

20. The thickness (diameter) of the wire is denoted by  $D$ . We use  $R \propto L/A$  (Eq. 27-16) and note that  $A = \frac{1}{4}\pi D^2 \propto D^2$ . The resistance of the second wire is given by

$$R_2 = R \left( \frac{A_1}{A_2} \right) \left( \frac{L_2}{L_1} \right) = R \left( \frac{D_1}{D_2} \right)^2 \left( \frac{L_2}{L_1} \right) = R(2)^2 \left( \frac{1}{2} \right) = 2R .$$