Question number	Answer	Notes	Marks
4 (a)	Any **two** of: current (in the coil) ; {in / produces} a magnetic field ; (resultant) force / interaction of magnetic fields ;	 IGNORE: electrical to kinetic energy / induced current IGNORE: unqualified refs to LHR IGNORE: refs to push / pull	2
(b)	Any **two** of: increase current / more cells (in battery) ; stronger magnet(s) ; more turns (on coil) ;	 ACCEPT: stronger current / more (battery) voltage REJECT: 'larger' batteries REJECT: 'bigger' magnet IGNORE: magnets closer together REJECT: more coils	2
(c)	Any **two** of: coil / wire cuts through (magnetic) field ; induced voltage / current ; current <u>in lamp</u> / complete circuit ; correct refs to an energy transfer e.g. kinetic to electrical (to light) ;	 ACCEPT: coil moves / breaks field ACCEPT: 'electromagnetic induction' ACCEPT: generated / produced OWTTE IGNORE: "lights lamp"	2

Total 6 Marks

Question number	Answer	Notes	Marks
12			4
M1	pressure greater in the full cup / less in the half-full cup ;		
M2	reference to equation / p = W ÷ A / p = h x ρ x g ;	ACCEPT: F in place of W	
M3	{depth / mass / weight} of liquid / force different in each cup ;	IGNORE: amount of coffee different	
M4	density / g / area the same for each cup ;		

Total 4 marks

Question number	Answer	Notes	Marks
14 (a)	two protons labelled ; two neutrons labelled ;	ACCEPT: a proton and a neutron for 1 mark ACCEPT: correct labels inside circles	2
(b) (i)	Any **two** of: to avoid / reduce absorption / ionisation / loss of energy of alpha particles ; to avoid / reduce chance of collisions between air molecules and alpha particles ; to allow sufficient range for alpha particles / would stop in few cm of air / does not reach foil ;	ACCEPT: ideas of alpha particle absorption, collision and range expressed in other words IGNORE: speed of alpha particles	2
(ii)	Any **two** of: electrostatic (force) ; repulsion ; between like charges ;	ACCEPT: electric (force) IGNORE: magnetic / poles	2

14 (b) (iii)	Any **five** of: Undeflected alpha particles show – there are gaps between nuclei/atoms mostly empty space; Deflections show – a repulsive force operates; (if electrostatic force) then nuclei have same charge as alpha particles (or both positive charge); (only some) deflected so nuclei are a <u>small</u> target; Large deflections show – nuclei have enough mass for alphas to bounce back; <u>mass</u> of a nucleus is <u>more</u> than the mass of an alpha particle; <u>high</u> density related to mass and <u>small</u> size;	ACCEPT: correct reverse arguments	5

Total 11 marks
PAPER TOTAL: 120 MARKS