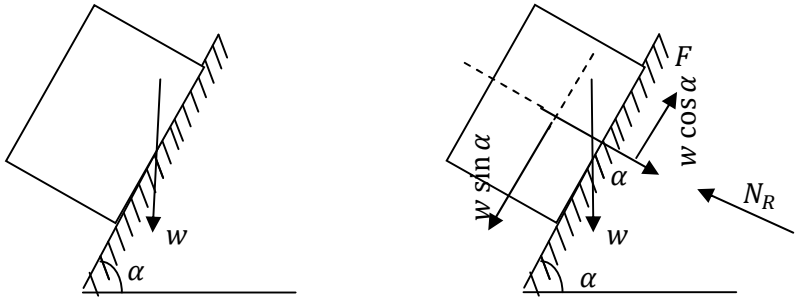
$P = 103\ N$

Angel of response



The normal reaction

$$N_R = W\ \cos\alpha$$

w.k.t

$$F = \mu N_R = \mu . W\ cos$$

When

$$\mu\ W\ cos\ \ (F) > W\ sin\alpha - rest$$

$$\mu\ W\ \cos\alpha(F) < W\ \sin\alpha - \text{implementing motion}$$

When the angle of place with horizontal α is increased $W\ \sin\alpha$ will be more than $W\ \cos\alpha$ and sliding window takes place .

"The angle of the inclined plane at which the body tends to slide is known as angle of response "."α_m"

Hence for downward impending motion

$$\mu\ W\ \cos\alpha_m \leq W \sin\alpha_m$$

$$\mu\ \cos\alpha_m = \sin\alpha_m$$

$$\mu = \tan\alpha_m$$

We know $\mu = \tan\phi$

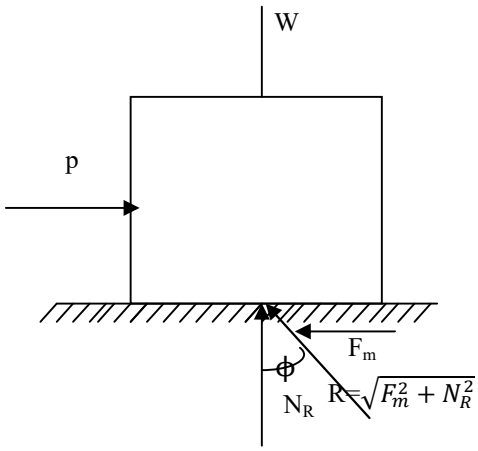
$$\therefore \tan\phi\ = \tan\alpha_m$$

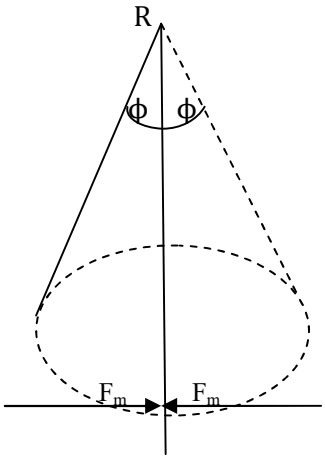
$$\phi = \alpha_m$$

i.e angle of response=angle of static friction

Cone of friction

When a body lying on a rough surface is subjected to a horizontal force P.





Cone of friction

P varied from o to 360^0

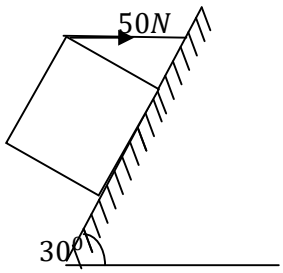
Problem 3:

A block is weight 150N is resting on a rough inclined plane as shown in Figure. The block is tied by a horizontal string, which has a tension of 50N. Find

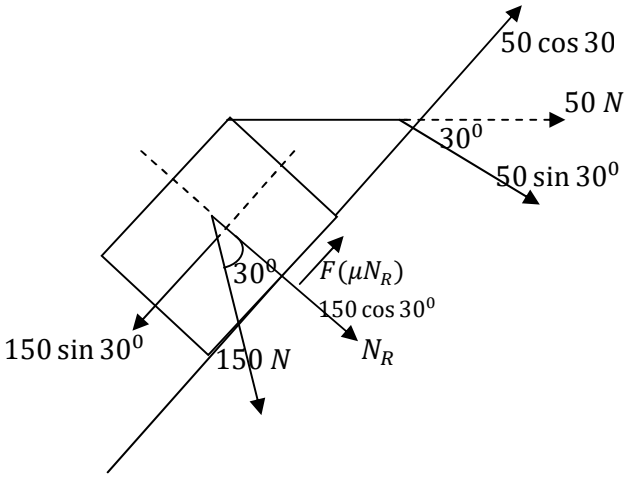
(i) The frictional force on the block.

(ii) The normal reaction of the inclined plane.

(iii) The coefficient of friction between the surfaces of contact.



Solution:



Resolving the forces along the plane.

$$F + 50\cos 30 - 150\sin 30 = 0$$

F=31.7N

Resolving the forces normal to the inclined plane

$$N_R - 50\sin 30 - 150\cos 30 = 0$$

$$N_R = 154.9N$$

Coefficient of friction $\mu = \frac{F_m}{N_R} = \frac{31.7}{154.9} = 0.204$

Problem 4:

What should be the value of the angle θ so that motion of the 390N block impends down the plane? The coefficient of friction μ for all surfaces is 1/3.