

Solids, liquids and gases explained

Grade 6 science (Year 7 · Class 6) · Lab

Name: _____ Date: _____ Class: _____

Can you squeeze air and water into a smaller volume? In this lab you push the plungers of two sealed syringes and compare what happens. You then use the results to explain the difference between a gas and a liquid, with measurements.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS1-4

Aim

To compare how much a fixed volume of air and a fixed volume of water can be squeezed in a sealed syringe.

Equipment

- 2 plastic syringes, 50 mL, without needles
- 2 rubber caps or blu-tack to seal the tips
- Tap water and a small beaker
- Paper towel

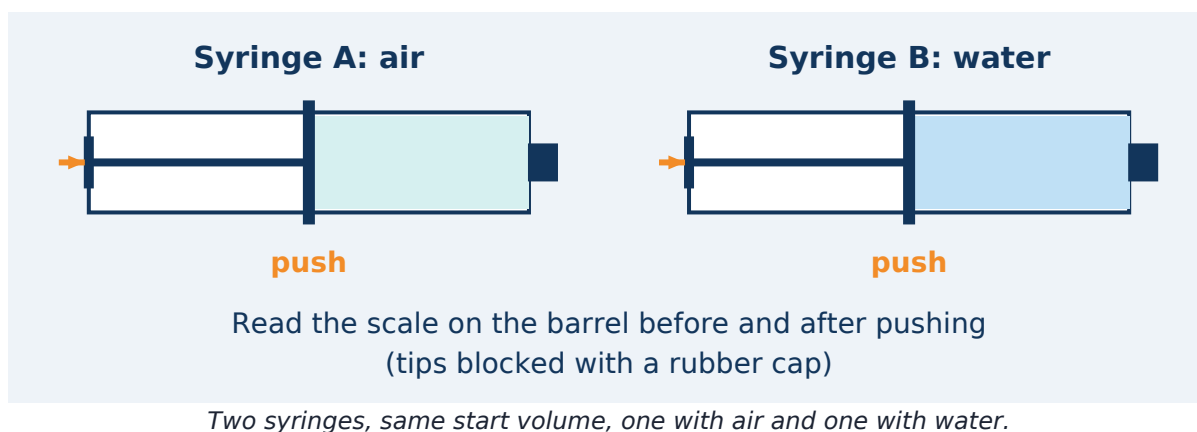
Safety

Safety

Use syringes without needles only. Do not push so hard that the cap shoots off; point the tip away from faces. Wipe up spilled water so nobody slips.

Method

1. Pull the plunger of syringe A to the 40 mL mark so it holds 40 mL of air. Seal the tip.
2. Fill syringe B with water, remove air bubbles and adjust it to 40 mL. Seal the tip.
3. Push the plunger of A as far as it will go and read the volume on the scale. Record it.
4. Do the same with B.
5. Release, reset both syringes to 40 mL and repeat for three trials.



Results

Sample measurements from one group:

Trial	Air start (mL)	Air end (mL)	Water start (mL)	Water end (mL)
1	40	16	40	40
2	40	14	40	40
3	40	15	40	40

Analysis questions

Question 1 Mean air volume

Calculate the mean final volume of the air.

Question 2 Percentage decrease

Calculate the percentage decrease in the volume of air.

Question 3 Explain the water result

Explain why the water volume did not change, using the particle picture.

Question 4 Reading uncertainty

The scale has divisions of 1 mL. State the reading uncertainty and give the range of the air results.

Question 5 Predict a new start volume

Predict the final volume for a syringe that starts with 60 mL of air, if it is squeezed by the same fraction.

Question 6 Source of error

Suggest two reasons why the air result might be too high.

Question 7 Improve the lab

Suggest one improvement that would give more reliable results.