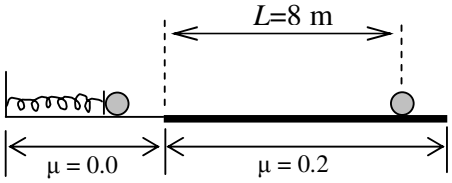
	UNIVERSITY OF GAZIANTEP **DEPARTMENT OF ENGINEERING PHYSICS** **EP 105 General Physics I** **Second Midterm Exam Questions**	**23/12/2004** **TIME 100 min.**

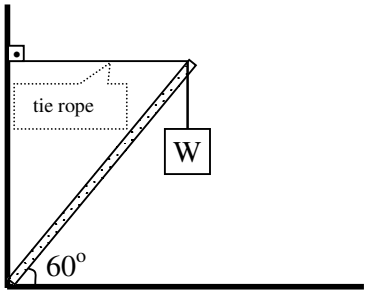
[1]. An object of mass *m* is moving with an initial speed of 5 m/s collides with a second object of mass 4*m* which is initially at rest. After the collision, the first object moves with a speed of 2.5 m/s at a direction 90° to its original line of motion. If the collision is not elastic, determine the speed and the direction of the second object.

[2]. A 3 kg-object is released from a compressed spring whose force constant is 120 N/m. After leaving the spring it travels over a horizontal surface, with coefficient of kinetic friction of 0.2, for a distance of 8m before coming to rest as shown in Figure.

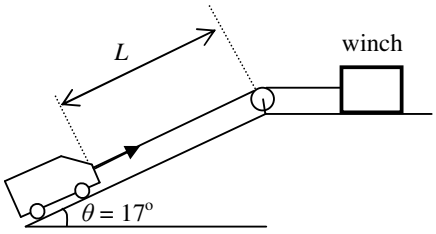


(a) What was its maximum kinetic energy?
(b) How far was the spring compressed before being released?

[3]. In the Figure, if the tie rope can hold a maximum tension of 725 N and if the beam is uniform and its weigh is 500 N
(a) What is the maximum weight W which can be supported on the beam?
(b) What are the components of forces exerted on the floor by the beam?



[4]. A 1400 kg car is pulled up a plane at a constant speed of 8 m/s by a winch as shown in Figure. The coefficient of kinetic friction between tires and way is 0.2. If the car travels a distance 25 m on the plane,
(a) What is the minimum power that must be supplied by the winch?
(b) How much work is done by the winch?
(c) How much work is done by the frictional force?
(Neglect mass of the pulley)



[5]. A 100 g rubber ball drops vertically from a height of 10 on to a hard floor and it rebounds with a speed of v_0. If the ball contacts with floor for 40 ms and work done by the floor is 7 J;
(a) What is the impulse acted on the ball during the contact?
(b) What is the average force exerted on the ball by the floor?
(c) How high does the ball bounce?

Useful constants:
g = 9.8 m/s^2, sin30°=0.5, cos30°=0.86, sin45°=cos45°=0.71