

Question			Expected response	Max mark	Additional guidance
12.	(a)	(i)	1.5 V	1	
		(ii)	$E = V + Ir$ (1) $1.5 = 1.3 + 0.88r$ (1) $r = 0.23 \Omega$ (1)	3	Accept: 0.2, 0.227, 0.2273 Alternative methods: $V = IR$ (1) $0.2 = 0.88 \times R$ (1) $R = 0.23 \Omega$ (1) lost volts = Ir (1) $0.2 = 0.88 \times R$ (1) $R = 0.23 \Omega$ (1)
		(iii)	(When the switch is closed) there is a current (in the circuit). (1) Voltage (is dropped) across the internal resistance. (1)	2	Independent marks Do not accept 'current increases' on its own. 'Lost volts' is not sufficient on its own
	(b)	(i)	$E = V + Ir$ and $V = IR$ (1) OR $E = I(R + r)$ $9.0 = I(2.4 + 1.2)$ (1) $I = 2.5 \text{ A}$ (1)	3	Accept: 3, 2.50, 2.500 Both relationships (1) Both substitutions (1) Alternative method: $V = IR$ (1) $9.0 = I \times 3.6$ (1) $I = 2.5 \text{ A}$ (1) For other alternative methods: All relationships (1) All substitutions (1) Correct final answer (1)
		(ii)	$P = I^2 R$ (1) $P = 2.5^2 \times 2.4$ (1) $P = 15 \text{ W}$ (1)	3	Or consistent with (b)(i) Accept 20, 15.0, 15.00 For alternative methods: All relationships (1) All substitutions (1) Correct final answer (1)