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| **Lesson Number – 20.1a** | | | | |
| **Lesson Title – Investigation of Boyle’s Law (constant temperature) and Charles’s Law (constant pressure) for a gas (Required practical #8)** | | | | |
| **Specification Reference** | | | **3.6.2.2** | |
| **Learning Objectives** | | | | |
| Required practical criteria (a) | | | | |
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| **Opportunities for Assessment** | | | | |
| Assessing the practical aspect of the lesson  **Skills Assessment (Required practical 8)**  AT (a) | | | | |
| **Starter:** | Recap lesson 20.1 (Gas laws) and the outcomes / targets of this lesson | | | |
| **Main:** | This is a required practical lesson so students need to work independently to perform the experiment | | | |
| **Plenary:** | Write-up the experiment | | | |
| **Homework:** | | Complete write-up of required practical | | |
| **Differentiation / Extension / S&C** | | | | |
| Assistance / guidance on the planning of the experiment can be altered for group’s ability | | | | |
| **Numeracy / Literacy** | | | | **SMSC / Fundamental British Values** |
| Use of the SHM formulae for both springs and pendulums | | | | Team work / Planning |

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| **RESOURCES:**  **Boyle’s Law experiment**  Class sets of:   * Stand and clamp * 10ml syringe with 0.5ml divisions * 5cm length of thin-walled rubber or silicone tubing to fit nozzle of syringe * Pinch clip * 2kg mass * Loop of string * 9 x 100g masses on a 100g mass holder * Micrometer   **Charles’s Law experiment**  Class sets of:   * 25cm length of glass capillary tubing * 5cm length of thin-walled rubber tubing to fit over the end of the capillary tubing * Contact adhesive * Concentrated sulphuric acid * 30cm ruler * 2 elastic bands * Thermometer (e.g. -10 to 110 oC) * 2 litre beaker * 250ml glass beaker * Paper towels * Kettle |
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| **Risk Assessment** e.g. CLEAPSS card reference |
| Sulphuric acid – this kit should be prepared by a technician in advance – breakages should be dealt with by adding water to dilute the acid before glassware is touched  Be aware that the 2kg mass can drop / string can break etc. so it must be placed over a desk with a bag or soft surface to catch it.  Broken glass – dust pan and brush used and correct glass wastage disposal  Kettle – hot water, do not pour into glassware that is being held, keep to centre of desk |
| **Working Scientifically (HSW)** |
| Assessed practical assessment criteria linked to the practical |