

MODEL ANSWER
A2 PHYSICS
ELECTRIC FIELD & CAPACITORS

11 JUNE 2008 PHY5

2.(a) (i) Electrical work done, $W = QV$
 $= 0.80 \times 10^{-9} \times 4.0$
 $= \underline{3.2 \times 10^{-9} \text{ J}}$

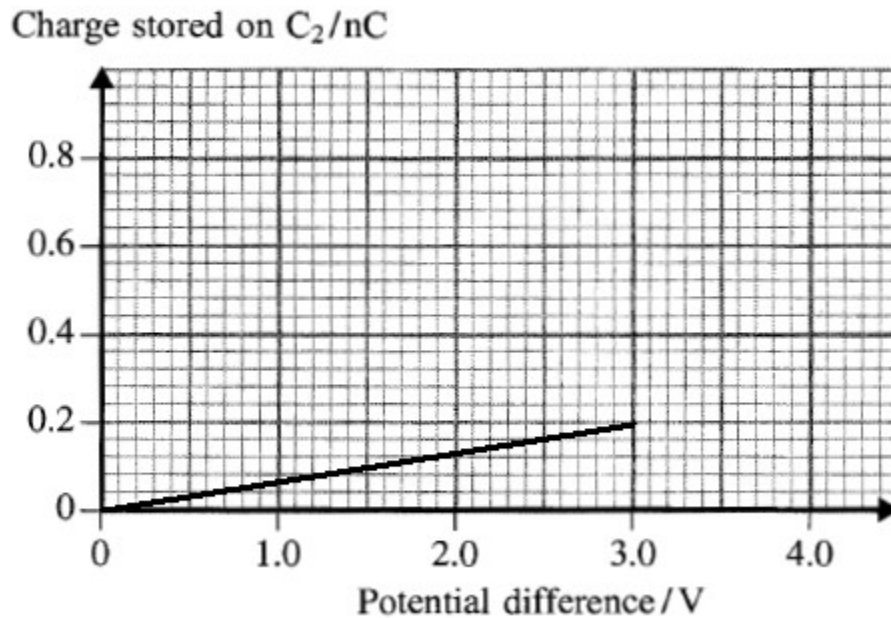
(ii) [+0.8 nC on the top plate and -0.8 nC on the bottom plate]

(b) Energy = $\frac{1}{2} QV$
 $= \text{Area under the charge- potential difference graph}$
 $= \frac{1}{2} \times 0.8 \times 10^{-9} \times 4.0$
 $= 1.6 \times 10^{-9} \text{ J}$
 $= \underline{1.6 \text{ nJ}}$

The graph supports the fact that the charged capacitors is storing 1.6 nJ of energy.

(c) (i) When potential difference across C_1 falls to 3.0 V,
the charged transferred to C_2
 $= 0.8 - 0.6$
 $= 0.2 \text{ nC}$

(ii)



(iii) The gradient of the charge-potential difference graph represents capacitance, since $Q = CV$

$$\begin{aligned}\text{Capacitance of } C_2 &= 0.2 \times 10^{-9} / 3.0 \\ &= 6.7 \times 10^{-11} \text{ F} \\ &= \underline{67 \text{ pF}}\end{aligned}$$

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