Question Number	Answer	Mark
2(a)	• Curved line of best fit (1)	**1**
2(b)(i)	• Minimum p.d. read from their line on the graph (1)	**1**
2(b)(ii)	• Use of $W = VQ$ with $Q = 1.6\times10^{-19}$ C and value of V from (b)(i) (1) • Value of W in the range of 2.5×10^{-19} to 3.0×10^{-19} (J) (1) Example of calculation $W = VQ$ $W = 1.8\text{ V} \times 1.6\times10^{-19}\text{ C}$ $W = 2.9\times10^{-19}\text{ J}$	**2**
2(c)	• Use of $c = f\lambda$ (with $\lambda = 625$ nm) (1) • Use of $E = hf$ (1) • $h = 6.5 \times 10^{-34}$ J s (1) (Use of $E = hc/\lambda$ scores MP1 and MP2) Example of calculation $c = f\lambda$ $3.0\times10^{8}\text{ m s}^{-1} = f \times 625\times10^{-9}\text{ m}$ $f = 4.8\times10^{14}$ Hz $E = hf$ $3.1\times10^{-19}\text{ J} = h \times 4.8\times10^{14}\text{ Hz}$ $h = 6.5\times10^{-34}$ J s	**3**
2(d)	• There would be an uncertainty in wavelength/frequency **Or** there would be a range of wavelengths/frequencies **Or** the LED emits different wavelengths/frequencies (1) • If wavelength was longer, the calculated Planck constant would be larger **Or** if the frequency was lower, the calculated Planck constant would be larger (1) • There would be an uncertainty in the calculated Planck constant **Or** there would be a range of possible values of the Planck constant (1) MP2 - Accept converse arguments for shorter wavelength or higher frequency	**3**
2(e)	• Take measurements for additional p.d.s between 1.5 and 2.0V **Or** Take measurements for smaller increments in p.d. (1) • This would allow for a more accurate line of best fit to be drawn **Or** to more accurately identify the p.d. where the line touches the x-axis (1) Accept use of a datalogger for MP1	**2**
	Total for question 2	**12**