

Answers to Assignment 15

21.1

- a) left;
- b) into page;
- c) up;
- d) zero;
- e) right;
- f) down.

21.2

- a) right;
- b) out of page;
- c) down;
- d) zero;
- e) left;
- f) up.

21.72

$$\frac{F}{l} = \frac{\mu_0 I_1 I_2}{2\pi} \left( \frac{1}{r_1} - \frac{1}{r_1 + r_2} \right)$$

$$F = l \frac{\mu_0 I_1 I_2}{2\pi} \left( \frac{1}{r_1} - \frac{1}{r_1 + r_2} \right) = 0.30 \times \frac{4\pi \times 10^{-7} \times 15.0 \times 30.0}{2\pi} \times \left( \frac{1}{0.075} - \frac{1}{0.075 + 0.10} \right) = 2.06 \times 10^{-4} \text{ N}$$

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21.82

a)

$$\therefore F = qvB = m \frac{v^2}{r},$$

$$\therefore r = \frac{mv}{qB}$$

$$\therefore T = \frac{2\pi r}{v} = 2\pi \frac{m}{qB}$$

b)

$$f = \frac{1}{T} = \frac{qB}{2\pi m}$$

c)

$$\omega = 2\pi f = \frac{qB}{m}$$