

Question Number	Answer	Mark
17(a)(i)	<p>Equates $F = BQv$ and $F = EQ$ (1) Uses $E = V/d$ (1) Suitable algebra to give $v = V/Bd$ (1)</p> <p><u>Example derivation</u> $BQv = EQ$ $v = E/B$ $E = V/d$ $v = V/Bd$</p>	3
17(a)(ii)	<p>Use of $v = V/dB$ (1) $v = 2.8 \times 10^7 \text{ m s}^{-1}$ (1)</p> <p><u>Example of calculation</u> $v = 231 \text{ V} / 0.015 \text{ m} \times 5.5 \times 10^{-4} \text{ T}$ $v = 2.8 \times 10^7 \text{ m s}^{-1}$</p>	2
17(a)(iii)	<p>States $r = p/BQ$ and $p = mv$ Or States $F = mv^2/r$ and $F = BQv$ (1) Derives and uses $Q/m = v/rB$ (1) $Q/m = 1.3 \times 10^{11} \text{ (C kg}^{-1}\text{)}$ is less than the accepted value (1)</p> <p><u>Example of calculation</u> $Q/m = v/rB$ $= 2.8 \times 10^7 \text{ m s}^{-1} / 0.39 \text{ m} \times 5.5 \times 10^{-4} \text{ T}$ $1.31 \times 10^{11} \text{ C kg}^{-1}$</p>	3
17(b)	<p>This is a diffraction/interference pattern (1)</p> <p>Diffraction only occurs for waves Or Particles do not undergo diffraction (1)</p> <p>(So) an electron does not always behave as a particle Or (so) electrons can behave as waves (and as particles) (1)</p>	3
Total for question 17		11