ADVANCED PHYSICS CLUB

JANUARY 26, 2020

Today's meeting

Today we continued to talk about oscillations. We solved homework problems from the last meeting. We derived the period of oscillations of the physical pendulum characterized by its mass, by the moment of inertia relative to the suspension point I and by the distance from the suspension point to the center of mass of the pendulum $T = 2\pi\sqrt{\frac{I}{mgL}}$. For $I = ml^2$ and $L = l$ this general formula reduces to the period of mathematical pendulum $T = 2\pi\sqrt{l/g}$.

We solved the following problems in class.

1. A block hanging still on a vertical spring extends it by length l. Find the period of small vertical oscillations of the suspended block.

2. Two blocks of masses m_1 and m_2 are connected by a spring with the spring coefficient k. What is the frequency of oscillations of such a system?

Homework problems

1. "Take" the Division 1 version of PhysicsBowl exam 2017. Read all instructions carefully. Mark problems that were difficult or the ones that you were not able to solve. Bring the exam sheets to the next club. The exam can be found here:
`https://www.aapt.org/Programs/PhysicsBowl/upload/PhysicsBowl_2017.pdf`

2. A heavy cart is moving with acceleration a downwards on an inclined plane making angle α with the horizon. Find the period of oscillations of a pendulum of length l mounted on the cart.

***3.** Imagine there is a straight tunnel dug through the Earth from one pole to the other. What time would it take a stone to fly from one end to the other? Neglect air resistance, assume the Earth density to be constant. Earth's radius is 6400 km.

IMPORTANT

The next club meeting is on February 2, 2020. We will continue discussing the PhysicsBowl exam.