

Ex4: For the compound truss shown in fig. Find

- i- Reaction at supports.
- ii- Axial force in bars a & b

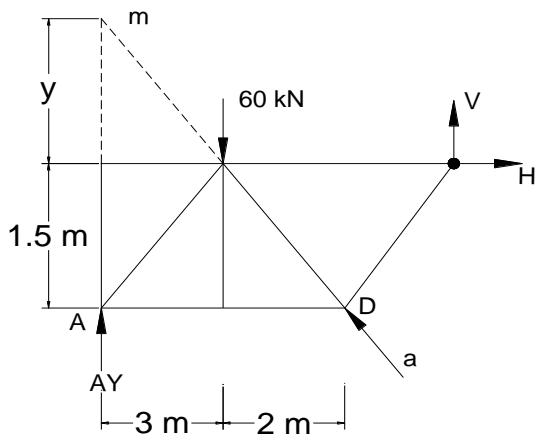
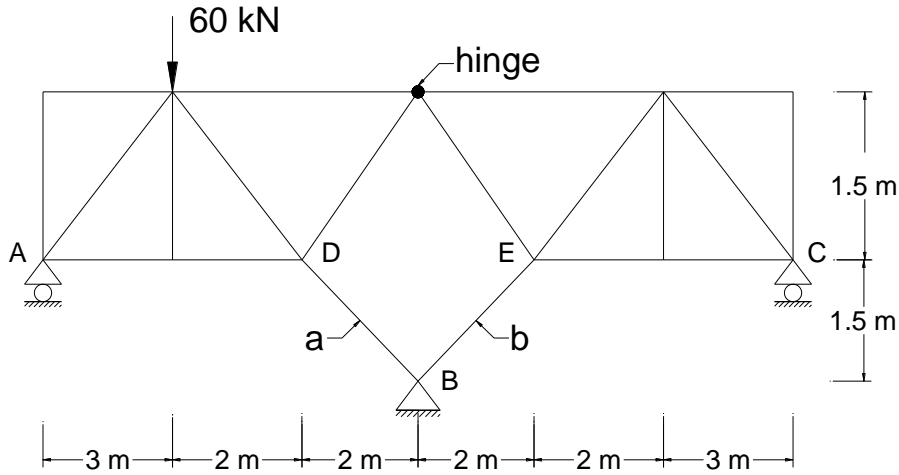


fig. 1

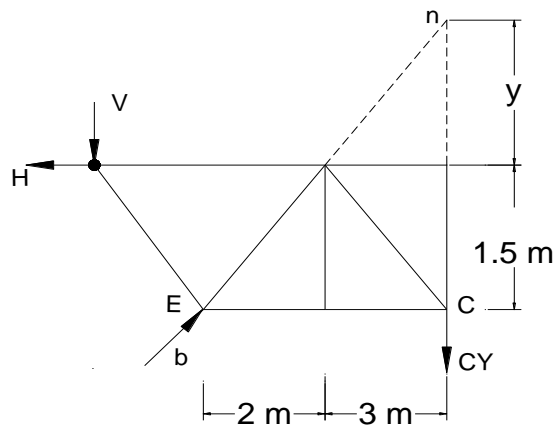


fig. 2

i) Reaction at supports

$$\frac{y}{3} = \frac{1.5}{2} \Rightarrow y = 2.25$$

From fig 1

$$\sum M_m = 0$$

$$(H \cdot 2.25) + (V \cdot 7) - (60 \cdot 3) = 0$$

$$2.25H + 7V - 180 = 0 \dots\dots\dots 1$$

From fig 2

$$\sum M_n = 0$$

$$H * 2.25 - V * 7 = 0$$

$$H = \frac{7V}{2.25} \dots\dots\dots 2$$

Sub equation 2 in equation 1

$$2.25 * \frac{7V}{2.25} + 7 * V - 180 = 0$$

$$V = 12.86 \text{ kN}$$

$$H = \frac{7 * 12.86}{2.25} = 40 \text{ kN}$$

From fig 1

$$\sum M_D = 0$$

$$(A_y * 5) + (40 * 1.5) - (12.86 * 2) - (60 * 2) = 0$$

$$A_y = 17.14 \text{ kN } \uparrow$$

From fig 2

$$\sum M_E = 0$$

$$(C_y * 5) - (12.86 * 2) - (40 * 1.5) = 0$$

$$C_y = 17.14 \text{ kN } \downarrow$$

From the whole truss

$$\sum F_x = 0, \Rightarrow B_x = 0$$

$$\uparrow \sum F_y = 0$$

$$17.14 - 17.14 - 60 + B_y = 0$$

$$B_y = 60 \text{ kN } \downarrow$$

ii) Axial force in bars a&b

For a& b use joint B

$$\uparrow \sum F_y = 0$$

$$60 - a * \frac{3}{5} - b * \frac{3}{5} = 0 \dots\dots\dots 1$$

$$\rightarrow \sum F_x = 0$$

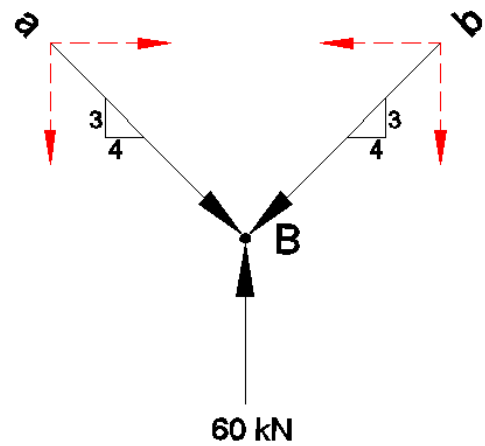
$$a * \frac{4}{5} - b * \frac{4}{5} = 0$$

a = b2, sub in equation 1

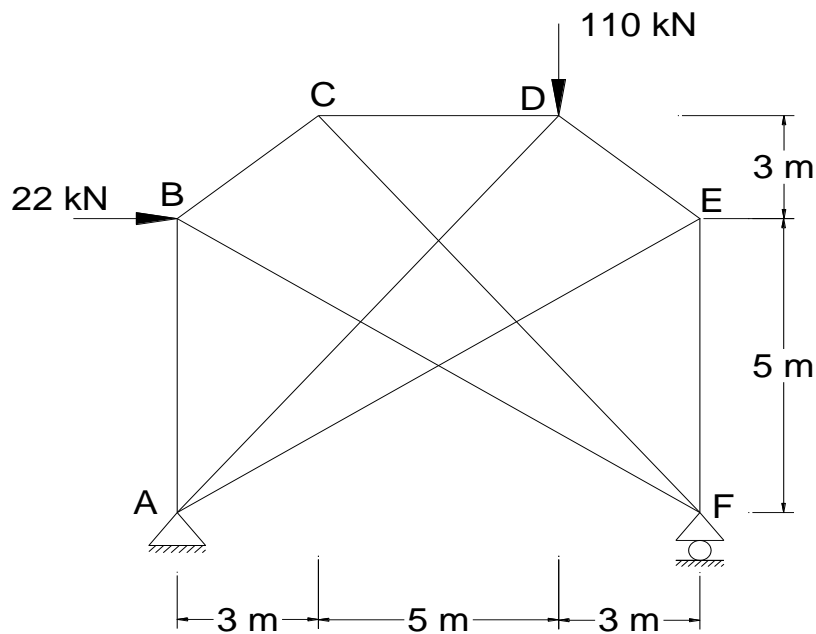
$$60 - a * \frac{3}{5} - a * \frac{3}{5} = 0$$

a = 50 kN (comp.)

b = 50 kN (comp.)



Ex5: For the compound truss shown in fig. find the axial force in bars a, b & c



$$\sum M_A = 0$$

$$(22 \cdot 5) + (110 \cdot 8) - (B_y \cdot 11) = 0$$

$$B_y = 90 \text{ kN} \uparrow$$

$$\uparrow \sum F_y = 0, \Rightarrow A_y + 90 - 110 = 0 \Rightarrow A_y = 20 \text{ kN} \uparrow$$

$$\rightarrow \sum F_x = 0, \Rightarrow 22 - A_x = 0 \Rightarrow A_x = 22 \text{ kN} \leftarrow$$

$$\sum M_O = 0$$

$$C \cdot 11 - 22 \cdot 3 = 0 \Rightarrow C = 6 \text{ kN (comp.)}$$

$$B_y = 90 \text{ kN}$$

$$\uparrow \sum F_y = 0$$

$$90 + 6 - b = 0 \Rightarrow b = 96 \text{ kN (comp.)}$$

$$\rightarrow \sum F_x = 0$$

$$22 - a = 0 \Rightarrow a = 22 \text{ kN (comp.)}$$

