1. **簡答題** (請勿以英文作答) (10%)

   Pin C on rod BC can slide freely in the slot on rod AO. Define point D on rod AO and contacting with pint C. (a) Describe the accelerations of point C and point D. (b) What is the difference between two accelerations?
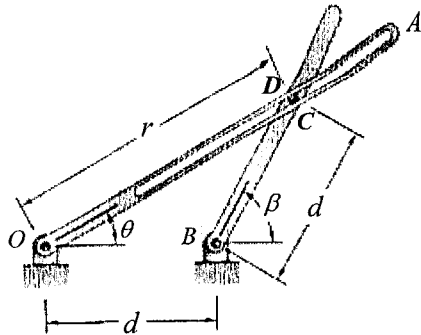

2. **(15%)** A 5-kg block B rests on the upper surface of a 15-kg wedge A. Neglecting friction, determine the accelerations of A and B after immediately the system is released from rest.
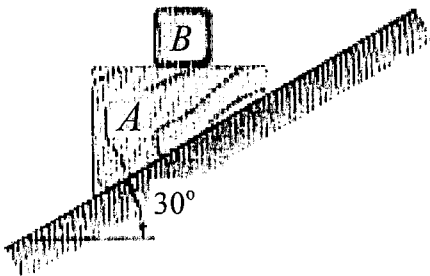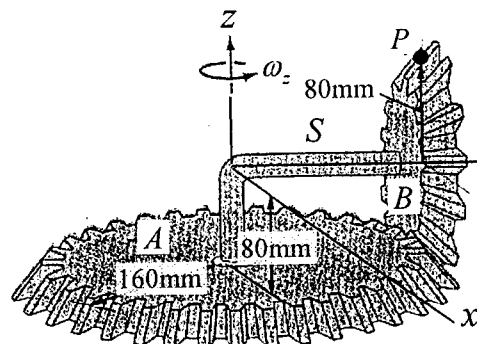

3. **(25%)** The 4-kg uniform rod is attached to a spring of constant k = 750 N/m. If end A of the rod is depressed 40 mm and released, determine (a) the period of vibration, (b) the maximum velocity of end A.
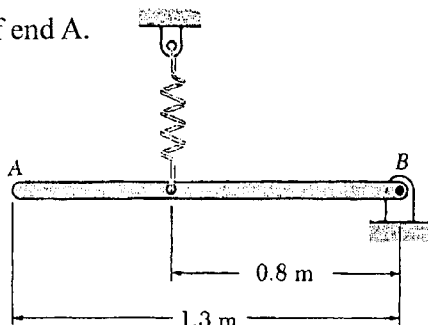
4. **(25%)** The rigid body (slab) has a mass *m* and is rotating with an angular velocity ω about an axis passing through the fixed point *O*. Show that the momenta of all the particles composing the body can be represented by a single vector having a magnitude mv_G and acting through point *P*, called the center of percussion, which lies at a distance $r_{P/G} = k_G^2 / r_{G/O}$ from the mass center *G*. Here k_G is the radius of gyration of the body, computed about an axis perpendicular to the plane of motion and passing through *G*.
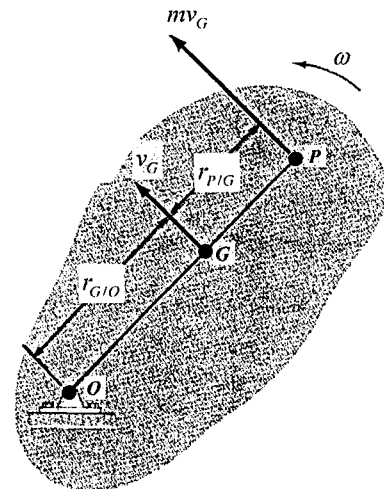
5. **(25%)** Gear A is fixed while gear B is free to rotate on the shaft S. If the shaft is turning about the z axis at $\omega_z = 5$ rad/s, which is increasing at 2 rad/s², determine the velocity and acceleration of point P at the instant shown. The face of gear B lies in a vertical plane.