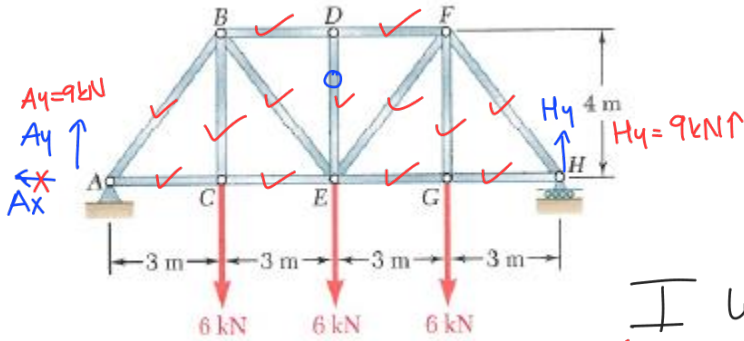


HOMEWORK 5

$$\odot \sum M_A = 0 = -3 \times 6 - 6 \times 6 - 9 \times 6 + 12 \times H_y = 6(-18) + 12 \times H_y = 0 \quad H_y = \frac{6 \cdot 18}{12} = 9 \quad \boxed{H_y = 9 \text{ kN}}$$

$$+\uparrow \sum F_y = 0 = A_y + 9 = 18 \quad \boxed{A_y = 9 \text{ kN} \uparrow} \quad \boxed{DE = 0} \quad \text{zero force member}$$

$$Q1) +\rightarrow \sum F_x = 0 = A_x \quad \boxed{A_x = 0}$$



JOINT A

$$9 \text{ kN} \uparrow \quad 0.8 AB \quad 0.6 AB \rightarrow AC$$

$$9 + 0.8 AB = 0$$

$$AB = -9/0.8 = -11.25$$

$$\boxed{AB = 11.25 \text{ COMPRESSION}}$$

$$AC = 11.25 \times 0.6$$

$$\boxed{AC = 6.75 \text{ TENSION}}$$

JOINT H

$$9 \text{ kN} \uparrow \quad FH \cdot 0.8 \quad 0.6 FH \leftarrow GH$$

$$FH = -11.25$$

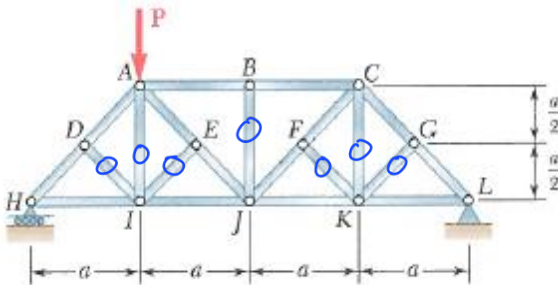
$$\boxed{FH = 11.25 \text{ COMPRESSION}}$$

$$\boxed{GH = 6.75 \text{ TENSION}}$$

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) FL

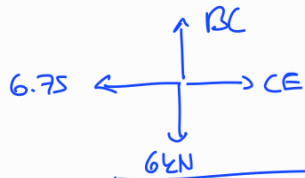
6) CK

7) GK

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

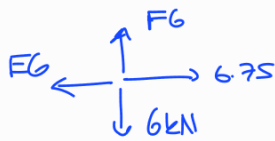
CONTINUING THE QUESTION 1

Joint C



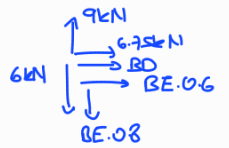
BC = 6 kN TENSION
CE = 6.75 kN TENSION

Joint G



EG = 6.75 kN TENSION
FG = 6 kN TENSION

Joint B



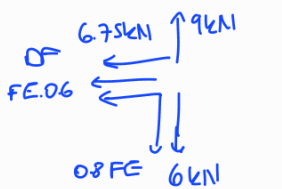
BE * 0.6 = 3 kN
BE = 3.75 kN TENSION

$$BD + 6.75 \text{ kN} + 3.75 \times 0.6 \text{ kN} = 0$$

$$BD = -9 \text{ kN}$$

BD = 9 kN COMPRESSION

Joint F



$$-6.75 - 3.75 \times 0.6 - DF = 0$$

$$DF = -9 \text{ kN}$$

DF = 9 kN COMPRESSION

$$9 \text{ kN} - 0.8FE - 6 \text{ kN} = 0$$

$$0.8FE = 3$$

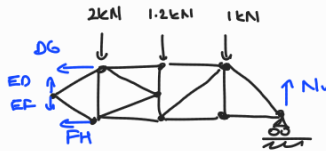
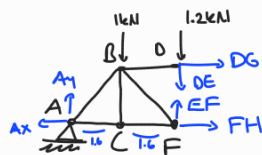
FE = 3.75 kN TENSION

Answer

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

FBD

Q3)



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

$$+\circlearrowleft \sum M_A = 0 = -1.6 - 3.2 \times 1.2 - 4.8 \times 2 - 6.4 \times 1.2 - 8 + 9.6 \times N_y = 0 \quad N_y = 3.2 \uparrow \text{ kN}$$

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

$$+\circlearrowleft \sum M_F = 0 = -A_y \times 3.2 + 1 \times 1.6 - DG \times 2.4 = 0$$

$$DG = \frac{-3.2 \times 3.2 + 1.6}{2.4} = -3.6 \text{ kN}$$

DG = 3.6 kN COMPRESSION

$$+\circlearrowleft \sum M_D = 0 = -A_y \times 3.2 + 1 \times 1.6 + 2.4 FH = 0$$

$$FH = \frac{3.2 \times 3.2 - 1.6}{2.4} = 3.6 \text{ kN}$$

FH = 3.6 kN TENSION

The diagram shows a truss structure with a total height of 2.4 m (two 1.2 m sections) and a total length of 9.6 m (eight 1.2 m sections). The truss consists of a top chord with joints B, D, G, I, L and a bottom chord with joints A, C, F, H, K, M, N. Vertical loads are applied at the top joints: 1 kN at B, 1.2 kN at D, 2 kN at G, 1.2 kN at I, and 1 kN at L. The truss is supported by a pin support at joint A (with reaction forces A_x and A_y) and a roller support at joint N (with reaction force N_y). The truss members are labeled with 'a' and 'b' for different types of members. The dimensions are given as 1.2 m for vertical spacing and 1.2 m for horizontal spacing between joints.

180
?
?
 $\frac{x \cdot 180}{x}$

A free body diagram of a frame structure. The frame consists of a vertical member CF and an inclined member AB. A cable is attached to the frame at point B and point C. A horizontal force of 4.5 kips is applied to the vertical member at point D. The dimensions are given as follows: the horizontal distance from A to B is 3.6 ft, from B to the vertical line through C is 7.2 ft, and the total horizontal distance from A to the vertical line through C is 10.8 ft. The vertical distance from the base F to point E is 6 ft, from E to D is 6 ft, and from D to C is 6 ft. The reactions are: at A, $A_x = 4.5 \text{ kips}$ (to the left) and $A_y = 5 \text{ kips}$ (up); at B, $B_x = 2.25 \text{ kips}$ (to the right) and $B_y = 0$; at C, $C_x = 2.25 \text{ kips}$ (to the right) and $C_y = 5 \text{ kips}$ (up); at E, $E_x = 2.25 \text{ kips}$ (to the left) and $E_y = 0$; at F, N_y (up). The cable force is 5 kips, acting from B to C.

$$+ \sum M_F = 0 = 6x(4.5 - C_x) + 18Cx - 12x(4.5) = 0$$

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

$$12Cx = 27 \quad \boxed{C_x = 2.25 \text{ kips}}$$
[illegible]

$$\textcircled{+} \sum M_B = 0 = -4.5 \times 6 + 5 \times 3.6 + (5 - 0.4) \times 7.2 - 2.25 \times 12 = 0$$

