



Material

Item-no.	Qty.	Description
DM345-1W	1	Ballistics base unit, demo
DM345-2W	1	Water gun, unit
DS093-04	1	Sliding saddle "Sepp", H=40 mm
DS201-00	1	Support rod, round, L=1000 mm, D=12 mm
DM461-1B	1	Discharge bag 3000 ml, with stopcock and holder
DG101-00	1	Ruler, metal, L=1000 mm

Purpose

To demonstrate the dependence of the throw (spray) distance on the initial speed and the angle.

Preparation

In this experiment we work with a water jet which has a throw (spray) distance of 150 to 200 cm, thus it is recommended to perform this experiment outdoors.



Place a table on a horizontal surface.

Mount the ballistics base unit on the edge of the table as shown on the images.



Mount the sliding saddle on the rail profile of the ballistics base unit and position it in the centre of the base. Insert the 1000 mm support rod into the sliding saddle.

Afterwards you can fix the discharge bag on its suspension on the upper end of the support rod.

Fix the water gun unit by its sliding saddle on the yellow metal profile of the base unit and Set the angle to 0° ; the hose of the discharge bag is connected to the glass pipe of the water gun.

Place the metal ruler on the front edge of the table, this should allow to understand the throw (spray) distance easily.

Experiment 1

Close the tap of the discharge bag and pour 2000 ml of water into it, for reasons of visibility it is recommended to colour the water before.

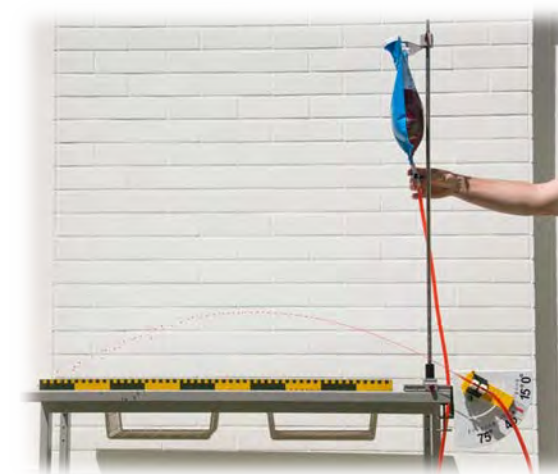
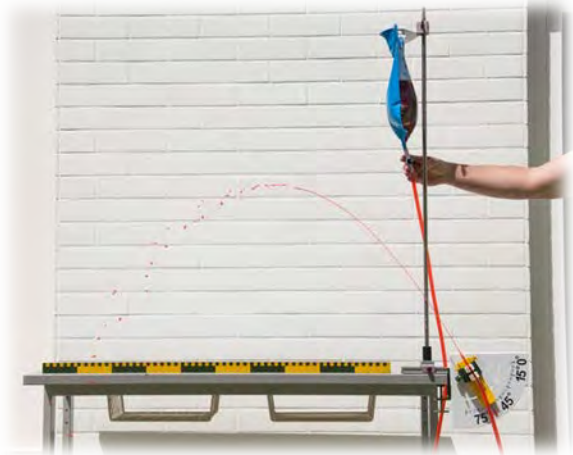
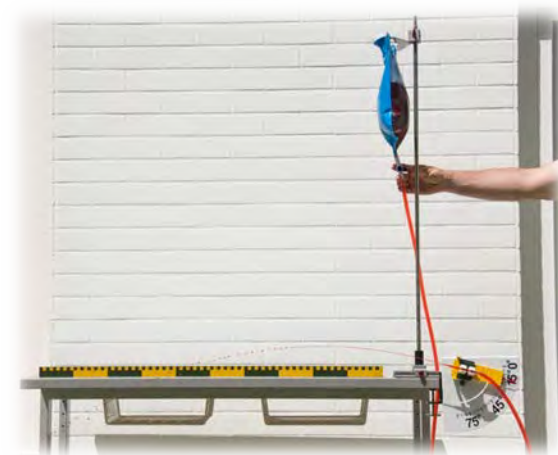
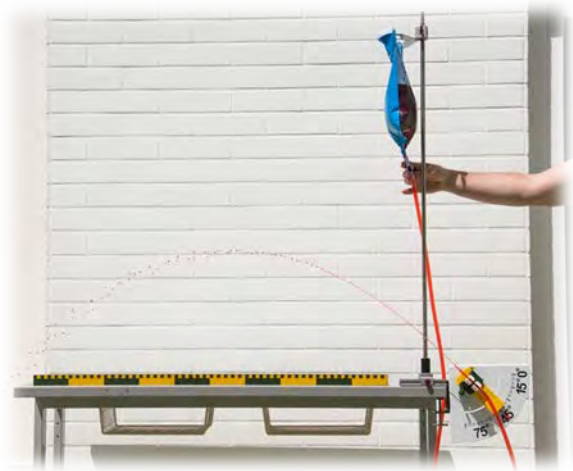
Now open the tap.



Loosen the screw on the backside of the base unit and slowly increase the angle from 0° to 75° and back again.



At which angle is the throw (spray) distance the largest?



Result

After opening the tap a throw (spray) parabola becomes visible.
The throw (spray) distance is at its peak at an angle of 45°.

Experiment 2

As in the 1st experiment pour 2000 ml of water into the discharge bag again and close the tap.

In the 1st experiment we found out that the throw (spray) distance is the largest at an angle of 45°, thus we set this angle and fix the holder of the glass pipe with the screw on the backside of the base unit.

Now open the tap again and observe the throw (spray) distance.



Loosen the screw of the suspension of the discharge bag is screwed on and slowly adjusted the height. The bag should be lowered so that the tap almost touches the table top, then raised to the original height and fastened there again with the screw.

How does the throw (spray) distance relate to the height of the discharge bag?

Result

After opening the tap the throw (spray) parabola is visible again.

If the discharge bag gets lowered the throw (spray) distance also becomes lower.

By lowering the discharge bag the water pressure at the tip of the glass pipe gets lowered too, thus the initial throw (spray) speed and therefore the throw (spray) distance also become lower.

Note

If the experiment is performed outdoors the wind has to be considered also besides the air resistance. Thus the throw (spray) parabola could be slightly deformed.

Curves that occur due to the influence of the air resistance are called “ballistic curves”.