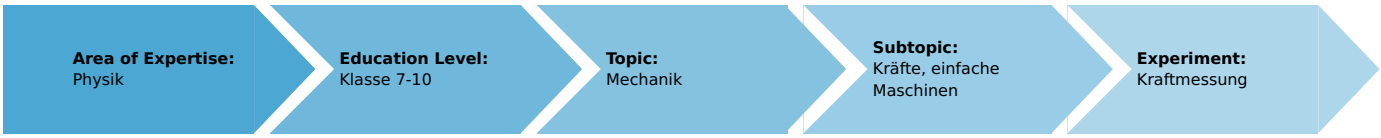
Measurement of force (Item No.: P0998800)

Curricular Relevance



Difficulty	Preparation Time	Execution Time	Recommended Group Size
Easy	10 Minutes	10 Minutes	2 Students

Additional Requirements:

Experiment Variations:

Keywords:

Task and equipment

Information for teachers

Additional Information

The students should become acquainted with the dependence of the reading of spring balances on their orientation and with their adjustment.

With the spring balance adjusted for use in the normal vertical position, the weight F in N of different objects should be determined.

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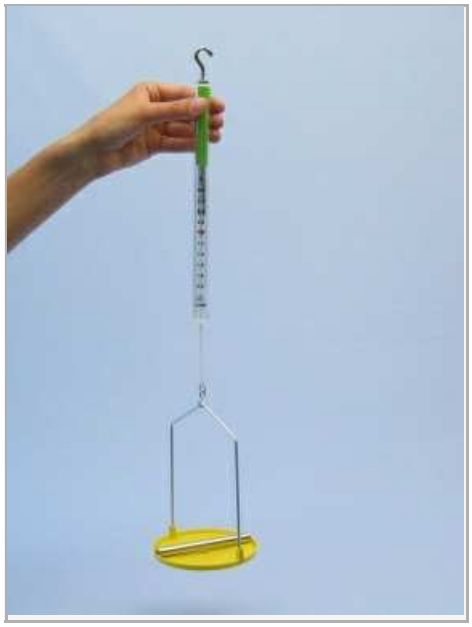
Task and equipment

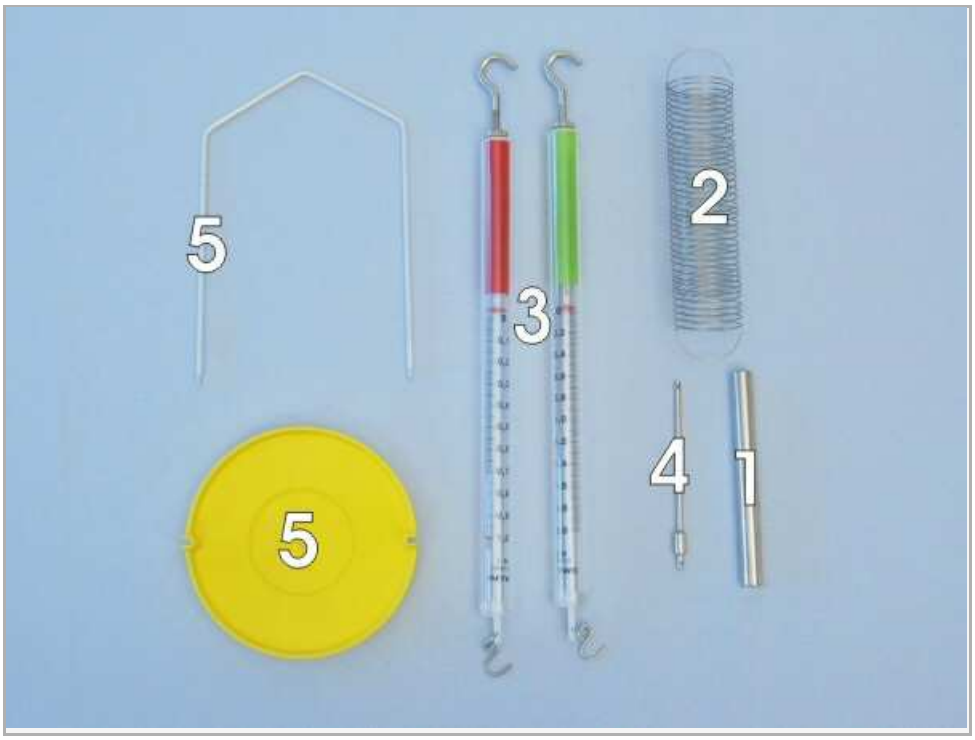
Task

How is force measured?

In this experiment you become acquainted with the dependence of the reading of spring balances on their orientation and with their adjustment. With the spring balance adjusted for use in the normal vertical position, the weight of different objects is determined.



Equipment



Position No.	Material	Order No.	Quantity
1	Support rod with hole, stainless steel, 10 cm	02036-01	1
2	Helical spring, 3 N/m	02220-00	1
3	Spring balance,transparent, 1 N	03065-02	1
3	Spring balance,transparent, 2 N	03065-03	1
4	Holding pin	03949-00	1
5	Balance pan, plastic	03951-00	1

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Set-up and procedure

Set-up

Assemble the balance pan as shown in Fig. 1.

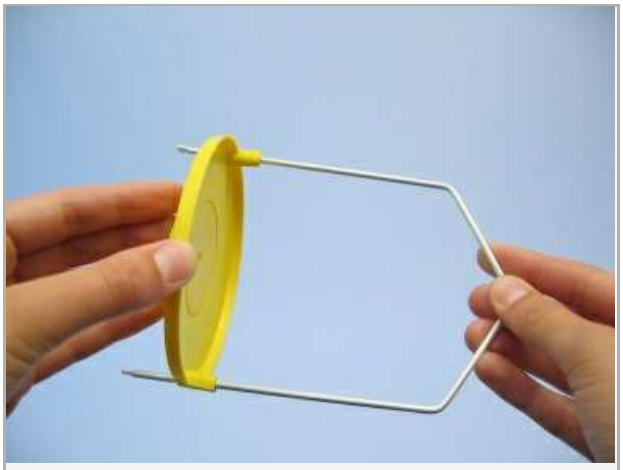

Fig. 1

Procedure

Hold the 2 N spring balance: first vertically (Fig. 2), then horizontally (Fig. 3) and finally upside down (Fig. 4). Observe the spring balance's indicator scale carefully in each position.

Fig. 2

Fig. 3

Fig. 4

- Hold the 2 N spring balance vertically upside down and adjust its indicator by loosening the screw at the top and turning the hook until the indicator points exactly to the zero mark. Then retighten the screw (Fig. 5).
- Now hold the spring balance vertically, then horizontally. Read the scale each time and record the values in Table 1 in the report.

Fig. 5

Adjust the 2 N spring balance which is being held vertically to zero (Fig. 6).

Fig. 6

Hang the balance pan on the hook and place the helical spring, the holding pin and the support rod one after another on it (Fig. 7 and Fig. 8). Record the measured values in Table 2 in the report.

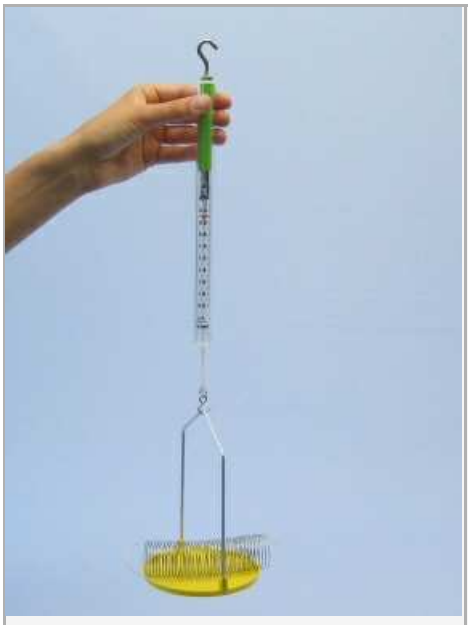
Fig. 7


Fig. 8

Report: Measurement of force

Results – Table 1

Enter the measured values in the table.

Position of spring balance	Reading *F* in N
upside down	1 ±0
horizontal	1 ±0
vertical	1 ±0

Results – Table 2

Enter the measured values in the Table.

Use the measured values in Table 2 to calculate the weight of the 3 objects - without the balance pan - and record the results in Table 2.

	Weight (force) *F* in N			
	with balance pan		without balance pan	
Spring balance	2N	1N	2N	1N
Balance pan	1 ±0	1 ±0		
Helical spring	1 ±0	1 ±0	1 ±0	1 ±0
Holding pin	1 ±0	1 ±0	1 ±0	1 ±0
Suport rod	1 ±0	1 ±0	1 ±0	1 ±0

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Evaluation – Question 1

Does the reading of the spring balance change in the 3 positions?

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Evaluation – Question 2

Explain the variations which occur in the 3 different positions of the spring balance.

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Evaluation – Question 3

What does one division on the face of the 1 N spring balance indicate? On the 2 N balance?

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