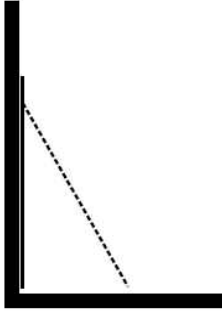


[BAUPC 1997]

3. A stick of length  $\ell$  and uniform mass density per unit length leans against a frictionless wall. The ground is also frictionless.



The stick is initially held motionless, with its bottom end an infinitesimal distance from the wall. The stick is then released, whereupon the bottom end begins to slide away from the wall, and the top end begins to slide down the wall.

A long time after the stick is released, what is the horizontal component of the velocity of its center of mass?

주석 : 막대의 질량중심의 자취는? (이건 기하학 문제)

[BAUPC 2002]

4. A sheet of metal lies on a roof which is inclined at an angle  $\theta$ . The coefficient of kinetic friction between the sheet and roof is  $\mu$  (where  $\mu > \tan \theta$ ).

During the warmth of daytime, the sheet will expand slightly. And then during the nighttime it will contract. Let the coefficient of thermal expansion of the sheet be  $\alpha$ , and let the difference in temperature between day and night be  $\Delta T$ . Let the length of the sheet (from its upper edge to lower edge) be  $\ell$ .

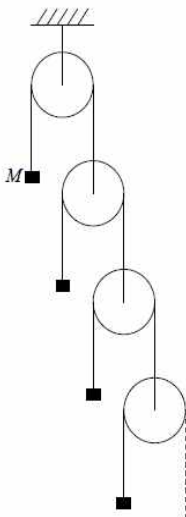
How far down the roof will the sheet move in one year if  $\theta = 30^\circ$ ,  $\mu = 1$ ,  $\ell = 1$  m,  $\Delta T = 10^\circ\text{C}$ , and  $\alpha = 17 \cdot 10^{-6} (\text{C}^\circ)^{-1}$  (the  $\alpha$  for copper)? Assume uniform contact with the roof.

(Note: the change in length due to thermal expansion is  $\Delta L = \alpha L \Delta T$ .)

주석 : 애초 지붕은 왜 아래로 내려갈까? “팽창중심”을 정의한다면?

[BAUPC 1998]

3. Consider the infinite Atwood’s machine shown in the figure.



A string passes over each pulley, with one end attached to a mass and the other end attached to another pulley. All the masses are equal to  $M$ , and all the pulleys and strings are massless.

The masses are held fixed and then simultaneously released. What is the acceleration of the top mass?

(You may define this infinite system as follows. Consider it to be made of  $N$  pulleys, with a non-zero mass replacing what would have been the  $(N + 1)$ st pulley. Then take the limit as  $N \rightarrow \infty$ . It is not necessary, however, to use this exact definition.)

주석 : 치환법, 환산질량