UE1020200 I FIRST- AND SECOND-CLASS LEVERS

BASIC PRINCIPLES

A lever is a fixed body which can rotate around a fixed axis and can be used to lift and move loads. A force or effort is applied at a certain point from the fulcrum in order to move a load or resistance at another point along the lever. With a second-class lever, the effort F_1 and load F_2 are both on the same side of the fulcrum and both the forces act in opposite directions. With a first-class lever, the forces are on different sides of the fulcrum and are both directed the same way.

For both types, the law of the lever follows from the equilibrium of moments:

(1) $$F_1 \cdot x_1 = F_2 \cdot x_2$$

This represents the physical basis for all kinds of mechanical transmission of force.

EVALUATION

From the values measured, calculate in each case the products

$$F_1 \cdot x_1 \quad \text{and} \quad F_2 \cdot x_2$$

and make a comparison between them.

> EXPERIMENT PROCEDURE

- Measure the force F_1 as a function of the load F_2, the distance between the load and the fulcrum x_2 and the distance between the force and the fulcrum x_1 for a second-class lever.

- Measure the force F_1 as a function of the load F_2, the distance between the load and the fulcrum x_2 and the distance between the force and the fulcrum x_1 for a first-class lever.

OBJECTIVE

Verification of the law of the lever

SUMMARY

The law of the lever follows from the equilibrium of moments, which works for all three classes of lever. It represents the physical basis for all kinds of mechanical transmission of force.

REQUIRED APPARATUS

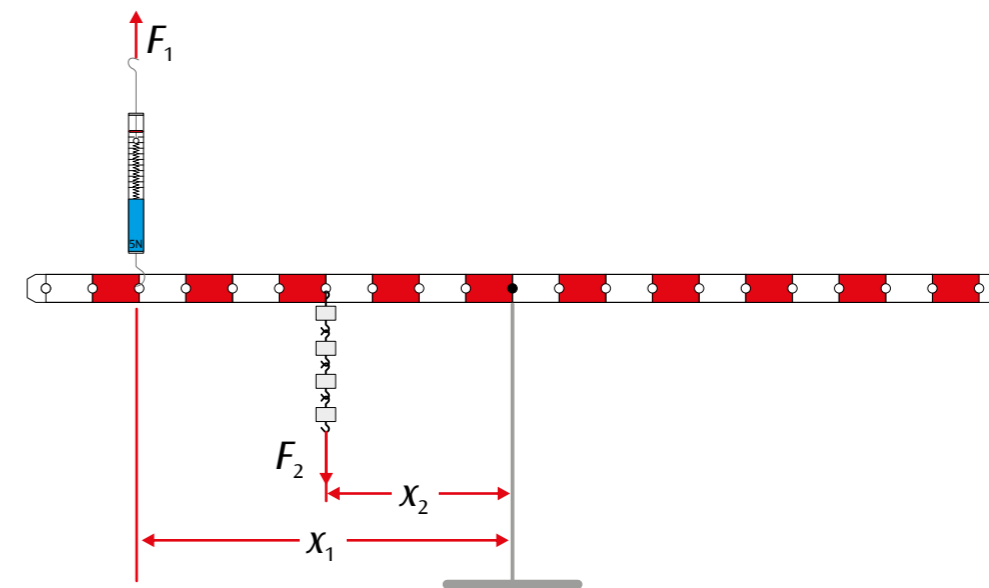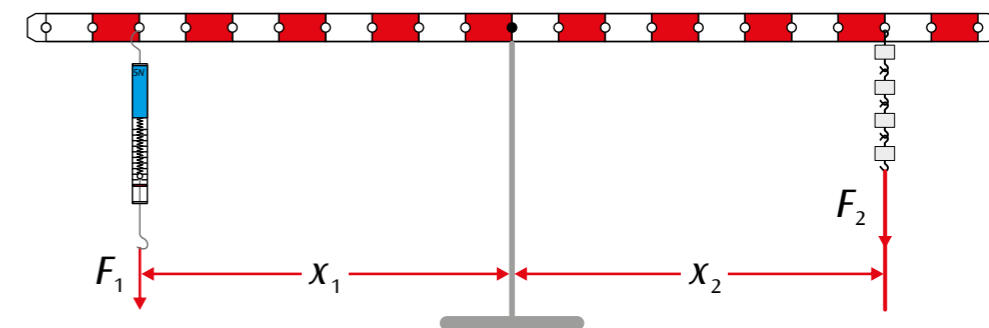| Quantity	Description	Item Number
1	Lever	1008539
1	Precision Dynamometer 2 N	1003105
1	Precision Dynamometer 5 N	1003106

Fig. 1: 2nd-class lever

Fig. 2: 1st-class lever