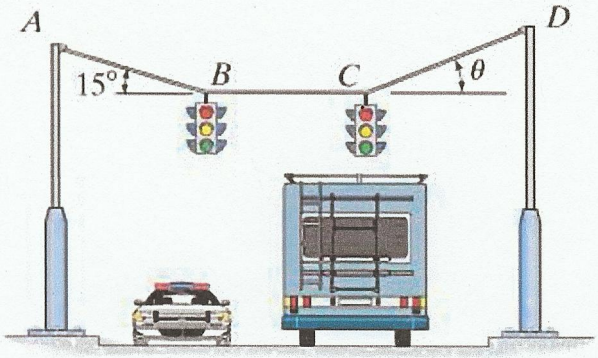
Equilibrium of a Particle 2

Determine the tension in cables ***AB***, ***BC*** and ***CD*** necessary to support the 10-kg and 15-kg traffic lights at *B* and *C*, respectively. Also, find the angle θ.



FBD 1

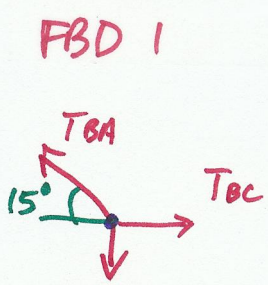
$\rightarrow \Sigma F_x = 0 = -T_{BA}\cos 15 + T_{BC}$

$\uparrow \Sigma F_y = 0 = T_{BA}\sin 15 - 98.1$

$T_{BA} = 379\ N\ \angle 15$

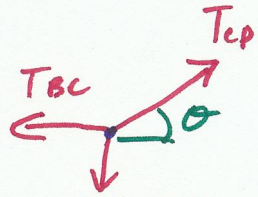
$T_{BC} = 366\ N \rightarrow$

FBD 1



CONCURRENT
2 EQNS
2 UNKS

FBD 2



CONCURRENT
2 EQNS
3 UNKS

FBD2

$\rightarrow \Sigma F_x = 0 = -T_{BC} + T_{CD}\cos\theta$ (366)

$\uparrow \Sigma F_y = 0 = T_{CD}\sin\theta - 147.15$

$\frac{T_{CD}\sin\theta}{T_{CD}\cos\theta} = \frac{147.15}{366} = \tan\theta$

$\theta = 21.9°$ $T_{CD} = 395\ N\ \angle 21.9°$