

Electricity Grade 4 Quiz

Teacher's Answer Key

1. What is the difference between a bolt of lightning and the electricity in your circuit? *Quantity.*
2. How does electricity pass through a material? Name two different ways. *By conduction: metallic conduction, electrolysis.*
3. What kinds of materials are conductors and insulators? Name three of each.
 - a. Conductor: paperclip
 - b. Conductor: key
 - c. Conductor: metal unpainted zipper
 - d. Insulator: paper
 - e. Insulator: foam
 - f. Insulator: glass
4. What is an NC SPST switch? How does it work when placed in a circuit? *SPST stands for Single Pole Single Throw, which means that the switch turns on only one circuit at a time. When the switch is engaged, current flows. When it's not, the circuit is broken open and electricity stops. NC stands for Normally Closed, which means that the switch allows electricity to flow until it's activated. In a circuit, when this switch is pressed, the current stops.*
5. What's the difference between an incandescent light bulb, a fluorescent light, and an LED?
 - a. *The incandescent light bulb uses a wire that glows when electric current runs through it. To keep the wire from burning itself up, the air is removed from the bulb and replaced with an inert gas. The wire is made from the element tungsten.*
 - b. *A fluorescent tube is lined with white stuff called phosphor, which gives off light whenever it's struck by UV rays. The tube is filled with a gas that gives off UV rays when placed in an electrical field. When the bulb is brought close to a static charge, electrons rip through the tube and go out the other side. As they go through, they smack into the gas vapor which releases light rays (UV in a fluorescent tube) that hit the phosphor on the inside of the tube, which then emits light. Fluorescent lights, or any tube of gas from the noble gases column on the periodic table... like neon will also glow in an electrically charged field.*
 - c. *LED stands for "Light Emitting Diode". They don't have a filament so they don't get hot.. They light up by the movement of electrons in a semiconductor material (more on this later), and they last a long time, like thousands of hours.*
6. If you measure 2.85 volts from your battery pack, do you need new batteries or will they work? *They will work, because $2.85 \div 2 = 1.4$ Volts. Batteries between 1.3 – 1.5 will work in a circuit.*
7. Where have you used potentiometers in everyday life? *As a dimmer switch, radio control knob, motor speed control on appliances...*
8. How is a CdS cell like a switch? How is it not like a switch? *The flow of current is controlled by the amount of light that falls on the detector. It's unlike a switch in that it never really stops the current completely.*
9. Is the trip wire an NO or NC switch without the paper inserted? *NC switch.*
10. What is a relay? *A relay is a switch you can turn on and off using electricity. It uses an electromagnet to active the switch inside it.*
11. Imagine your teacher just asked you to hook up a simple circuit to power a motor. Draw the circuit as a diagram below, and show how electricity flows through your circuit (indicate the direction with an arrow). Label every part of your diagram, including every component used. For bonus points, also show where you would put your DMM probes to measure how much voltage the motor is receiving. *DMM probes go one at each motor terminal with motor removed.*

Electricity Grade 4 Quiz

Name _____

1. What is the difference between a bolt of lightning and the electricity in your circuit?
2. How does electricity pass through a material?
3. What kinds of materials are conductors and insulators? Name three of each.

a. Conductor:	d. Insulator:
b. Conductor:	e. Insulator:
c. Conductor:	f. Insulator:
4. What is an NC SPST switch? How does it work when placed in a circuit?
5. What's the difference between an incandescent light bulb, a fluorescent light, and the LED?
6. If you measure 2.85 volts from your battery pack, do you need new batteries or will they work?
7. Where have you used potentiometers in everyday life?

8. How is a CdS cell like a switch? How is it not like a switch?
9. Is the trip wire an NO or NC switch without the paper inserted?
10. What is a relay?
11. Imagine your teacher just asked you to hook up a simple circuit to power a motor. Draw the circuit as a diagram below, and show how electricity flows through your circuit (indicate the direction with an arrow). Label every part of your diagram, including every component used. For bonus points, also show where you would put your DMM probes to measure how much voltage the motor is receiving.