

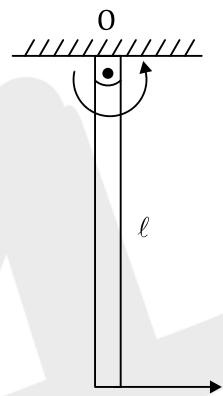
DPP 03

- Q.1** A rod of mass m and length ℓ is connected with a light rod of length ℓ . The composite rod is made to rotate with angular velocity ω as shown in Figure.



Total kinetic energy of rod is $\frac{(k+1)}{k} m\omega^2 \ell^2$. Then k is _____

- Q.2** A uniform rod of mass m and length ℓ is pivoted smoothly at O . A horizontal force acts at the bottom of the rod.



The angular velocity of the rod as the function of angle of rotation θ is $\sqrt{\frac{2kF \sin \theta}{m\ell}} - \frac{kg}{\ell}(1 - \cos \theta)$.

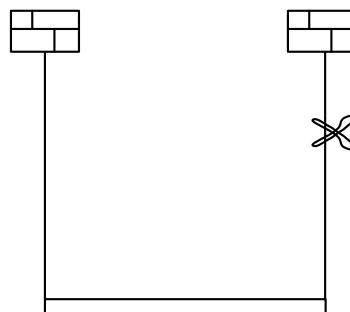
Then k is _____

- Q.3** A uniform cube of side a and mass m rests on a rough horizontal table. A horizontal force F is applied normal to one of the faces at a point directly above the centre of the face, at a height $\frac{3a}{4}$ above the base.

The minimum value of F for which the cube begins to topple about an edge is $\frac{k_1}{k_2} mg$. Then $k_1 + k_2$ is _____

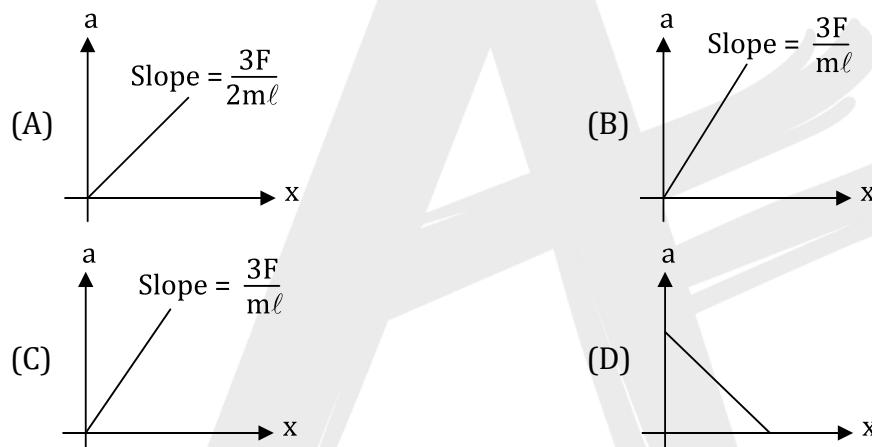
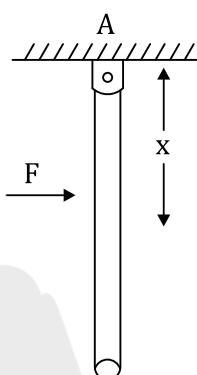
- Q.4** A square plate of side a and mass m is lying on a horizontal floor. A force F is applied at the top. The maximum force that can be applied on the square plate, so that the plate does not topple about A is $\frac{mg}{\beta}$. Then β is _____

- Q.5** A uniform rod of mass m and length ℓ is held horizontally by two vertical strings of negligible mass, as shown in Figure. Immediately after the right string is cut, find the

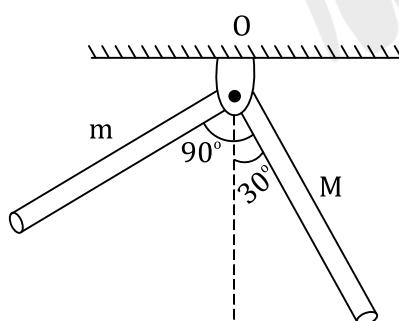


- (a) linear acceleration of the free end of the rod.
- (b) linear acceleration of the centre of mass of rod.
- (c) tension in the left string.

Q.6 A rod of mass m and length l is hinged at one of its end A as shown in figure. A force F is applied at a distance x from A. The acceleration of centre of mass (a) varies with x as

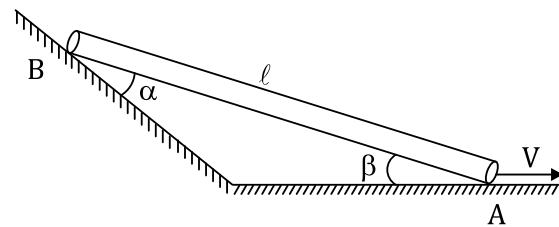


Q.7 Two uniform rods of equal length but different masses are rigidly joined to form an L-shaped body, which is then pivoted as shown. If in equilibrium the body is in the shown configuration, ratio $\frac{M}{m}$ will be



- (A) $\sqrt{2}$ (B) 2 (C) $\sqrt{3}$ (D) 3

Q.8 A rod of length l slides down along the inclined wall as shown in figure. At the instant shown in figure the speed of end A is v , then the speed of B will be



(A) $\frac{v \sin \alpha}{\sin \beta}$

(B) $\frac{v \sin \beta}{\sin \alpha}$

(C) $\frac{v \cos \alpha}{\cos \beta}$

(D) $\frac{v \cos \beta}{\cos \alpha}$



Answer Key

- | | | | | | | | | | | | | | | |
|----|-----|----|-----|----|-----|----|---|----|-----|----------------|-----|----------------|-----|----------------|
| 1. | 6 | 2. | 3 | 3. | 5 | 4. | 2 | 5. | (a) | $\frac{3g}{2}$ | (b) | $\frac{3g}{4}$ | (c) | $\frac{mg}{4}$ |
| 6. | (B) | 7. | (C) | 8. | (D) | | | | | | | | | |

