Capacitance Assignment 10/11/08

Hello Year 13!
– In order to help you with your task I thought I'd upload this to the web – it also allows you to test the PDF download in i-Tunes if you wish!

Remember we're working in groups to teach each other about capacitance – with the presentations on Friday (or Fizzicks Funday! As it's known). You'll need to prepare a super-speed lesson of about 4min. in length covering your area of the topic. It might be nice to produce a little handout of your topic to add to everyone's revision notes!

13.6 Capacitance and Exponential Decay

Definition of capacitance	$C = Q/V$
Significance of markings on an electrolytic capacitor	
Calculation of effective capacitance of combinations of series and parallel capacitors	$1/C = 1/C_1 + 1/C_2$ $C = C_1 + C_2$ Proof of formulae is not required.

Group member number 1

Energy stored by a capacitor	$W = \frac{1}{2}QV; \frac{1}{2}CV^2; \frac{1}{2}Q^2/C$ Use as energy storage for backup in computers.
Factors affecting capacitance	$C = \varepsilon_0\varepsilon_r A/d$ Experimental treatment is expected, e.g. using a reed switch.

Group member number 2

Quantitative and experimental treatment of charge and discharge curves including the curves for the resistor and capacitor in a circuit	$Q = Q_0e^{-t/RC}$ and equivalent formulae for current and voltage. Candidates should be aware of the slope of a charge-time graph and that charge is the area under a current-time graph. Numerical questions using formulae will be set only on capacitor discharge.

Group member number 3

Time constant and time for quantity to halve	Time constant $= RC$. Time to halve $= 0.69\ RC$. Use of $Q = Q_0(1 - e^{-t/RC})$ is **not** expected. Candidates should appreciate the application of Kirchhoff's law to an RC circuit.

Group member number 4