Lab #5

Hooke's Law

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Purpose

To use Hooke's law to find the null value and the spring constant of a spring.

Theory

Even though the technical load is $\frac{20}{1000} x\ 9.8\ N$ etc., since the load for 40 is double the load for 20 etc. we can call each load 20, 40, 60 etc.

Every spring has a null value which is the maximum load that will give you nothing. To calculate the null value we graph values which we can calculate and extend the graph backward toward the axis until it gets down to 0 on the X-axis.

Even though the stretch is dependent on the load, we still plot the stretch on the X-axis and the load on the Y-axis. Possible reasons for this are:

1) The letter that is designated to represent stretch in physics is X
2) We are trying to calculate the stretch constant so if the y-axis is over the x-axis then that's slope.

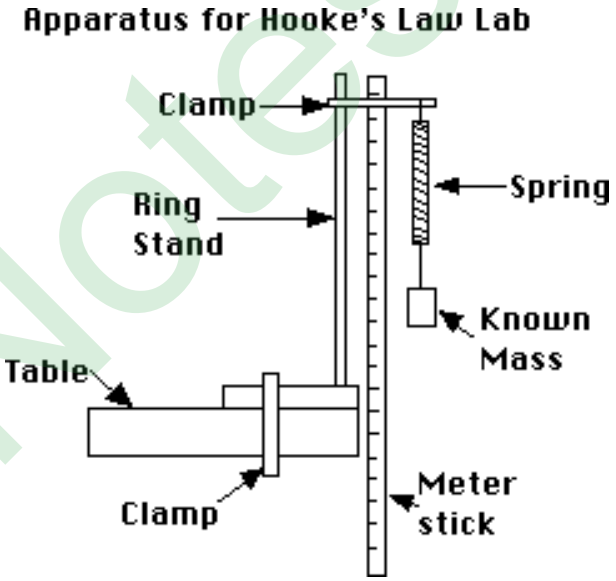
Materials

1. Ring Stand
2. Clamp
3. Meter Stick
4. Mass (whose value is known)

Procedure

1. Draw the line with the load being the Y-axis and stretch being the X-axis.
2. Extend the line to the point where the X value equals 0, to calculate the null value.
3. Calculate the slope which represents the tightness factor of the spring.

Diagram



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Data

X-axis	Y-axis
Stretch (in cm)	**Load (in grams)**
1.0	20
2.3	40
3.6	60
5.1	80
6.6	100

Stretch

Null value=10

Slope=$\frac{100-40}{6.6-2.3}$=13.95$\frac{g}{cm}$=K (spring constant)

- 13.95 grams are required per centimeter of pull

Accepted value for slope=14.00 $\frac{g}{cm}$

Percent error=$\frac{14.00-13.95}{14}$=.0036=00.36%

Conclusions and Discussion of Results

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We have learned how to calculate the tightness factor and null value of a spring using a measured stretch and a known load.

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