

Question Number	Answer	Mark
12(a)	<p>Equates $F = \frac{mv^2}{r}$ and $F = BQv$ (1)</p> <p>Substitutes $p = mv$ with suitable algebra to arrive at $r = \frac{p}{BQ}$ (1)</p> <p><u>Example of derivation</u></p> $\frac{mv^2}{r} = BQv$ $\frac{mv}{r} = BQ$ $\frac{p}{r} = BQ$ $r = \frac{p}{BQ}$	2
12(b)	<p>Use of conversion factor from eV to J (1)</p> <p>Use of $E_k = \frac{p^2}{2m}$</p> <p>Or</p> <p>Use of $E_k = \frac{1}{2} mv^2$ and $p = mv$ (1)</p> <p>Use of $r = \frac{p}{BQ}$ (1)</p> <p>$B = 3.5 \text{ T}$ (1)</p> <p><u>Example of calculation</u></p> $E = 5.4 \text{ MeV} \times 10^6 \times 1.6 \times 10^{-19} \text{ C}$ $= 8.64 \times 10^{-13} \text{ J}$ $8.64 \times 10^{-13} \text{ J} = \frac{p^2}{2 \times 6.64 \times 10^{-27} \text{ kg}}$ $p = 1.07 \times 10^{-19} \text{ Ns}$ $0.096 \text{ m} = 1.07 \times 10^{-19} \text{ Ns} / B \times 2 \times 1.6 \times 10^{-19} \text{ C}$ $B = 3.48 \text{ T}$	4
Total for question 12		6