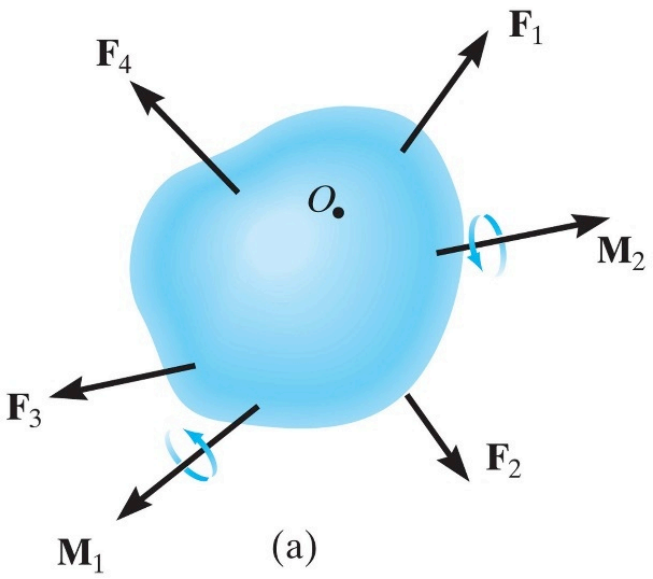
Announcements

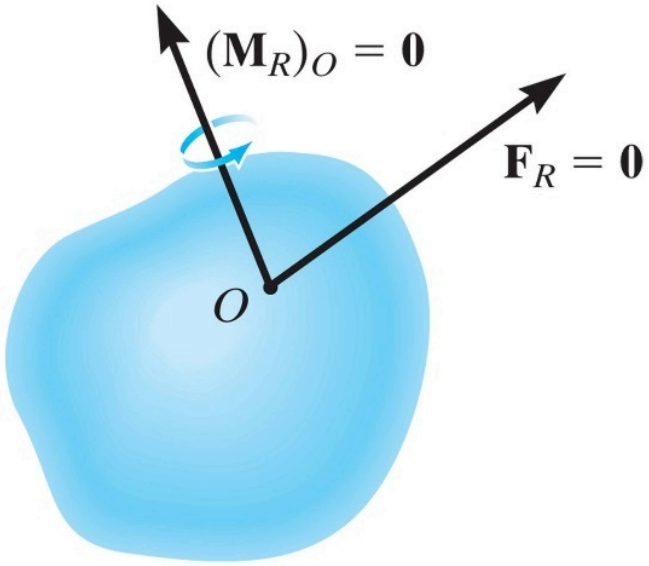
- In-class Quiz 3 next Monday (10/2)
  - DRES accommodations for in class quiz/final – make your appointment for Testing Accommodations Center (TAC) with DRES
  - DRES accommodations for CBTF –Talk to CBTF proctors directly prior to the exam

❑ Upcoming deadlines:

- Thursday (9/28)
  - ME HW9
- Tuesday (10/3)
  - PL HW10

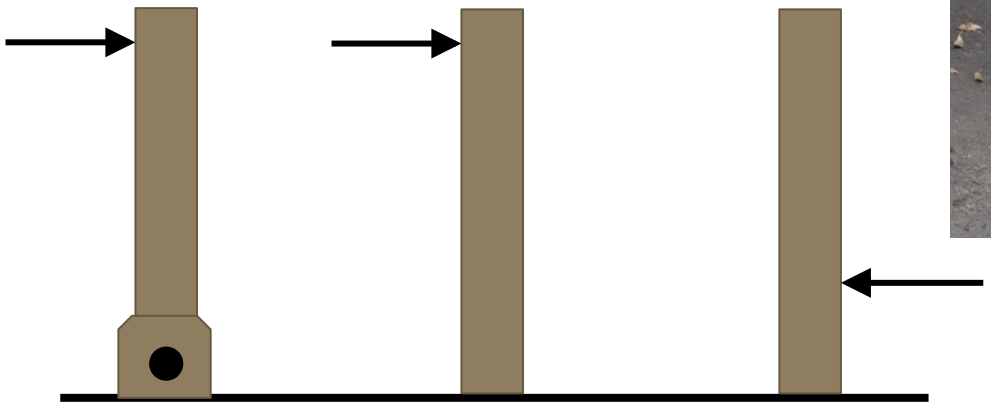
Recap: Equilibrium of a Rigid Body





Equilibrium in two-dimensional bodies

Active Forces vs. Support reactions

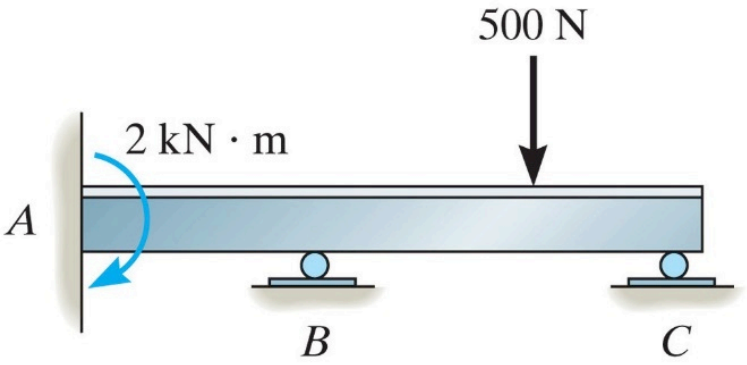


Equilibrium in two-dimensional bodies

Why different support?

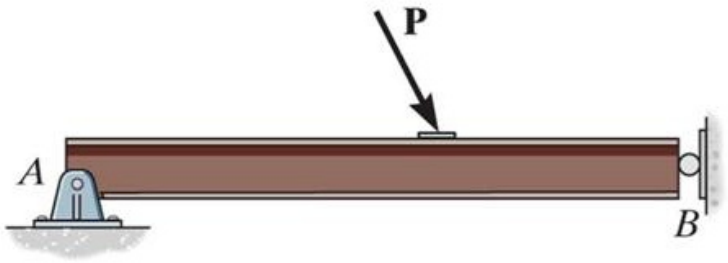
Constraints

To ensure equilibrium of a rigid body, it is not only necessary to satisfy equations of equilibrium, but the body must also be properly constrained by its supports



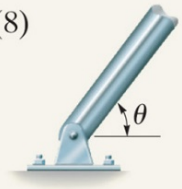
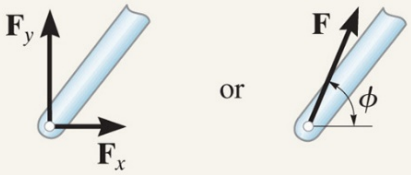
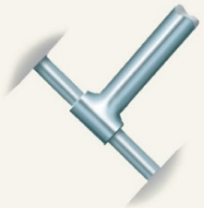
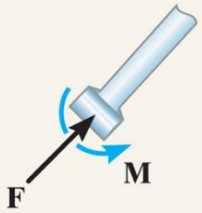
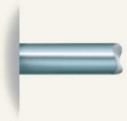
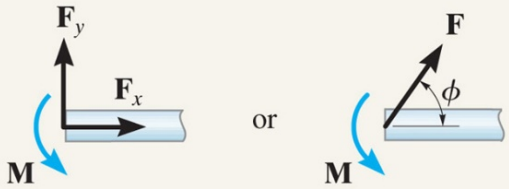
- **Redundant constraints**: the body has more supports than necessary to hold it in equilibrium; the problem is STATICALLY INDERTERMINATE and cannot be solved with statics alone

- **Improper constraints:** In some cases, there may be as many unknown reactions as there are equations of equilibrium. However, if the supports are not properly constrained, the body may become unstable for some loading cases.



Types of connectors

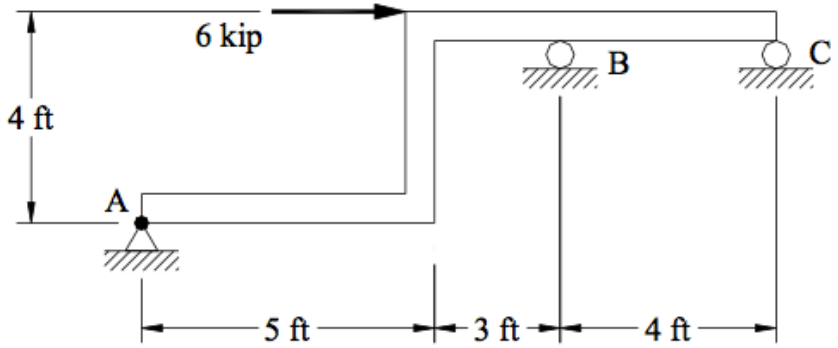
TABLE 5–1 Continued

Types of Connection	Reaction	Number of Unknowns
(8)  smooth pin or hinge		Two unknowns. The reactions are two components of force, or the magnitude and direction ϕ of the resultant force. Note that ϕ and θ are not necessarily equal [usually not, unless the rod shown is a link as in (2)].
(9)  member fixed connected to collar on smooth rod		Two unknowns. The reactions are the couple moment and the force which acts perpendicular to the rod.
(10)  fixed support		Three unknowns. The reactions are the couple moment and the two force components, or the couple moment and the magnitude and direction ϕ of the resultant force.

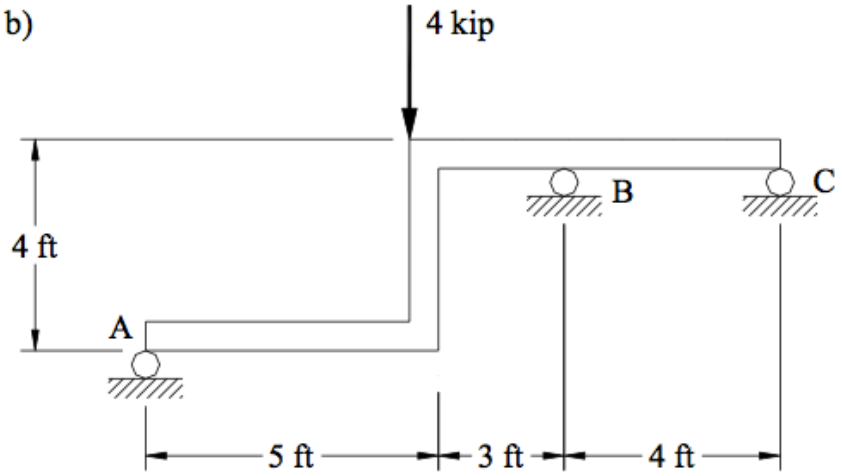
Constraints

Proper, redundant, or improper constraints

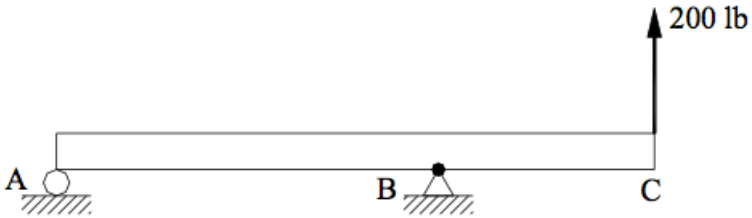
a)



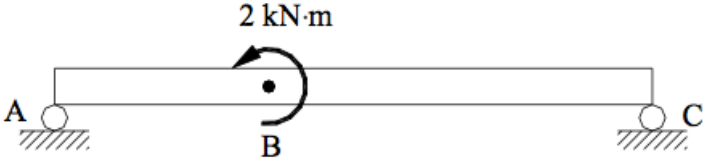
b)



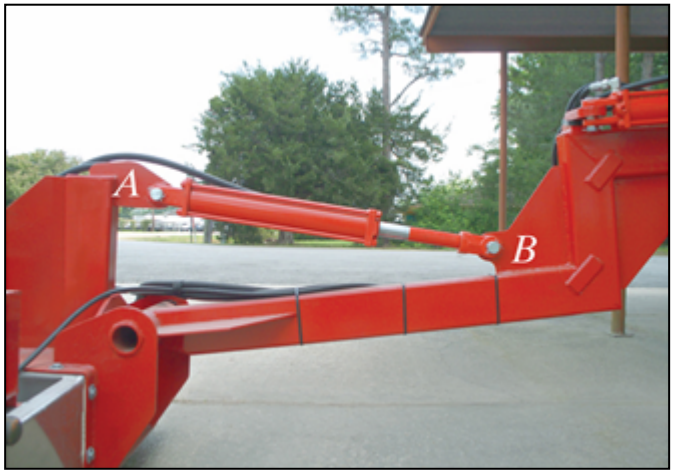
c)



d)



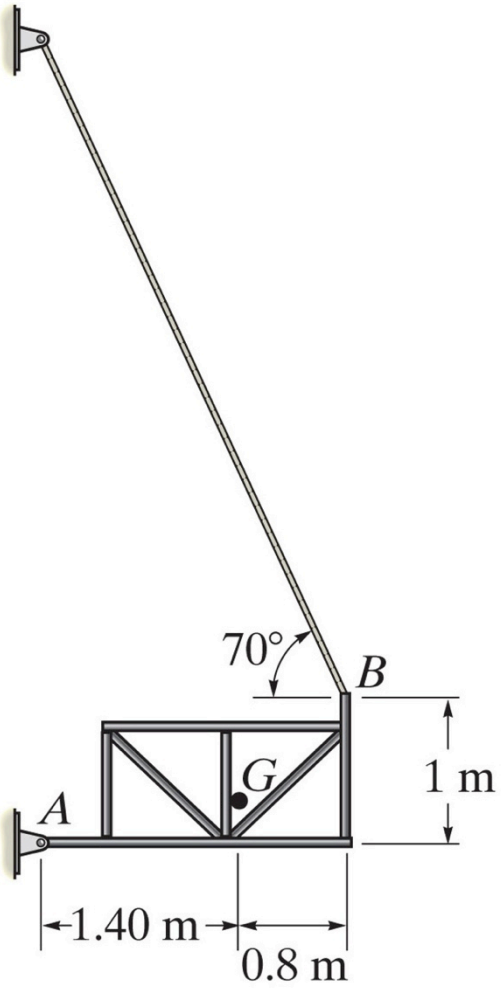
Two-force members



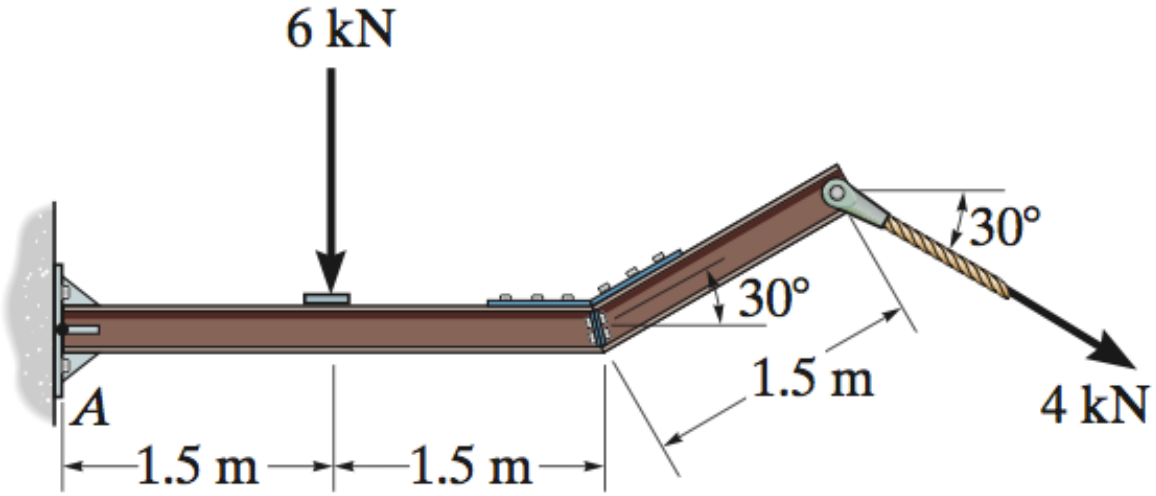
Members AB can be considered as two-force members, provided that their weight is neglected.

Three-force members

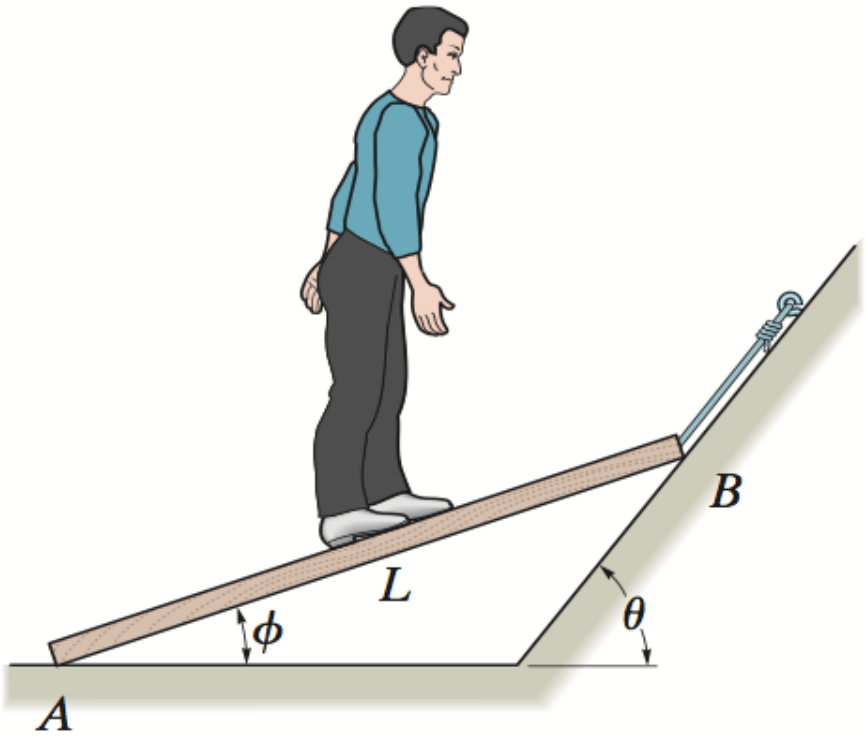
The platform has a mass of 200 kg. Find the support reactions.



Determine the components of the support reactions at the fixed support *A* on the cantilevered beam.



The man has a weight W and stands at the center of a plank with negligible weight. If the planes at A and B are smooth, determine the tension in the cord in terms of W and θ.



The uniform rod *AB* has a mass of 40 kg. Determine the force in the cable when the rod is in the position shown. There is a smooth collar at *A*.