INERTIA AS A FUNCTION OF MASS

MED 07.02

Material

Item-no.	Qty.	Description
DS101-1G	1	Support base, large, L=500 mm
DS093-04	2	Sliding saddle "Sepp", H=40 mm
DS300-50	1	Support rod, squared, L=500 mm, 12x12 mm
DS300-25	1	Support rod, squared, L=250 mm, 12x12 mm
DS400-3K	3	Bosshead cross-pattern, Demo, green
DS204-2L	2	Bearing pin with clamp insert
DG200-1S	1	Cord, white, D=1.7 mm, L=5 m
DM386-1H	1	Pendulum ball with hook, wooden, D=60 mm
DM386-1K	1	Pendulum ball with hook, soft plastics, D=60 mm
DM701-2L	1	Blower 12 V
P3130-2Q	1	Fixed voltage transformer 12V DC/10 A

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Purpose
With the same accelerating force a body of larger mass is accelerated less.
The inertia is greater with a body of larger mass.

Experiment
Place one sliding saddle on the leg of the support base; the 500 mm rod is inserted into this sliding saddle. Fix a bosshead at the upper end of the support rod.

Mount the 250 mm support rod horizontally in this bosshead; afterwards mount the two other bossheads on this support rod as shown on the image – the distance between them should be approximately 15 cm.

Mount one bearing pin with clamp insert in each of these two bossheads.

Cut off two pieces of cord (each 60 cm) and make loops at the ends of the cord pieces.

Place the second sliding saddle on the support base as shown on the images, do not fasten screw yet. Mount the blower at this sliding saddle and supply 12 V DC to the blower.

Attention
The blower has an output of about 60 watts, a power supply with at least 5 A must be used!

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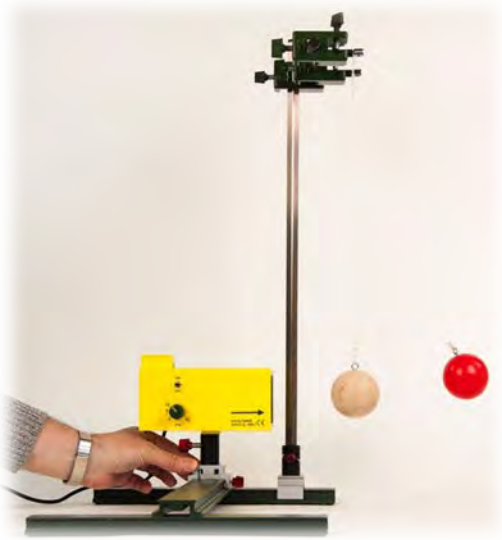
Experiment
Clamp the two pieces of cord into the bearing pins and tie them to the pendulum balls afterwards. The centre of the pendulum balls should be approximately at the same height level as the air flow of the blower. The height can be easily varied with the bearing pin with clamp insert.

Turn the knob of the blower carefully to the left before starting the experiment.
Now turn the blower on and set the knob to average flow velocity

First the wooden ball is blown.
Then the blower is moved and the plastic ball is blown.
Make sure that the angle of attack to the ball is the same. This is the only way that the force of the air flow has the effect on the two pendulum balls.

Which ball has a larger deflection?



The ball with the smaller mass has a larger deflection. It is accelerated more because the weight is smaller.

Note
The forces that cause a change in the direction of speed and the inertial forces that occur can also be discussed. This refers to the forces that force vehicles or skiers into the curve or to the inertia at a cornering (vehicles, sleding, ski).