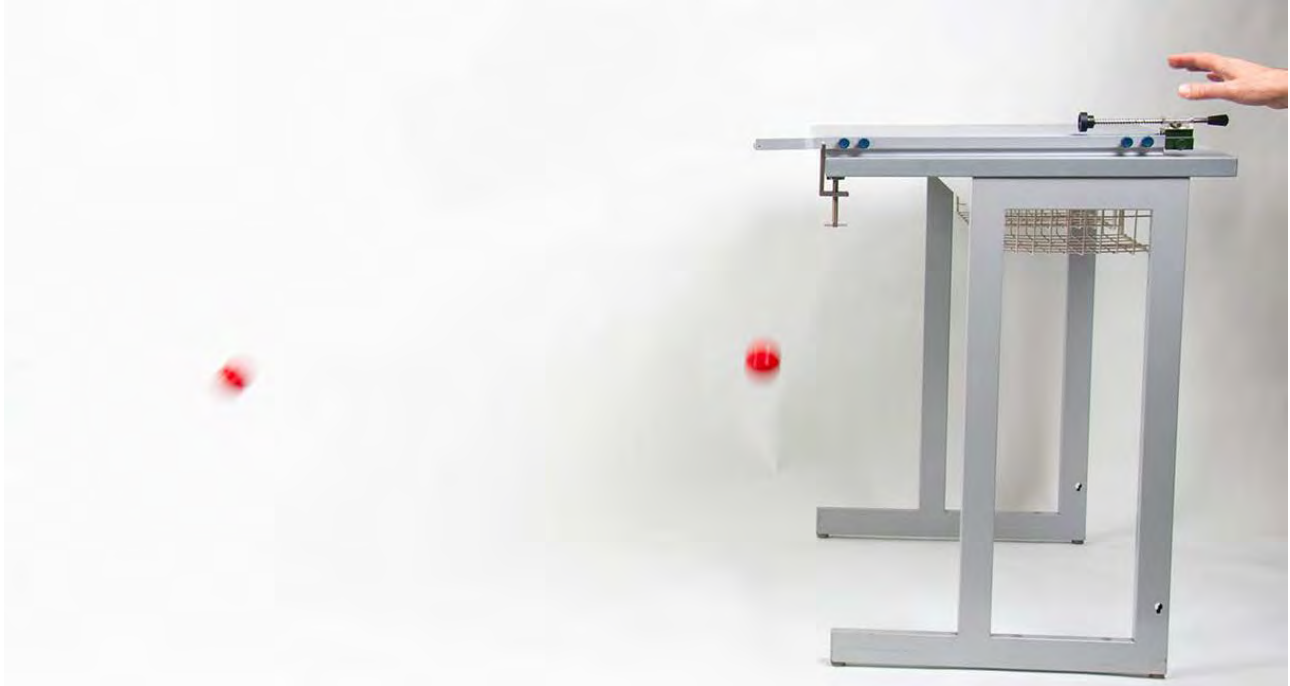




Material

Item-no.	Qty.	Description
DS101-50	1	Stand rail, universal, L=500 mm
P7220-2D	1	Table clamp NTL, SE
P5310-1S	1	Rail bond SE, universal
DM344-1S	1	Projectile launcher 02
DS503-1H	1	Ball holder for the principle of independence
DM360-5R	2	Ball, D=60 mm, plastics, red

Purpose

To demonstrate the independence of the fall motion of a body from a horizontal (or other) motion.

Preparation

Place the stand rail upside down on the table and fix it there with the help of the table clamp, in this position the stand rail can be used as a runway.

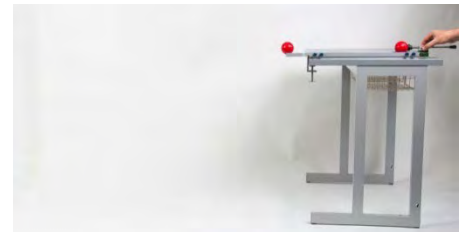


At the end (where the table clamp is) the ball holder for the principle of independence gets fixed with two screws.

The rail connector is mounted at the end of the stand rail; next you can fix the projectile apparatus to the rail connector.

Pull the piston of the projectile apparatus completely in and fix it at the last notch.

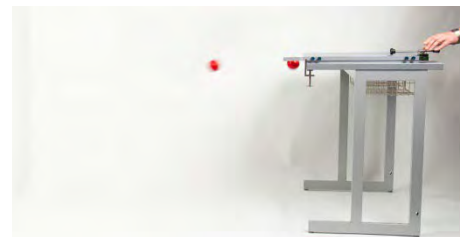
One ball is placed at the ball holder while the other ball gets placed in front of the piston as shown on the images.



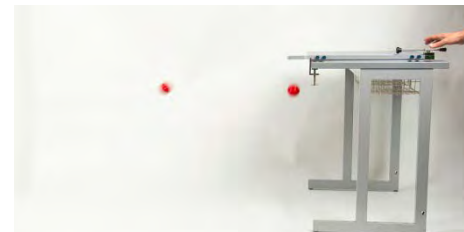
Experiment

Release the piston of the projectile apparatus.

The first ball gets accelerated and hits the second ball. In this moment the complete momentum of the first ball gets transferred to the second ball and therefore the second ball falls vertically off the table.



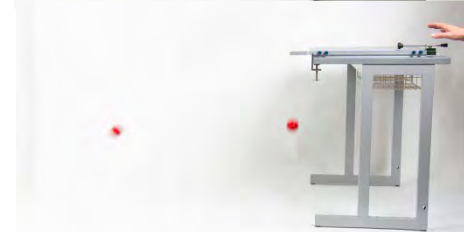
The flight path of the second ball describes a parabola. Observe which ball reaches the floor first.



Result

The two balls reach the floor at the same time

The principle of independence applies:
If a body performs various movements in the same time these movements do not affect each other.



Explanation

The second ball that falls to the ground along a parabola performs a uniform movement in the horizontal direction and a uniformly accelerated movement in the vertical direction. These two movements do not affect each other. The path that the second ball travels from the impact is considerably longer than the path of the first ball, but the drop height that is decisive for the required fall time is the same.

