1. The two blocks shown are originally at rest. Neglecting the masses of the pulleys and the effect of friction in the pulleys and between the blocks and the incline, determine the acceleration of block B. (25%)

2. Two steel blocks slide without friction on a horizontal surface; immediately before impact their velocities are as shown. Knowing that $e = 0.75$, determine their velocities after impact. (25%)

3. Two small spheres A and B, respectively of mass m and $2m$, are connected by a rigid rod of length l and negligible mass. The two spheres are resting on a horizontal, frictionless surface when A is suddenly given the velocity $\mathbf{v}_0 = v_0\mathbf{i}$. Determine (a) the linear momentum of the system and its angular momentum about its mass center G, (b) the velocities of A and B after the rod AB has rotated through 180°. (25%)

4. Two slender rods, each of length l and mass m, are released from rest in the position shown. Knowing that a small frictionless knob at end B of rod AB bears on rod CD, determine immediately after releases (a) the acceleration of end C of rod CD, (b) the force exerted on knob B. (25%)
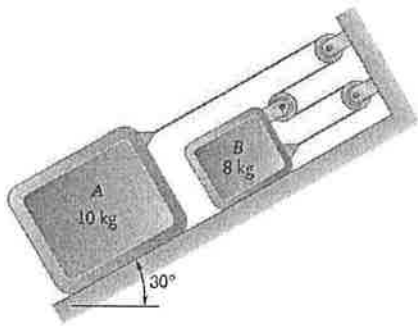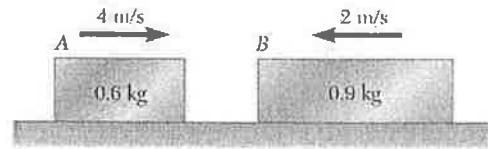

Fig. 1

Fig. 2

Fig. 3
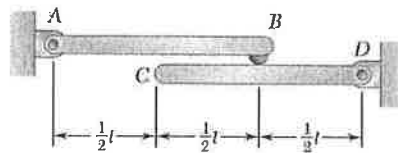

Fig. 4