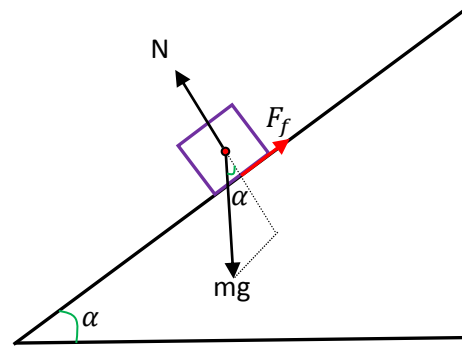# Answer Question #65600 – Physics – Mechanics – Relativity

A box of mass 50 kg is placed on an inclined plane. When the angle of the plane is increased to 30^0, the box begins to slide downwards. Calculate the coefficient of static friction between the plane and the box. Draw the free body diagram.

Solution. Draw the free body diagram

We have an inclined plane at an angle α to the horizontal. A box of mass 50 kg acting forces:

mg – the force of gravity ($m = 50kg$, $g = 9.8\frac{m}{s^2}$);

N – normal force ($N = mg\cos\alpha$);

F_f – the friction force (μN, μ – coefficient of static friction).

The box begins to slide along the inclined plane when the projection of gravity along the plane is equal to the friction force. Hence

$$mg\sin\alpha = \mu N \rightarrow mg\sin\alpha = \mu mg\cos\alpha \rightarrow \mu = \tan\alpha$$

$$\mu = \tan 30^0 = \frac{1}{\sqrt{3}} \approx 0.577$$

Answer. $\frac{1}{\sqrt{3}} \approx 0.577$