Question Number	Answer		Mark
12(a)	Potential difference is the energy transfer per unit charge Energy is dissipated in the battery Energy transferred to circuit is less than energy transferred in battery **OR** Potential difference is the energy transfer per unit charge Voltage is dropped across the internal resistance Less voltage is dropped across the rest of the circuit (MP3 via either method is conditional upon awarding MP2) (Allow "lost volts in the internal resistance" for MP2 via 2nd method) (Allow "terminal p.d. is lower" for MP3 via 2nd method)	(1)(1) (1) (1) (1) (1)	**3**
12(b)	Use of $I = \frac{V}{R}$ for the whole circuit Use of $V = IR$ for one of the resistors V = 8.5 V (voltmeter reading) (Award 1 mark for candidates using V = IR with any values given in the question) **OR** See ratio of p.d.s compared to ratio of resistances With correct values substituted V = 8.5 V (voltmeter reading) (Award 1 mark for candidates using potential divider formula with any values given in the question). <u>Example of calculation</u> $I = \frac{9.0\ \text{V}}{(270 + 15)\Omega} = 0.0316\ \text{A}$ $V = 0.0316\ \text{A} \times 270\ \Omega = 8.53\ \text{V}$	(1) (1) (1) (1) (1) (1)	**3**
12(c)	Use of $V = \frac{W}{Q}$ W = 110 J (Can award MP1 if candidate multiplies any value of V (of 9.0V or less) by the given charge) <u>Example of calculation</u> $W = 9.0\ \text{V} \times 12\ \text{C} = 108\ \text{J}$	(1) (1)	**2**
	Total for Question 12		**8**