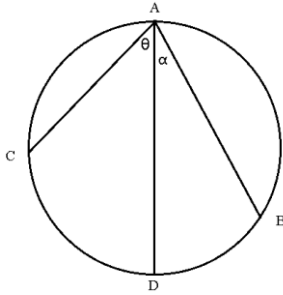
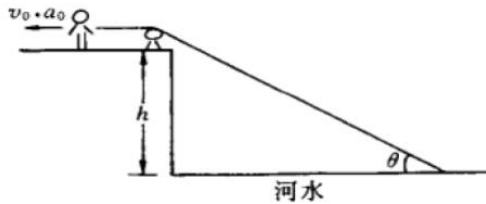


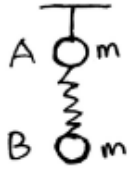
1. The pathway AB, AC, AD are all frictionless, and the diameter of the ring is d . Try to find t_{AB} , t_{AC} and t_{AD} .



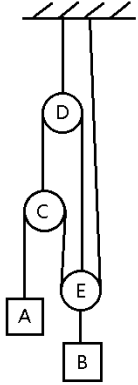
2. As shown in the figure, a person is dragging a boat through the string. At this instant, the person has a speed v_0 and an acceleration a_0 . Find the speed v and the acceleration a of the boat at this moment. h and θ are given.



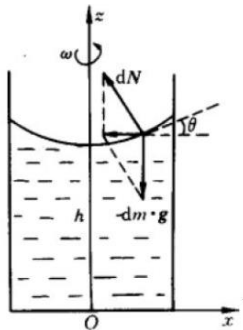
3. Two identical balls A and B with mass m is connected to two sides of a spring with initial length L_0 , A is connected to the ceiling with a string. The spring stretches to length L because of the gravity.
- (1) At the moment that the string is cut through, what is the acceleration of A and B?
 - (2) What motion will A and B do then?
 - (3) If the length of the spring return to L_0 the moment B reaches the ground, find the height of A before the string is cut.



4. Neglect m_C , m_D , m_E , m_{string} , $m_A = m_B = m_0$, Find \mathbf{a}_A and \mathbf{a}_B .



5. A bucket of water is rotating about its central vertical axis at constant angular velocity ω . Try to prove that when the water is static relative to the bucket, the upper surface of the water is paraboloid.



6. Suppose that a uniform rope with mass m and length d , placed on a horizontal table, is attached to a block with mass M resting on the same table. The rope is pulled from the side opposite the block with an applied horizontal force of magnitude F , and the system moves with acceleration. The coefficient of kinetic friction between the block and the surface is k , and there **does exist** friction between the rope and the surface. Find the tension in the rope as a function of the distance from the block.