

1. (15%) Determine the angular velocity of link AB at the instant shown in Fig. 1 if block C is moving upward at 12 in./s.

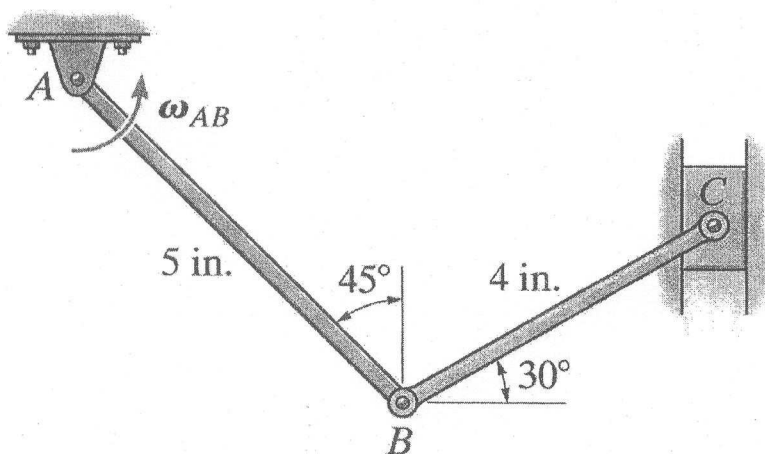


Fig. 1

2. (20%) The pendulum consists of a uniform 5-kg plate and a 2-kg slender rod. Determine the horizontal and vertical components of reaction that the pin O exerts on the rod at the instant $\theta = 30^\circ$, at which time its angular velocity is $\omega = 3 \text{ rad/s}$.

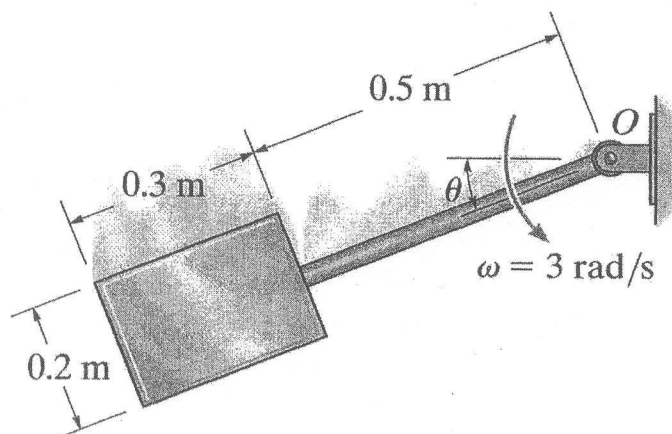


Fig. 2

3. (15%) The 10-lb slender rod is suspended from the pin at A , as shown in Fig. 3. If a 5-lb ball B is thrown at the rod and strikes its center with a horizontal velocity of 30 ft/s, determine the angular velocity of the rod just after impact. The coefficient of restitution is $e = 0.5$.

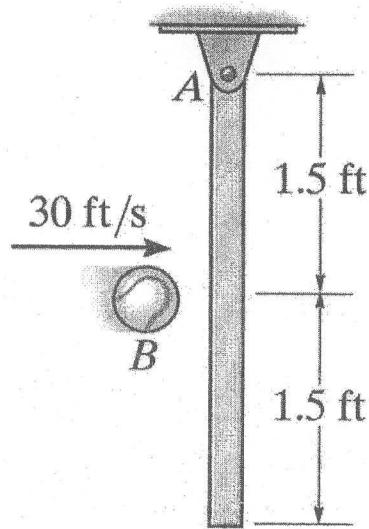


Fig. 3

4. (25%) A block B of mass m slide freely on a frictionless arm OA which rotates in a horizontal plane at a constant rate $\dot{\theta}_0$. Knowing that B is released at a distance r_0 from point o, find the answers of following questions as a function of r ,

- (a) The component v_r of the velocity of B along OA,
 (b) The magnitude of the force exerted on B by the arm OA.

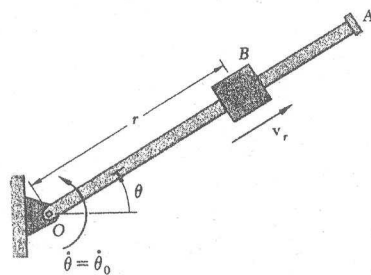


Fig. 4

5. (25%) The system shown in Fig. 5 is held in equilibrium by a vertical force P applied at point E. Knowing that $\theta = 60$ degree, determine the magnitude of P and the reactions at A and B.

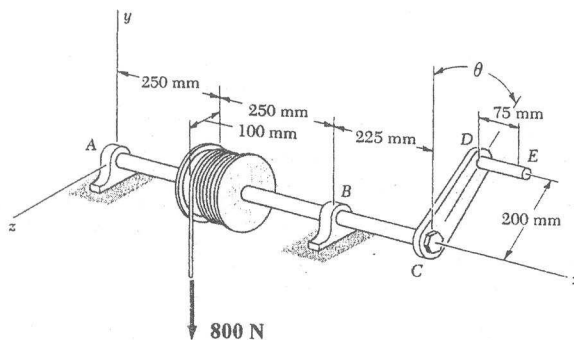


Fig. 5