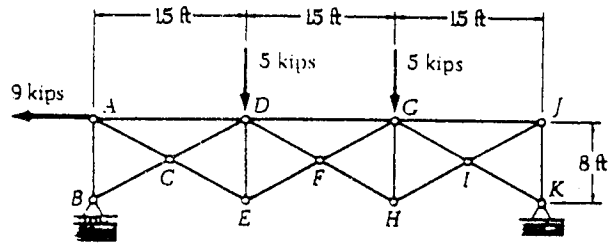
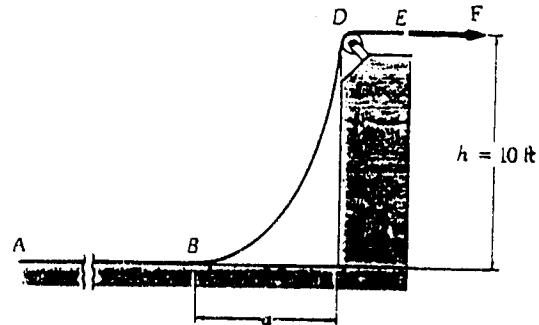


工程力學

(10%) 1. Determine the force in members AD, CD, and CE of the truss shown.



(20%) 2. To the left of point B the long cable ABDE rests on the rough horizontal surface shown. Knowing that the cable weighs 1.8 lb/ft, determine the force F required when  $a=9$  ft. (20%)



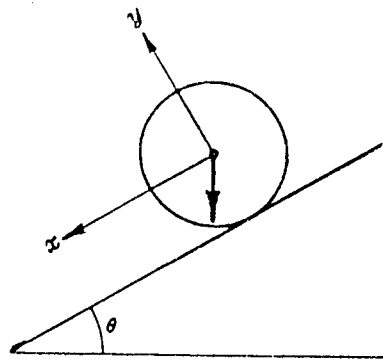
(30%) 3. Define the following in terms of Engineering Mechanics

- (1) Newton's Law
- (2) Inertial System
- (3) Perigee and Apogee
- (4) Particle and rigid body
- (5) Mass Center and Principal axes of inertia
- (6) Natural frequency

(背面仍有題目,請繼續作答)

(20%) 4. A homogeneous sphere and a homogeneous cylinder roll, without slipping, from rest at the top of an inclined plane to the bottom. The moments of inertia for the sphere and the cylinder are  $\frac{2}{5}(W_s/g)r_s^2$  and  $\frac{1}{2}(W_c/g)r_c^2$ , respectively. The subscripts  $s$  and  $c$  refer to the sphere and the cylinder respectively.  $W_s$  and  $W_c$  are the weights;  $r_s$  and  $r_c$  are the radii of the sphere and the cylinder, respectively.  $g$  is gravity.

- (1) Which reaches the bottom first? Calculate the acceleration.
- (2) If the sphere and the cylinder are to have rolling with slipping motion. Which reaches the bottom first? Justify your answer by calculating the acceleration.



(20%) 5. The 0.8-m arm OA for a remote-control mechanism is pivoted about the horizontal  $x$ -axis of the clevis, and the entire assembly rotates about the  $z$ -axis with a constant speed  $N=60$  rev/min. Simultaneously the arm is being raised at the rate  $\dot{\beta}=4$  rad/s and  $\ddot{\beta}=1$  rad/s<sup>2</sup>.

- (1) For the position where  $\beta = 30^\circ$  determine the angular velocity and the angular acceleration of OA.
- (2) If a collar B is traveling outward to point A at the velocity 0.1 m/sec measured relative to the arm OA. At the instant when  $OB=0.1$  m. Find the velocity and acceleration of the collar in the inertial reference frame.

