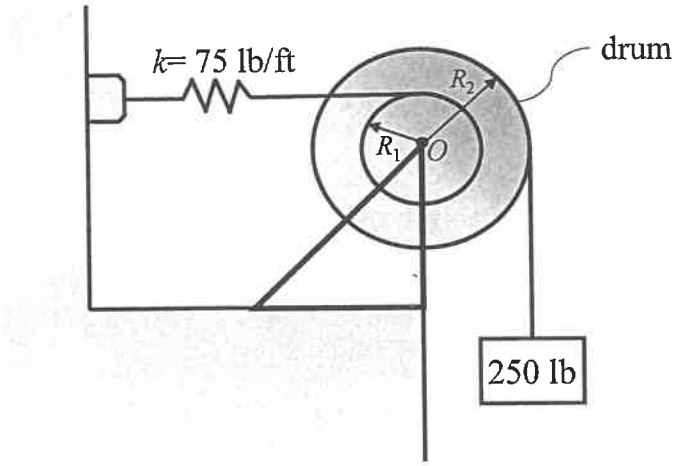
國立中正大學 114 學年度碩士班招生考試試題

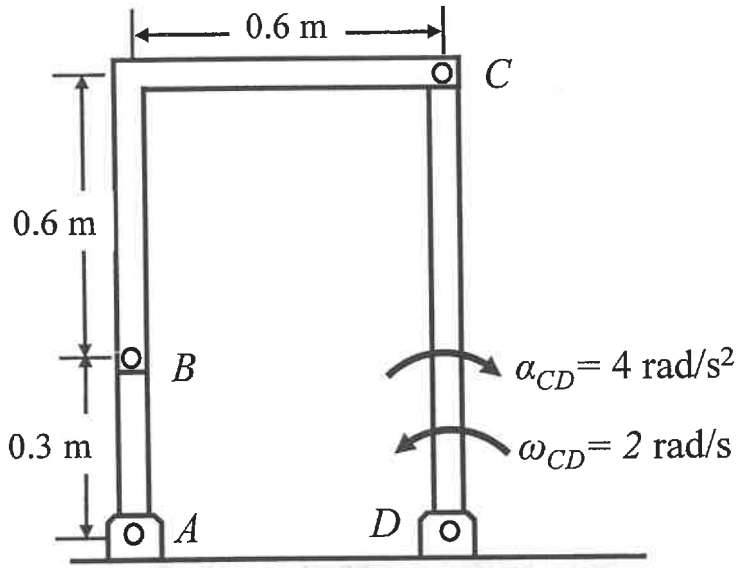
科目名稱：動力學　　本科目共 2 頁　第 1 頁

系所組別：機械工程學系-甲組

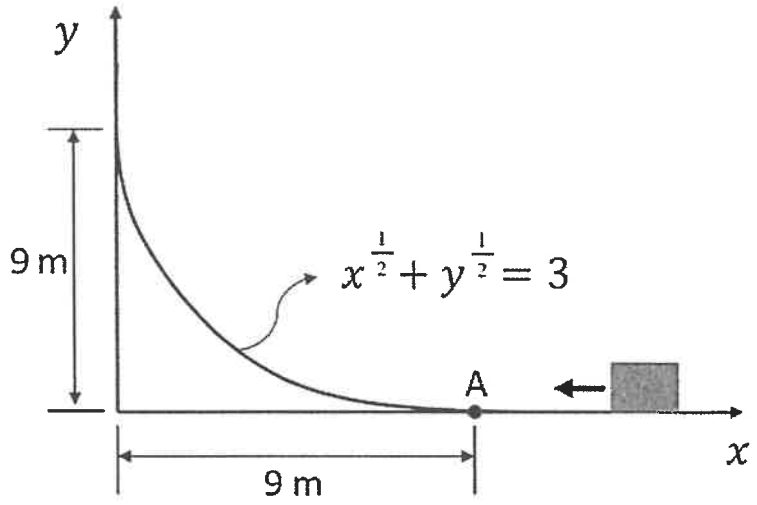
1. (25%) If the 250-lb block is released from rest when the spring is unstretched as shown in the figure, determine the velocity of the block after it has moved downward by 5 ft. The drum has a weight of 50 lb, inner radius of $R_1 = 0.375$ ft, outer radius of $R_2 = 0.75$ ft, and a radius of gyration of $k_0 = 0.5$ ft about its center of mass O. Neglect the weight of the spring and cable.



2. (25%) Determine the angular acceleration of link AB if link CD has the angular velocity and angular acceleration as shown in the figure. The links are pin connected.



3. (25%) A 10-kg box moves along the curved path, $x^{\frac{1}{2}} + y^{\frac{1}{2}} = 3$, as shown in the figure. When the box reaches point A, it has a speed $v = 8.86$ m/s. The gravity is 9.81 m/s^2. Neglect friction and the size of the box.
   (a) Determine how high the box reaches up the path before it comes to a stop. (5%)
   (b) Determine the acceleration of the box at the highest point. (20%)



4. (25%) The 20-kg block A slides on the surface. The block has a velocity $v = 10$ m/s when $s = 3.6$ m, from the 15-kg block B, as shown in the figure. The friction coefficient on the contact between block and the surface is 0.51. The unstretched spring has a stiffness $k = 1000$ N/m, and the coefficient of restitution $e = 0.53$. The gravity is 9.81 m/s^2. Determine the maximum compression of the spring due to the collision.