Electric Circuits and Electric Current

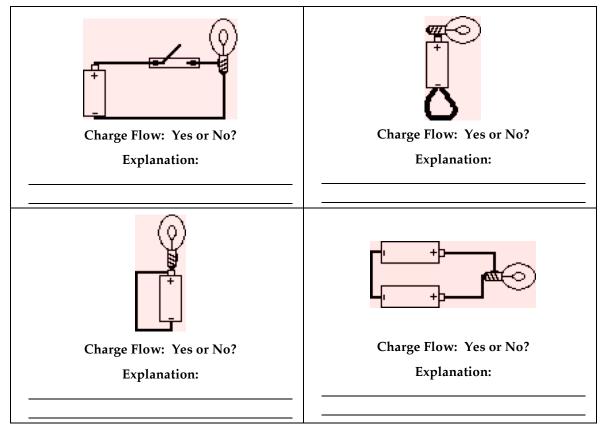
Read from Lesson 2 of the Current Electricity chapter at The Physics Classroom:

http://www.physicsclassroom.com/Class/circuits/u9l2b.html http://www.physicsclassroom.com/Class/circuits/u9l2c.html http://www.physicsclassroom.com/Class/circuits/u9l2e.html

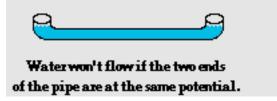
MOP Connection: Electric Circuits: sublevel 1

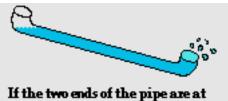
- 1. To maintain a charge flow in an electric circuit, at least two requirements must be met:
 - **#1:** An external energy supply (e.g., battery, wall outlet, generator, etc.) to pump the charge through the internal circuit and establish a potential difference across the circuit.
 - **#2:** The external circuit must make up a "closed conducting loop" between the + and terminal.

Utilize your understanding of these requirements to state whether charge would flow through the following circuits. If there is no charge flow, then explain why not.



Charge flow in a circuit is often compared to water flow. For water to flow between two points, there must be a difference in water pressure between the points. Water pressure is like electric potential. Water will only flow through a pipe if there is a difference in potential between the two ends. Charge will only flow through a wire if there is an electric potential difference across its ends.





different potentials, then water will flow.

Electric Circuits

- 2. Consider the two requirements for an electric circuit (described in question #1). When a light bulb is burned out and no longer works, requirement #_____ is not met. When a battery no longer works, requirement #_____ is not met.
- 3. What do you believe? Respond to the following statements as being **TRUE** or **FALSE**.

	When a battery no longer works, it is out of charge and must be re-charged before it can be used again.	Т	or	F
b.	A battery can be a source of charge in a circuit. The charge that flows through the circuit originates in the battery.	Т	or	F
c.	Charge becomes used up as it flows through a circuit. The amount of charge that exits a light bulb is less than the amount that enters the light bulb.	Т	or	F
d.	Charge flows through circuits at very high speeds. This explains why the light bulb turns on immediately after the wall switch is flipped.	Т	or	F

- e. Commonwealth Edison supplies millions and millions of electrons to our **T or F** homes everyday.
- A current is said to exist whenever ______
 a. a wire is charged
 c. electric charges are unbalanced
- b. a battery is present

d. electric charges move in a loop

5. As a quantity, electric current is defined as the _____.
a. amount of charge present in a circuit b. potential energy per charge c. rate at which charge moves through a cross-sectional area of a wire d. speed at which charge moves from one location to another location

6. Complete the statements:

- a. Â current of one ampere is a flow of charge at the rate of _____ coulomb per second.
- b. When a charge of 8 C flows past any point along a circuit in 2 seconds, the current is ______ A.
- c. If 5 C of charge flow past point A (diagram at right) in 10 seconds, then the current is ______ A.
- d. If the current at point D is 2.0 A, then _____ C of charge flow past point D in 10 seconds.
- e. If 12 C of charge flow past point A in 3 seconds, then 8 C of charge will flow past point E in ______ seconds.
- f. **TRUE** or **FALSE**:

The current at point E is considerably less than the current at point A since charge is being *used up* in the light bulbs.

- Which sentence best describes what happens to charge as it moves through an electric circuit?
 a. Charge is consumed or used up.
 - b. Charge is re-energized and recycled.
- 8. Which sentence best describes how fast charge moves through an electric circuit?
 - a. Charge moves very fast, faster than any human can run.
 - b. Charge moves very slowly, slower than the *proverbial* snail.
- 9. When you turn on the room lights, they light immediately. This is best explained by the fact that
 - a. electrons move very fast from the switch to the light bulb filament.
 - b. electrons present everywhere in the circuit move instantly.

