

STEP (1.) REACTIONS

$$\sum M_F = 0 = 15^k(16') - 40^k(15') + R_{Gy}(20')$$

$$R_{Gy} = \frac{15(16) + 40(15)}{20} = 42 \uparrow$$

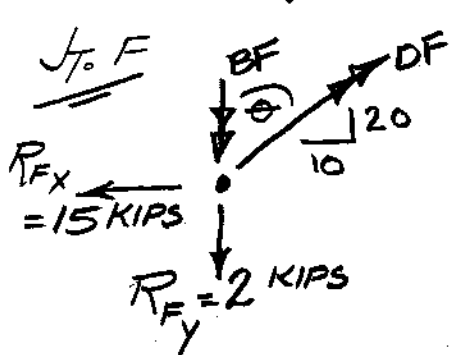
$$\sum F_y = 0 = -40 + 42 + R_{Fy}$$

$$R_{Fy} = -2 \therefore R_{Fy} = 2 \downarrow$$

$$\sum F_x = 0 = 15^k - R_{Fx}$$

$$R_{Fx} = 15 \text{ kips } \leftarrow$$

STEP (2.) SUM FORCES ACTING ON JOINTS



$$\tan^{-1}\left[\frac{10}{20}\right] = 26.57^\circ$$

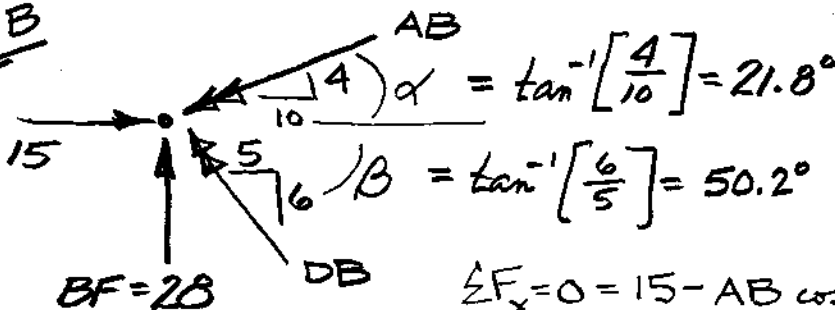
$$\sum F_x = 0 = -15 + DF \sin 26.57^\circ$$

$$DF = 33.54 \quad \textcircled{T}$$

$$\sum F_y = 0 = -BF + DF \cos \theta - 2$$

$$BF = 33.54 \cos 26.57^\circ - 2 = 28 = BF \quad \textcircled{C}$$

Jt. B



AB + DB ASSUMED  $\textcircled{C}$

$$\sum F_x = 0 = 15 - AB \cos 21.8^\circ - DB \cos 50.2^\circ \quad \textcircled{1}$$

$$\sum F_y = 0 = 28 - AB \sin 21.8^\circ + DB \sin 50.2^\circ \quad \textcircled{2}$$

$$\textcircled{1} (.928 AB + .64 DB = 15) \div .64 \Rightarrow 1.45 AB + DB = 23.438$$

$$\textcircled{2} (.371 AB - .768 DB = 28) \div .768 \Rightarrow .48 AB - DB = 36.458$$

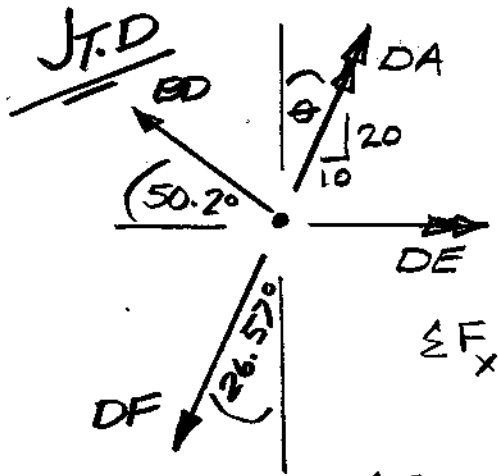
$$1.93 AB = 59.896$$

$$AB = 31.034 \quad \textcircled{C}$$

BACK SUB

$$\therefore DB = 23.438 - 1.45 AB \Rightarrow DB = -21.562 \text{ OPP.}$$

$$\therefore DB = 21.562 \quad \textcircled{T}$$



DA + DF SAME SLOPE

$\theta = 26.57^\circ$

DA + DE ASSUMED (T)

$BD = 21.562 \text{ (T)}, DF = 33.54 \text{ (T)}$

$\sum F_x = 0 = -21.562 \cos 50.2 - 33.54 \sin 26.57^\circ + DE + DA \sin 26.57^\circ \quad (1)$

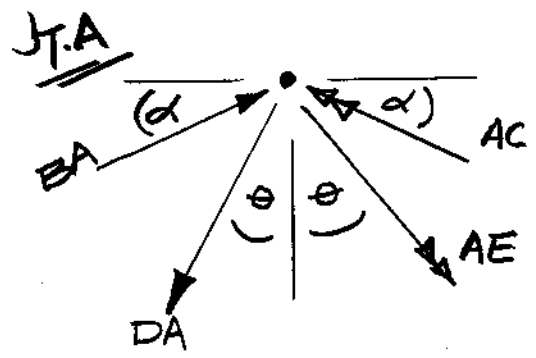
$\sum F_y = 0 = DA \cos 26.57^\circ + 21.562 \sin 50.2 - 33.54 \cos 26.57^\circ \quad (2)$

$(2) \quad DA = \frac{33.54 \cos 26.57^\circ - 21.562 \sin 50.2^\circ}{\cos 26.57^\circ} = 15.018 \text{ (T)}$

$\therefore (1) \quad DE = - (15.018) \sin 26.57^\circ + 21.562 \cos 50.2 + 33.54 \sin 26.57^\circ$

$DE = 22.087 \text{ (T)}$

$DA = 15.018 \text{ (T)}$



$\alpha = 21.8^\circ \quad BA = 31.034 \text{ (C)}$

$\theta = 26.57^\circ \quad DA = 15.018 \text{ (T)}$

Already you can see 2 unknowns in each eq. Solve Simult. Equations

$(1) \quad \sum F_x = 0 = 31.034 \cos 21.08^\circ - 15.018 \sin 26.57^\circ - AC \cos 21.8^\circ + AE \sin 26.57^\circ$

$(2) \quad \sum F_y = 0 = 31.034 \sin 21.08^\circ - 15.018 \cos 26.57^\circ + AC \sin 21.8^\circ - AE \cos 26.57^\circ$

$(1) \div \sin 26.57^\circ \quad 49.721 = 2.076 AC - AE$

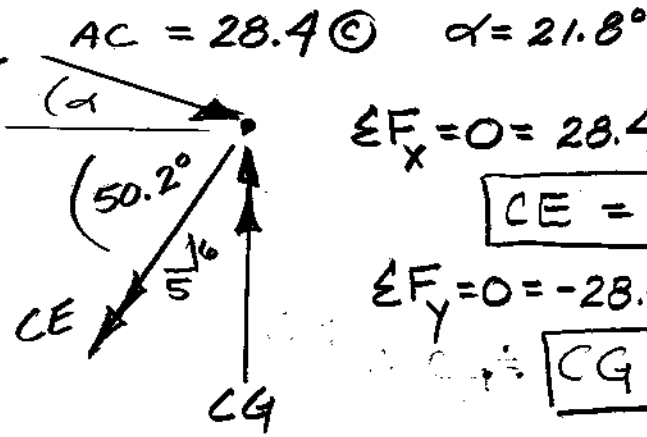
$(2) \div \cos 26.57^\circ \quad -2.538 = -.415 AC + AE$

$47.183 = 1.661 AC \Rightarrow AC = 28.4 \text{ (C)}$

SUB. (1)  $\therefore AE = 2.076(28.4) - 49.721 \Rightarrow AE = 9.25 \text{ (T)}$

MIGHT AS WELL CONTINUE IN CLOCKWISE ORDER. So Jt. C IS NEXT. ONE MORE SHEET OF PAPER!

Jt. C



6.27

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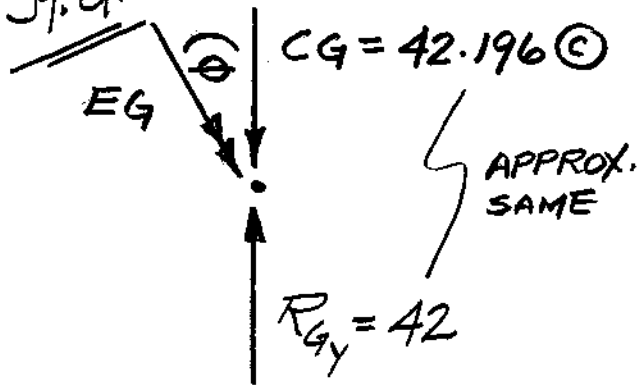
$$\sum F_x = 0 = 28.4 \cos 21.8^\circ - CE \cos 50.2^\circ$$

$$CE = 41.194 \text{ (T)}$$

$$\sum F_y = 0 = -28.4 \sin 21.8^\circ - CE \sin 50.2^\circ + CG$$

$$CG = 42.196 \text{ KIPS (C)}$$

Jt. G



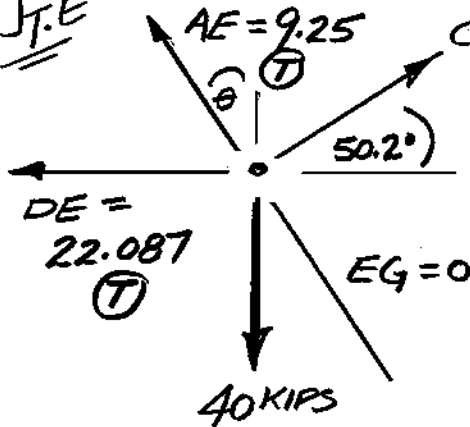
$$\sum F_x = 0 = EG \sin \theta$$

$$\therefore EG = 0$$

APPROX. SAME

CHECK SUMMATIONS AT JT. E

Jt. E



$$CE = 41.2 \text{ (T)} \quad \theta = 26.57^\circ$$

$$\sum F_x = 0 = -22.087 - 9.25 \sin 26.57^\circ + 41.2 \cos 50.2^\circ = 0.148$$

$$\sum F_y = 0 = -40 + 9.25 \cos 26.57^\circ + 41.2 \sin 50.2^\circ = -0.073$$

CLOSE ENOUGH!

SUMMARY

FB = 28 KIPS (C)

AC = 28.4 (C)

BA = 31 KIPS (C)

AE = 9.25 (T)

BD = 21.56 (T)

CE = 41.2 (T)

FD = 33.54 (T)

CG = 42 (C)

GE = 0

DA = 15 (T)

DE = 22 (T)