

Name(because I'm too lazy to type it): _____
Date(because I'm too broke to afford a calendar): _____
Period(Because I don't know what time it is when you're taking this test): _____

Shock Value Test by a person

(I) Fill in the blank, fairly straight-forward.

1. A circuit in which electricity has multiple paths to go through is a(n) _____.
(parallel)
2. A network is a(n) _____ in which the parts are connected in some special way that can't be classified as series, parallel, or any combination of parallel/series.
(electrical circuit)
3. A(n) _____ is a device that converts _____ energy into kinetic energy. (motor, electrical)
4. The _____ is the amount of charge moving through a circuit. current
5. A path in which current can go through and is closed is also known as a(n) _____.
(circuit)
6. A brush is a device that conducts current between stationary wires and moving parts, also used in _____. (DC Motor)
7. 60 Hertz is also known as _____. (common american ac voltage frequency)
8. The small groups of atoms called domains behave like small _____ inside a large _____. (same word) (magnet)
9. The _____ between two plates of a capacitor is called a dielectric. (insulator)
10. A _____ medium that can be decomposed by electrolysis is called an electrolyte. (conducting)
11. A battery maintains a set _____ across its terminals. (voltage)
12. Conductors are materials in which an excess of _____ can move easily.
(electrons)
13. The breakdown of gas in an electric arc produces _____. (plasma)
14. The frequency is the number of _____ occurring in the unit of time. (period)
15. Polarity has an indicated _____. (pole)
16. A turbine is pushed by steam, wind, or water to provide energy to a(n) _____.
(generator)
17. The impedance is the total opposition which a circuit offers the flow of _____.
(alternating current)
18. The filament is the part in a light bulb that glows, usually _____ in an incandescent lamp, and _____ in a neon lamp. (tungsten, plasma)
19. The cathode is the _____ electrode of a battery. (positive)
20. The _____ is equal to current divided by voltage. (Conductance)

(IIa) Units, relationship between units. Name what each unit is equivalent to:

EX: $N = \text{kg} \times \text{m}/\text{s}^2$

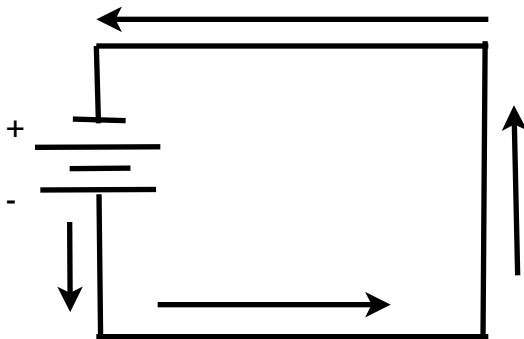
1. Ampere: (Volt/Ohm, 1/2 credit), (Coulomb/Second, preferred)
2. Conductance: (Amp/Volt)
3. Watt: (Volt x Amp)
4. Joule: (Watt x Second)
5. Ohm: (Volt/Amp)
6. Volt: (Joule/Coulomb)

(IIb) Converting units to other units:

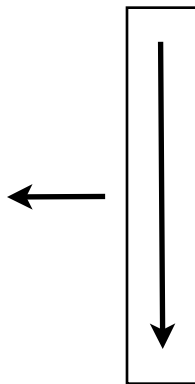
EX: 1 kilometer = 1000 meters, but difficulter than that

1. Tesla \rightarrow Gauss (1 Tesla = 10^4 Gauss)
2. kilowatt/hour \rightarrow watt (1 watt = 1000 kilowatts/hr)

(III) Electron/Magnetic Flow



Draw arrows to which way the electrons will flow.



Current is shown, draw arrows showing the magnetic field.

(IV) Schematic Drawings: Draw what symbol should be what.

| | | | |
|-------------------|--------------------------|--------------|-----------------|
| Variable Resistor | Coil | Capacitor | AC Power Source |
| Push Button | Diode | Inductor | Fuse |
| Heater | Double Pole Throw Switch | Galvanometer | Cell |
| DC Power Source | Battery | Junction | Lightbulb |

(V) Label each object as a conductor or insulator for 1-7, and as a ferro-, para-, or dia-, magnetic for all of them.

1. Pure water-insulator, diamagnetic
2. Saltwater- conductor, diamagnetic
3. Rubber-insulator, diamagnetic
4. Copper-conductor, diamagnetic
5. Iron-conductor, ferromagnetic
6. Plastic-insulator, diamagnetic
7. Nickel-conductor, ferromagnetic
8. Carbon steel-diamagnetic
9. Stainless steel-paramagnetic
10. Platinum-Paramagnetic
11. Cobalt-Ferromagnetic
12. Aluminum-Paramagnetic
13. Narwhals-I'm assuming diamagnetic, as I doubt anyone has actually tried to see whether or not a narwhal is magnetic or not. =D

(VI) Calculations

Given 4 resistors of 16 ohms, 4 ohms, 56 ohms, and 45 ohms, create the following circuits(1-4).

1. Create a circuit with a resistance of about 16.7 ohms.
4 & 16 in series and 56 and 45 in series and both in parallel

2. Create a circuit of about 3.9 ohms
All but the 4 in series in parallel with 4

3. Create a circuit of approximately 3.5 ohms.
56 and 4 in parallel in parallel with the series of 45 and 16

4. Create both the circuit with the most resistance and the least. Add the sum of the resistance as your final answer as a decimal rounded to the nearest hundredths.
Approximately 123.84 ohms total

5. I use a heater to keep a steady temperature in my aquarium. The heater is a 20 watt heater. It costs 2.6 cents per kilowatt/hour. Assume I keep it on 360 days a year(I keep it off a few days because I'm too lazy to turn it on everyday).

- a. How many kilowatts/hour each year do I use? 172.8 kilowatt/hour
- b. How much money do I spend? \$449.28
- c. How many more kilowatts per hour would I use if I kept it on all year for a leap year? 2.88 kilowatt/hour
- d. How much money do I save forgetting to turn it on 6 days in a leap year? \$7.488-> \$7.49

(VI) Conceptual Questions: Answer the following questions on circuits, magnets, electricity, and other stuff of my choice.

- 1. Why is high power able to be transported along power lines at a low current?
(+1) High Voltage
- 2. What are two materials that can be used as battery diodes?
(+2) Any two dissimilar metals
- 3. What is the difference between a dry cell and a wet cell? Why are wet cells rarely used?
(+1) A dry cell's electrolyte is a paste and/or orientation won't affect leakage
(+1) A wet cell's electrolyte is a liquid and/or orientation would cause leakage
(+1) The way a wet cell is placed could cause leakage and failure
- 4. Why are short circuits dangerous?
(+1) The resistance is low
(+1) The current is high
- 5. A step-up transformer has a ratio of 1:10, how many more times of power comes out in the secondary coil than goes in the primary coil (in watts)?
(+1) The watts are the same
- 6. What are the differences between a battery, generator, and a motor, in terms of energy?
(+1) Battery converts chemical energy into electrical energy
(+1) Generator converts kinetic energy into electrical energy
(+1) Motor converts electrical energy into kinetic energy
- 7. Why do CFL lightbulbs give off more light than an incandescent lightbulb of the same power?
(+2) CFL's give off less heat
(+2) Incandescent have to heat up the filament first before it glows, so large amount of the energy goes into heating the filament

8. You are given 4 lightbulbs, a 70-watt one, a 75-watt one, a 90-watt one, and a 100-watt one. List the bulbs in order of brightness, current, and resistance.

(+2) Brightness-70, 75, 90, 100

(+2) Current-100, 90, 75, 70

(+2) Resistance-70, 75, 90, 100

9. What is one difference between magnetic field lines and electric field lines?

(+1) Magnetic field lines never end, but electric field lines do

10. What kills you, high voltage, or high current?

(+1) High current

11. What is the difference between a primary and a secondary cell?

(+2) Secondary is rechargeable, primary is not

12. Why do resistors wired in parallel always have less resistance than each resistor used?

(+2) There are multiple paths for the current to flow

(VII) What do the following meters measure (both units, and what the unit measures).

Ammeter: amps, current

Ohmmeter: ohms, Ω , resistance

Voltmeter: volts, voltage

Galvanometer: amps, current

(+1 ea)