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| **Lesson Number: 23.1** | | |
| **Lesson Title: Capacitance** | | |
| **Specification Reference** | | **3.7.4.1** |
| **Learning Objectives** | | |
| Definition of capacitance: | | |
| **Opportunities for Assessment** | | |
| Page 381 questions | | |
| **Starter:** | Slide #1 enables a discussion on how to store charge. Students may have preconceptions about cells that need to be revisited to assure them that these do not store charge. Discussions of how much charge flows down a lightning strike can be interesting. | |
| **Main:** | Slides #2 and #3 describe the construction of a capacitor.  Use two layers of aluminium foil and a sheet of thin plastic from a bin-liner between them to model this  Slide #4 explains how to charge a capacitor – Apply a High Voltage DC across the two sheets of foil and see them attract to each other  Slide #5 enables the capacitance of a capacitor to be calculated from a graph of data, alternatively you can perform an experiment at constant current to obtain the data yourself (See page 380-381)  Slide #6 explains why capacitors have a maximum charge that they can hold - (Optional, turn the p.d. up too high and the insulation will fail with loud cracks – turn the lights off to see sparks)  Slide #7 is a list of common uses of capacitors – use this list as research for homework / presentations | |
| **Plenary:** | Slide #8 is a summary | |

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| **Homework:** | Page 381 questions; research the uses of capacitors | |
| **Differentiation / Extension / S&C** | | |
| Research the uses of capacitors, discuss the effect on current over time as the capacitor charges | | |
| **Numeracy / Literacy** | | **SMSC / Fundamental British Values** |
| Formula use, new units (Farads) and prefixes | | Uses of capacitors |
| **RESOURCES:** | | |
| Demo:   * Two layers of aluminium foil (approx. 50cm x 50cm) * 1 layer of think plastic (bin – liner) 60cm x 60cm * High Voltage DC supply * High voltage leads x2 and crocodile clips   Optional   * Capacitors with ratings written on * 1.5V cell x2 * Voltmeter (digital) * Charge meter | | |
| **Risk Assessment** e.g. CLEAPSS card reference | | |
| High voltage danger – only use DC, keep pupils and staff away from the aluminium sheets, check classroom RCCD unit prior to lesson | | |
| **Working Scientifically (HSW)** | | |
| Uses of capacitors (Slide #7 and page 381) | | |

Images courtesy of:

Slide #1 - <https://commons.wikimedia.org/wiki/File%3AMultiple_Lightning_Strikes.jpg> from <http://www.photolib.noaa.gov/>

Slide #2 - Wikipedia (Public Domain)

Slide #3 - http://pgfplots.net/tikz/examples/cylinder-spiral/