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| **Lesson Number: 23.3** | | |
| **Lesson Title: Charging and discharging a capacity through a fixed resistor** | | |
| **Specification Reference** | | **3.7.4.4** |
| **Learning Objectives** | | |
| Graphical representation of charging and discharging of capacitors through resistors.  Corresponding graphs for *Q*, *V* and *I* against time for charging and discharging.  Time constant *RC*.  Calculation of time constants including their determination from graphical data.  Time to halve, *T*½ = 0.69*RC*  Quantitative treatment of capacitor discharge,  Use of the corresponding equations for *V* and *I*.  Quantitative treatment of capacitor charge, | | |
| **Opportunities for Assessment** | | |
| Page 387 questions | | |
| **Starter:** | Slide #1 enables discussion of the shape of a graph looking at discharge from a capacitor, students should be able to realise that it will be exponential decay | |
| **Main:** | Slides #2 - #4 go through the simple graph shapes and the extraction from a curved graph of the time constant – Note that AQA do **not** use **Tau** as a time constant however to completeness the PowerPoints start from this and move onto *RC*  Slide #5 poses a hinge question – depending on the student’s use of natural logs the next few slides are a recap / teaching aid of logs  Slides #6 - #8 are a quick teaching of logs and exponential decay formulae  Slide #9 is the main slide that derives the formulae for exponential decay in capacitor, it has some animation so check it works on your screen  Slides #10 - #12 extend to charging a capacitor (note the change in the formula for the growth curve) and also link to half-life and total time to discharge (Essential exam points)  The next lesson is the required practical (number 9) so planning this or extending this lesson into a discussion of the equipment needed is appropriate | |
| **Plenary:** | Slide #13 is a summary | |

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| **Homework:** | Page 387 questions, research of the uses of a time constant in physics, planning required practical | |
| **Differentiation / Extension / S&C** | | |
| Derivation of natural log formulae | | |
| **Numeracy / Literacy** | | **SMSC / Fundamental British Values** |
| Formula use and derivation  Exponential decay curves and growth formulae | | Use of decay constant in everyday physics, application of *RC* circuits |
| **RESOURCES:** | | |
| None | | |
| **Risk Assessment** e.g. CLEAPSS card reference | | |
| None | | |
| **Working Scientifically (HSW)** | | |
| None | | |