

Answer on question #54450, Physics / Electric Circuits

Question A 12 cm wire is given a shape of a right angled triangle ABC having sides 3 cm,4 cm,5 cm. The resistance between the two ends (AB,BC,CA) of the respective sides are measured one by one by a multi meter. What is the ratio of resistance.

Solution As all of AB, BC, CA are made of the same material and have same cross-section area, we consider dependence of resistance only on the length. Lets say AB=3, BC=4 and CA=5. In every measurement two sides in series will be connected to the third one in parallel.

When AB is measured, resistance is

$$R_{AB} = \frac{3k \cdot (4k + 5k)}{3k + 4k + 5k} = 2.25k$$

where k is some coefficient. When BC is measured, resistance is

$$R_{BC} = \frac{4k \cdot (3k + 5k)}{3k + 4k + 5k} \approx 2.66k$$

When CA is measured, resistance is

$$R_{CA} = \frac{5k \cdot (3k + 4k)}{3k + 4k + 5k} \approx 2.92k$$

Hence, $R_{AB}/R_{BC}/R_{CA} = 2.25/2.66/2.92 = 27/32/35$