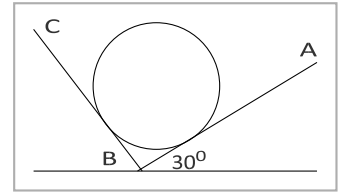


Q- A 5 kg uniform ball lies between two mutually perpendicular smooth planes AB and BC. Determine the thrust of the ball against each plane if plane BC is inclined at 60° to the horizontal. ($g = 10 \text{ ms}^{-2}$)



Solution:

The thrust of the ball is equal in magnitude and opposite in direction of the normal reactions N_1 and N_2 on the ball which balances the weight of the ball.

As the planes are mutually perpendicular, N_1 makes 30° and N_2 makes 60° with the horizontal. The ball is in equilibrium under the forces N_1 , N_2 and the weight mg of the ball. Resolving the forces and writing the equations of motion for the ball in horizontal and vertical direction we get for horizontal direction

$$N_1 \cos 30^\circ - N_2 \cos 60^\circ = 0$$

$$\text{Or } N_2 = \sqrt{3} N_1 \quad \text{--- (1)}$$

And for vertical direction

$$N_1 \sin 30^\circ + N_2 \sin 60^\circ - mg = 0$$

$$\text{Or } N_1 + \sqrt{3} N_2 = 2mg$$

Substituting value of N_2 from equation (1) we get

$$N_1 + 3N_1 = 2mg$$

$$\text{Or } N_1 = mg/4 = 25 \text{ N}$$

And from equation (1)

$$N_2 = \sqrt{3} N_1 = \sqrt{3} * 25 = 43.3 \text{ N}$$

