HS_04_25_22

AP 12.4

Goal: Find the kinetic energy of the box after 3 seconds.

Problem Outline

1. Find the total force
2. Find the final velocity of the box
3. Use the kinetic energy formula

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1. Find the total force

$$
\begin{aligned}
a^2 &= b^2 + c^2 \\
F_{tot}^2 &= F_N^2 + F_W^2 \\
F_{tot} &= 56.6
\end{aligned}
$$

2. Find the final velocity of the box

First find the acceleration of the box. Then obtain the final velocity

$$
v_f = v_i + at
$$

3. Find KE

$$KE = \frac{1}{2}mv^2$$

AP 12.10

Problem A person does 5000 J of work on a 50g box over a distance of 5m. The coefficient of friction is 0.2. Find the velocity of the box at 5m.

Problem Outline

1. Find the force of friction.
2. Find the work done by friction.
3. Find the net work.
4. Obtain velocity of the box using the KE formula.

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1. Find the force of friction.

$$F_k = k * F_N = 98$$

2. Find the work done by friction.

$$W_k = F_k * s = 490$$

3. Find the net work

$$W_{net} = W_{person} - W_k = 4510$$

4. Obtain KE

$$\begin{aligned} KE &= \frac{1}{2}mv^2 \\ 2KE &= mv^2 \\ \frac{2KE}{m} &= v^2 \\ \sqrt{\frac{2KE}{m}} &= v \end{aligned}$$

AP 20.8

Problem [...]

Problem Outline

1. Find the period of the pendulum
2. First find the force of gravity felt on the pendulum.

3. Use the gravitational force between two bodies formula to obtain the mass of the unknown planet.

Important Formulas to Know

$$T = 2\pi\sqrt{\frac{L}{g}}$$

$$f = \frac{1}{T}$$

$$F = G\frac{m_1 m_2}{r^2}$$

1. Find the period of the pendulum To find the frequency, divide the number of complete swings over the amount of time it takes to complete.

$$f = \frac{10}{3}$$

$$T = \frac{3}{10}$$

2. Find the force of gravity felt on the pendulum.

$$T = 2\pi\sqrt{\frac{L}{g}}$$

$$\frac{T}{2\pi} = \sqrt{\frac{L}{g}}$$

$$(\frac{T}{2\pi})^2 = \frac{L}{g}$$

$$g = L(\frac{2\pi}{T})^2$$

3. Use the gravitational force between two bodies formula to obtain the mass of the unknown planet.