MOBILE in crib will hang from pt. C (PIVOT)

MEMBER DE will be horiz.

∴ "MOMENTS" will balance.

$$\sum M = 0 \Rightarrow \sum \text{FIRST MOMENTS} = 0$$
$$\sum \bar{x} L = 0$$

ABCDE = aluminum tubing same A_x all around

MOMENT = $W_T \times$ MOM. ARM

CONSIDER WT. of each section of tubing = $\gamma \times$ Volume

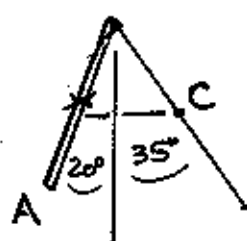$$W = \text{gravity force} = \frac{lb_f}{Vol.} \times Vol.$$

and Vol. = $(A_x)(\text{Length})$

Aluminum ⇒ same γ for all members } only Length
⇒ same A_x for all members } is different!

So, the moment reduces to (mom. arm) × (length)
$$= \bar{x} L$$

$\bar{x}$ = dist. from C.G. of member to pt. C

SECT.	$\bar{x}$	$\bar{x} L$
B	$-\left[\frac{1}{2}\overline{AB} \sin 20° + \overline{BC} \sin 35°\right]$ $-\left[\frac{1}{2} \times .75 \sin 20° + .5 \sin 35°\right] = -0.415\,m$	$-0.311\,m^2$
	$\frac{1}{2}\overline{BCD} \sin 35° - \overline{BC} \sin 35°$ $\frac{1}{2} \times 1.5 \sin 35° - .5 \sin 35° = 0.143\,m$	$0.215\,m^2$
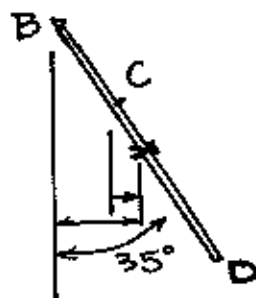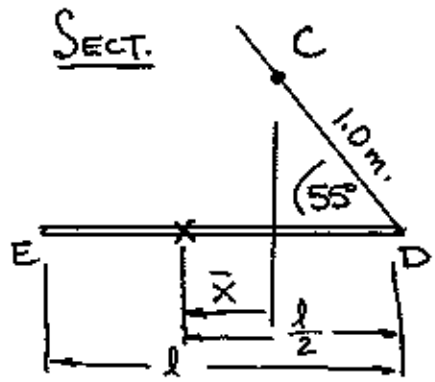
$\underline{\text{Sect.}}$

$$-\left[\frac{1}{2}l - \overline{CD}\cos 55°\right] =$$

$$-\left[\frac{1}{2}l - 1m \cos 55°\right] =$$

$$-\frac{l}{2} + \cos 55°$$

$\overline{x}L$

$$-\frac{l^2}{2} + 0.574l$$

$$\mathcal{E}\,\overline{x}L = 0 = -0.311 + 0.215 - \frac{l^2}{2} + 0.574l \quad (m^2)$$

$$0 = -0.622 + 0.430 - l^2 + 1.148l$$

REARRANGE   AS   QUADRATIC   EQ.

$$0 = l^2 - 1.148l + 0.192$$

$$l = -\frac{(-1.148)}{2} \pm \frac{\sqrt{(-1.148)^2 - 4(1)(0.192)}}{2}$$

$$= 0.574 \pm 0.370 \qquad = 0.945\,m$$
$$\text{and} \quad 0.204\,m.$$

SINCE BOTH ARE POSITIVE VALUES, SECTION DE CAN
BE   0.945 m.   or   0.204 m.   and remain horiz.