Answer on Question #45720, Physics, Electromagnetism

An air-cored transformer is assumed to be 100 % efficient. The ratio of the secondary turns to the primary turns is 1:20. A 240V ac supply is connected to the primary coil and a 6 Ω load is connected to the secondary coil. what is the current in the primary coil? Solution

100 % efficiency means that transformer will save power. Hence

$$\frac{U_1}{U_2} = \frac{I_2}{I_1} = \frac{N_1}{N_2} = \frac{20}{1}$$

If in primary coil there is 240 V, in secondary it will be

$$U_2 = \frac{U_1}{20} = 240/20 = 12\,V$$

Then current in secondary coil is

$$I_2 = \frac{U_2}{R} = \frac{12}{6} = 2\,A$$

So now we can find current is primary coil

$$I_1 = 20 I_2 = 20 \cdot 2 = 40\,A$$