Mark schemes

## Q1.

(e)    16 mA = 0.016 A

*allow 1.6 × 10⁻² (A)*

**1**

0.013 = $B$ × 0.016 × 6.5

*allow correct substitution using incorrectly / not converted current*

**1**

$$B = \frac{0.013}{0.016 \times 6.5}$$

*allow correct re-arrangement using incorrectly / not converted current*

**1**

$B$ = 0.125 (T)

*allow correct calculation using incorrectly / not converted current*
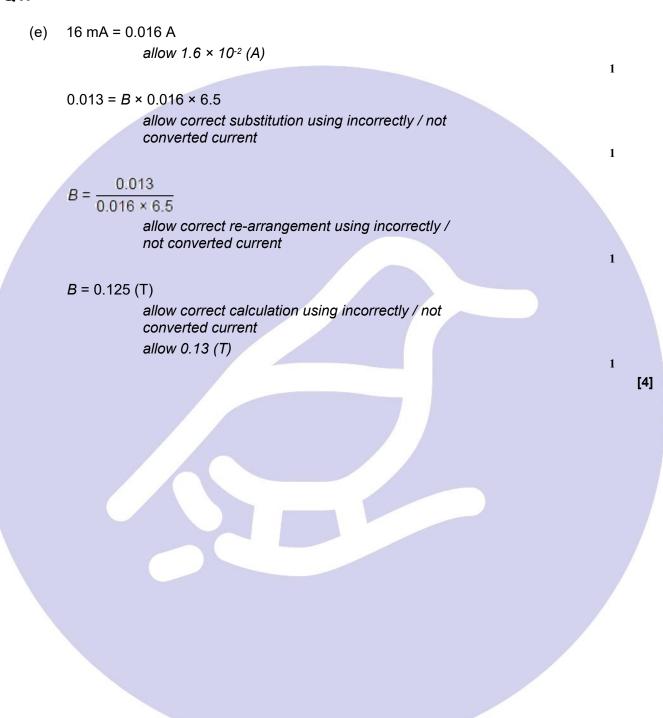
*allow 0.13 (T)*

**1**

**[4]**

**Q2.**

(e)    $B = 60 \times 10^{-6}$ T

1

$0.045 = 60 \times 10^{-6} \times 50 \times l$

*allow correct substitution of incorrectly / not converted value of B*

1

$$l = \frac{0.045}{60 \times 10^{-6} \times 50}$$

*allow correct rearrangement using an incorrectly / not converted value of B*

1

$l = 15$ (m)

*allow a correct calculation using an incorrectly / not converted value of B*

1

(e)    the wire / force is at right angles to the magnetic field

*allow the current is constant*

*allow the cable is straight*

*allow the field is uniform*

*allow the force is constant*

1

[5]

**Q3.**

(c)   F = 0.30 × 1.7 × 0.050

**1**

F = 0.0255 (N)

**1**

m = 0.004(0 kg)

**1**

0.0255 = 0.0040 × a

> *this mark may be awarded if m is incorrectly / not converted and / or F is incorrectly calculated*

**1**

a = 0.0255 / 0.0040
**or**
a = 6.375

> *this mark may be awarded if m is incorrectly / not converted and / or F is incorrectly calculated*

**1**

Δv = 6.375 × 0.15 = 0.95625 (m/s)

> *allow a correct calculation using an incorrectly / not converted m and / or an incorrectly calculated F*
>
> *allow 0.96 **or** 0.956 (m/s)*

**1**

alternative method

*F* = 0.30 × 1.7 × 0.050 (1)

*F* = 0.0255 (N) (1)

m = 0.004(0 kg) (1)

$0.0255 = \dfrac{0.0040 \times \Delta v}{0.15}$   (1)

> *this mark may be awarded if m is incorrectly / not converted and / or F is incorrectly calculated*

$\Delta v = \dfrac{0.0255 \times 0.15}{0.0040}$   (1)

> *this mark may be awarded if m is incorrectly / not converted and / or F is incorrectly calculated*

Δv = 0.95625 (m/s) (1)

> *allow a correct calculation using an incorrectly / not converted m and / or an incorrectly calculated F*
>
> *allow 0.96 **or** 0.956 (m/s)*

**[13]**

**Q4.**

4.8 × 10⁻⁴ = F × 8 × 10⁻²

**1**

F = 6 × 10⁻³ (N)

**1**

6 × 10⁻³ = B × 1.5 × 5 × 10⁻²

**1**

$B = \dfrac{6 \times 10^{-3}}{7.5 \times 10^{-2}}$

**1**

B = 8 × 10⁻² or 0.08

**1**

*allow 8 × 10⁻² **or** 0.08 with no working shown for **5** marks*
*a correct method with correct calculation using an incorrect value of F gains **3** marks*

Tesla

*accept T*

*do not accept t*

**1**

**[8]**