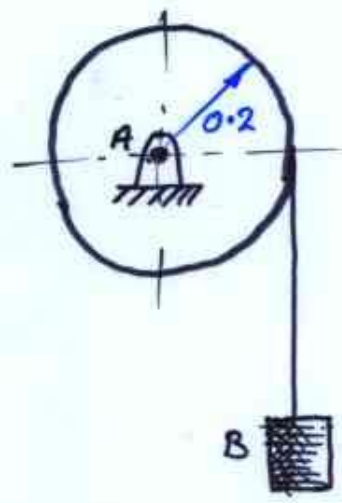


# EXAMPLE

4

Disk: 20 kg  
 $r = 0.2$  m  
 $I_A = 0.40$  kgm<sup>2</sup>  
about axis at A



Block: 6 kg  
 $v_B = 2$  m/s down  
find  $v_B$  3s later

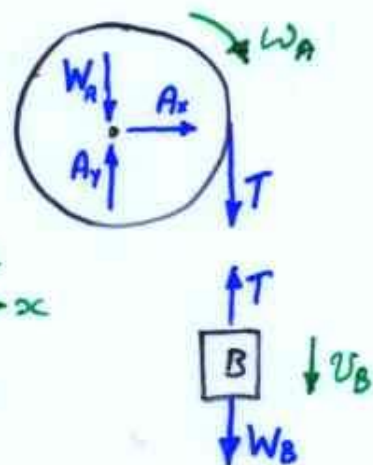
cord is wrapped around disk

## SOLUTION I

Begin by drawing Free Body Diagram

$$W_A = (20)(9.81) = 196.2 \text{ N}$$

$$W_B = (6)(9.81) = 58.86 \text{ N}$$



We can eliminate  $A_x, A_y, W_A$  for disk by applying angular impulse-momentum Equation about point A.

Disk

$$I_A \omega_1 + \sum \int_1^2 M_A dt = I_A \omega_2$$

$$\textcircled{+} \quad \underline{(0.40)\omega_1 + (T)(3)(0.2) = 0.40\omega_2} \quad \textcircled{A}$$

for Block...

$$m_B v_{B1} + \sum \int_1^2 F_y dt = m_B v_{B2}$$

$$\textcircled{\uparrow} \quad \underline{-6(2) + (T)(3) - (58.86)(3) = -6(v_{B2})} \quad \textcircled{B}$$

"1" @ start of time  
"2" after 3s