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Electricity Review

Multiple choice: Circle the **best possible** answer.

1) The law of conservation of energy states	
a) matter cannot be created or destroyed	b) energy cannot be created or destroyed
c) energy comes from electrons	d) energy comes from atoms

2) Electricity is a form of	
a) high temperature subatomic particles	b) energy resulting from the existence of charged particles
c) stored chemical energy	d) energy resulting from the existence of light

3) Static charge is when	
a) electric charge builds up and does not move	b) electric charge builds up and moves
c) electric charge flows through a complete path on a circuit	d) electric charge is converted into a different form of energy

4) An object that has no charge has	
a) more neutrons than protons	b) the same number of electrons as protons
c) more electrons than protons	d) the same number of neutrons as protons

5) Which of the following is **not** a part of the law of static charges?	
a) Objects with the same charge repel each other	b) Charged objects attract neutral objects
c) Objects with opposite charges attract each other	d) Objects with a neutral charge are repelled by other neutral objects

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6) The amount of electric force that acts on any pair of objects can depend on:	
a) the distance between the objects	b) the temperature of the objects
c) the elasticity of the objects	d) the number of neutrons in the objects

7) A battery's energy is created by	
a) the electrolyte	b) the electrodes
c) the terminals	d) the conductors

8) Energy is	
a) the power in an electronic device	b) the ability to do work
c) the ability to absorb heat	d) another word current of a circuit

9) Which of the following is **not** a load?	
a) a heater	b) a resistor
c) a lightbulb	d) a generator

10) Electric current is	
a) the amount of atoms that pass a point in a circuit in a certain time	b) the amount of electrons that pass a point in a circuit in a certain time
c) the amount of pressure of the electrons in a circuit	d) the amount of resistance on the atoms in a circuit

11) When resistance increases...	
a) The total resistance decreases	b) the current increases at the same rate
c) the current decreases	d) The voltage increases

12) Which of the following has the highest resistance?	
a) Acid	b) Copper
c) Tungsten	d) Wood

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13) Ohm's law states...	
a) the mathematical relationship between current, voltage, and resistance	b) static charge must be converted to current electricity
c) the resistance is always bigger than the current	d) all objects have resistance

14) If the potential difference in a circuit doubles...	
a) the current is halved	b) the voltage is halved
c) the current is doubled	d) the resistance is doubled

15) 400 mA is the same as	
a) 0.04 A	b) 0.4 A
c) 400000 A	d) 0.0004 A

16) A 5 Ω lightbulb is added to a circuit connected to a 15 V battery pack. What is the current in this circuit?	
a) 5 A	b) 300 mA
c) 0.333 A	d) 3 A

17) A resistor in a circuit is swapped out with a resistor with double the resistance. The current will become:	
a) quadruple	b) half
c) double	d) quarter

18) **Extending:** In a parallel circuit:	
a) Batteries are placed on separate wires	b) The resistance across each load adds up to the total resistance
c) The current is the same everywhere	d) The voltage is the same everywhere

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19) In a series circuit:	
a) There must be an ammeter	b) The current across each load adds up to the total current
c) The voltage across each load adds up to the total voltage	d) The resistance is the same everywhere

20) **Extending:** An amusement park has set up Christmas lights. The lights in one part of the park suddenly go out, while the others are still on. This is because...	
a) All of the lightbulbs in the section that went out burnt out	b) The current was too high in that particular section of the park
c) The section that went out was wired in series	d) The section that went out was wired in parallel

21) What is dangerous about electricity?	
a) The resistance	b) The voltage
c) The current	d) The type of circuit

22) Electricity can	
a) Cause electrical burns	b) Stop a human heart
c) Cause brain damage	d) All of the above

23) **Bonus!** What is the voltage of the electrical outlets in Europe?	
a) 120 V	b) 180 V
c) 240 V	d) 60 V

Matching:

Letter	**Description**	**Term**
E	1. The unit for static charge	A) Dry cell
H	2. When static charge is transferred by contact	B) Ohm

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C	3. The unit for the intensity of current	C) Ampere
N	4. The ability to do work	D) Induction
M	5. The name for two ends of a battery	E) Coulomb
O	6. A material that allows easy electron flow	F) Electrochemical cell
J	7. A material that resists the flow of electrons	G) Volts
K	8. An acid that can separate charged particles	H) Conduction
F	9. Another word for battery	I) Wet cell
A	10. A battery made of a moist paste	J) Insulator
G	11. The unit for electric potential energy	K) Electrolyte
M	12. **Extending:** The point where multiples paths form or come together in a circuit	L) Electrodes
D	13. When charges are temporarily moved when two charged objects are near each other	M) Junction
J	14. The unit for resistance	N) Energy
I	15. A battery with a liquid electrolyte	O) Conductor

<u>Word Questions:</u>

1) a) What happens during grounding?

Built-up electrical charge is transferred to the neutral ground of the Earth.

b) How are appliances grounded? If an appliance is not grounded, what happens?

Appliances are grounded by a grounding wire in their electrical socket. If they are not grounded, an electrical charge can build up and hurt the user. (by traveling through the user).

2) Explain how a balloon can stick to a wall

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As a negatively charged balloon nears the wall, induction forces away electrons in the wall, leaving a positive spot to be attracted to.

3) a) How does a Van der Graaff machine generate charge on the outside of the sphere?

A belt inside the machine causes friction/conduction to move electrons off the middle of the sphere, attracting the electrons from the outer sphere inside, leaving it positively charged.

b) How does the Van der Graaff rod cause electrical sparks?

The electrons move to the bottom of the machine and transfer to the rod. They can then jump from the negative rod to the positive sphere

4) a) If a negative object is near an electroscope's metallic ball, what happens at the particle level?

Negative electrons move onto the ball, down to the leaves, causing them to repel.

b) If a positive object is near an electroscope's metallic ball, what happens at the particle level?

Negative electrons move from the leaves up to the ball and objects, causing the leaves to repel.

5) a) What causes lightning to move from a cloud to the Earth? How can lightning strike a human, as reported throughout history?

A storm cloud builds up charge and gets attracted to the neutral ground, passing through the air to get their. It will take the easiest path; in a field, this may be through a human.

b) Why can a car protect you from a lightning strike?

The care forms a Faraday cage, arcing the electrons around the user.

6) A toaster is connected to a 80 V portable battery. It has 200 Ω of resistance. What is the current flowing through the circuit?

80V/200 Ω = .4 A = 400 mA

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7) A 24 V battery is connected to a small light bulb. The current through the circuit is 150 mA. What is the resistance of the light bulb?

150 mA = 0.15 A **24 V / 0.15 A = 160 Ω**

8) a) A 180 Ω resistor is connected to an **old** battery that states it is 9 V. The ammeter in the circuit reads 45 mA. What is the actual voltage of the battery?

45 mA = 0.045 A **180 Ω X 0.045 A = 8.1 V**

b) Why is the battery producing a different amount of voltage?

The battery's electrolyte is starting to run out of energy to separate the charges.

9) If an experiment is conducted, but the results do not obey Ohm's Law, propose three reasons why the results are not accurate.

Wire have resistance, human error when reading the meters, and inaccuracies from the measuring equipment.

10) How does a lightbulb work?

Electrons flow through the more resistant filament (like tungsten) and lose energy in the form of heat and light.

11) The following circuit was created by a student. The circuit was meant to have 12 V and 4 A, but did not have either.

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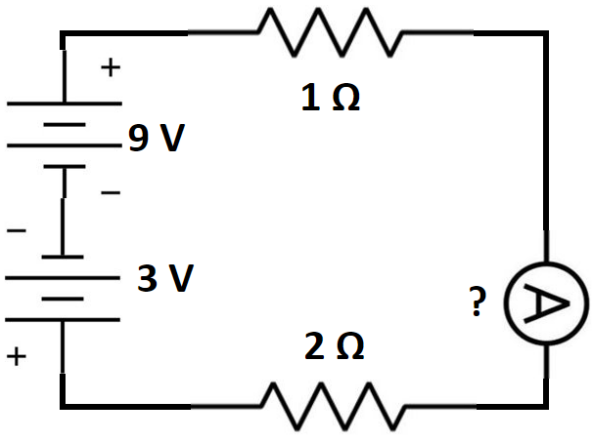
a) What kind of circuit is the drawing showing?

Series



b) Why is the voltage not 12 V?

The batteries are positioned backwards. The overall voltage will be 6 V.

c) What was the actual current of the circuit?

6V / 3 Ω = 2 A

12) Solve the table below:

	V	**I**	**R**
Source	18 V	3 A	6 Ω
R1	**3 V**	3 A	**1 Ω**
R2	6 V	3 A	**2 Ω**
R3	9 V	3 A	**3 Ω**