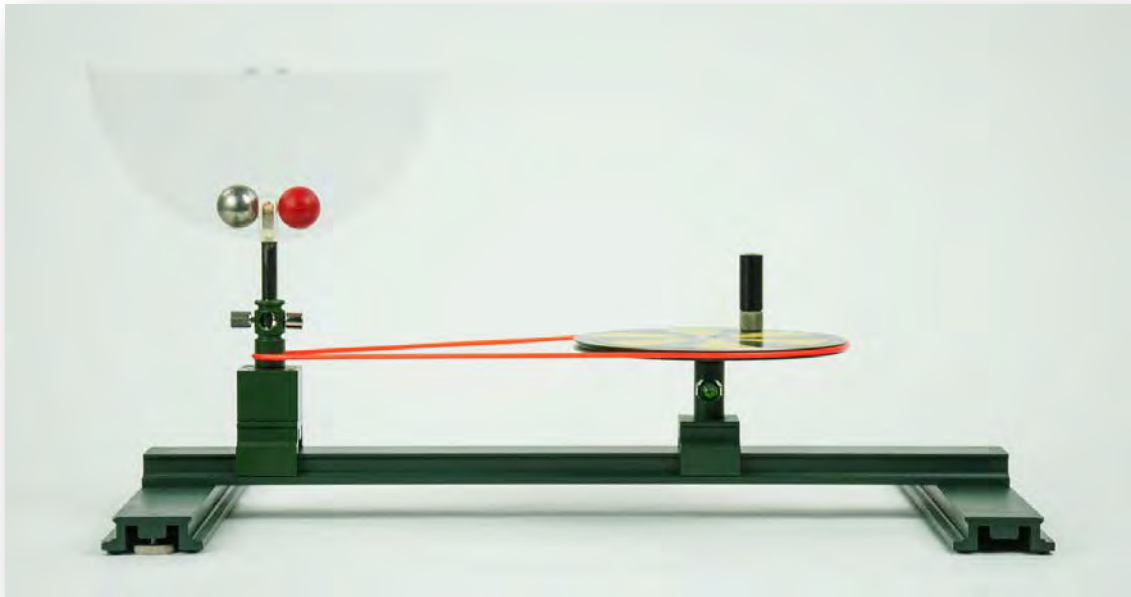


CENTRIFUGAL FORCE IS PROPORTIONAL TO MASS

MED 09.06



Material

Item-no.	Qty.	Description
DS101-1G	1	Support base, large, L=500 mm
DS103-3G	1	Sliding saddle, H=34 mm
DS402-3B	1	Pivot bearing with transverse hole,
DS402-3S	1	Drive pulley demo, with ball bearing
DS402-2N	1	Crank pin, L=50 mm
DS401-1A	1	Drive belts, set of 2
DM358-1K	1	Rotational dynamics paradox

CENTRIFUGAL FORCE IS PROPORTIONAL TO MASS

MED 09.06

Purpose

To demonstrate centrifugal force and that its proportional to the mass.

Preparation

Mount the pivot bearing and the sliding saddle on the support base as shown on the image; afterwards screw the crank pin on the drive pulley.

Insert the drive pulley into the sliding saddle and mount the rotational dynamics paradox on the pivot bearing.

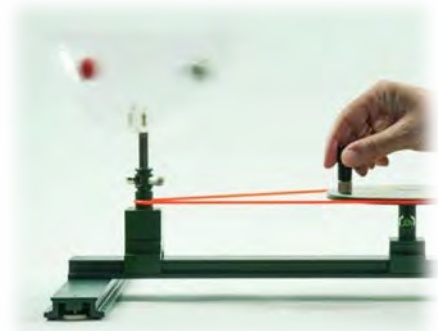
As shown on the image below taut the long drive belt between the sliding saddle and the pivot bearing.

Experiment

Set the rotational dynamics paradox into rotation.

The following formula applies for the centrifugal force:

$$F = m r \omega^2$$



The balls are pushed outwards by the centrifugal force and "rise" on the wall of the rotational dynamics paradox. The height is the same for both balls because the mass must be taken into account for both the weight ($m \cdot g$) and the centrifugal force.

Thus the respective climbing height depends only on the rotational speed.

Note

As long as the balls have not climbed much the centrifugal force increases by an increasing of the distance from the axis of rotation (r) in addition to an increase of the angular velocity ω , thus that the balls rise very quickly in the begin.

The diagram shows how ω has to be increased (y-value) so that the centrifugal force of the weight is balanced at a certain angle α (x-value).

