# Set #6 - for Wednesday November 6



**Read** RHK Ch 5
K&K Ch.2 (p. 87-97)
Feynman V.1 Ch. 11, 12

**Solve**

From RHK **Ch. 5** Exercise 30. Problems 1, 2, 4, 20

**Ch. 5** **Problem (2+).** Use a suitable constraint equation to relate the accelerations of the pulley and of each of the masses, and solve this problem in the general case that the masses are off the ground.)

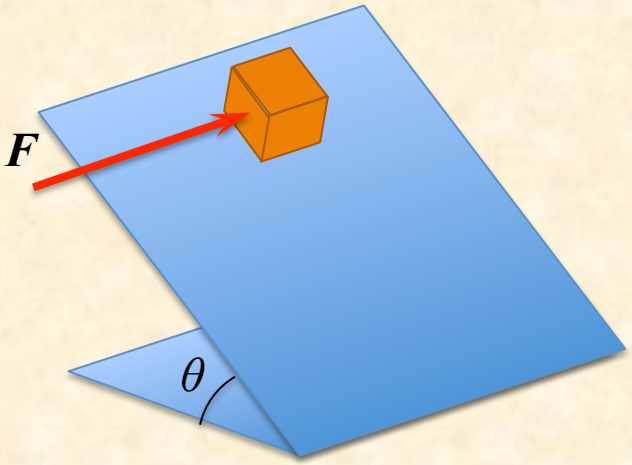
From K&K **Ch. 2** Problems 2.6, 2.7, 2.11, 2.12

**Problem 1.** A cube of weight $F_W$ rests on a rough inclined plane which makes an angle  with the horizontal.

a) What is the minimum force parallel to the slope necessary to start the cube moving down the plane?

b) What is the minimum force necessary to start the cube moving up the plane?

c) What is the minimum horizontal (transverse to the slope) force necessary to start the cube moving down the plane?




Use important additional parameters of the system you need to solve the problem.

Go to page 2

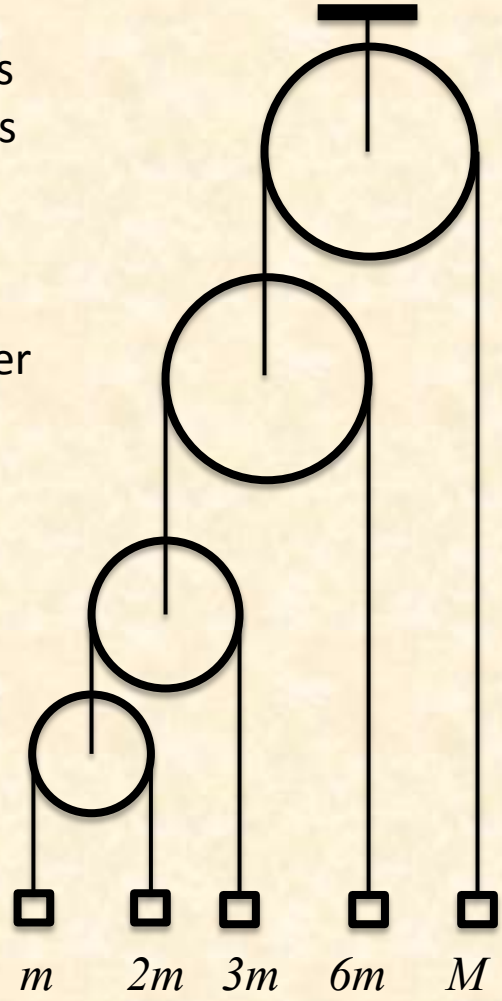
# Set #6 - for Wednesday November 6



**Problem 2a.** Find the time it takes the mass $m$ to reach the bottom of the wedge of length $l$ (slant), wedge angle $\theta$ and mass $M$. Neglect friction with any surface. Use picture below.

**Problem 2b.** Find the ratio of final speeds of the wedge and the mass $m$.

**Problem 3.** The following system consists from ideal massless pulleys and strings. There is no friction in the system. Four out of five masses are given on the picture. What should be the value of mass $M$ of the last block if you know that the block does not move?




**Extra Credit:** A particle of mass m slides down an inclined plane under the influence of gravity. If the motion is resisted by a force $f = kmv^2$, show that the time required to move a distance $d$ after starting from rest is

$$t = \frac{\cosh^{-1}(e^{kd})}{\sqrt{kg\sin\theta}}$$

where $\theta$ is the angle of inclination of the plane.


Good Luck, Dr. B