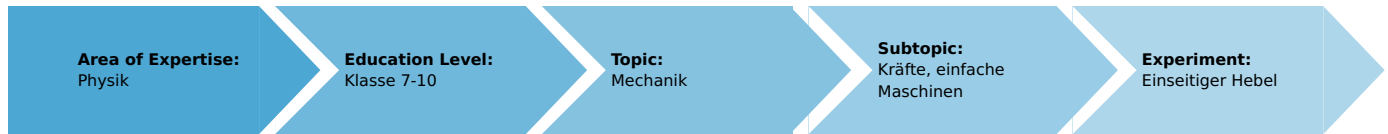


One-sided lever (Item No.: P1253200)

Curricular Relevance



Difficulty



Intermediate

Preparation Time



10 Minutes

Execution Time



10 Minutes

Recommended Group Size



1 Student

Additional Requirements:

Experiment Variations:

Keywords:

Principle and equipment

Principle

Prove that an equilibrium exists on a one-sided lever when the products of two conversely acting forces and their power arms are equal.

Equipment

Position No.	Material	Order No.	Quantity
1	Demo Physics board with stand	02150-00	1
2	Rod on fixing magnet	02151-02	1
3	Torsion dynamometer	03069-03	1
4	Scale for demonstration board	02153-00	1
5	Weight holder for slotted weights	02204-00	1
6	Slotted weight, black, 10 g	02205-01	2
7	Slotted weight, silver bronze, 10 g	02205-02	2
8	Slotted weight, black, 50 g	02206-01	1
9	Slotted weight, silver bronze, 50 g	02206-02	2
10	Lever	03960-00	1
11	Pointer for demonstration lever	03963-00	1
12	Marker, black	46402-01	1

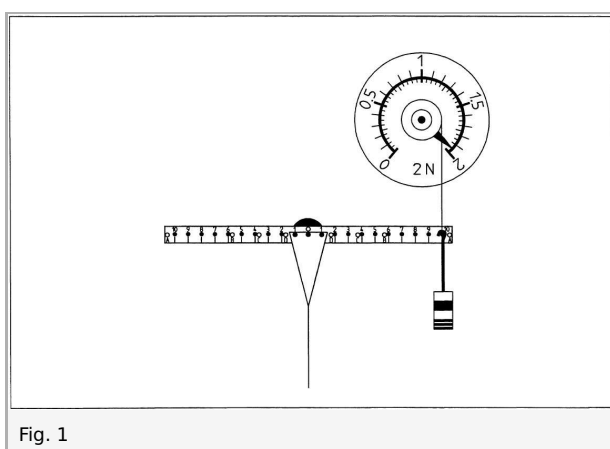
Set-up and procedure

Set-up

- Place the axle on fixing magnet onto the lower part of the demonstration board, and slip the middle hole of the lever onto the axle.
- Using the white board pen, draw a vertical line downwards from the axle.
- Attach the pointer for demonstration lever to the lever (in the following its tip lies directly on the vertical line when the lever is in equilibrium).

Procedure

- Place the dynamometer onto the board, and measure the weight- in the following termed F_1 - for the weight holder with all the slotted weights. Note F_1 in the upper part of Table 1.
- Hook both the traction cord of the dynamometer and the weight holder with the slotted weights in the hole at the #10 index mark on the right side.
- Move the dynamometer until the lever is horizontal and the traction cord is perpendicular to it (Fig. 1).



- Read F_2 on the dynamometer, and record its value in Table 1.
- Shorten the power arm I_1 progressively. For each length measure the force F_2 required for the maintenance of equilibrium and record it (cf. given values in Table 1, upper part).
- Remove two 50-g slotted weights from the weight holder, measure the weight F_1 again and record it.
- Hook the weight holder into the hole next to the #9 index mark, and leave it there while performing the following steps.
- Progressively shorten the power arm I_2 . To do this, hook the traction cord of the dynamometer in the holes next to the #10, #9, ... , #6 index marks (cf. Table 1, lower part), Measure F_2 in each case and record the respective values.

Observation and evaluation

Observation

Table 1

Index mark no.	l_1 / cm	F_1 / N	$\frac{F_1 * l_1}{N * cm}$	Index mark no.	l_2 / cm
10	20	1.95	39.0	10	20
8	16	1.95	31.2	10	20
6	12	1.95	23.4	10	20
4	8	1.95	15.6	10	20
2	4	1.95	7.8	10	20
9	18	0.98	17.6	10	20
9	18	0.98	17.6	9	18
9	18	0.98	17.6	8	16
9	18	0.98	17.6	7	14
9	18	0.98	17.6	6	12

Evaluation