

Electromagnetism

$$\begin{aligned} \textcircled{1} \quad F &= BIL \\ &= (0.2)(15)(0.25) \\ F &= \boxed{0.75 \text{ N}} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad F &= BIL \\ L &= \frac{F}{BI} \\ &= \frac{0.1}{(0.033)(20)} \\ L &= \boxed{0.15 \text{ m}} \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad F &= BIL \\ B &= \frac{F}{IL} \\ &= \frac{6 \times 10^{-5}}{(1.5)(1)} \\ B &= \boxed{4 \times 10^{-5} \text{ T}} \end{aligned}$$

$$\textcircled{4} \quad F = BIL \sin \theta$$
$$= (5 \times 10^{-5}) (200) (50) \sin 45$$

$$F = \boxed{0.35 \text{ N}}$$

$$\textcircled{5} \quad B = \frac{F}{IL}$$
$$= \frac{0.4}{(20)(0.15)}$$

$$B = \boxed{0.13 \text{ T}}$$

$$\textcircled{6} \quad F = BIL \sin \theta$$
$$= (0.5) (4) (0.25) \sin 45$$

$$F = \boxed{0.35 \text{ N}}$$

$$\textcircled{7} \quad F = F_g$$
$$BIL = mg$$
$$I = \frac{mg}{BL}$$
$$= \frac{(0.015)(9.8)}{(0.2)(0.4)}$$

$$I = \boxed{1.84 \text{ A}}$$

$$\begin{aligned} \textcircled{8} \quad F &= BIL \\ &= (0.4)(8)(0.5) \\ F &= \boxed{1.6 \text{ N}} \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad B &= \frac{F}{IL} \\ &= \frac{0.6}{(6)(0.75)} \end{aligned}$$

$$B = \boxed{0.13 \text{ T}}$$

$$\begin{aligned} \textcircled{10} \quad B &= \frac{F}{IL} \\ &= \frac{0.35}{(6)(0.4)} \end{aligned}$$

$$B = \boxed{0.15 \text{ T}}$$

ii) Parallel to the Field, so that $\theta = 0$.

$$\begin{aligned} \text{Then } \vec{F} &= BIL \sin \theta \text{ becomes} \\ &= BIL \sin 0 \end{aligned}$$

$$F = 0$$

⑫ a) $F = BIL$

$$= (5 \times 10^{-5})(225)(1)$$

$$F = \boxed{0.011 \text{ N}}$$

b) down

c) No. Over a 50 m span, the force is only 0.011 N. This is insignificant when compared to the weight of the wire.