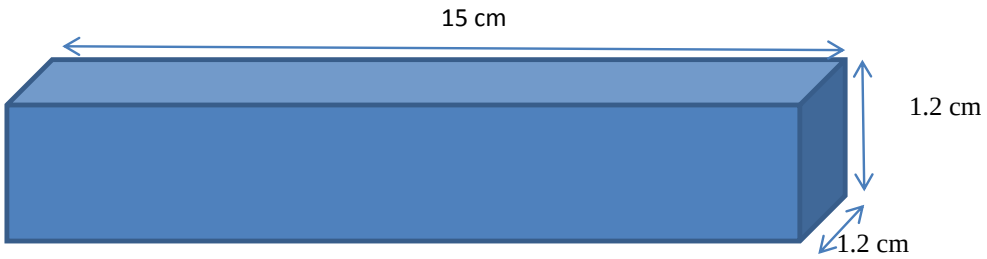
Question: A rectangular block has a dimensions 1.2 cm x 1.2 cm x 15 cm (i) what is the resistance of opposite square ends? )ii) what is the resistance between two of the rectangular faces?

(the resistivity of iron at room temperature is 9.6x10-8 ohm-m)

Answer:

Sketch:




The resistance R of a conductor of uniform cross section can be computed as:

$$R = \rho * \frac{l}{A}$$

We are given :

$$\rho = 9.6 * 10^{-8} Ohm * m$$

(i) In this case:

$$A = 1.2\ cm * 1.2\ cm = (0.012) * 0.012 = 1.44 * 10^{-4} m^2$$
$$l = 0.15\ m$$

Calculating:

$$R = 9.6 * 10^{-8} * \frac{0.15}{1.44 * 10^{-4}} = 0.0001 = \mathbf{10^{-4} Ohm}$$

(ii) In this case:

$$A = 1.2\ cm * 15\ cm = (0.012) * 0.15 = 0.0018 m^2$$
$$l = 0.012\ m$$

Calculating:

$$R = 9.6 * 10^{-8} * \frac{0.012}{0.0018} = \mathbf{6.4 * 10^{-7} Ohm}$$