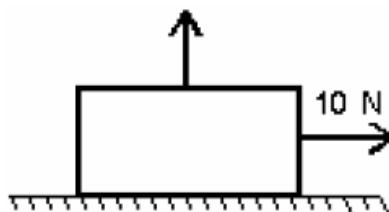


Answer on Question #44437, Physics, Mechanics | Kinematics | Dynamics

A box with the weight of 50 N rests on a horizontal surface. A person pulls horizontally on it with a force of 10 N and it does not move. To start it moving a second person pulls vertically upward on the box. If the coefficient of static friction is 0.4 what is the smallest vertical force for which the box moves?

Solution:



Given:

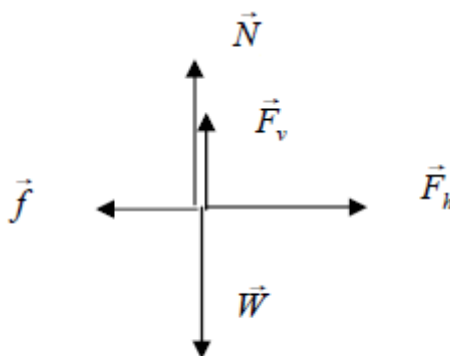
$$W = 50 \text{ N},$$

$$F_h = 10 \text{ N},$$

$$\mu = 0.4,$$

$$F_v = ?$$

Draw a FBD



The normal force acting on the box is

$$N = W - F_v$$

When the box starts moving, the friction force is equal to F_h

$$f = F_h$$

But, friction force is

$$f = \mu N = \mu(W - F_v)$$

Thus,

$$\mu(W - F_v) = F_h$$

$$F_v = W - \frac{F_h}{\mu} = 50 - \frac{10}{0.4} = 25 \text{ N}$$

Answer: $F_v = 25 \text{ N}$.