Question number	Answer	Notes	Marks
2 (a)	9 (kPa);		1
(b)	(liquid) pressure = depth (of liquid) × density × *g*;	accept d, h, height for depth rho, ρ for density g.f.s or gravitational field strength for *g* reject gravity for *g*	1
(c)	substitution; rearrangement; evaluation; e.g. pressure difference = 9 kPa 9 000 = d × 960 × 10 d = 9000 / (9600) d = 0.94 (m)	allow ecf from (a) allow use of g = 9.8(1) m/s^2 giving 0.96 m allow 0.937(5) POT error penalty of 1 mark, except if formula is incorrect i.e. no 'g'	3

Total for Question 2 = 5 marks

Question number			Answer	Notes	Marks
9	(a)	(i)	4; 2;		2
		(ii)	removal of electron(s) (from an atom);	allow gaining electron(s)	1
		(iii)	alpha particles are **absorbed** by/cannot **penetrate/ stopped** by a few cm **in air**; so alphas do not reach the workers;	allow do not penetrate **casing** (of deionser) condone 'do not penetrate skin/clothes'	2
	(b)	(i)	time taken; for (radio)activity/mass/number of (remaining) nuclei to half;	accept any synonym e.g. period/amount of time/	2
		(ii)	evidence of halving of 70; 420 days means 3 half-lives; evaluation of 8.75 (kBq);	accept however presented i.e. 70→35→17.5→8.75 allow 9 (kBq)	3

Total for Question 9 = 10 marks

Question number			Answer	Notes	Marks
12	(a)		A – arrangement W; B cannot be correct as arrangement X would give a downwards force C and D cannot be correct because at the position of the wire, the magnetic field is zero, so there cannot be a magnetic force on the wire		1
	(b)	(i)	substitution into "W = mg"; evaluation; e.g. W = 0.0065 × 10 W = 65 (mN)	ignore POT for this mark accept use of g = 9.8(1) m/s^2 giving 63.7 or 63.8 (mN)	2
		(ii)	resultant force is difference between weight and magnetic force; resultant force = 31 mN; substitution in "F=ma"; re-arrangement; evaluation; e.g. resultant force = 65 – 34 = 31 mN resultant force = 31 × 10^{-3} = 6.5 × 10^{-3} × a a = 31 × 10^{-3} / 6.5 × 10^{-3} a = 4.8 (m/s^2)	allow ecf from (b)(i) POT error gives 1 mark penalty 5.2(3) scores 3 MAX (no evidence of resultant idea) allow 4.76(9) (m/s^2) use of g = 9.81 m/s^2 gives 4.57 (m/s^2)	5
		(iii)	EITHER • increase the current; • by increasing the voltage of power supply; OR • increase the magnetic field strength; • by using stronger magnets/moving the poles closer together;	ignore unqualified reference to increasing the turns/creating a coil	2
		(iv)	use a.c. rather than d.c.; since a.c. current has alternating/changing current direction;		2

Total for Question 12 = 12 marks