3

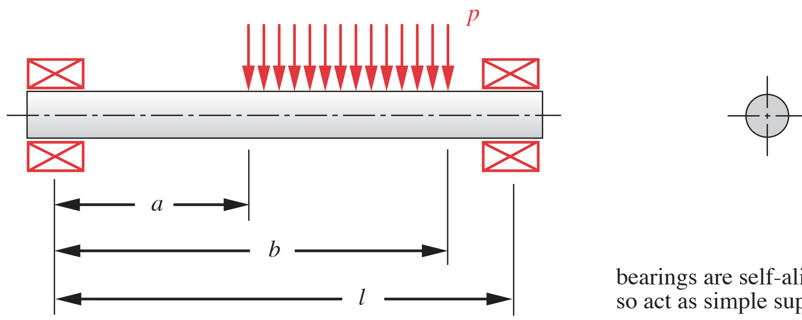

FIGURE P3-16

Problems 3-36 and 3-37

Table P3-3

Problem 3-44

R_{12}	13.20 in @ 135°
R_{14}	79.22 in @ 196°
R_{32}	0.80 in @ 45°
R_{34}	32.00 in @ 169°
R_{12}	124.44 in @ 185°
F_{cable}	2970 lb
W_2	598 lb
W_4	2706 lb
θ_3	98.5°

3-42 A 1000-kg speedboat reaches a speed of 16 kph at the instant it takes up the slack in a 100-m-long tow rope attached to a surfboard carrying a 100-kg passenger. If the rope has $k = 5$ N/m, what is the dynamic force exerted on the surfboard?

3-43 Figure P3-19 shows an oil-field pump jack. For the position shown, draw free-body diagrams of the crank (2), connecting rod (3) and walking beam (4) using variable names similar to those used in Case Studies 1A and 2A. Assume that the crank turns slowly enough that accelerations can be ignored. Include the weight acting at the CG of the walking beam and the crank but not the connecting rod.

3-44 For the pump jack of Problem 3-43 and the data of Table P3-3, determine the pin forces on the walking beam, connecting rod, and crank and the reaction torque on the crank.

3-45 Figure P3-20 shows an aircraft overhead bin mechanism in end view. For the position shown, draw free-body diagrams of links 2 and 4 and the door (3) using variable names similar to those used in Case Studies 1A and 2A. There are stops that prevent further clockwise motion of link 2 (and the identical link behind it at the other end of the door) resulting in horizontal forces being applied to the door at points A. Assume that the mechanism is symmetrical so that each set of links 2 and 4 carry one half of the door weight. Ignore the weight of links 2 and 4 as they are negligible.

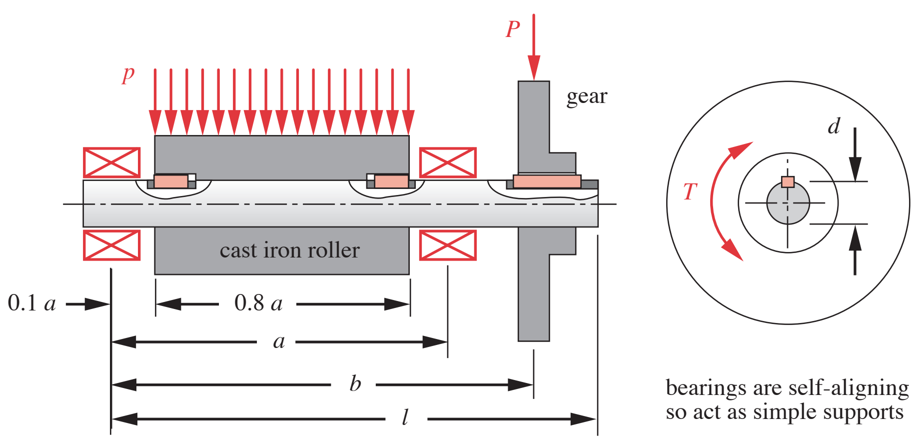

FIGURE P3-17

Problems 3-38 and 3-39

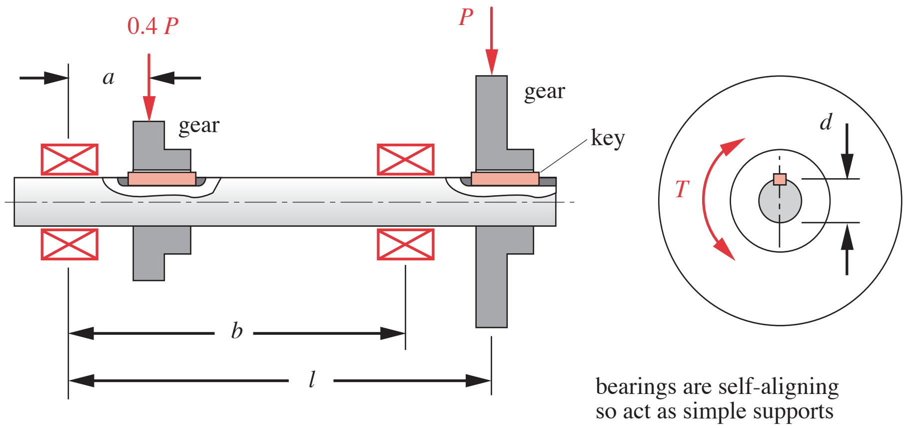

FIGURE P3-18

Problems 3-40 and 3-41

3

3-46 For the overhead bin mechanism of Problem 3-45 and the data of Table P3-4, determine the pin forces on the door (3), and links 2 & 4 and the reaction force on each of the two stops.

3-47 A particular automobile wheel suspension consists of two A-arms, the wheel (with tire), a coil spring, and a shock absorber (damper). The effective stiffness of the suspension (called the "ride rate") is a function of the coil spring stiffness and the tire stiffness. The A-arms are designed to give the wheel a nearly vertical displacement as the tire rides over bumps in the road. The entire assembly can be modeled as a spring-mass-damper system as shown in Figure 3-15(b). If the sprung mass (mass of the portion of the vehicle supported by the suspension system) weighs 675 lb, determine the ride rate that

Table P3-4

Problem 3-46

R_{23}	7.086 in @ 160.35°
R_{43}	7.086 in @ 27.86°
W_3	10.0 lb
θ_2	85.88°
θ_4	172.35°

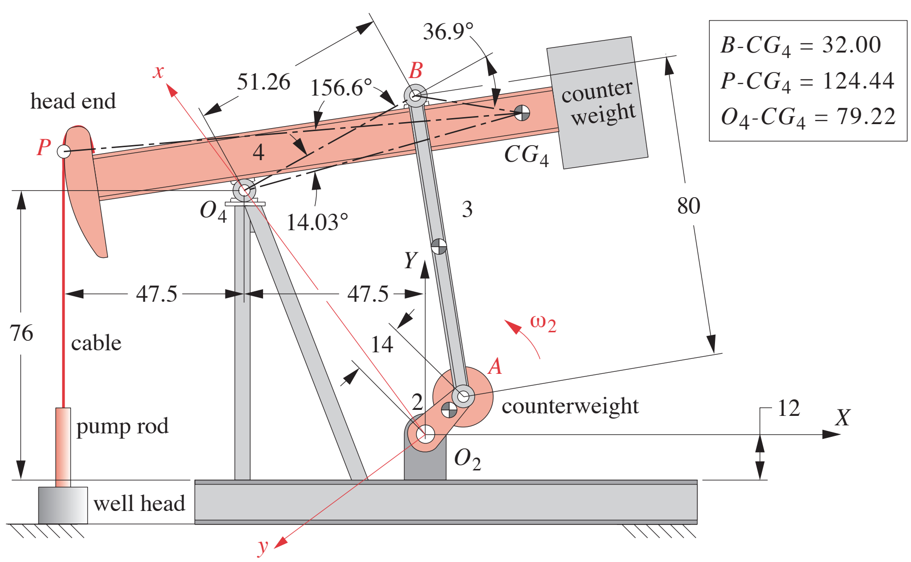

FIGURE P3-19

Problems 3-43 and 44