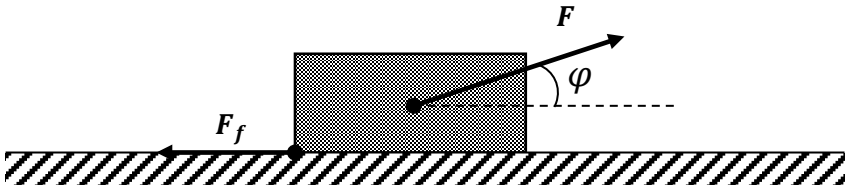
Answer on Question #51076 - Physics - Mechanics - Kinematics – Dynamics

A $F = 40\text{N}$ force applied at an angle φ of 37 degrees above the horizontal pulls a $m = 5\text{kg}$ box on a horizontal floor. The acceleration of the box is $a = 3\frac{\text{m}}{\text{s}^2}$. How large a frictional force F_f must be retarding the motion of the box?

Solution:



According to the 2 Newton's law (horizontal plane) we obtain

$$ma = F\cos\varphi - F_f$$

Or equivalently

$$F_f = F\cos\varphi - ma = 40\text{N}\cdot\cos 37° - 5\text{kg}\cdot 3\frac{\text{m}}{\text{s}^2} \approx 17\text{N}$$

Answer: $F_f = F\cos\varphi - ma \approx 17\text{N}$.