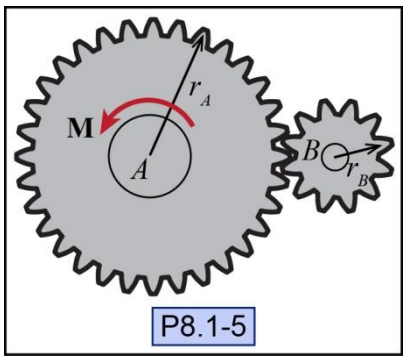
P8.1-5) Consider gear A that is driven by a constant moment M = 0.1 N-m. Gear A has a radius r_A = 30 cm and gear B has a radius r_B = 10 cm. The respective moments of inertia of the two gears are I_A = 0.18 kg-m^2 and I_B = 0.02 kg-m^2 with respect to an axis though the gear center. If the gears start from rest, estimate their angular velocities after gear B has turned 5 revolutions. Assume the friction in the system is negligible.



P8.1-5

Given:

Find:

Solution:

Set up the problem.

Is this a conservative or non-conservative system?

Conservative Non-conservative

What type of motion do the gears experience? Indicate: **Pure translation**, **Pure rotation**, or **General planar** motion.

Gears:

Relate the angular speeds of the gears.

ω_B = _____ ω_A

Use the work-energy balance equation to determine the minimum speed of the ball.

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

Calculate the work done by the moment.

U_M = _____

Calculate the change in kinetic energy of gear A.

ΔT = _____

Calculate the change in kinetic energy of gear B as a function of the angular speed of gear A.

ΔT = _____

Calculate the angular speeds at the final state.

ω_A = _____

ω_B = _____