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| **Lesson Number: 23.2** | | |
| **Lesson Title: Energy stored in a charged capacitor** | | |
| **Specification Reference** | | **3.7.4.1, 3.7.4.3** |
| **Learning Objectives** | | |
| Definition of capacitance:  Interpretation of the area under a graph of charge against pd. | | |
| **Opportunities for Assessment** | | |
| Page 383 questions | | |
| **Starter:** | Slide #1 should enable pupils to revise their formulae knowledge from AS level and recent lessons on charges and fields | |
| **Main:** | Slide #2 works slowly through defining the main formulae for this lesson. Be careful to ensure pupils understand that the vertical axis p.d. is the p.d. on the plates **not** the charging p.d. – Pupils often struggle knowing which formula to use so practice with selecting them is crucial here  Slide #3 has a key learning point that 50% of the energy is wasted. Even if pupils do not understand why this occurs it is critical that they remember it as a simple rule.  Slide #4 explains a simple experiment to measure the energy dissipated by a charged capacitor. If joule-meters are not available then monitoring current flow over time and plate p.d. can yield results that will give an estimate. | |
| **Plenary:** | Slide #5 is summary | |

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| **Homework:** | Page 383 questions, research lightning | |
| **Differentiation / Extension / S&C** | | |
| Links to thunderstorms; discussion of energy and area under a graph | | |
| **Numeracy / Literacy** | | **SMSC / Fundamental British Values** |
| Area under a graph, selection of formulae | | Energy stored in devices, application of physics |
| **RESOURCES:**  Sets of: | | |
| * Joule-meter * 1.5V bulb and holder * Capacitor (Variety can be used although larger capacitance work better) * Low voltage supply (DC) | | |
| **Risk Assessment** e.g. CLEAPSS card reference | | |
| None (Very large capacitors and 12V supply can be dangerous e.g. car ignition systems) due to large discharges | | |
| **Working Scientifically (HSW)** | | |
| Lightning and energy calculations – page 383 | | |