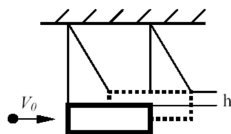


ROZWIAZANIE WYGENEROWANE PRZEZ CHAT GPT

1. W zawieszone na dwóch niciach wahadło balistyczne o masie $M = 1$ kg (patrz rysunek) wbija się pocisk o masie $m = 10$ g (zderzenie jest idealnie niesprężyste). Wahadło wraz z pociskiem podnosi się na wysokość $h = 5$ cm. Obliczyć prędkość pocisku V_0 oraz ilość ciepła, jakie wydzielilo się podczas zderzenia.



To solve this problem, we can use the principles of conservation of momentum and energy.

Given: - Mass of pendulum, $M = 1$ kg - Mass of bullet, $m = 10$ g = 0.01 kg - Height, $h = 5$ cm = 0.05 m

1. Calculate the initial speed V_0 of the bullet.

First, let's find the velocity V of the pendulum-bullet system just after the collision using energy conservation from the highest point:

1. Potential energy at the top:

$$E_p = (M + m)gh = (1 + 0.01) \times 9.81 \times 0.05$$

2. Kinetic energy at the bottom:

$$E_k = \frac{1}{2}(M + m)V^2$$

Equating potential energy to kinetic energy:

$$(1.01) \times 9.81 \times 0.05 = \frac{1}{2}(1.01)V^2$$

Solving for V :

$$V^2 = 2 \times 9.81 \times 0.05$$

$$V = \sqrt{2 \times 9.81 \times 0.05}$$

Now using the conservation of momentum for the collision:

$$mV_0 = (M + m)V$$

Solving for V_0 :

$$V_0 = \frac{(M + m)V}{m}$$

$$V_0 = \frac{(1 + 0.01)V}{0.01}$$

2. Calculate energy dissipated as heat:

Energy loss is given by the difference in kinetic energy before and after the collision:

1. Initial kinetic energy of the bullet:

$$E_{k_{initial}} = \frac{1}{2}mV_0^2$$

2. Final kinetic energy of the system:

$$E_{k_{final}} = \frac{1}{2}(M + m)V^2$$

Energy dissipated as heat:

$$\Delta E = E_{k_{initial}} - E_{k_{final}}$$

Plug in the values to find specific numerical values.