Question 1:

The uniform 20-kg slender bar is pivoted at O and swings freely in the vertical plane. If the bar is released from rest in the horizontal position, calculate the initial value of the force R exerted by the bearing on the bar at the instant after release.


O

1.6 m
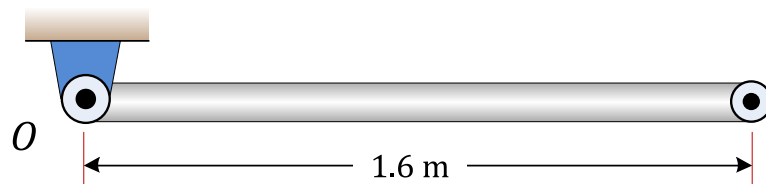
$[R = 49 \text{ N}]$

Questions 2-3:

The figure below shows a 20-kg homogeneous disk of radius 0.15 m. The disk is at rest before the horizontal force $P = 180$ N is applied to its mass centre G. The coefficients of static and kinetic friction for the surfaces in contact are 0.20 and 0.15, respectively. Determine:

  (a) the acceleration of G, and
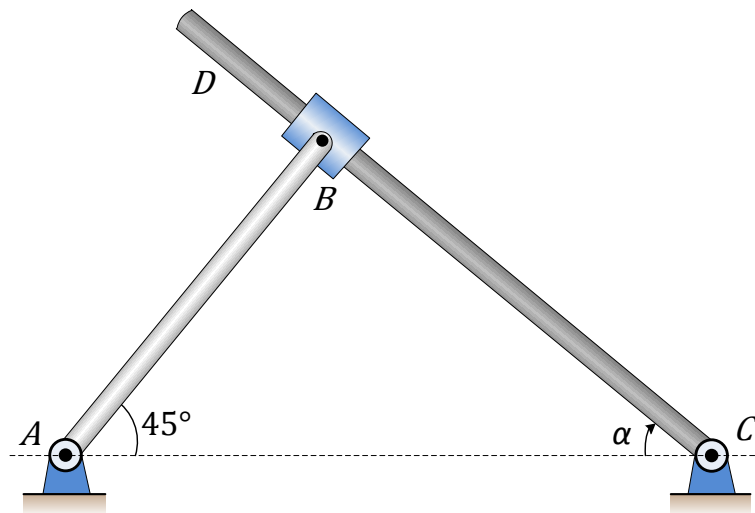 (b) the angular acceleration of the disk after the force P is applied.

$R = 150$ mm

$P = 180$ N

G

y

x

$\mu_s = 0.20$
$\mu_k = 0.15$
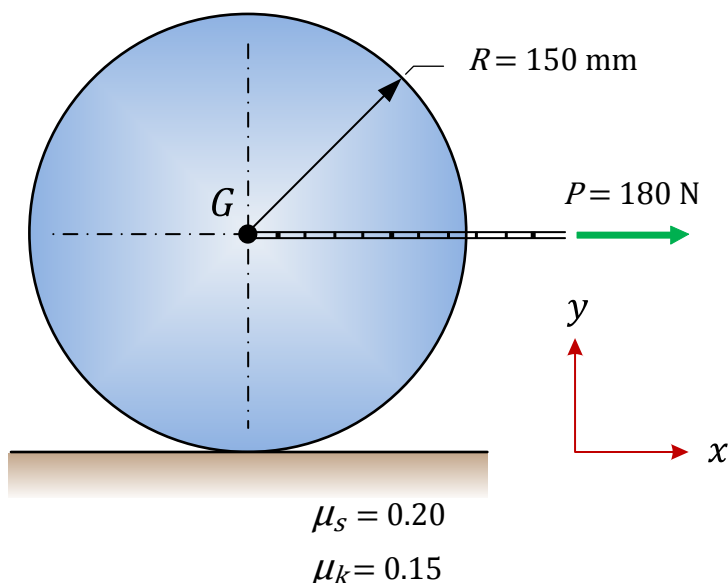
$[a_G = 7.53 \text{ m/s}^2; \ \alpha = 19.62 \text{ rad/s}^2 \text{ CW}]$

Question 4:

For the mechanism in the position shown, link *AB* has an angular velocity of 5 rad/s CW and an angular acceleration of 1 rad/s² CCW. The mass of the uniform member *AB* is 5 kg, and the mass of the uniform member *CD* is 8 kg. Neglect all friction forces. Determine the reaction force acting at the pin *A*.

Given: $AC = 400$ mm, $AB = 150$ mm, and $CD = 600$ mm.

$[R_A = 21.30 \text{ N}]$