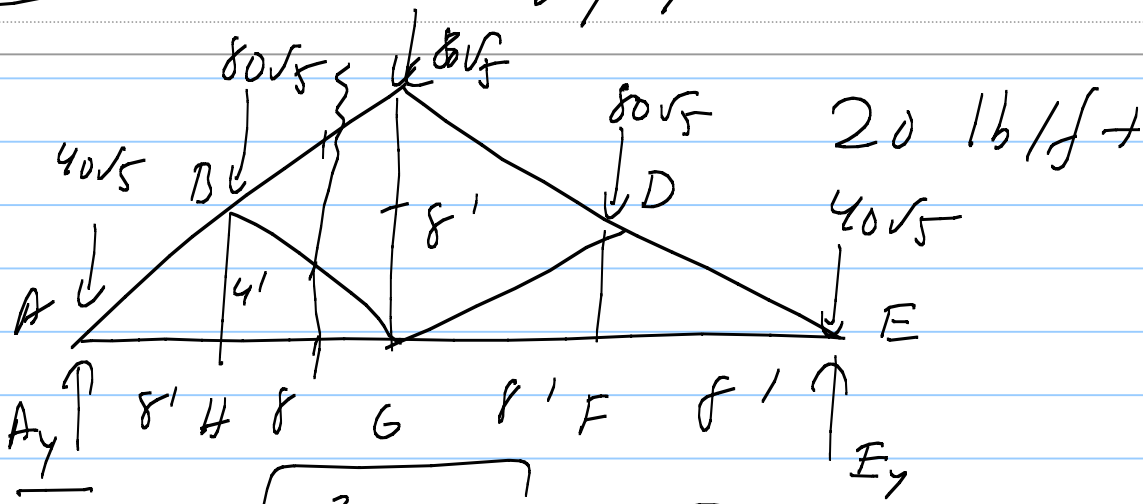
EGR180 7/7

Note Title 7/7/2009

7.27



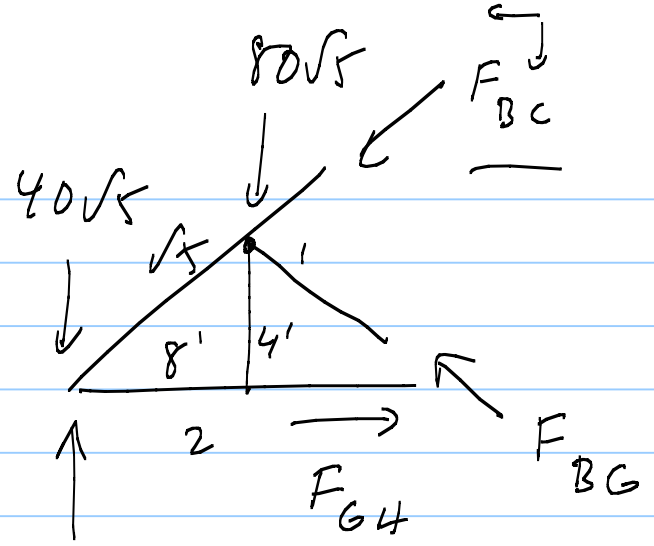
$$|\overline{AB}| = \sqrt{8^2 + 4^2} = \sqrt{80} = 4\sqrt{5}\ ft$$

$$L_{AB} = 80\sqrt{5}\ lbs$$

$$\sum M_A = -8\cdot 80\sqrt{5} - 16\cdot 80\sqrt{5} - 24\cdot 80\sqrt{5} + 32E_y - 32\cdot 40\sqrt{5} = 0$$

$$32E_y = 40\sqrt{5}\,[32 + 48 + 32 + 16] \Rightarrow E_y = 160\sqrt{5}\ lbs$$

$$A_y = 160\sqrt{5}\ lbs$$



$$\sum M_B = 8 \cdot 40\sqrt{5} - 8 \cdot 160\sqrt{5} + 4F_{GH} = 0$$

$$4F_{GH} = 8 \cdot 120\sqrt{5}$$

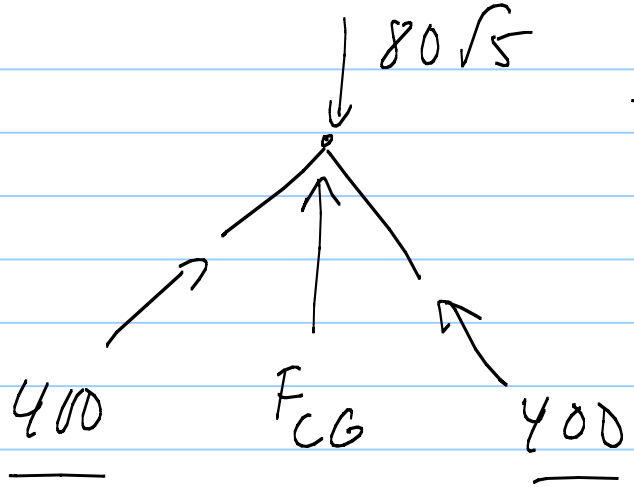
$$F_{GH} = 240\sqrt{5} \text{ lbs}$$

$$\sum M_G = -120\sqrt{5} \cdot 16 + 8 \cdot 80\sqrt{5} + \frac{2}{\sqrt{5}} F_{BC} \cdot 8 = 0$$

$$F_{BC} = 400 \text{ lbs}$$

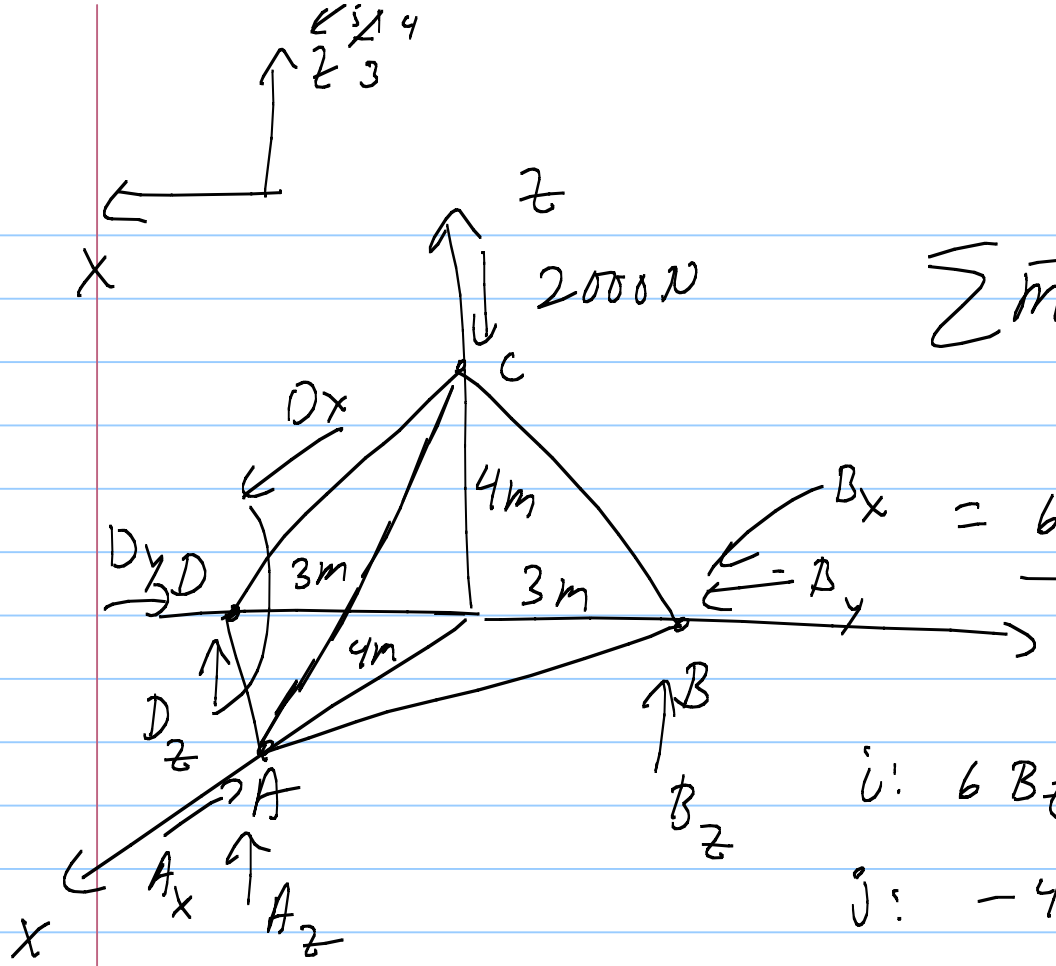
$$\sum F_x = 240\sqrt{5} - \frac{2}{\sqrt{5}} \cdot 400 - \frac{2}{\sqrt{5}} F_{BG} = 0$$

$$F_{BG} = 200 \text{ lbs}$$



$$\sum F_y = -80\sqrt{5} + \frac{800}{\sqrt{5}} + F_{CG} = 0$$

$$F_{CG} = -80\sqrt{5} \text{ lbs}$$



$$\sum \vec{m}_J = 6\hat{j} \times B_z\hat{i} + 3\hat{j} \times (-1600\hat{k} + 1200\hat{i}$$

$$(4\hat{i} + 3\hat{j}) \times (A_z\hat{k} - 7_x\hat{i})$$

$$= 6B_z\hat{i} - 4800\hat{i} - 3600\hat{k}$$

$$-4A_z\hat{j} + 3A_z\hat{i} + 3A_x\hat{k} = 0$$

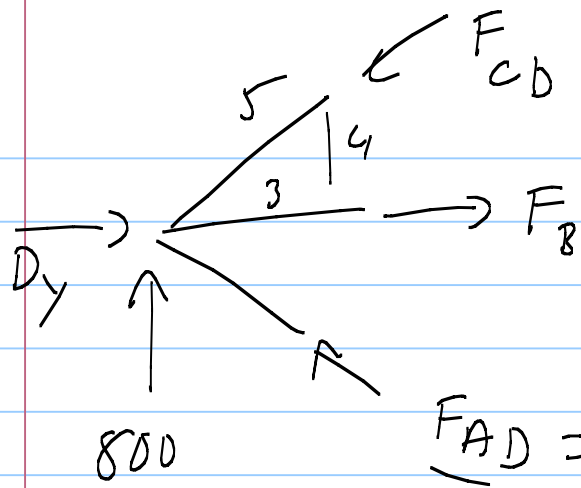
$\hat{i}$: $6B_z - 4800 + 3A_z = 0 \Rightarrow B_z = 800$ N

$\hat{j}$: $-4A_z = 0 \Rightarrow A_z = 0$

$-6B_x$

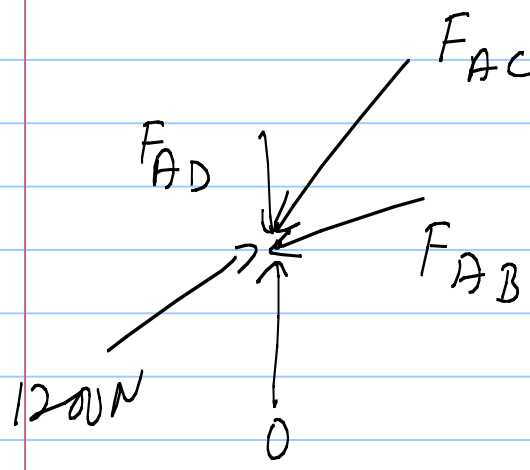
$\hat{k}$: $-3600 + 3A_x = 0 \Rightarrow A_x = 1200$ N

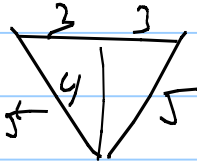
$D_z = 800$ N



$$\sum F_z = -.8\,F_{CD} + 800 = 0$$

$$F_{CD} = 1000\,N$$



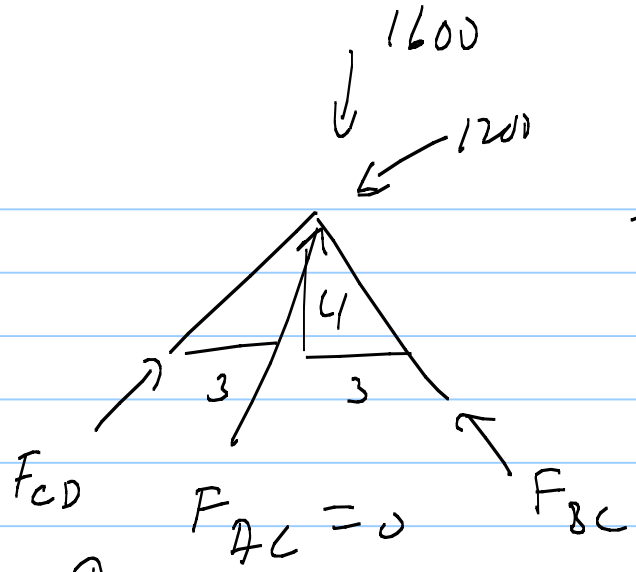


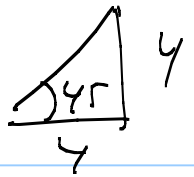
$$\sum F_y = .6\,F_{AD} - .6\,F_{AB} = 0$$

$$F_{AB} = F_{AD}$$

$$\sum F_x = .8\,F_{AD} + .8\,F_{AB} - 1200 = 0$$

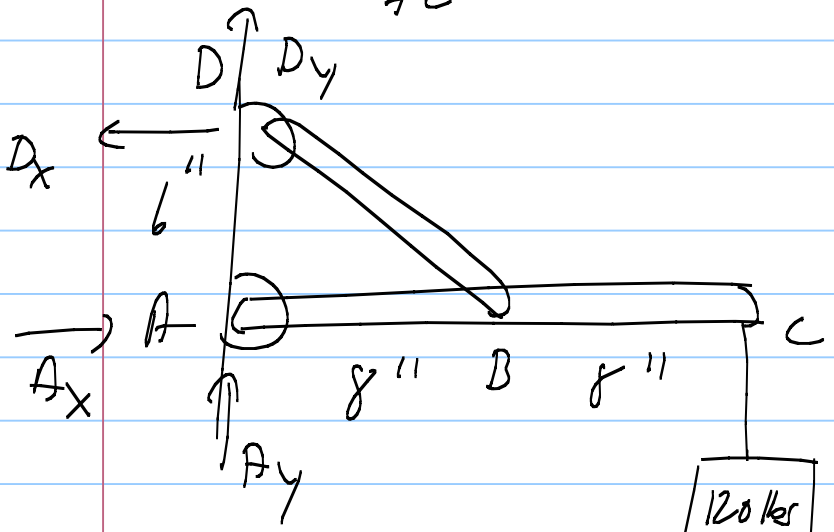
$$F_{AB} = F_{AD} = 750\,N$$





$$\sum F_x = -F_{BC}/\sqrt{2} + 1200 = 0$$

$$F_{BC} = 1200\sqrt{2}\ N$$



$$\sum M_A = 6D_x - 16 \cdot 120 = 0$$

$$D_x = 320\ lbs$$

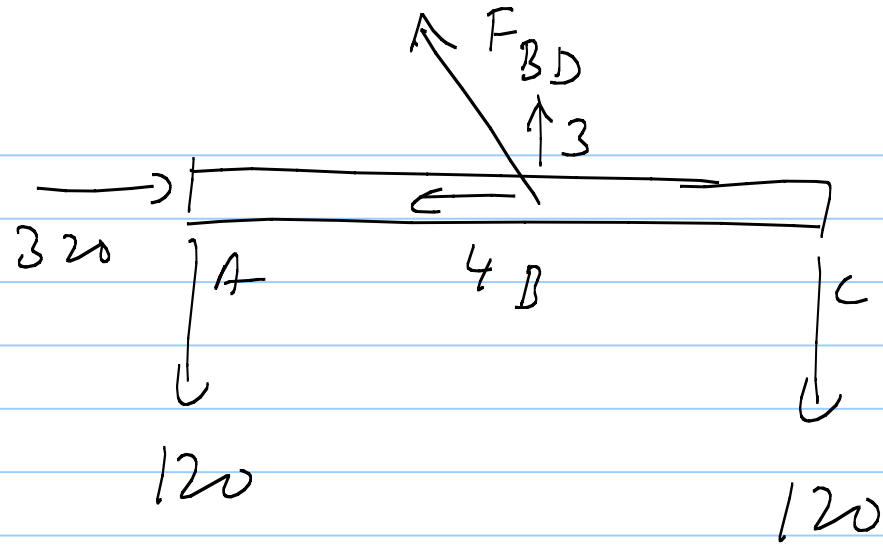
$$\sum F_x = -D_x + A_x = 0$$

$$A_x = 320\ lbs$$

$$\frac{D_x}{D_y} = \frac{8}{6} \Rightarrow D_y = \frac{3}{4} D_x = 240\ lb$$

$$\sum F_y = A_y + 240 - 120 = 0$$

$$A_y = -120\ lbs$$

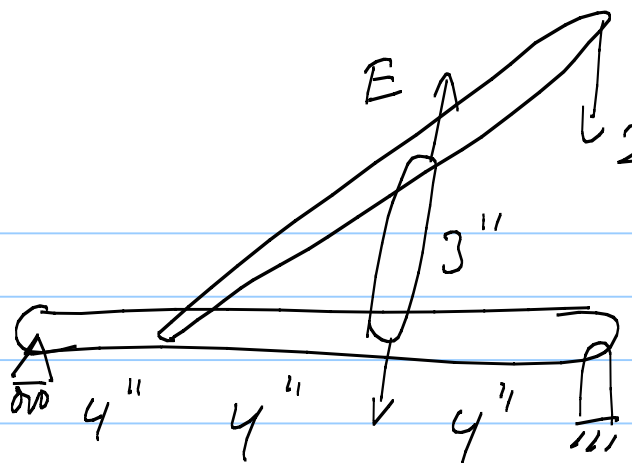


$$\sum M_A = 8.(.6)F_{BD} - 16 \cdot 120 = 0$$

$$F_{BD} = 400 \text{ lbs}$$

$$F_{BDx} = .8 F_{BD} = 320 \text{ lbs}$$

$$F_{BDy} = .6 F_{BD} = 240 \text{ lbs}$$



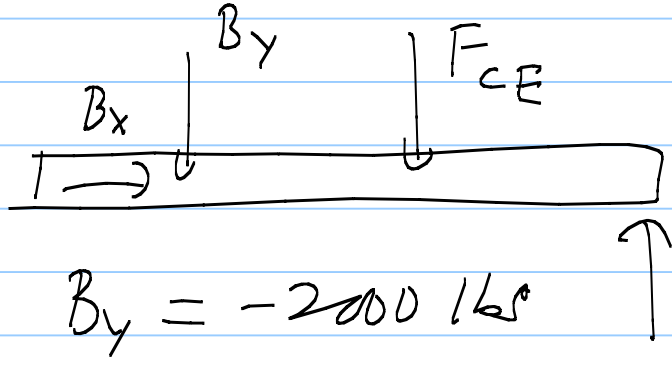
A B C D

B E F

C E — 2 force member

$\sum M_A = D_y = 2000$ lbs

$A_y = 0$

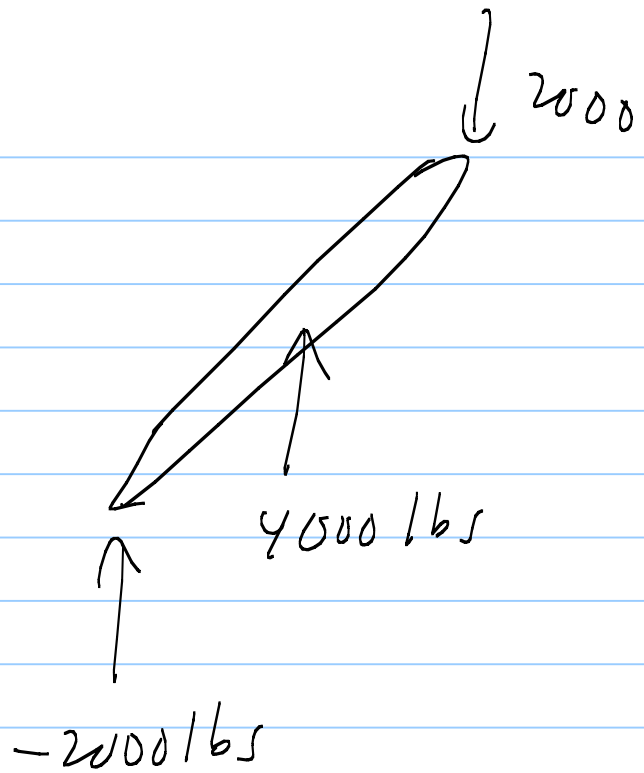


$\sum F_x \Rightarrow B_x = 0$

$B_y = -2000$ lbs

$\sum M_B = -4F_{CE} + 8 \cdot 2000 = 0$

$F_{CE} = 4000$ lbs


2000
4000 lbs
-2000lbs