Question Number	Answer	Mark
15a	See $I_T = I_1 + I_2$ (1) See $V/R_T = V/R_1 + V/R_2$ (1) Divides both sides by V to give $1/R_T = 1/R_1 + 1/R_2$ **Or** V is the same in parallel, so $1/R_T = 1/R_1 + 1/R_2$ (1) (MP3 cannot be awarded for just seeing the equation as this is given on the formula sheet).	**3**
15bi	Use of resistors in parallel formula for N, P and Q (or see 3.3 Ω from relevant working) (1) Adds total to resistance of O (or see 8.3 Ω) (1) Total resistance = 3.1 (Ω) (1) (No unit penalty as is a "show that") (Each step in calculation could be achieved with product/sum calculations, but need to see bracketed values for MP1 and MP2) <u>Example of calculation</u> Resistor N = 5.0 Ω, P + Q = 5.0 Ω + 5.0 Ω = 10.0 Ω $1/R_T$ for N parallel with (P+Q) = (1/5.0 Ω) + (1/10.0 Ω). R_T = 10/3 = 3.3 Ω. O in series with this 3.3Ω, so total for N,O,P,Q section = 25/3 = 8.3 Ω. $1/R_T$ (for whole combination) = (1 / 8.3 Ω) + (1 / 5.0 Ω) R_T = 3.1 Ω	**3**
15bii	Replace resistor M (1) The resistance of a parallel combination is always less than a single resistor in parallel with the others. (1) (MP2 dependent on MP1)_	**2**
	Total for question 15	**8**