

NAME:

CLASS:

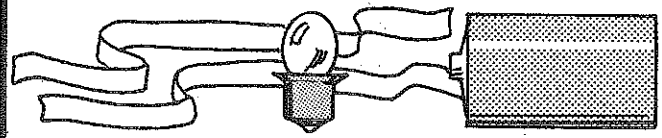
Bulbs and Batteries H-2

TO LIGHT OR NOT TO LIGHT



Find a friend who also has a bulb and dry cell. Then solve each puzzle below and draw what you discover.

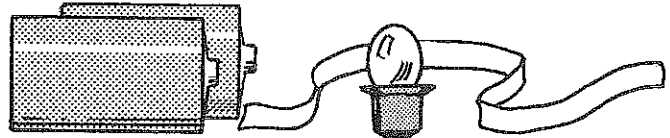
a. Light a bulb without touching it to the dry cell. (You may use 2 foil ribbons.)



(1) It lights:

(2) No light:

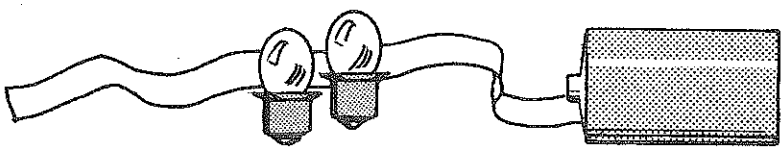
b. Make the bulb shine extra bright with 2 dry cells and 1 foil ribbon.



(1) It lights:

(2) No light:

c. Experiment with 2 bulbs plus 1 dry cell and 1 foil ribbon.



(1) Two shine bright.

(2) Two shine dim.

(3) One shines bright.

(4) No light.

2 Where are the two main contact areas. . .

a. . . on a dry cell?

b. . . on a bulb?

NAME:

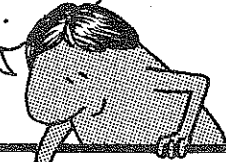
CLASS:

Bulbs and Batteries H-3

LIGHT BULB PREDICTIONS

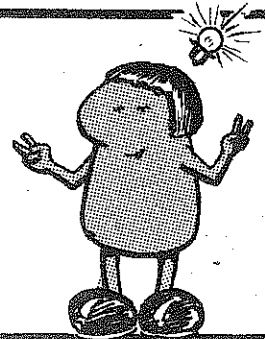
In the tables below, first guess whether the dry cell lights the bulb.

Write your prediction next to each hook-up.



After you predict, experiment to see if you are right. Write each result in the tables.

REMEMBER HOW MANY CONTACT POINTS MUST CONNECT TO MAKE THE BULB LIGHT!



HOOK-UP	PREDICTION Will it light?	RESULT Did it light?	HOOK-UP	PREDICTION Will it light?	RESULT Did it light?
	a1.	a2.		d1.	d2.
	b1.	b2.		e1.	e2.
	c1.	c2.		f1.	f2.



2 You are now an expert on how to light a bulb. Write directions for someone who doesn't know how:

PSSST... REMEMBER TO TALK ABOUT CONTACT POINTS.



NAME:

CLASS:

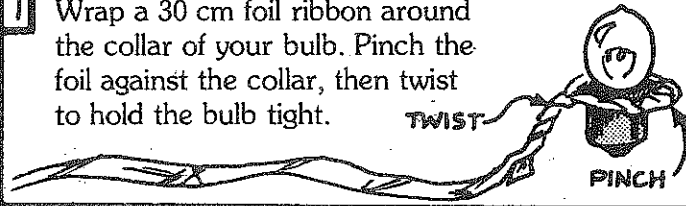
Bulbs and Batteries H-4

SERIES MEANS IN A ROW

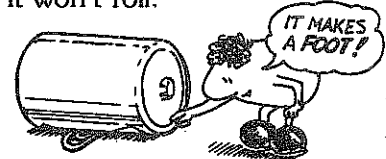
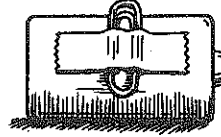
1 Wrap a 30 cm foil ribbon around the collar of your bulb. Pinch the foil against the collar, then twist to hold the bulb tight.

TWIST

PINCH



2 Tape a paper clip to the side of your dry cell so it won't roll.



3 If the bulb shines "dim" with 1 cell, find out how it shines with more cells connected in a series. Tell if it shines bright, medium or dim.



a.



b.

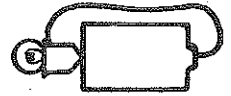


c.



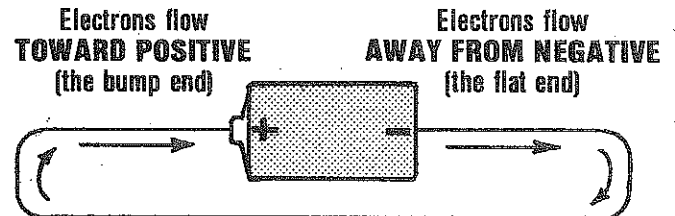
d.

SERIES



e.

f. What happens as you add more cells in series?



g. Which way do electrons flow in circuits "a" through "e"?

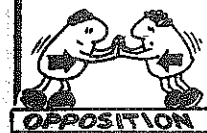


CLOCKWISE



COUNTERCLOCKWISE

4 If the bulb shines "dim" with 1 cell, tell how it shines with more cells connected in *opposition* and *series*: bright, medium, dim or not at all.



OPPOSITION



a.



b.



c.



d.



e.

f. Cells "b" are in opposition. What other cells are in opposition?

Cells "c" are in series. What other cells are in series?

g. Tell how electrons flow through each circuit; clockwise or counter clockwise.

- a.
- b.
- c.
- d.
- e.

h. Why do cells "d" give less light than cells "e"?

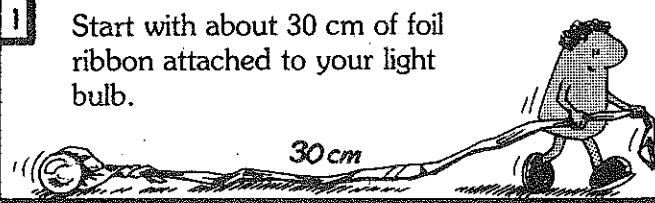
NAME: _____

CLASS: _____

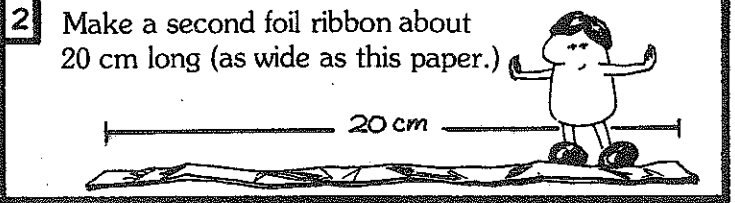
Bulbs and Batteries H-5

PARALLEL MEANS SIDE BY SIDE

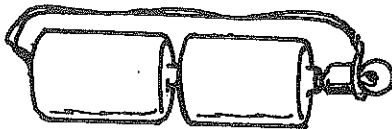
1 Start with about 30 cm of foil ribbon attached to your light bulb.



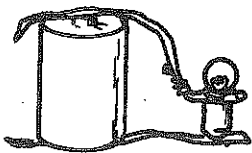
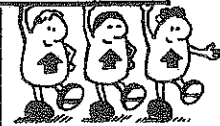
2 Make a second foil ribbon about 20 cm long (as wide as this paper.)



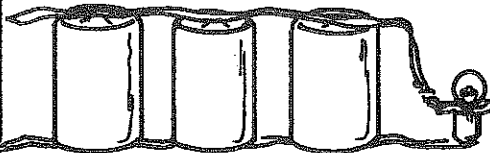
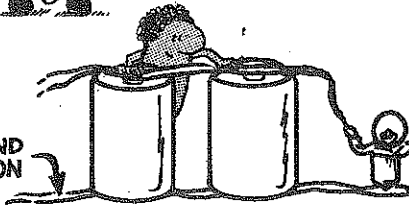
3 If the bulb shines *medium* with 2 cells in *series*, find out how it shines with cells connected in *parallel*: bright, medium or dim.



PARALLEL



SECOND RIBBON



e. Finish each sentence.

When you add more cells in parallel, the bulb. . .

To make a bulb shine brightest, it is best to connect. . .

4 Predict how each bulb shines: bright, medium, dim or not at all. Then experiment to see if you are right.

FIRST PREDICT, THEN EXPERIMENT!



	PREDICTION	RESULT
a.	a1.	a2.
b.	b1.	b2.
c.	c1.	c2.
d.	d1.	d2.
e.	e1.	e2.

f. Tell how the cells are connected in each circuit.

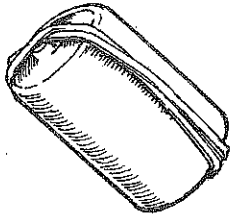
- a. *series* d.
- b. e.
- c.

NAME:

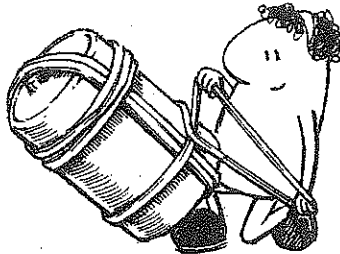
CLASS:

CONDUCTOR OR INSULATOR?

1 Wind 3 rubber bands around your dry cell as *tightly* as you can.

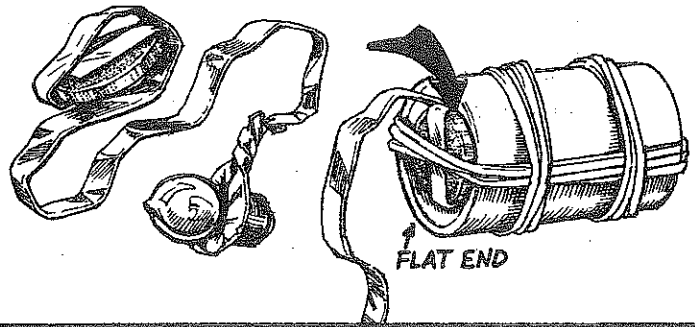


FIRST
wind one
the long way.

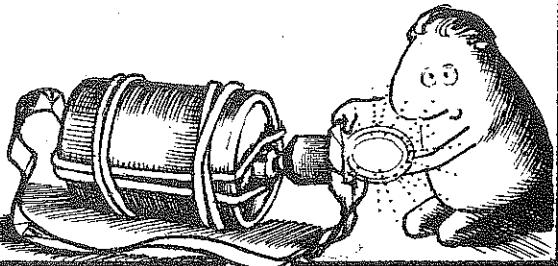


THEN
wind two
the short way.

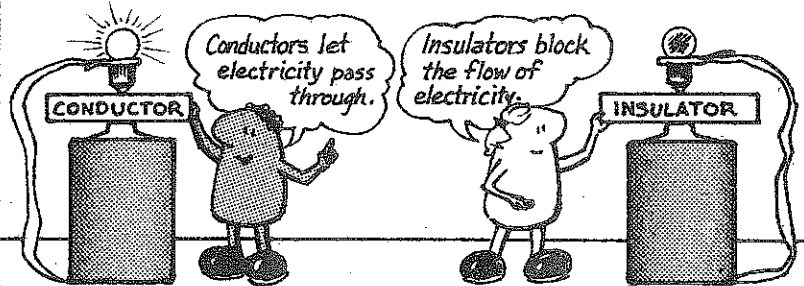
2 Wrap the free end of your ribbon and bulb 2 times around a coin. Slide this coin between the *flat* end of the dry cell and the rubber band.



3 Slide the rubber band off the bump on your dry cell. Check to see that the bulb lights.



4 Use your bulb and dry cell to make a list of conductors and insulators. Fill in the table below.



a. WASHER? PENNY? GLASS? WOOD? CHALK

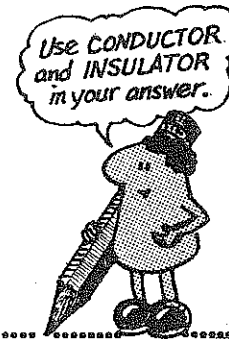
CONDUCTORS	INSULATORS
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

b. How are conductors alike?

.....
.....
.....

c. Would foil ribbons work if we folded the tape to the outside and the foil inside? Explain.

.....
.....
.....



NAME: _____

CLASS: _____

Bulbs and Batteries H-7

ELECTRIC PUZZLE

1 Fold 2 sheets of paper into quarters.

2 Draw 6 numbered circles on one of the papers like this.

3 Cut out each circle: bend the paper and cut into the folded edge.

4 Tape foil over the holes so some are connected and others are not.

Use the unnumbered side.

KEEP SHINY SIDE UP

5 Cover with the other folded paper so no one can see which holes are connected.

6 Fasten with 2 paper clips. Write your name on the puzzle.

7 Unbend a paper clip. Slide it between the bump end of your dry cell and the rubber band.

8 Trade your puzzle for a friend's. Use your bulb and dry cell to find out which holes are connected with foil.

9 Record your results in a table.

WHOSE PUZZLE?	PREDICT WHICH HOLES JOINED.	RIGHT OR WRONG?
a.		
b.		
c.		

Remove the cover to see if you are right. . .

...then put the puzzle back together so someone else can try.

NAME:

CLASS:

Bulbs and Batteries H-1

IT WORKS!

1 Stick 30 cm of masking tape to a narrow strip of aluminum foil.

30 cm is a little longer than this page.

2 Cut around the inside edge of the masking tape.

CUT ALL AROUND

Remove all excess foil.

3 Fold the ribbon along its length; foil side out, tape side in.

TAPE FOIL

4 Crease the fold along the edge of your table.

5 Use your foil ribbon to light a bulb with a dry cell.

How to make it light?

6 Draw your results below using pictures like these.

DRY CELL

BULB

RIBBON

These work: a1.

Draw 3 different ways you tried that WORKED!

b1.

c1.

These don't work: a2.

Also draw 3 different ways you tried that DIDN'T WORK!

b2.

c2.

TAPE YOUR RIBBON TO YOUR DRY CELL