Electricity

Question 1.

Jason and Candice are studying electricity in their science class. They want to make a table that compares static and current electricity.

<table>
<thead>
<tr>
<th></th>
<th>Static</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>How It Travels</td>
<td>moves in a steady flow in a circuit</td>
<td>jumps from one object to another</td>
</tr>
<tr>
<td>Example</td>
<td>flashlight switched on</td>
<td>lightning</td>
</tr>
</tbody>
</table>

Which table correctly compares static and current electricity?

- A. Y
- B. Z
- C. X
- D. W

Question 2.

The diagram below shows a light bulb connected to a battery by a wire.

What will happen to the light bulb?

- A. It will not light up because the battery is not charged.
- B. It will not light up because a complete loop of wires is needed.
- C. It will light up because the wire is electrically charged.
- D. It will light up using energy from the battery.
Question 3.

Which of the following is caused by static electricity?

- A. a light bulb coming on when a switch is turned on
- B. a lightning strike during a storm
- C. a magnet being attracted to a refrigerator
- D. a stove getting hot when it is turned on

Question 4.

The picture below shows an electric circuit.

What carries electric energy through the circuit?

- A. the battery
- B. the wires
- C. the fan
- D. the light bulb
Question 5.

When you move the switch of a flashlight to "on," the light goes on. When you move the switch of a flashlight to "off," the light goes off. How does this happen?

- **A.** When the switch is moved to the "on" position, it opens the circuit, and electricity flows through the flashlight bulb.
- **B.** The switch in the "on" position closes the circuit, and the electricity flows through the flashlight bulb.
- **C.** The terminals of the flashlight are the battery and the bulb. When these are connected, the bulb will light.
- **D.** The wire in the flashlight is considered an insulator, and when the insulator is "on", you will have a closed circuit, lighting the bulb.

Question 6.

**Directions: Select each correct entry from the table.**

Jenny built a circuit with a gap in it to test if certain objects conduct electricity. Jenny closed the gap in the circuit with each of the objects. Then, she observed an electric fan in the circuit to see if it started spinning. Jenny recorded her data in the table below.

Select the name of each electrical conductor.

<table>
<thead>
<tr>
<th>Material Conductivity Test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object</strong></td>
</tr>
<tr>
<td>plastic fork</td>
</tr>
<tr>
<td>copper penny</td>
</tr>
<tr>
<td>metal wire</td>
</tr>
<tr>
<td>wooden toothpick</td>
</tr>
</tbody>
</table>
Question 7.

Directions: Select each correct entry from the table.

Andy is trying to see which objects conduct electricity by placing them in a gap in an electric circuit. A light bulb is in the circuit. When it lights up, Andy knows the current is flowing. He records his data in the table below.

Select the name of each electrical insulator.

<table>
<thead>
<tr>
<th>Object</th>
<th>Light Bulb Lit Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>paper clip</td>
<td>yes</td>
</tr>
<tr>
<td>rubber band</td>
<td>no</td>
</tr>
<tr>
<td>nail</td>
<td>yes</td>
</tr>
<tr>
<td>glass rod</td>
<td>no</td>
</tr>
</tbody>
</table>

Question 8.

Marcus has a circuit that uses a battery to light up a light bulb. He needs three wires to make his circuit. He changes the circuit to have a paper clip attached to wire 2 as shown in the picture below.

What should Marcus predict will happen when he connects wire 3 to the paper clip?

- A. The battery will die.
- B. The paper clip will turn black.
- C. The light bulb will light up.
- D. The light bulb will break.
Question 9.

The image below shows a device that can be used to test whether an object is an electrical conductor.

Which of the following describes the best method of using the device to test whether a particular object is an electrical conductor?

A. Touch the object to both metal terminals at the same time.
B. Disconnect the light bulb, and connect the object to one of the two wires where the light bulb was.
C. Remove the batteries, and place the object in the battery case.
D. Touch the object to only one of the metal terminals.

Question 10.

Which of the following describes an example of current electricity?

A. A student feels a shock when she touches a doorknob after walking across a carpeted surface.
B. A battery connected to a motor in a toy car allows the car to move.
C. A lightning bolt produces sound and light.
D. A balloon sticks to the wall after being rubbed with a piece of wool.
Answers

1. C
2. B
3. B
4. B
5. B
6. --
7. --
8. C
9. A
10. B
Explanations

1. This table compares static electricity and current electricity correctly.

<table>
<thead>
<tr>
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<th>Current</th>
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<tbody>
<tr>
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<td>lightning</td>
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<td></td>
<td>jumps from one object to another</td>
<td>moves in a steady flow in a circuit</td>
</tr>
</tbody>
</table>

2. An electrical circuit must begin and end at the same place, forming a loop. An electrical circuit is, in other words, a complete, closed path through which electric charges flow. If the circuit is not a loop, the electricity will not flow. So, the light bulb will not light up because a complete loop of wires is needed.

3. The lightning strikes that occur during storms are the result of static electricity. Chunks of ice in the clouds bang against each other causing a large imbalance of electrons at the bottom of the cloud. Once this imbalance is large enough, the electrons will jump to the ground, causing lightning.

4. Circuits are made up of three parts:
   - an energy source, such as a battery
   - the wires that connect the parts of the circuit together
   - a load, such as a light bulb or fan

   In the circuit shown, the wires carry electric energy through the circuit.

5. The switch is the part of the circuit that can complete or break the circuit. When the switch is on, it completes the circuit, creating a closed circuit, and the light bulb will turn on. When the switch is off, the circuit is broken, or open, and the light bulb will not light.

6. The metal wire and the copper penny must be electrical conductors because they allowed the fan to turn on.

   The fan did not turn on when Jenny closed the gap with the wooden toothpick and the plastic fork. These materials do not conduct electricity very well, so they are called insulators.

7. The glass rod and the rubber band are electrical insulators.

   Some objects conduct electricity well, and some objects do not. The objects that conduct electricity well are called conductors. The objects that do not allow electric current to pass easily through them are called insulators.

   In Andy's experiment, the nail and the paper clip were conductors because the electric current passed through them and into the light bulb. The rubber band and the glass were insulators because the electric current did not pass through them very well.

8. The original circuit was able to light the light bulb. Marcus then disconnected the circuit to add a paper clip. When the circuit is disconnected, the light bulb will not light.

   He then connected the paper clip to wire 2. The paper clip is made of metal which is a conductor. So when he touches wire 3 to the paper clip, it will be a complete circuit again.

   So, it is most reasonable to predict that the light bulb will light up once again.
9. The device shown in the image can be used to find out if an object conducts electricity. When touching both metal terminals at the same time, the object becomes part of a complete circuit. If the object is an electrical conductor, there will be a current and the bulb will light up. Therefore, the best way to test the object's electrical conductivity is to **touch the object to both metal terminals at the same time**.

10. The lightning, shock from the doorknob, and balloon all describe examples of static electricity. That is, there is a build up of a charge without a continuous electric current. The toy car has a battery connected to its motor. In order for the motor to work properly, both the motor and battery must be part of an electric circuit.

When the switch of the toy car is turned on, a circuit is closed so that electricity can run through it continuously. A battery gives the power for current electricity, and it must be connected in a circuit. That is how a **battery connected to a motor in a toy car allows the car to move**.