

S-27-3

A small sphere that carries a charge of 8.00 nC is whirled in a circle at the end of an insulating string. The angular frequency of rotation is  $100 \pi$  rad/s. What average current does this rotating charge represent?

S-27-22

Aluminum and copper wires of equal length are found to have the same resistance. What is the ratio of their radii?

S-27-30

The rod in the figure is made of two materials. Both have a square cross section 3.0 mm on a side. The first material has a resistivity of  $4.0 \times 10^{-3} \Omega \text{ m}$  and is 25 cm long, while the second material has a resistivity  $6.0 \times 10^{-3} \Omega \text{ m}$  and is 40 cm long. What is the resistance between the two ends of the rod?

S-27-32

The resistance of a platinum wire is to be calibrated for low-temperature measurements. A platinum wire has a resistance  $1.00 \Omega$  at  $20^\circ \text{C}$ . If the temperature response of the platinum wire is linear, what is the expected resistance of the platinum wire when it is immersed in liquid nitrogen (at 77 K)? Assume  $\alpha_{\text{platinum}} = 3.92 \times 10^{-3}/^\circ \text{C}$ .

~S-27-52

The heating element of a coffee maker operates at 120 V and carries a current of 2.0 A. Assuming that 20 % of the heat generated is absorbed by the water, how long does it take to heat 100 g of water from room temperature ( $23^\circ \text{C}$ ) to the boiling point?

S-27-19

A  $12\ \Omega$  wire is cut into three equal pieces that are then connected side by side to form a new wire the length of which is  $1/3$  the original length. What is the resistance of this new wire?

S-27-21

A wire with a resistance  $100\ \Omega$  is lengthened to 1.25 times its original length by pulling it through a small hole. Find the resistance of the wire after it is stretched.

S-27-31

What is the fractional change in the resistance of an iron filament when its temperature changes from  $25\ ^\circ\text{C}$  to  $50\ ^\circ\text{C}$ ? Assume  $\alpha_{\text{iron}} = 5.0 \times 10^{-3}/^\circ\text{C}$ .