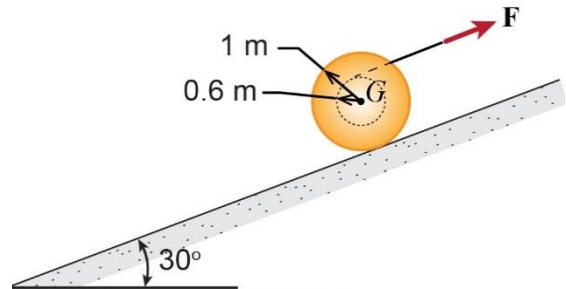


P8.5-2) The 10-kg spool shown has a centroidal radius of gyration of 0.75 m and a cord wrapped securely about its inner radius. The cord is pulled by a constant force equal to $F = 100$ N. If the spool begins from rest, determine the speed v achieved by the spool's mass center G after the mass center has moved 2 m up the incline. Assume the spool rolls without slipping.



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 spool experience? Indicate: **Pure translation**, **Pure rotation**, or **General planar** motion.

Spool:

Calculate the mass moment of inertia of the spool.

What is your reference point?

$I_{spool} =$ _____

Relate the speed of the spool's center of mass to its angular speed.

$\omega =$ _____ v_G

Calculate the distance the force moves through.

$d =$ _____

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

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

What is the change in potential energy?

$$\Delta V = \underline{\hspace{10em}}$$

What is the change in kinetic energy?

$$\Delta T(v_G) = \underline{\hspace{10em}}$$

Calculate the work done by the force.

$$U_F = \underline{\hspace{10em}}$$

Calculate the speed of the spool at the final state.

$$v_G = \underline{\hspace{10em}}$$