

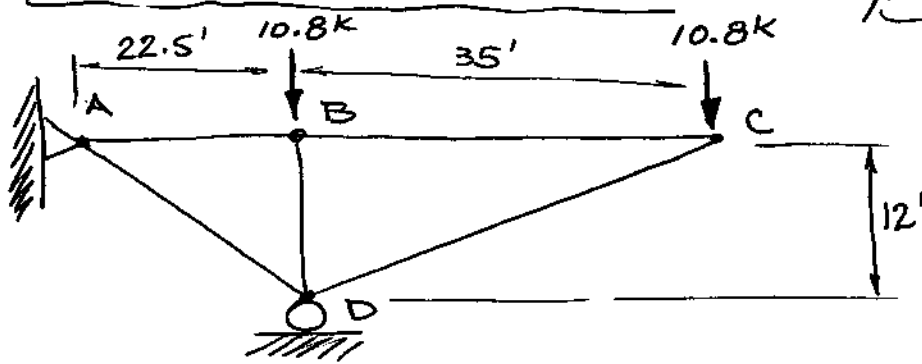
# CLASS EXAMPLE

MECH 234-101

MILANO

P6.4

p. 287 1 of 3



KIPS =  
KILO POUNDS  
= 1,000 lbf

10.8 KIPS = 10,800 lbf

STEP ① SKETCH A F.B.D. WITH REACTIONS. ASSUME DIR. FOR THESE. STATE YOUR SIGN CONVENTION.



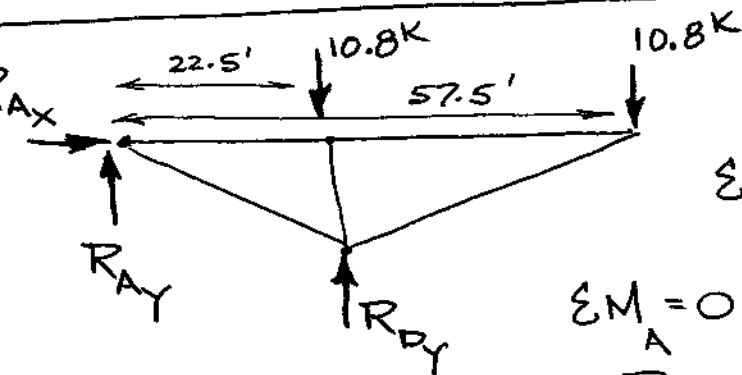
STEP ② SOLVE FOR REACTIONS BY APPLYING  $\sum F_x = 0$ ,  $\sum F_y = 0$ ,  $\sum M = 0$

SUM YOUR MOMENTS ABOUT PINNED JOINT

STEP ③ ADD ASSUMED DIR. VECTORS ON EACH MEMBER FOR TENSION & COMPRESSION

RULE OF THUMB: LOWER MEMBERS FOR THIS ONE MAY BE COMPRESSION. UPPER MEMBERS APPEAR "STRETCHED" OR IN TENSION.

STEP ④ SOLVE FOR INTERNAL FORCES USING JOINT METHOD. ISOLATE EACH JOINT SEPARATELY AND APPLY  $\sum F_x = 0$  and  $\sum F_y = 0$ .



$$\sum F_x = 0 = \boxed{R_{Ax} = 0}$$

$$\sum F_y = R_{Ay} + R_{Dy} - 10.8 \text{ k} - 10.8 \text{ k} = 0$$

$$\sum M_A = 0 = -10.8 \text{ k}(22.5') - 10.8 \text{ k}(57.5') + R_{Dy}(22.5')$$

$$R_{Dy} = \frac{243 \text{ k} + 621 \text{ k}}{22.5'} = \boxed{38.4 = R_{Dy} \uparrow}$$

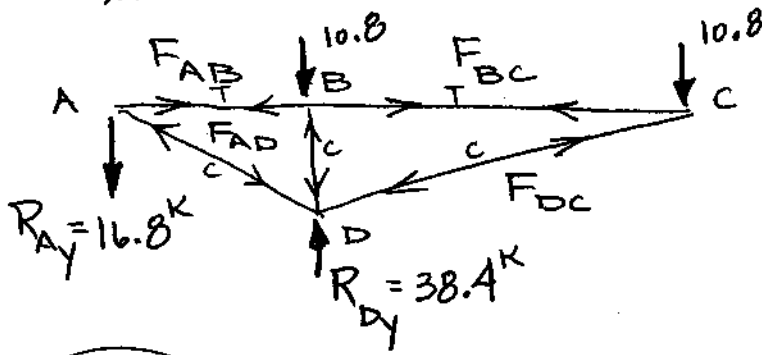
SUB. BACK INTO

$$\sum F_y = 0 \quad \therefore R_{Ay} = -38.4 + 10.8 + 10.8 = -16.8 \text{ k}$$

$$\therefore \boxed{R_{Ay} = 16.8 \text{ k} \downarrow}$$

DIR. OPP. TO THAT ASSUMED

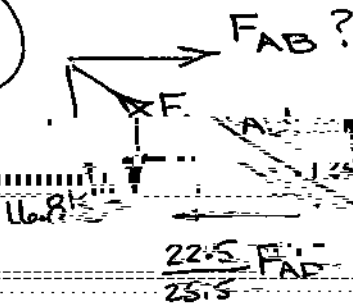
Now FOR INTERNAL FORCES IN EACH MEMBER. ASSUME T or C. P6.4 p. 2 of 3



BEGIN AT ANY JT. WITH LEAST UNKNOWNNS TO SOLVE.

YOUR CHOICE!

JT. A



YOU'LL NEED A HYPOTENUSE FOR PROPORTIONS, OR ANGLE FOR SIN, + COS.

$$H = 22.5, V = 12, \text{HYPOTENUSE} = \sqrt{(22.5)^2 + (12)^2} = 25.5$$

$$\theta = \arctan \frac{12}{22.5} = 28.07^\circ$$

$$\sum F_x = 0 = +F_{AB} - \frac{22.5}{25.5} F_{AD}$$

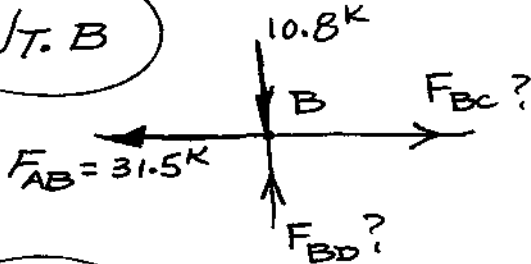
$$\sum F_y = 0 = -16.8 + \frac{12}{25.5} F_{AD}$$

$$\therefore F_{AD} = 35.7 \text{ KIPS C}$$

$$\therefore F_{AB} = \frac{22.5}{25.5} (35.7 \text{ K}) = 31.5 \text{ KIPS T}$$

$$F_{AB} = 31.5 \text{ KIPS T}$$

JT. B

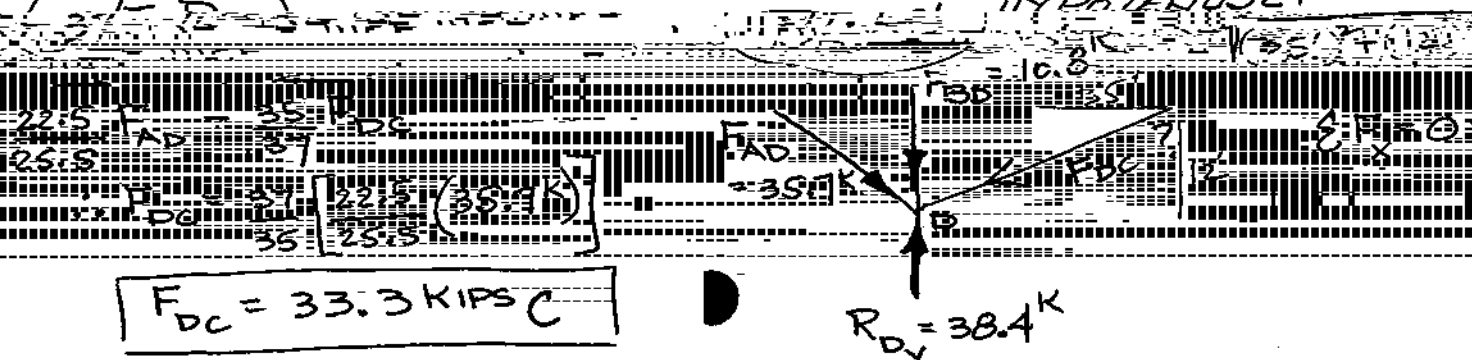


BY SYMMETRY or EQS.

$$\sum F_x = 0 \therefore F_{BC} = F_{AB} = 31.5 \text{ K T}$$

$$\sum F_y = 0 \therefore F_{BD} = 10.8 \text{ KIPS C}$$

HYPOTENUSE



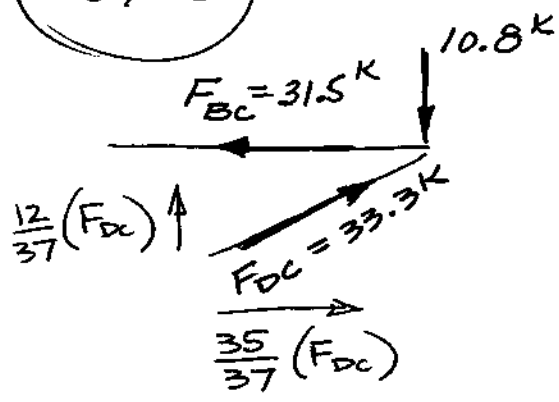
$$F_{DC} = 33.3 \text{ KIPS C}$$

OUR WORK AT JT. C

CHECK YOUR

J.T.C

DOUBLE CHECK!



$$\sum F_x = 0 = -F_{Bc} + \frac{35}{37}(F_{Dc})$$

$$-31.5^k + \frac{35}{37}(33.3^k) = 0 \checkmark$$

$$\sum F_y = 0 = -10.8^k + \frac{12}{37}(F_{Dc})$$

$$-10.8^k + \frac{12}{37}(33.3^k) = 0 \checkmark$$

CHART YOUR RESULTS TO BE SURE YOU SOLVED EVERY MEMBER.

| MEMBER | FORCE               |
|--------|---------------------|
| AB     | 31.5 <sup>k</sup> T |
| BC     | 31.5 <sup>k</sup> T |
| AD     | 35.7 <sup>k</sup> C |
| BD     | 10.8 <sup>k</sup> C |
| DC     | 33.3 <sup>k</sup> C |

BE SURE YOU IDENTIFY EACH MEMBER AS TENSION OR COMPRESSION.

If you can solve one truss, you can solve any truss.  
GM.