



**Work each of the following problems. SHOW ALL WORK.**

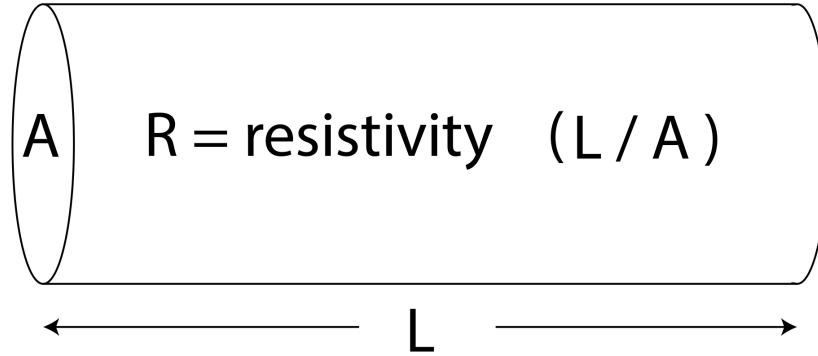
4. An electric saw at a local hardware store features a motor that supplies 15 A. Find the resistance of the saw when it is plugged into a 110 V outlet.

5. Defibrillator machines are used to deliver an electric shock to the human heart, to resuscitate a heart that has stopped beating. It is estimated that a current as low as 18 mA through the heart is required to resuscitate. Using 95 k $\Omega$  as the resistance, determine the output voltage a defibrillator needs.

6. A taser sends about 1100 V through the human body, resulting in an average current of 2.5 mA. From these numbers, estimate the electrical resistance of the human body.

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7. Related to resistance is a term called resistivity. Resistivity depends on material type, and is a number with units of  $\Omega\text{m}$ . When multiplied by a wire's length divided by its area, resistivity yields the overall resistance of that length of wire:



The wire heating element of an electric toaster is 190 cm long, and has a diameter of 0.05 cm. If the heating element is made of nichrome (which has a resistivity of  $1.1 \times 10^{-6} \Omega\text{m}$ ), what is the overall resistance of the wire?

8. You are analyzing an electrical circuit around a battery that outputs 9 V. The circuit is designed to carry a maximum current of 2 A - anything above that and a fuse in the circuit will break, to keep the circuit from being overloaded. Currently a  $3.2 \Omega$  appliance is the only resistor in the circuit. Will the fuse blow out? If so, what new resistor would be needed so the 2 A limit is not exceeded?

Name:

Date:

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9. A lamp draws a current of 0.34 A, from a power outlet that supplies 120 V. What is the resistance of the lamp?