PROBLEM 11.163

The rotation of rod OA about O is defined by the relation $\theta = \pi(4t^2 - 8t)$, where $\theta$ and $t$ are expressed in radians and seconds, respectively. Collar B slides along the rod so that its distance from O is $r = 10 + 6 \sin \pi t$, where $r$ and $t$ are expressed in inches and seconds, respectively. When $t = 1$ s, determine (a) the velocity of the collar, (b) the total acceleration of the collar, (c) the acceleration of the collar relative to the rod.

PROBLEM 11.167

To study the performance of a race car, a high-speed motion-picture camera is positioned at Point A. The camera is mounted on a mechanism which permits it to record the motion of the car as the car travels on straightway BC. Determine the speed of the car in terms of $b$, $\theta$, and $\dot{\theta}$.

PROBLEM 11.168

Determine the magnitude of the acceleration of the race car of Problem 11.167 in terms of $b$, $\theta$, $\dot{\theta}$, and $\ddot{\theta}$. 