Tuesday Reading Assessment: Unit 3, Magnetic Forces and Fields

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1 Memory Bank

- $\vec{F} = i\vec{L} \times \vec{B}$ ... The Lorentz force, by a magnetic field $\vec{B}$ on a *current* i of length and direction $\vec{L}$.

2 Magnetic Force on a Wire

1. Consider Fig. 1, in which a current passes through a *magnetic field* generated by a permanent magnet. Notice in the Memory Bank the formula for the force on the conductor carrying the current. (a) If the amount of wire in the magnetic field is $L = 10$ cm, the magnetic field is $B = 10^{-1}$ Tesla, the voltage is $V = 24$ Volts, and the effective resistance in the wire is $R = 2\Omega$, what is the force upwards on the wire? (b) If the wire was attached to a scale, and the scale has a mass of $m = 24$ grams on it, what would the scale read if we turn on this current in this magnetic field? (*Hint: it won't say 24 grams*).

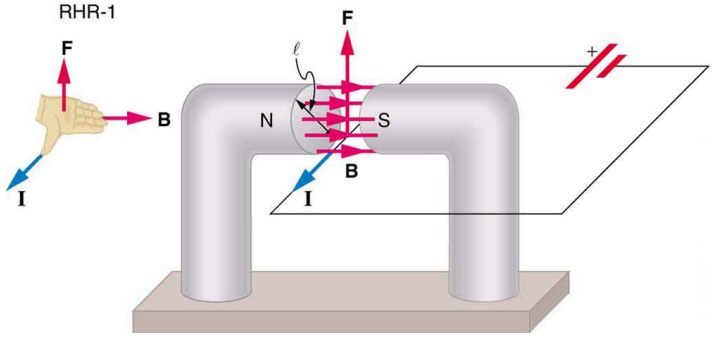

Figure 1: A permanent magnet creates a magnetic field to the *left*, while a voltage pushes a current *out of the page*. The force is measured to occur in the *upward direction*.