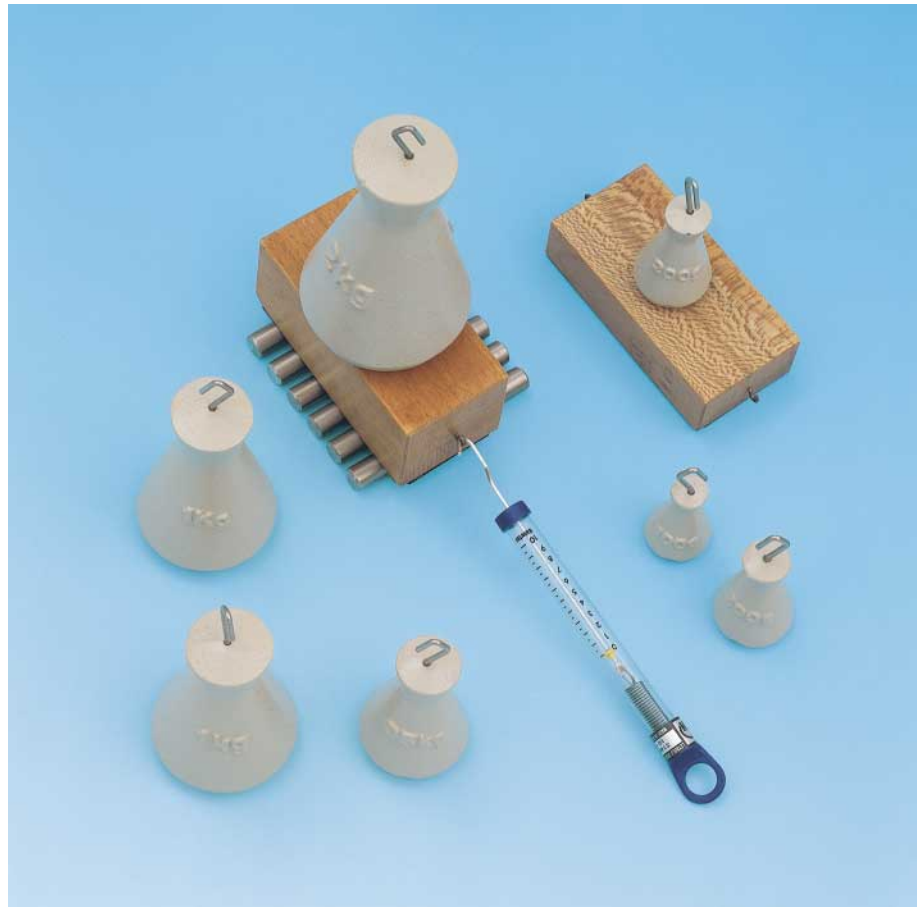


**P 1.2.6**

**Friction**

P1.2.6.1 Static friction, sliding friction and rolling friction



Static friction, sliding friction and rolling friction (P 1.2.6.1)

In discussing friction between solid bodies, we distinguish between static friction, sliding friction and rolling friction. Static friction force is the minimum force required to set a body at rest on a solid base in motion. Analogously, sliding friction force is the force required to maintain a uniform motion of the body. Rolling friction force is the force which maintains the uniform motion of a body which rolls on another body.

To begin, this experiment verifies that the static friction force  $F_H$  and the sliding friction force  $F_G$  are independent of the size of the contact surface and proportional to the resting force  $G$  on the base surface of the friction block. Thus, the following applies:

$$F_H = \mu_H \cdot G \text{ and } F_G = \mu_G \cdot G.$$

The coefficients  $\mu_H$  and  $\mu_G$  depend on the material of the friction surfaces. The following relationship always applies:

$$\mu_H > \mu_G.$$

To distinguish between sliding and rolling friction, the friction block is placed on top of multiple stand rods laid parallel to each other. The rolling friction force  $F_R$  is measured as the force which maintains the friction block in a uniform motion on the rolling rods. The sliding friction force  $F_G$  is measured once more for comparison, whereby this time the friction block is pulled over the stand rods as a fixed base (direction of pull = direction of rod axes). This experiment confirms the relationship:

$$F_G > F_R.$$

Cat. No.	Description	P 1.2.6.1
315 36	Set 7 weights, 0.1 – 2 kg, with hook	1
300 40	Stand rod, 10 cm	6
314 47	Spring balance, 10.0 N	1
342 10	Pair of wooden blocks for friction experiments	1