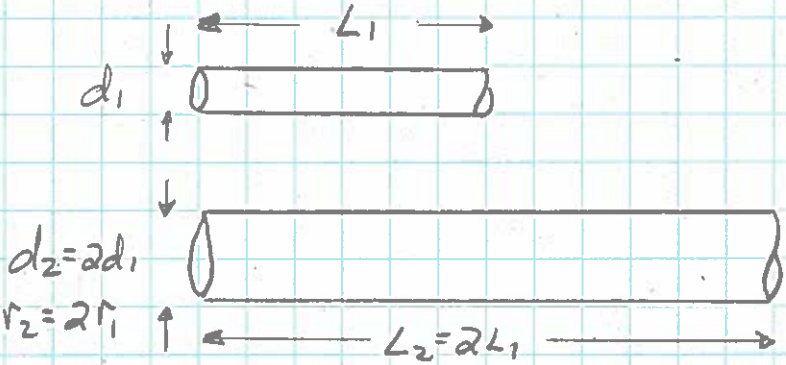

same material

a.) Same material $\Rightarrow$ same resistivity

$$\frac{\rho_2}{\rho_1} = 1$$

b.) $$R = \frac{\rho L}{A}$$

So, $$\frac{R_2}{R_1} = \frac{\rho L_2 / A_2}{\rho L_1 / A_1} = \frac{L_2}{L_1}\frac{A_1}{A_2}$$

$$= \left(\frac{L_2}{L_1}\right)\left(\frac{\pi r_1^2}{\pi r_2^2}\right)$$

$$= (2)\left(\frac{1}{2}\right)^2$$

$\therefore$ $$\frac{R_2}{R_1} = \frac{1}{2}$$