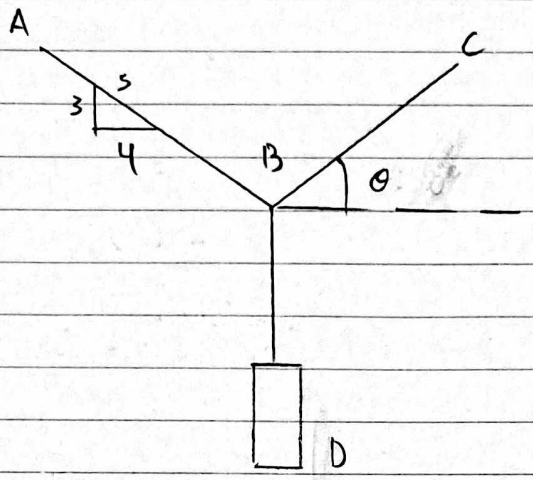
Solution: 21-5-3.3-MK-003



Given: $D = 60\ kg$
$\theta = 40°$

Find: T_{BC}
T_{BA}

$D = (60\ kg)(9.81\ m/s^2) = 588.6\ N$

$\Sigma F_x = T_{AB_x} - T_{BC_x} = \left(\frac{4}{5}\right) T_{AB} - T_{BC}\cos(40°)$

① $T_{AB} = \dfrac{T_{BC}\cos(40°)}{(4/5)}$

$\Sigma F_y = T_{AB_y} + T_{BC_y} - D = \left(\frac{3}{5}\right) T_{AB} + T_{BC}\sin(40°) - 588.6N$ ②

① → ②

$0 = \frac{3}{5}\left(\frac{5}{4}\right) T_{BC}\cos(40) + T_{BC}\sin(40°) - 588.6N$

$0 = \frac{3}{4} T_{BC}\cos(40) + T_{BC}\sin(40°) - 588.6\ N$

$T_{BC}\left(\frac{3}{4}\cos(40) + \sin(40)\right) = 588.6N$

FIVE STAR

$$T_{BC} = \frac{566.6\ N}{\left(\left(\frac{3}{4}\right)\cos(40) + \sin(40)\right)} = 483.52\ N$$

$T_{BC} = 483.52\ N$

$$T_{BA} = \frac{T_{BC}\cos 40}{4/5} = \frac{483.52(\cos 40)}{4/5} = 463.00\ N$$

$T_{BA} = 463.00\ N$

Check

$\Sigma F_y = \frac{3}{5}(463.00N) + (483.52N)\sin(40^\circ) - 566.6N$

$\Sigma F_y = 0$