OCR
Oxford Cambridge and RSA

A level Physics B

H557/01 Fundamentals of physics

Question Set 8

1. (a) A student makes an iterative model for the decay of charge on a capacitor. The time constant ofthe circuit is $RC = 10\,\text{s}$.

time lapsed / s t	charge Q on capacitor / C Q	charge ΔQ leaving capacitor in time interval $\Delta t = 1\,\text{s}$ / C $\Delta Q \approx \frac{Q\Delta t}{RC}$	charge Q remaining after time interval Δt / C $Q = (Q - \Delta Q)$
0	5	$\frac{5 \times 1}{10} = 0.5$	$5 - 0.5 = 4.5$
1	4.5		

Complete the numerical values in the two blank cells in the table. **[2]**

(b) (i) Explain the physics behind the approximation in the third column of the table

$$\Delta Q \approx \frac{Q\Delta t}{RC}.$$

[2]

(ii) State the assumption made in using this approximation and explain how its effect can be made insignificant.

[2]

Total Marks for Question Set: 6