Hooke's law (Item No.: P1251800)

Curricular Relevance

Area of Expertise: Physik
Education Level: Klasse 7-10
Topic: Mechanik
Subtopic: Kräfte, einfache Maschinen
Experiment: Hookesches Gesetz

Difficulty	Preparation Time	Execution Time	Recommended Group Size
Intermediate	10 Minutes	20 Minutes	1 Student

Additional Requirements:

Experiment Variations:

Keywords:

Principle and equipment

Principle

Show that Hooke's law is valid in the loading of a helical spring and that the extension of the springs is a function of the acting force and of the hardness of the springs.

Equipment

Position No.	Material	Order No.	Quantity
1	Demo Physics board with stand	02150-00	1
2	Torsion dynamometer	03069-03	1
3	Hook on fixing magnet	02151-03	1
4	Scale for demonstration board	02153-00	1
5	Helical spring, 3 N/m	02220-00	1
6	Helical spring, 20 N/m	02222-00	1

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Set-up and procedure

Set-up

- Position the hook on the fixing magnet near the upper edge of the demonstration board and hang the soft helical spring with 3 N/m onto it.
- Place the dynamometer directly below the helical spring; hook its traction cord onto the helical spring; turn the dynamometer in such a manner that the line is as short as possible and that the spring is slightly preloaded.
- Position the scale on the demonstration board such that the lower end of the spring is at the same height as the zero mark of the scale.
- Set the pointer of the dynamometer to zero, and secure the scale (Fig. 1).

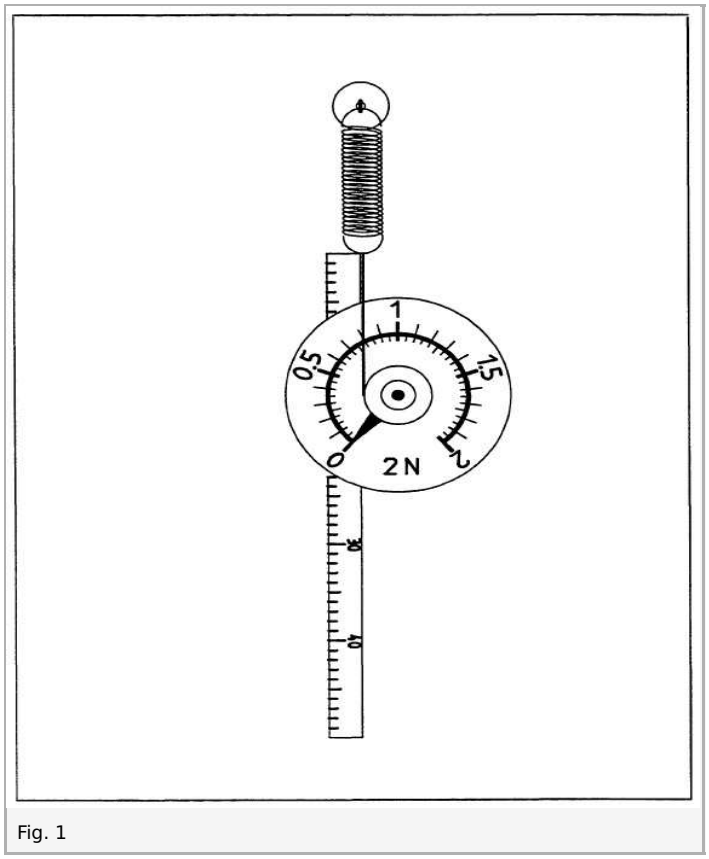

Fig. 1

Procedure

- Move the dynamometer downward until it indicates 0.2 N; measure the resulting extension s and record it in Table 1.
- Increase the tractive force in further steps of 0.2 N each. (When the dynamometer has reached the lower edge of the demonstration board, turn the dynamometer slightly, if necessary, and thus wind up the cord until a value ofF = 0.8 N is reached.) Measure the respective extension and note it in Table 1.
- In a corresponding manner, perform the experiment with the hard helical spring with 20 N/m (until F = 1.2 N), and record the measured values in Table 2.

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Observation and evaluation

Observation

Table 1: Soft spring.

F/N	s/cm	s/m	$\frac{F/s}{N/m}$
0	0	0	-
0.2	6.6	0.066	3.0
0.4	12.8	0.128	3.1
0.6	19.2	0.192	3.1
0.8	25.5	0.255	3.1

Table 2: Hard spring.

F/N	s/cm	s/m	$\frac{F/s}{N/m}$
0	0	0	-
0.2	1.0	0.010	20.0
0.4	2.0	0.020	20.0
0.6	3.0	0.030	20.0
0.8	4.1	0.041	19.5
1.0	5.0	0.050	20.0
1.2	6.0	0.060	20.0

Evaluation

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