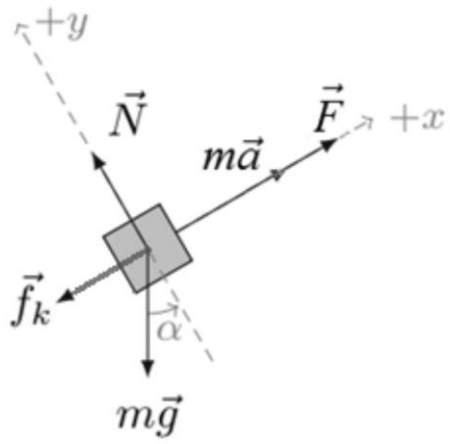
Answer on Question #75401-Physic-Mechanics-Relativity

A crate of mass 30kg is pulled by force of 1800N up an inclined plane which makes an angle of 30 with horizon. The coefficient of kinetic friction between the plane and the crate is 0.225. If the crates starts from rest , calculate its speed after it has been pulled 15m. Draw the free body diagram

Solution

Free body diagram for body



$$ma = F - mg\sin\alpha - \mu mg\cos\alpha$$

$$a = \frac{F - mg\sin\alpha - \mu mg\cos\alpha}{m}$$

$$a = \frac{1800}{30} - 9.81\sin 30 - (0.225)(9.81)\cos 30 = 53.18\frac{m}{s^2}$$

$$v = \sqrt{2sa} = \sqrt{2(15)(53.18)} = 40\frac{m}{s}.$$

Answer: $40\frac{m}{s}$.