Quiz 3

Solutions

Choose the best answer.

1. A stone is thrown from the top of a cliff of height *h*, with initial speed v_0 and at angle θ above the horizontal. Neglecting air resistance, the speed *v* with which it lands in the ocean below:

   A. Is greater for positive θ than for $\theta = 0$.

   B. Is greater for negative θ than for $\theta = 0$.

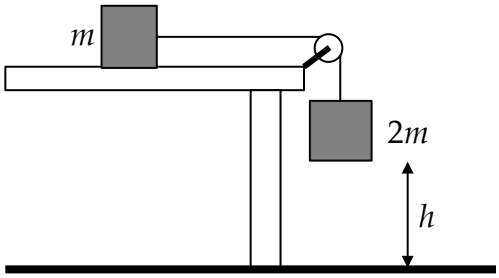
   C. Is less for positive θ than for negative θ.

   ☛D. Is independent of θ. [Depends only on *h*, by conservation of energy.]

Choose T or F depending on whether the statement is true or false.

2. The total potential energy is a minimum at a point of stable equilibrium. **T**

3. The two blocks shown are connected by a light string passing over an ideal pulley. The kinetic friction coefficient between the table and block on the table is $\mu_k = \frac{1}{2}$. The system starts from rest and the hanging block drops to the floor. Give answers in terms of the given quantities and *g*.



   a. How much work is done by friction? [Be careful about the sign.]

   b. The hanging block strikes the floor with speed *v*. What is the change in total mechanical energy *E*?

   c. What is *v* in terms of the other quantities?

a. The block on the table also moves a distance h, so friction does work $W_f = -\mu_k N \cdot h = -\frac{1}{2}mgh$.

b. $\Delta E = \frac{1}{2}(3m)v^2 - (2m)gh = \frac{3}{2}mv^2 - 2mgh$. [Both blocks are moving.]

c. Set $\Delta E = W_f$: $\frac{3}{2}mv^2 - 2mgh = -\frac{1}{2}mgh$. This gives $v^2 = gh$.