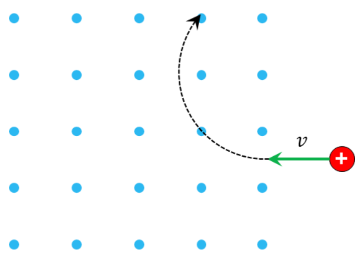
Question	Part		Answer	Marks
177	(a)		 	1
	(b)	(1)	$qvB = \frac{mv^2}{r}$ $qvB = \frac{mv^2}{r}$ $qB = \frac{mv}{r}$ $r = \frac{mv}{qB}$	1 1
		(2)	$r = \frac{mv}{qB}$ $r = \frac{1.673 \text{ x } 10^{-27} \text{ x } 7.5 \text{ x } 10^4}{1.6 \text{ x } 10^{-19} \text{ x } 50 \text{ x } 10^{-3}}$ $r = 1.6 \text{ x } 10^{-2}$ m	1 1
		(3)	If kinetic energy is increased by a factor of 9, then speed is increased by a factor of 3 ($E_k \propto v^2$) which triples the radius as $r \propto v$. Hence the proton would follow a circular path in the same direction, but the radius of the circular path would be three times as large.	1 1
178	(a)		The alpha particle has uniform circular motion and follows a circular path in the magnetic field. This is because there is a constant magnetic force perpendicular to the velocity of the alpha particle.	1 1
	(b)	(1)	$F = qvBsin\theta$ $F = 1.6 \text{ x } 10^{-19} \text{ x } 1.2 \text{ x } 10^5 \text{ x } 10 \text{ x } 10^{-3} \text{ x } sin90$ $F = 1.9 \text{ x } 10^{-16}$ N	1 1
		(2)	$r = \frac{mv}{qB}$ $r = \frac{6.64 \text{ x } 10^{-27} \text{ x } 1.2 \text{ x } 10^5}{3.2 \text{ x } 10^{-19} \text{ x } 10 \text{ x } 10^{-3}}$ $r = 0.25$ m	1 1
	(c)		The electron has a much smaller radius than the alpha particle due to the lower mass. The electron moves in the opposite direction to the alpha particle due to the opposite sign of electric charge.	1 1