sliding. Which object reaches the bottom of the inclined plane first when released at the same time?

Go to page 2

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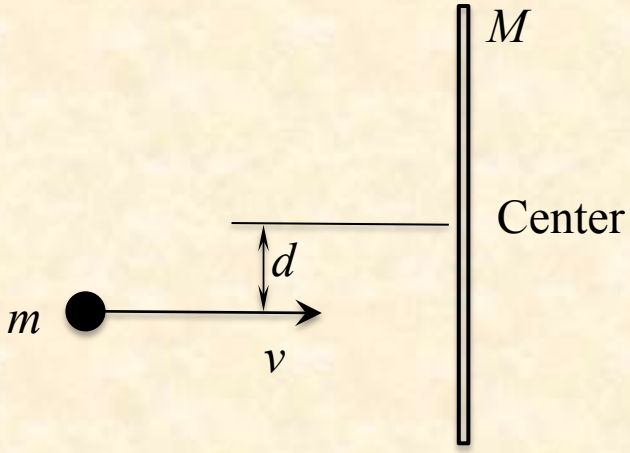
Problem 3. A stick of length L and mass M lies on a frictionless horizontal table on which it is free to move in any way. A hockey puck of mass m, moving as shown below with speed v collides elastically with the stick. What must be the mass m of the puck so that it remains at rest immediately after the collision?



Problem 4. A billiard ball is struck by a cue so that the line of action of the applied impulse is horizontal and passes through the center of the ball. The initial velocity v_0 of the ball, its radius R, its mass M, and the coefficient of friction μ_k between the ball and the table are all known. How far will the ball move before it ceases to slip on the table? What will its angular velocity be at this point?

Problem 5. Calculate the inertia tensor of homogeneous cube of density ρ, mass M, and side length b. Let corner be at the origin, and let three adjacent edges lie along the coordinate axes.

Good Luck, Dr. B