GNG 1105E – Engineering Mechanics

CHAPTER S4 – STRUCTURES

Assigned readings

4/1 Introduction

4/2 Plane trusses

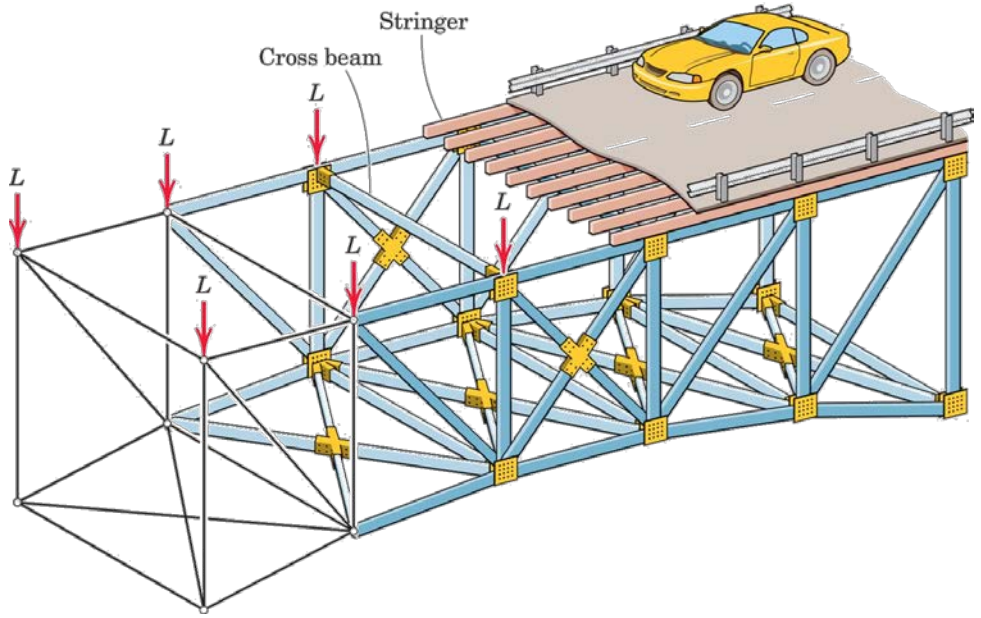
4/3 Method of joints

4/2 Plane trusses

Previously we have focused on **external forces** acting on a body

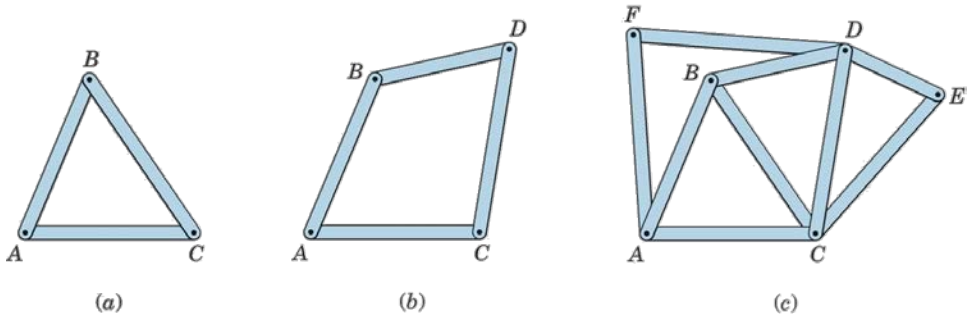
In this section, we will look at **internal forces**

Many trusses can be treated as 2-D structures

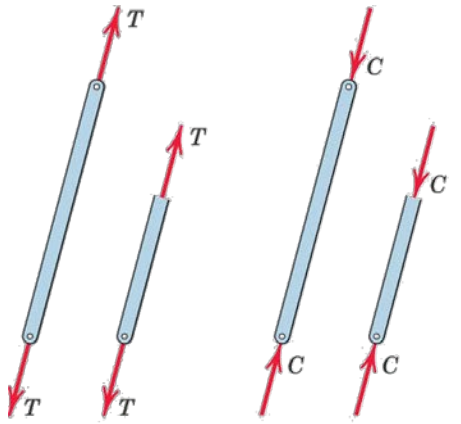


4/2 Plane trusses

A **simple truss** is built from basic triangles to make a rigid structure



Truss members are assumed to be pin-connected at their ends; therefore, all truss members must be **two-force members**



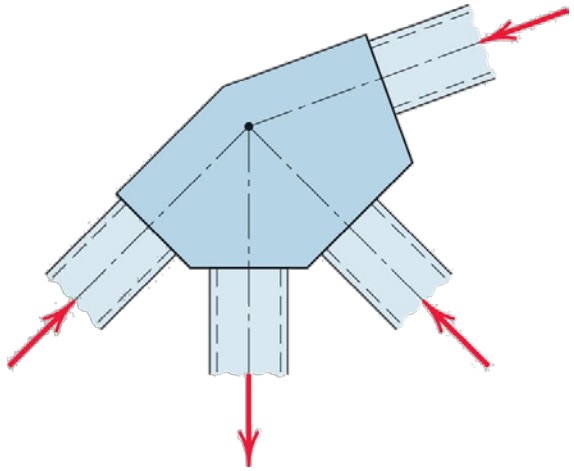
Two-Force Members

4/3 Method of joints

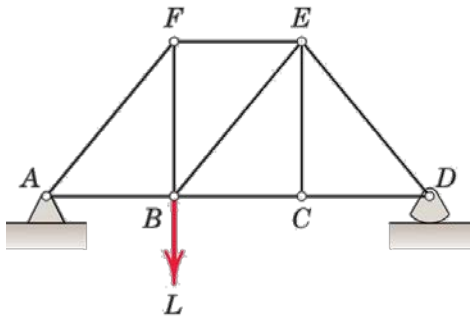
Since the overall structure is in equilibrium, each member and joint must also be in equilibrium

Each individual joint is analysed as a set of concurrent forces

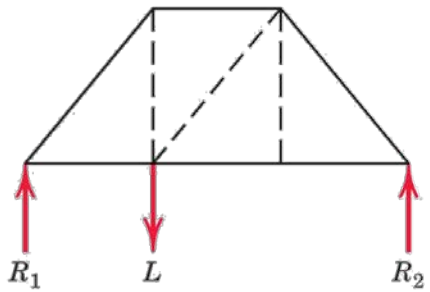
For each joint, two equations of equilibrium may be used to solve for up to two unknown forces



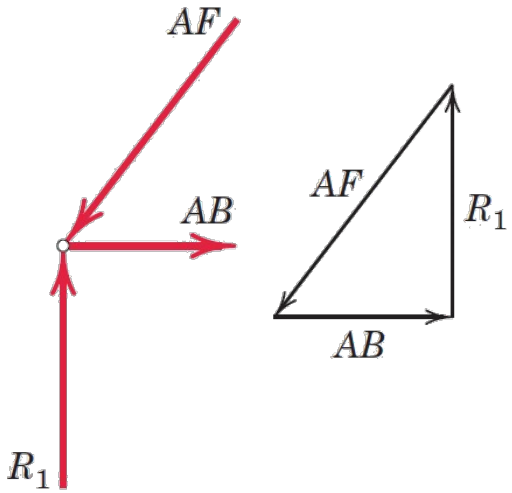
4/3 Method of joints

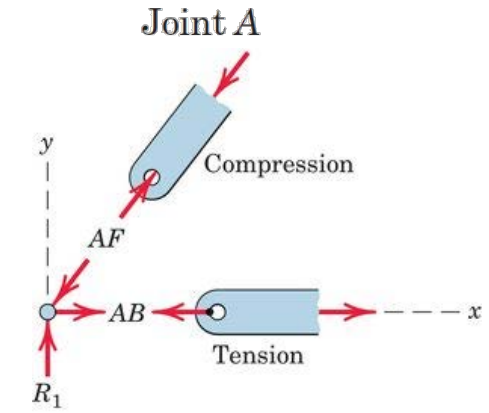


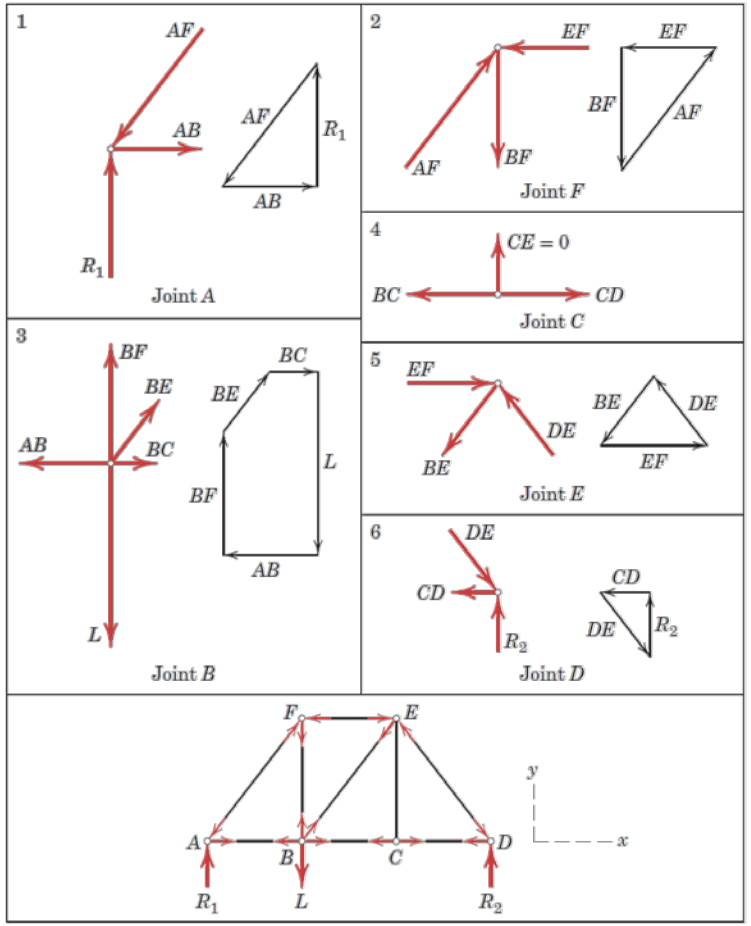
(a)



(b)

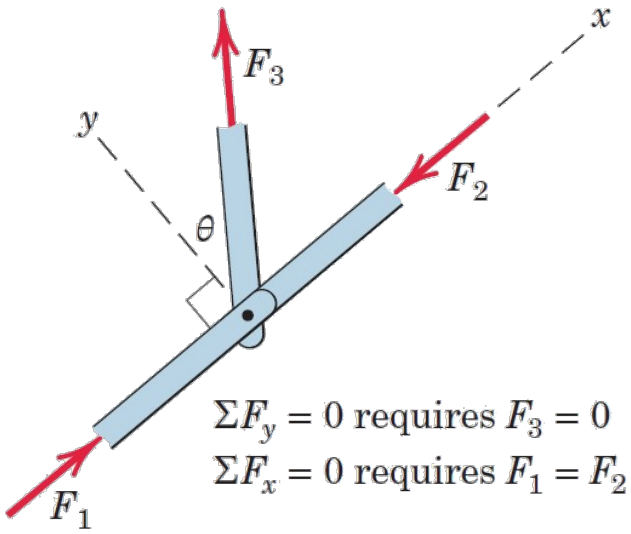


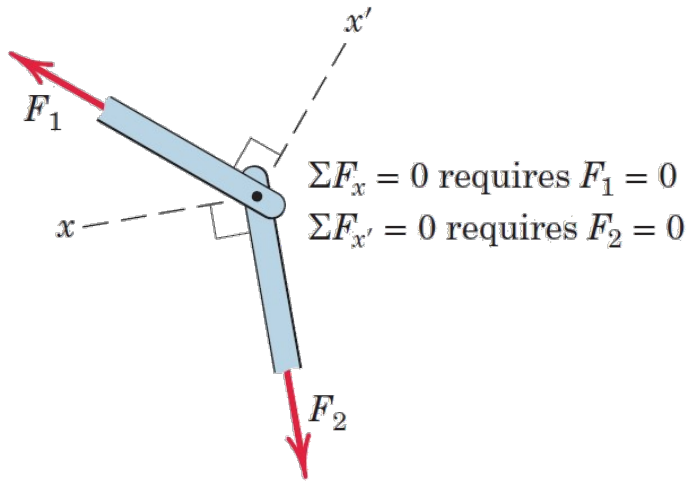




4/3 Method of joints

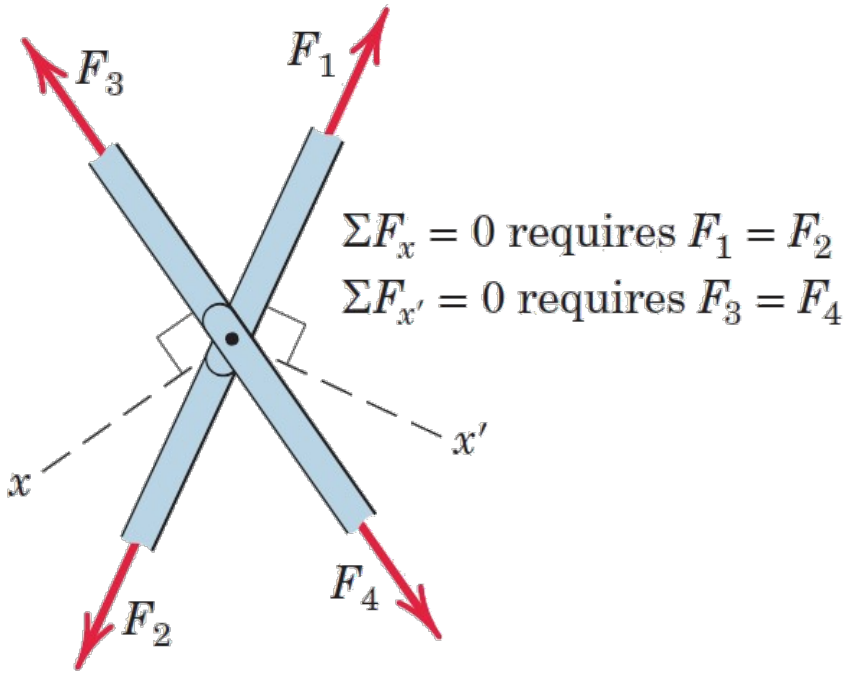
Special cases: **zero force members**





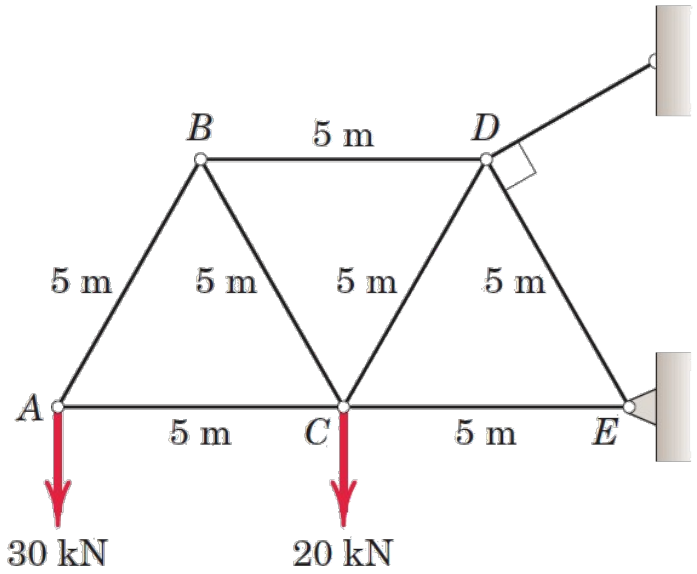
4/3 Method of joints

Special cases: collinear members

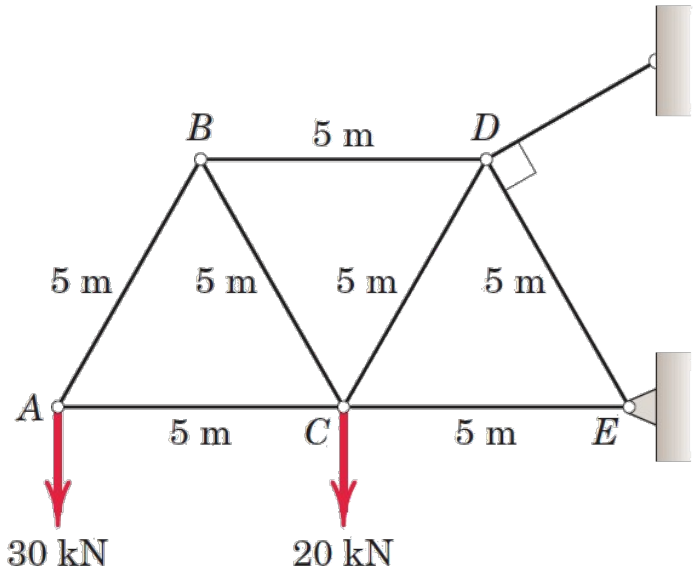


Sample problem 4/1

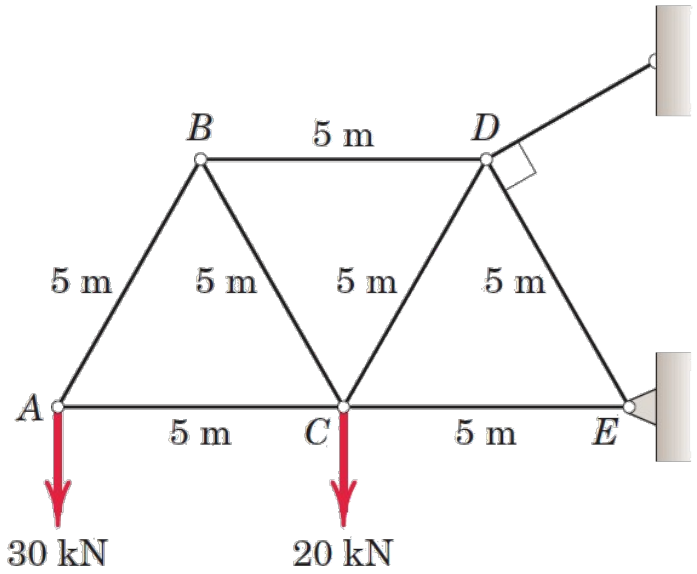
Compute the force in each member of the loaded cantilever truss by the method of joints.



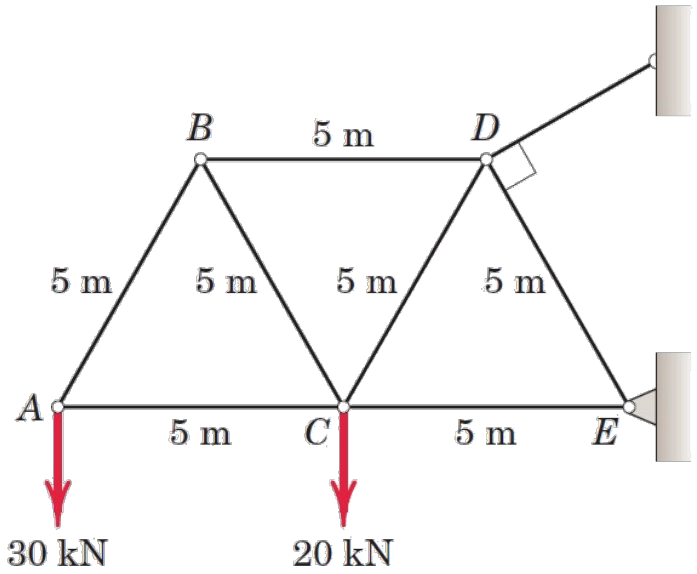
Sample problem 4/1



Sample problem 4/1

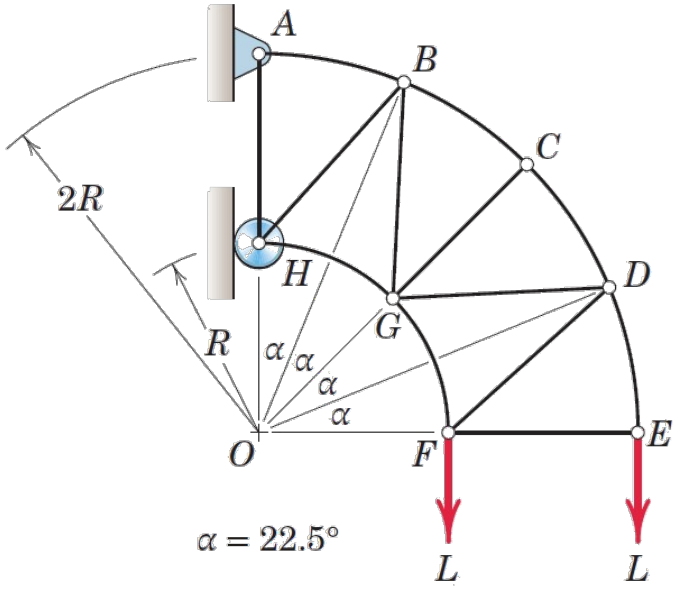


Sample problem 4/1

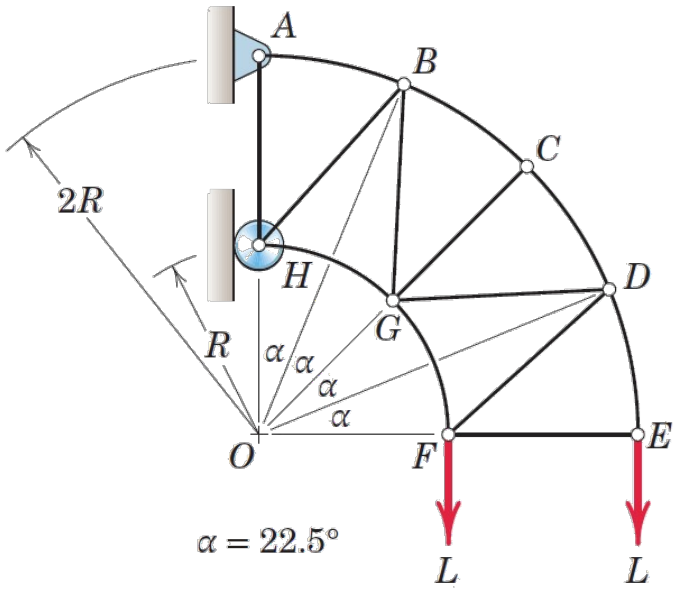


Sample problem 4/2

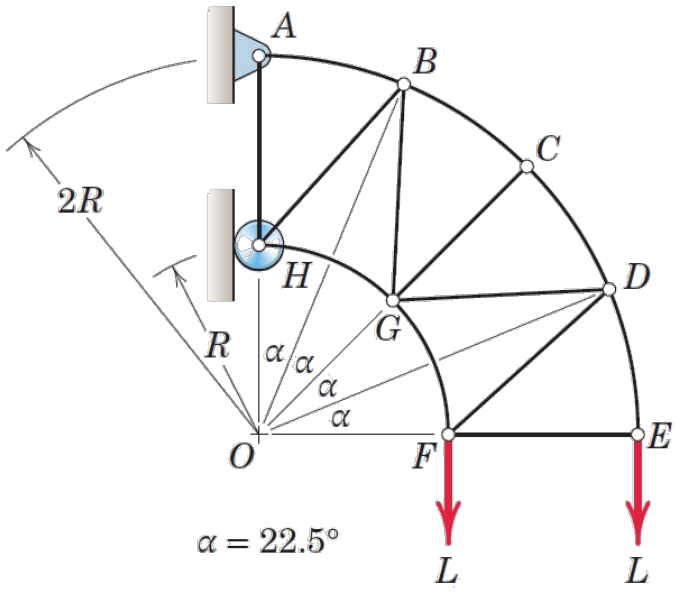
The simple truss shown supports the two loads, each of magnitude *L*. Determine the forces in members *DE*, *DF*, *DG*, and *CD*.



Sample problem 4/2



Sample problem 4/2



Sample problem 4/2