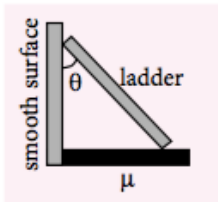
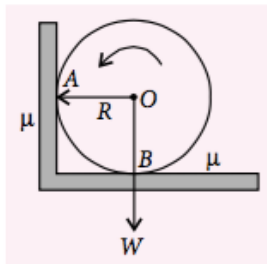


THOUGHT PROVOKING PROBLEMS

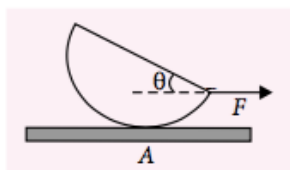
1. A uniform ladder rests in equilibrium with its lower end on a rough horizontal plane and its upper end against a smooth vertical wall as shown in figure. Find the maximum inclination θ of the ladder to the vertical.



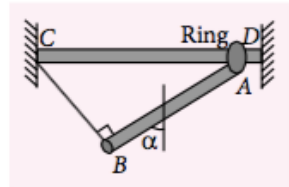
2. What is the magnitude of the maximum couple C which may be applied to the cylinder if it is not to spin. The cylinder has a weight W , radius R and the coefficient of friction μ is same at A and B as shown in figure.



3. A short semicircular right cylinder of radius r and weight W rests on a horizontal surface and is pulled at right angle to its geometric axis by a horizontal force F applied at B of the front edge. Find the angle θ that the flat face will make with the horizontal plane just before sliding begins if the coefficient of friction at the line of contact A is μ as shown in figure.

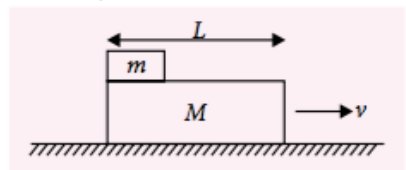


4. One end of a heavy uniform rod AB can slide along a rough horizontal rod CD to which it is attached by a ring, B and C are joined by a string.

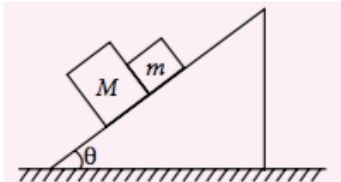


If ABC is a right angle and α is the angle between AB and vertical when the rod is on the point of sliding, find the coefficient of friction between ring and horizontal rod CD as shown in figure.

5. Figure shows a small block of mass m kept at the left end of a larger block of mass M and length L . The system can slide on a horizontal surface. The system is started moving towards right with an initial velocity v . The coefficient of friction between the bigger block and floor is μ and that between two blocks is $\mu/2$. Find the time elapsed before the smaller block separates from the bigger block.



6. Figure shows that two blocks in contact are sliding down an inclined surface of inclination $\theta = 30^\circ$. The friction coefficient between the block of mass $m = 2$ kg and the incline is $\mu_1 = 0.20$ and that between the block of mass $M = 4$ kg and the incline is $\mu_2 = 0.30$. Find the acceleration of 2 kg block.



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