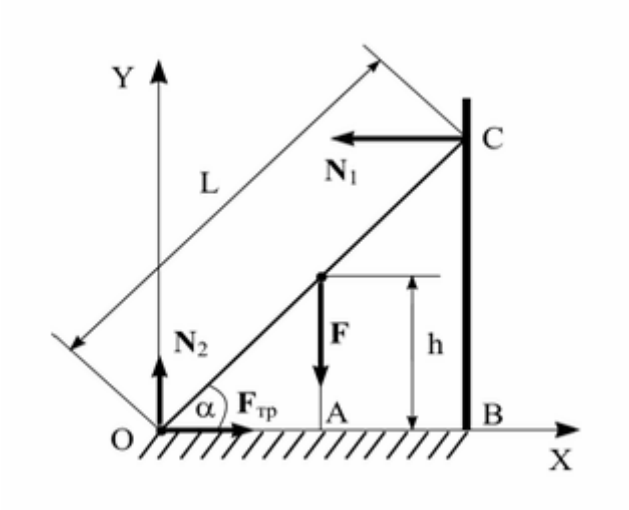
Task:

There is a ladder 4 m high which is placed against a wall with its foot at an angle of 30 degrees to the horizontal. Calculate the force exerted by the wall on the ladder?

Solution:



$$\mathbf{N}_2 + \mathbf{F}_{тр} + \mathbf{F} + \mathbf{N}_1 = 0.$$

$$N_{2x} + F_{трx} + F_x + N_{1x} = 0,$$

$$N_{2y} + F_{тру} + F_y + N_{1y} = 0.$$

$$N_{2x} = 0,\ F_{трx} = F_{тр},\ F_x = 0,\ N_{1x} = -N_1,$$

$$N_{2y} = N_2,\ F_{тру} = 0,\ F_v = -F,\ N_{1v} = 0.$$

$$F_{тр} - N_1 = 0,\ F_{тр} = k\,N_2$$

$$N_2 - F = 0.$$

$$k\,N_2 - N_1 = 0,\ N_2 = \frac{N_1}{k}$$

$$\frac{N_1}{k} - F = 0, N_1 = k\,F$$

$N_1, N_2 -$ *reactive forces,*

$F_{тр} -$ *force of friction,* $F -$ *weight of the ladder,*

$k -$ *coefficient of friction between the ladder and the floor*

Answer:

$N_1 = kF$