**M1.** A

**[1]**

**M2.** C

**[1]**

**M3.** B

**[1]**

**M4.** C

**[1]**

**M5.** C

**[1]**

**M6.** (a) $\Phi$ (= $BA$) = $45 \times 10^{-3} \times \pi \times (70 \times 10^{-3})^2$ **(1)**

= $6.9 \times 10^{-4}$ Wb **(1)** ($6.93 \times 10^{-4}$ Wb)

**2**

(b) (i) $N\Delta\Phi$ ( = $NBA$ – 0) = $850 \times 6.93 \times 10^{-4}$ **(1)**

= 0.59 (Wb turns) **(1)** (0.589 (Wb turns))

(if $\Phi = 6.9 \times 10^{-4}$, then 0.587 (Wb turns))

(allow C.E. for value of $\Phi$ from (a))

(ii) induced emf ( = $N\ \frac{\Delta\Phi}{\Delta t}$) = $\frac{0.589}{0.12}$ **(1)**

= 4.9 V **(1)** (4.91 V)

(allow C.E. for value of Wb turns from (ii)

**4**

**[6]**

**M7.** (a) deflects one way **(1)**
then the other way **(1)**

**2**

(b) (i) acceleration is less than *g* [or reduced] **(1)**
suitable argument **(1) (**e.g. correct use of Lenz's law)

(ii) acceleration is less than *g* [or reduced] **(1)**
suitable argument **(1) (**e.g. correct use of Lenz's law)

**4**

(c) magnet now falls at acceleration *g* **(1)**
emf induced **(1)**
but no current **(1)**
no energy lost from circuit **(1)**
[or no opposing force on magnet, or no force from magnetic field or no magnetic field produced]

**3**
**QWC 2**

**[9]**

**M8.** (a) greater flux (linkage) or more flux lines (at same distance)
[or stronger magnet produces flux lines closer together] **(1)**
greater rate of change of flux (linkage)
[or more flux lines cut per unit time] **(1)**
emf $\propto$ rate of change of flux (linkage) **(1)**

[or using $\epsilon = N\frac{\Delta\phi}{\Delta t}$, where $\Delta\Phi = A\ \Delta B$, *v* and $\Delta t$ are the same **(1)**
$\Delta B$ is larger since magnet is stronger **(1)**
*N* and *A* are constant, $\therefore\ \epsilon$ is larger **(1)**]

**3**

(b) (i) area swept out, $\Delta A = lv\Delta t$ **(1)**

$\Delta\Phi$(= B$\Delta A$) = $Blv\ \Delta t$ **(1)**

[redacted] gives result **(1)**

(c) (i) $w(=2\pi f) = 2\pi \times l6$ **(1)** $= 101$ rads$^{-1}$ **(1)**

(ii) $v(= rw) = 32 \times 10^{-3} \times 101 = 3.2(3)$ms$^{-1}$ **(1)**

*(allow C.E. for value of w from (i))*

(iii) $\in(= Blv) = 28 \times 10^{-3} \times 64 \times 10^{-3} \times 3.23$ **(1)**

$= 5.7(9) \times 10^{-3}$V **(1)**

*(allow C.E. for values of v from (ii))*

*(solutions using $\in$ $Bf\pi r^2$ to give 5 7(6) × $10^{-3}$ V acceptable)*

**5**

**[11]**