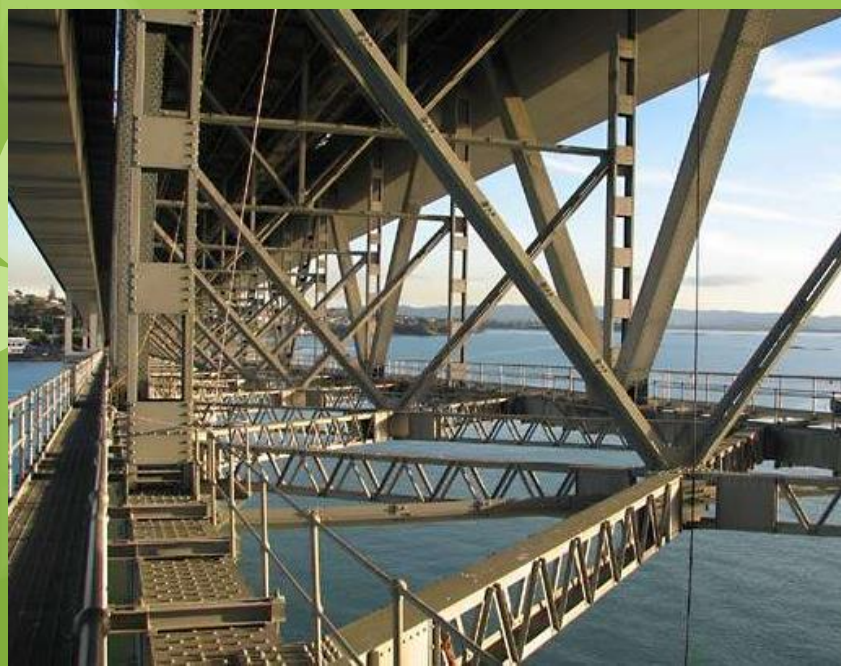


Structural Analysis (Truss)

Chapter objectives

- ✓ To show how to determine the forces in the members of a truss using the method of joints and the method of sections.
- ✓ To analyze the forces acting on the members of frames and machines composed of pin-connected members.



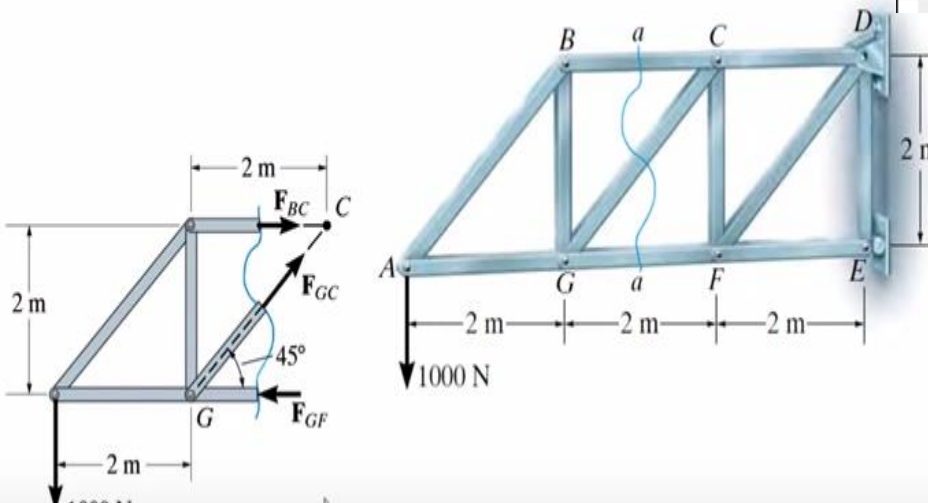
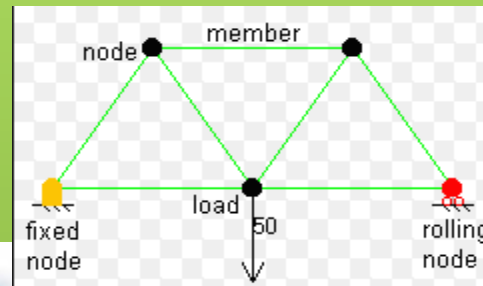
Simple Trusses

A truss is a structure composed of slender members joined together at their end points. The members commonly used in construction consist of wooden struts or metal bars.

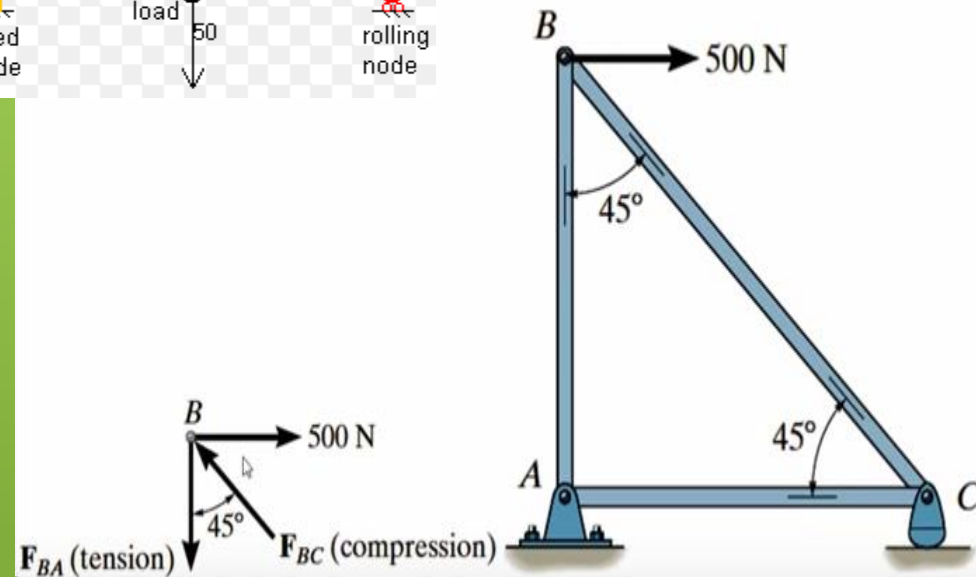
❖ There are two methods to analyze truss loads for each member:

❖ The Method of joint

❖ The Method of Sections



❖ The Method of Sections



❖ The Method of joint

1- Procedure for Analysis a truss by using the method of joints

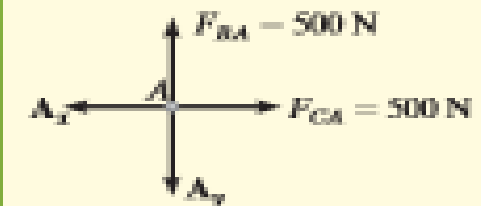
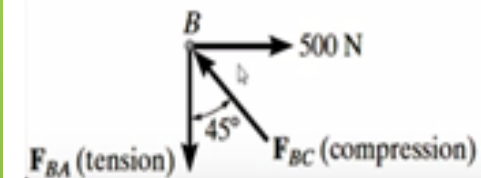
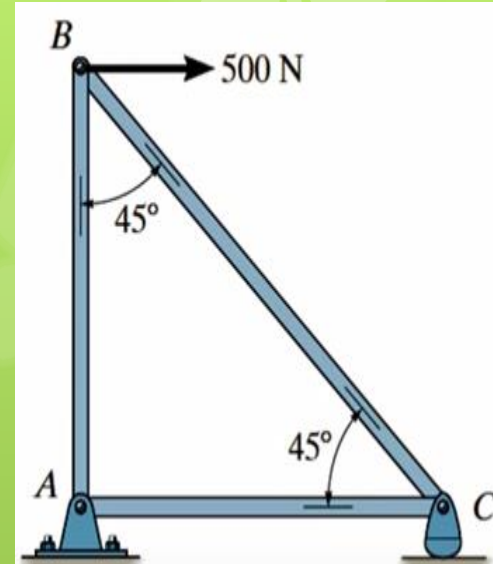
- ✓ Draw the free-body diagram of a joint having at least one known force and at most two unknown forces. (If this joint is at one of the supports, then it may be necessary first to calculate the external reactions at the support.)
 - ✓ Use one of the two methods described above for establishing the sense of an unknown force.
 - ✓ Orient the x and y axes such that the forces on the free-body diagram can be easily resolved into their x and y components and then apply the two force equilibrium equations and Solve for the two unknown member forces and verify their correct sense.
 - ✓ Using the calculated results, continue to analyze each of the other joints. Remember that a member in compression “pushes” on the joint and a member in tension “pulls” on the joint.
- Also, be sure to choose a joint having at most two unknowns and at least one known force.

2- Procedure for Analysis by the method of sections

- Make a decision on how to “cut” or section the truss through the members where forces are to be determined.
- Before isolating the appropriate section, it may first be necessary to determine the truss’s support reactions.
- Draw the free-body diagram of that segment of the sectioned truss which has the least number of forces acting on it.
- Use one of the two methods described above for establishing the sense of the unknown member forces. Equations of Equilibrium.
- Moments should be summed about a point that lies at the intersection of the lines of action of two unknown forces, so that the third unknown force can be determined directly from the moment equation.

Ex: Determine the force in each member of the truss shown in Fig. and indicate whether the members are in tension or compression.

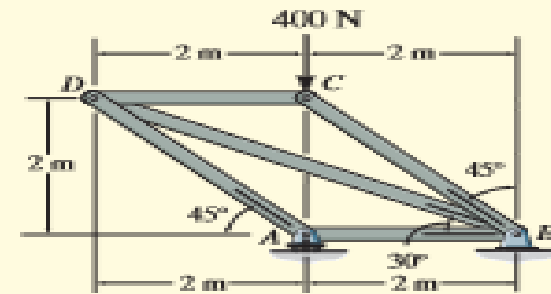
Solution:



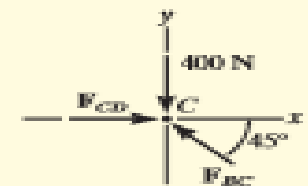
Answer: $F_{BC} = 707.1 \text{ N (C)}$ & $F_{BA} = 500 \text{ N (T)}$
 $F_{CA} = 500 \text{ N (T)}$ & $C_y = 500 \text{ N}$
 $A_x = 500 \text{ N}$ & $A_y = 500 \text{ N}$

Ex: Determine the force in each member of the truss in fig. a . And indicate if the members are in tension or compression.

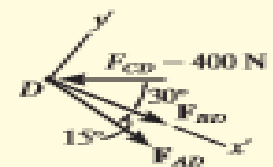
Solution:



(a)



(b)



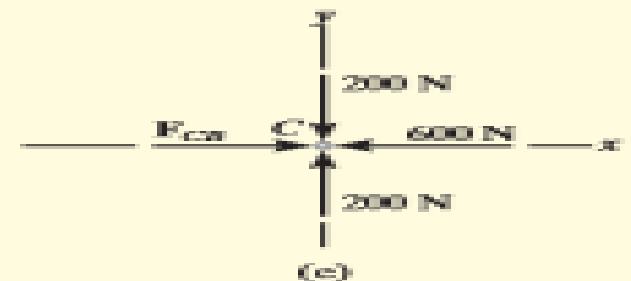
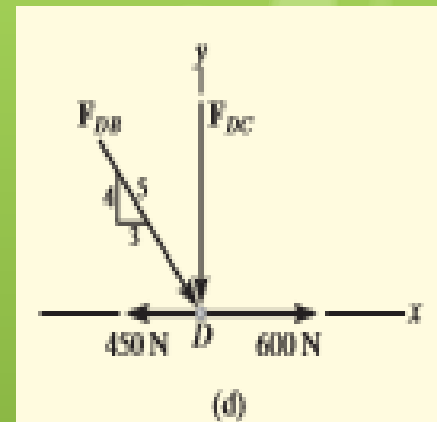
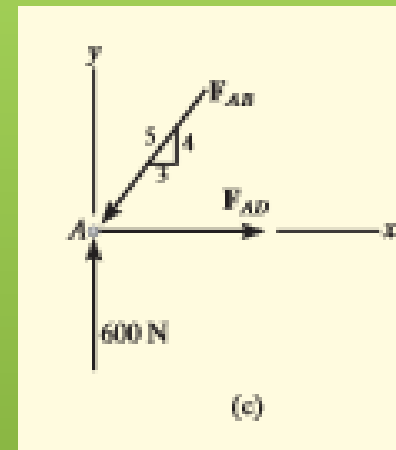
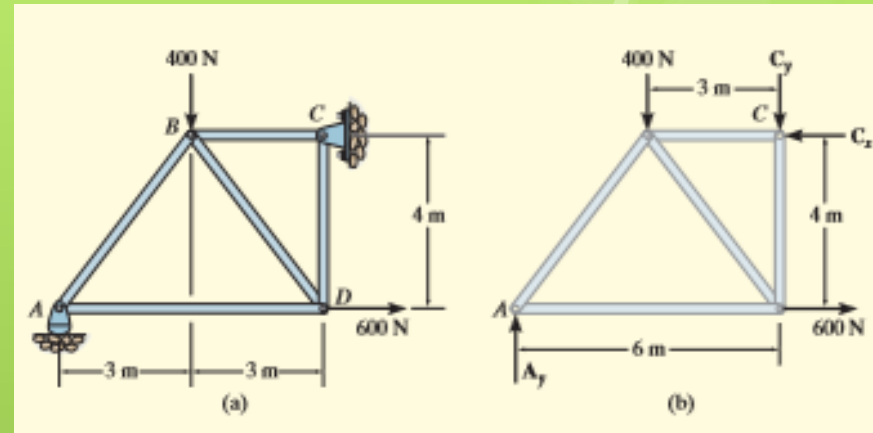
(c)



(d)

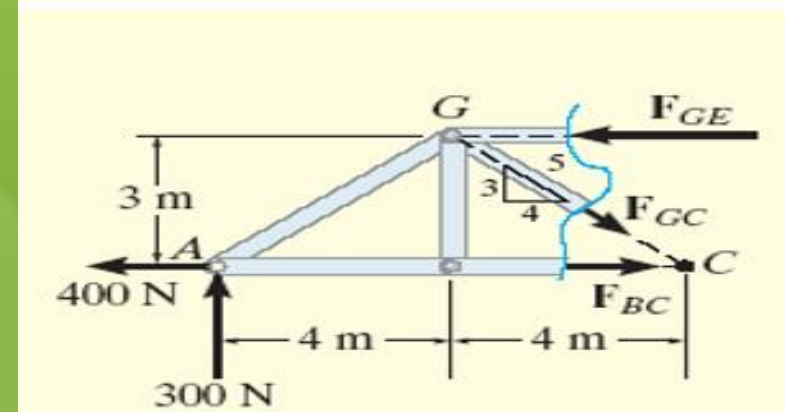
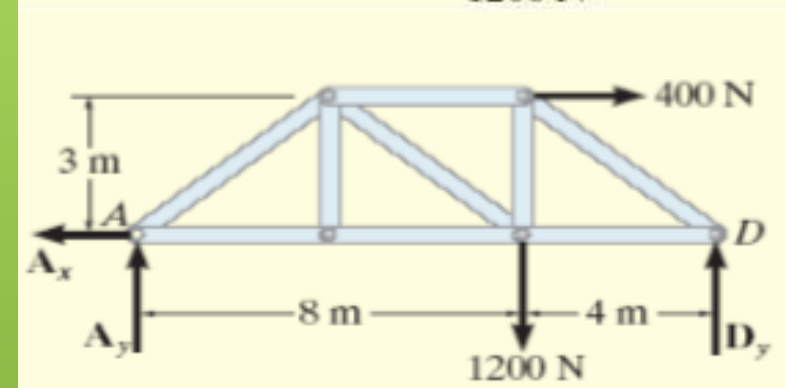
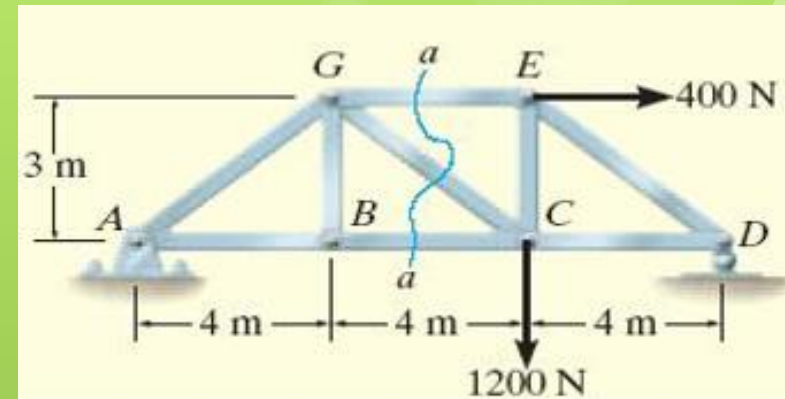
Ex: Determine the force in each member of the truss shown in Fig.a.
Indicate whether the members are in tension or compression.

Solution:

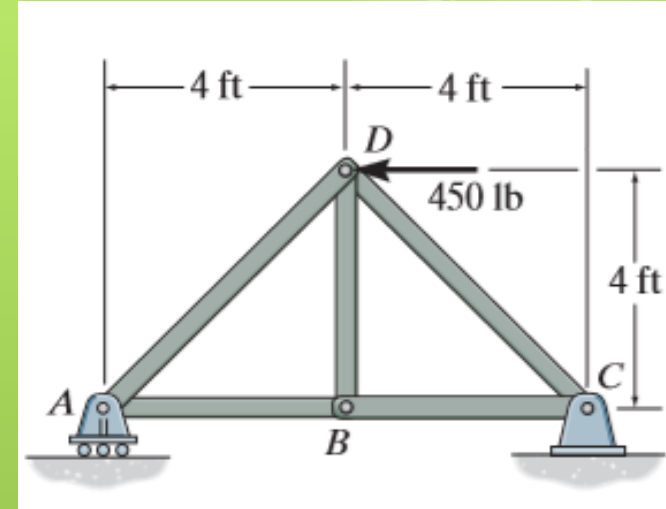


EX: Determine the force in members GE, GC, and BC of the truss. Indicate whether the members are in tension or compression.

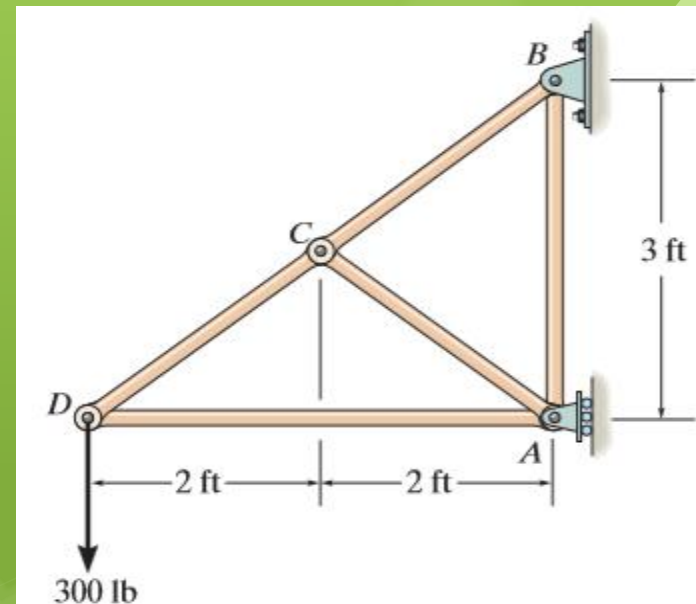
Solution:



H.W: Determine the force in each member of the truss. State if the members are in tension or compression



H.W: Determine the force in each member of the truss. State if the members are in tension or compression.



H.W: Determine the force in members EF, BF, and BC of the truss. State if the members are in tension or compression

