

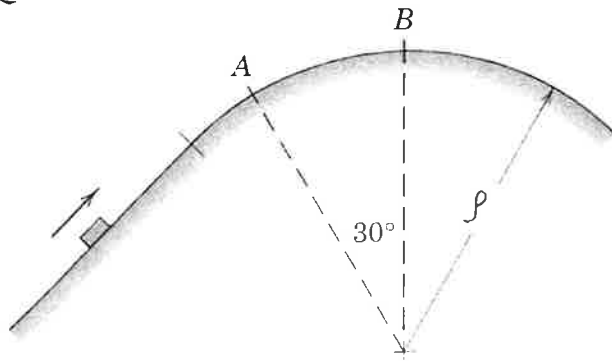
科目名稱	動力學	類組代碼	D37
		科目碼	D3794

※本項考試依簡章規定所有考科均「不可」使用計算機。 本科試題共計 3 頁

Problem 1. Consider a block with mass  $m$  passes over the top  $B$  of the circular portion of the path. What is the maximum speed  $v$  which the block can have at  $A$  without losing contact with the path.

- (A)  $\sqrt{g\rho\cos 30^\circ}$  (B)  $g/(\rho\cos 30^\circ)$  (C)  $\sqrt{g\rho\sin 30^\circ}$  (D)  $g/\sin 30^\circ$  (E)  $g/\tan 30^\circ$

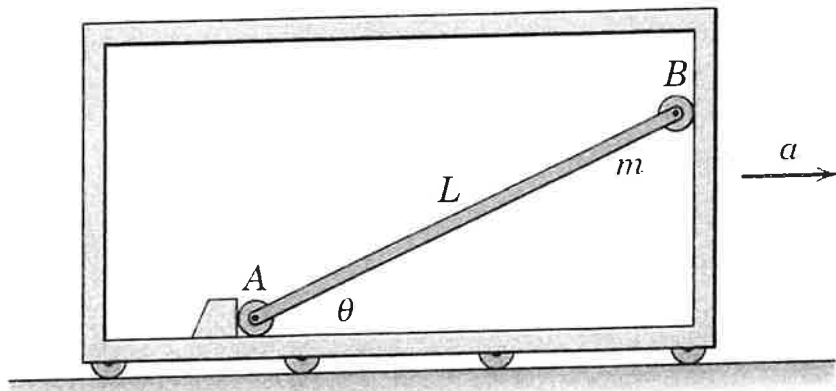
10 分/題，答錯倒扣 10 分/題



Problem 2. The uniform slender bar of mass  $m$  and length  $L$  is held in the position shown by the stop at  $A$ . What acceleration  $a$  will cause the normal force acting on the roller at  $B$  to become zero.

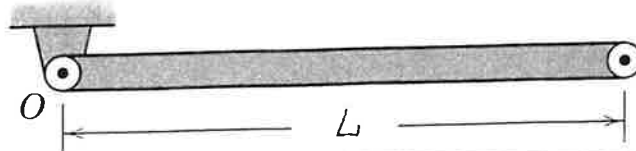
- (A)  $mg\sin\theta/L$  (B)  $gL\tan\theta$  (C)  $mg\cos\theta$  (D)  $g\cot\theta$  (E)  $gL/\tan\theta$

10 分/題，  
答錯倒扣 10 分/題



Problem 3. The uniform slender bar with mass  $m$  and length  $L$  is pivoted at  $O$  and swing freely in the vertical plane. If the bar is released from rest in the horizontal position, what is the initial value of the force  $R$  exerted by the bearing on the bar at the instant just after release. (hint: the answer of  $R$  only in the horizontal or vertical direction) (A)  $mg/2$  (B)  $mg/3$  (C)  $mg/4$  (D)  $mg/5$  (E)  $mg/6$

10 分/題，答錯倒扣 10 分/題

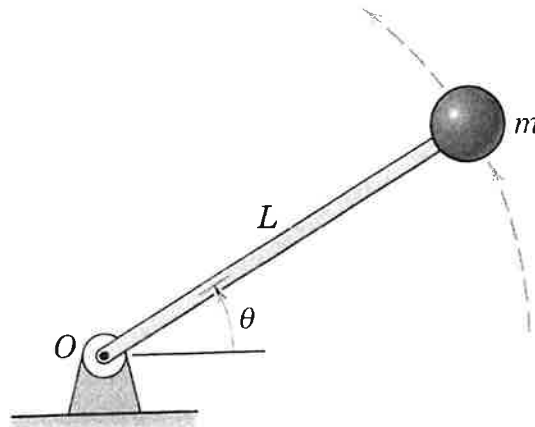


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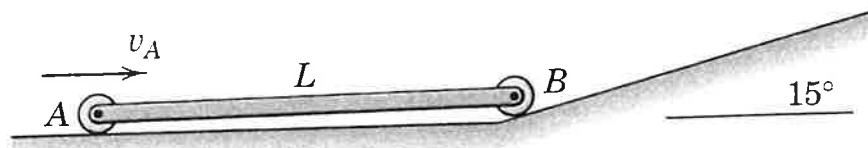
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Problem 4. The particle of mass  $m$  is attached to the light rigid rod, and the assembly rotates about a horizontal axis through  $O$  with a constant angular velocity  $\dot{\theta} = \omega$ . Determine the tension  $T$  in the rod as a function of  $\theta$ . (A)  $T = mg \tan \theta$  (B)  $T = mg \tan \theta + mL\omega^2$  (C)  $T = mg \sin \theta - mL\omega^2$  (D)  $T = mg \cos \theta - L\omega^2$  (E)  $T = mL\omega^2$

10 分/題，答錯倒扣 10 分/題

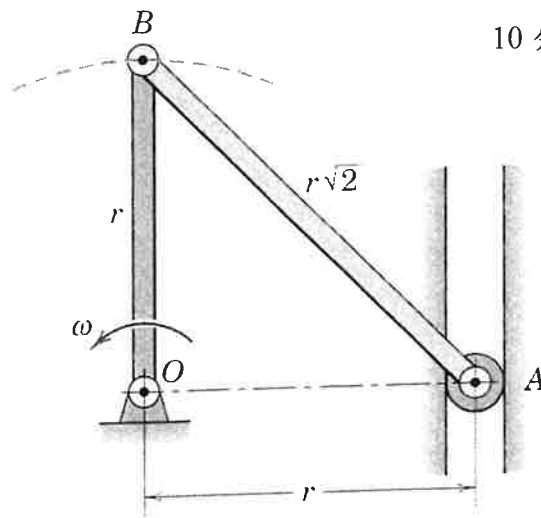


Problem 5. What is the angular velocity of bar AB just after roller B has begun moving up the  $15^\circ$  incline. At the instant under consideration, the velocity of roller A is  $v_A$ . (A)  $v_A \tan 15^\circ / L$  (B)  $v_A L \cos 15^\circ$  (C)  $v_A L \cot 15^\circ$  (D)  $v_A L \tan 15^\circ$  (E)  $v_A \cot 15^\circ / L$  10 分/題，答錯倒扣 10 分/題



Problem 6. What is the angular acceleration  $\alpha_{AB}$  of AB for the position shown if link OB has a constant angular velocity  $\omega$ . (A)  $\omega / \sqrt{2}r$  (B)  $\omega^2$  (C)  $\omega / r$  (D)  $\sqrt{2}r\omega$  (E)  $\omega^2 / \sqrt{2}r$

10 分/題，答錯倒扣 10 分/題



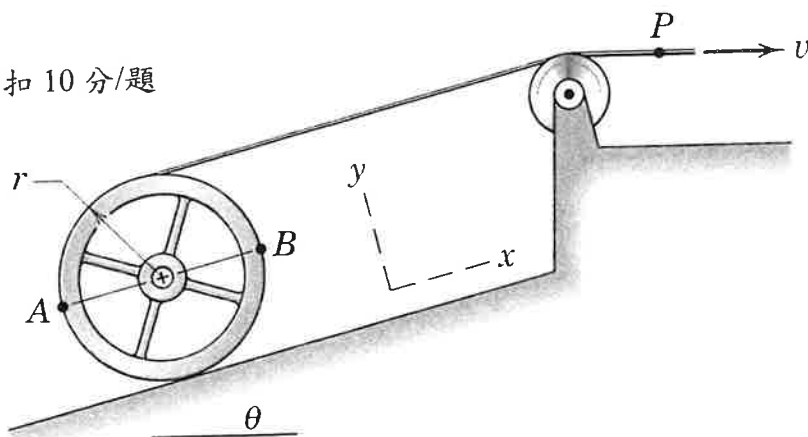
背面有題，請繼續作答。

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Problem 7. The spoked wheel of radius  $r$  is made to roll up the incline by the cord wrapped securely around a shallow groove on its outer rim. For a given cord speed  $v$  at point  $P$ , What is the velocity of the point A. No slipping occurs. (A)  $v/2\mathbf{e}_i + v/2\mathbf{e}_j$ , (B)  $v/2\mathbf{e}_i - v/2\mathbf{e}_j$ , (C)  $-v/2\mathbf{e}_i + v/2\mathbf{e}_j$ , (D)  $-v/2\mathbf{e}_i - v/2\mathbf{e}_j$ , (E) 0

10 分/題，答錯倒扣 10 分/題



Problem 8. Same as Problem 7, what is the velocity of point B. (A)  $v/2\mathbf{e}_i + v/2\mathbf{e}_j$ , (B)  $v/2\mathbf{e}_i - v/2\mathbf{e}_j$ , (C)  $-v/2\mathbf{e}_i + v/2\mathbf{e}_j$ , (D)  $-v/2\mathbf{e}_i - v/2\mathbf{e}_j$ , (E) 0

10 分/題，答錯倒扣 10 分/題

Problem 9. The car with mass  $m$  has its mass center at  $G$ . The mass of the wheels is small compared with the total mass of the car. The coefficient of static friction between the road and the rear driving wheel is  $\mu$ . What is the normal force  $N_B$  between the road and the rear pairs of wheels under conditions of maximum acceleration. (A)  $mgL_{AG} / (L_{AB} - \mu L_{G0})$  (B)  $\mu mgL_{AG} / (L_{AB} - L_{G0})$  (C)  $\mu mgL_{AB} / L_{G0}$  (D)  $\mu mgL_{BG} / L_{G0}$  (E)  $mgL_{AG} / \mu L_{G0}$

20 分/題，答錯倒扣 20 分/題

