615-1285 (40-095) Stringless Pendulum

Theory:

The stringless pendulum demonstrates simple harmonic motion in a way that doesn't seem so tied down. Students will see the period of an oscillating body from a different perspective than the standard string and ball. The period of the 1 inch steel ball can be measured, and the distance to a focal point can be calculated to compare the demonstration to a classic pendulum.

Warranty and Parts:

We replace all defective or missing parts free of charge. Additional replacement parts may be ordered toll-free. We accept MasterCard, Visa, checks and School P.O.s. All products warranted to be free from defect for 90 days. Does not apply to accident, misuse or normal wear and tear. Intended for children 13 years of age and up. This item is not a toy. It may contain small parts that can be choking hazards. Adult supervision is required.

Simple Harmonic Motion Demonstration:

1. Students should place the curved pendulum track on a flat surface such as a laboratory bench or table.
2. One student should obtain a stopwatch and be prepared for the release of the steel ball in step 3 below.
3. A second student should release the steel ball from the right hand side of the track with enough force to allow the ball to complete one oscillation (i.e., from the right to the left of the track and back to the right of the track). The students should repeat this experiment three times and record the oscillation times below.

Time 1 = _____(s)
Time 2 = _____(s)
Time 3 = _____(s)

Students should obtain the average time as follows:

$$\text{Average time} = \frac{(T1+T2+T3)}{3}$$

Average time = _____(s)

4. Using the average time value found above, students are able to solve for the length of the imaginary pendulum string according to the following equation:

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

T = period
l = length of pendulum string
g = acceleration due to gravity (9.8 m/s^2)

l = _____ (m)

For example, if it took 30 seconds for the steel ball to complete one oscillation, the length of the string would be as follows:

$$30 = 2\pi\sqrt{l}\left(\sqrt{\frac{1}{9.8}}\right)$$

$$30 = 2(3.14)\left(\sqrt{l}\right)(0.316)$$

$$30 = 1.98\left(\sqrt{l}\right)$$

$$15.15 = \left(\sqrt{l}\right)$$

$$(15.15)^2 = l$$

229.52 meters = l

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Related Products:

40-130 Ballistic Pendulum- The Ballistic Pendulum is a classic example of conservation of momentum.

40-100 Angular Momentum Apparatus - This rod may be used with one of the movable masses for a center of gravity paradox. With two masses placed on the rod, angular momentum can be "felt" by rotating the rod with the masses near the center, then on the ends. With three masses on the rod, students can mathematically calculate the necessary positions of the masses to allow the center of gravity to be determined at a given point.

Stringless Pendulum Teaching Concepts:

Grades 9-12

- Force and Motion
- Motions and forces
- Conservation of energy

Curriculum Fit

- Simple harmonic motion

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