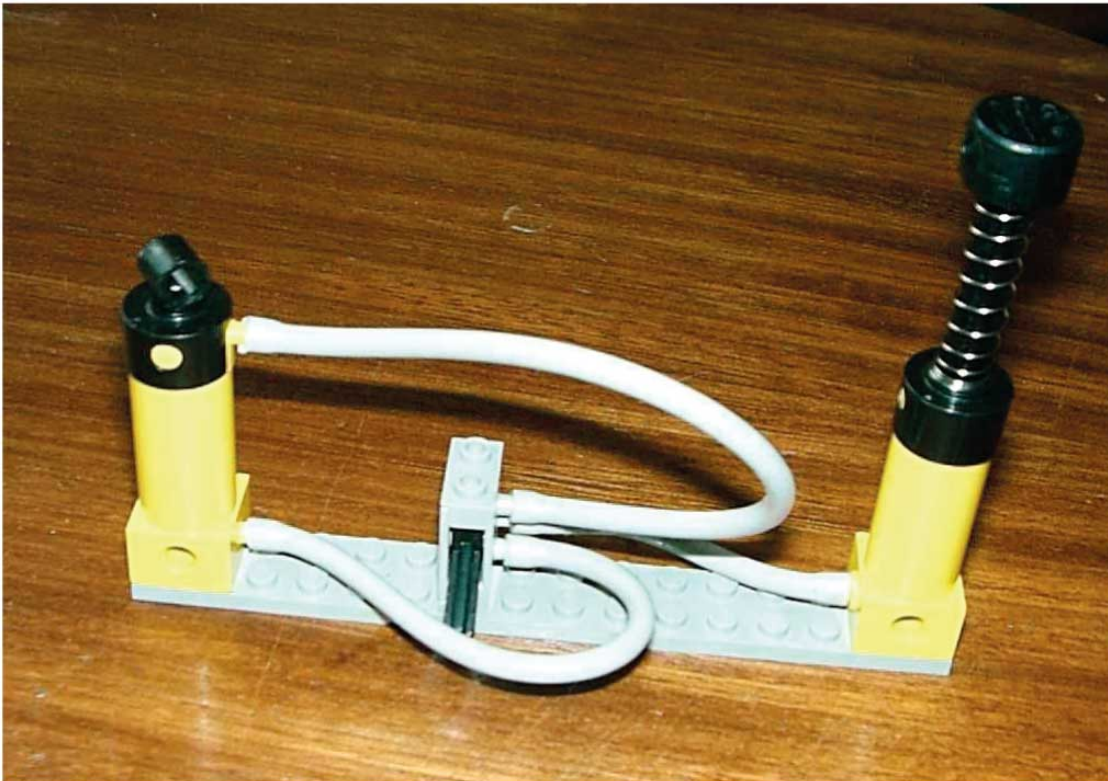


# Exploring pneumatics

Robert Boyle wrote a treatise on the that he called the “spring of the air”. Air is springy: just like a spring it can support forces. You push down on it, and it pushes back. Start by feeling a sealed syringe. Push down on the plunger, and feel the plunger push back on you. How does the air in the syringe support your finger?

Now to explore your answer more fully, you will build a connected pair of cylinders, with a switch between them.



A few things to try: 1. Put the switch in the up position. 2. Press the master pump down once to provide a single shot of air. 3. See the slave cylinder rise. 4. Try to press the top of the slave cylinder down. Feel the “spring of the air”. 5. Put the switch down - now there is no spring as the shot of air has escaped. 6. Put the switch up again. Press the master cylinder down again for a single shot of air. Feel the spring. 7. Now another shot of air and feel the spring again. 8. After 3 shots you can probably just about move the cylinder. 9. After 6 shots, you might find it very hard. 10. Put the switch in the down position to let the shots of air escape.

## Now for the next step

1. Put the switch in the down position.
2. Press the master pump down once to provide a single shot of air.
3. See the slave cylinder rise.
4. Try to pull the top of the slave cylinder up. Feel the "spring of the air".
5. Put the switch up - now there is no spring as the shot of air has escaped.
6. Put the switch down again. Press the master cylinder down again for a single shot of air. Feel the spring.
7. Now another shot of air and feel the spring again.
8. After 3 shots you can probably just about move the cylinder.
9. After 6 shots, you might find it very hard.
10. How is this like pumping up a bike tyre?



Now you have finished the practical activity, check that you can: - Say how air under pressure can support a force - Show how a larger force can be supported - Explain how this larger force is supported - Relate air pressure to what the particles are up to

For further thought: Why use liquids rather than gases in hydraulic systems?

# IOP Institute of Physics

## Some pneumatics

This document is a part of Supporting Physics Teaching, from the Ma topic, episode number 2T, and the A0 thread.

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## The location



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