

| Question number | Answer | Notes | Marks |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 7 (a) | circuit symbols for variable resistor, ammeter and voltmeter drawn correctly; variable resistor drawn in series with battery and component X; ammeter drawn in series with component X; voltmeter drawn in parallel with component X; | allow variable power supply allow potentiometer circuit if clear | 4 |
| (b) (i) | straight line of best fit drawn with points distributed equally either side; | ignore extrapolation below $V = 1.5V$ | 1 |
| (ii) | use of voltage = current \times resistance; correct reading of current from graph; substitution OR rearrangement; evaluation; matching unit; e.g. $V = I \times R$ current = $2.35 (\times 10^{-3}) (A)$ $4.2 = 2.35 (\times 10^{-3}) \times R$ OR $R = V / I$ (resistance =) 1800 ohms / Ω | seen in words or symbols or implied by working allow ecf from (i) ignore non-conversion of mA to A at this point expect Ω but allow kΩ if matched to appropriate value -1 POT error allow 2.3-2.4 (mA) allow 1750 - 1826 | 5 |
| (iii) | D (4.2 joules per coulomb); A is incorrect because this is the unit for current B is incorrect because this is the reciprocal of the unit for power C is incorrect because this is the unit for power | | 1 |
| (iv) | graph for lamp should be a curve; (because) a lamp does not obey Ohm's Law/ lamp does not have I directly proportional to V. component X is a resistor; | allow line is straight allow reference to (direct) proportionality allow component X is an ohmic conductor accept component X could be a lamp but it's not warm enough yet for the graph to curve for 2 marks | 2 |

Total for Question 7 = 13 marks