

系所組別： 工程科學系丙、戊、己組

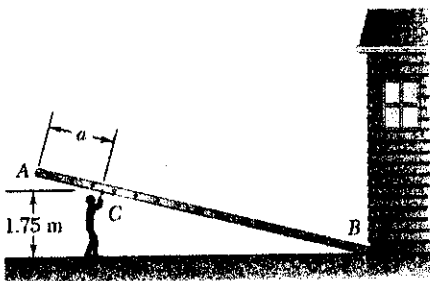
考試科目： 工程力學

考試日期： 0307，節次： 1

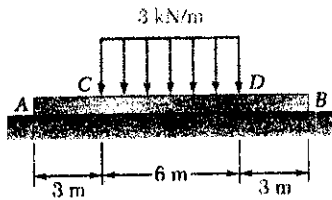
※ 考生請注意：本試題 可 不可 使用計算機

(請勿在本試題紙上作答，否則不予計分)

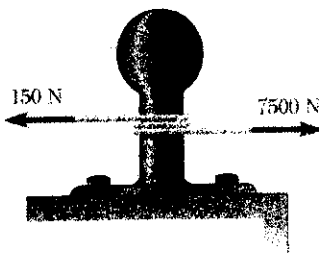
考生請注意：本試題全部為填充題；請將答案(含單位)填入「答案卷」中相對題號的位置，否則不予計分。評分時只看填入的答案，而不看計算過程。每題有(a)及(b)兩個小題，共 16 小題，除了 8(b)以 10 分計外，其它每個小題 6 分。重力加速度請一律以 9.81 m/s^2 計算。



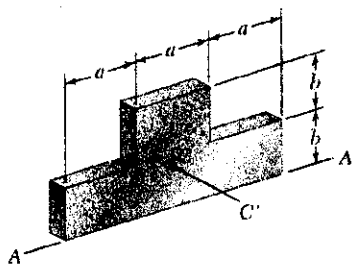
1. A worker is raising a 9.2-m-long ladder of mass 53 kg as shown. Knowing that $a = 1.8 \text{ m}$ and that the force exerted by the worker is perpendicular to the ladder, calculate (a) the magnitude of the force exerted by the worker and (b) the magnitude of the reaction at B .



2. Assuming the upward reaction of the ground on beam AB to be uniformly distributed, calculate (a) the maximum absolute value of the shear and (b) the maximum absolute value of the bending moment.



3. A rope is wrapped two full turns around a short column as shown. The tension in the rope is 7500 N, and a force of 150 N has to apply on its free end in order to just keep rope from slipping to the right. (a) Calculate the coefficient of friction between the rope and the column. (b) Calculate the tension in the rope that would be resisted by the 150-N force if the rope were wrapped three full turns around the column.



4. Denoting the mass of the thin plate by m , determine its mass moment of inertia with respect to (a) the axis AA' and (b) the centroidal axis CC' that is perpendicular to the plane of the plate.

(背面仍有題目,請繼續作答)

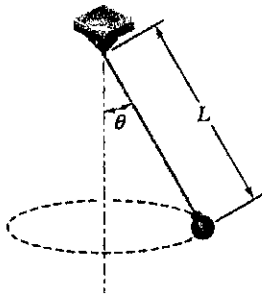
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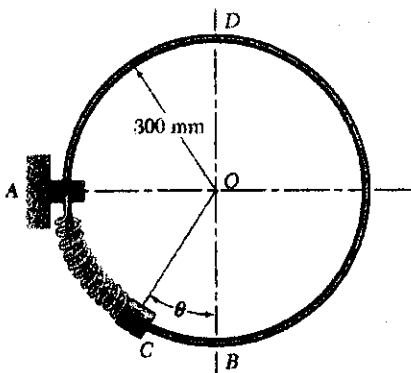
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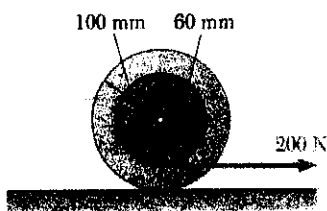
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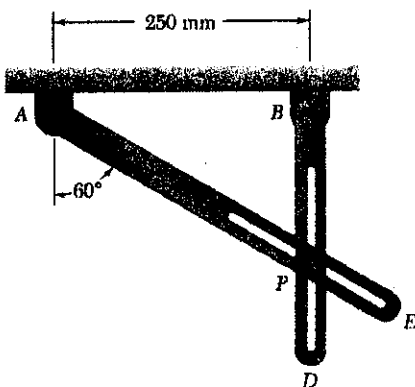
5. A 2-kg ball revolves in a horizontal circle as shown at a constant speed of 1.5 m/s. Knowing that $L = 600$ mm, determine (a) the angle θ that the cord forms with the vertical and (b) the tension in the cord.



6. A circular rod is supported in a vertical plane by a bracket at A . Attached to the bracket and loosely wound around the rod is a spring of constant $k = 40$ N/m and undeformed length equal to the arc of circle AB . A 200-g collar C , not attached to the spring, can slide without friction along the rod. Knowing that the collar is released from rest when $\theta = 30^\circ$, determine (a) the maximum height above point B reached by the collar and (b) the maximum velocity of the collar.



7. A cord is wrapped around the inner drum of a wheel and pulled horizontally with a force of 200 N. The wheel has a mass of 50 kg and a radius of gyration of 70 mm. Knowing that $\mu_s = 0.20$ and $\mu_k = 0.15$, determine (a) the magnitude of the acceleration of G and (b) the magnitude of the angular acceleration of the wheel.



8. The motion of pin P is guided by slots cut in rods AE and BD . Knowing that the rods rotate with the constant angular velocities $\omega_A = 4$ rad/s clockwise and $\omega_B = 5$ rad/s clockwise. For the position shown, determine (a) the magnitude of the velocity of pin P and (b) the magnitude of the acceleration of pin P .