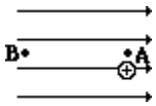
Current Electricity Notes Guide

Electric Potential Difference

Electric potential is defined as:

Example: if a charge possesses a relatively large amount of potential energy at a given location, then that location it is said to have ____HIGH___ electric potential.

If a charge possesses a relatively small amount of potential energy at a given location, then that location is said to have a ___Low___ electric potential.



Consider the task of moving a positive test charge within a uniform electric field from location A to location B as shown in the diagram at the right. In moving the charge against the electric field from location A to location B, ___WORK _____ will have to be done on the charge by an external force. The work done on the charge changes _____POTENTIAL ENERGY_____ to a ___HIGHER__ value; and the amount of work that is done is equal to the change in the potential energy. As a result of this change in potential energy, there is also a difference in __ELECTRIC POTENTIAL_____ between locations A and B.

This "change in electric potential" is defined as: THE DIFFERENCE IN ELECTRIC POTENTIAL (V) BETWEEN THE FINAL AND INITIAL LOCATION WHEN WORK IS DONE UPON A CHARGE TO CHANGE ITS POTENTIAL ENERGY

The equation for "change in electric potential is: $\Delta V = VB-VA = WORK/CHARGE = \Delta PE/CHARGE$

What is the mathematical symbol for the word "change?" __DELTA___

The unit for electric potential difference is ____VOLT____ but it is commonly called ___VOLTAGE____.

(named after __ALESSANDRO VOLTA_____)

Simple Ciircuits

In a circuit, charges move from one location to another. _WORK____ must be done to move a positive test charge from the negative side of a battery to the positive side. (called the internal circuit) Why?_____THE CHARGE IS AT A LOW POTENTIAL ENERGY STATE AND WILL NEED WORK TO BE DONE TO INCREASE ITS ENERGY AND MOVE IT AGAINST THE FIELD.

As the positive test charge moves through the *external circuit* from the positive terminal to the negative terminal, it LOSES___ its electric potential energy and thus is at low potential by the time it returns to the negative terminal.

As it decreases its electric potential, the potential energy of the charge also decreases. Where does this energy go? What does (can) it do? Explain. __ENERGY IS NOT CREATED OR DESTROYED BUT TRANSFERS FROM ONE FOR TO ANOTHER. AS THE ENERGY IS LOST IT WILL GO INTO ANOTHER FORM LIKE LIGHT, MOTION OR HEAT.

Define what PCR means by the internal circuit and external circuit. What does each part do?

THE INTERNAL CIRCUIT IS THE PART OF THE CIRCUIT THAT INCREASES THE ENERGY OF THE CHARGES. THE EXTERNAL CIRCUIT IS MADE OF RESISTORS THAT USE THE ENERGY AND CONVERT IT TO OTHER FORMS.

PCR talks about how an electric circuit is like a water park ride. Use that analogy to match the following list of parts of a water ride to the correct part of a circuit:

Battery PUMP THAT PUSHES THE WATER TO THE TOP

Battery voltage THE DIFFERENCE IN THE HEIGHT OF THE SLIDE

Requirements of a circuit

What are the parts that a circuit MUST have in order to work? (give me general names not specific parts)

Briefly describe the anatomy of a light bulb:

What does it mean when you say that you need a "closed conducting path" for charge to flow? A COMPLETE CIRCUIT HAS A LOOP BETWEEN THE HIGH POTENTIAL AND LOW POTENTIAL SIDE OF A BATTERY/POWER SOURCE. THE BATTERY THEN INCREASE THE ENERGY OF THE CHARGE.

What does it mean to have an "energy supply" in a circuit? THE BATTERY SUPPLIES THE CHARGES WITH ENERGY BY MOVING THEM AGAINST THE ELECTRIC FIELD.

If an electric circuit could be compared to a water circuit at a water park, then the ...

... battery would be analogous to the _WATER PUMP__.

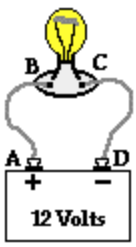
... positive terminal of the battery would be analogous to the TOP OF THE SLIDE___.

... current would be analogous to the ___FLOW OF WATER___.

... charge would be analogous to the ___WATER _____.

... electric potential difference would be analogous to the _DIFFERENCE IN THE HEIGHT OF THE SLIDE____.

The diagram at the right shows a light bulb connected to a 12-V car battery. The + and - terminals are shown. ASSUMING A POSITIVE TEST CHARGE



a. As a + charge moves through the battery from D to A, it _____ (gains, loses) potential energy and _____ (gains, loses) electric potential. The point of highest energy within a battery is the _____ (+, -) terminal.

b. As a + charge moves through the external circuit from A to D, it _____ (gains, loses) potential

energy and _____ (gains, loses) electric potential. The point of highest energy within the external circuit is closest to the _____ (+, -) terminal.