Squirting

Apparatus

various squirting devices including:

a container with holes along the side, so students can see how the water flow varies with height,

a drinking straw and cup of water,

a watering can with a closable top, for example a conical flask with holes in the bottom and a mouth small enough to be closed by covering with a thumb.

A bucket or two is also handy and paper towels or tea towels for cleaning up spillages.

Action

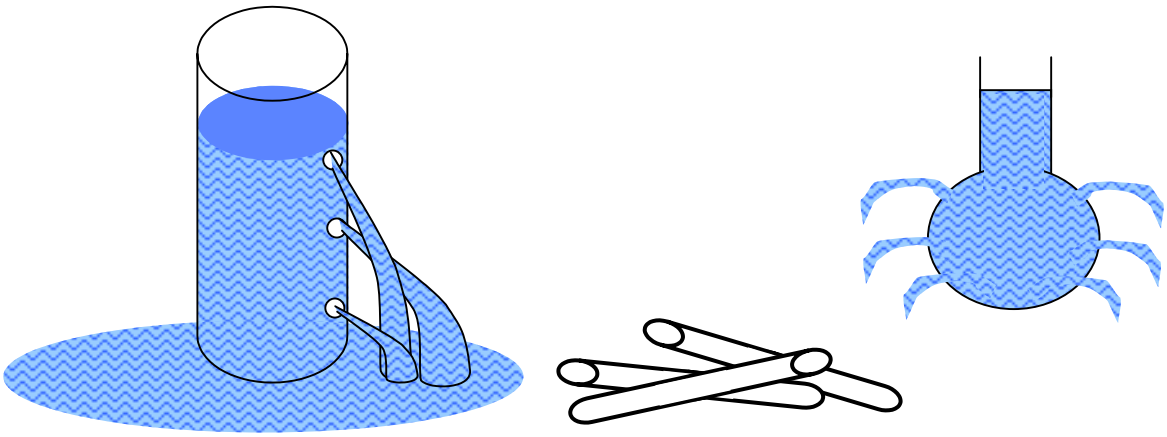
The students investigate how the flow of water through a leak depends on depth.

They dip the straw into the water, then close off the top with a finger and raise it, taking the water inside along with it. When they uncover the top, the water falls out.

The Physics

The water will come out perpendicular to the container wall, as this is the direction of the net force. The pressure is greater near the bottom, so the water squirts out with greatest velocity here. The horizontal distance the water squirts will be a maximum for holes at half the depth of the water. (See solutions to problem sheet *PR4T -Fluid Flow I* for details.)

In the straw and watering can the liquid is held in by the low pressure in the tube or bottle, when this pressure is increased to atmospheric pressure by opening the lid or removing the finger the water will come out.



Accompanying sheet

Squirting

Why does the water squirt out the holes in the bottle?
What can you say about the direction of the water as it leaves the holes?

Insert the straw into the cup, then put your finger over the top and lift it out.
Explain what happens.
What happens when you uncover the top?
Why?