A tightly coiled spring having 75 coils each 3.5 cm in diameter is made of insulated metal wire 3.25 mm in diameter. An ohm meter connected across its opposite ends reads 1.74 ohms. What is the resistivity of the metal?

Solution: The resistance R of metallic conductor with length L, cross-sectional area A and resistivity ρ can be calculated as $R = \rho \cdot \frac{L}{A}$. In our case $L = n \cdot \pi \cdot D$, $A = \frac{\pi \cdot d^2}{4}$, where n and D are the number and diameter (m) of the spring coils; d is the diameter of the metal wire, m.

Then, $\rho = \frac{R \cdot A}{L} = \frac{R \cdot \pi \cdot d^2}{4n \cdot \pi \cdot D} = \frac{R \cdot d^2}{4n \cdot D} = \frac{1.74 \cdot (3.25 \cdot 10^{-3})^2}{4 \cdot 75 \cdot 0.035} = 1.75 \cdot 10^{-6}$ ohm $\cdot$ m.

Answer: $1.75 \cdot 10^{-6}$ ohm·m.