



Hooke's Law Apparatus

ACTIVITY GUIDE

Cat. No. HKLW12

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Assembly of Apparatus

Remove the hex nut from the long rod and insert the threaded end of the rod into the round base. Once the rod is inserted, fasten the rod in place with the hex nut.



Slide the barrel of the clamp onto the long rod, and tighten at desired height.



Slide the hook onto the clamp, and tighten.

When assembled, the long rod should be perpendicular to the base and the clamp with hook attached should be at right angles to the long rod.

Clip the scale to the long rod. The bottom end of the scale holder should be even with the hole in the long rod.

Hang the spring from the hook.

Background

Robert Hooke (1635-1703) was a brilliant experimental philosopher and architect. He constructed the first reflecting telescope and invented the quadrant (a marine barometer) and the universal joint. He also discovered the relationship between the stress and strain in elastic bodies: "the power of any springy body is in the same proportion with the extension." He used his Law to explain the arch, the balance spring of watches, and other mechanical marvels.

The Physics Behind Hooke's Law

According to Hooke's Law, the strain produced in a material or physical system subjected to stress is directly proportional to the stress applied. In other words, stress ÷ strain = constant. A simple example is a spring. The stretch of a spring from its rest position is proportional to the applied force. Mathematically, this

is written as $F = kx$ where F is the applied force, x is the amount of stretch (the deformation of the elastic

body subjected to force F), and k is the spring constant, a constant that depends on the "stiffness" of the spring.

Activity 1: Investigating Hooke's Law

Additional Materials Needed: hooked weight

In this activity, the weight of a known mass will be the force used to stretch a spring.



Measure the stretch of the spring by noting the change in the spring's position before and after the force is applied. Use the formula $W = mg$ to calculate the force.

On a data chart, record the mass of the weight. Record the position of the end of the spring before the mass is added (starting position.) Fasten the hooked weight to the spring. Wait for all oscillations to cease, then record the new position of the end of the spring (ending position.) Repeat the experiment at least eight times and record your data for each trial.

Sample Data Table

Trial	Mass (grams)	Starting Position (cm)	Ending Position (cm)	Force (Newtons)	Stretch (cm)
1					
2					
etc.					

Graph the force (independent variable/horizontal axis) vs. stretch (dependent variable/vertical axis).

Activity 2: The Relationship Between Force & Stretch

Additional Materials Needed: slotted weights

According to Hooke's Law, the stretch of a spring from its rest position is proportional to the applied force. What effect will using twice the force have on a spring?