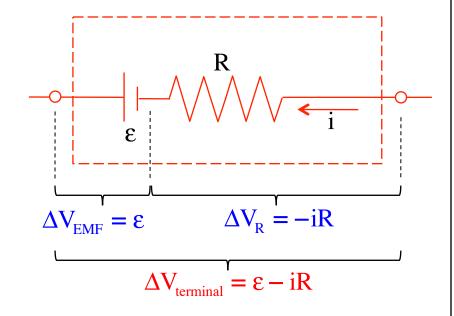# Problem 28.1

The EMF of a battery measures the inherent power-producing, electric field generating character of the battery. When current is drawn from the battery (which is analogous to current passing *through* the battery), the voltage difference across the battery's terminal is such that

$$\Delta V_{terminal} = V_{terminal} = \varepsilon - iR$$

$$\Rightarrow \quad (11.6 \text{ V}) = (15 \text{ V}) - iR$$

$$\Rightarrow \quad i = \frac{(3.4 \text{ V})}{R}$$

The power rating is:

$$P = i \quad V_{terminal}$$

$$(20 \text{ W}) = \left[\frac{(3.4 \text{ V})}{R} \right] (11.6 \text{ V})$$

$$\Rightarrow \quad R = 1.97 \ \Omega$$

$$\Delta V_{EMF} = \varepsilon \qquad \Delta V_R = -iR$$

$$\Delta V_{terminal} = \varepsilon - iR$$

1.)