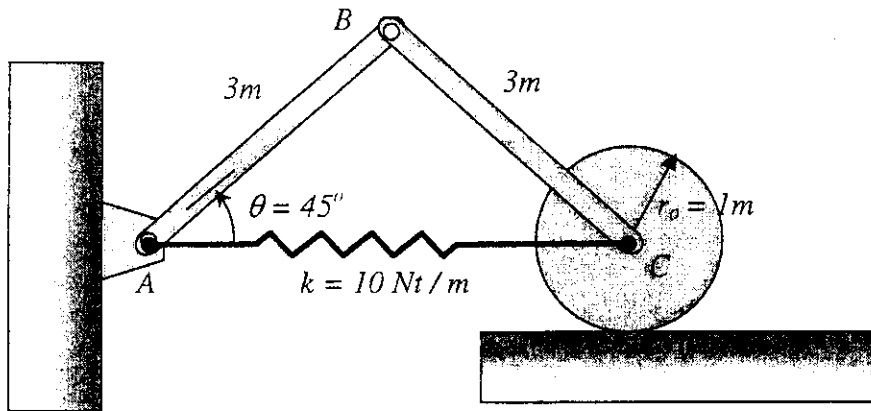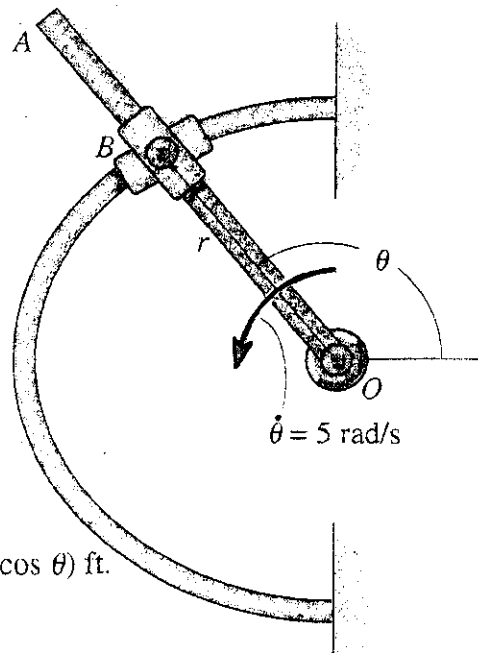本試題是否可以使用計算機： ☑可使用 ， □不可使用   （請命題老師勾選）

1. As shown in the figure, the assembly consists of two 10-kg slender bars and a
   20-kg disk. If the spring is unstretched when $\theta = 45°$, and the assembly is release
   from rest at this position, determine the angular velocity of rod AB at the instant
 $\theta = 0°$. The disk rolls without slipping.   (25 %)

2. Rod OA rotates counterclockwise with a constant angular velocity of $\dot{\theta} = 5$ rad/s.
   The double collar B is pin-connected together such that one collar slides over the
   rotating rod and the other one collar slides over the horizontal curved rod, of which
   the shape is described by the equation $r = 1.5\ (2 - \cos\theta)$ ft. If both collars weigh
   0.75 lb, determine the normal
   force which the curved rod
   exerts on one collar at the
   instant $\theta = 120°$. Neglect
   friction.   (25 %)

$r = 1.5\ (2 - \cos\theta)$ ft.

（背面仍有題目,請繼續作答）

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3. The 3 kg uniform rod *AB* is connected to crank *BD* and to a collar of negligible mass, which can slide freely along rod *EF*. Knowing that in the position shown crank *BD* rotates with an angular velocity of 15 rad/s and an angular acceleration of 60 rad/s^2, both clockwise, determine the reaction at A.　(25 %)
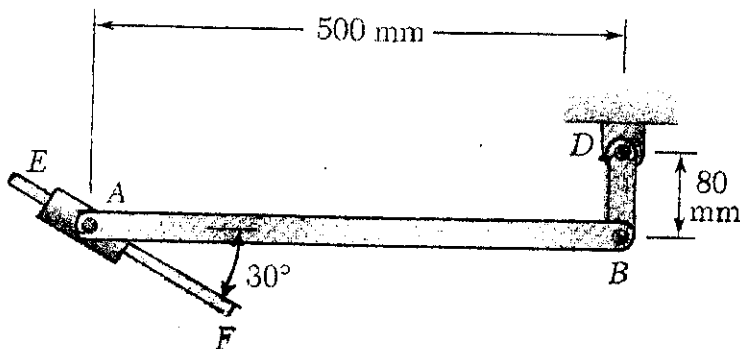
4. Circular disc A is shown with a circular hole. It rests on a frictionless horizontal surface. A smaller disk with a velocity of 10 m/s is translating on the surface as shown in the figure. Both disks have the same thickness of 0.01 m and density of 2000 kg/m^3. Please determine the velocities of the centers of disc *A* and *B* (point O_A and O_B) right after the impact. Assume the coefficient of restitution (*e*) is 0.8 and no friction force during impact.　(25 %)