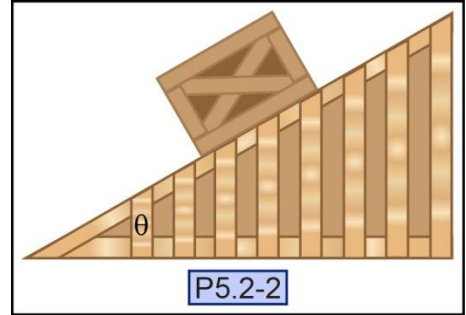


**P5.2-2)** A wooden crate is placed on a wooden ramp as shown. The crate starts from rest. Determine the acceleration of the crate for the two given angles.

- a)  $\mu_s = 0.5, \mu_k = 0.3, \theta_1 = 20^\circ, \theta_2 = 30^\circ$
- b)  $\mu_s = 0.4, \mu_k = 0.2, \theta_1 = 20^\circ, \theta_2 = 35^\circ$
- c)  $\mu_s = 0.3, \mu_k = 0.15, \theta_1 = 20^\circ, \theta_2 = 30^\circ$
- d)  $\mu_s = 0.4, \mu_k = 0.3, \theta_1 = 25^\circ, \theta_2 = 30^\circ$



Given:

Find:

Solution:

**Free-body diagram**



**Friction**

Derive the kinetic and maximum static friction forces in variable form.

$F_k =$  \_\_\_\_\_

$F_{fs,max} =$  \_\_\_\_\_

**Impending motion**

Assume no slip and calculate the angle of impending motion.

$\theta =$  \_\_\_\_\_

**Equation of Motion**

Calculate the acceleration of the crate at the two angles given.

$a @ (\theta = \text{---}) =$  \_\_\_\_\_

$a @ (\theta = \text{---}) =$  \_\_\_\_\_