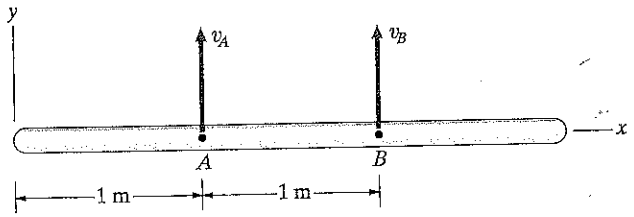
Problems

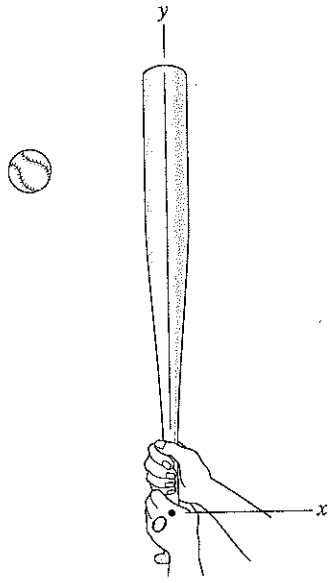
17.64 If the bar has a clockwise angular velocity of 10 rad/s and $v_A = 20$ m/s, what are the coordinates of the instantaneous center of the bar, and what is the value of v_B?

17.65 If $v_A = 24$ m/s and $v_B = 36$ m/s, what are the coordinates of the instantaneous center of the bar, and what is its angular velocity?



Problems 17.64/17.65

17.66 The velocity of point O of the bat is $\mathbf{v}_O = -6\mathbf{i} - 14\mathbf{j}$ (ft/s), and the bat rotates about the z axis with a counterclockwise angular velocity of 4 rad/s. What are the x and y coordinates of the bat's instantaneous center?

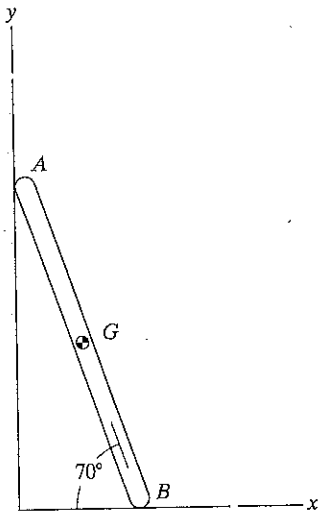


Problem 17.66

17.67 Points A and B of the 1-m bar slide on the plane surfaces. The velocity of B is $\mathbf{v}_B = 2\mathbf{i}$ (m/s).

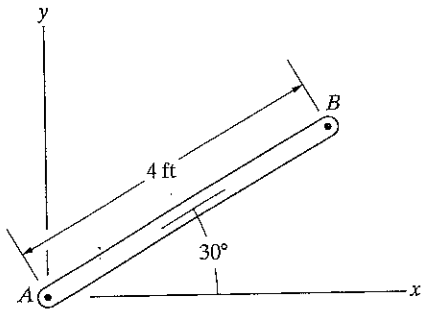
(a) What are the coordinates of the instantaneous center of the bar?

(b) Use the instantaneous center to determine the velocity of A.



Problem 17.67

17.68 The bar is in two-dimensional motion in the x–y plane. The velocity of point A is $\mathbf{v}_A = 8\mathbf{i}$ (ft/s), and B is moving in the direction parallel to the bar. Determine the velocity of B (a) by using Eq. (17.6) and (b) by using the instantaneous center of the bar.

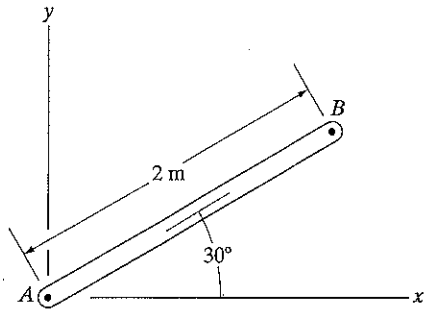


Problem 17.68

17.69 Point A of the bar is moving at 8 m/s in the direction of the unit vector $0.966\mathbf{i} - 0.259\mathbf{j}$, and point B is moving in the direction of the unit vector $0.766\mathbf{i} + 0.643\mathbf{j}$.

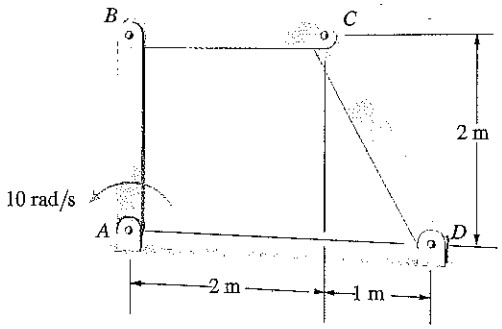
(a) What are the coordinates of the bar's instantaneous center?

(b) What is the bar's angular velocity?



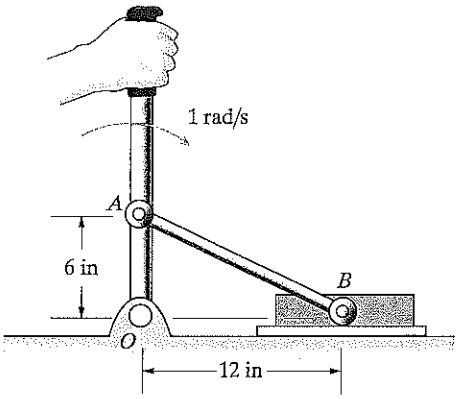
Problem 17.69

▶ 17.70 Bar AB rotates with a counterclockwise angular velocity of 10 rad/s. At the instant shown, what are the angular velocities of bars BC and CD? (See Active Example 17.4.)



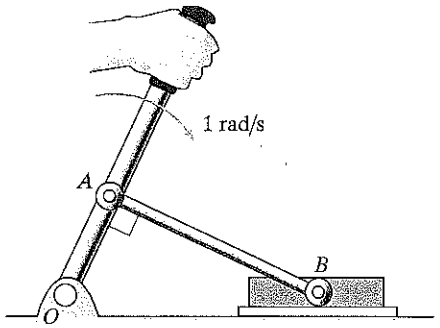
Problem 17.70

17.71 Use instantaneous centers to determine the horizontal velocity of B.



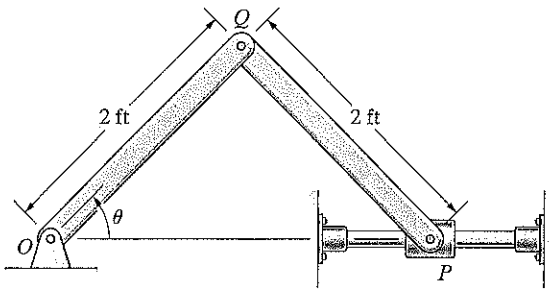
Problem 17.71

17.72 When the mechanism in Problem 17.71 is in the position shown here, use instantaneous centers to determine the horizontal velocity of B.



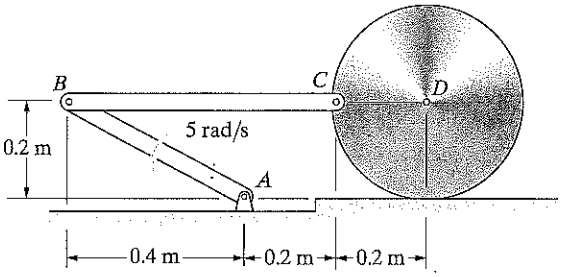
Problem 17.72

17.73 The angle $\theta = 45°$, and bar OQ is rotating in the counterclockwise direction at 0.2 rad/s. Use instantaneous centers to determine the velocity of the sleeve P.



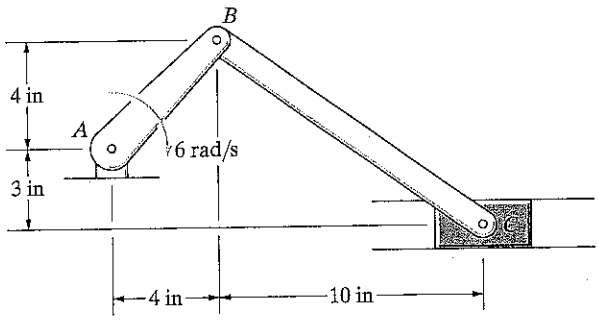
Problem 17.73

17.74 Bar AB is rotating in the counterclockwise direction at 5 rad/s. The disk rolls on the horizontal surface. Determine the angular velocity of bar BC.



Problem 17.74

17.75 Bar AB rotates at 6 rad/s in the clockwise direction. Use instantaneous centers to determine the angular velocity of bar BC.

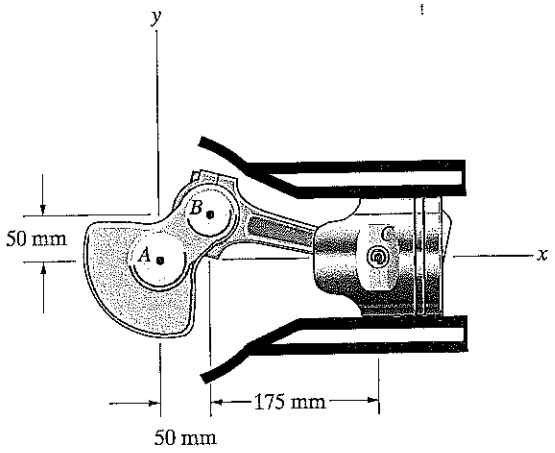


Problem 17.75

17.76 The crank AB is rotating in the clockwise direction at 2000 rpm (revolutions per minute).

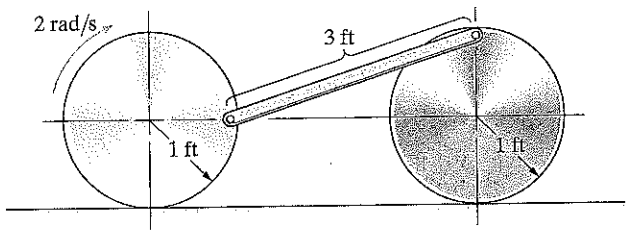
(a) At the instant shown, what are the coordinates of the instantaneous center of the connecting rod BC?

(b) Use instantaneous centers to determine the angular velocity of the connecting rod BC at the instant shown.



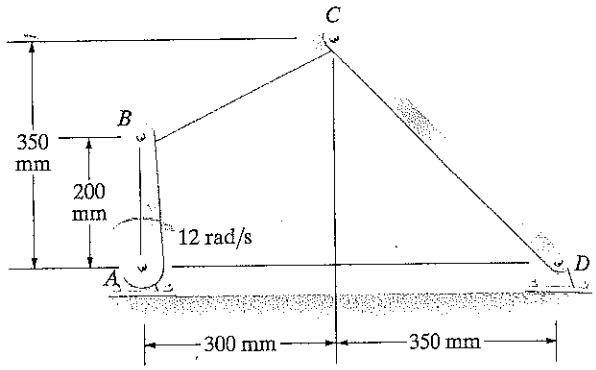
Problem 17.76

17.77 The disks roll on the plane surface. The left disk rotates at 2 rad/s in the clockwise direction. Use instantaneous centers to determine the angular velocities of the bar and the right disk.



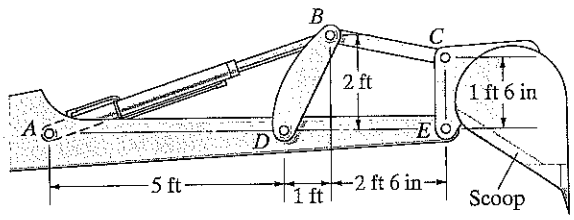
Problem 17.77

17.78 Bar AB rotates at 12 rad/s in the clockwise direction. Use instantaneous centers to determine the angular velocities of bars BC and CD.



Problem 17.78

17.79 The horizontal member ADE supporting the scoop is stationary. The link BD is rotating in the clockwise direction at 1 rad/s. Use instantaneous centers to determine the angular velocity of the scoop.

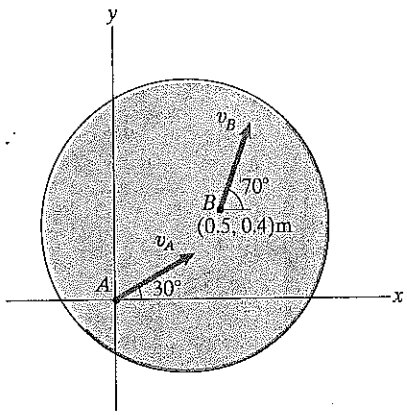


Problem 17.79

17.80 The disk is in planar motion. The directions of the velocities of points A and B are shown. The velocity of point A is $v_A = 2$ m/s.

(a) What are the coordinates of the disk's instantaneous center?

(b) Determine the velocity v_B and the disk's angular velocity.



Problem 17.80