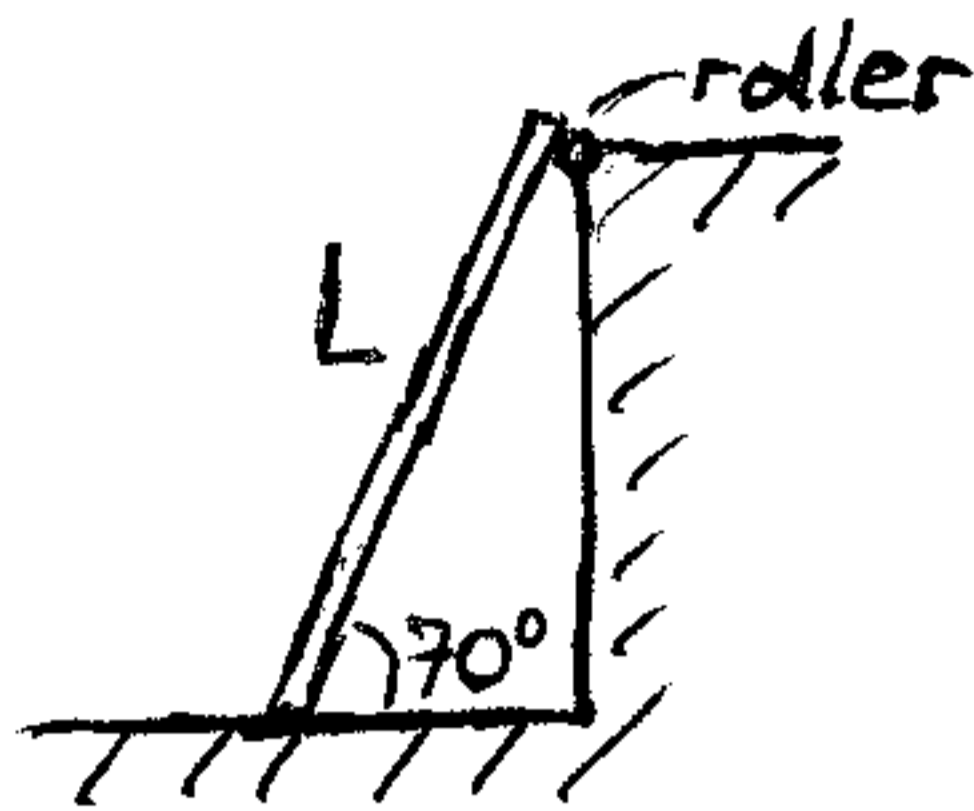
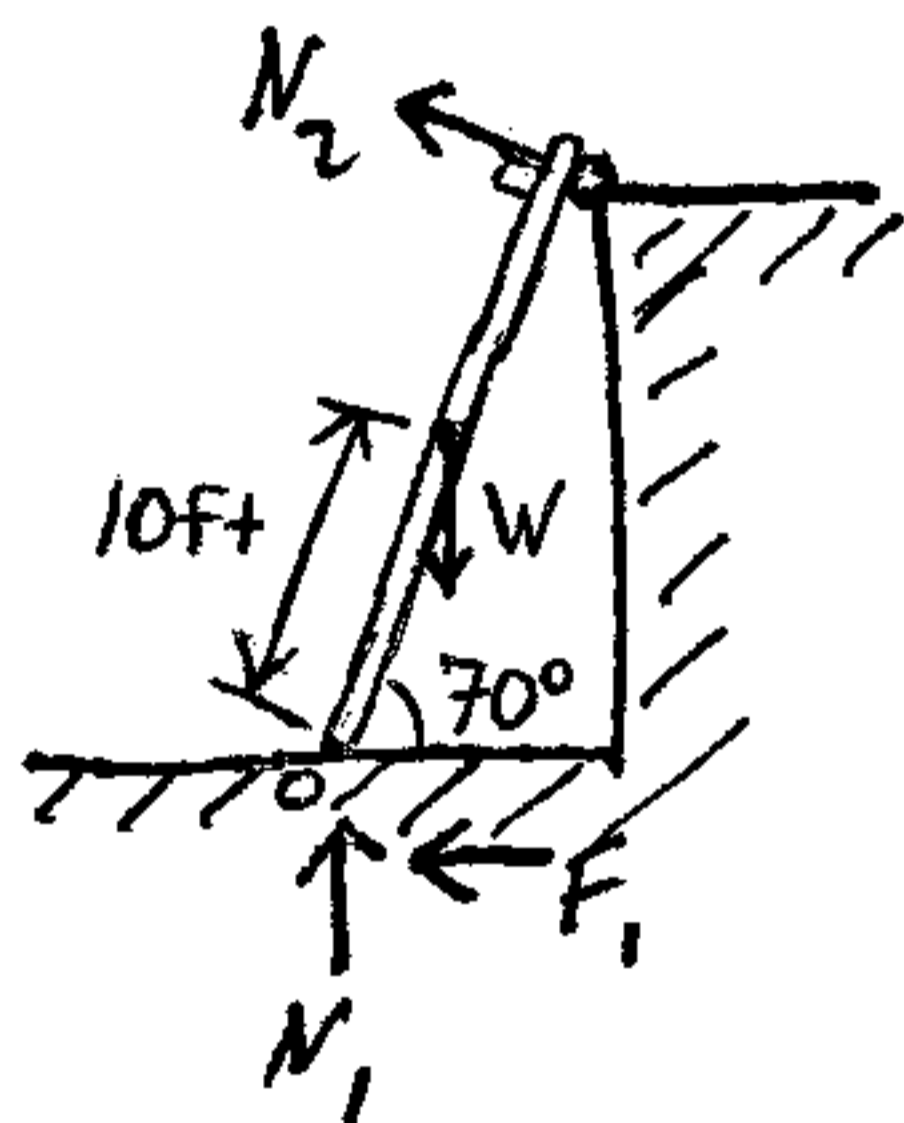


This is a problem involving statics.



A uniform board of length $L = 20\text{ft}$ is leaning against a roller, as shown. If the board has a weight of 70lb , what is the ^{minimum} coefficient of static friction between board and ground?

Solution:



$$\sum F_x = 0 \Rightarrow -F_1 - N_2 \sin 70^\circ = 0 \quad (1)$$

$$\sum F_y = 0 \Rightarrow N_1 + N_2 \cos 70^\circ - W = 0 \quad (2)$$

$$\sum \tau_o = 0 \Rightarrow -W \cos 70^\circ (10) + N_2 (20) = 0 \quad (3)$$

$$(W = 70\text{ lb})$$

From equations (1)-(3) solve for F_1 , N_1 , N_2 :

$$F_1 = -11.25\text{ lb}$$

$$N_1 = 65.91\text{ lb}$$

$$N_2 = 11.97\text{ lb}$$

$$\text{minimum } \mu_s = \frac{|F_1|}{N_1} = 0.17 \quad (\text{answer})$$