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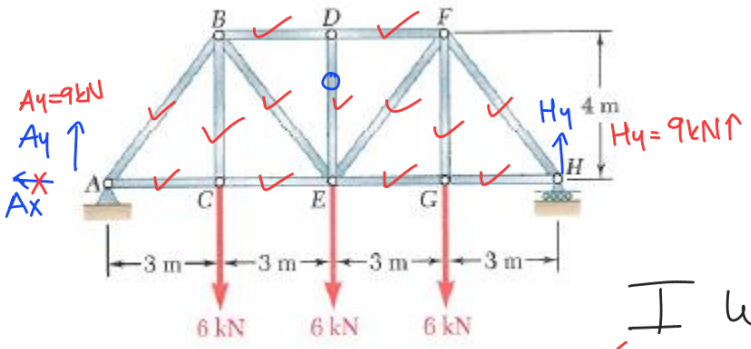
HOMEWORK 5

$\circlearrowleft +\sum M_A = 0 = -3\times6 - 6\times6 - 9\times6 + 12\times H_y = 6(-18) + 12\times H_y = 0$ $H_y = \frac{6\cdot18}{12} = 9$ $H_y = 9\,kN$

$+\uparrow \sum F_y = 0 = A_y + 9 = 18$ $A_y = 9\,kN\uparrow$ DE = 0 zero force member

$\xrightarrow{+} \sum F_x = 0 = A_x$ $A_x = 0$

Q1)



Joint A

0.8AB

9kN ↑ ↑ 0.6AB → AC

$9 + 0.8AB = 0$

$AB = -9/0.8 = -11.25$

AB = 11.25 COMPRESSION

AC = 11.25 × 0.6

AC = 6.75 TENSION

Joint H

FH = 0.8

FH.0.6 ← ↑ 9kN

GH

FH = −11.25

FH = 11.25 COMPRESSION

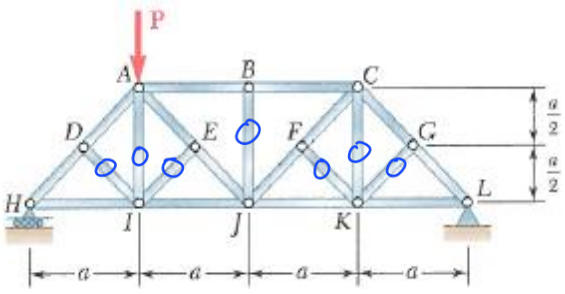
GH = 6.75 TENSION

I WILL CONTINUE WITH NEXT PAGE

(Answer is on the next page)

Determine the force in each member of the Pratt bridge truss shown. State whether each member is in tension or compression.

Q2)

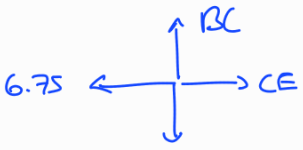


1) DI
2) AI
3) EI
4) BJ
5) FK
6) CK
7) GK

For the given loading, determine the zero-force members in the truss shown.

CONTINUING THE QUESTION 1

Joint C

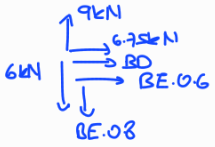


BC = 6 kN TENSION
CE = 6.75 kN TENSION

Joint G

EG = 6.75kN TENSION
FG = 6kN TENSION

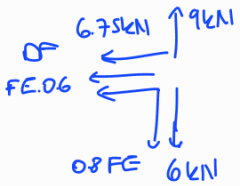
Joint B



BE.0.8 = 3kN
BE = 3.75kN TENSION

BD + 6.75kN + 3.75x0.6kN = 0
BD = −9kN
BD = 9 kN COMPRESSION

Joint f



9kN − 0.8FE − 6kN = 0
0.8FE = 3
FE = 3.75 kN TENSION

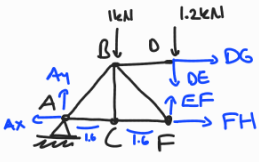
−6.75 − 3.75x0.6 − DF = 0
DF = −9kN
DF = 9kN COMPRESSION

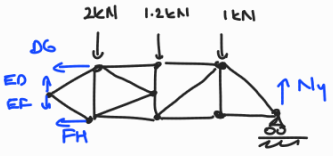
Answer

AB	= 11.25 kN (C)	DF	= 9kN (C)
AC	= 6.75 kN (T)	EF	= 3.75 kN (T)
BC	= 6 kN (T)	EG	= 6.75 kN (T)
BE	= 3.75kN (T)	FG	= 6 kN (T)
BD	= 9kN (C)	FH	= 11.25 kN (C)
CE	= 6.75 kN (T)	GH	= 6.75 kN (T)
DE	= 0		

Q3)

FBD





$\pm \rightarrow \sum F_x = 0 = A_x \quad A_x = 0$

$+\circlearrowleft \sum M_A = 0 = -1.6 - 3.2\times1.2 - 4.8\times2 - 6.4\times1.2 - 8 + 9.6\times N_y = 0 \quad N_y = 3.2 \uparrow \text{kN}$

$+\uparrow \sum F_y = 0 = A_y + 3.2 - 1 - 1.2 - 2 - 1.2 - 1 = 0 \quad A_y = 3.2 \uparrow \text{kN}$

$+\circlearrowleft \sum M_F = 0 = -A_y \times 3.2 + 1\times1.6 - DG\times2.4 = 0$

$DG = \dfrac{-3.2\times3.2 + 1.6}{2.4} = -3.6 \text{ kN}$

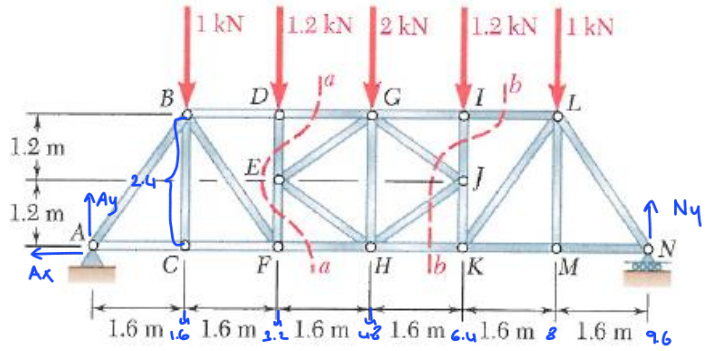
DG = 3.6 kN COMPRESSION

$+\circlearrowleft \sum M_D = 0 = -A_y\times3.2 + 1\times1.6 + 2.4FH = 0$

$FH = \dfrac{3.2\times3.2 - 1.6}{2.4} = 3.6 \text{ kN}$

FH = 3.6kN TENSION

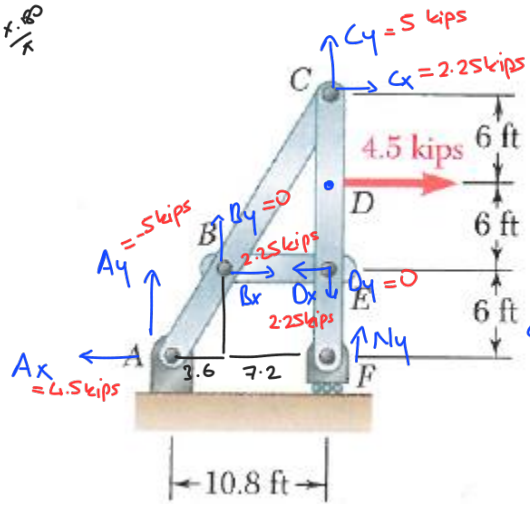
Q3)



Determine the force in members DG and FH of the truss shown. (Hint: use section *aa*.)

ANSWER IS ABOVE PAGE

Q4)



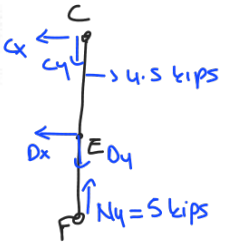
Here, we cannot mension a truss system since it is against the assumption that the forces are applied on joints. I will behave pins as reactions.

$+\circlearrowleft \sum M_A = 0 = 10.8 \times N_y - 4.5 \times 12 = 0$

$N_y = 5$ kips ↑

$+\uparrow \sum F_y = 0 \quad 5 + A_y = 0 \rightarrow A_y = -5$ kips

$A_y = 5$ kips ↓



$\rightarrow \sum F_x = 0 \quad C_x + D_x = 4.5 \quad D_x = 4.5 - C_x$

$+\circlearrowleft \sum M_F = 0 = 6 C_x (4.5 - C_x) + 18 C_x - 12 \times 4.5 = 0$

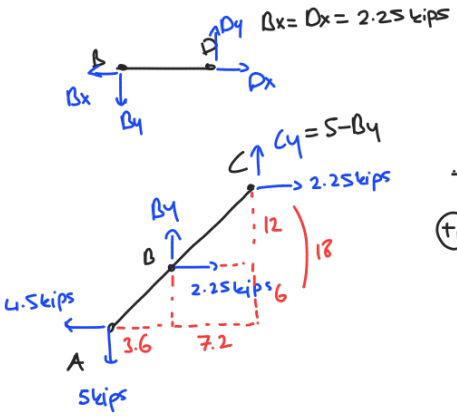
$27 - 6C_x + 18C_x - 54 = 0$

$12C_x = 27$

$C_x = 2.25$ kips

$D_x = 2.25$ kips

For the frame and loading shown, determine the components of all forces acting on member ABC.



$+\uparrow \sum F_y = 0 = B_y + C_y - 5 = 0 \quad C_y = 5 - B_y$

$+\circlearrowleft \sum M_B = 0 = -4.5 \times 6 + 5 \times 3.6 + (5 - B_y) \times 7.2 - 2.25 \times 12 = 0$

$0 = -27 + 18 + 36 - 7.2B_y - 27$

$0 = B_y$

$C_y = 5$ kips