Question Number	Answer		Mark
18(a)(i)	• Use of $E = V/d$ • $V = 4.5 \times 10^4$ V Example of calculation $7.5 \times 10^5 = V / 0.06$ $V = 4.5 \times 10^4$ V	**(1)** **(1)**	**2**
18(a)(ii)	• Use of $E = F/Q$ • Use of $\Delta W = F\Delta s$ with $s = 3.0$cm • Use of $\Delta W = E_k = ½mv^2$ • $v = 5.2 \times 10^5$ (m s^{-1}) **Or** • Use of $E = F/Q$ • Use of $F = ma$ • Use of $v^2 = u^2 + 2as$ with $s = 3.0$cm • $v = 5.2 \times 10^5$ (m s^{-1}) **Or** • Use of $V = W/Q$ • Understanding that $V = 2.25 \times 10^4$ V (ecf from (i)) • Use of $\Delta W = E_k = ½mv^2$ • $v = 5.2 \times 10^5$ (m s^{-1}) Example of calculation 7.5×10^5 Vm^{-1} = F / 1.6×10^{-19} C ($F = 1.2 \times 10^{-13}$ N) $\Delta W = 1.2 \times 10^{-13}$ N × 0.03 m ($\Delta W = 3.6 \times 10^{-15}$ J) 3.6×10^{-15}J = ½ × 2.7×10^{-26} kg × v^2 $v = 5.16 \times 10^5$ (m s^{-1})	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(1)**	**4**
18(b)(i)	• The direction of electric force will be downwards so magnetic force must be upwards • and the magnetic field is into the page (dependent on MP1)	**(1)** **(1)**	**2**
18(b)(ii)	• Use of $F_E = EQ$ • Use of $F_M = BQv$ • $B = 0.021$ T Example of calculation $F_E = 10500$ Vm$^{-1} \times 1.6 \times 10^{-19}$C = 1.68×10^{-15} N $B \times 1.6 \times 10^{-19}$C × 5.0 × 10^5 ms^{-1} = 1.68×10^{-15} N $B = 0.021$ T	**(1)** **(1)** **(1)**	**3**
18(c)	• Isotopes have different masses • The magnetic force will be the same because charge is the same **Or** $r = mv / Bq$ and B, q, v are all the same • Different mass will lead to a circle/path with different radius/deflection (so only one isotope is detected)	**(1)** **(1)** **(1)**	**3**
	Total for question 18		**14**