

# Pressure and force

## Class practical

Feeling forces with two nylon syringes of different sizes connected together.

## Apparatus and materials

Syringe, nylon, large

Syringe, nylon, small

Plastic tubing to connect the syringes

## Health & Safety and Technical notes

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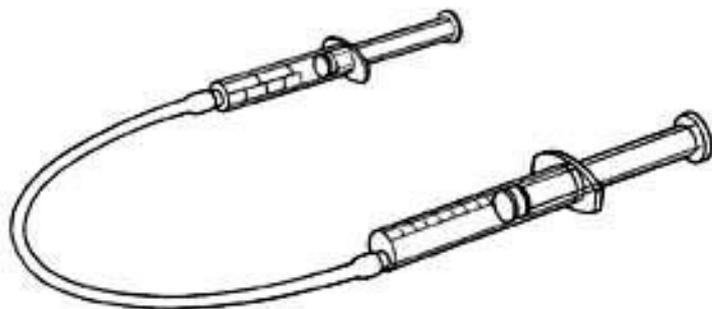
[Read our standard health & safety guidance](#)

If the syringes need to be disconnected, the wrong method is to pull on the plastic tubing. This merely tightens the tubing around the end of the syringe and breakage is likely. The correct method is to push the tubing towards the syringe and it will come apart easily.

## Procedure

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**a** Fill the syringes and connecting tube with water.



**b** One student holds one syringe, while another student holds the other. They try pushing water to and fro.

**c** Change over so that the one who had the larger syringe now has the smaller one.

**d** Hold both syringes so that you can feel how the forces differ.

## Teaching notes

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**1** The syringes can be air filled or water filled.

**2** One student should try pushing the in-going piston while another feels the out-going piston pushing out.

**3** The two syringes have different areas of cross section but students will not know about the difference of force between the two until they take both syringes into their own hands and feel what happens. Bigger forces acting over bigger areas create the same pressure as a small force on a small area. This is the principle of the hydraulic press.

**4** Simple numerical examples are now needed to reinforce the discussions that pressure is equal to force/area. For example:

- a mass of 2 kg in the earth's gravitational field of 10 N/kg will have a force on it of 20 N. It will create a pressure on an area of 4 m<sup>2</sup> of 5 N/m<sup>2</sup>
- if the pressure is 40 N/m<sup>2</sup> then the force on 2 m<sup>2</sup> would be 80 N.

*The experiment was safety-checked in July 2007*

**Source URL:** <http://www.nuffieldfoundation.org/practical-physics/pressure-and-force>

### Links:

[1] <http://www.nuffieldfoundation.org/node/1634/>