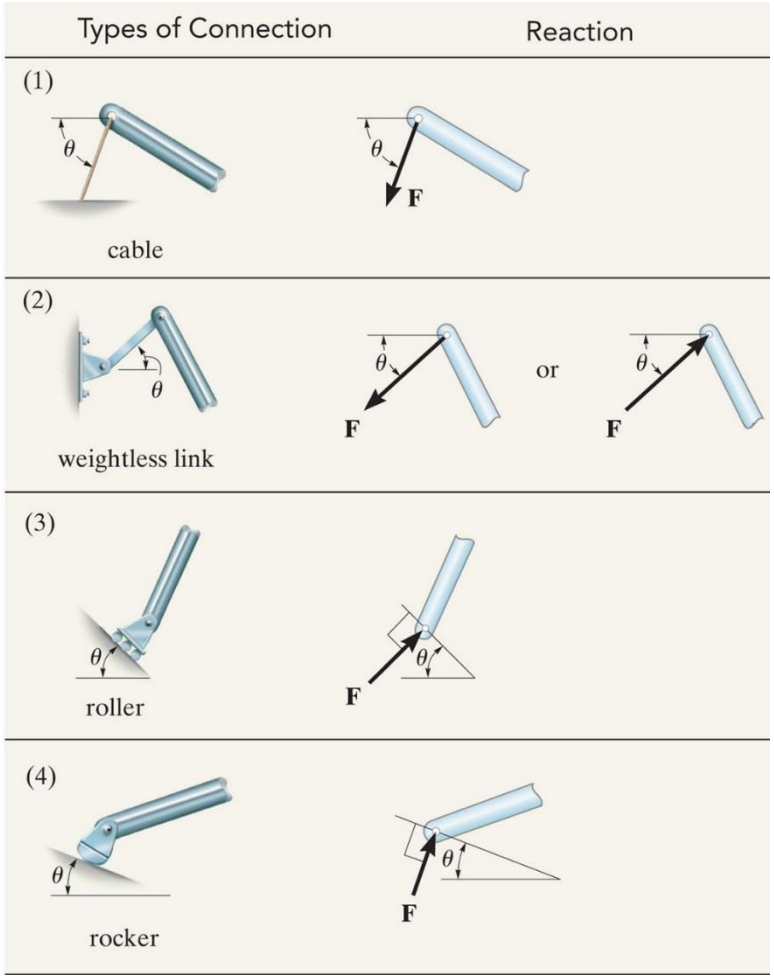
Chapter 5 Part II – 3-D Rigid Body

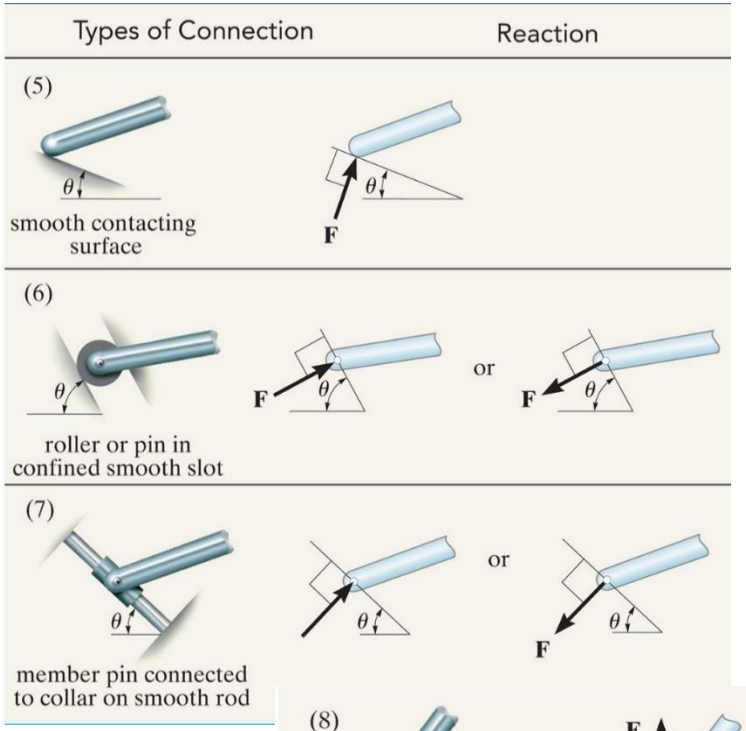
Equilibrium of a rigid body

Now we add the z-axis to the coordinate system!

6 Equations of Equilibriums:

Types of 2D connectors





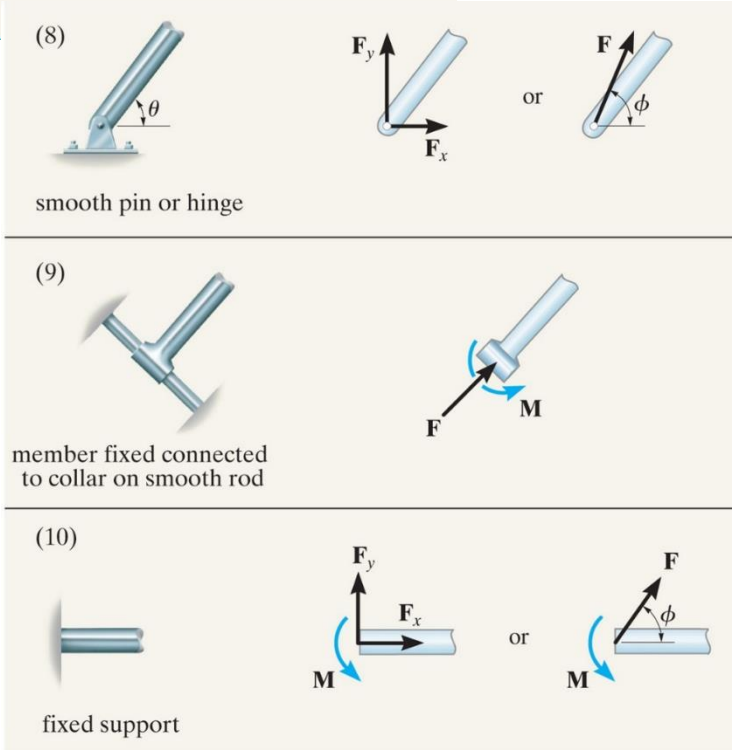


TABLE 5–2 Supports for Rigid Bodies Subjected to Three-Dimensional Force Systems

Types of Connection	Reaction	Number of Unknowns
(1) cable		
(2) smooth surface support		
(3) roller		

TABLE 5–2 Supports for Rigid Bodies Subjected to Three-Dimensional Force Systems

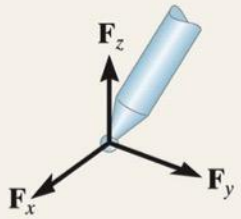
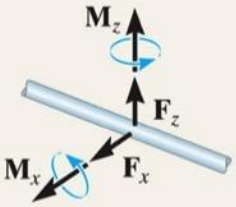
Types of Connection	Reaction	Number of Unknowns
(4) ball and socket		
(5) single journal bearing		

TABLE 5–2 Continued

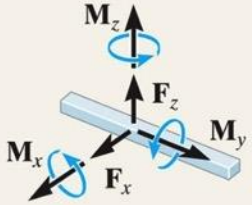
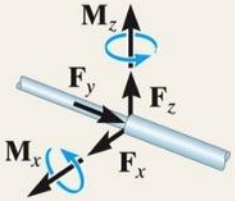
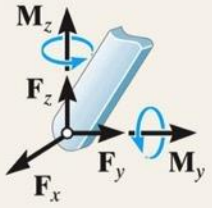
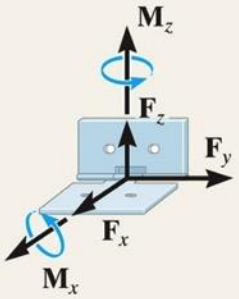
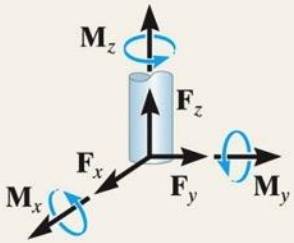
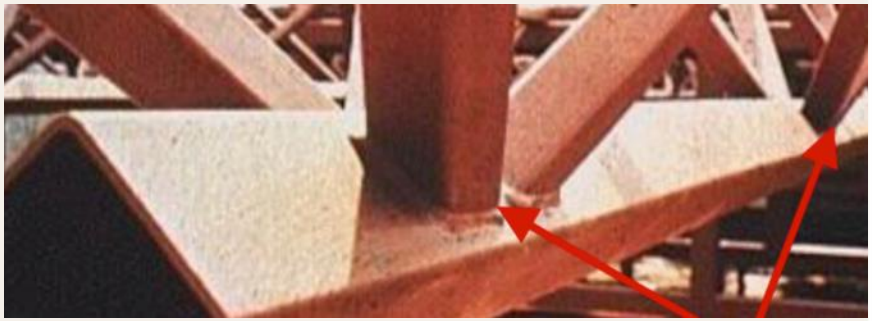
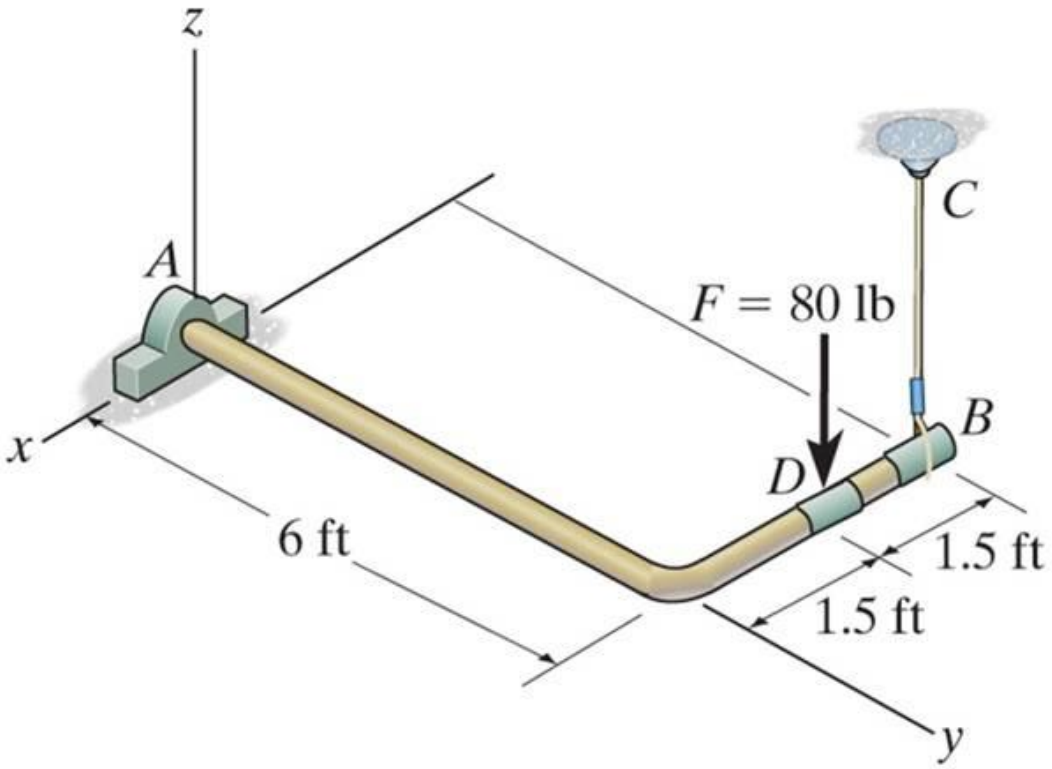
Types of Connection	Reaction	Number of Unknowns
(6) single journal bearing with square shaft		
(7) single thrust bearing		
(8) single smooth pin		

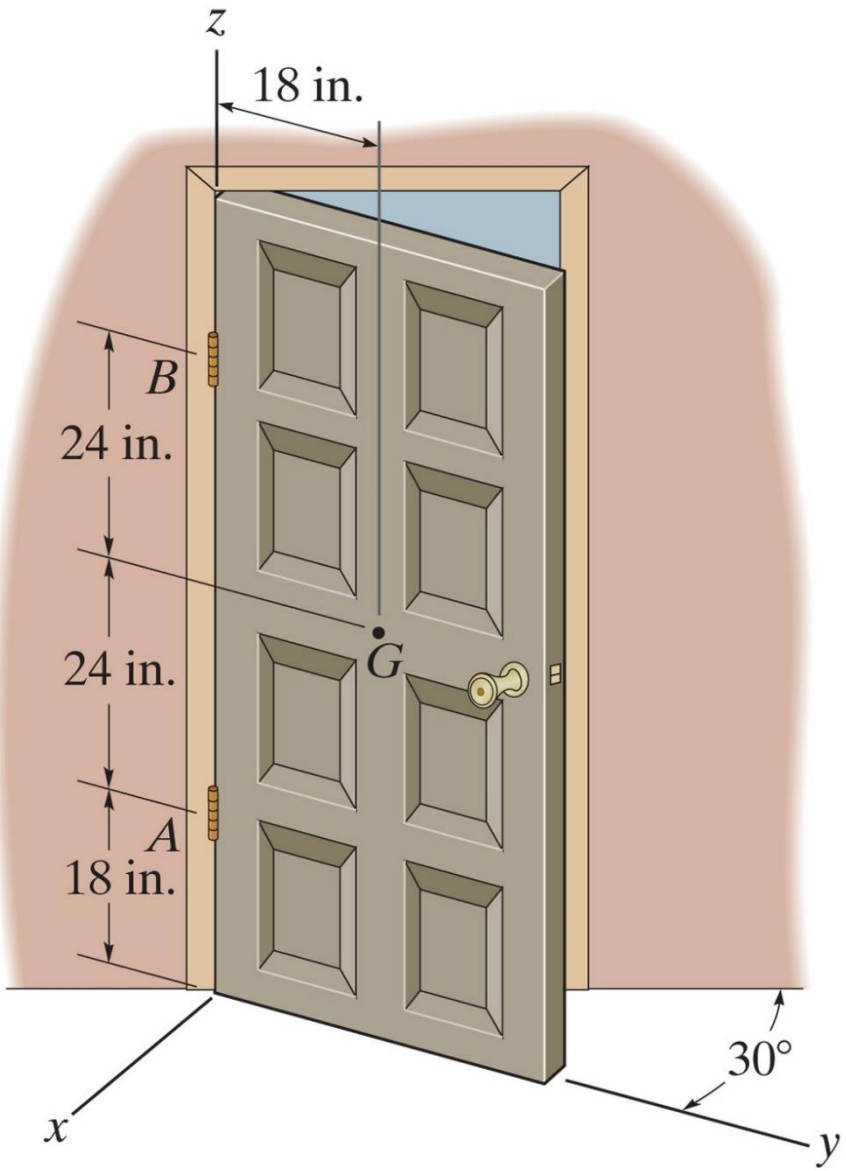
TABLE 5–2 Continued

Types of Connection	Reaction	Number of Unknowns
(9) single hinge		
(10) fixed support		

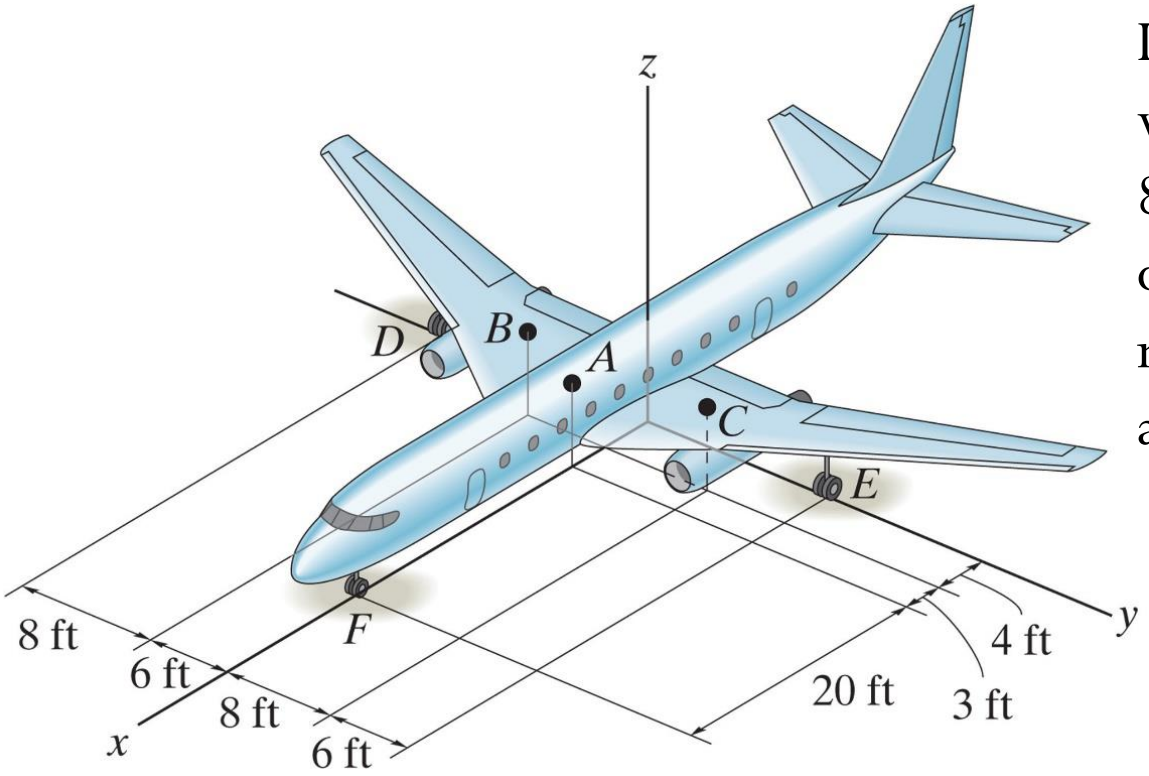


Given: The rod, supported by thrust bearing at A and cable BC, is subjected to an 80 lb force.

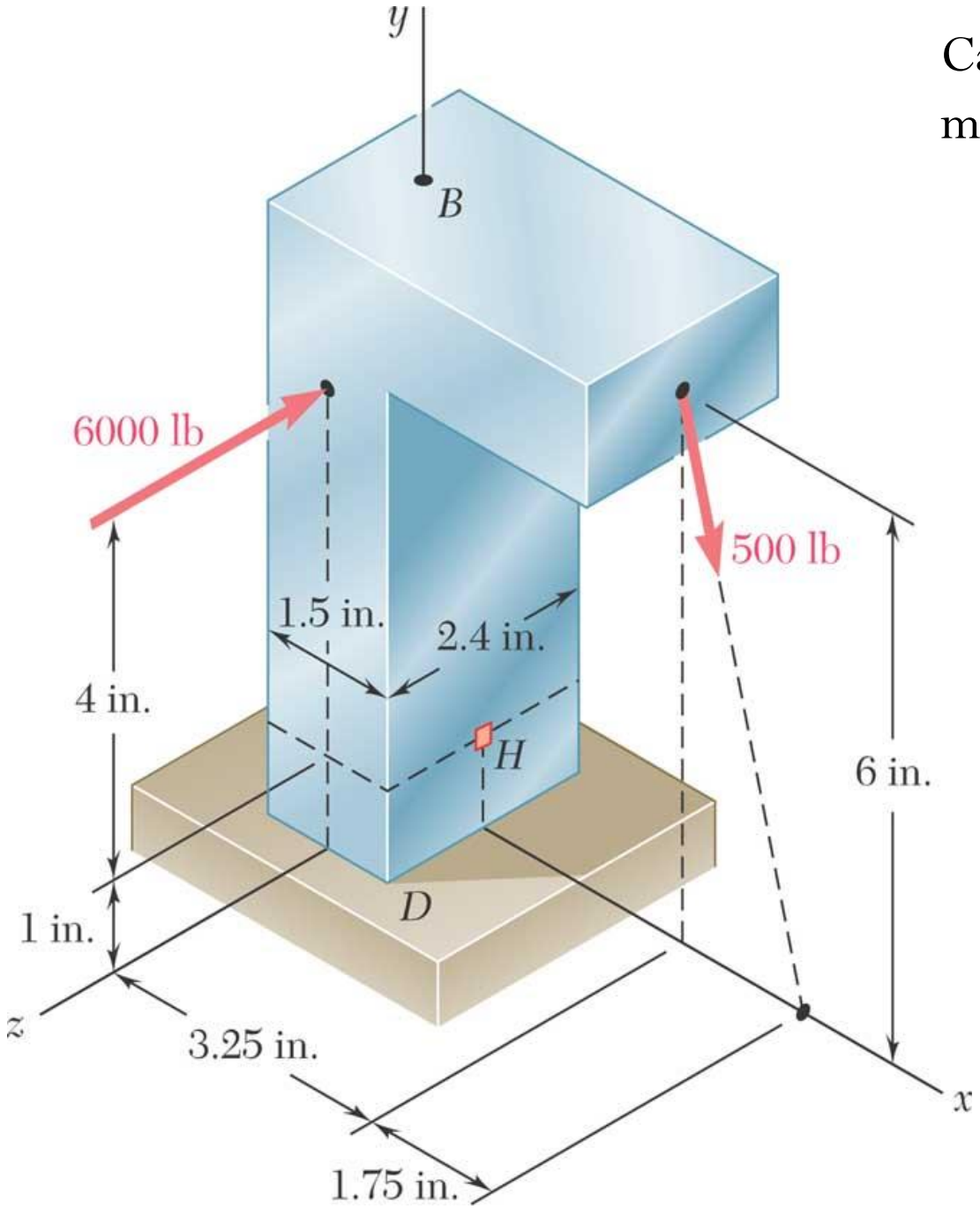
Find: Reactions at the thrust bearing A and cable BC.



The 100 lb door has its center of gravity at *G*. Determine the components of reaction at hinges *A* and *B* if hinge B resists only forces in the x and y directions and A resists forces in the x, y, z directions.



If these components have weights $W_A = 45000$ lb, $W_B = 8000$ lb and $W_C = 6000$ lb, determine the normal reactions of the wheels D, E, and F on the ground.

WEST
324A
Siegen Lane

Calculate the reaction forces and moments at the support