동역학 : 과제 #2

제출 마감 : 10 월 6 일 (월)

11.137 Pin A, which is attached to link AB, is constrained to move in the circular slot CD. Knowing that at $t = 0$ the pin starts from rest and moves so that its speed increases at a constant rate of 20 mm/s^2, determine the magnitude of its total acceleration when (a) $t = 0$, (b) $t = 2$ s.

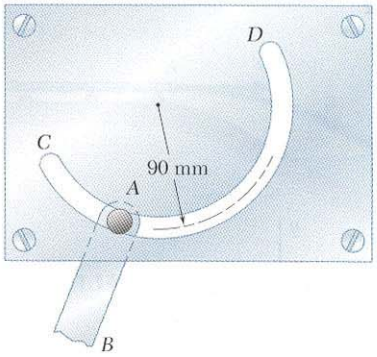

Fig. P11.137

11.161 The rotation of rod OA about O is defined by the relation $\theta = 0.5e^{-0.8t} \sin 3\pi t$, where θ and t are expressed in radians and seconds, respectively. Collar B slides along the rod so that its distance from O is $r = 0.2 + 1.92t - 6.72t^2 + 6.4t^3$, where r and t are expressed in meters and seconds, respectively. When $t = 0.5$ s, determine (a) the velocity of the collar, (b) the acceleration of the collar, (c) the acceleration of the collar relative to the rod.

11.162 The oscillation of rod OA about O is defined by the relation $\theta = (4/\pi)(\sin \pi t)$, where θ and t are expressed in radians and seconds, respectively. Collar B slides along the rod so that its distance from O is $r = 10/(t + 6)$, where r and t are expressed in mm 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.

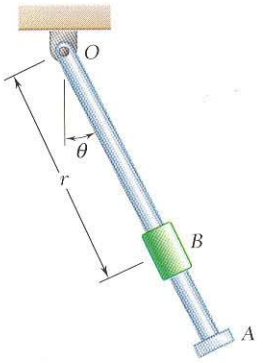

Fig. *P11.161* and *P11.162*

11.179 The motion of a particle on the surface of a right circular cylinder is defined by the relations $R = A$, $\theta = 2\pi t$, and $z = At^2/4$, where A is a constant. Determine the magnitudes of the velocity and acceleration of the particle at any time t.

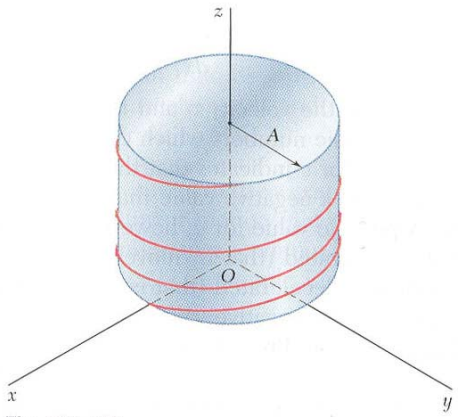

Fig. *P11.179*

11.185 Block B starts from rest and moves downward with a constant acceleration. Knowing that after slider block A has moved 400 mm its velocity is 4 m/s, determine (*a*) the accelerations of A and B, (*b*) the velocity and the change in position of B after 2 s.

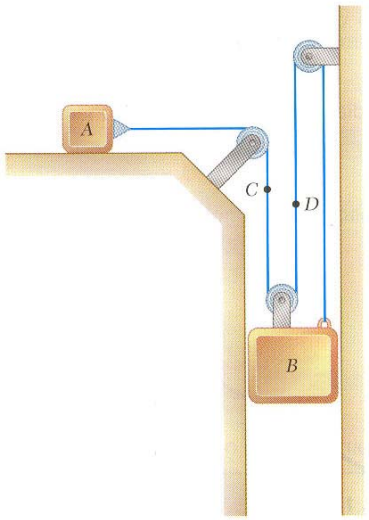

Fig. P11.185

12.15 Block A has a mass of 40 kg and block B has a mass of 8 kg. The coefficients of friction between all surfaces of contact are $\mu_s = 0.20$ and $\mu_k = 0.15$. Knowing that $P = 0$, determine (*a*) the acceleration of block B, (*b*) the tension in the cord.

12.16 Block A has a mass of 40 kg and block B has a mass of 8 kg. The coefficients of friction between all surfaces of contact are $\mu_s = 0.20$ and $\mu_k = 0.15$. Knowing that $\mathbf{P} = 50\ \text{N} \rightarrow$, determine (*a*) the acceleration of block B, (*b*) the tension in the cord.

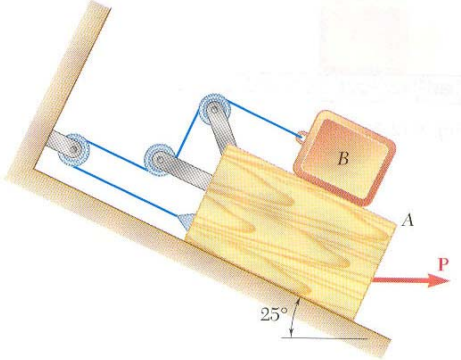

Fig. P12.15 and P12.16

12.32 A 25-kg block A rests on an inclined surface, and a 15-kg counterweight B is attached to a cable as shown. Neglecting friction, determine the acceleration of A and the tension in the cable immediately after the system is released from rest.

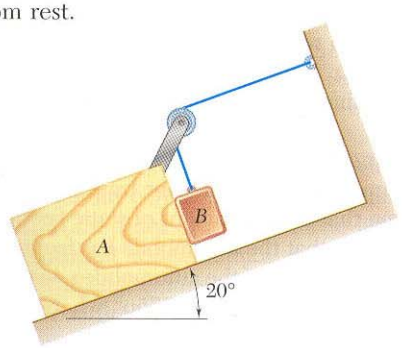

Fig. *P12.32*

12.46 During a high-speed chase, an 1100-kg sports car traveling at a speed of 160 km/h just loses contact with the road as it reaches the crest A of a hill. (*a*) Determine the radius of curvature ρ of the vertical profile of the road at A. (*b*) Using the value of ρ found in part *a*, determine the force exerted on a 70-kg driver by the seat of his 1400-kg car as the car, traveling at a constant speed of 80 km/h, passes through A.

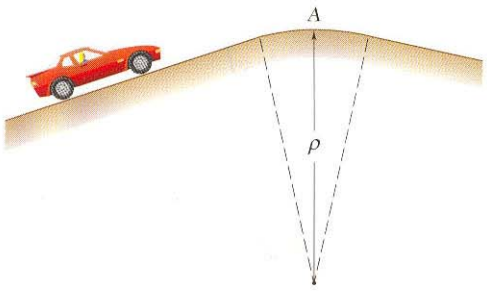

Fig. P12.46

12.59 A turntable A is built into a stage for use in a theatrical production. It is observed during a rehearsal that a trunk B starts to slide on the turntable 12 s after the turntable begins to rotate. Knowing that the trunk undergoes a constant tangential acceleration of 0.25 m/s^2, determine the coefficient of static friction between the trunk and the turntable.

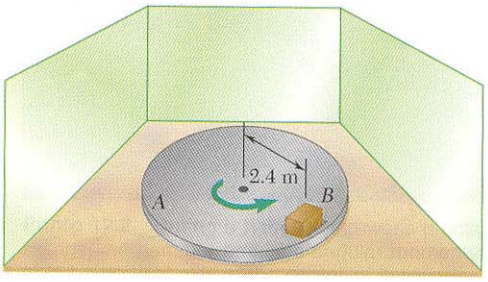

Fig. P12.59