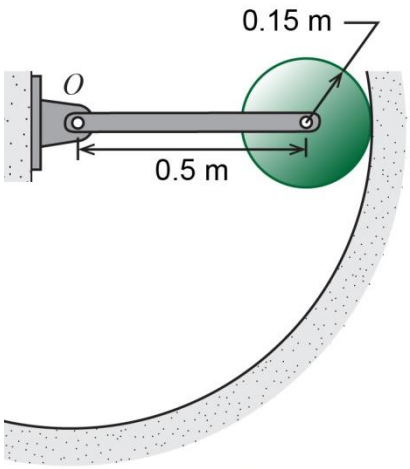
P8.5-6) The 1-kg uniform slender bar and 2-kg disk shown are released from rest when the bar is horizontal. The disk rolls without slip on the curved surface shown with constant radius centered at O. Determine the angular velocity of the bar when the system reaches the position where the bar is completely vertical.



Given:

Find:

Solution:

Set up the problem.

Label your states on the figure.

Identify your zero gravitational potential energy on the figure.

Is this a conservative or non-conservative system?

Conservative Non-conservative

What type of motion does each body experience? Indicate: **Pure translation**, **Pure rotation**, or **General planar** motion.

Bar:

Disk:

Calculate the mass moment of inertia for the bar and disk.

What is your reference point?

Bar:

Disk:

I_{bar} = _____

I_{disk} = _____

Relate the angular speed of the bar to the speed of the disk's center of mass and its angular speed.

$v_{G,disk}$ = _____ ω_{bar}

ω_{disk} = _____ ω_{bar}

Use the work-energy balance equation to determine the angular speed of the bar.

Write down the energy balance equation and indicate which terms go to zero

Calculate the change in potential energy of the bar?

ΔV_{bar} = _____

Calculate the change in potential energy of the disk?

ΔV_{disk} = _____

Calculate the change in kinetic energy of the bar?

$\Delta T_{bar}(\omega_{bar})$ = _____

Calculate the change in kinetic energy of the disk?

$\Delta T_{disk}(\omega_{bar})$ = _____

Calculate the angular speed of the bar at the final state.

ω_{bar} = _____