ROQED PHYSICS LAB

Determination of the equilibrium condition of the lever.

Purpose of work:
To find out from experience at what ratio of forces and their shoulders the lever is in equilibrium. Test the rule of the moment experimentally.

Required tools / items / reagents:
000 - tripod
029 - arm on the tripod and there is something else
003 - weight with suspended mass 102 g (4 pcs.)
018 - dynamometer

Theoretical part The
arm is a solid body that can rotate around a fixed support ...
Figure 1 shows a lever whose axis of rotation O (fulcrum) is located between the points of application of forces A and B. Figure 2 shows a diagram of this lever. Both forces F_1 and F_2 acting on the lever are directed in the same direction.

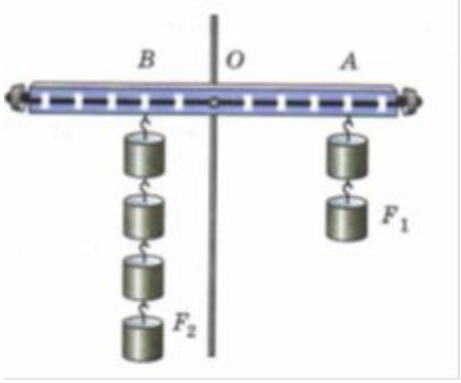

Figure 1

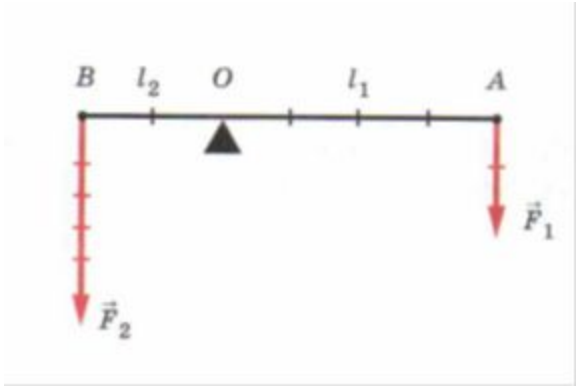

Figure 2

From the experience in Figure 1, it can be seen that the force of 2 N balances the force of 4 N. At the same time, the shoulder of a lesser force is 2 times larger than the shoulder of a greater force.

$$\frac{F1}{F2} = \frac{l1}{l2}$$

On the basis of such experiments, the condition (rule) of the balance of the lever was established. The lever is in equilibrium when the forces acting on it are inversely proportional to the arms of these forces, that is, the moment of force M = FL rotating it clockwise should be equal to the moment of force rotating it counterclockwise.

$M_1 = M_2$ or $F_1L_1 = F_2L_2$

On a board,
loads weighing 100 grams.

Work progress:

1. According to the image on the board with,select the workplace for the experiment.

2. The force of gravity on the left side of the lever will be denoted F_1, on the right - F_2. Create a formula to calculate these forces
$F = mg$

3. Start the simulation.

4. Balance the lever by placing thering on the left shoulder at a distance of 12 cm from the pivot ($l_1$weight) and sliding the weight ring on the right shoulder (l_2). Enter the measurement result in the Table.

5. Repeat the experiment, hanging on the left side of the axis of rotation in turn 2 and 3 weights. The length of the left shoulder should remain unchanged, move the weight only on the right shoulder. Enter the measurement results in Table 1.

6. Collect the formula for calculating the moment of force.
$M = F\,l$

7. Experimenttable

No.	m_1 (kg)	F_1 (N)	l_1 (m)	m_2 (kg)	F_2 (N)	l_2 (m)	M_1 (N * m)	M_2 (N * m)	F_1 / F_2	l_1 / l_2
1	0.1		0.12	0.1		...				
2	0.2					...				
3	0.3					...				

8**. Make theconclusion:**

A. The lever is in balance when the forces acting on it are inversely proportional to the shoulders of these forces.

B. The lever is in balance when the forces acting on it are directly proportional to the shoulders of these forces.

C. The lever is in balance when the forces acting on it are equal.