Batteries and Bulbs

Batteries and Bulbs

Using hands on activities, children will explore the various aspects of electricity. Students will work at their own pace experimenting, answering the questions, and taking the three quizes. There are inference boards and a circuit card game to be used with this unit. You may also wish to have the students form an electricity dictionary as part of their work. There are four comic books you may wish to use with this unit. You may find this information in the appendix.

Gregory Grambo
The Louis Armstrong Middle School

Contents

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Chapter Two

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Appendix

Chapter One

Experiment Sheets

Batteries and Bulbs
Experiment 1

Name _____

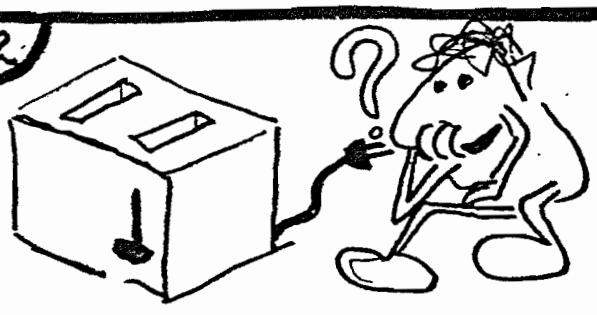
Class ____ Box No ____

Problem- What is electricity?

1.  Begin With

Batteries 

Encyclopedia 

2. 

Q- How can I make this work?

3. Q- Why is there a wire on the toaster?

4. Q- How do you think electricity gets into your toaster?

5. 

Q- How did Benjamin Franklin Discover electricity? (look in an encyclopedia)

Batteries and Bulbs
Experiment 1

Name _____

Class ____ Box No ____

Problem- What is electricity?

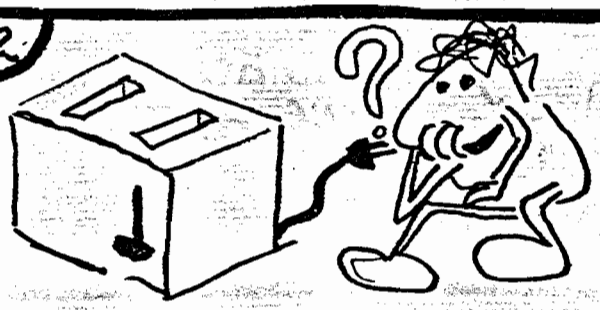
1

Begin With

Batteries

Encyclopedia

2



Q- How can I make this Work?

3

Q- Why is there a wire on the toaster?

4

Q- How do you think electricity gets into your toaster?

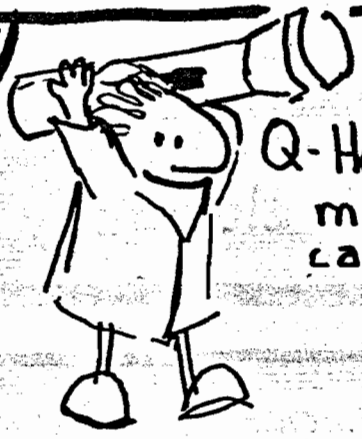
5

Q- How did Benjamin Franklin Discover electricity? (look in an encyclopedia)

6 This light is nice but

Q- How can I make it easier to carry around?

7



Q- How has this light been made so it's easier to carry around?

8

(list more than one reason)

Look at the batteries the teacher will give out

Q- How are they different?

9

Q- Why are some large and some small?

Q- Why is there a + on one side and a − on the other?

10 Fill in Chart

Battery	Size	Shape	Voltage
A			
AA			
C			
D			
Transistor			

Conclusion -

Q- What is a battery?

Q- How is it like a storage chest?

Q- Why do we need batteries?

Batteries and Bulbs

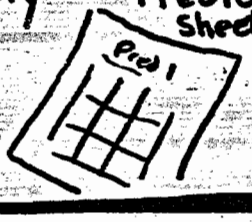
Name _____

Experiment 2

Class ___ Box No ___

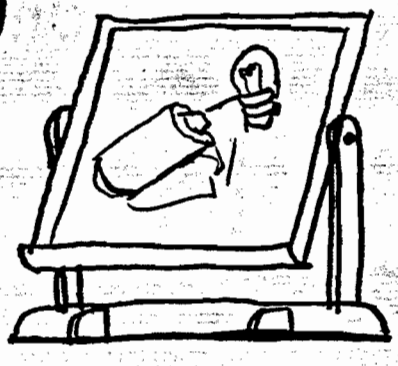
Problem – How can we light a bulb with a battery and a wire?

---

1) Begin With Bulb  Battery  Prediction sheet #1 

Wire. 

2) Q- How can we light this bulb? 

3) 

Draw the methods that make it work here.

4) Q- Why does the bulb have to touch the battery?

Q- Why did you get the wire?

5) Why did the wire have to touch the bulb and then the other side of the battery?

Experiment #3

6 Q- How can I light the bulb without making the bulb touch the battery?

(Draw Predictions Here)

7 Q- Why did I give you a rubber band? or tape

Use prediction sheet Number One

Conclusion-

Draw methods that don't make the bulb light here

Explain How we can light a bulb.

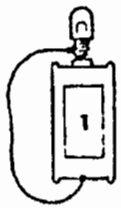
Homework -

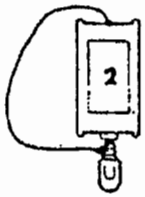
How can we make a bulb light with 2 wires?

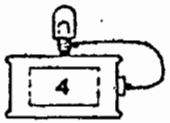
Name
Class Box No

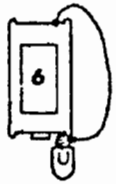
Prediction Sheet 1

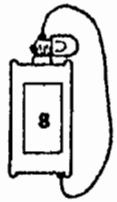
Will the bulb light? If you are not sure, try it and see!

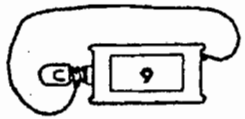


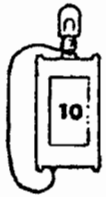


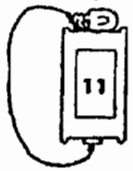








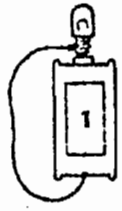


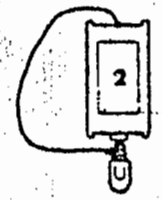


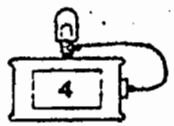
Name
Class Box No

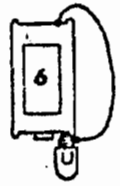
Prediction Sheet 1

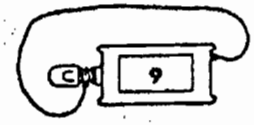
Will the bulb light? If you are not sure, try it and see!

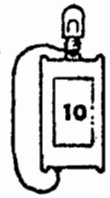


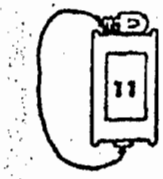


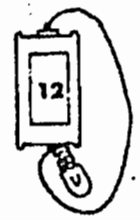












Batteries and Bulbs

Name _____

Experiment 3

Class ___ Box No ___

Problem- Can you light a bulb if it does not touch the battery?

1) Begin With:

2) Q- How can we light a bulb with one wire and one battery?

3) Q- How can another piece of wire help us?

Try It

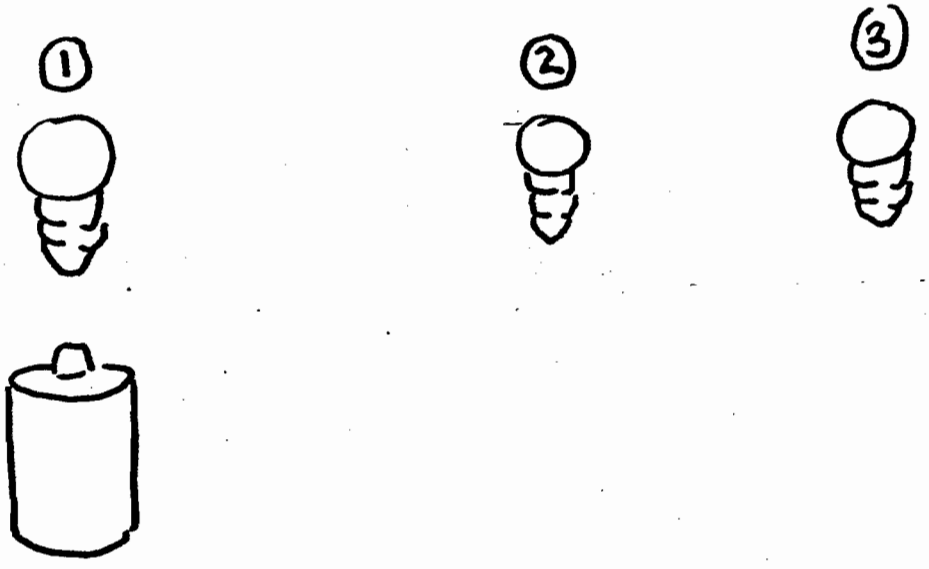
4) Draw methods to make it: (more than one)

Work

① ② ③

Experiment 3

Draw methods where it won't work



Conclusion -

Q- Why does it work some ways and not others?

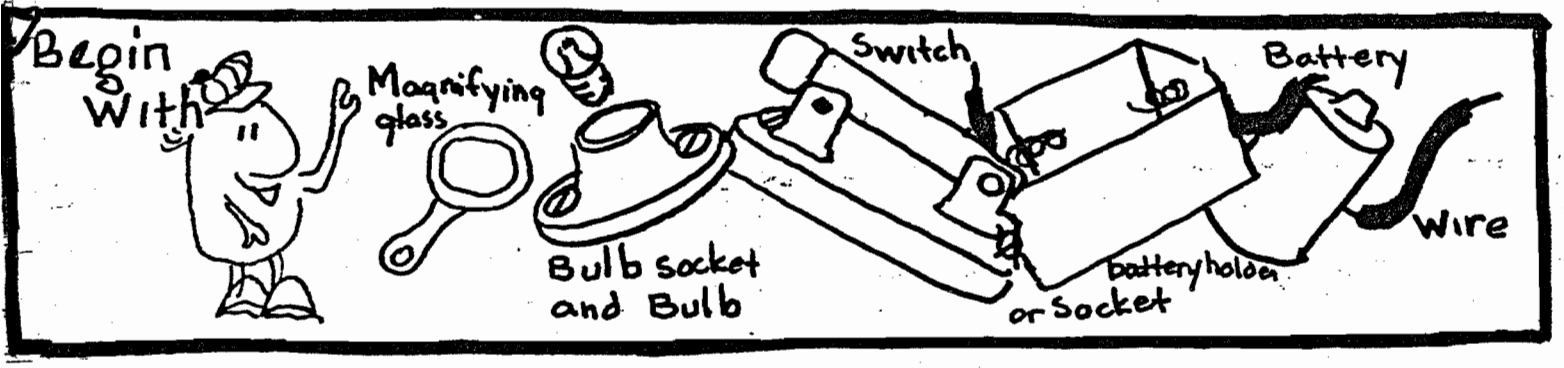
Batteries and Bulbs

Name _____

Class ___ Box No ___

Experiment 4

Problem– How can we use a holder (battery) socket, and switch to make circuits?

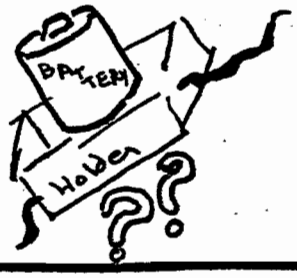


2) Examine the holder

Battery holder

Why are there screws on the holder?

3) Q-Which parts of the holder touch which part of the battery?



4) Examine the bulb socket.

How do you think it works?

5) Q-Why does it look like a screw inside the Socket?

6) Q-Which parts of the bulb touch which parts of the socket?

7) Why do these parts of the bulb touch those parts of the socket?

8) Make a simple circuit with a bulb, socket, battery and wire.

9) look in your box. Do you see anything you can use to make the electricity go on and off

10) Q- How does this object work?

Q- Why does it make the electricity go on and off?

11) Q- How do we add it to our circuit?

12) Q- Why will the electricity go off if I break the wire?

13) What will happen if I open the switch?

Why?

14) a- What does this tell you about the way electricity moves?

Homework- 1) How can we use a switch to turn off a light?

2) Why does it work?

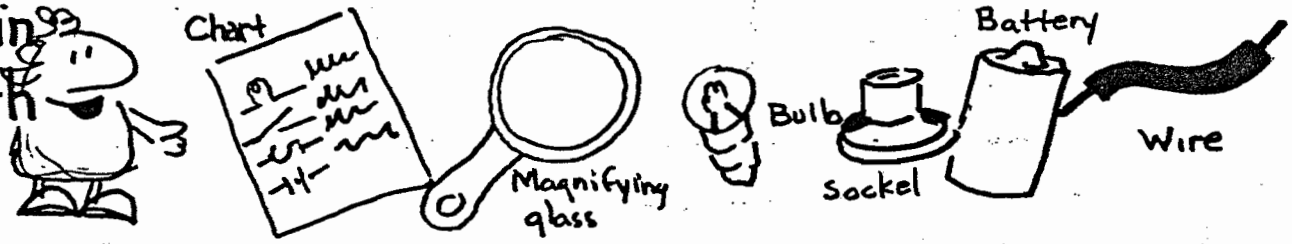
Experiment 5

Name _____

Class ___ Box No ___

Problem – How can we make a circuit drawing?

1) Begin With



2) Make a drawing of a circuit with a bulb, wire and a battery.

3) How would a house circuit drawing look if we drew every bulb switch and wire?

4) How can we make it simpler so it isn't so crowded?

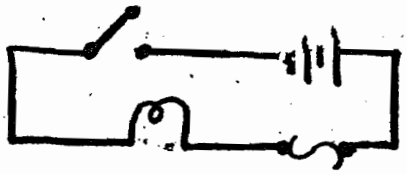
5) On road signs, Why do we use symbols?

6) How can we use symbols to make our circuit drawing simpler?

7) look at the symbol chart on the back of the materials list. How Can we use these symbols to redraw our circuit with the bulb, wire and a battery?

8 We call these new drawings Schematic diagrams

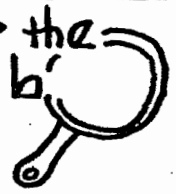
label the things in this circuit



9 Q- Why will the bulb go off if I open the switch?

10 Q- Why will the bulb go off if I break the wire?

11 Examine the bulb



Why is a wire going across the inside of the bulb?

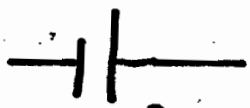
12 Q- How can I make another light bulb light in our circuit?

Try it

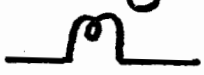
Draw your Results Here

Homework

1) What do the following symbols mean?



a._____



b._____

c._____

d._____

e._____

2) Why do we use symbols in schematic diagram

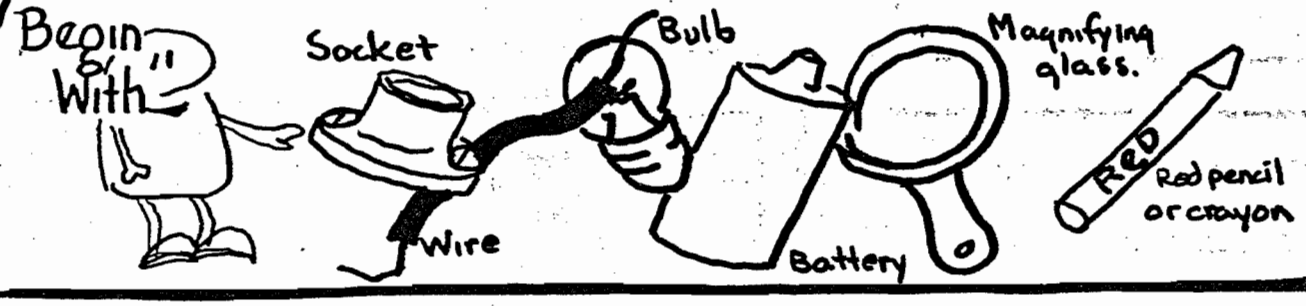
Stop It's

Experiment 6

Class____ Box No_____

Problem- How does electricity move through a bulb?

1 Begin With "



2 Q- In a circuit, why won't the bulb light if we cut the wire?

3 Examine a bulb

Describe how the inside looks.

4 Q- How does electricity make the bulb go on?

5 Make a circuit with a bulb, wire, Battery and switch. Draw the schematic diagram Here!

6 look at the bulb when it is off and when it is on.

Q- What differences did you notice?

7 Q- Why did the wire do this?

Grambo

Q-How do you have to connect the wires to the bulb in order to make it light?

9 Q-Why must you connect them this way?

10 Inside the bulb, Why are there 2 wires sticking up?

Q-Why is there a coil of wire Connecting these two wires inside the bulb?

12 Q-What do you think would happen if that coil broke?

Why?

Q-How do you think the bulb will be affected if I remove the glass? (see teacher)

Draw a picture of how you think the bulb lights. Make believe the metal parts of the bulb are see through. Use red for electricity.

Homework

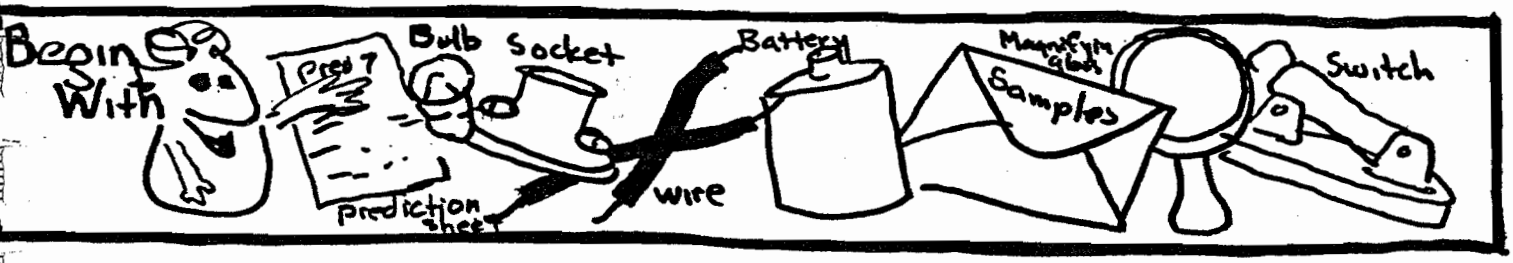
1) Why is there a coil of wire in a bulb?

2) How is the circuit affected if I break it open somewhere?

Experiment 7

Class___ Box No___

Problem - Why do some pathways make the bulb light while others do not?



2) A road allows a car to go from one place to another.

Q- How does the wire help the bulb light?

3) Q- Why are wires put in Circuits?

4) Q- How does electricity get from the power plant to your house?

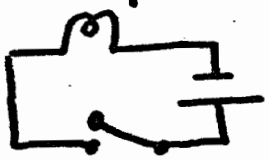
5) Q- How does electricity move around your house?

6) Examine a wire. Q- What is it made out of?

7) What part of the wire do you think electricity can move through?

Grambo

7 Set up this circuit

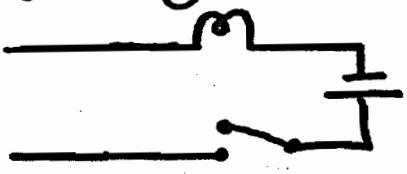


Q- How does electricity get from the battery to the bulb?

9 Q- What will happen if I cut the wire?

Q- Why?

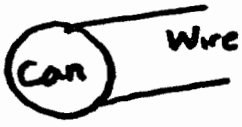
10 Q- How can I make this bulb light again?



11 Q- We will try to complete the circuit with some of our samples.

Note- Set up circuit in Box 10

12 Connect wires with objects in sample envelope.



Object	lights	Does not light

13 Why do some objects make the bulb light and others do Not?

Use the Prediction Sheet.

Homework

We call objects which allows electricity to travel through them Conductors.

Non conductors will not carry electricity.

Insulators are like non conductors. They will not carry electricity. They also will not carry heat.

Name _____

Class _____ Box No ____

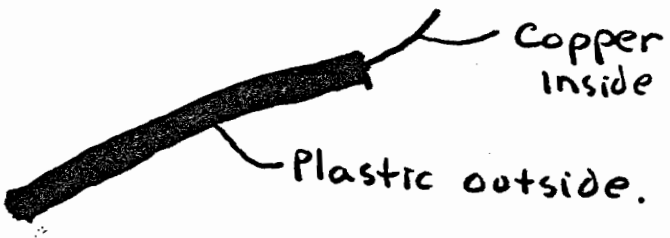
Prediction Sheet

7

This is Homework

(Use with experiment 7)

Which part of the wire is the conductor and which is the insulator?



look at the wire on the teachers desk. This is the wire found in the street. Why is it thicker than your wire?

Which is a conductor, Non conductor?
How can you find out?

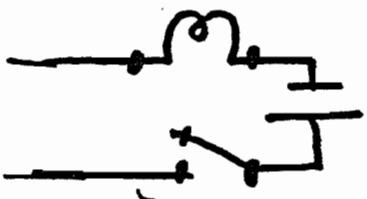
Paper	Crayon	Penny
Key	Plastic Wrap	Dime
Paper Clip	Tin foil	Desk Top
Pencil	Rubber band	_____
Pencil point	Zinc	_____

What do the conductors have in common?

1—

2-

5- Setup this Circuit



Place wires in a glass of water.

Describe what happens.

Add Salt to the water.

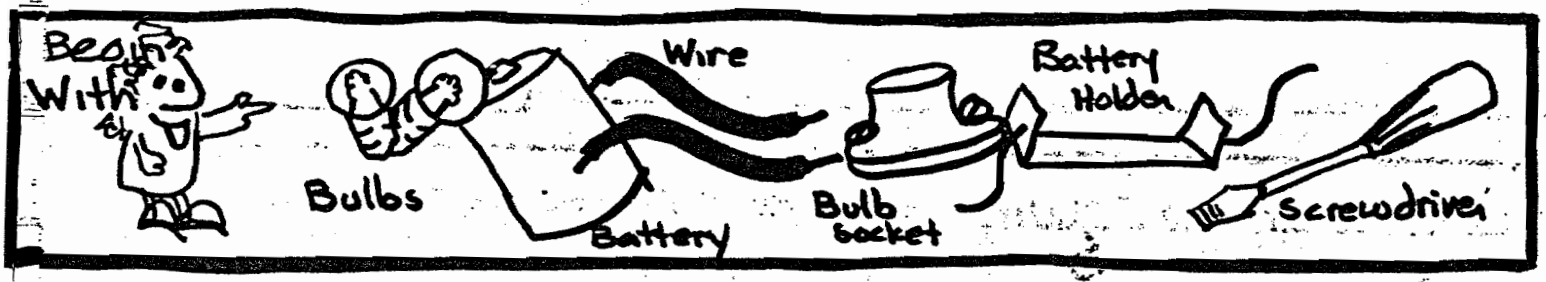
How has salt changed the electrical properties of water?

- Why shouldn't you bring an electric radio in the bathtub or shower?

Staple this sheet to experiment 7

Experiment 8 Class___ Box No___

Problem- How can we light 2 bulbs with one battery?



1) Make a circuit with a bulb, battery and wire, so that the bulb lights.

2) Q-How can we add another bulb to this?

Q-How can we remember how we did this?

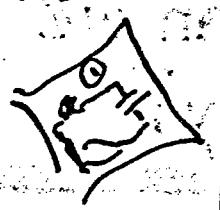
3) Draw your Predictions Here

Note- you might have to look up the word prediction.

4) Draw your actual results Here:

Now Test your guess

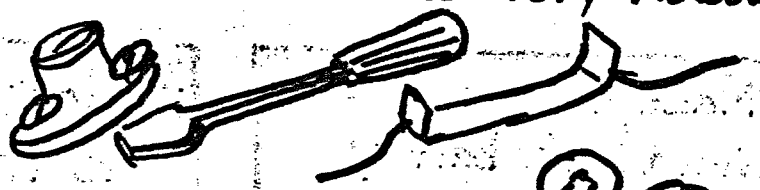
5) Q- How many different ways can you do it? (look at your schematic diagrams)



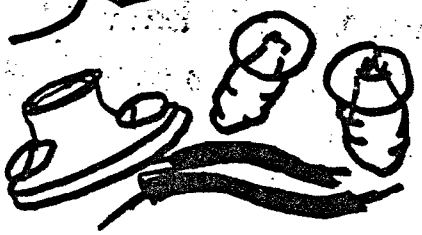
6) Q- How are the drawings similar?

7) Q- How are the drawings different?

8) Re wire some of these circuits with the bulb + battery holders

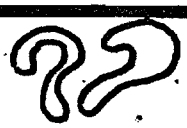


(Take circuits apart + put them back together again)



9) Unscrew one bulb -

Q- Did it go out? Why?



Q- Did the other bulb go out? Why or why not?

Homework -

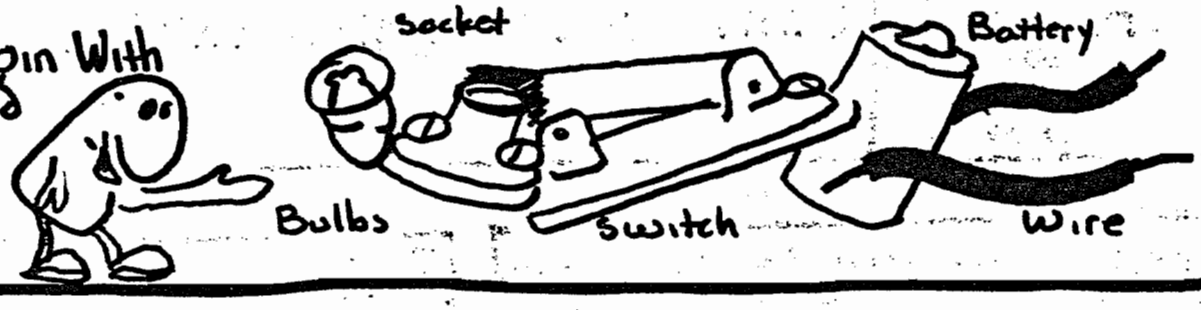
1) What are 2 ways (different ways) to light up 2 bulbs with one battery?

2) Draw these ways.

Experiment 9 Class___ Box No___

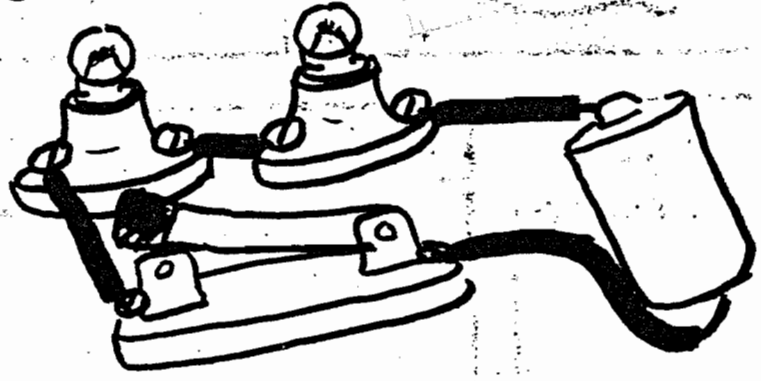
Problem - Why are some circuits different from others?

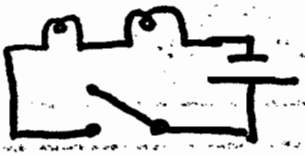
1 Begin With



2 Examine these Drawings

A





Q- How are they similar?

Q- How are they different?

B

Note: you may have to connect Battery with tape or rubberband

Grambo

Q-What will happen to each circuit when I close the switch?

Q-Why?

4 Q-What will happen if I unscrew one bulb? Try it

5 Q-How is each circuit affected?

Q-Why do you think this happened?

6 Remember: electricity is like a car. It has to have a road to drive on and a place to go

7 Trace the path or road of electricity from one end of the battery to the other.

8 In circuit A, Why do both bulbs go out when I remove one bulb?

9 What is needed in order to make the other bulb stay on?

10 In Circuit B. Why don't both bulbs go out when I remove one of the bulbs?

A is a Series Circuit. B is a Parallel circuit.

Homework-

Q- How is a series and a parallel circuit different?

Batteries and Bulbs

Name _____

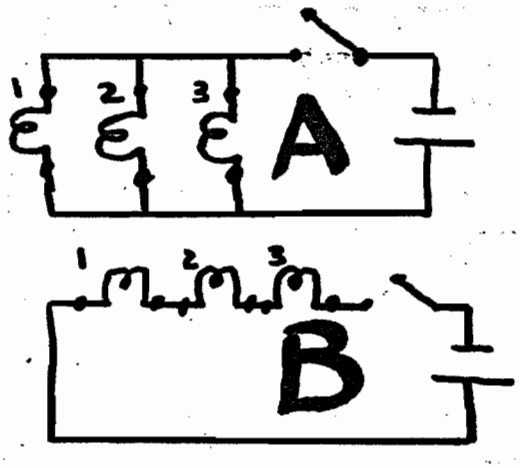
Class ____ Box No ____

Experiment 1D

Problem- What are series and parallel Circuits?

1) Begin With

2) Set up the following Circuits



3) Q- What will happen if I close the switches?

Q- Why?

4) Q- What will happen in each one if I remove bulb #1?

5) Q- Why will this happen?

Q- Which stays lit A or B?

Screw all light bulbs back in sockets.

6) Close switch.

Q- Examine the Bulbs. Which are brighter?

Gramba

Q-Why are these bulbs brighten?

9 Q-In the circuit, which is not bright, How will the bulbs be affected if I hook up all 6 bulbs the same way. Try it

8 Q-Did they get brighter or dimmer (not bright)?

Q-Why?

A is a parallel circuit
B is a series circuit.

10 Q-Would you want your house connected in series or Parallel?

Q-Why?

11 Q-What are the advantages and disadvantages of series and parallel circuits?

	Advantage	Disadvantage
Series		
Parallel		

Homework-

1) -You have a battery and three bulbs. Draw a series and parallel circuit.

2) How are they different?

Stop! It's ft Q

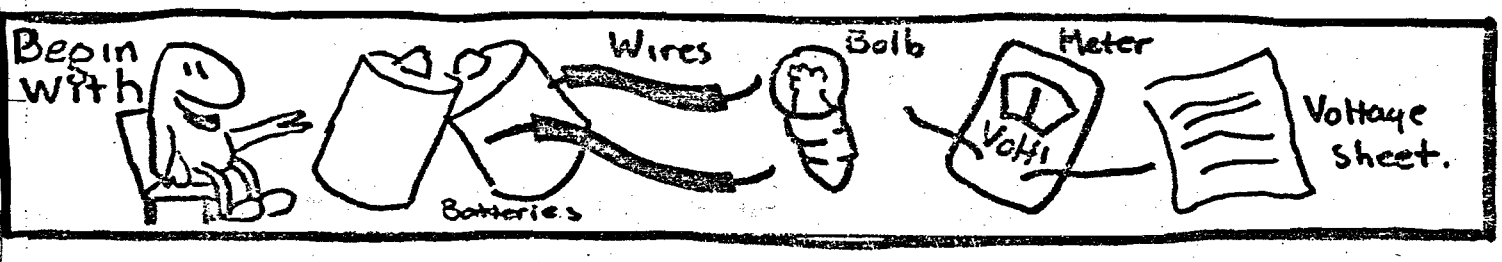
teries and Bulbs

Name _____

Experiment 11

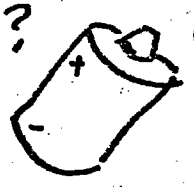
Class ____ Box No ____

Problem- What happens when we add another battery to our circuit?



Q- How can we make the bulb light with these materials?

3) How can we add this Battery to our Circuit?



(you now have 2 batteries)

Draw Predictions Here.

Q- How is a parallel circuit different from a series circuit?

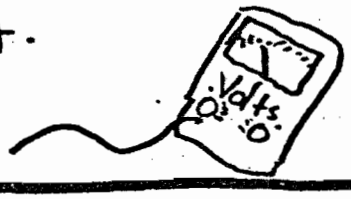
How will the bulb be affected if we connect the new battery in series?

6) What about if we connect the new battery in parallel?

Why do you say this?

-Why did the bulb get brighter when you connected the batteries in series?

8) Q- You may wish to test your ideas with a instrument that measures the total voltage or amount of electricity in your circuit.



Ask teacher if you want to test the circuit.

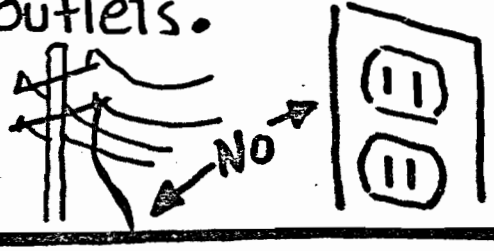
get voltage sheet

Voltage in a Circuit can get very strong.

Q- look at the wire on the teachers desk.
-Why would a wire this thick be made?

-What is it used for?

10) In some circuits, like a series circut, voltage from batteries adds up and gets bigger. Voltage can hurt you if it is strong enough. Power companies send out high voltage so there is enough for everyone to use. This voltage can kill you. Never play with hanging wires or electric outlets.



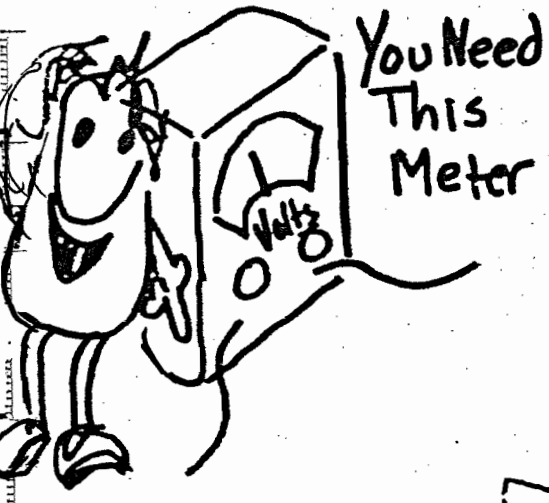
Homework

1) What happens to a bulb in a series circuit?

2) What might happen to a bulb if I connect 4 batteries in series? Why?

Class ___ Box No___

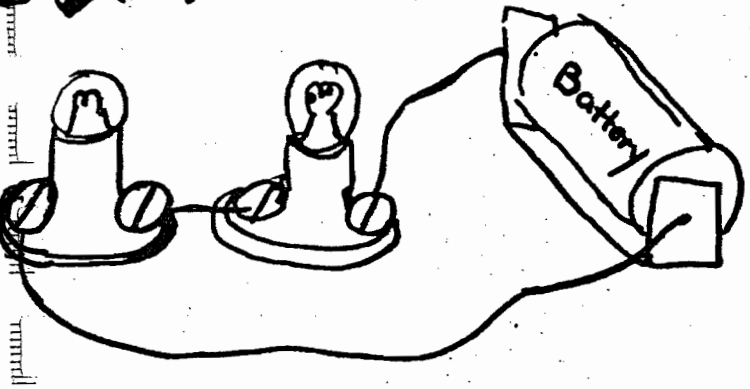
Voltage Sheet
Experiment 11



You Need This Meter

Your teacher will give you the Voltmeter to use. Do Not Change the dials on the meter unless the teacher tells you.to.

. Voltage is the amount of electricity in a circuit. We will measure how much voltage is in the Series and parallel circuit.

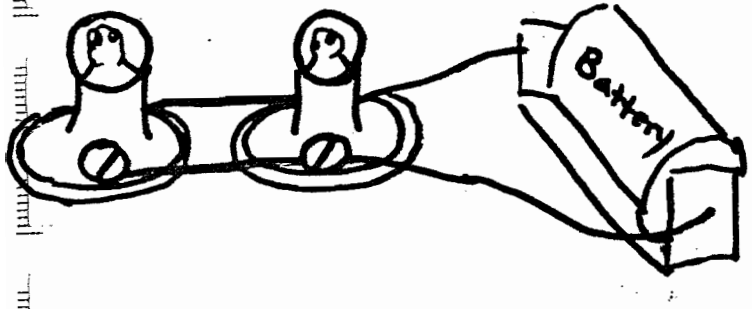


Series ☐ Parallel ☐

Q- How are these circuits different?

Q- In which circuit are the bulbs brighter?

Q- Why?



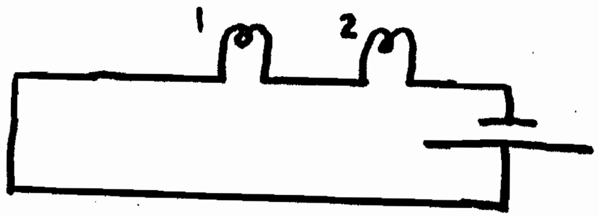
Series ☐ Parallel ☐

Look at the diagrams showing how we connect the meter.

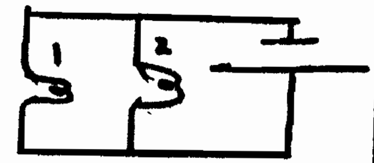
Q- What can you tell me about the voltage in each circuit?

Gramba

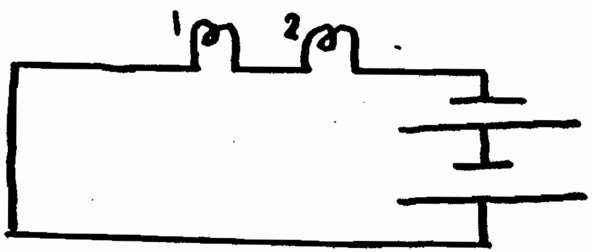
Predict then test the Voltage



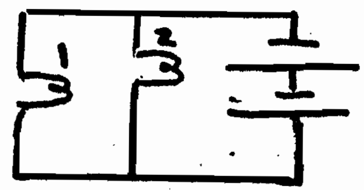
	Across Battery	Bulb 1	Bulb 2
Predict			
Trial			



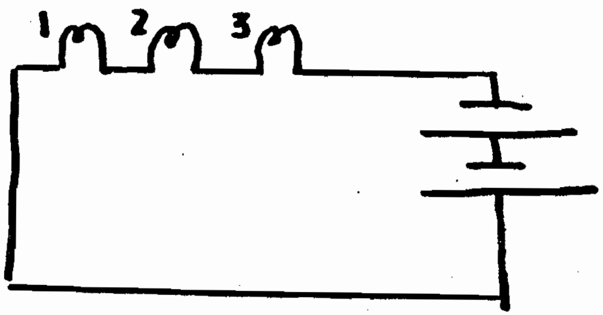
	Across Battery	Bulb 1	Bulb 2
Predict			
Trial			



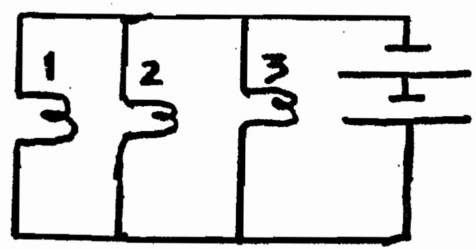
	Across Battery	Bulb 1	Bulb 2
Predict			
Trial			



	Across Battery	Bulb 1	Bulb 2
Predict			
Trial			



	Across Battery	Bulb 1	Bulb 2	Bulb 3
Predict				
Trial				



	Across Battery	Bulb 1	Bulb 2	Bulb 3
Predict				
Trial				

Compare your results to your classmates results. Are they the same? Why or Why Not?

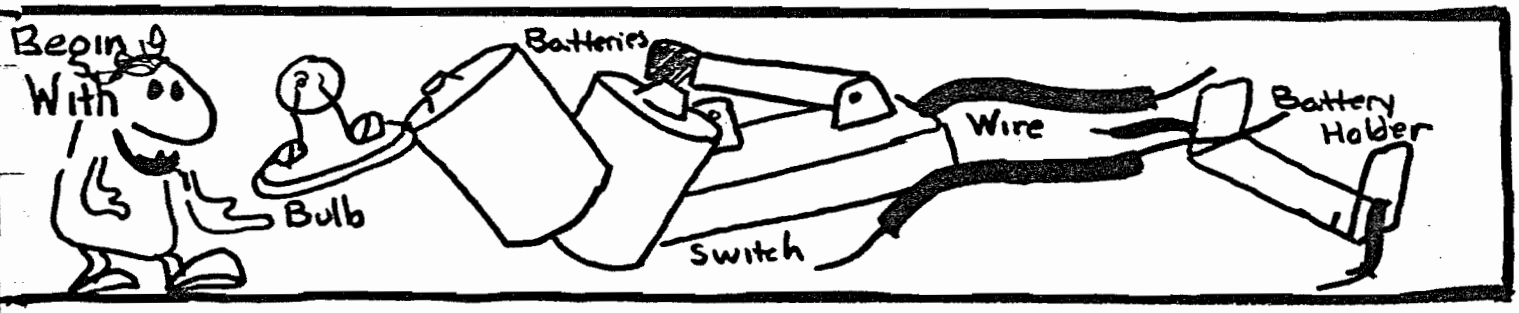
Q-What happens to the voltage in a series and parallel circuit when you add a battery?

Q-How is the voltage in each circuit affected when I add a third bulb?

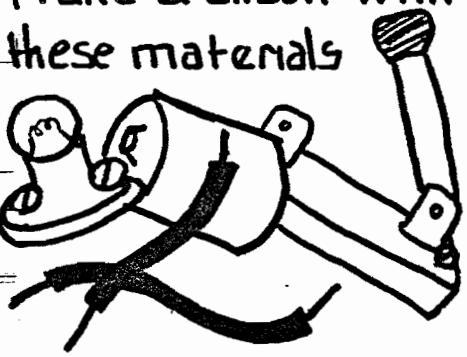
xperiment 12

Class ___ Box No ___

roblem- What happens if we connect batteries in parallel instead of in series?



Make a circuit with these materials

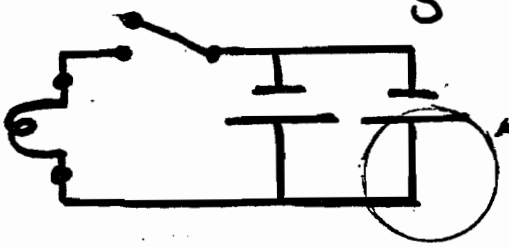


w schematic here

3) Remove the wire from the Battery

Q- Why did the bulb go out?

4) Make the following circuit.



Q- Did anything happen to the bulb?

Q- Why?

7) Q- What are some advantages of this arrangement?

8) Q- How is this arrangement of batteries different from the arrangement in experiment 11?

8) Q- Why does the bulb go out when we remove the wire from Step 2 and does not go out in step 4?

9) Q- What do you think is the total voltage of the circuit from step 4?

Homework-

1) How can we <u>increase</u> the <u>voltage</u> in a circuit?

2) What are the advantages and disadvantages of a parallel arrangement of batteries in a circuit?

3) Do you think your house is wired in series or parallel?

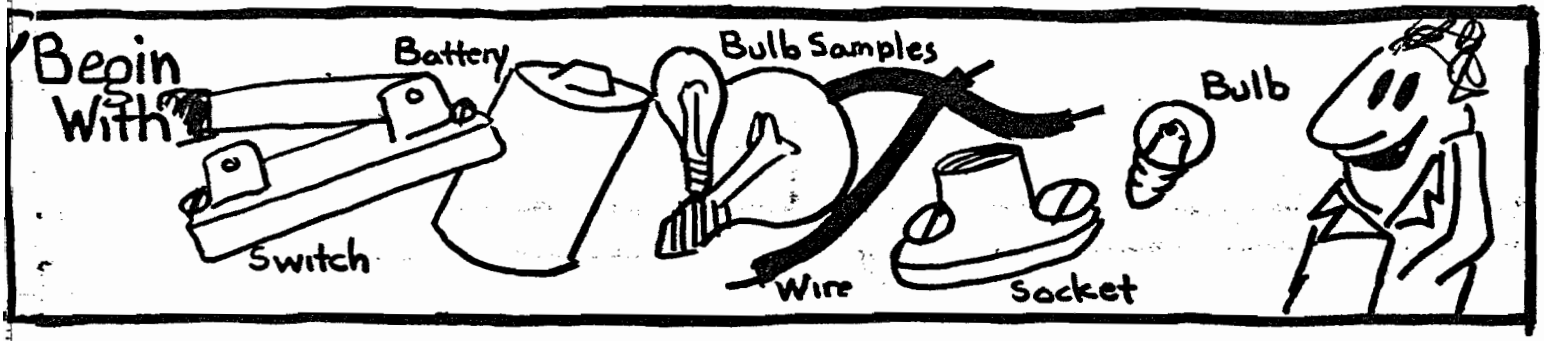
Why do you say this?

Why did they do it this way?

Class____ Box No____

Experiment 13

Problem – Lets talk some more about light bulbs.



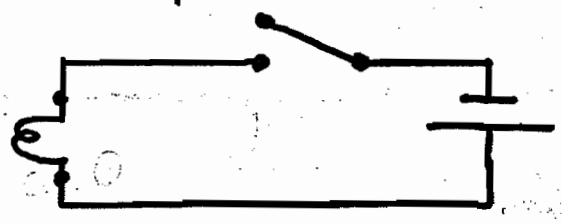
2) Look at the light bulbs on the teachers desk. Examine them.

Q- Why are they different sizes?

Q- How do we get them to light?

Some bulbs are brighter than others. A 200 watt bulb is brighter than a 75 watt bulb. Watts are units of power.

3) Set up this circuit



4) Remove the wire from the battery.

Q- Why does the bulb go out?

5) How does electricity in our circuit get from one side of the battery to the other?

Grambo

6 Q- What happens to the electricity when it gets to the bulb?

7 Draw a picture of your bulb here.
Give as much detail as possible.

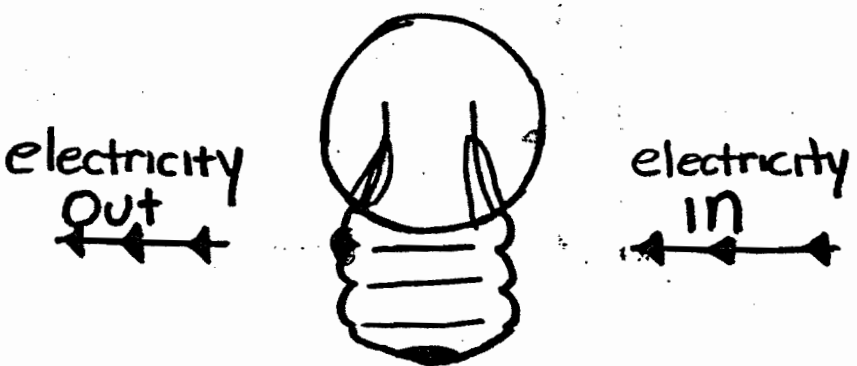
8 Q- What do you think goes on under the metal part?

9 Q- Why do you connect wires to the bottom and side of the bulb to make it go on?

10 Q- How does electricity flow through the bulb?

Homework-

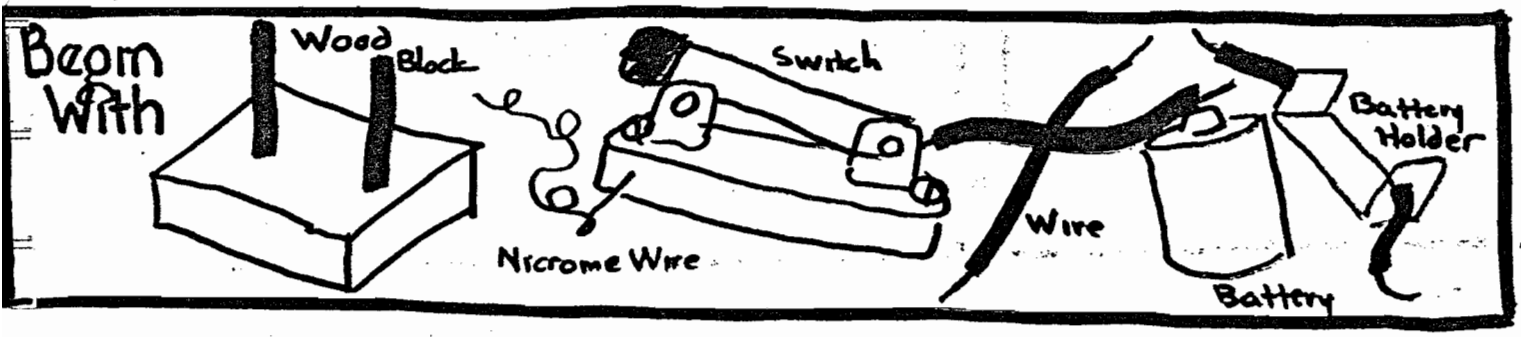
Finish this drawing. Show what happens to the electricity when it goes under the metal part. Trace the path of electricity in, through and out of the bulb in **Red.**



Experiment 14

Class ___ Box No ___

Problem – What is inside a lightbulb?



Have you ever looked in a toaster when making toast?

Describe how it looks

3) Q-Why do the wires inside, glow?

lets try to explain this.

Most wire is like a super highway for electricity. The little cars called <u>electrons</u> can move through the wire very fast. There are some wires that are like a road full of holes and trees. The electricity or electrons move very slowly through this wire. The <u>resistance</u> through this wire causes the electrons that want to move fast, to move slow. Since there is energy that isn't doing anything, the wire gets hot and glows. This kind of wire is found in toasters.

4) Where in a lightbulb will we find this special wire?

5) Q-How do you know this is the wire?

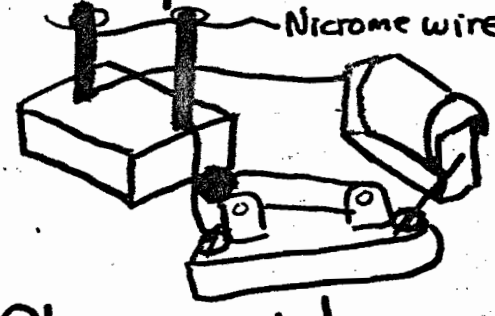
6 Q-Why shouldn't you touch a bulb afer It's been on for a while?

7 Q-Where does the heat come from?

8 Q-Why does the bulb glow?

Lets try to make a bulb. Ask teacher for wood block 

9 Set up this circuit



Close switch

10 Q-Why does the wire glow?

11 Q-How is this like a bulb?

12 How is it different from a bulb?

Mr Edison had a problem when he invented the bulb. He could get the bulb to glow but it wouldn't light up a room.

Q-How do you think he solved his problem?

Q- How can we find out?

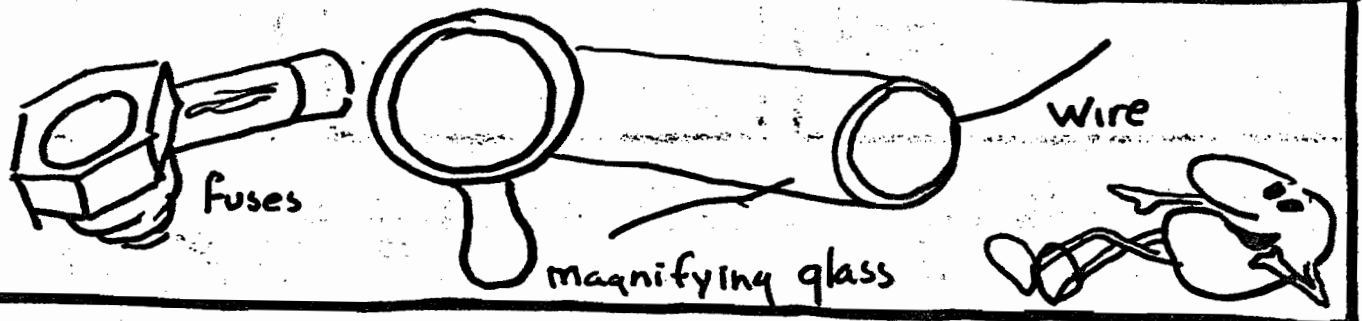
Find out and tell me what he did- Attach that to a seperate sheet of paper, staple to this sheet and hand it in.

Experiment 15

Class___ Box No ___

Problem- What happens if too much electricity gets into a circuit?

1) Begin With



2) Q-Why is the wire on the teachers desk thicker than the wire you use?

3) Q-What might happen if I put alot of voltage through your wire?

4) Q-Why wouldn't you want your house wired with this thin wire?

5) Q-In your house, why do bulbs burn out?

6) Q-Why won't these bulbs work any more?

7) Q-How can a bulb make sure too much electricity does not run through your house?

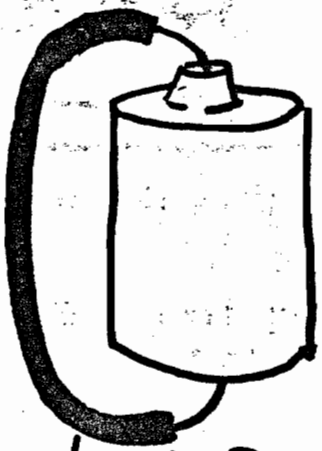
nahouse we don't always want a light on to make sure too much electricity does not get in the house. Instead we use a fuse. It is like a light, but it does not glow

8) look at the fuse.
Q-In what ways is it like a bulb

9) Q-How do you think a fuse works?

10) Q-Why are fuses put in homes, radios, and tape recorders

Electricity is like a car. It has to go somewhere and do something. If you connect the bottom to the top of the battery the electricity will not have a place to go. Since the electrons will move, but do not have a place to go, they begin to heat up the wire. We call this a <u>short Circuit</u>. This can also happen when wires cross and touch causing the electricity to go from one side of the battery to the other without doing anything. Electricity moves through a <u>path of less resistance</u>. This means that if electricity can find an easier path back to the battery without doing anything it will. <u>Fuses will blow out if there is a short circuit.</u>



<u>Homework</u> –

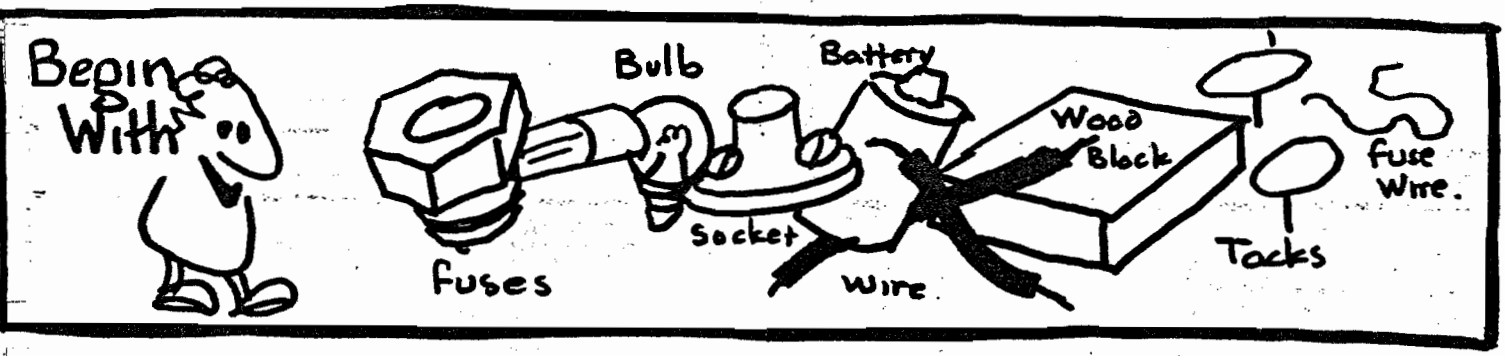
1) What is a fuse? How is it helpful?

2) What is a short circuit? Why is it bad?

Experiment 16

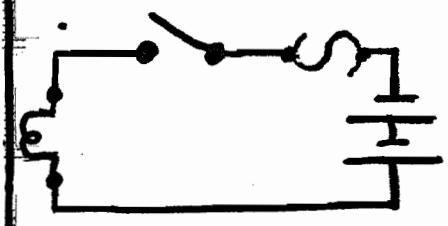
Class____ Box No____

Problem- How can we make a fuse?

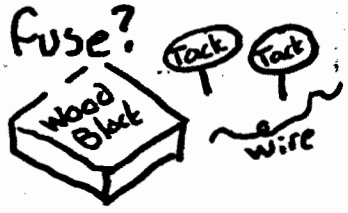


1) Examine a fuse. Draw it here

2) Construct this circuit.



3) Q- How can we use these materials to make a fuse?



Draw it here. (show to teacher)

4) This is the symbol for a fuse.

5) Remove the bulb from the circuit. Again close the switch.

6) Close Switch and describe what happened

8) Describe what happens now.

Grambo

9) Q- Why didn't this happen when the bulb was there?

10) Q- Why is it a good idea to put fuses in circuits?

11) Q- Why do we have fuses in our house?

12) Q- How can we test to see if fuses are good?

Fuse (Yes, No,)

1.____ 2.____ 3.____ ____ ____ ____ ____ ____

Homework

1) Explain this statement:
A fuse is the weakest link or part of an electric circuit.

2)- Define

Short Circuit –

Overload –

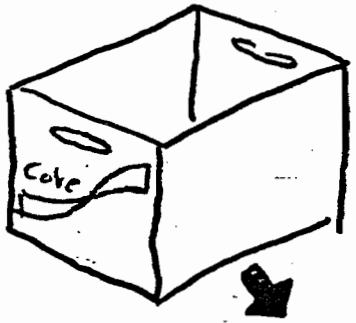
Chapter Two

Inference Boards

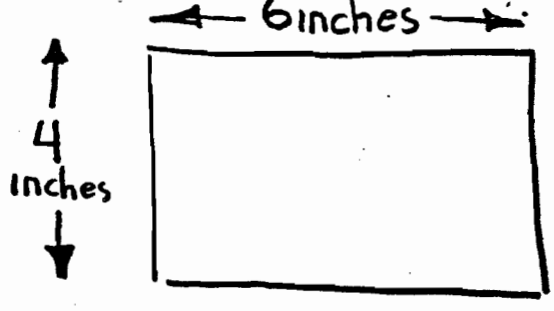
Instructions for making Inference Boards

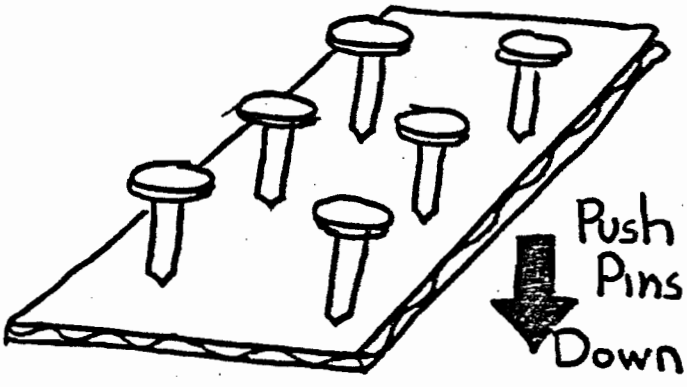
Materials Needed for each Inference Board.

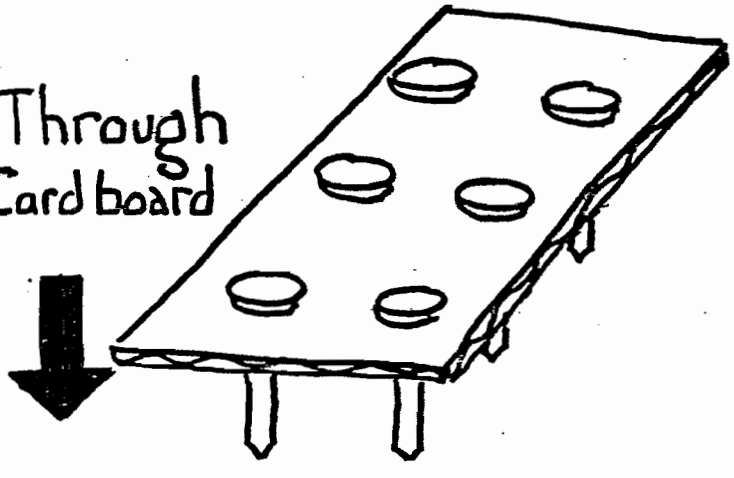
Quantity	Description
2	4inch x 6inch Cardboards
6-8	Paper fastners
1-4	Wire
4	Paper Tape
1	Instruction Sheet

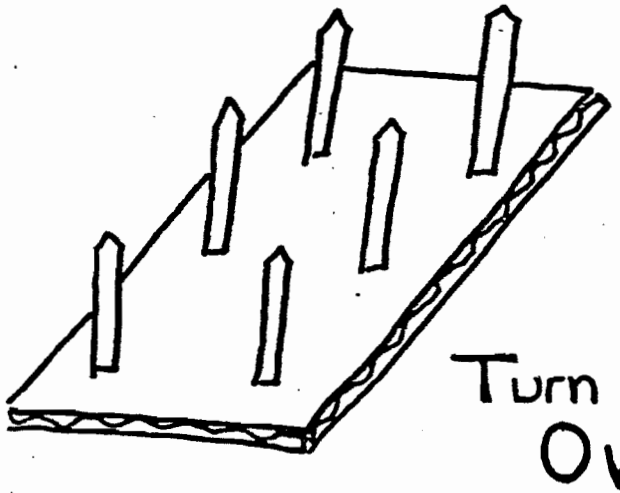


Cut 4inch by 6inch cards outof a cardboard box



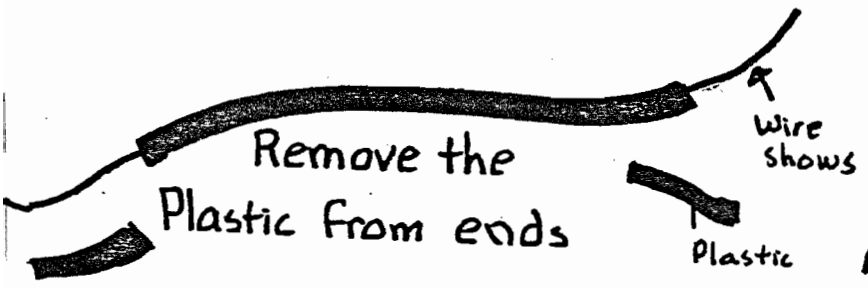




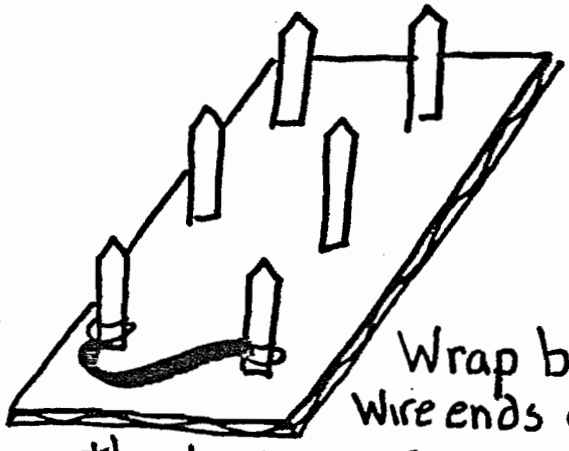


Turn card Over

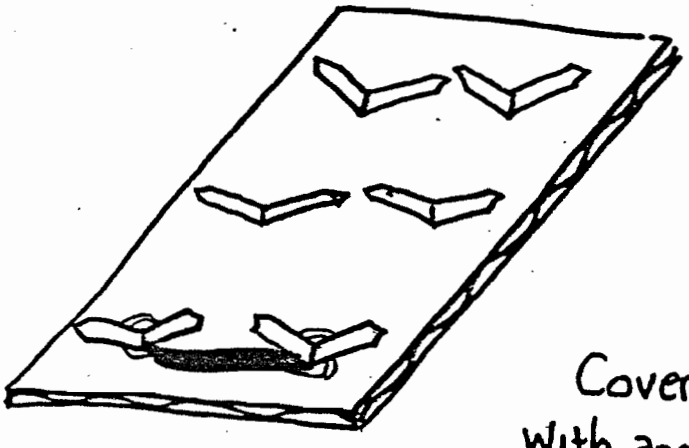
Cut small pieces of Wire



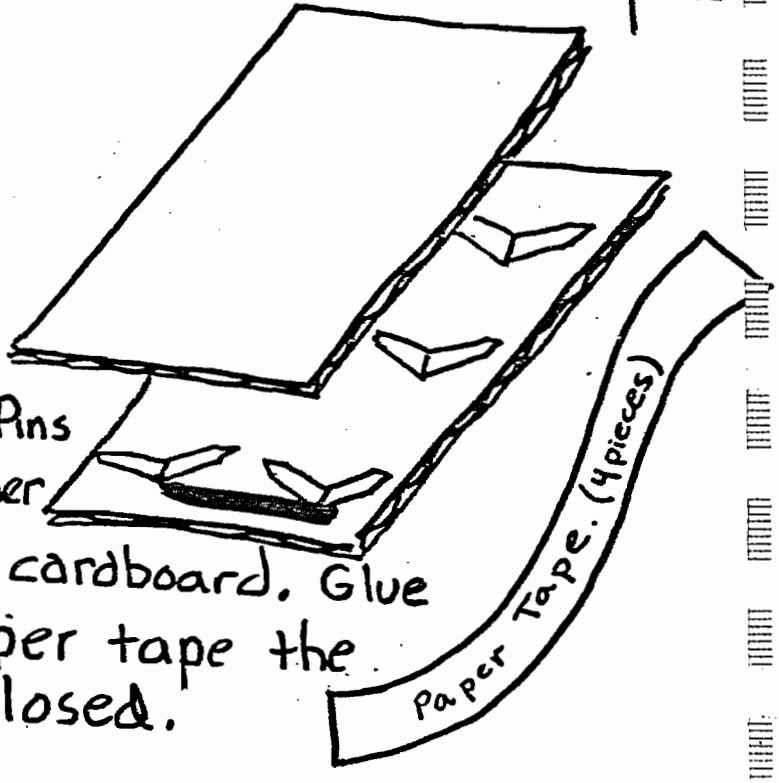
Remove the Plastic from ends



Wrap bare Wire ends around the bottom of the pins.

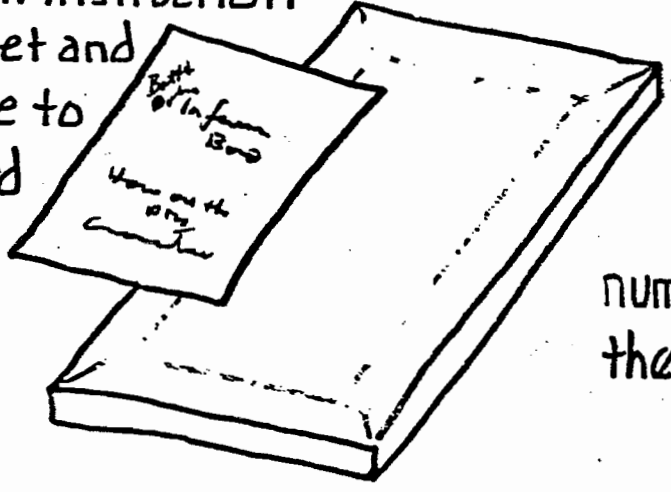


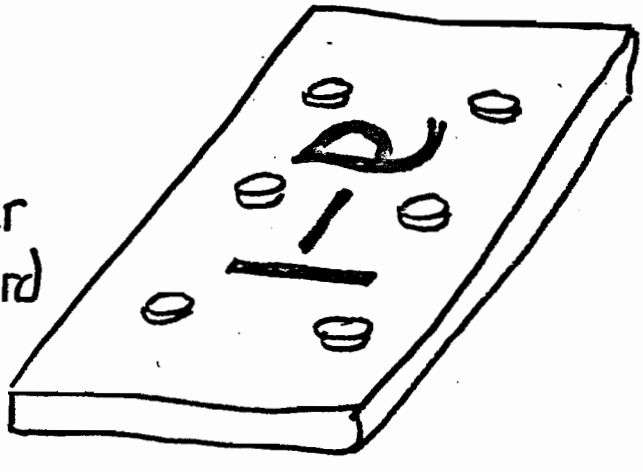
Bend Pins over



Cover Pins With another Piece of cardboard. Glue and paper tape the card Closed.

Print Instruction Sheet and glue to Card





number the card

Thick cardboard makes sure students can't feel for the wires. They must look to see how they are

Batteries and Bulbs

Inference Board

How are the pins connected ?

Batteries and Bulbs

Inference Board

How are the pins connected ?

Batteries and Bulbs

Inference Board

How are the pins connected ?

Batteries and Bulbs

Inference Board

How are the pins connected ?

Name_____

Class___Box No_____

Prediction Sheet for Inference Boards

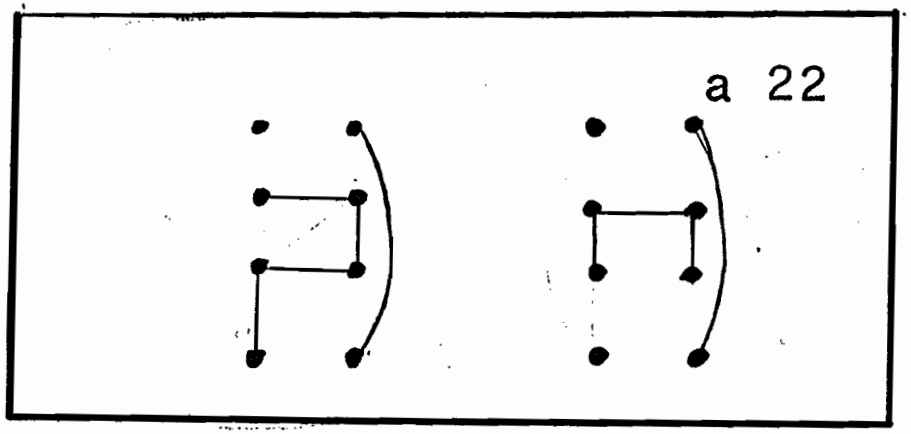
a-1	a-7	a-13	a-19
a-2	a-8	a-14	a-20
a-3	a-9	a-15	a-21
a-4	a-10	a-16	a-22
a-5	a-11	a-17	a-23
a-6	a-12	a-18	a-24

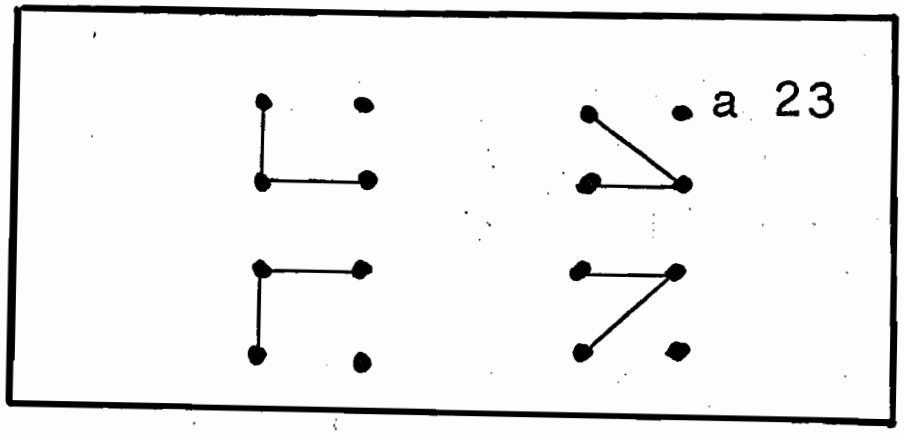
Batteries
and Bulbs

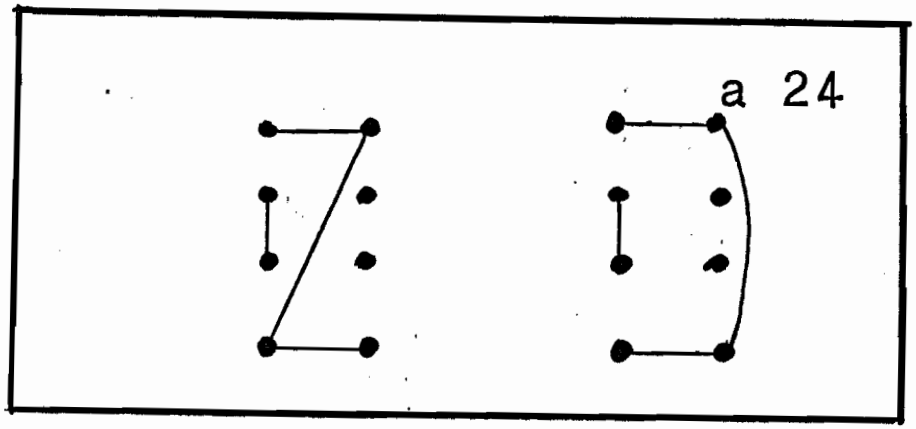
Batteries and Bulbs

Inference Boards

Answer Key







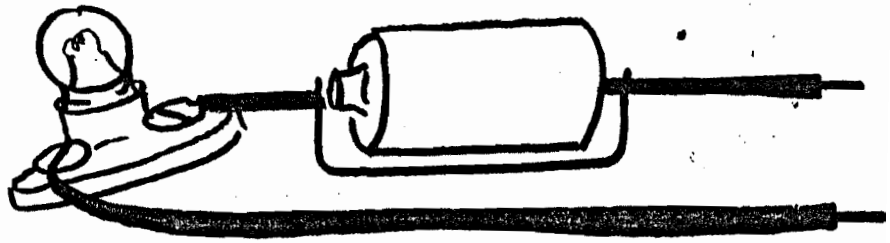
Inference Boards

Instructions

Materials

There are twenty four different inference boards. All are wired from inside.

Make or allow students to make a tester for the boards as shown.



Opening Questions

Q- What is inside the inference boards?

Q- How can we find out without pulling it open?

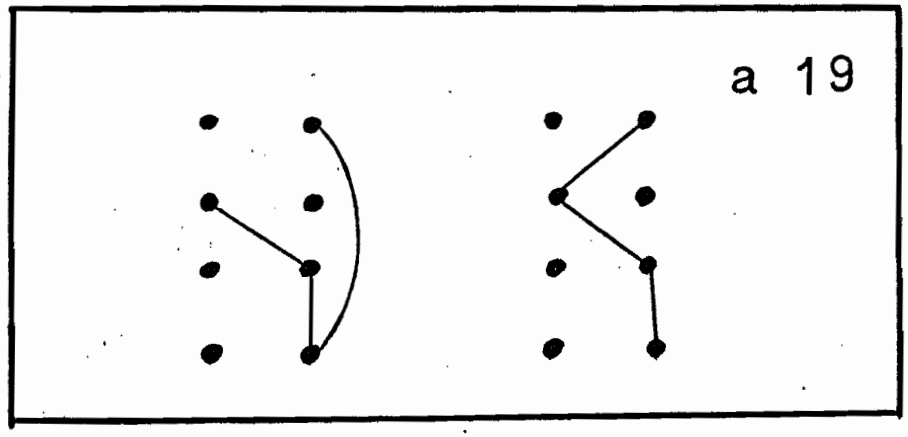
Allow students to touch, press, and examine the boards to try to figure out what is in them. Some students may suggest the use of a testing device. If not, you may have to sugges the use of one. Let students keep a record of the buttons they think are connected, in thei log books. When they are sure of themselves, have them record their findings on the infere sheets, and collect them.

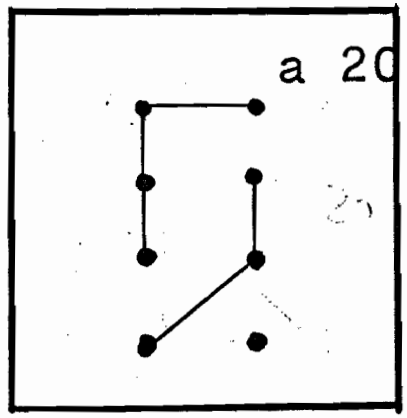
Make sure students do not pull open the inference boards.

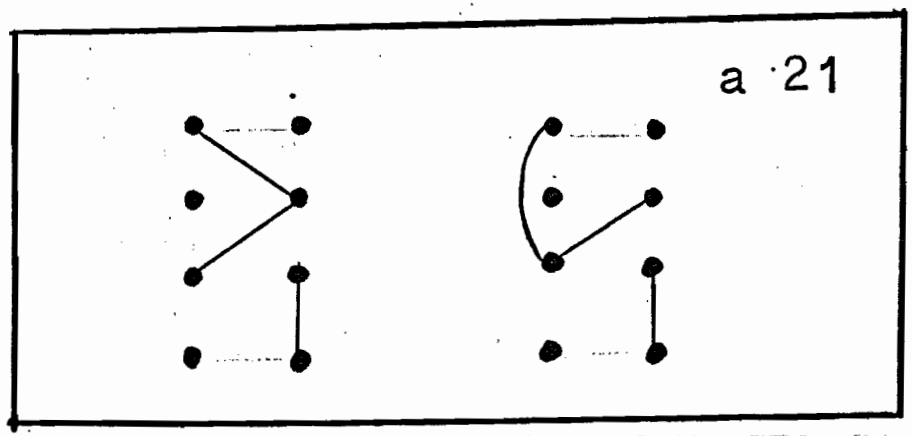
Activities

See which buttons are connected to which buttons. See which buttons are not connected. Why does the bulb light when you touch some buttons and not others? What methods were used to figure out which buttons were connected?

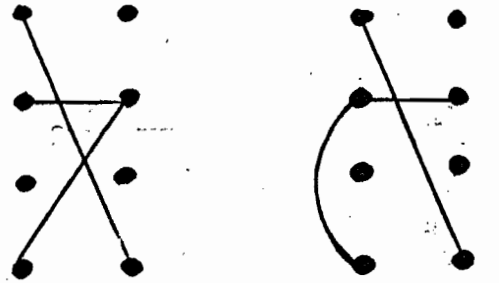
After predictions are made on the prediction sheet, the should be compared to the following key. Corrections should be made as soon as possible, so work may be returned to the children.





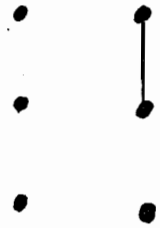


a 15



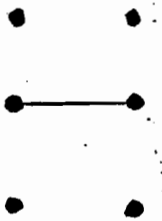
a 1

a 2



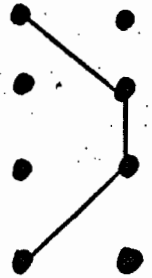
a 16

a 3

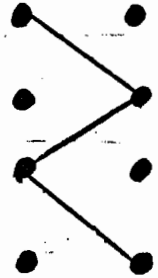


a 4

a 17

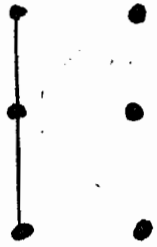


a 18



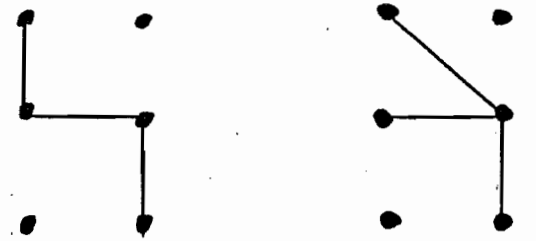
a 5

a 6



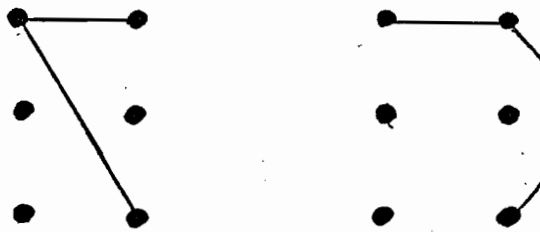
Grambo

a 7

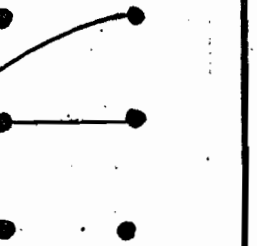


a 11

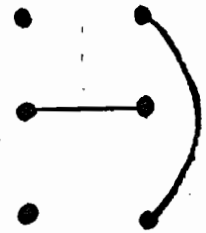
a 8



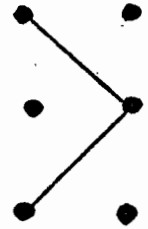
a 12



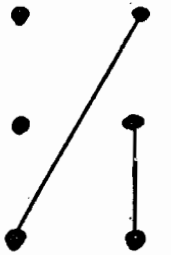
a 13



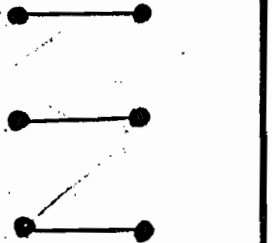
a 9



a 10



a 14

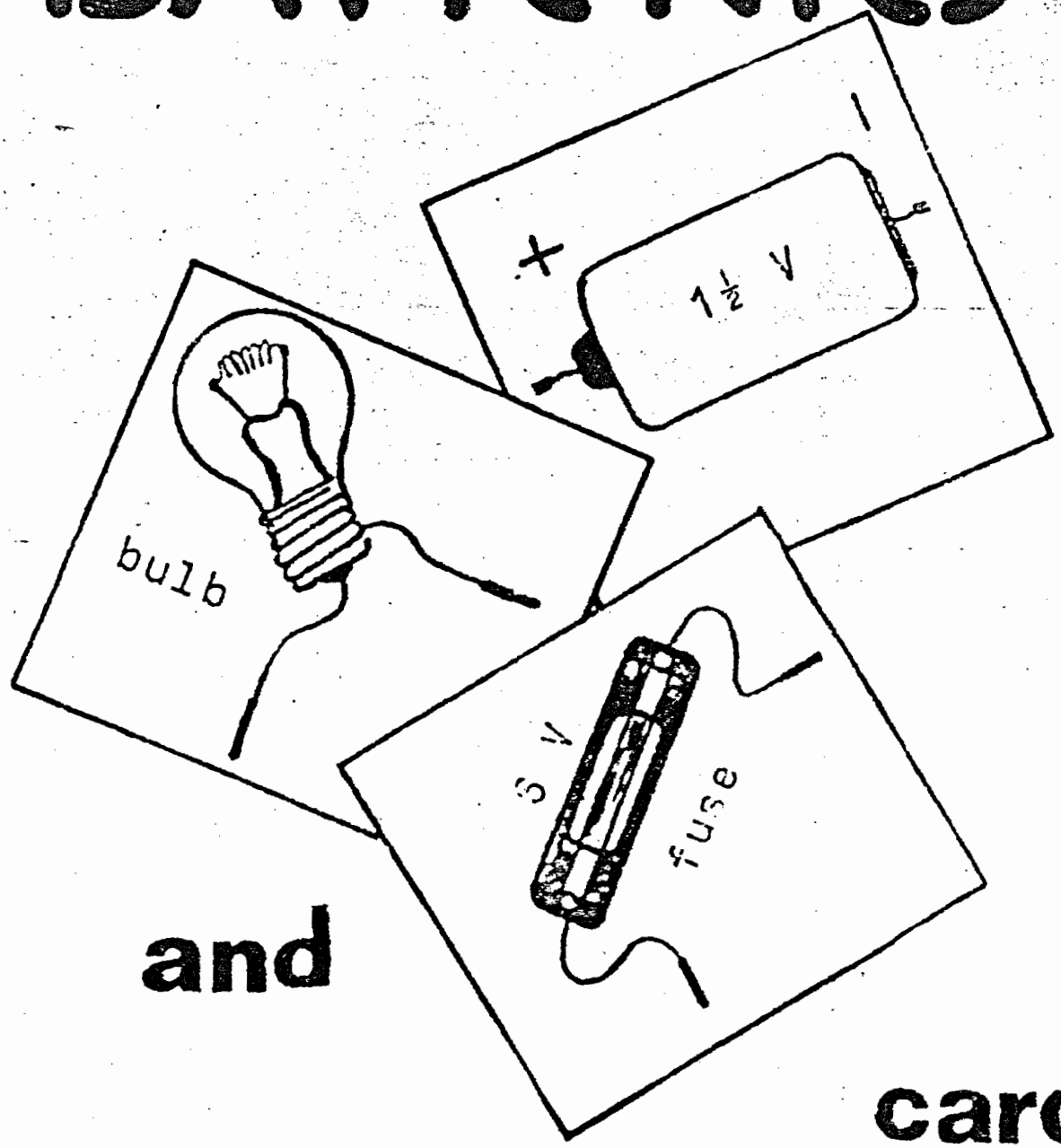


a-15 to a-24 have eight pins rather than six. Children should put answers on seperate sheets.

Chapter Three

Batteries and Bulbs
Card Game

BATTERIES



and

BULBS

card game

Batteries and Bulbs- Rules

The object of the game is to create circuits while collecting points. Each card has a point value. The player with the highest score wins.

To Begin

Each player is delt four cards.

To Play

The game is played clockwise around the table. A player places a card on the table, face up, then picks another card from the deck. Point values for the cards are added to the players score as the cards are played. The game continues until a circuit is made. Any cards left in the players hand are subtracted from the players score.If a mistake is made , double the card score is subtracted from the players score. If a player puts a card down and picks it up again the value of that card is subtracted from the players score.

Card Values

Straight Wire	- 1	Plug	- 6
Bent wire	- 2	Switch	- 5
Crossed wire	- 2	T wire	- 4
Light Bulb	- 4	Bell	- 3
Fuse	- 10		
Battery	- 8		

Batteries and Bulbs- Rules

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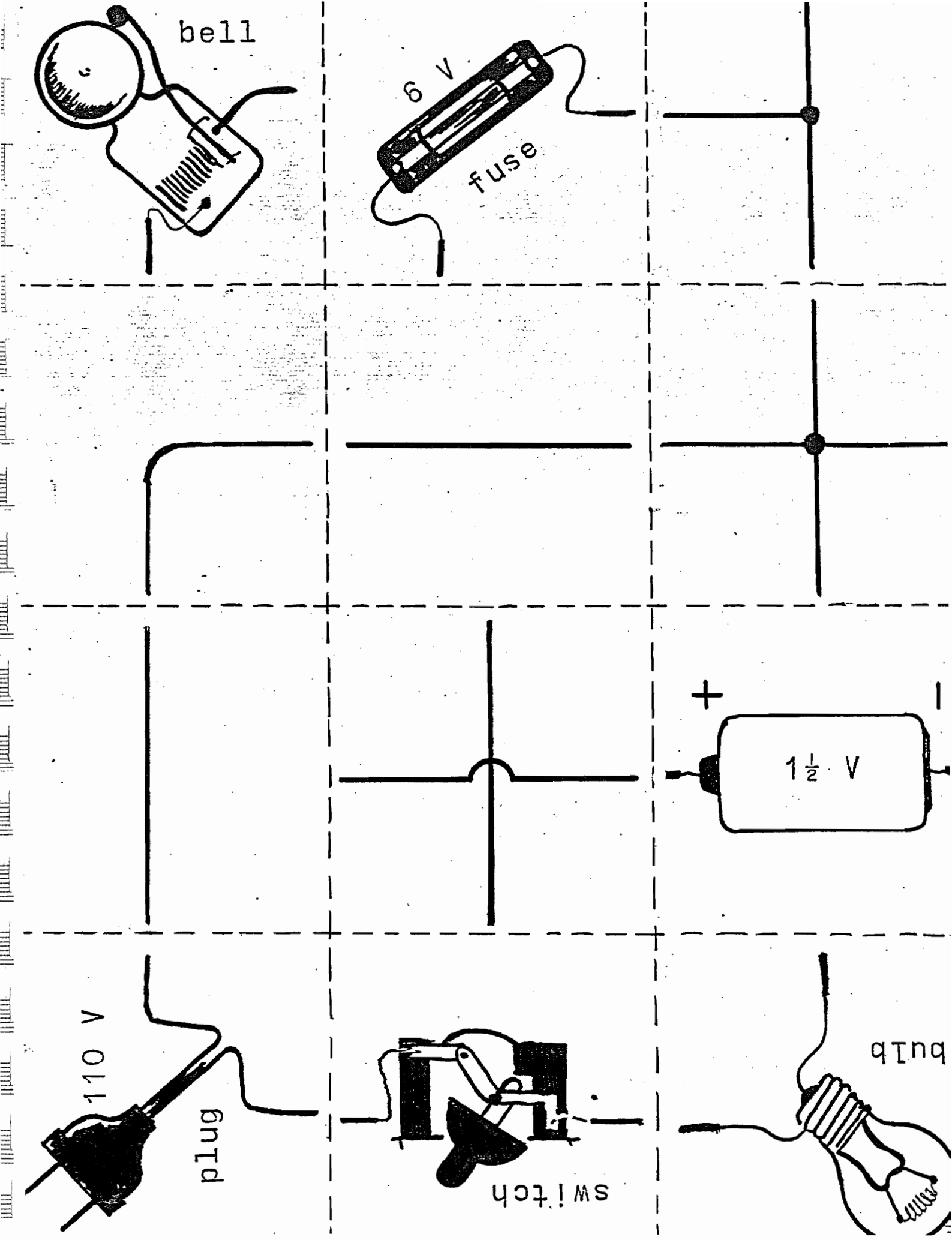

bell
6 V
fuse
+
1 ½ V
110 V
plug
switch
bulb

110 V
fuse
bulb
switch
1½ V
−
+

Appendix

Name _____

Class ___ Box No ___

Batteries and Bulbs

Quiz on experiments 1-5

1)- What is a battery?

2)- How is a battery like a storage chest?

3)- Using these materials - Draw a picture to make the bulb light.

4)- What is a schematic Diagram?

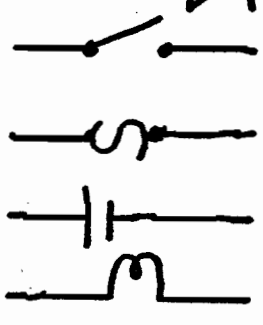
5) Match the symbols to the equiptment

Battery

Bulb

Fuse

Switch



Name _____

Class _____ Box No _____

Batteries and Bulbs.

Quiz on experiments 6-10

1) What is a light bulb?

2) How is wire like a road for electricity?

3) Define-

Conductor -(not for a train)

Non-conductor—

4) Draw 2 ways we can light 2 bulbs with 1 battery

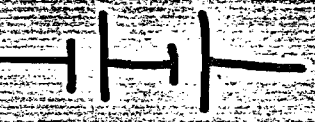
5) You have 2 bulbs, sockets switches a battery and wire. Connect them in series then parallel. Draw schematic diagrams on the back and label the drawings.

Name _____

Class___ Box No ____

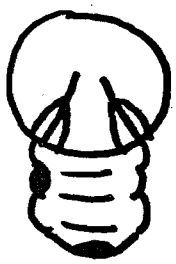
Batteries and Bulbs

Quiz on Experiments 11-15

1) What happens to the Voltage in a circuit if we connect the batteries like this? 

2) What is another way to connect 2 batteries in a circuit? What do we call these 2 ways?

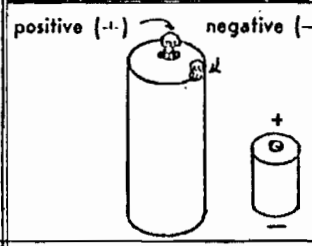
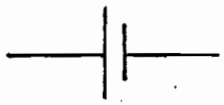
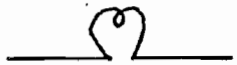
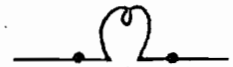
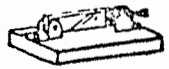
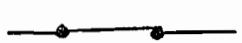
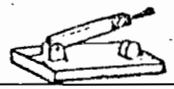
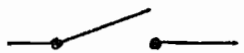
3) Finish this drawing. Show how electricity moves through a bulb



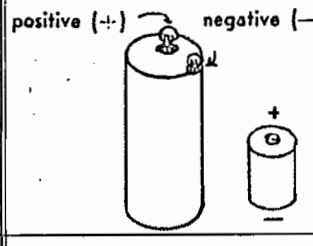
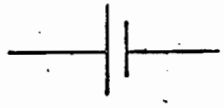
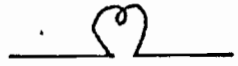
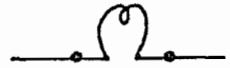
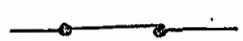
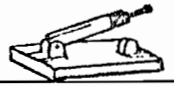
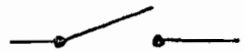
4) Why does the wire in a bulb glow?

5) What is a fuse? Why is it important?

The language of electricity

	PICTORIAL	SCHEMATIC
dry cell		
wire		
lamp bulb		
lamp bulb in socket		
switch (closed)		
switch (open)		
fuse		

The language of electricity

	PICTORIAL	SCHEMATIC
dry cell		
wire		
lamp bulb		
lamp bulb in socket		
switch (closed)		
switch (open)		
fuse		

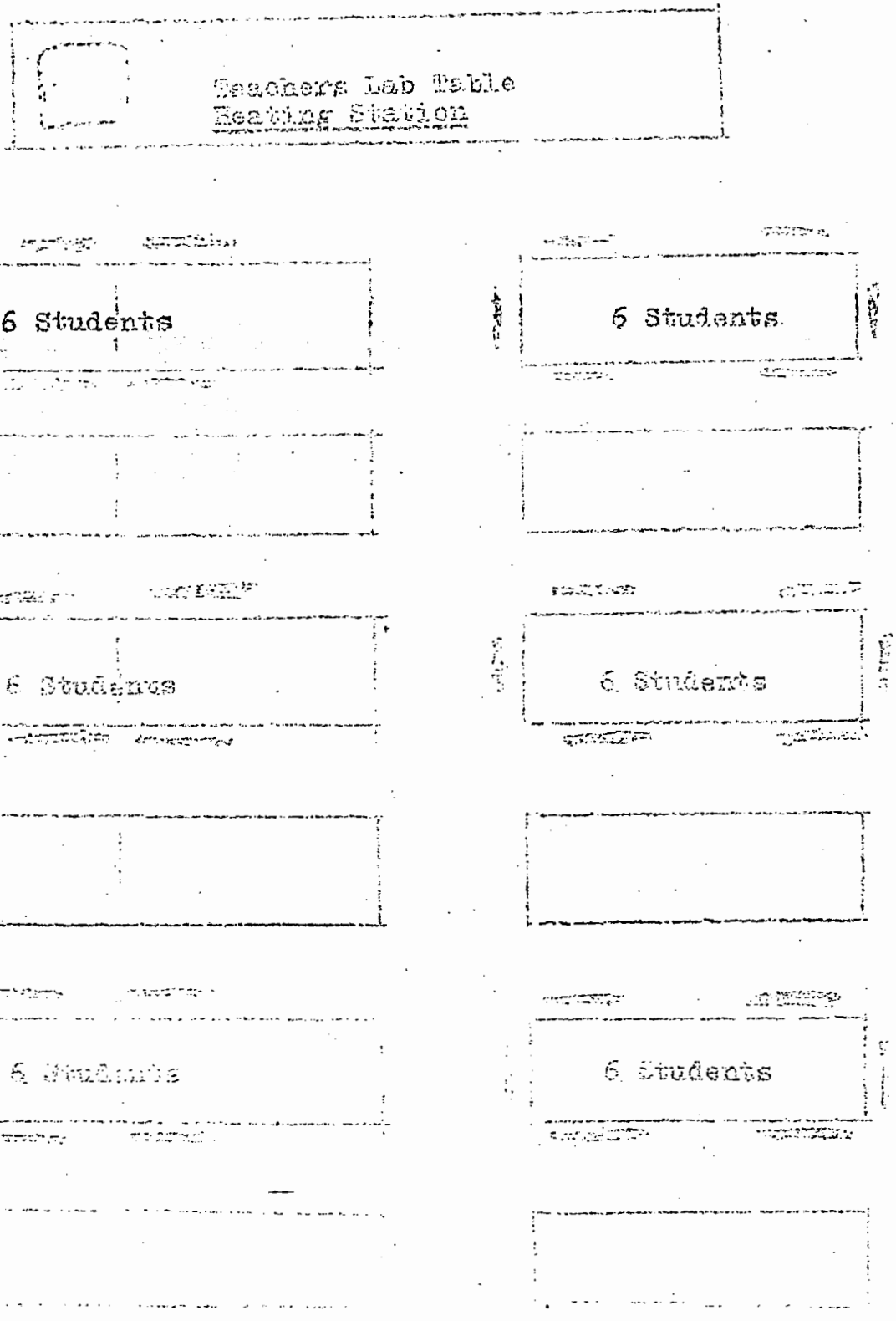
Batteries and Bulbs
Electricity

Materials List –

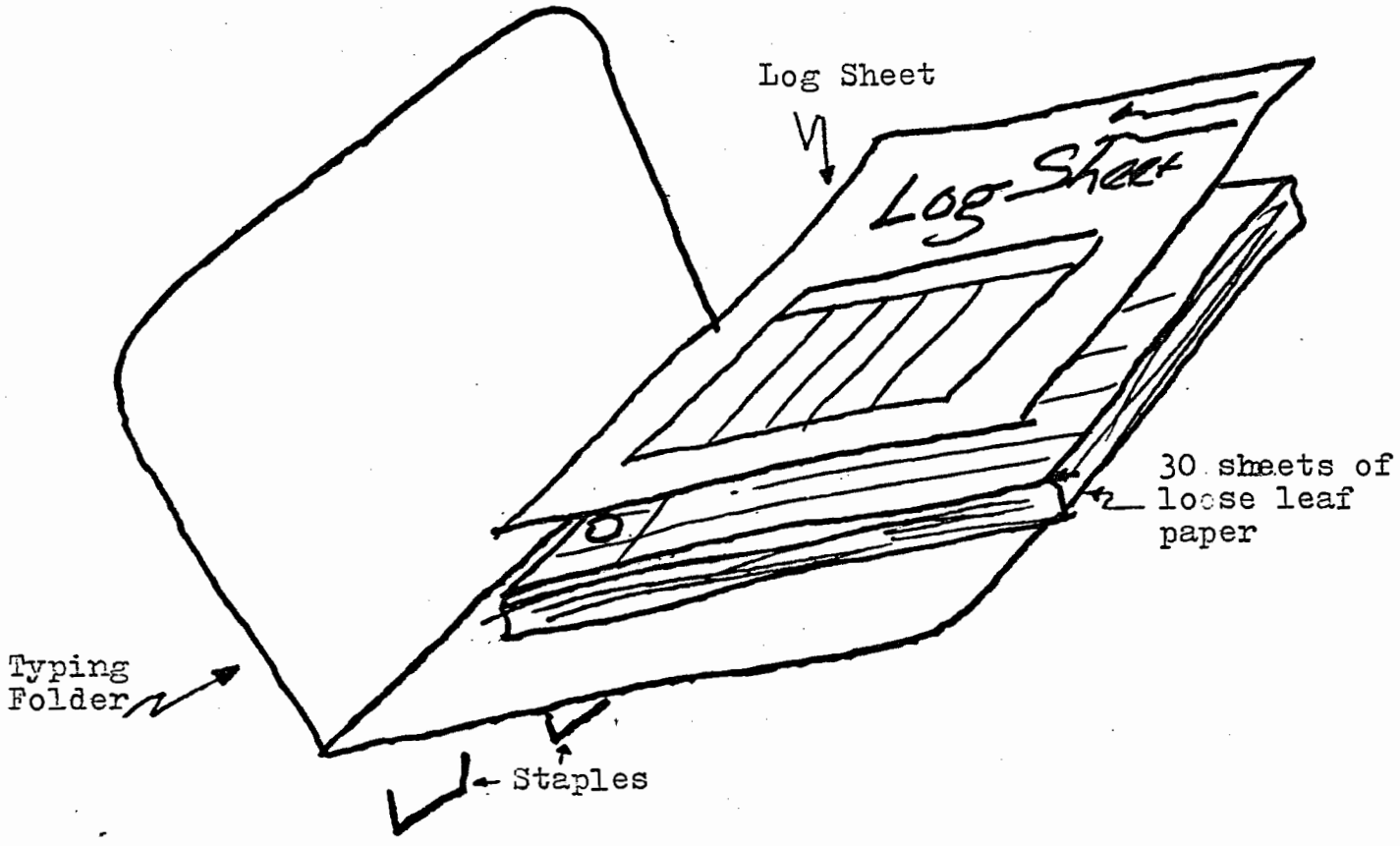
Your group is responsible for all materials in your box. Keep them neat and clean. Report missing materials to your teacher.

- Wire
- Screwdriver
- 6 Light bulbs
- 2 bulb sockets
- 2 switches
- Battery
- Battery Holder (when needed)
- Fuses (Various Sizes)
- Magnifying Glass
- Rubber Bands
- Thumb Tacks
- Paper Clips
- Nails
- Magnet

How to Set Up Room For Group Work



How To Set Up A Log Book



Bind 30 sheets of paper along with the log sheet into a typing filder. Staple folder closed so papers will not fall out. Place students name and class at the top of the folder. Students may wish to decorate their folders. Pass out folders at the beginning of the period. and collect them at the end. Store folders in a milk crate of in a box. Students will write a summary of each days experiment into the log book. Periodically check log books.

Name _____

Class ___ Box No. ___

Science Log Book

Dates From	To	Pages	Teacher's Comments	Checked By

Grambo

Batteries and Bulbs

Name_____

Class___Box No___

My Electricity Dictionary

Ammeter-

Amperes-

Amps-

Battery-

Battery Holder-

Bell-

Bulb-

Bulb Socket-

Circuit-

Coil-

Conductors-

Dry Cell-

Electrolyte-

Filament-

Fuse-

Insulator-

Lamp –

Magnet –

Non Conductor –

Parallel –

Parallel Circuit –

Path –

Schematic Diagram –

Series –

Series Circuit –

Short Circuit –

Switch –

Symbols –

Threads –

Voltage –

Volts –

Volt Meter –

Wire –

_____ –

_____ –

_____ –

_____ –

_____

Comic Books You May Wish To Order

Consolidated Edison
Consumer Education
4 Irving Place, Room 1625-S
N.Y., N.Y. 10003

Where the little light bulb gets its juice.

The story of electricity.

A century of light.

Mr. Edisons Dilema.

Radio Shack
Tandy Corporation

The science fair story of electronics.

You may order up to 35 copies of each comic book. Write letter on school letterhead. Have students read then write a summary of what they read, or have questions based on the comic books.