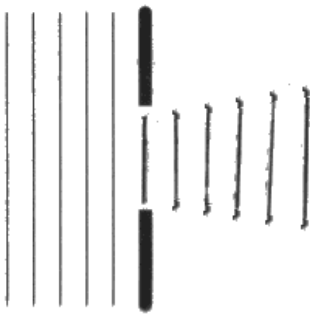| Question number		Answer	Notes	Marks
3	(a)	left diagram: at least 3 correctly curved wavefronts centred on the gap; spacing of wavefronts is consistent with original wavefronts; right diagram: evenly spaced planar wavefronts (curved at the edges);	ignore where wavefront lines start and finish DOP judge spacing by eye reject if any wavefront line is as long as original wavefront lines ignore spacing of wavefronts	3
	(b) (i)	(wave) speed = frequency x wavelength;	allow rearrangements and use of **standard symbols e.g. v = f x λ** condone s for speed	1
	(ii)	substitution / rearrangement; evaluation of frequency; evaluation of wavelength to at least 2 significant figures; e.g. 6.0 = f x 4.0 f = 1.5 (Hz) (λ_2 =) 2.7 (cm)	allow alternative methods e.g. **6 / 4 = 4 / λ gains both method** marks allow 2.67, 2.6 recurring condone 2.6, 2.66 etc. do not allow 3.0	3

Total for question 3 = 7 marks

Question number		Answer	Notes	Marks
6 (a)		either correct moment seen; use of principle of moments; correct evaluation of weight; e.g. W x 8 OR 0.1 x 12 W x 8 = 0.1 x 12 (W =) 0.15 (N)	seen mathematically or in writing **e.g. 'clockwise moment = anticlockwise moment'** answer of 0.25 (N) gets 2 marks allow 0.2 (N) if supported by correct working	3
(b)		coil becomes an electromagnet / coil produces a magnetic field; coil {attracts / exerts a force on} magnet; increasing anti-clockwise moment;	allow current for coil reject if repulsion mentioned allow creating (additional) anti-clockwise moment	3
(c)	(i)	sensible linear scales on both axes that occupy >50% of the grid; both axes labelled correctly with quantity and unit; correct orientation; all 6 points correctly plotted; 	allow symbols I for current and W for weight current on x-axis reject plotting mark if non-linear scale used in region of plots | Current in A	Total weight added in N
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0.0	0.1
0.1	0.5
0.5	2.1
0.7	2.5
0.9	3.7
1.1	4.5		4
	(ii)	straight line of best fit avoiding anomalous reading;		1
	(iii)	(repeat to) check accuracy / validity of reading; (because) reading appears to be anomalous;	allow idea of checking to see if same reading obtained again allow reading does not follow the trend / does not lie near the line of best fit	2

Question number			Answer	Notes	Marks
7	(a)	(i)	measuring cylinder;	allow graduated cylinder, burette, pipette, syringe	1
		(ii)	0.005 (cm^3)		1
	(b)	(i)	correctly calculated average; given to 3 significant figures; e.g. (average =) 300.8 (mm) (average to 3 s.f. =) 301 (mm)	DOP	2
		(ii)	use of radius in calculation; substitution and rearrangement; evaluation; e.g. radius = 150(.4) (mm) (length =) 1.0 / (π x 150.4 x 150.4) (length =) 1.4 x 10^{-5} (mm)	allow ecf from (b)(i) throughout seen anywhere -1 for POT error answer of 3.5 x 10^{-6} (mm) gains 2 marks for using diameter instead of radius allow answers that round to 1.40-1.41	3

Total for question 7 = 7 marks