2026 Sec 4 Physics Assignment 14
Current of Electricity (Sample Solutions)

Reminders:

1. Use subscripts for similar quantities belonging to different components, e.g. R_1, R_2.
2. Write down the **basic formulae** before substitution.
3. Show all key mathematical steps clearly.
4. Evaluate your final answer!

AS 14

1 $I = Q / t$
Current in lightning = 120 C / 0.20 s = 600 A

2 R $= \rho L / A = \rho L / \pi r^2$ $= (7.0 \times 10^{-7}\ \Omega\ m \times 600\ m) / \pi (5.0 \times 10^{-4})^2\ m^2$
$= 534.76\ \Omega$
$= 530\ \Omega$ (2 sf)

3 R $= \rho L / A = \rho L / \pi r^2$

$R_x = \rho L / A = \rho L / \pi r^2 = \rho L / \pi (d/2)^2 = 10\ \Omega$

$R_y = \rho\ 2L / \pi\ (2d/2)^2 = \frac{2}{4} (\rho L / \pi (d/2)^2) = \frac{1}{2}(10\ \Omega) = 5.0\ \Omega$

4 Given $L_x : L_y = 4 : 1 \Rightarrow \frac{L_x}{L_y} = \frac{4}{1}$ and $D_x : D_y = 1 : 2 \Rightarrow \frac{D_x}{D_y} = \frac{1}{2}$

$$R_x : R_y = \frac{R_x}{R_y} = \frac{\rho\frac{L_x}{A_x}}{\rho\frac{L_y}{A_y}} = \frac{L_x}{L_y} \times \frac{A_y}{A_x} = \frac{4}{1} \times \frac{\pi {r_y}^2}{\pi {r_x}^2} = \frac{4}{1} \times \frac{\pi(\frac{D_y}{2})^2}{\pi(\frac{D_x}{2})^2} = \frac{4}{1} \times \frac{(2)^2}{1} = 16$$

5 (a) Rheostat or variable resistor

(b) (i) 0.053 A OR 0.052 A

(ii) $R = V / I$ = 2.5 V / 0.053 A = 47 Ω (2 sf)

(iii) $I = V / R$ = 2.5 / 200 = 0.0125 A = 0.013 A (2 sf)

(iv) I = 0.053 + 0.0125 = 0.066 A (3 d.p, not 3sf)