

**M1.** C

[1]

**M2.** B

[1]

**M3.** C

[1]

**M4.** A

[1]

**M5.** B

[1]

**M6.** B

[1]

**M7.** D

[1]

**M8.** D

[1]

**M9.** A

[1]

**M10.** (a) units:  $F$  - newton (N),  $B$  - tesla (T) or weber metre<sup>-2</sup> (Wb m<sup>-2</sup>),  
 $I$  - ampere (A),  $l$  - metre (m) **(1)**  
 condition:  $I$  must be perpendicular to  $B$  **(1)**

2

(b) (i) mass of bar,  $m = (25 \times 10^{-3})^2 \times 8900 \times l$  **(1)**  
 (= 5.56 $l$ ) weight of bar (=  $mg$ ) = 54.6 $l$  **(1)**  
 $mg = BIl$  or weight = magnetic force **(1)**  
 $54.6l = B \times 65 \times l$  gives  $B = 0.840$  T **(1)**

(ii) arrow in correct direction (at right angles to  $l$ , in plane of bar) **(1)**

5

[7]

**M11.** (a) (i) out of plane of diagram **(1)**

(ii) circular path **(1)**  
 in a horizontal plane [or out of the plane of the diagram] **(1)**

$$BQv = \frac{mv^2}{r} \quad \mathbf{(1)}$$

$$\text{radius of path, } r \left( \frac{mv}{BQ} \right) = \frac{1.05 \times 10^{-25} \times 7.8 \times 10^5}{0.28 \times 2 \times 1.6 \times 10^{-19}} \quad \mathbf{(1)}$$

$$= 0.91(4) \text{ m} \quad \mathbf{(1)}$$

max 5

(b) (i) radius decreased **(1)**  
 halved **(1)**  
 [or radius is halved **(1) (1)**]

(ii) radius increased **(1)**  
 doubled **(1)**  
 [or radius is doubled **(1) (1)**]

max 3

[8]