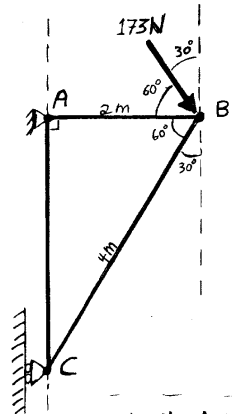


ENGRD 202 Quiz 3

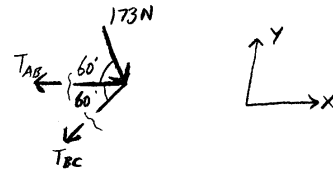
February 28, 2003

5) (7 pts) The only load on the truss ABC is the 173N force at B. Find the tension in bar AB.



Method 1:

Joint B:



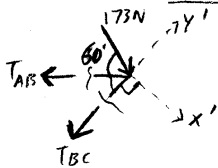
$$\sum F_y = 0: T_{BC} \sin 60^\circ + (173N) \sin 60^\circ = 0$$

$$\Rightarrow T_{BC} = -173N \quad \text{BC is in Compression}$$

$$\sum F_x = 0: -T_{BC} \cos 60^\circ - T_{AB} + (173N) \cos 60^\circ = 0$$

$$\Rightarrow T_{AB} = 173N \quad \text{AB is in Tension}$$

Method 2:



$$\sum F_{x'} = 0:$$

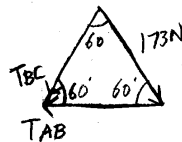
$$-T_{AB} \cos 30^\circ + (173N) \cos 30^\circ = 0$$

$$\Rightarrow T_{AB} = 173N$$

AB is in tension

Method 3:

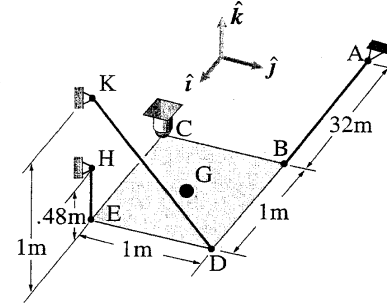
The 3 forces at Joint B form an equilateral triangle.



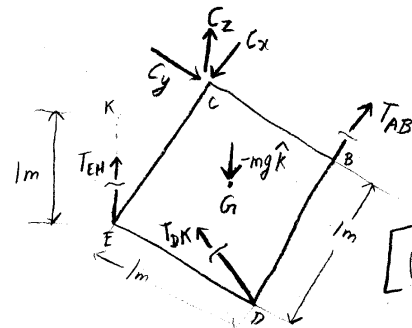
$$T_{AB} = 173N$$

$$T_{AB} = 173N (T)$$

6) (10 pts) The uniform 10 kg shelf is supported by a ball-and-socket joint at C and by the three negligible-mass rods shown (each connected with a ball-and-socket joint to each end). Use $g = 10N/kg$. Find the tension in bar AB.



FBD of 10kg shelf:



$$\sum M_{CK} = 0$$

Only T_{AB} & weight have moments about axis CK.

$$(\sum M_{/C}) \cdot \hat{r}_{CK} = 0$$

$$\left[\left(\frac{1}{2} \hat{i} + \frac{1}{2} \hat{j} \right) \times (-100N \hat{k}) + \hat{j} \times (-T_{AB} \hat{i}) \right] \cdot (\hat{i} + \hat{k}) = 0$$

$$[50N \hat{j} - 50N \hat{i} + T_{AB} \hat{k}] \cdot [\hat{i} + \hat{k}] = 0$$

$$-50N + T_{AB} = 0$$

$$\Rightarrow T_{AB} = 50N$$

$$T_{AB} = 50N$$