

Fig. P13.58

13.58 A 3-lb collar is attached to a spring and slides without friction along a circular rod in a horizontal plane. The spring has an undeformed length of 7 in. and a constant $k = 1.5 \text{ lb/in.}$ Knowing that the collar is in equilibrium at A and is given a slight push to get it moving, determine the velocity of the collar (a) as it passes through B, (b) as it passes through C.

13.59 A 2-kg collar can slide without friction along a horizontal rod and is in equilibrium at A when it is pushed 25 mm to the right and released from rest. The springs are undeformed when the collar is at A and the constant of each spring is 500 kN/m. Determine the maximum velocity of the collar.

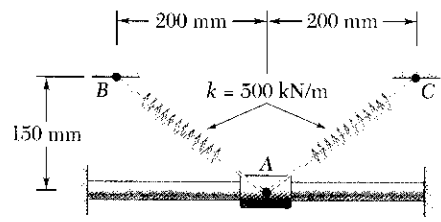


Fig. P13.59 and P13.60

13.60 A 2-kg collar can slide without friction along a horizontal rod and is released from rest at A. The undeformed lengths of springs BA and CA are 250 mm and 225 mm, respectively, and the constant of each spring is 500 kN/m. Determine the velocity of the collar when it has moved 25 mm to the right.

13.61 A thin circular rod is supported in a vertical plane by a bracket at A. Attached to the bracket and loosely wound around the rod is a spring of constant $k = 40 \text{ N/m}$ and undeformed length equal to the arc of circle AB. A 200-g collar C, not attached to the spring, can slide without friction along the rod. Knowing that the collar is released from rest when $\theta = 30^\circ$, determine (a) the maximum height above point B reached by the collar, (b) the maximum velocity of the collar.

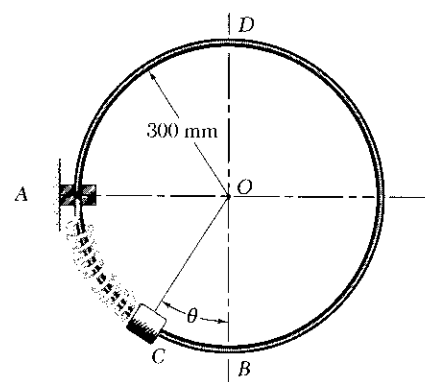


Fig. P13.61 and P13.62

13.62 A thin circular rod is supported in a vertical plane by a bracket at A. Attached to the bracket and loosely wound around the rod is a spring of constant $k = 40 \text{ N/m}$ and undeformed length equal to the arc of circle AB. A 200-g collar C, not attached to the spring, can slide without friction along the rod. Knowing that the collar is released from rest at an angle θ with respect to the vertical, determine (a) the smallest value of θ for which the collar will pass through D and reach point A, (b) the velocity of the collar as it reaches point A.