

Answer on Question #73253 - Physics / Electric Circuits

Two metallic wires made from copper have same length l but the radius of wire 1 is half of that wire 2. The resistance of wire 1 is R_0 . If both the wires are joined together in series, the total resistance becomes?

Solution:

The resistance of wire is related with its length l and radius r by formula

$$R = \rho \frac{l}{A} = \rho \frac{l}{\pi r^2}$$

Because the radius of wire 1 is half of that wire 2 ($r_1 = r_2/2$) we obtain that

$$R_2 = \frac{R_1}{4} = \frac{1}{4}R_0$$

When both the wires are joined together in series, the total resistance

$$R = R_1 + R_2 = R_0 + \frac{1}{4}R_0 = \frac{5}{4}R_0 = 1.25R_0$$

Answer: $1.25R_0$

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