

## Practice for 20.2

1. a. 26.1 A of current flow north along a wire in a magnetic field of 0.0154 T that is  $62.0^\circ$  east of South. What force acts on the wire if it is 132 m long? (Magnitude and direction) (46.8 N vert down)  
b. A 1.48 Amp current flows South in a wire that is 17.2 cm long. What is the magnetic field (Assume it is perpendicular) if the wire experiences a vertically upward force of 3.17 N? (Magnitude and direction) (12.5 T east)  
c. A moving electron travels through a 2.43 T upward magnetic field, and experiences a force of  $7.2 \times 10^{-12}$  N to the east. What is the magnitude and direction of the particle's velocity? ( $1.8 \times 10^7$  m/s south)  
d. A mystery particle with a mass of  $6.69 \times 10^{-27}$  kg traveling  $2.96 \times 10^6$  m/s in a 1.21 T magnetic field out of this page revolves clockwise with a radius  $5.11 \times 10^{-2}$  m. What is the **charge** of the particle, and is it **positive, or negative**? ( $3.20 \times 10^{-19}$  C, positive)  
e. What **electric field** in what **direction** would make the particle go straight down the page in the previous problem? ( $3.58 \times 10^6$  N/C right)
2. a. 21.4 A of current flow west along a wire in a magnetic field of 0.0305 T that is  $78.0^\circ$  north of east. What force acts on the wire if it is 215 m long? (Magnitude and direction) (137 N vert down)  
b. A current of 31.8 A flowing in a wire experiences a force to the North of 1.61 N in a region where there is a magnetic field of 0.597 T vertically upward. What is the length of the wire perpendicular to the magnetic field, and in what direction does the current flow? (0.0848 m, west)  
c. A proton travels at  $2.17 \times 10^3$  m/s vertically upward, and experiences a force of  $8.1 \times 10^{-16}$  N to the east. What is the magnitude and direction of the magnetic field exerting this force? (2.33 T south)  
d. An electron is going  $2.47 \times 10^6$  m/s in the plane of the page in a 0.128 T magnetic field out of this page. What is the **radius** of its path? Which **direction** does it circle, **ACW or CW**? ( $1.10 \times 10^{-4}$  m, ACW)  
e. What **electric field** in what **direction** would make the particle go straight to the right on the page ( $\rightarrow$ ) in the previous problem? ( $3.16 \times 10^5$  N/C up the page)
3. a. 11.8 A of current flow east along a wire in a magnetic field of 0.0451 T that is  $32.0^\circ$  east of North. What force acts on the wire if it is 126 m long? (Magnitude and direction) (56.9 N vert up)  
b. A vertical wire 35.7 cm long experiences a 0.821 N force to the East in a 0.0783 T Northerly magnetic field. What is the current flowing in the wire, and which way does it flow? (Assume it is perpendicular) (29.4 A vert down)  
c. A moving electron travels through a 0.78 T westerly magnetic field, and experiences a force of  $2.5 \times 10^{-14}$  N vertically upward. What is the magnitude and direction of the particle's velocity? ( $2.0 \times 10^5$  m/s south)  
d. A proton traveling at  $4.81 \times 10^6$  m/s in the plane of this page travels anti-clockwise in a circle with a radius of 2.87 mm ( $2.87 \times 10^{-3}$  m). What is the **magnitude and direction** of the **magnetic** field that effects this? (17.5 T into the page)  
e. What **electric field** in what **direction** would make the particle go straight to the left on the page ( $\leftarrow$ ) in the previous problem? ( $8.42 \times 10^7$  N/C up the page)
4. a. 13.1 A of current flow south along a wire in a magnetic field of 0.0241 T that is  $56.0^\circ$  north of West. What force acts on the wire if it is 501 m long? (Magnitude and direction) (88.4 N vert down)  
b. A 45.7 cm long wire experiences a force of 3.12 N to the North in a vertically upward 0.0382 T magnetic field. What is the current, and in what direction does it flow? (Assume it is perpendicular) (179 A West)  
c. A proton travels at  $5.2 \times 10^3$  m/s to the North through a vertically downward 0.45 T magnetic field. What is the magnitude and direction of the force acting on the particle? ( $3.7 \times 10^{-16}$  N West)  
d. An electron in a 0.00287 T magnetic field out of this page goes in a circle with a radius of 0.0781 m. What is the electron's **velocity**, and which direction does it circle, **ACW or CW**? ( $3.94 \times 10^7$  m/s, ACW)  
e. What **electric field** in what **direction** would make the particle go straight up the page in the previous problem? ( $1.13 \times 10^5$  N/C left)
5. a. 15.2 A of current flow north along a wire in a magnetic field of 0.0127 T that is  $23.0^\circ$  south of East. What force acts on the wire if it is 157 m long? (Magnitude and direction) (vert down 27.9 N)  
b. A 3.2 Amp current flows West in a wire that is 32.1 cm long. What is the magnetic field (Assume it is perpendicular) if the wire experiences a vertically downward force of 4.17 N? (Magnitude and direction) (4.1 T North)  
c. An electron travels at  $7.8 \times 10^5$  m/s to the South, and experiences a force of  $4.3 \times 10^{-14}$  N to the East. What is the magnitude and direction of the magnetic field exerting this force? (0.34 T vert up)  
d. A proton is going  $3.71 \times 10^5$  m/s in the plane of the page. A magnetic field is making it travel in clockwise circles with a radius of 2.37 m. What is the **magnitude and direction** of the **magnetic field**? (0.00163 T out of page)  
e. What **electric field** in what **direction** would make the particle go straight down the page in the previous problem? (607 N/C right)