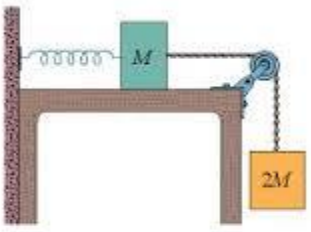
Answer on Question #51834, Physics, Optics

1)Two blocks of masses M=2.0kg and 2M,are connected to a spring of spring constant k= 200 N/m that has one fixed. The horizontal surface and the pulley are frictionless and the pulley has negligible mass. The blocks are released from rest with the spring relaxed.

a)What is the combined kinetic energy of the two blocks when the hanging block has fallen 0.10m?

b)What is the kinetic energy of the hanging block when it has fallen that 0,10m?

Solution:



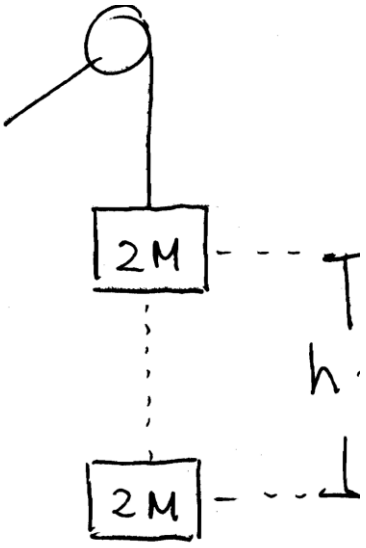
a)

$$E = E_k + E_{spring}$$

$$2Mgh = \frac{1}{2}Mv_M^2 + \frac{1}{2}2Mv_{2M}^2 + \frac{1}{2}kx^2$$

where

$$x = 0.10 \text{ m}$$



$$E_k = 2Mgh - \frac{1}{2}kx^2 = 2 * 2 * 9.81 * 0.1 - \frac{200}{2} * (0.1)^2 = 2.92 \text{ J}$$

b) Since M and 2M are connected

$$v = v_M = v_{2M}$$

$$\frac{3}{2}Mv^2 = 2.92$$

$$v = \sqrt{2.92 * \frac{2}{3 * 2}} = 0.99 \approx 1 \text{ m/s}$$

Then,

$$E_{k2} = \frac{2}{3} E_k = 2.92 * \frac{2}{3} = 1.95 \text{ J}$$