

TAP 224- 1: Demonstrations involving circular motion

Rotating candle - flame bends inwards

Put a candle on a turntable shielded by a glass tube such as a jam jar – the candle must be shorter than the height of the jar. Light the candle and rotate the turntable. Watch the flame! (Diameter of table 30 cm and a rotation rate of about 1 Hz are appropriate)

Back seat of a car

Who falls into whose lap as you go round corners? The person nearest the centre of the curve travels on in a straight line whereas the one on the outside of the curve is pushed round by the side of the car to meet them. So it appears that the person on the inside falls into the other one's lap. This is similar to the effect on the clothes in a spin drier. Notice that if the driver over does it the car will roll outwards - the inner wheels leaving the ground first.

A simple centrifuge by whirling a container on string

A simple centrifuge can be made by whirling a large test tube round your head on a piece of string. Use a mixture of water and sand to show the separation. Experimenting with other liquids such as syrup and wallpaper paste makes an interesting extension to this.

Safety

Eye protection must be worn. The demonstration should be done outside with the class standing at least 10m from the demonstration.

Rotating jelly - circular motion

The effects of centripetal forces on a rotating object can be shown impressively by making a circular jelly about 3 cm deep in an 8cm diameter crystallising dish. When it is set empty it out carefully onto the centre of a saucer which is securely fixed to the centre of the rotating table (use a safety screen all round the table.). Slowly increase the rate of spin of the table. The jelly will flatten.

Further increasing the rate of spin will eventually make the jelly break up - the cohesive forces within it being less than the centripetal forces needed. It can be used to demonstrate why car tyres fly apart when they are spun too fast. It used to be said that if you used some of the old forms of tyre remoulds, you should not travel at more than 60 mph to reduce the risk of the tyres breaking up!

The jelly experiment also shows the shape of the liquid surface while rotating. It is useful to photograph it or take a video for later analysis.

Cress seed and rotating table - g forces

Can we demonstrate the effect of the g force on a cress seed growing on a rotating table? We would have to rotate them for a week – would they grow outwards, inwards or straight up?

Wall of death simulation

Mount a vertical sided glass beaker or crystallising dish on the centre of a rotating table. Set it spinning and carefully place a rubber eraser in it against the wall but not touching the bottom of the dish. The rubber “sticks” to the walls.

External References

This activity is taken from Resourceful Physics <http://resourcefulphysics.org/>