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| **Lesson Number – 20.3** |
| **Lesson Title – The kinetic theory of gases** |
| **Specification Reference** |  |
| **Learning Objectives** |
| Brownian motion as evidence for existence of atoms.Explanation of relationships between *p*, *V* and *T* in terms of a simple molecular model.Students should understand that the gas laws are empirical in nature whereas the kinetic theory model arises from theoryAssumptions leading to  including derivation of the equation and calculations.A simple algebraic approach involving conservation of momentum is required.Appreciation that for an ideal gas internal energy is kinetic energy of the atomsUse of *average molecular kinetic energy* Appreciation of how knowledge and understanding of the behaviour of a gas has changed over time. |
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| **Opportunities for Assessment** |
| Page 326 questions |
| **Starter:** | Slide #1 enables a discussion to recap the three gas laws and to try and explain, qualitatively, why the relationships occur. Why does reducing the volume of a vessel increase the pressure? Why does increasing temperature increase pressure?Slide #2 summarises the introduction discussions |
| **Main:** | Slides #3 - #5 should assist non-mathematicians in understanding the root mean square calculations and Gaussian distribution curves. Pupils should be able to sketch Gaussian curves for identical gases at different temperaturesSlides #6 - #8 simply state the ideal gas assumptions and the three main formulae that are of use in gas calculations. Proofs of these are available in the course book however pupils are not expected to show an understanding of these proofs. |
| **Plenary:** | Slides #9 and #10 summarise the key points. Time could be used to discuss the evolution of ideas over time (See the final learning objective above) by going through the “Classical Physics” section on page 325 |

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| **Homework:** | Page 326 questions; Page 325 Classical Physics – create a timeline of changing ideas and the main scientists involved |
| **Differentiation / Extension / S&C** |
| Derivation of the formula from base ideas – see pages 324 - 325 |
| **Numeracy / Literacy** | **SMSC / Fundamental British Values** |
| Use of formulae and “root mean squared” statistics | Page 325 “Classical Physics” – history of science |
| **RESOURCES:** |
| None |
| **Risk Assessment** e.g. CLEAPSS card reference |
| N/A |
| **Working Scientifically (HSW)** |
| Page 324 “Making assumptions” – discuss the role of models and averages in Physics |