

## The Sun on the Floor

IKA 1996

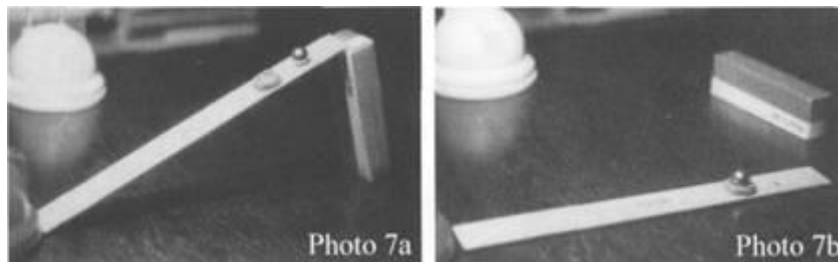
*Tomasz Dindorf, Wojciech Dindorf*

### Dropping a Ball Into a Cup

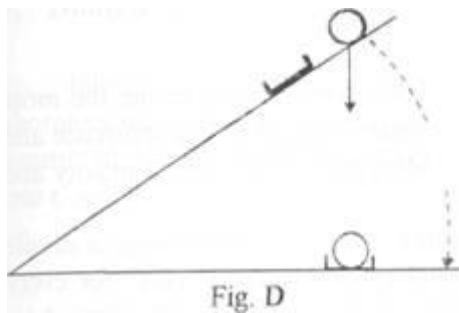
This simple to perform trick is a challenging puzzle for mathematically able students.

Take a 30 cm ruler that has a hole at one end. The hole will serve as a nest for a marble or a ball bearing. A few centimetres from the hole attach a small cup made out of plasticine. The diameter of the cup should be somewhat larger than that of the ball.

Photos 7a and 7b show the initial and the final stage of the demonstration:



The ruler with the cup attached and the ball bearing in its nest is lifted up and held in position by an upright support. Make sure that the lower end does not skid. The initial position is shown in Fig. D.



Flick the upright away and observe what happens. A ball while falling down, changes its place moving from the hole to the cup!

Do not get disappointed if it does not work every time. A real experimenter must persevere and be patient.

This experiment shows that the plank reaches the ground faster than the freely falling ball! Try to imagine how the

motion of the ball would look to a dwarf sitting in the cup.

A discussion of different descriptions of the same effect observed from various frames of reference is a logical consequence of this experiment.

Advanced students can justify mathematically the difference in times of falling of the two objects. It is worth to note that the plank wins the race with the ball only when angles of inclination do not exceed a certain limit - a good topic for a larger investigation.