

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. $W = 0.0065 \times 10$ $W = 65 \text{ (mN)}$	ignore POT for this mark accept use of $g = 9.8(1) \text{ m/s}^2$ 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 = $65 - 34 = 31 \text{ mN}$ resultant force = $31 \times 10^{-3} = 6.5 \times 10^{-3} \times a$ $a = 31 \times 10^{-3} / 6.5 \times 10^{-3}$ $a = 4.8 \text{ (m/s}^2\text{)}$	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 $g = 9.81 \text{ m/s}^2$ gives 4.57 (m/s ²)	5
(iii)	EITHER <ul style="list-style-type: none"> increase the current; by increasing the voltage of power supply; OR <ul style="list-style-type: none"> 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