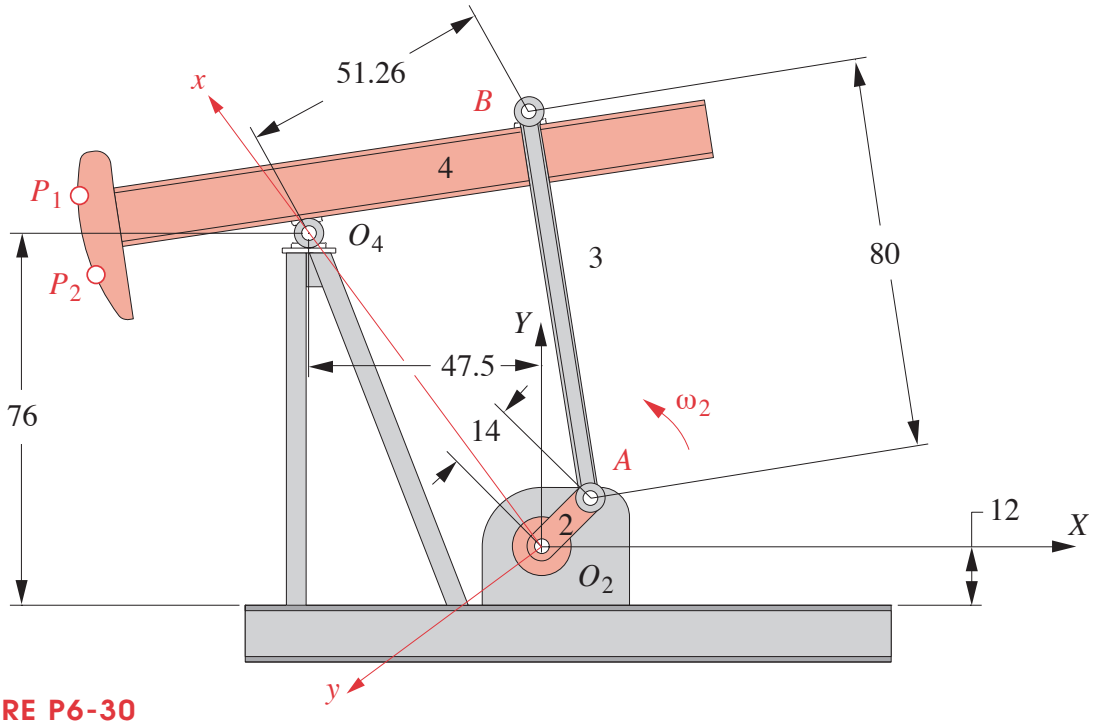

FIGURE P6-30

Problems 6-83 to 6-85 An oil field pump - dimensions in inches

6-83 Find all instant centers of the linkage in Figure P6-30 in the position shown.

6-84 Find the angular velocities of links 3 and 4 and the linear velocities of points A, B and P_1 in the XY coordinate system for the linkage in Figure P6-30 in the position shown. Assume that $\theta_2 = 45°$ in the XY-coordinate system and $\omega_2 = 10$ rad/sec. The coordinates of the point P_1 on link 4 are (114.68, 33.19) with respect to the xy coordinate system.

a. Using a graphical method.
b. Using the method of instant centers.
†c. Using an analytical method.

†6-85 Using the data from Problem 6-83, write a computer program or use an equation solver such as *Mathcad, Matlab*, or *TKSolver* to calculate and plot magnitude and direction of the absolute velocity of point P_1 in Figure P6-30 as a function of θ_2.

† These problems are suited to solution using *Mathcad, Matlab,* or *TKSolver* equation solver programs. In most cases, your solution can be checked with program FOURBAR.