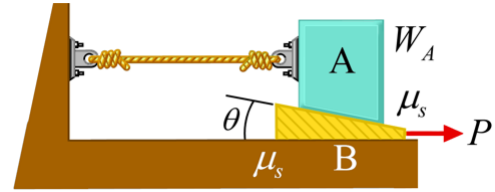


STATICS

Friction

Dr. Umit N. ARIBAS

Question : Determine the minimum force P that will make the wedge move in the rightwards direction. There is an object A on the wedge that has a weight $W_A = 1\text{kN}$ and it is connected to the wall by a cable. The coefficient of friction is $\mu_s = 0.2$. The angle of the inclined surface of wedge with respect to the horizontal is $\theta = 18.69^\circ$.



Solution:

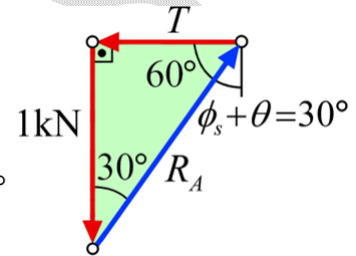
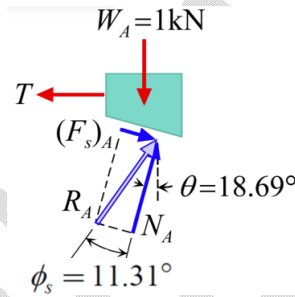
The angle of friction on all surfaces is $\phi_s = \tan^{-1} \mu_s = \tan^{-1}(0.2) \cong 11.31^\circ$.

The sinusoidal theorem is used with respect to the free body diagram of the object A as,

$$R_A = \frac{T}{\sin 30^\circ} = \frac{1}{\sin 60^\circ}$$

$$R_A \cong 1.16\text{kN}$$

$$T_A \cong 0.58\text{kN}$$



The sinusoidal theorem is used with respect to the free body diagram of the wedge as,

$$\frac{P}{\sin 41.3^\circ} = \frac{R_B}{\sin 60^\circ} = \frac{1.16}{\sin 78.7^\circ}$$

$$R_B = 1.02\text{kN}$$

$$P = 0.78\text{kN}$$

