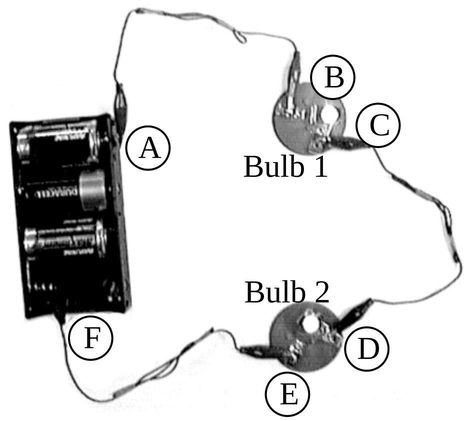
Date: ________________

Name: __________________ Pd.____

Activity 1



What will happen to bulbs 1 and 2 when you disconnect the wires at various points?

Prediction:

Point	Bulb 1 Lit / Unlit	Bulb 2 Lit / Unlit
A		
B		
C		
D		
E		
F		

Observation(s):

Point	Bulb 1 Lit / Unlit	Bulb 2 Lit / Unlit
A		
B		
C		
D		
E		
F		

Briefly explain your reasoning for point predictions B, D, and E.

Conclusion:
(Your answer to the focus question in the "V" above.)

Consensus:

New Terms:

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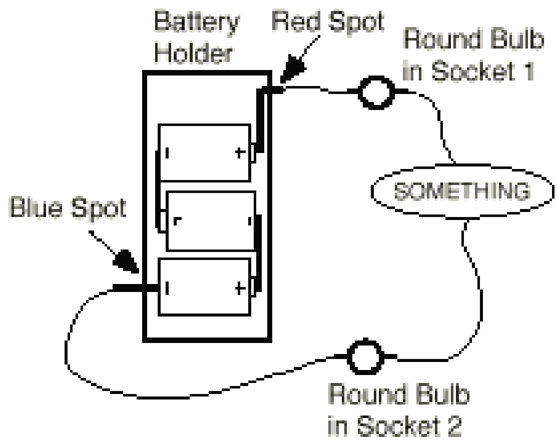
Activity 2



What type of object, when inserted into the loop, will allow the two test bulbs to light?

Prediction(s):

Object	Light? (Y or N)
Foil	
Cardboard	
Paperclip	
Shoestring	
Wax paper	

Observation(s):

Object	Light? (Y or N)
Foil	
Cardboard	
Paperclip	
Shoestring	
Wax paper	

Conclusion:

Consensus:

New Terms:

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Activity 3

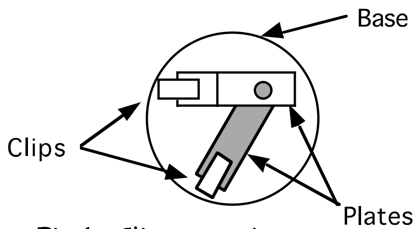

Fig 1. Clip – top view

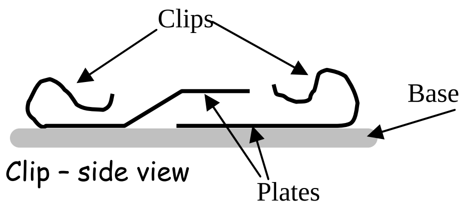

Fig 2. Clip – side view

There are two clips and two plates for each socket. One clip and plate goes under the other clip and plate. The clip is where the wire connects to. The plate is what the bulb screws into. You need to label one clip and plate as "A" and the other clip and plate as "B".

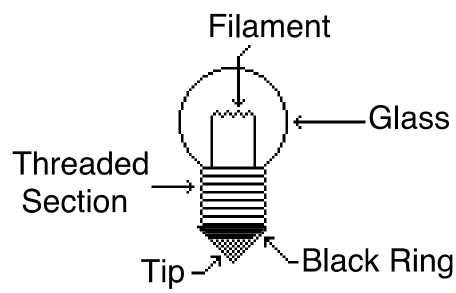

Fig 3. Diagram of a bulb

What parts of a socket and bulb are conductors and which are insulators?

What is the conducting path through the bulb?

Prediction(s):

Test Objects	Closed Loop?
Socket parts:	
1) Touch Clip A & Clip B	
2) Clip A & plate A	
3) Plate A & plate B	
4) Plate A & Base	
5) Clip A & Base	
6) others?	
Parts of the bulb:	
7) Tip of bulb	
8) Thread part	
9) Glass	
10) Black ring	

Observation(s):

Test Objects	Closed Loop?
Socket parts:	
1) Touch Clip A & Clip B	
2) Clip A & plate A	
3) Plate A & plate B	
4) Plate A & Base	
5) Clip A & Base	
6) others?	
Parts of the bulb:	
7) Tip of bulb	
8) Thread part	
9) Glass	
10) Black ring	

Conclusion:

Consensus:

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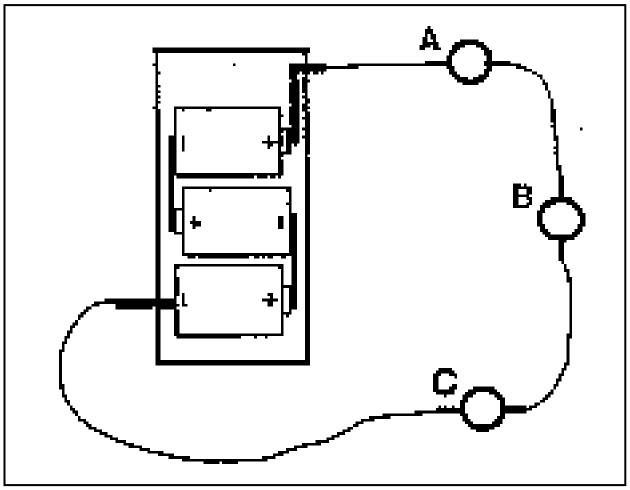
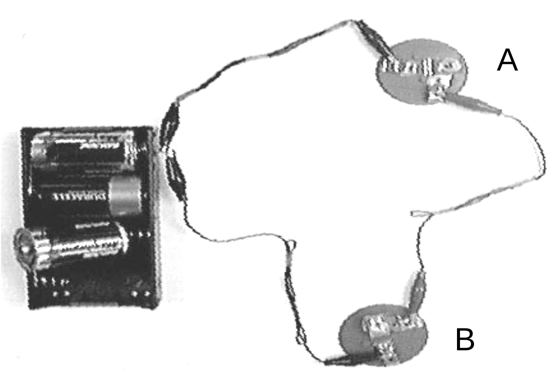
Worksheet 1



1. In the following circuit, which bulb lights first?

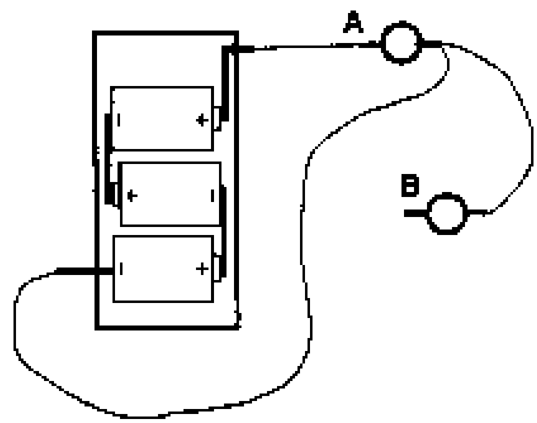
A) Bulb A
B) Bulb B
C) Bulb C
D) They all light at the same time
E) A and C light first, B lights after them.

Study the three loops shown below. For each loop, state which bulbs will light when the connections are made.



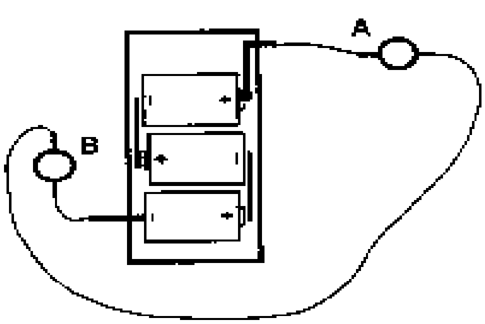
2. ____________

A) bulb A
B) bulb B
C) both bulbs
D) neither bulb



3. ____________

A) bulb A
B) bulb B
C) both bulbs
D) neither bulb



4. ____________

A) bulb A
B) bulb B
C) both bulbs
D) neither bulb

5. Using a colored pencil, go back and trace the continuous conducting paths in numbers 1 – 4.

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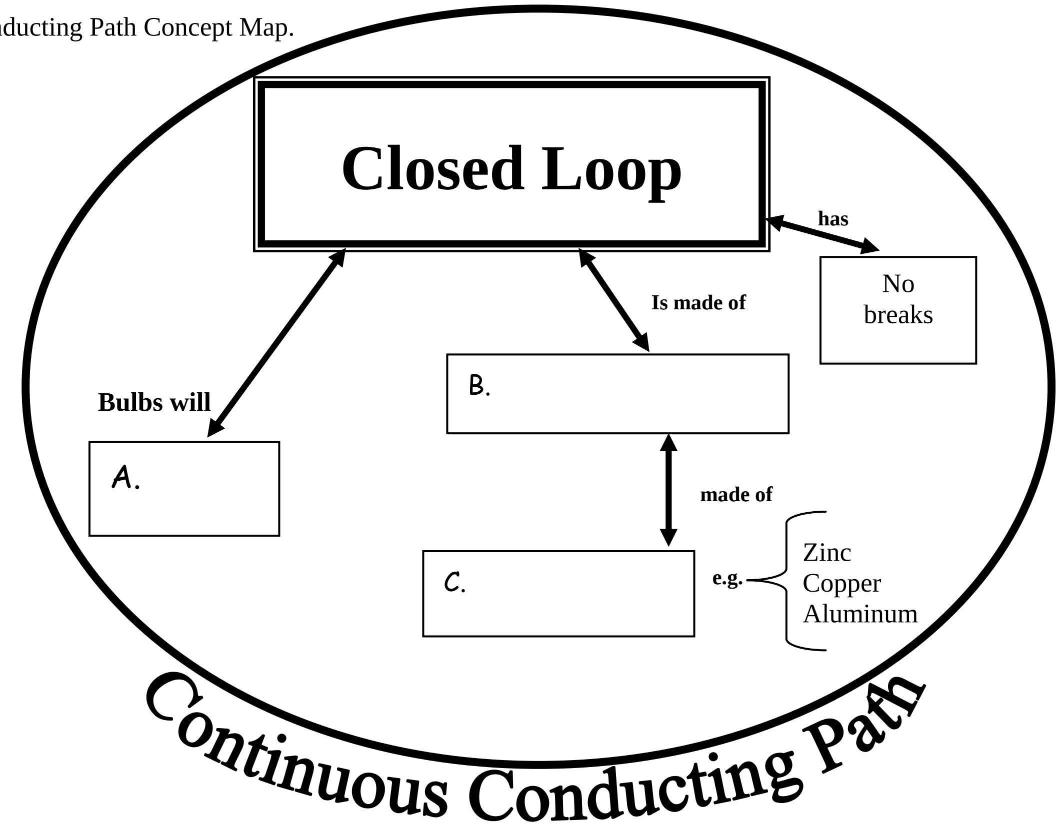
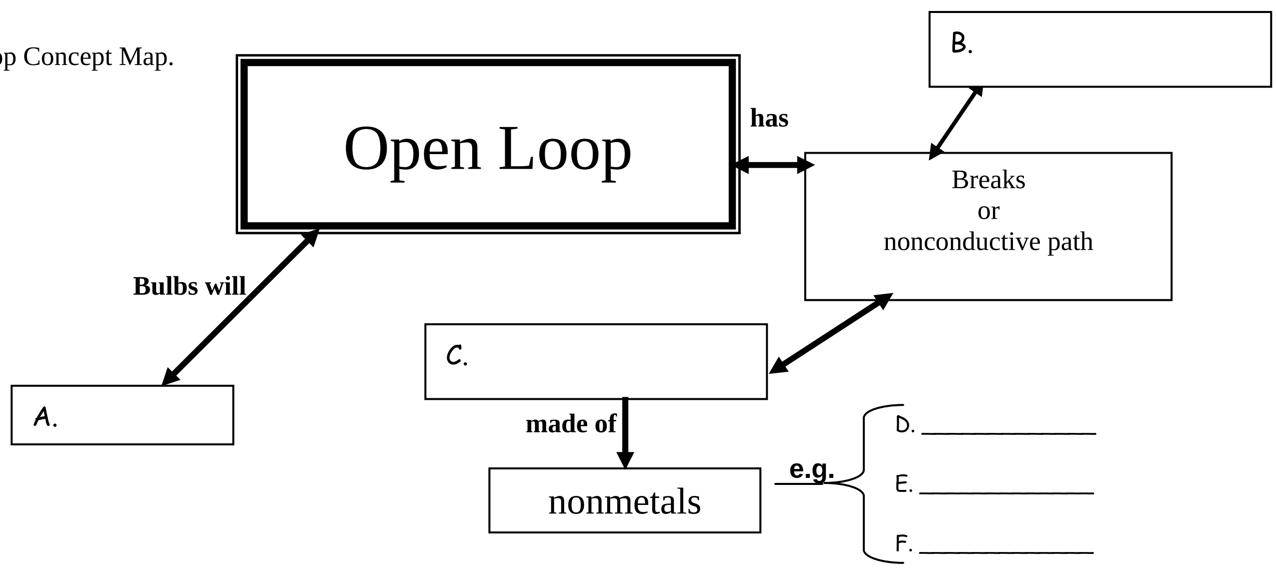
The two concept maps below are a visual representation of how major ideas fit together. Fill the blanks with appropriate words, or phrases.

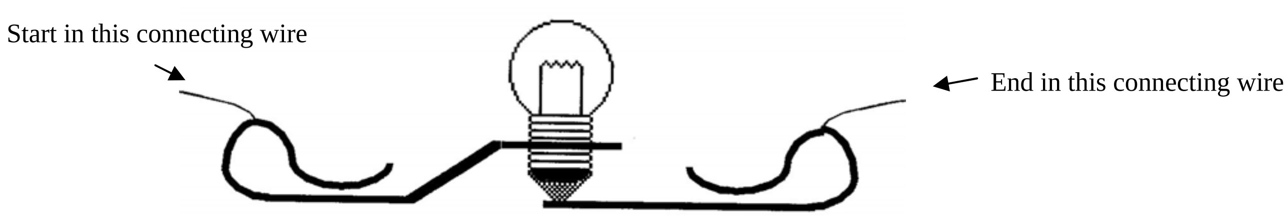
6 – Continuous Conducting Path Concept Map.



7. Open Loop Concept Map.



8. Draw the continuous Conducting path through this bulb and socket.



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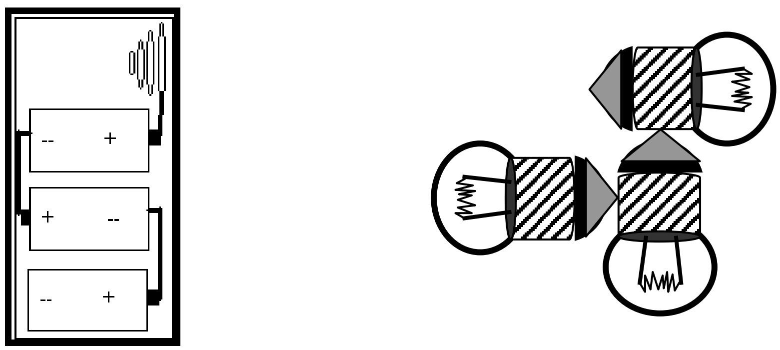
Worksheet 2

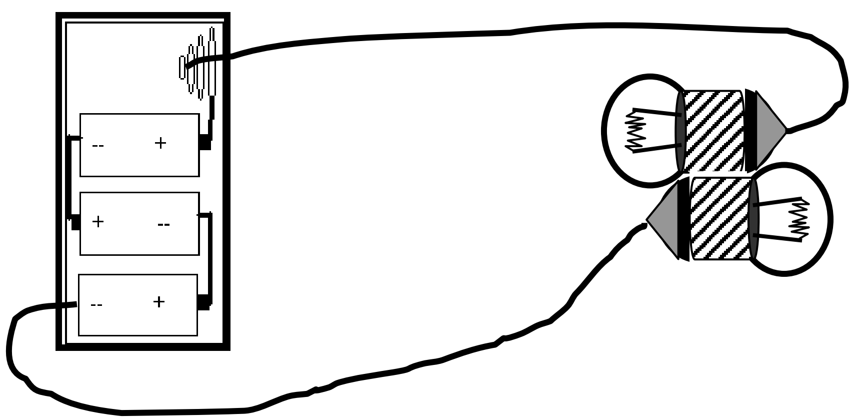
Continuous Conducting Paths and the Internal Path Through a Bulb.

1. Examine the picture below. You have a battery pack and three cells arranged like so. You are given two wires to make all three bulbs light.

a) draw the wires
b) in another color, trace the **C**ontinuous **C**onducting **P**ath (CCP) through the circuit – this includes through the filaments of the bulbs and the batteries!



2. Homer and Hilda found a way to light two bulbs with a 3-cell battery and only 2 wires! Trace the CCP throughout the entire circuit.



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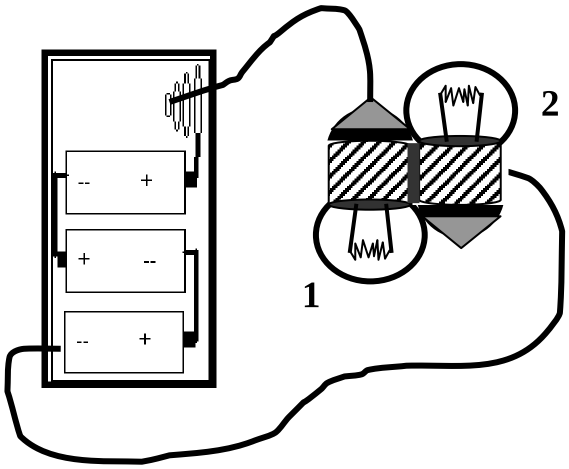
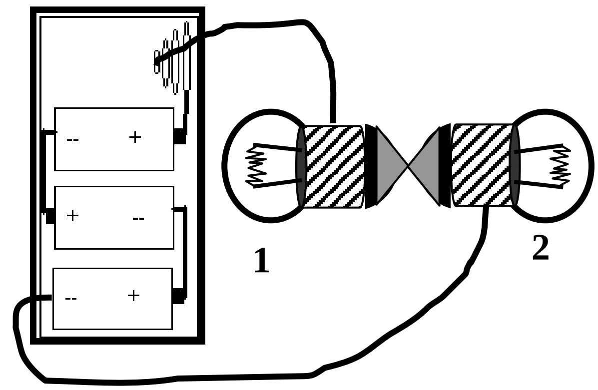
Here are some more attempts from Homer and Hilda. Your job is to trace the CCP and determine which of the bulbs will light.
Note: the bulbs are always touching each other.



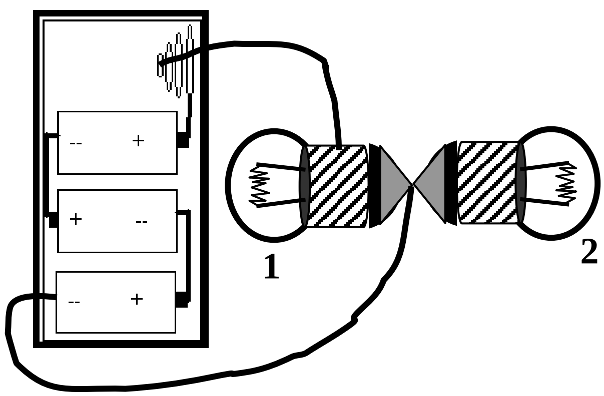


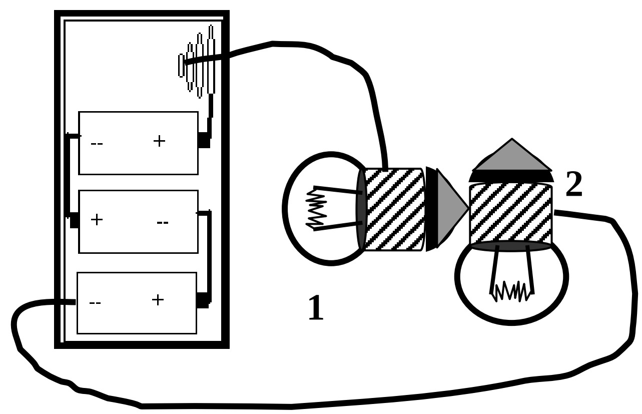
3. bulb 1: Lit Unlit

bulb 2: Lit Unlit

4. bulb 1: Lit Unlit

bulb 2: Lit Unlit



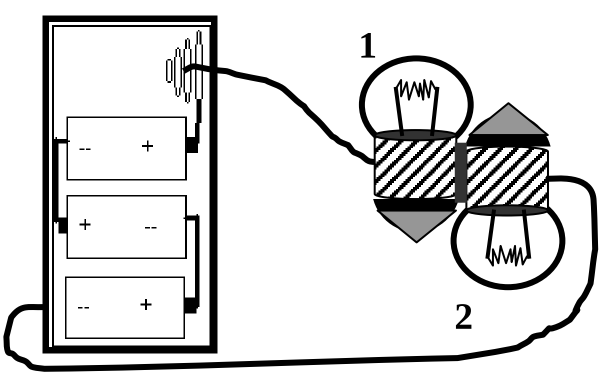


5. bulb 1: Lit Unlit

bulb 2: Lit Unlit

6. bulb 1: Lit Unlit

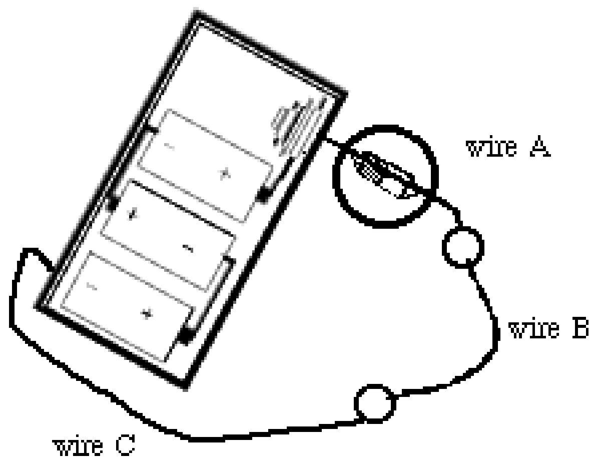
bulb 2: Lit Unlit



7. bulb 1: Lit Unlit

bulb 2: Lit Unlit

Activity 4



Predictions

What does a compass tell you about what is happening in the wires?

Observations

Predict the relative strength of electrical activity in each wire. (e.g. A = B, B < C)

Predict the direction and amount of compass deflection for each wire in the diagram above.

What would be the effect of reversing the battery pack on the compass deflection?

Describe the relative strength of electrical activity in each wire as indicated by the compass.

Describe the direction and amount of compass deflection for each wire.

Describe the direction and amount of compass deflection for each wire when the battery pack is reversed.

Conclusion:	*Consensus*:

New Terms:

Date: ________________ Name: _________________ Pd.____

Reading

What is moving in the wires and in what direction is it going?

What's moving?

No one can see what moves through the wires, but something about the moving substance causes a compass needle to deflect. The property that enables the substance to do this is called **CHARGE**, from a Latin word that means "vehicle". Particles that carry charge from one place to another are called "charge carriers". The experiments you've done provide evidence that CHARGE is carried through wires, but they provide no evidence yet about the nature of the charge carriers.

Which direction is it moving?

The reversal of compass needle deflection when the battery orientation is reversed indicates a **change** in the direction of charge flow in the loop, but provides no information about which actual direction exists before or after the change. Scientists searched for hundred of years trying to determine which way the charge really moved, but were unable to do so until the late 1800's. In the absence of any evidence, they decided to **assume a direction** for the motion. Such an assumption is "conventional" — that is, simply an "agreement" which isn't necessarily right or wrong but is **useful** because it is necessary for communication. The international convention is that the charges circulating around a circuit **leave the battery at the "positive" end** (red spot), travel around the circuit and **re-enter at the "negative" end** (blue spot), and pass through the battery. In later Sections we will collect evidence to determine whether this "conventional" direction is accurate or not.