College of Technological Studies

Department of Civil Engineering Technology

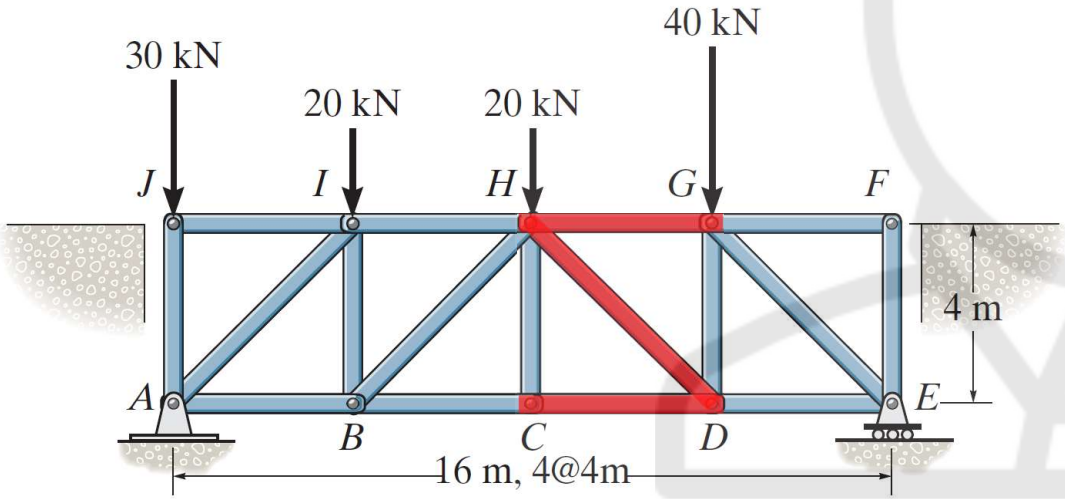
CE 278 Structural Analysis

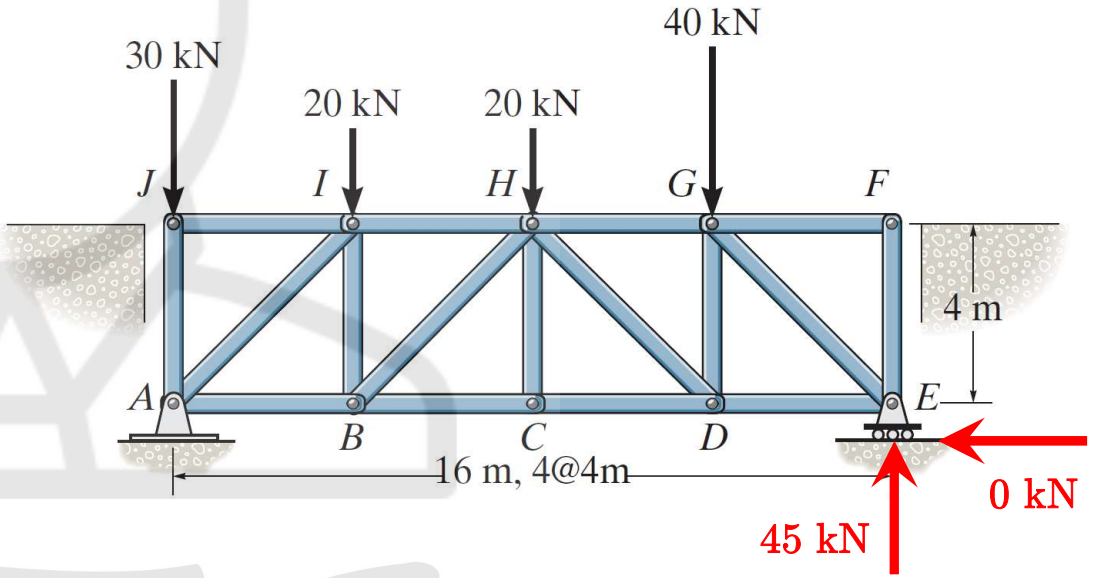
Tutorial (5)

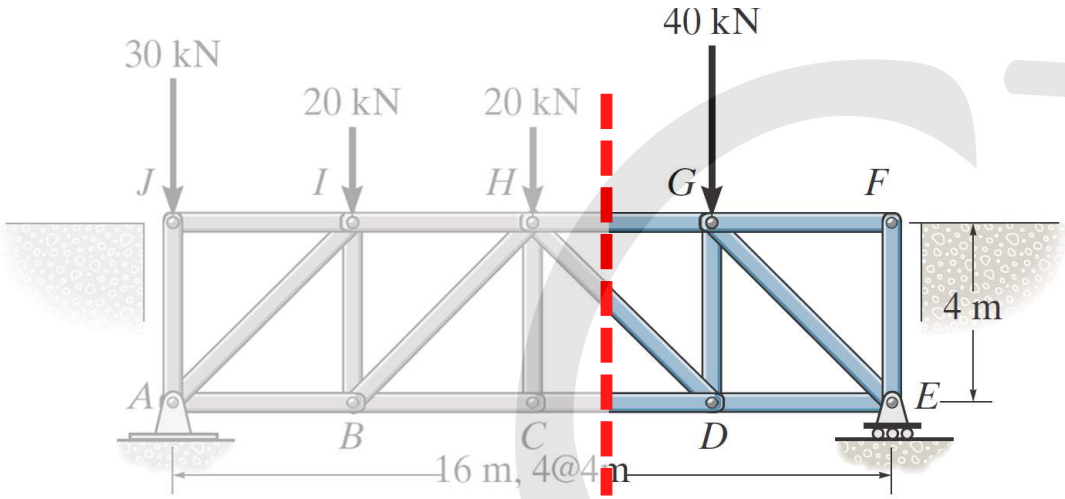
Plane Truss Analysis

Method of Sections (MOS)

Example (1): Using the method of sections, determine the force in members CD, HD, and HG of the truss shown.







$$\sum F_x = 0 \qquad \boxed{E_x = 0}$$

$$\sum M_A = 0 \qquad (E_y \times 16) + (-40 \times 12)$$

$$+(-20 \times 8) + (-20 \times 4) = 0 \qquad \boxed{E_y = 45\text{kN}}$$

$$\sum M_D = 0 \qquad (GH \times 4) + (45 \times 4) = 0$$

$$\boxed{GH = -45\,\text{kN}}$$

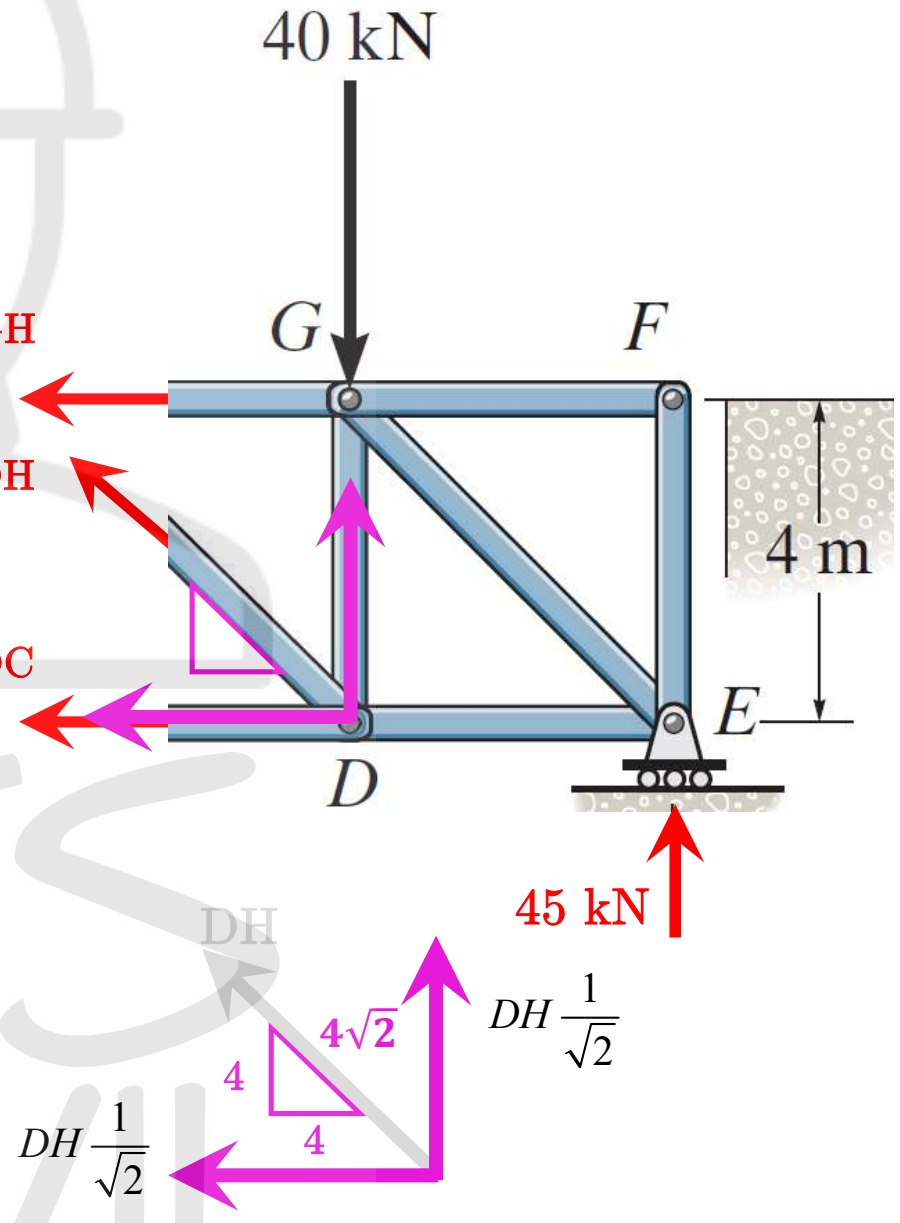
$$\sum M_H = 0 \qquad (45 \times 8) + (-40 \times 4) + (-DC \times 4) = 0$$

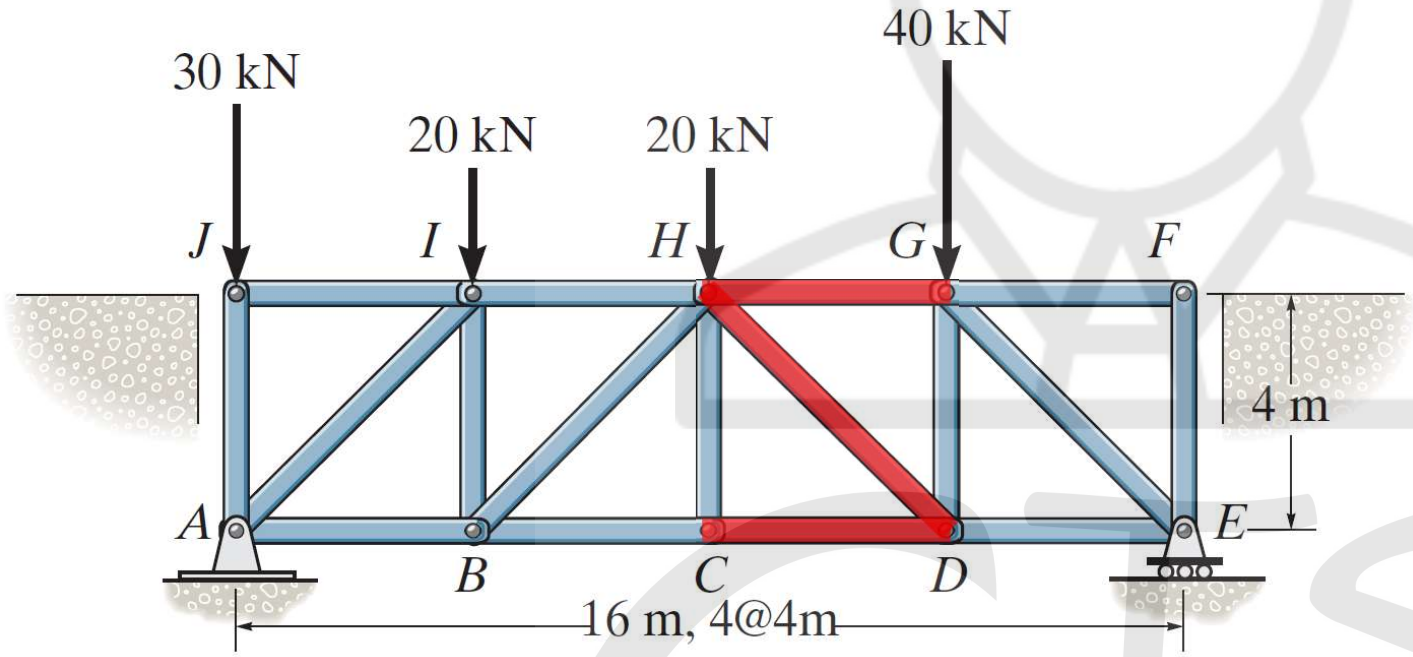
$$\boxed{DC = 50\,\text{kN}}$$

$$\sum M_G = 0 \qquad (45 \times 4) + (-DC \times 4) + \left(-DH \frac{1}{\sqrt{2}} \times 4\right) = 0$$

$$(45 \times 4) + (-50 \times 4) + \left(-DH \frac{1}{\sqrt{2}} \times 4\right) = 0$$

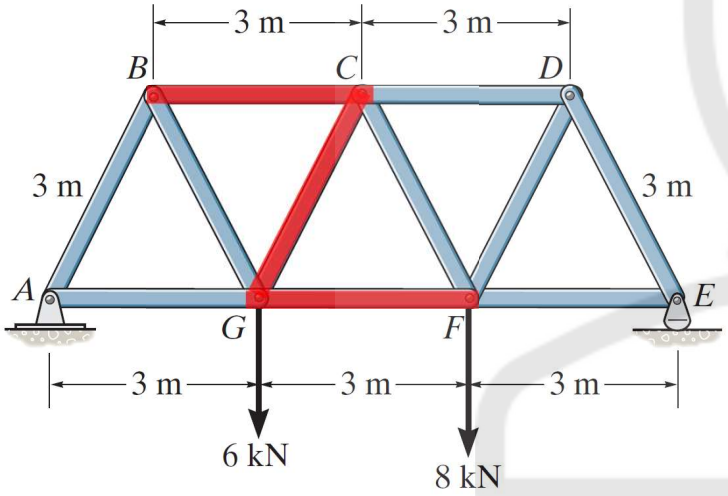
$$\boxed{DH = -7.07\,\text{kN}}$$

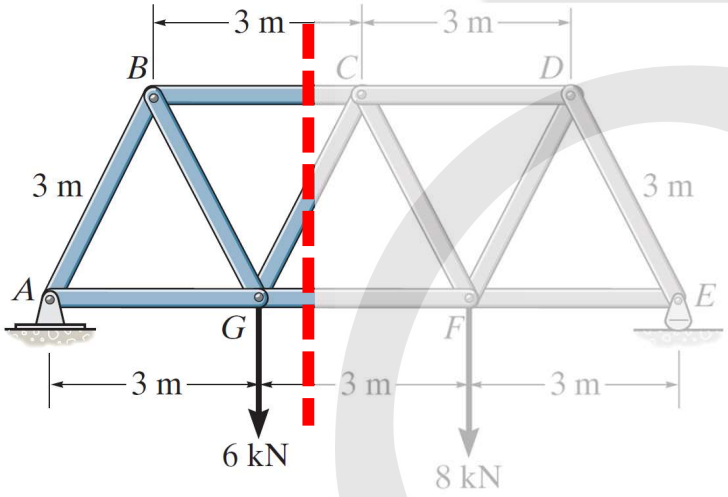


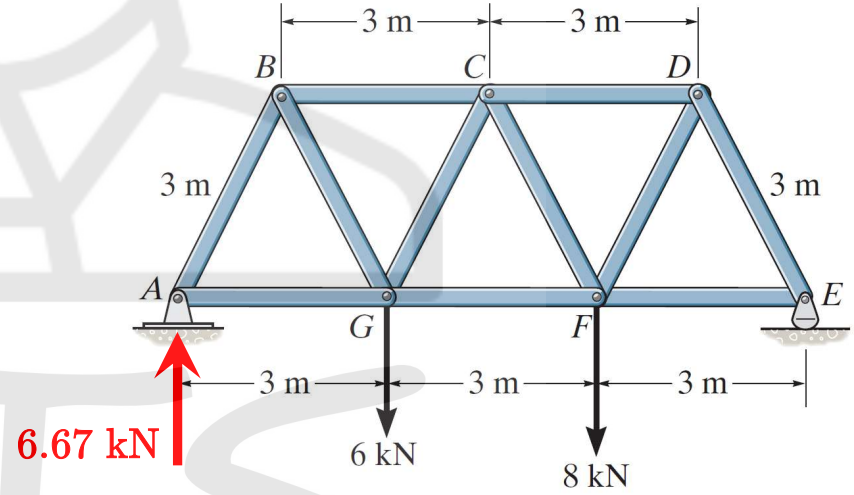


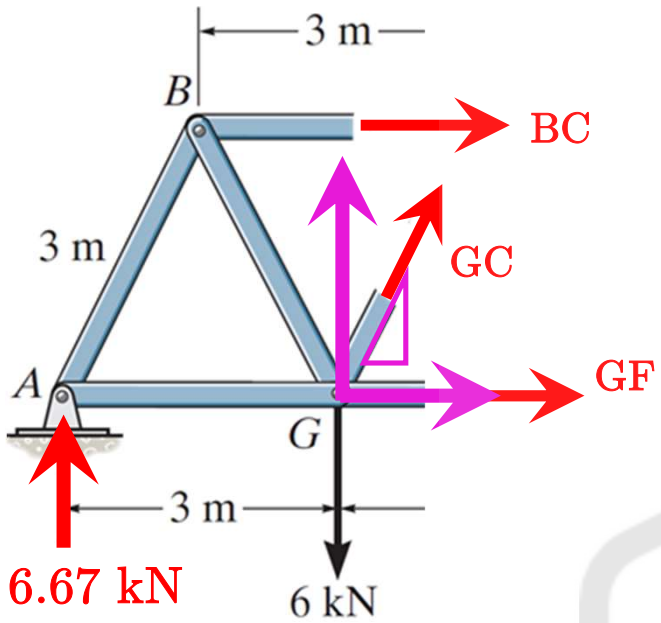
Member	Force (kN)	Type
CD	50	T
HD	-7.07	C
HG	-45	C

Example (2): Using the method of sections, determine the force in members BC, GC, and GF of the truss shown.









$$\sum M_G = 0 \qquad (-BC \times 2.6) + (-6.67 \times 3) = 0 \qquad \boxed{BC = -7.69\,\text{kN}}$$

$$\sum M_C = 0 \qquad (GF \times 2.6) + (6 \times 1.5) + (-6.67 \times 4.5) = 0$$

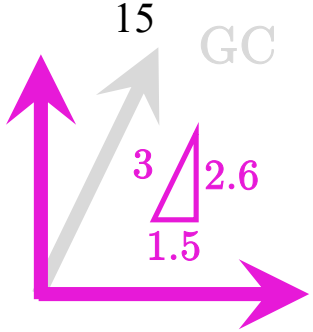
$$\boxed{GF = -8.08\,\text{kN}}$$

$$\sum M_F = 0 \qquad (-BC \times 2.6) + \left(-GC\frac{13}{15} \times 3\right) + (6 \times 3) + (-6.67 \times 6) = 0$$

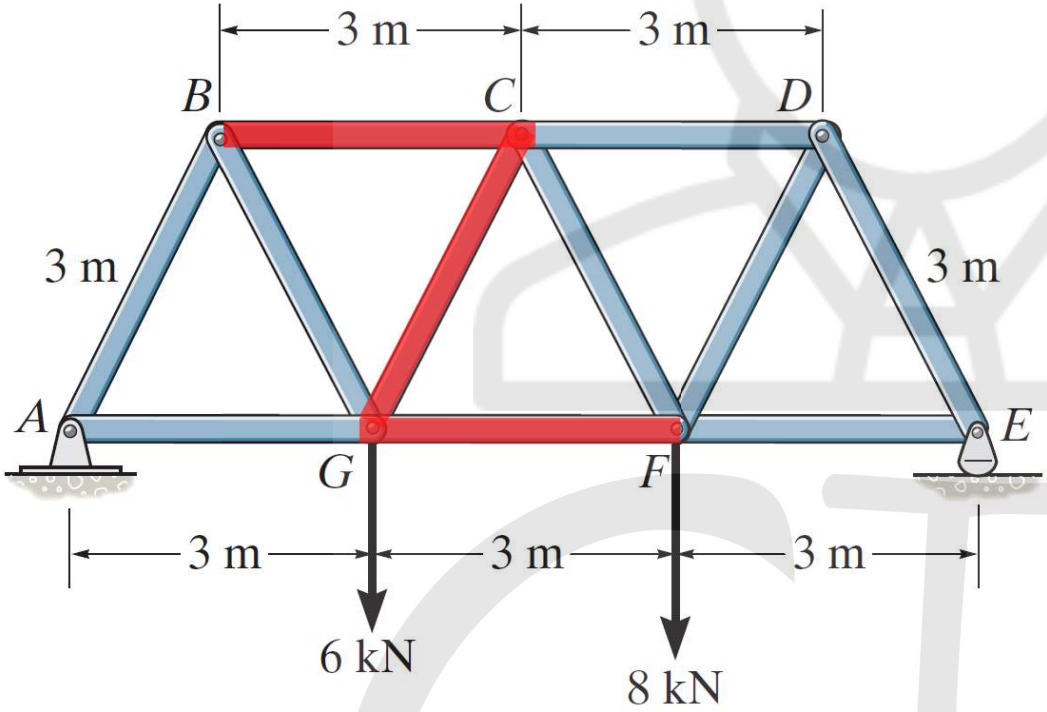
$$\left(-(-7.69) \times 2.6\right) + \left(-GC\frac{13}{15} \times 3\right) + (6 \times 3) + (-6.67 \times 6) = 0$$

$$\boxed{GC = -0.77\,\text{kN}}$$

$$GC\frac{2.6}{3} = GC\frac{13}{15}$$

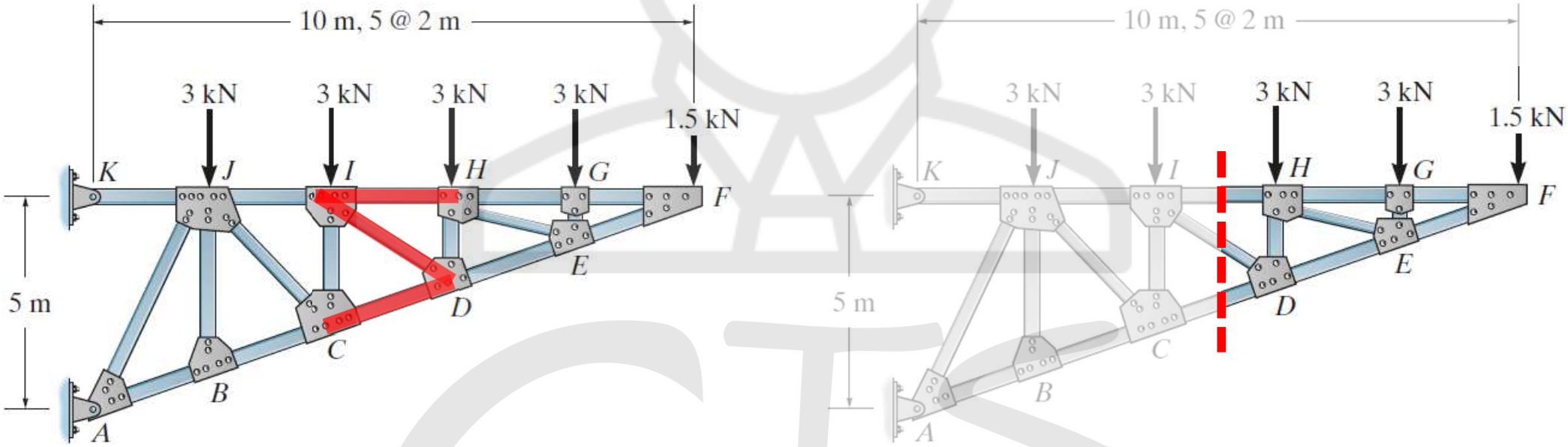


$$GC\frac{1.5}{3} = GC\frac{1}{2}$$



Member	Force (kN)	Type
BC	-7.69	C
GF	-8.08	C
GC	-0.77	C

Example (3): Using the method of sections, determine the force in members IH, ID, and CD of the truss shown.



$$\sum M_D = 0 \qquad (HI \times 2) + (-1.5 \times 4) + (-3 \times 2) = 0$$

$$\boxed{HI = 6\,\text{kN}}$$

$$\sum M_I = 0 \qquad \left(-DC \frac{1}{\sqrt{5}} \times 2\right) + \left(-DC \frac{2}{\sqrt{5}} \times 2\right) +$$

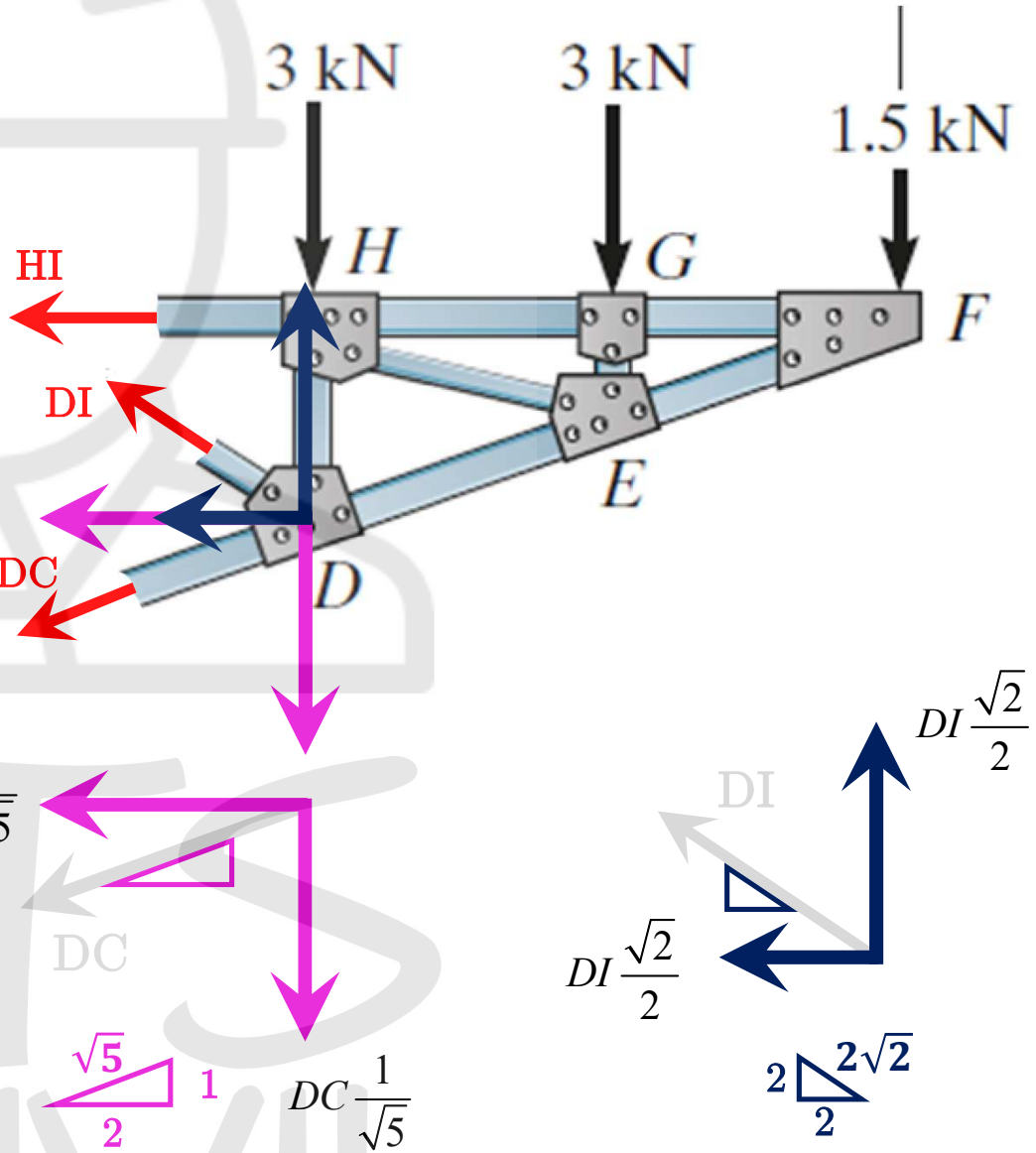
$$(-3 \times 2) + (-3 \times 4) + (-1.5 \times 6) = 0$$

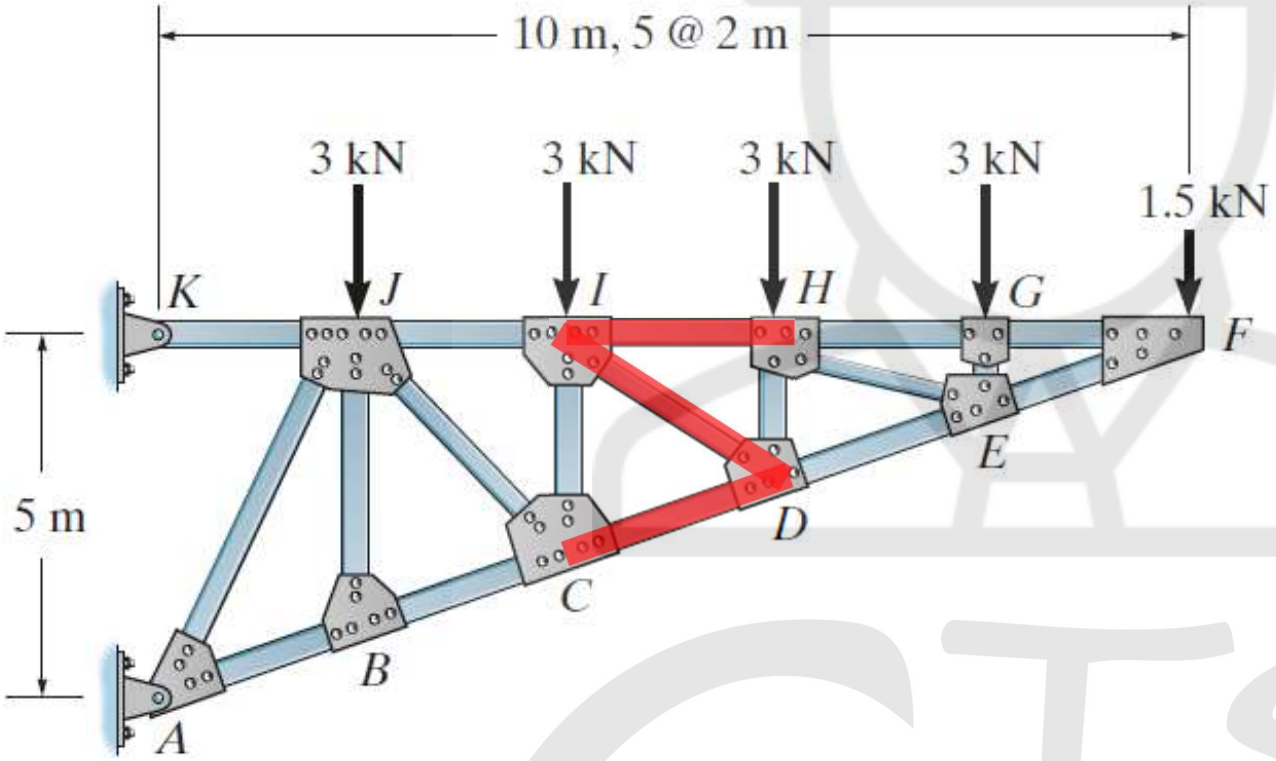
$$\boxed{DC = -10.06\,\text{kN}}$$

$$\sum M_F = 0 \qquad \left(-DI \frac{\sqrt{2}}{2} \times 2\right) + \left(-DI \frac{\sqrt{2}}{2} \times 4\right) +$$

$$(3 \times 4) + (3 \times 2) = 0$$

$$\boxed{DI = 4.24\,\text{kN}}$$





Member	Force (kN)	Type
HI	6	T
DI	4.24	T
DC	-10.06	C

Questions?