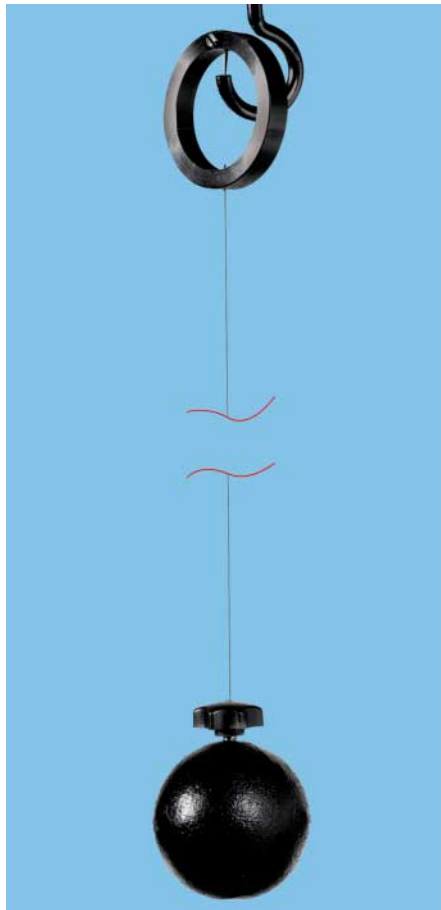


**P 1.5.1**

**Mathematic and physical pendulum**

- P 1.5.1.1 Determining the gravitational acceleration with a mathematic pendulum
- P 1.5.1.2 Determining the gravitational acceleration with a reversible pendulum



Determining the gravitational acceleration with a mathematic pendulum (P 1.5.1.1)



Determining the gravitational acceleration with a reversible pendulum (P 1.5.1.2)

A simple, or “mathematic” pendulum is understood to be a point-shaped mass  $m$  suspended on a massless thread with the length  $s$ . For small deflections, it oscillates under the influence of gravity with the period

$$T = 2\pi \cdot \sqrt{\frac{s}{g}}$$

Thus, a mathematic pendulum could theoretically be used to determine the gravitational acceleration  $g$  precisely through measurement of the oscillation period and the pendulum length.

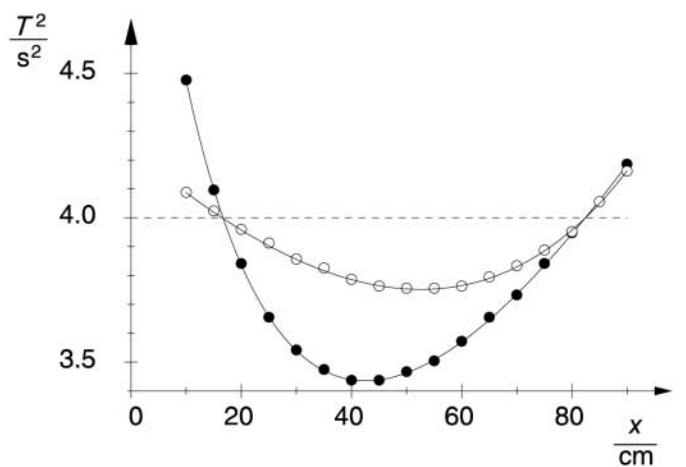
In the first experiment, the ball with pendulum suspension is used to determine the gravitational acceleration. As the mass of the ball is much greater than that of the steel wire on which it is suspended, this pendulum can be considered to be a close approximation of a mathematic pendulum. Multiple oscillations are recorded to improve measuring accuracy. For gravitational acceleration, the error then depends essentially on the accuracy with which the length of the pendulum is determined.

The reversible pendulum used in the second experiment has two edges for suspending the pendulum and two sliding weights for “tuning” the oscillation period. When the pendulum is properly adjusted, it oscillates on both edges with the same period

$$T_0 = 2\pi \cdot \sqrt{\frac{s_{\text{red}}}{g}}$$

and the reduced pendulum length  $s_{\text{red}}$  corresponds to the very precisely known distance  $d$  between the two edges. For gravitational acceleration, the error then depends essentially on the accuracy with which the oscillation period  $T_0$  is determined.

Cat. No.	Description	P 1.5.1.1	P 1.5.1.2
346 39	Ball with pendulum suspension	1	
346 111	Reversible pendulum		1
311 77	Steel tape measure, 2 m	1	1
313 07	Stopclock I 30 s/15 min	1	1



Measurement diagram for reversible pendulum (P 1.5.1.2)