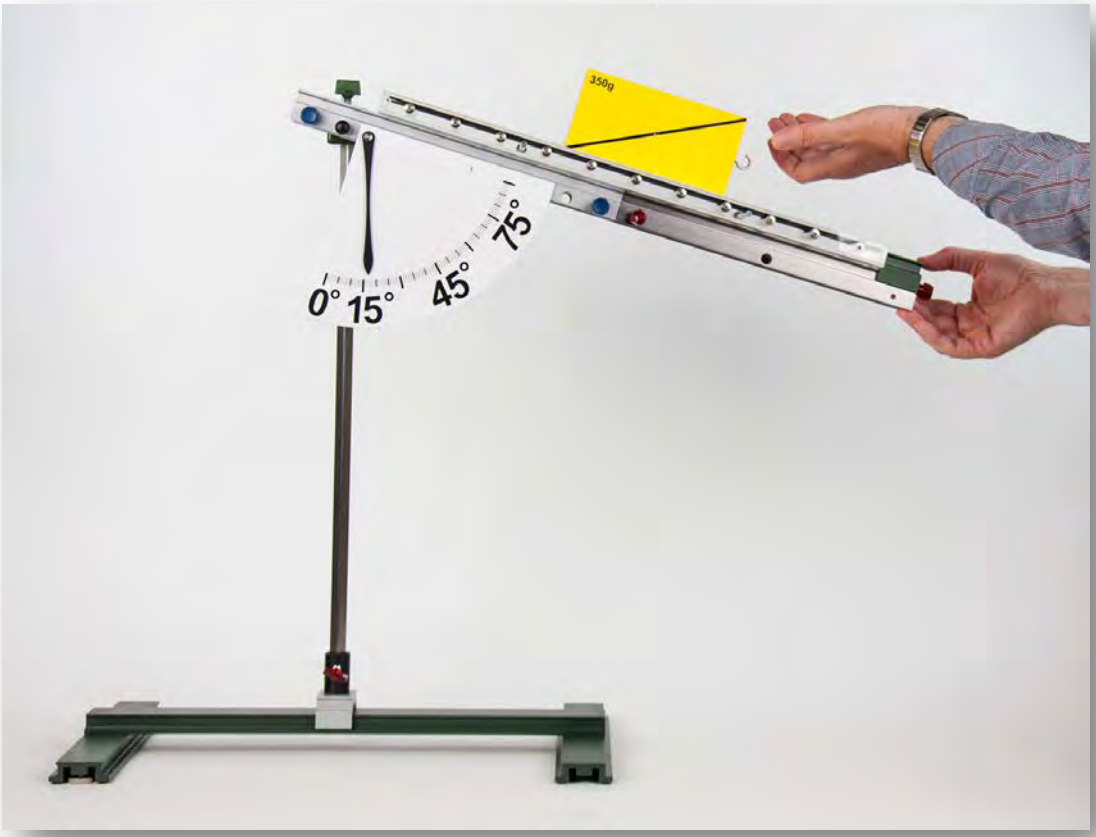
DETERMINATION OF THE COEFFICIENT OF FRICTION

MED 05.04



Material

Item-no.	Qty.	Description
DS101-1G	1	Support base, large, L=500 mm
DS093-04	1	Sliding saddle "Sepp", H=40 mm
DS300-50	1	Support rod, squared, L=500 mm, 12x12 mm
DS400-3K	1	Bosshead cross-pattern, Demo, green
DS102-2G	1	Clamp saddle
DS130-1S	1	Inclined plane, simple (02)
P7210-5C	1	Stand rail NTL, L=300 mm, SE
P5310-1S	1	Rail bond SE, universal
DM680-2P	1	Static, sliding and rolling friction board
DM680-2R	1	Block for friction and stability

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Purpose
To determine the coefficient of friction from the angle at which the frictional force coincides with the downhill force.

R = μ . G (R...friction force, μ...coefficient of friction, G...Normal force)
The coefficient of friction stands for the surface composition.

Preparation – Experiment 1
The static, sliding and rolling friction board is raised and placed on a non-slipping surface on a table (for example put it on a box as shown on the image); the plastic side of the friction board is facing upwards.

Cut off a 50 cm piece of the cord and make loops at the both ends of the cord.
Position the block for friction and stability on the left end of the friction board.

Put the cord to the hook of the block for friction and stability.

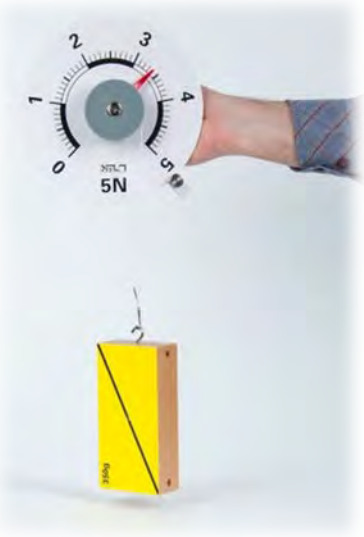
The bosshead is mounted on the support rod of the Torsion dynamometer; it serves as a handle for the dynamometer.

Hang the free end of the cord to the hook of the Torsion dynamometer

Experiment 1
Determine the coefficient of friction when moving the block for friction and stability on a horizontal surface (smooth side of the friction board).
The Torsion dynamometer is now pulled horizontally, at a slow but constant speed to the right.

Static friction R_h = …….. N

Sliding friction R_g = …….. N



Now determine the weight of the block for friction and stability with the help of the torsion dynamometer.

Weight: G = …….. N

The coefficient of friction μ can be calculated with the formula

R = μ . G μ = R/G μ =……

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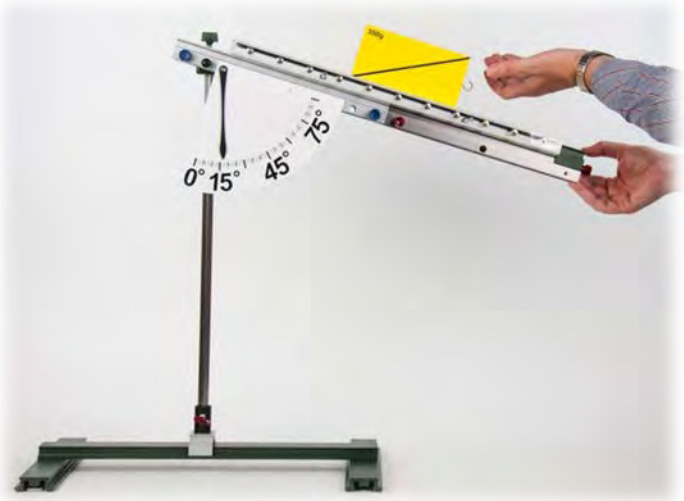
Preparation – Experiment 2



Place the sliding saddle in the centre of the large support base; afterwards insert the support rod into the sliding saddle

Mount the bosshead at the top end of the support rod.

Connect the inclined plane to the 30 cm support rail with the help of the rail bond.

Mount the inclined plane on its support rod at the bosshead as shown on the image above and bring it into horizontal position.

Put the static, dynamic and rolling friction board on the inclined plane; the plastic side of the friction board is facing upwards.

The block for friction and stability is positioned in the centre.

Experiment 2

The plane is inclined (the angle of inclination increases) until the body begins to slide. Then the frictional force coincides exactly with the downhill force.

The coefficient of friction μ can be calculated with the formula

$$\mu = R/G = h/b = \tan \alpha$$

μ =.....

Conclusion

For the friction force R the following relationship applies: R = μ . G,
where G is the normal force (weight moving horizontally).

With the help of this formula the coefficient of friction μ can be determined.

The coefficient of friction is greater for static friction than for sliding friction.