

1. Magnetic fields cause forces on (choose the most appropriate):

- A) moving objects. B) atoms. C) charges. D) other magnetic fields. **E) moving charges.**

2. Chapter 21, Problem 2a

- A) zero newtons
 B) $2.3 \times 10^{-4} \text{ N}$, out of the paper
 C) $2.3 \times 10^{-4} \text{ N}$, into the paper
 D) $5.7 \times 10^{-5} \text{ N}$, out of the paper
E) $5.7 \times 10^{-5} \text{ N}$, into the paper

3. Chapter 21, Problem 2b

- A) zero newtons
 B) $1.1 \times 10^{-4} \text{ N}$, out of the paper
C) $1.1 \times 10^{-4} \text{ N}$, into the paper
 D) $2.3 \times 10^{-4} \text{ N}$, out of the paper
 E) $2.3 \times 10^{-4} \text{ N}$, into the paper

4. Chapter 21, Problem 4

- A) $1/3$** B) $1/\sqrt{3}$ C) $\sqrt{3}$ D) 3 E) 9

5. A proton traveling due east in a region that contains only a magnetic field experiences a vertically upward force away from the surface of the earth. What is the direction of the magnetic field?

- A) north** B) east C) south D) west E) down

6. Chapter 21, Problem 6

- A) $2.1 \times 10^{12} \text{ m/s}^2$ **B) $5.9 \times 10^{12} \text{ m/s}^2$** C) $7.0 \times 10^{12} \text{ m/s}^2$ D) $8.6 \times 10^{12} \text{ m/s}^2$ E) zero m/s^2

7. An electron is moving with a speed of $3.5 \times 10^5 \text{ m/s}$ when it encounters a magnetic field of 0.60 T. The direction of the magnetic field makes an angle of 60.0° with respect to the velocity of the electron. What is the magnitude of the magnetic force on the electron?

- A) $4.9 \times 10^{-13} \text{ N}$ B) $3.2 \times 10^{-13} \text{ N}$ C) $1.7 \times 10^{-13} \text{ N}$ D) $3.4 \times 10^{-14} \text{ N}$ **E) $2.9 \times 10^{-14} \text{ N}$**

2a) $q = 8.4 \times 10^{-6} \text{ C}$

$\Theta_{vB} = 30^\circ$

$v = 45 \text{ m/s}$

$F = qvB \sin \Theta_{vB} = 5.67 \times 10^{-5} \text{ N}$

$B = 0.30 \text{ T}$

Dir in by RHR

2b) Same, but $\Theta_{vB} = 90^\circ$

Same dir (in) by RHR.

$F = qvB = 1.13 \times 10^{-4} \text{ N}$

4) $F = qvB \sin \Theta_{vB}$

Increase v by $3x$, q must \downarrow by $3x$

a) $F = qvB = 5.38 \times 10^{-18} \text{ N}$

$a = \frac{F}{m} = 5.9 \times 10^{12} \text{ m/s}^2$

7) $F = qvB \sin \Theta_{vB} = 2.91 \times 10^{-14} \text{ T}$