Engineering Mechanics : Statics

Chapter 6: Structural analysis

Chapter outline

- Simple Trusses
- The Method of Joints
- The Method of Sections

6. 4 The Method of Sections

- Key points……

6. 4 The Method of Sections

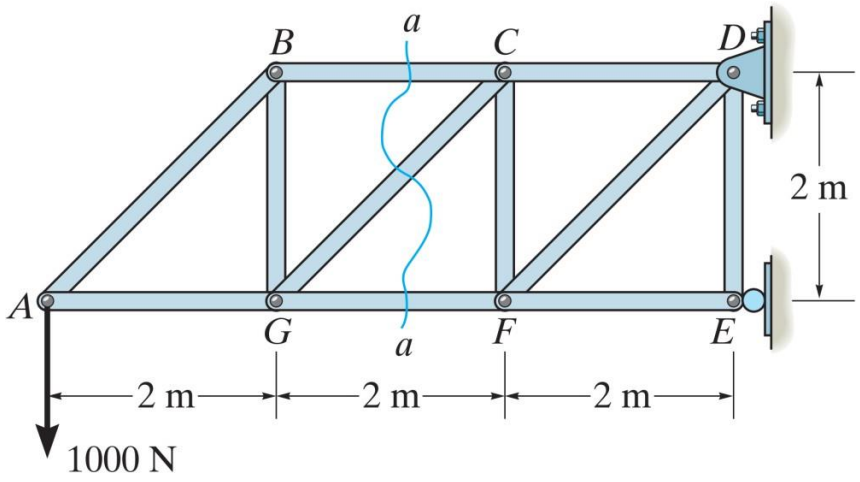
There are 3 types of forces, External, Internal and reactive. Our objective is to find all of these forces.

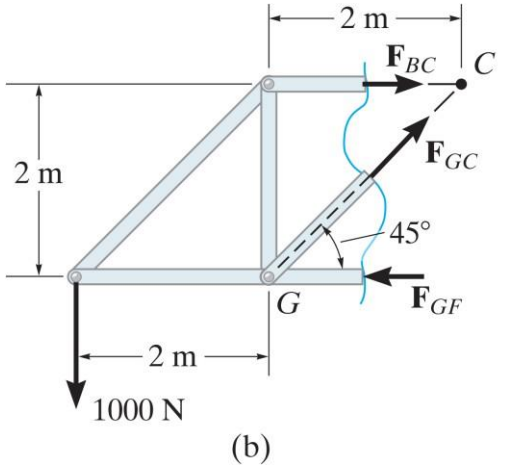
Step 1: Find the reactive forces uses global equilibrium

Step 2: Cut through members of interest (No more than 3 members cut through)

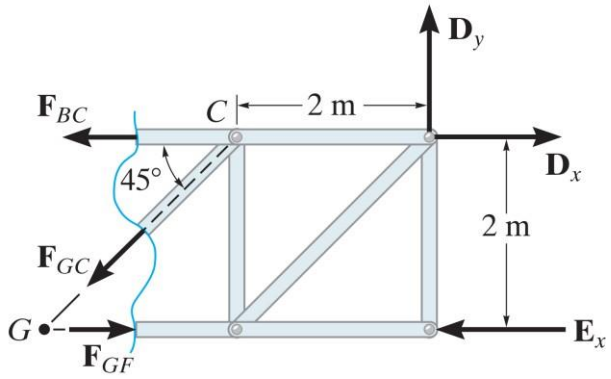
Step 3: Draw free body diagram of the easiest side

Step 4: Solve





(b)

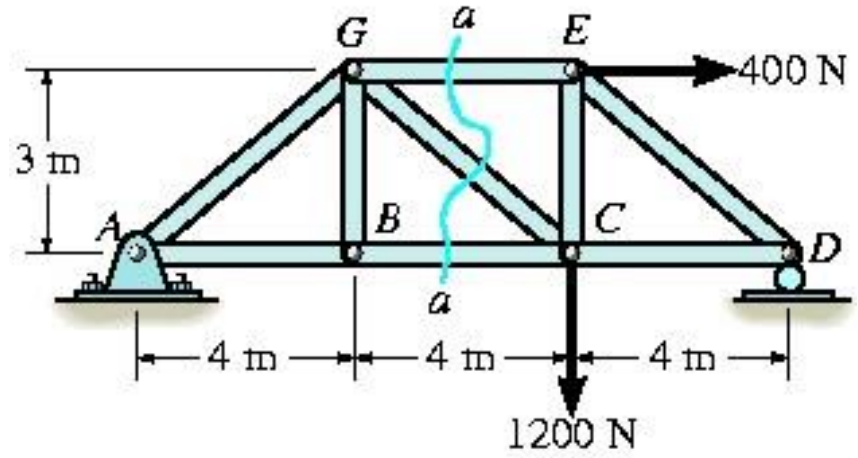


(c)

6. 4 The Method of Sections

Example 6.5

Determine the force in members GE, GC, and BC of the truss. Indicate whether the members are in tension or compression.

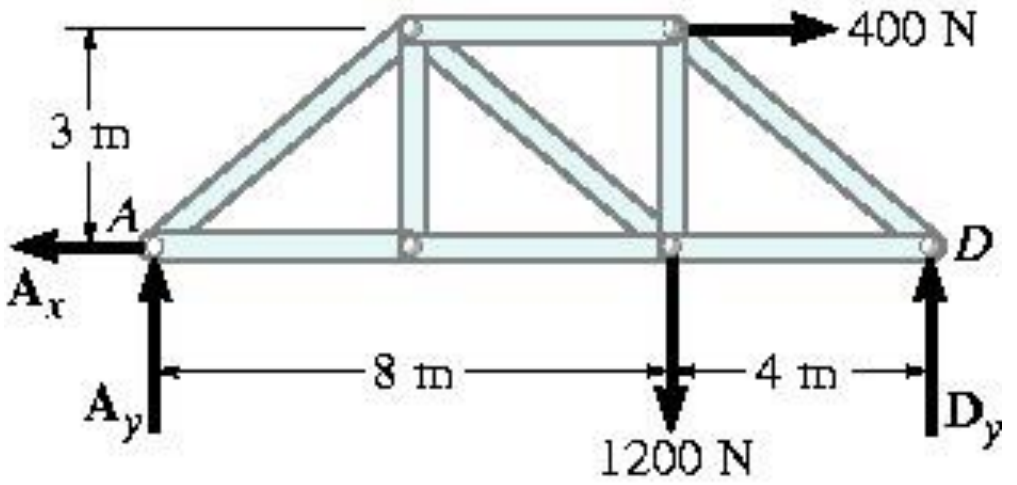


(a)

6. 4 The Method of Sections

Solution

- Choose section aa since it cuts through the three members
- FBD of the entire truss



(b)

Solution

$$+\rightarrow \sum F_x = 0; 400N - A_x = 0$$

$$A_x = 400N$$

$$\sum M_A = 0;$$

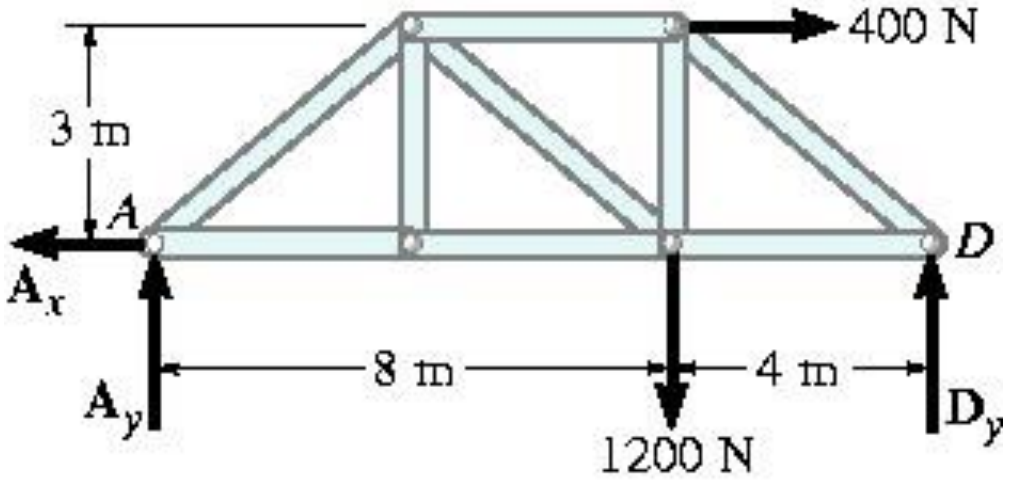
$$-1200N(8m) - 400N(3m) + D_y(12m) = 0$$

$$D_y = 900N$$

$$+\uparrow \sum F_y = 0;$$

$$A_y - 1200N + 900N = 0$$

$$A_y = 300N$$

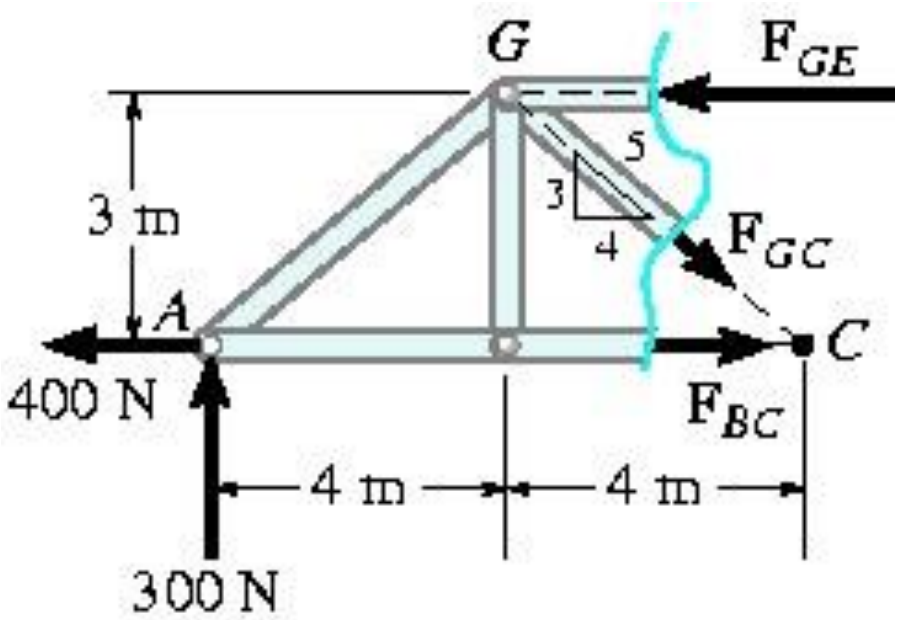


(b)

6. 4 The Method of Sections

Solution

FBD of the sectioned truss



(c)

6. 4 The Method of Sections

Solution

$$\sum M_G = 0;$$

$$-300N(4m) - 400N(3m) + F_{BC}(3m) = 0$$

$$F_{BC} = 800N(T)$$

$$\sum M_C = 0;$$

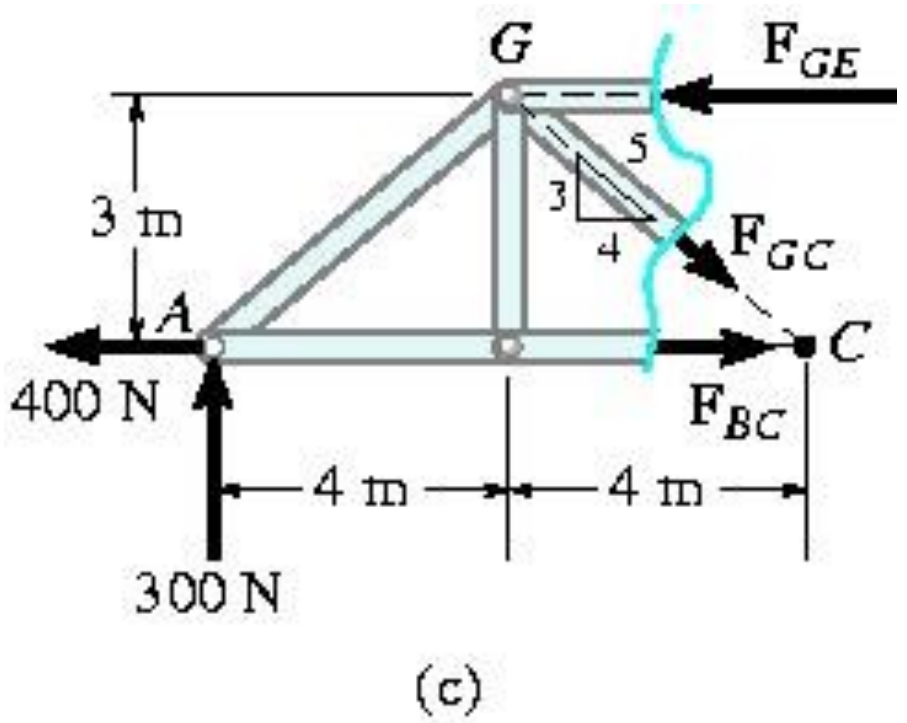
$$-300N(8m) + F_{GE}(3m) = 0$$

$$F_{GE} = 800N(C)$$

$$+\uparrow \sum F_y = 0;$$

$$300N - \frac{3}{5}F_{GC} = 0$$

$$F_{GC} = 500N(T)$$



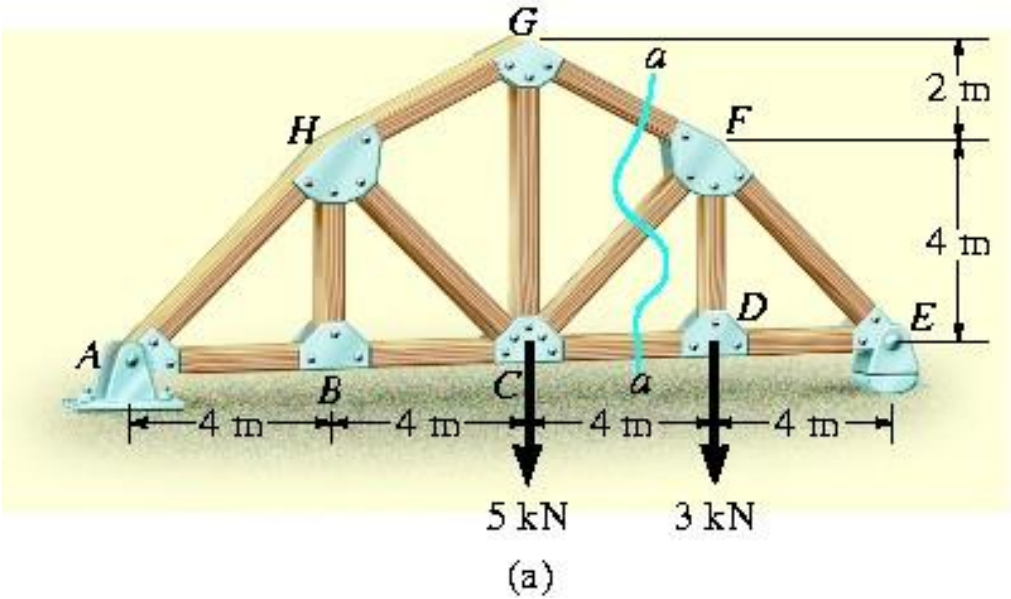
(c)

6. 4 The Method of Sections

Example 6.6

Draw the FBD of the sectioned truss for the force in member CF.

Assume each member is pin connected.



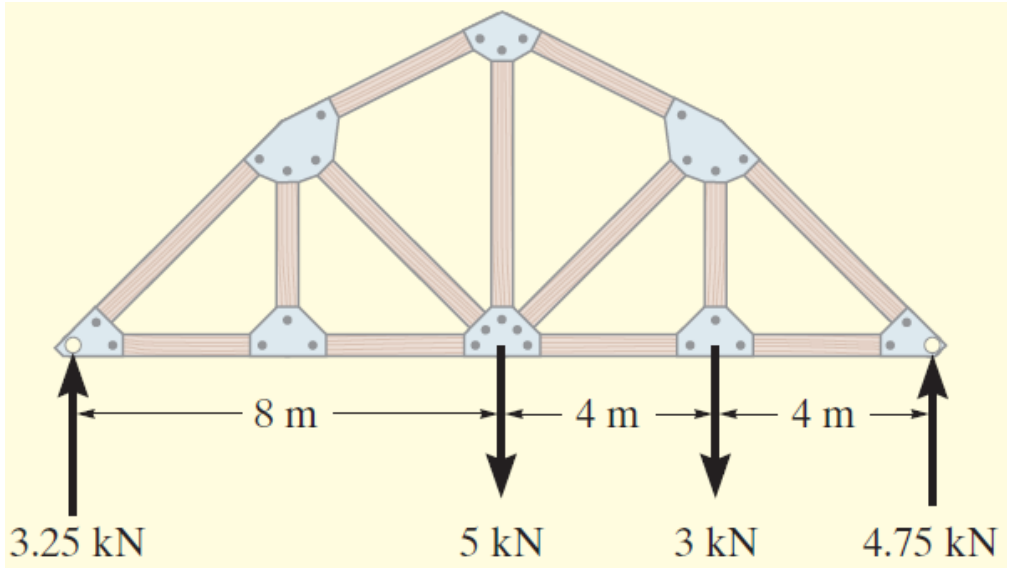
(a)

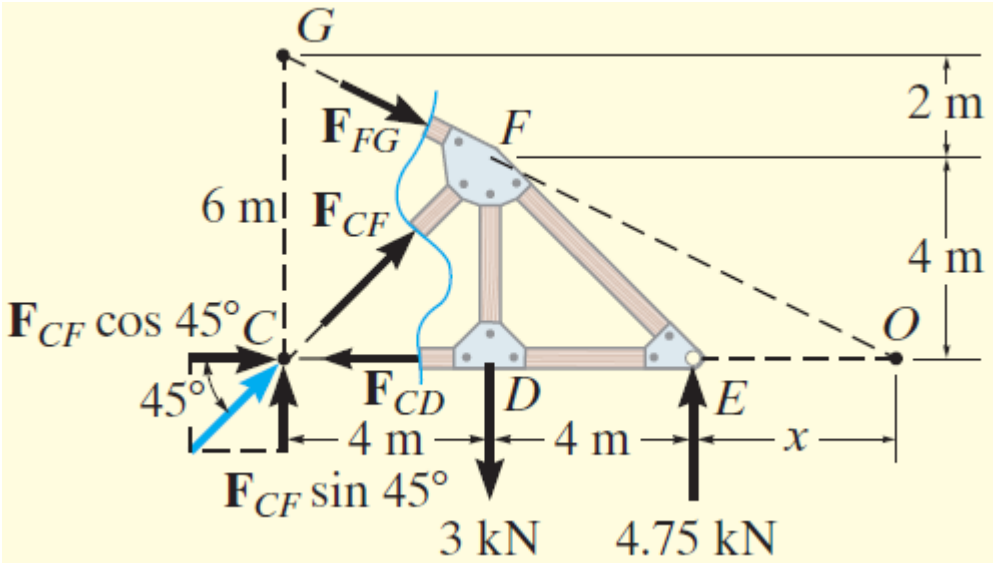
6. 4 The Method of Sections

Solution

FBD of the sectioned truss

- Three unknown F_{FG}, F_{CF}, F_{CD}

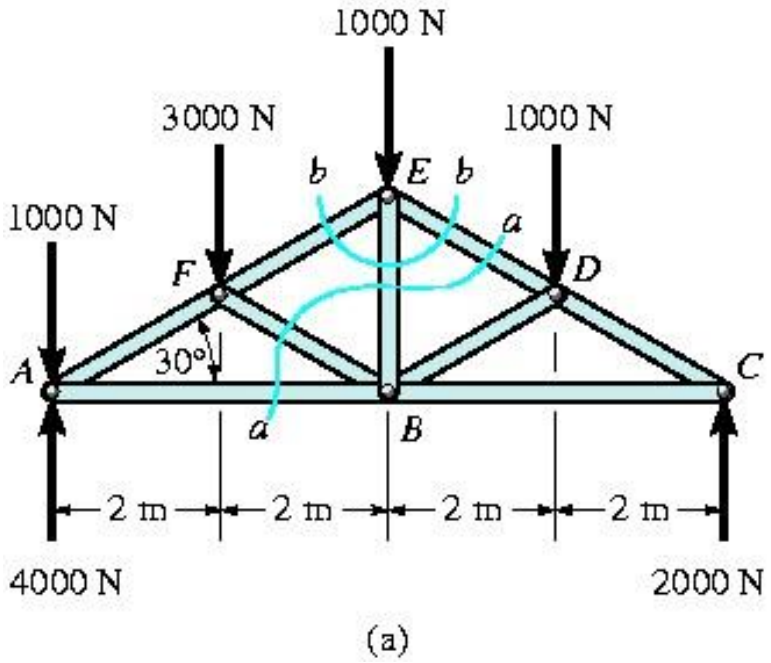




6. 4 The Method of Sections

Example 6.7

Draw the FBD of the sectioned truss for the force in member EB. Indicate whether the member are in tension or in compression.

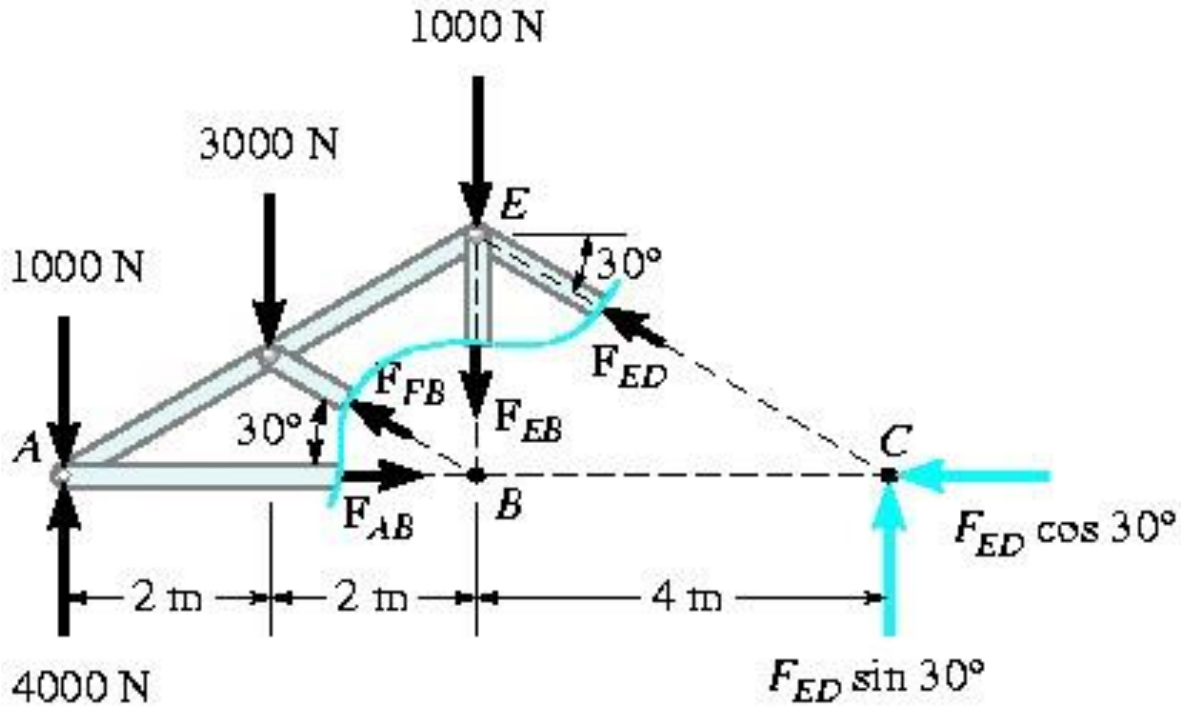


(a)

6. 4 The Method of Sections

Solution

FBD of the sectioned truss



(b)