Answer on Question #45038 – Physics – Mechanics | Kinematics | Dynamics

The period of a simple pendulum in a laboratory does not depend on
A) the altitude of the laboratory
B) the acceleration due to gravity in the laboratory
C) the length of the string
D) the vibration in the laboratory
E) the mass of the bob

Solution:

A simple pendulum consists of a small object (the "bob") suspended by a lightweight cord. The mass of the pendulum is actually only the mass of the bob; the mass of the string is not included. The period of a pendulum is the amount of time for the bob to complete exactly one cycle or oscillation back and forth. The length of the pendulum extends from the attached end of the string to the center of mass of the bob. The amplitude of the pendulum is the angle formed by a vertical line and the cord when the bob reaches its maximum outward displacement.

As long as it does not swing too far from center, a simple pendulum exhibits a special type of behavior known in physics as simple harmonic motion According to theory, the period of a simple pendulum will not depend on the mass of the bob or the amplitude (so long as it is less than about 10°). Instead, the period will depend only upon the length and acceleration due to gravity in the laboratory as indicated in the following equation:

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

where: $T -$ period, $l -$ length, and $g -$ a gravitational constant

Answer: E) the mass of the bob