



Hooke's Law Set

Model No. ME-9827



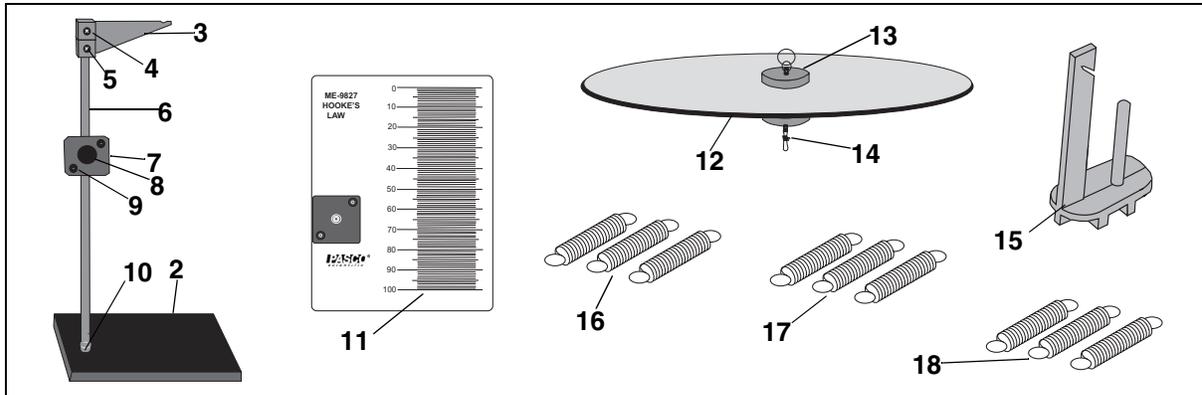
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Equipment List



Included Equipment	Replacement Model Number*
1. Hooke's Law Apparatus (includes all items shown in illustration)	ME-9827
2. Base (1), 10.4 cm x 7.5 cm	648-01081
3. Support Arm (1)	648-07989
4. Clamps (2)	648-02023
5. Screws (2), 6-32 x 1/2	610-042
6. Rod (1), stainless steel, 29.3 cm length	648-01080
7. Rod Clamp (1)	648-05132/648-05133
8. Thumb screw with knob, 1/4-20 x 1.0'	617-019
9. Screws (2), 10-32 x 5/8	610-143
10. Thumb nut, 1/4-20	614-034
11. Transparent Scale Plate (1)	966-07988
12. Stretch Indicator (1)	648-07990
13. Grommet (1)	623-007
14. Eye, swivel (1)	616-148
15. Mass Hanger (1)	648-04857
16. 5 N/m Springs (3)	632-050
17. 8 N/m Springs (3)	632-051
18. 70 N/m Springs (3)	632-052

Additional Equipment Recommended (for experiments)	Model Number
Mass and Hanger Set	ME-9348
DataStudio [®] software (for graphing data)	CI-6870C

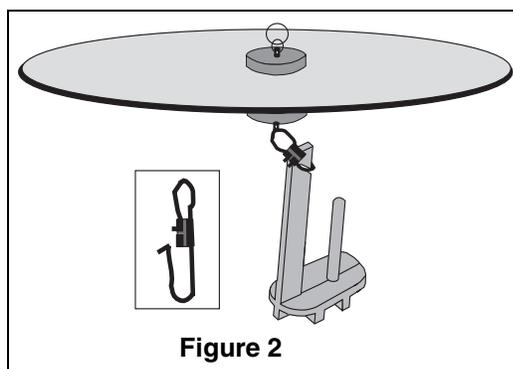
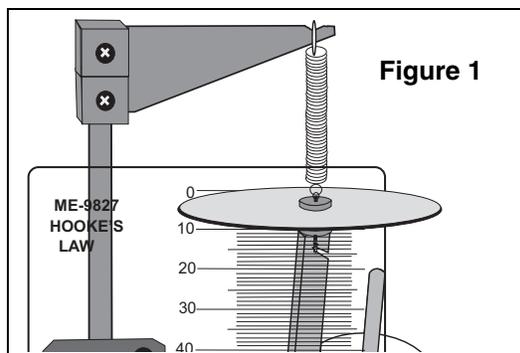
Introduction

PASCO's ME-9827 Hooke's Law Apparatus allows students to investigate the relationship between the force applied to a spring and the amount the spring stretches. Its rugged base and brilliant stretch indicator will provide years of use in the physics classroom. In addition, it includes three different springs of varying stiffness. Each spring has identical length and diameter, but the spring constant varies between 4 N/m and 96 N/m. Three of each spring type are included for a total of nine springs.

Equipment Assembly

The stand comes fully assembled, including the transparent scale. To ready the unit for use, perform the following:

1. Hang the desired spring from the notch on the support arm. (Figure 1).
2. Connect the Stretch Indicator to the bottom of the spring.
3. Align zero on the sliding transparent scale with the Stretch Indicator (Figure 1).
4. Connect a mass hanger to the bottom of the Stretch Indicator. To connect the mass hanger, unclip the bottom wire clamp and slide the clamp through the slit on the hanger (Figure 2). The complete setup is shown on the next page.



Note: You may need to adjust the clamp on the support rod until the indicator reading falls at exactly zero. Always take your reading from the bottom edge of the indicator.

Experiment: Discovering Hooke's Law

1. Choose the increments of mass to be used in the experiment. Keep the spring constant in mind when making this choice. The different springs in the set have spring constants of approximately 4 N/m, 8 N/m, and 96 N/m.
2. Connect the mass hanger to the bottom of the stretch indicator and place the first mass increment on the hanger. Record the stretch of the spring and the weight of the hanging mass. Don't forget to include the mass of the hanger.
3. Add five more increments of mass, each time recording the stretch of the spring and the weight of the hanging mass.
4. Repeat steps 2-3 for a different spring.
5. In DataStudio, create a graph with "Force" on the vertical axis and "Stretch" on the horizontal axis. For more details, see the instructions in Appendix B.
6. Using $y = mx + b$, write an equation for each of the lines. Make sure to include appropriate variable, numbers, and units in the equation.
7. The slope of the Force vs. Stretch graph is known as the spring constant or rate. The vertical intercept represents the amount of force needed to begin stretching the spring and is also known as the initial tension. (See "Sample Data" on the next page.)

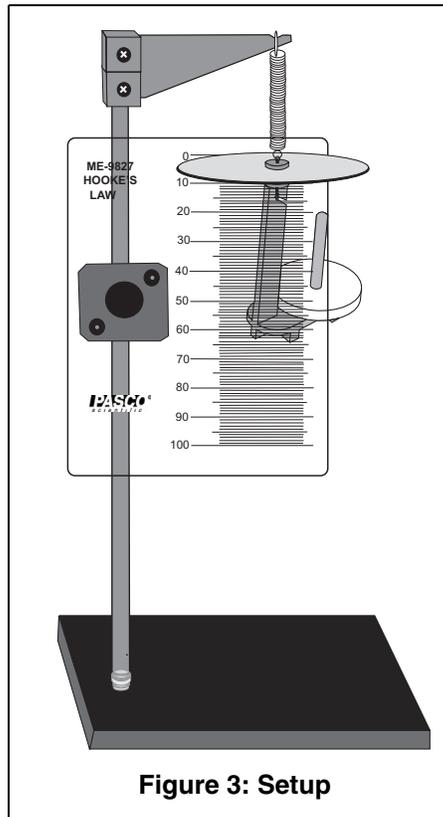
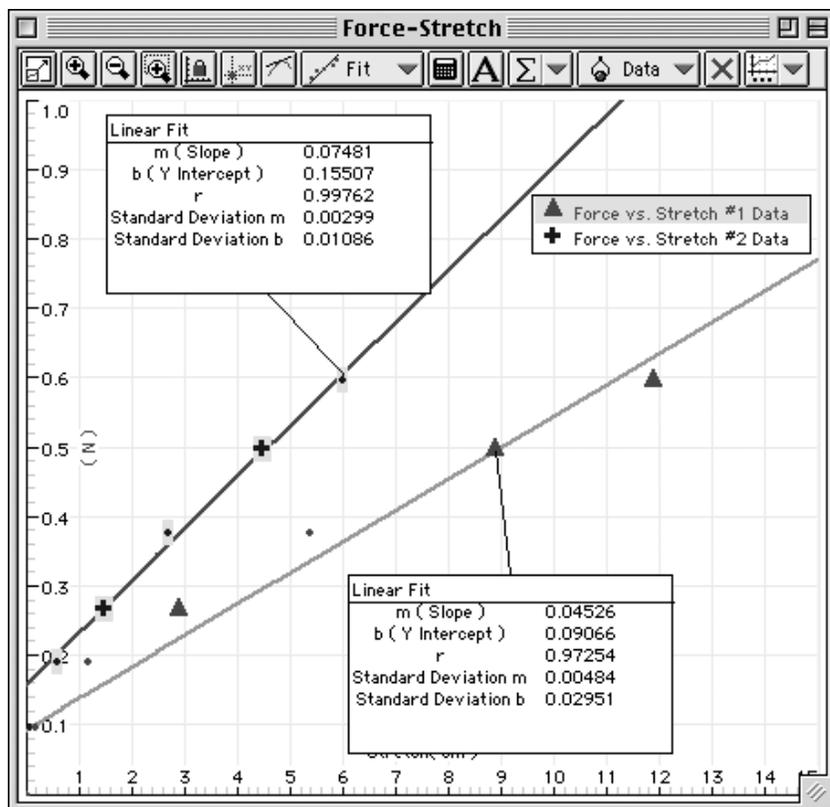


Figure 3: Setup



CAUTION: Stretching the spring more than twice its resting length can damage the spring. The maximum allowable force for each spring is listed under Specifications in Appendix A. Test your mass choice prior to trying the experiment with students.

Sample Data



Appendix A: Specifications

Part	Specifications
Stretch Indicator	fluorescent disc, 6.6 cm diameter, acrylic
Spring 5 N/m	length (with hooks) = 6.4 cm; diameter = 0.71 cm; spring constant = 5 N/m
Spring 8 N/m	length (with hooks) = 6.4 cm.; diameter = 0.71 cm; spring constant = 8 N/m
Spring 70 N/m	length (with hooks) = 6.4 cm; diameter = 0.71 cm; spring constant = 70 N/m
Rod stand	semi-steel, length = 29.2 cm, diameter = 0.64 cm
Mass hanger	mass = 5 grams
Base support	11.4 cm (length) x 7.6 cm (width) x 0.6 cm (height)

Appendix B: Plotting Data in DataStudio

The following instructions are provided for new users or those unfamiliar with DataStudio. The following instructions explain how to create an x-y graph and/or calculate statistics on previously collected data.

1. Open DataStudio. When the Welcome to DataStudio window opens, select “Enter Data.” An editable table and Graph display open.
2. On the main toolbar, click the **Summary** button.
3. In the Data list, double click on the data icon to open the Data Properties dialog.
4. In the Data Properties dialog, do the following:
 - a) Enter a name for your experiment in the **Name** box.
 - b) Click on the **X tab** and enter the variable name “Stretch” to label the x axis. Enter the units for stretch (mm or m).
 - c) Click on the **Y tab** and enter the variable name “Force” to label the y axis. Enter the units for force (N). Click **OK**.
5. In the Editable data table, enter your values for force and stretch. The data values automatically plot in the graph to the right.
6. On the graph toolbar, click the **Curve Fit** button and select “Linear Fit.” Slope, intercept, correlation, and standard deviation values appear in a box on your display.

Appendix C: Technical Support

For assistance with the ME-9827 Hooke's Law Apparatus or any other PASCO products, contact PASCO as follows:

Address: PASCO scientific

10101 Foothills Blvd.

Roseville, CA 95747-7100

Phone: 1-800-772-8700 or (916) 786-3800

FAX: (916) 786-3292

Web: www.pasco.com

Email: techsupp@pasco.com

Appendix D: Copyright and Warranty Information

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Limited Warranty

PASCO scientific warrants the product to be free from defects in materials and workmanship for a period of one year from the date of shipment to the customer. PASCO will repair or replace, at its option, any part of the product which is deemed to be defective in material or workmanship. The warranty does not cover damage to the product caused by abuse or improper use. Determination of whether a product failure is the result of a manufacturing defect or improper use by the customer shall be made solely by PASCO scientific. Responsibility for the return of equipment for warranty repair belongs to the customer. Equipment must be properly packed to prevent damage and shipped postage or freight prepaid. (Damage caused by improper packing of the equipment for return shipment will not be covered by the warranty.) Shipping costs for returning the equipment after repair will be paid by PASCO scientific.