

When a current flows in an aluminum wire of diameter 3.67 mm, the drift speed of the conduction electrons is 2.07×10^{-4} m/s. What is the electron current in the wire? The conduction electron density in aluminum is 6.00×10^{28} m⁻³.

Number

s⁻¹

What is the resistance of a 44.9-m-long aluminum wire that has a diameter of 8.05 mm? The resistivity of aluminum is $2.83 \times 10^{-8} \Omega \cdot \text{m}$.

Number



Ω

You need to prepare a 0.189×10^{-3} m diameter tungsten wire with a resistance of $2110 \, \Omega$. How long must the wire be? The resistivity of tungsten is $5.62 \times 10^{-8} \, \Omega \cdot \text{m}$.

Number

m

Your professor gives you a summer job organizing his lab. On the first day, you come across three identically shaped cylinders of metal, each having a diameter of 6.31 mm and a length of 6.19 cm. They appear to be made out of different metals, but they are not labeled! They are, however, packaged with a table of the conductivities of several metals. You locate a multimeter and use it to measure the electrical resistance of each cylinder. Using the measured resistances and the table of conductivities, identify the metal that each cylinder is composed of.

Metal	$\sigma \text{ } (\Omega \cdot \text{m})^{-1}$
Silver	6.30×10^7
Copper	5.69×10^7
Aluminum	3.50×10^7
Tungsten	1.82×10^7
Tin	8.70×10^6
Titanium	1.80×10^6

Sample 1: $R_1 = 1.10 \times 10^3 \mu$

Titanium

Copper

Tungsten

Silver

Aluminum

Sample 2: $R_2 = 34.8 \mu\Omega$

Sample 3: $R_3 = 228 \mu\Omega$

Tin

A power supply maintains a potential difference of 87.9 V across a 1950- Ω resistor. What is the current in the resistor?

Number

A

You measure the current through a $33.9\text{-}\Omega$ resistor to be 637 mA . What is the potential difference across the contacts of the resistor?

Number



V

The maximum allowed power dissipation for a $25.3\text{-}\Omega$ resistor is stated to be 10.0 W . Find the largest current that this resistor can take safely without burning out.

Number

A

The Iceberg Kid, infamous for imposing a deep freeze on whoever disagrees with him, discovers that in his advanced teenaged years his hands constantly feel chilled. As he is a cool physics student, the Iceberg Kid quickly calculates the resistance of the resistor needed to warm his hands. Given that 189 J of thermal energy is generated by the resistor during 6.73 s of operation while connected to a 12.0-V battery, find the correct value of this resistance (and avoid a cold, cold fate).

Number

Ω