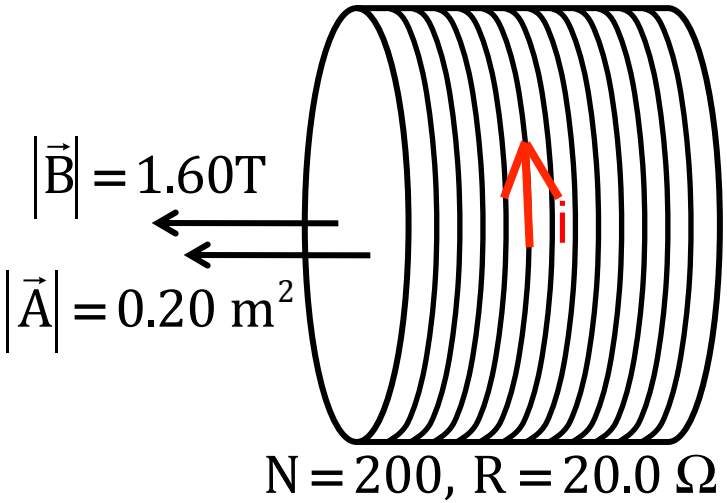
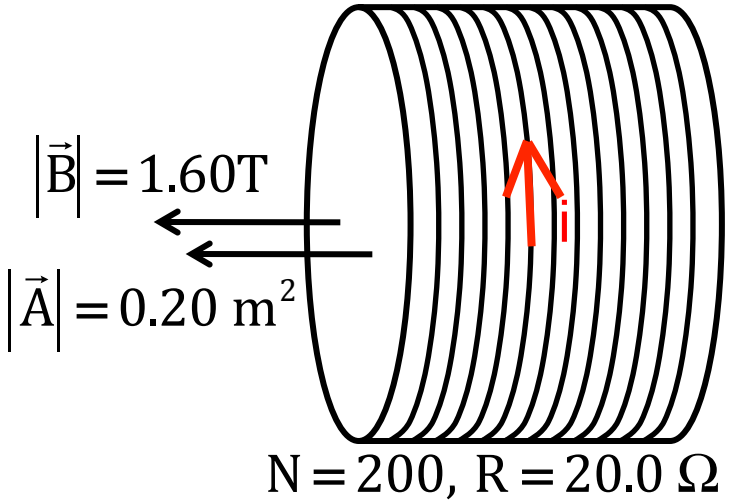
Problem 31.6

What's the induced current in the secondary coil? Starting with the most general expression we can write:



$$
\begin{aligned}
i &= \frac{\varepsilon_{\text{induced}}}{R} \\
&= \frac{-N\dfrac{d\Phi_B}{dt}}{R} \\
&= \frac{-N\left[\dfrac{\Delta\Phi_B}{\Delta t}\right]}{R} \\
&= \frac{-N\left[\dfrac{\left(\Phi_{B,2}\right)-\left(\Phi_{B,1}\right)}{\Delta t}\right]}{R} \\
&= \frac{-N\left[\dfrac{\left(\vec{B}_2 \bullet \vec{A}\right)-\left(\vec{B}_1 \bullet \vec{A}\right)}{\Delta t}\right]}{R}
\end{aligned}
$$



$$i = \frac{-N\left[\frac{\left(\left|\vec{B}_2\right|\left|\vec{A}\right|\cos 0^o\right)-\left(\left|\vec{B}_1\right|\left|\vec{A}\right|\cos 0^o\right)}{\Delta t}\right]}{R}$$

$$= \frac{-(200)\left[\frac{\left((0\ \text{T})(.2\ \text{m}^2)\cos 0^o\right)-\left((1.6\ \text{T})(.2\ \text{m}^2)\cos 0^o\right)}{\left(20\text{x}10^{-3}\ \text{seconds}\right)}\right]}{(20\ \Omega)}$$

$$= \frac{3200\ \text{V}}{(20\ \Omega)}$$

$$= 160\ \text{amps}$$