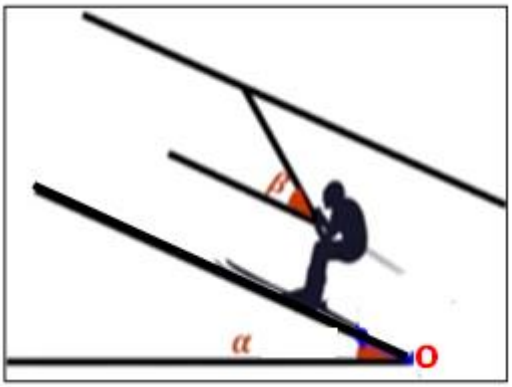
Series 4

Exercise 1

Pulled by a ski lift, a skier of mass M = 60 kg has a rectilinear movement on a slope inclined at an angle α = 10° with the horizontal. The pole makes an angle β = 25° with the slope and exerts on the skier a tension T= 300 N. The skier is subjected to friction equivalent to a force of value f_k = 50 N. Initially, the skier is at point O of the frame (Ox, Oy) without initial velocity.



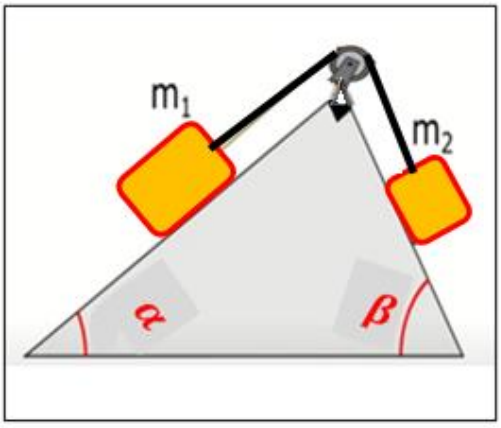
1- Represent qualitatively the external forces exerted on the skier and write their coordinates components in the frame (Oxy).

2- Show that the skier has a uniformly accelerated movement and determine the value a of his acceleration. g=9.81(m/s^2).

3- In what is the time required for the skier in order to ke much time will the skier have travel 400 m ? And what will be his velocity be at that time?

Exercise 2

Two masses m_1 = 9kg and m_2 = 2kg are connected to an inextensible rope of negligible mass that slides without friction on a pulley of negligible mass (see figure).



The two masses m_1 and m_2 slide on the inclined plane with friction and make two angles α=40° and β=50° with the horizontal respectively.

If the coefficient of kinetic friction for the two blocks with the inclined planes is $\mu_k = 0.2$ then Calculate:

1- What is the intensities of the normal forces N_1 and N_2 for two blocks.

2-Find the kinetic friction forces $f_{k1}$and f_{k2}.

3- What is the acceleration of the blocks?

Exercise 3

A block of mass M =7 kg is connected to another block of mass m =10 kg as shown below. We admit that there is no friction between the surface and the block of mass M.

-What is the expression for the acceleration of the system in each of the three cases (a, b and c) ?