

# **Halliday/Resnick/Walker** **Fundamentals of Physics 8<sup>th</sup> edition**

Classroom Response System Questions

Chapter 26 Current and Resistance

**Interactive Lecture Questions**

26.2.1. In which one of the following situations does a conventional electric current flow due north?

- a) Protons in a beam are moving due south.
- b) A water molecule is moving due north.
- c) Electrons in a beam are moving due south.
- d) Electrons in a wire connected to a battery are moving from south to north.

26.2.2. The battery capacity of a lithium ion battery in a digital music player is 750 mA-h. The manufacturer claims that the player can operate for eight hours if the battery is initially fully charged. Given this information, determine the number of electrons that flow through the player as you listen to your favorite songs for three hours.

- a)  $6.2 \times 10^{18}$  electrons
- b)  $1.0 \times 10^3$  electrons
- c)  $2.4 \times 10^9$  electrons
- d)  $6.3 \times 10^{21}$  electrons
- e)  $8.1 \times 10^{28}$  electrons

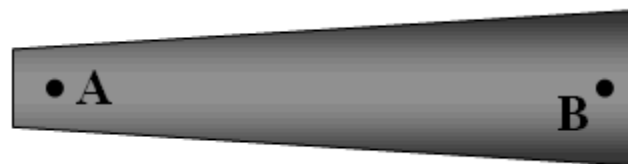
26.2.3. When lightning strikes, the current flows from the ground upward to the clouds above. What is the direction of the electric field of the lightning?

- a) upward
- b) downward
- c) perpendicular to the current at each location on the lightning bolt
- d) parallel to the ground

26.3.1. Which one of the following statements concerning the electric field inside a conductor is true if electrons are moving from right to left in a conducting wire?

- a) The electric field must be zero in this case.
- b) The electric field is directed perpendicular to the direction the electrons are moving.
- c) The electric field is directed toward the left.
- d) The electric field is directed toward the right.

26.4.1. A copper wire is fabricated that has a gradually increasing diameter along its length as shown. If an electric current is moving through the wire, which quantities vary along the length of the wire?



- a) current only
- b) current and current density only
- c) current density and electric field only
- d) resistivity and current only
- e) current, resistivity, current density, and electric field

26.4.4. Wires A and B are identical, except that the length of wire A is one-half that of wire B. If the same potential difference is applied between the two ends of each wire, how does the electric field within wire A compare to that in wire B?

- a) The electric field in wire A is one fourth that in wire B.
- b) The electric field in wire A is one half that in wire B.
- c) The electric field in wire A is the same as that in wire B.
- d) The electric field in wire A is twice that in wire B.
- e) The electric field in wire A is four times that in wire B.

26.4.5. When a potential difference is applied to a certain copper wire, a current of 1.5 A passes through the wire. If the wire was removed from the circuit and replaced with a copper wire of twice the diameter, what current would flow through the new wire? Assume the wires are identical in all other aspects.

- a) 0.38 A
- b) 0.75 A
- c) 1.5 A
- d) 3.0 A
- e) 6.0 A



26.4.6. When a potential difference is applied to a certain copper wire, a current of 1.5 A passes through the wire. If the wire was removed from the circuit and replaced with a copper wire of twice the cross-sectional area, what current would flow through the new wire? Assume the wires are identical in all other aspects.

- a) 0.38 A
- b) 0.75 A
- c) 1.5 A
- d) 3.0 A
- e) 6.0 A

26.4.8. For which combination for the length  $L$  and radius  $r$  of a wire will the resistance have the smallest value?

a)  $L = 0.50$  m and  $r = 0.03$  m

b)  $L = 0.25$  m and  $r = 0.08$  m

c)  $L = 0.40$  m and  $r = 0.2$  m

d)  $L = 0.80$  m and  $r = 0.1$  m

e)  $L = 0.10$  m and  $r = 0.05$  m

26.5.4. A certain circuit contains a battery and a resistor. An instrument to measure the current in the circuit, an ammeter, is connected in between one of the terminals of the battery and one end of the resistor. The graph shows the current in the circuit as the voltage is increased. Which one of the following statements best describes the resistor in this circuit?

- a) The resistor does not obey Ohm's law.
- b) The resistor obeys Ohm's law for voltages between zero and twenty-five volts.
- c) The resistor obeys Ohm's law for voltages between zero and thirty-five volts.
- d) The resistor obeys Ohm's law for voltages between zero and forty volts.
- e) The resistor obeys Ohm's law for voltages between thirty and forty volts.

