



## Physics

## PHY6T/P13/task

### Unit 6 Investigative and Practical Skills in A2 Physics ISA (P) Pressure – volume relationship for gases

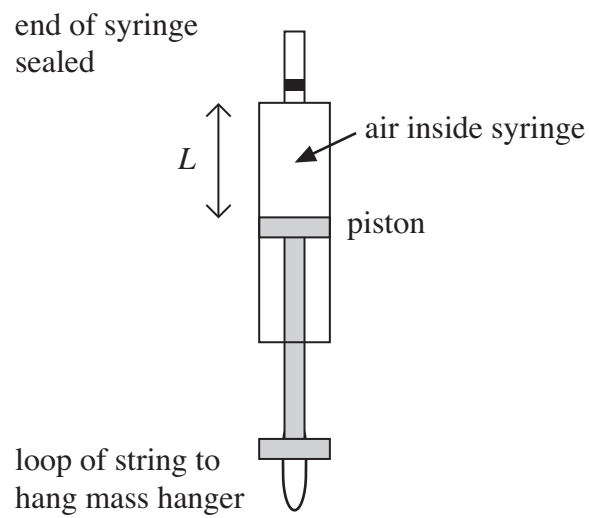
#### Stage 1: Task Sheet

This task is worth 7 marks

*You are advised to read through these instructions before beginning your work.*

**You are going to investigate how the volume of a fixed mass of gas changes when the pressure is changed.**

- The syringe has a fixed mass of air sealed inside it. A mark on the syringe indicates the initial position of the piston. The syringe has been clamped upside down as shown in **Figure 1**.
- Measure the length  $L$  from the piston to the closed end of the syringe.
- Gently move the piston up and down a few mm to ensure it does not stick. Return it to the original mark on the syringe.
- Hang a 100 g slotted mass holder from the loop and measure the new length  $L$ .
- Add further 100 g masses, each time recording the total mass  $M$  in kg, and the corresponding value of  $L$ .
- Take sufficient readings to reduce the uncertainty in your results. Before each new set of readings gently move the piston back to its original unloaded position.
- Calculate  $F$  where  $F = (p_0 \times A) - Mg$  and  $p_0 = 1.01 \times 10^5 \text{ Pa}$ ,  $g = 9.81 \text{ N kg}^{-1}$  and  $A =$  cross-sectional area of syringe in  $\text{m}^2$  provided by your supervisor.
- Record your results in a table which should include measurements of  $L$ ,  $M$ ,  $F$ ,  $\log_{10}(F/N)$  and  $\log_{10}(L/m)$ .
- Plot a graph of  $\log_{10}(F/N)$  on the  $y$ -axis against  $\log_{10}(L/m)$ . Draw a straight line of best fit.

**Figure 1****After the investigation**

At the end of the investigation, hand in all your written work, including the graph, to the supervisor.

This documentation will be required for Stage 2 of the ISA. Ensure that you have entered your centre details, candidate number and name on all the sheets you have completed.