

Answer on question #64163, Physics / Mechanics — Relativity

Question If the coefficient of friction between a 500-gram mass and a rough board is 0.4, find the net force acting on the body when a) the board is horizontal and a pull of 100 grams is applied to the body; b) the board makes an angle of 30 degree with the horizontal. Assume force to be always parallel to the board.

Solution (a). There are four forces acting on mass. Along y-axis its gravitational force and reaction force from floor and they compensate each other. Along the x-axis there is 100 gram force and friction force. The friction force can be bigger than 100 gram, as

$$F_f = \mu mg = 500 \cdot 9.8 \cdot 0.4 = 200 \cdot 9.8 > 100 \cdot 9.8$$

So, the friction force compensates the 100 gram force and hence total net force is zero.

(b). When there is 30 degree, we will have along the board

$$F_{net} = mg \cos 30^\circ - \mu mg \sin 30^\circ = mg(\cos 30^\circ - \mu \sin 30^\circ) \approx 0.67 \cdot mg = 333 \text{ gram}$$