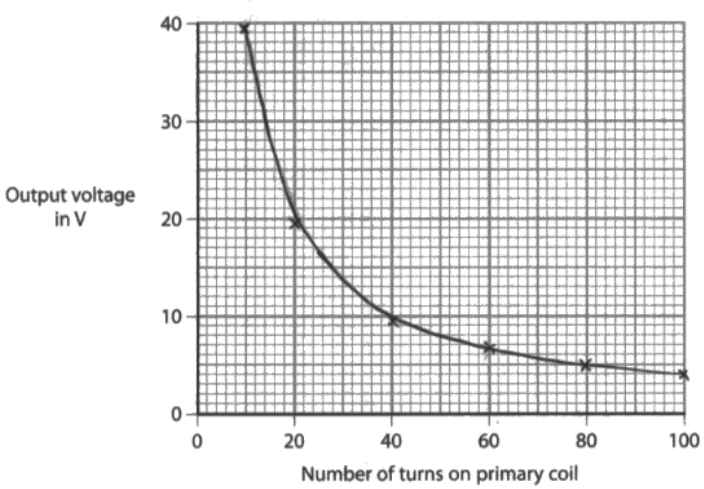
Question number	Answer	Notes	Marks
2 (a) (i)	Points plotted to within half a small square; **Number of turns on primary coil** / **Output voltage in V** 10 / 39.6 20 / 19.7 40 / 9.9 60 / 6.6 80 / 5.0 100 / 4.0  	Points should lie on a very good curved line.	1
(ii)	Best fit line is smooth curve;	ECF their data points.	1
(iii)	As number of (primary) turns increases, (secondary) voltage decreases; At a decreasing rate/is non-linear;	Allow RA Allow unqualified 'inversely proportional' for 2 marks. Ignore: 'negative exponential'	2

Question number	Answer	Notes	Marks
4 (a)	A helium **nucleus** / 2 protons and 2 neutrons/ 4 nucleons, 2 protons;	Ignore chemical symbol	1
(b) (i)	Arrow labelled Y, through X away from nucleus; Line of action of force would pass through centre of nucleus by eye;		2
(ii)	Arrow labelled Z, opposite direction to their answer from b) (i) by eye; Same size as their answer from b) (i) by eye;	If no arrow Y, condone correct direction for arrow Z, i.e. force arrow pointing away from point X.	2
(iii)	MP1 Force on alpha is repulsive; MP2 Alpha and nucleus must be same (type of) charge; MP3 Alpha is positive **therefore** nucleus is positive;	Allow 'like charges repel' for MP1 and MP2	3
4 (c)	Selection of F = ma; Substitution or re-arrangement; Evaluation; e.g. a = 3.6 / 6.6 x 10^{-27} = 5.5 x 10^{26} m/s^2	Can be implied from working -1 for PoT error Allow 5.45 x 10^{26}, 5.454 x 10^{26}, 5.4545... x 10^{26} etc Condone 5.4 x 10^{26}	3

(b)	Any THREE from MP1 Dog and water are at different temperatures; MP2 Dog and water in physical contact so likely to be conduction; MP3 No movement of particles from dog to water, so not convection / EQ; MP4 Dog and bag are both solids, so convection impossible; MP5 Not much radiation as dog and water similar temperatures;	Allow “no gap between dog and bag so no convection”	3