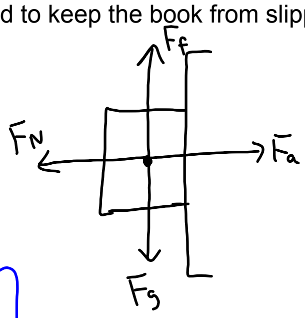
A 3.4 kg book is pressed against the wall. The coefficient of static friction between wall and book is 0.23. Calculate the minimum applied force needed to keep the book from slipping down.

$m = 3.4\,kg$

$\mu = 0.23$



$$F_f = \mu F_N$$

$$|F_N| = |F_a|$$

$$|F_g| = |F_f|$$

} Σ all forces is zero

Horizontal direction

$$F_{net} = \Sigma\, Forces$$

$$F_{net} = F_N + F_a$$

$$0 = F_N + F_a$$

So, $-F_N = F_a$ or $|F_N| = |F_a|$

Vertical Direction

$$F_{net} = \Sigma\, Forces$$

$$F_{net} = F_g + F_f$$

$$0 = F_g + F_f$$

So, $-F_g = F_f$ or $|F_g| = |F_f|$

$$F_f = \mu F_N$$

$$\downarrow \qquad \downarrow$$

$$F_g = \mu F_a$$

$$mg = \mu F_a$$

$$(3.4)(9.81) = 0.23\, F_a$$

$$33.35 = 0.23\, F_a$$

$$\frac{33.35}{0.23} = F_a$$

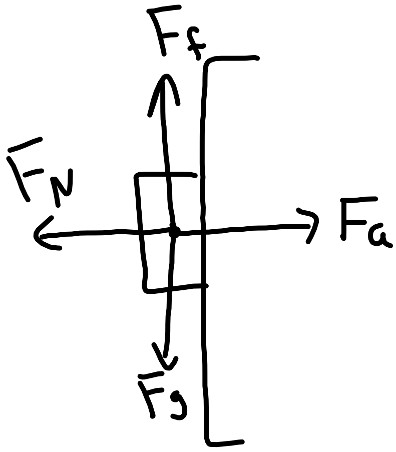
$$\boxed{145\,N = F_a}$$

A 4.2 kg book is pressed up against the wall using an applied force of 75 N. For the book not to fall, calculate the minimum coefficient of static friction necessary between the wall and the book. ($\mu = 0.55$)

$$F_f = \mu F_N$$

$F_a = F_N$

$F_f = F_g$



$$F_g = \mu F_a$$

$$mg = \mu F_a$$

$$(4.2)(9.81) = \mu (75)$$

$$\frac{(4.2)(9.81)}{75} = \mu$$

$$\boxed{0.55 = \mu}$$

Attachments

forces-and-motion-basics_all.jar

forces-1d_all.jar

friction_en.jar