CENTRIFUGAL FORCE – PARADOX

MED 09.10

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
DM366-2P	1	Centrifugal vessel, demo
DM366-3S	1	Styrofoam ball on cord with plug

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Purpose
To demonstrate the effect of centrifugal forces on bodies of different densities.

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.

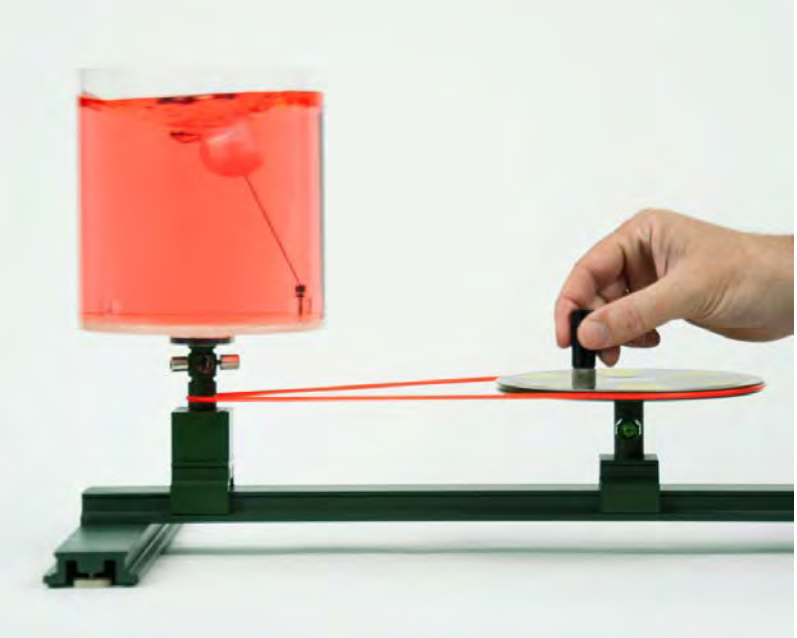
Insert the drive pulley into the sliding saddle; mount the centrifugal vessel on the pivot bearing and afterwards place the Styrofoam ball in the vessel and plug it in.

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

Pour coloured water into the vessel until the Styrofoam ball is fully immersed.

Experiment
Set the vessel slowly into motion and observe the Styrofoam ball.

Contrary to the assumption that a resultant force acts to the outside at a rotation in air and bodies with a density greater than air, the ball (with a smaller density than water) in the water tilts inwards.



Additional experiments
Instead of placing a Styrofoam ball in the water, a small candle can be placed in the vessel; there should only be air in the vessel for this experiment.

The flame tilts inwards when rotating.
The air in the flame is hotter and therefore lighter; the surrounding cold air is heavier and therefore pushes outwards.

If you hold a helium-filled balloon on a string in a car, it would move backwards when the vehicle is braked.

If a liquid contains particles with a lower density the same effect occurs while stirring.