Question Number	Answer		Mark
13(a)	Use of $R = \frac{\rho l}{A}$	**(1)**	**3**
	Use of cross-sectional area = width × thickness	**(1)**	
	Thickness of layer of carbon $= 1.2 \times 10^{-5}$m	**(1)**	
	Example of calculation $8.8\ \Omega = \frac{3.7 \times 10^{-5}\ \Omega\ \text{m} \times 0.12\ \text{m}}{0.042\ \text{m} \times t}$ $t = 1.2 \times 10^{-5}$m		
13(b)(i)	Use of $R = V/I$ to calculate I **Or** ratio of resistances = ratio of p.d.s	**(1)**	**3**
	Calculate p.d. across the internal resistance (see 0.1V) **Or** calculate whole circuit resistance (see 9.4 Ω)	**(1)**	
	r = 0.63 Ω	**(1)**	
	Example of calculation $I = \frac{1.4}{8.8} = 0.16\ \text{A}$ $r = \frac{0.1\ \text{V}}{0.16\ \text{A}} = 0.63\ \Omega$		
13(b)(ii)	Reading on voltmeter = 0.35 V	**(1)**	**1**
	Example of calculation $\frac{V}{1.4\ \text{V}} = \frac{3.0\ \text{cm}}{12.0\ \text{cm}}$ $V = 0.35\ \text{V}$		
	Total for question 13		**7**