Physics 250: Unquiz 05

A wire of length L=3m has a current I=2A running towards the +x direction. If the wire is in a uniform magnetic field in the +y direction of strength B=0.1 T, calculate the direction and magnitude of the force on the wire. Show from fundamental definitions that the units are those of N. If the direction of the magnetic field were in the -y direction, what would be the direction of the force? If the current were in the -x direction while the magnetic field were in the +y direction, what would be the direction of the force?

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$$\vec{F}=I\vec{L}x\vec{B}:I\vec{L}=|IL|\hat{x}:\vec{B}=|B|\hat{y}:\hat{x}x\hat{y}=\hat{z}\Rightarrow\vec{F}=|F|\hat{z}:|\vec{F}|=ILB=(2A)(3m)(0.1T)=0.6N$$

$$[AmT]=[A][L][\frac{N}{AL}]=N$$

$$\vec{B}=-|\vec{B}|\hat{y}\Rightarrow\vec{F}=-|\vec{F}|\hat{z}$$

$$I\vec{L}=-|I\vec{L}|\Rightarrow\vec{F}=-|\vec{F}|\hat{z}$$