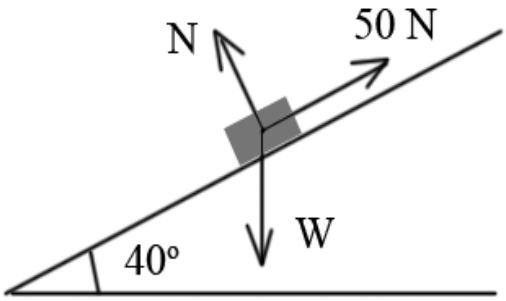
Question #77508, Physics / Classical Mechanics

A particle of weight W rests on a smooth plane which is inclined at 40degrees to the horizontal. the particle is prevented from slipping by a force of 50N acting parallel to the plane &up a line of greatest slope. Calculate;

(a)W

(b)the reaction due to the plane

Solution



(diagram not to scale)

Considering *x*-axis up the slope and *y*-axis normal to the slope and parallel to the normal reaction N.

Since the forces are in equilibrium, setting up the equations.

$$\begin{cases} \sum F_x = 0 \\ \sum F_y = 0 \end{cases};$$

$$\begin{cases} -W\sin 40° + 50 = 0 \\ -W\cos 40° + N = 0 \end{cases}$$

Solving the system, obtaining

(a) W = 77.8 N;
(b) N = 59.6 N