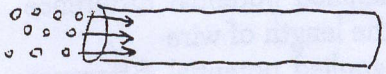
Circuits Test

Part 1

Name _____

(1) Electric current in a solid metal conductor is caused by the movement of

1 electrons, only
2 protons, only
3 both electrons and protons
4 neutrons



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(2) If the cross-sectional area of a metallic conductor is halved and the length of the conductor is doubled, the resistance of the conductor will be

1 halved
2 doubled
3 unchanged
4 quadrupled

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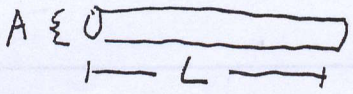
(3) 

A metal wire has length L and cross-sectional area A. The resistance of the wire is directly proportional to

(1) $\frac{L}{A}$
(2) $L \times A$
(3) $\frac{A}{L}$
(4) $L + A$

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(4) A copper wire of length L and cross-sectional area A has resistance R. A second copper wire at the same temperature has a length of $2L$ and a cross-sectional area of $\frac{1}{2}A$. What is the resistance of the second copper wire?

(1) R
(2) $2R$
(3) $\frac{1}{2}R$
(4) $4R$

(5) Which changes would cause the greatest increase in the rate of flow of charge through a conducting wire?

(1) increasing the applied potential difference and decreasing the length of wire
(2) increasing the applied potential difference and increasing the length of wire
(3) decreasing the applied potential difference and decreasing the length of wire
(4) decreasing the applied potential difference and increasing the length of wire

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(6) What is the resistance at 20°C of a 1.50-meter-long aluminum conductor that has a cross-sectional area of 1.13×10^{-6} meter^2?

(1) $1.87 \times 10^{-3}\ \Omega$
(2) $2.28 \times 10^{-2}\ \Omega$
(3) $3.74 \times 10^{-2}\ \Omega$
(4) $1.33 \times 10^{6}\ \Omega$

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(7) A 0.686-meter-long wire has a cross-sectional area of 8.23×10^{-6} meter^2 and a resistance of 0.125 ohm at 20° Celsius. This wire could be made of

(1) aluminum
(2) copper
(3) nichrome
(4) tungsten

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(8) A 10 meter long wire has a thickness of 4×10^{-6} meters^2. The resistance of this wire is .04 ohms. This wire could be made of -

1) Silver 2) Nichrome 3) Aluminum 4) Copper

(9) If the length of the wire in question 8 was doubled, the resistivity of the Wire would -

1) Increase 2) Decreases 3) Remain the same

(10)

The current through a lightbulb is 2.0 amperes. How many coulombs of electric charge pass through the lightbulb in one minute?

(1) 60. C
(2) 2.0 C
(3) 120 C
(4) 240 C

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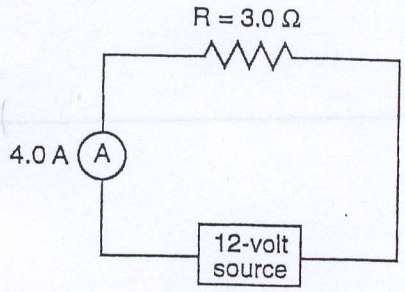
(11)

The diagram below represents a simple electric circuit.



How much charge passes through the resistor in 2.0 seconds?

(1) 6.0 C
(2) 2.0 C
(3) 8.0 C
(4) 4.0 C

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(12)

If 1.8×10^{21} electrons pass through a wire in 5 minutes how many Amps of current flow through the wire ? (Answer is a bit rounded)

1) 0.0034 Amps
2) 0.5 Amps
3) 1 Amp
4) 288Amps

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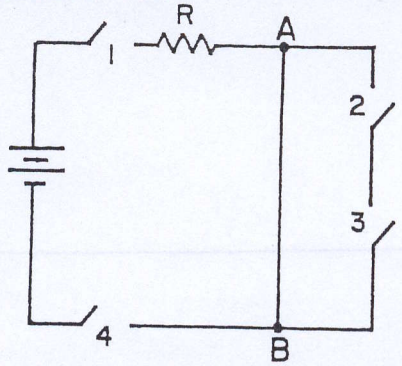
In the circuit represented below, which switches must be closed to produce a current in conductor *AB*?



(1) 1 and 4
(2) 2 and 3
(3) 1, 2, and 3
(4) 2, 3, and 4

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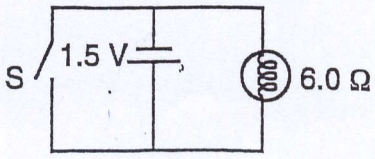
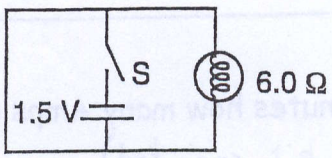
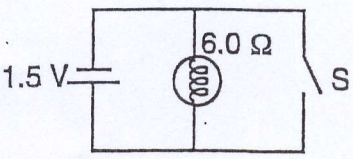
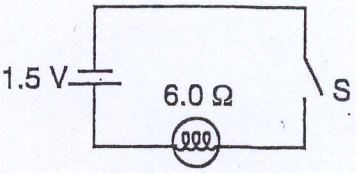
A 6.0-ohm lamp requires 0.25 ampere of current to operate. In which circuit below would the lamp operate correctly when switch *S* is closed?

(1)


(2)


(3)


(4)


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A 330.-ohm resistor is connected to a 5.00-volt battery. The current through the resistor is

(1) 0.152 mA
(2) 15.2 mA
(3) 335 mA
(4) 1650 mA

$1mA = 1 \times 10^{-3}$ Amp.

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The current through a 10.-ohm resistor is 1.2 amperes. What is the potential difference across the resistor?

(1) 8.3 V
(2) 12 V
(3) 14 V
(4) 120 V

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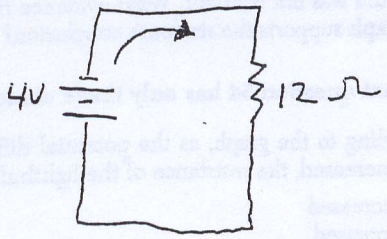
If the potential difference across a 12-ohm resistor is 4 volts, the current through the resistor is

(1) $\frac{1}{3}$ A
(2) $\frac{1}{2}$ A
(3) 3 A
(4) 4 A



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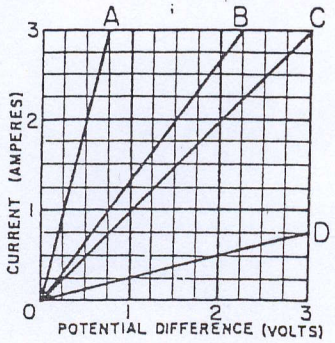
The graph below represents the relationship between potential difference and current for four different resistors. Which resistor has the greatest resistance?



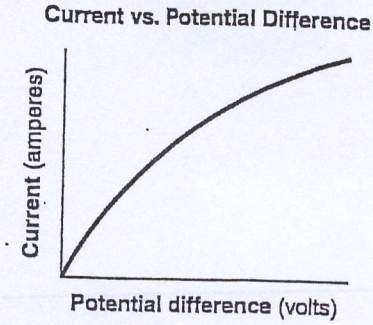
(1) A
(2) B
(3) C
(4) D

Long Problems

(1)

Base your answers to questions 53 through 55 on the information and graph below.

A student conducted an experiment to determine the resistance of a lightbulb. As she applied various potential differences to the bulb, she recorded the voltages and corresponding currents and constructed the graph below.



A) 53 The student concluded that the resistance of the lightbulb was not constant. What evidence from the graph supports the student's conclusion? [1]

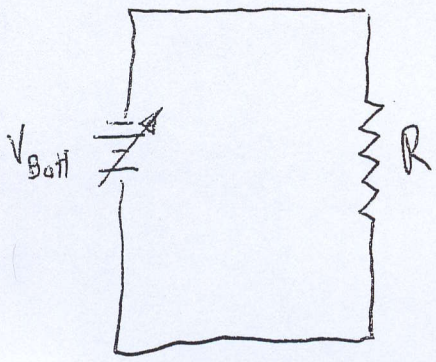
Note that question 54 has only three choices.

B) 54 According to the graph, as the potential difference increased, the resistance of the lightbulb

(1) decreased
(2) increased
(3) changed, but there is not enough information to know which way

C) 55 While performing the experiment the student noticed that the lightbulb began to glow and became brighter as she increased the voltage. Of the factors affecting resistance, which factor caused the greatest change in the resistance of the bulb during her experiment? [1]

A variable battery is hooked up to a resistor as shown. The voltage (or potential difference) is turned up to up to 3 volts, 6 volts, 9 volts ..... up to 24 volts as is shown in the data table. At each voltage level current flow in the circuit is measured -



Volts	Current
3V	.10 A
6V	.25 A
9V	.34 A
12V	.48 A
15V	.59 A
18V	.74 A
21V	.80 A
24V	.96 A

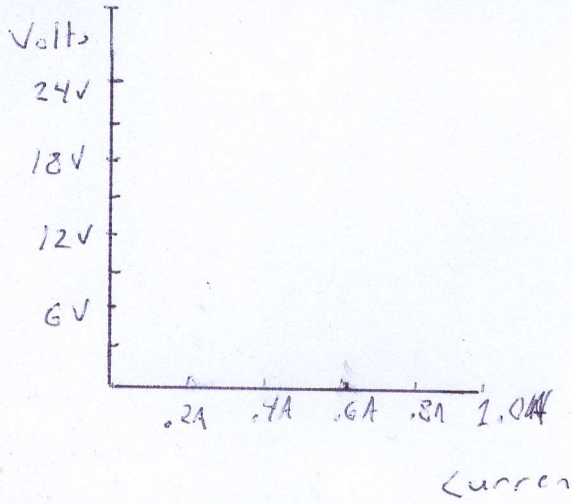
A -On the graph on your answer paper Mark an appropriate number scale for current flow on the X axis. [1]

B - Plot the data points from the table [1]

C - Sketch the best fit line [1]

D - Find the slope of this line *(Include equation with substitution and with units)* [2]

E - What is the physical significance of the slope of this line [1]



#3)

Base your answers to questions 53 and 54 on the information below.

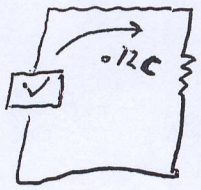
A copper wire at 20°C has a length of 10.0 meters and a cross-sectional area of 1.00×10^{-3} meter^2. The wire is stretched, becomes longer and thinner, and returns to 20°C.

53 What effect does this stretching have on the wire's resistance? [1]

54 What effect does this stretching have on the wire's resistivity? [1]

#4) A battery is hooked up to a resistor. After watching the circuit for 30 seconds a student measures that .12 coulombs of electrons have flowed through the circuit. (or charge)

a) Calculate the Amps of current Flowing (show equ., with sub. & unit) (2)



b) If the temperature of the circuit were increase & the experiment re-done for 30sec. would more or less coulombs of charge flow through (1)