Estimating and Measuring Height

Purpose

1. Determine the spring constant of a rubber band.
2. Use iSENSE software to analyze a scatter plot and create a line of best fit for data.

Materials

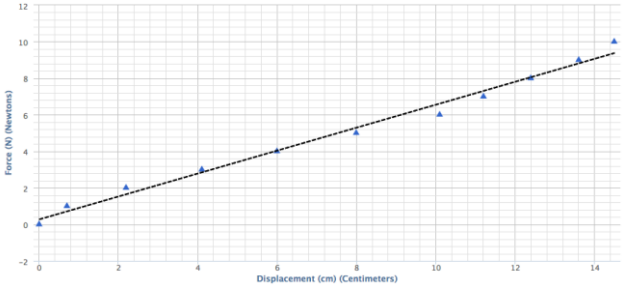
1. Stable stand or other apparatus to hang weights.
2. Stout rubber band.
3. Set of hanging weights.
4. One of meter stick (precision 1 cm)
5. Computer or tablet with internet connection
6. Interactive website – www.isenseproject.org

Methods

1. Hang one rubber band from the stand and loop the hook of the weight hanger through the rubber band. Use the meter stick to record the height of the bottom of the hanger from the base in centimeters.
2. Set up your data in iSENSE
   - Go to www.isenseproject.org
   - Click on *Projects.*
   - Search for and select *Rubber Band Spring Constant*.
   - Enter your contributor key (see the whiteboard) and your last name (i.e. Richter) in the *Contribute Data* fields. Click *Submit Key*.
   - Click on *Manual Entry* under *Contribute Data.*
   - Enter the data set name as your last name and the current time (i.e. Richter 8:21)
   - Click "Add Row" until you have 11 rows for your data.
   - In the first line of your data, enter 0 for "Displacement" and 0 for "Force".
3. Add 1 Newton (N) of weight to your hanger (100g ≈ 1 N). Measure the displacement (**change** in height of hanger). Enter your new data in the next row.
4. Repeat step 3 until you reach a weight of 10 N. Then click "Save".

iSENSE Analysis

1. In your scatter plot, select the "Displacement" button for the x-axis and the "Force" button for the y-axis.
2. Under analysis tools (scroll down) click "Draw Best Fit Line".
3. Mouse over the best fit line and note the coefficient of x, which is the slope of the line. This value is your spring constant in units of N/cm.



4. Take a screenshot of your graph, like the one above, and save it as a picture file named YourLastName –Rubber Band (i.e. Richter – Rubber Band).

Discussion Questions

Compose an email to your teacher with the subject YourLastName –Rubber Band (i.e. Richter – Rubber Band)

1. Attach your visualization to the email.

Answer the questions below in **2-3 complete sentences**.

2. What is the spring constant of your rubber band? How do you know?
3. Of all of the rubber bands the class tested, which one had the highest spring constant? Which had the lowest? How do you know?
4. What could you change about the materials or the procedure of this experiment to increase your understanding of spring constants for your next experiment?

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