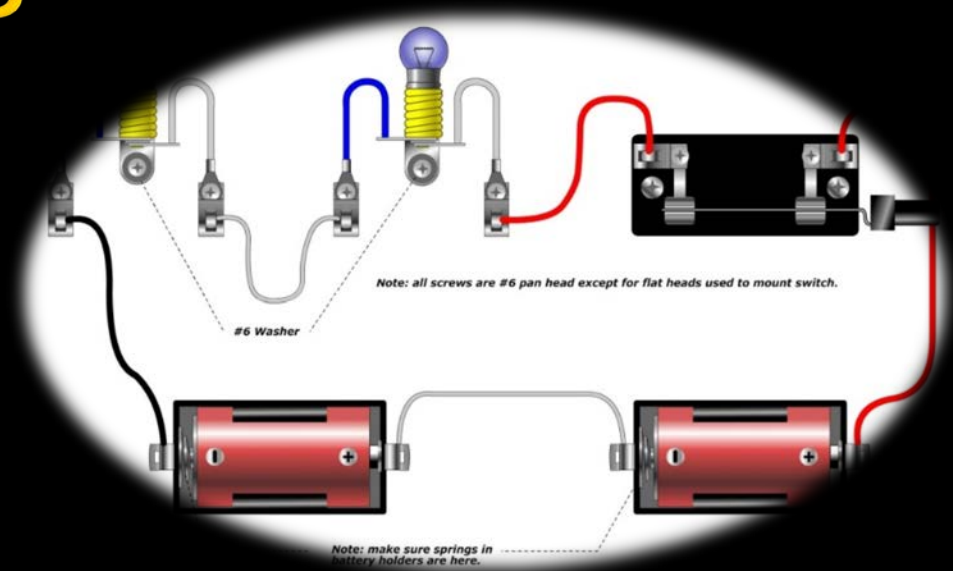


# Using Challenge-based Learning Strategies to teach Basic Electricity Concepts and Skills to Youth



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# Challenge-based Learning is:

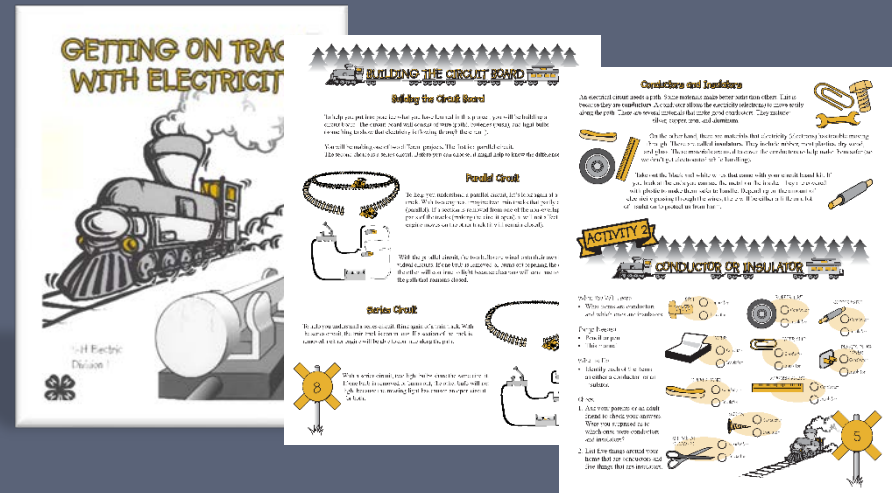
- collaborative
- hands-on
- students working with other students, their teachers, and experts in their communities and around the world

**to develop deeper knowledge**

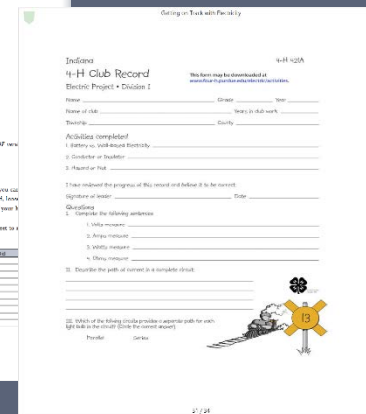
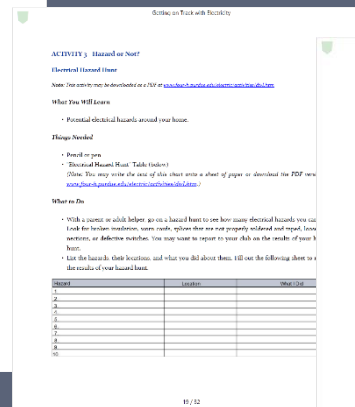
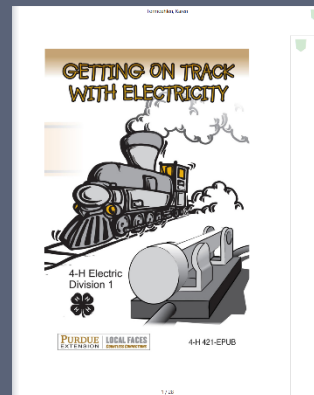
# Learning Resources

## 1. Electricity for Youth I Manual

- Paper-based



- E-pub

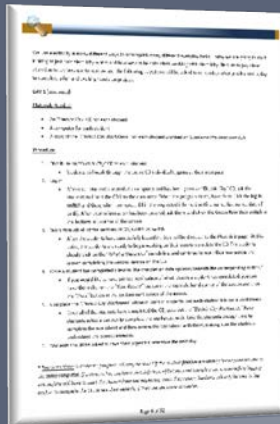




# Learning Resources

## 3. Teacher resource

- Lesson plans
- State education standards
- Hands-on activities



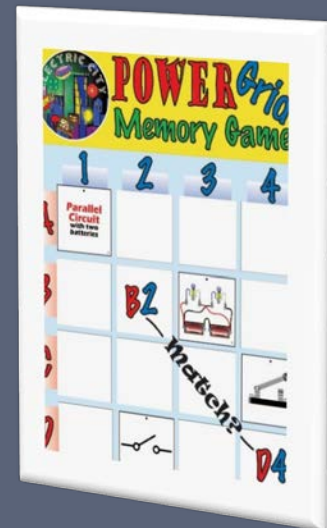
Grade 5

Looking On Track with Electricity

|  | English Language Arts | Mathematics | Science   | Social Studies |
|--|-----------------------|-------------|-----------|----------------|
| 1. Identify the author's purpose.                | 5.5.1.2               | 4.0         | 5.7.4     | 4.0            |
| 2. How does electricity travel through wires?    | 5.5.2.2               | 4.0         | 5.3.1.1   | 4.0            |
| 3. Conductors vs. Insulators                     | 5.5.1.2               | 4.0         | 5.1.3.1.0 | 4.0            |
| 4. List the safety rules when using electricity. | 5.5.1.2               | 4.0         | 4.0       | 4.0            |
| 5. Hazardous?                                    | 5.5.1.2               | 4.0         | 4.0       | 4.0            |
| 6. Building the circuit board                    | 5.5.1.2               | 4.0         | 5.1.1     | 4.0            |
| 7. Earth's magnetic field                        | 5.5.1.2               | 4.0         | 5.1.1     | 4.0            |

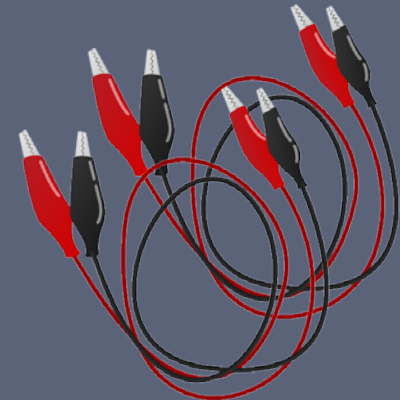
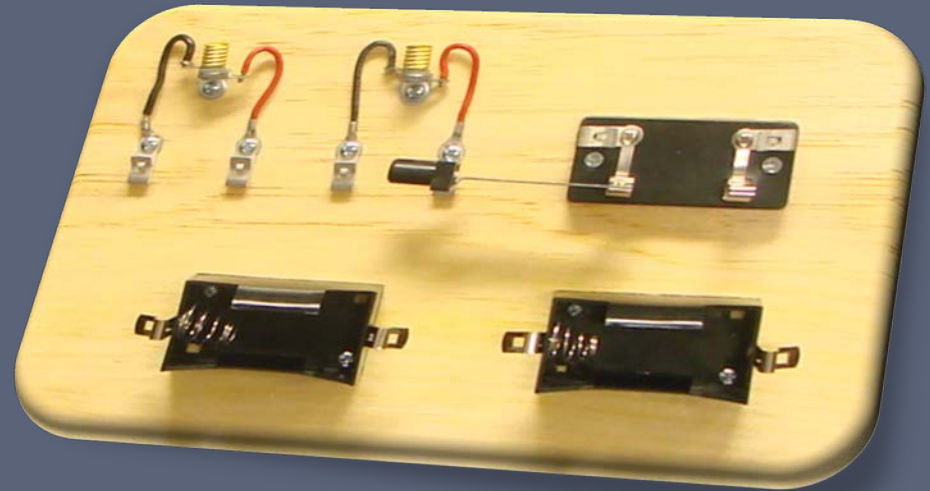
  

|                              | English Language Arts | Mathematics | Science   | Social Studies |
|------------------------------|-----------------------|-------------|-----------|----------------|
| 1. What is conductivity?     | 5.5.1.2               | 4.0         | 5.7.4     | 4.0            |
| 2. Switch                    | 5.5.2.2               | 4.0         | 5.3.1.1   | 4.0            |
| 3. Conductors and insulators | 5.5.1.2               | 4.0         | 5.1.3.1.0 | 4.0            |
| 4. Why do we use?            | 5.5.1.2               | 4.0         | 4.0       | 4.0            |
| 5. Safety                    | 5.5.1.2               | 4.0         | 5.1.1     | 4.0            |
| 6. Storing                   | 5.5.1.2               | 4.0         | 5.1.1     | 4.0            |
| 7. Metals or not?            | 5.5.1.2               | 4.0         | 5.1.1     | 4.0            |



# Learning Resources

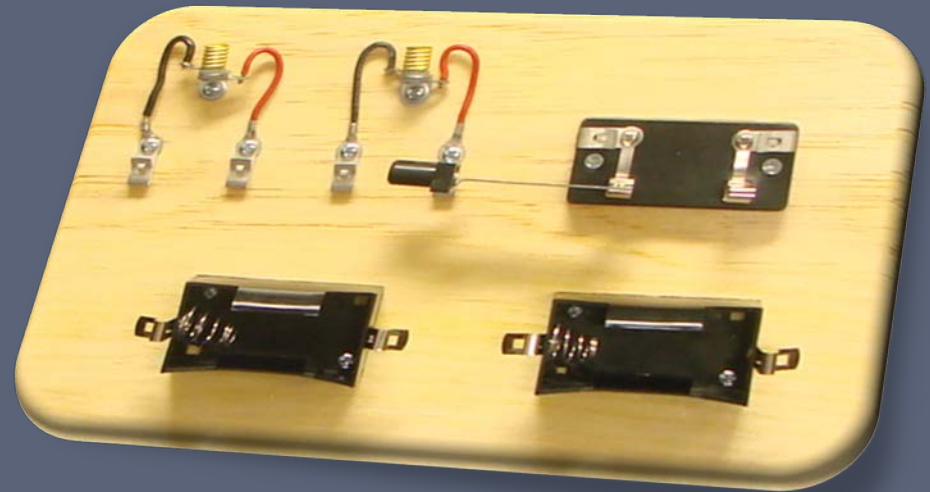
## 4. Wiring board





# Educational Methodology

The school-based electric curriculum is designed as an **exploratory activity** set in the context of a “**challenge.**”



For example, the student(s) are given a kit and told “**make light.**” In **teams** of two they experiment to accomplish that challenge. Other challenges would follow.

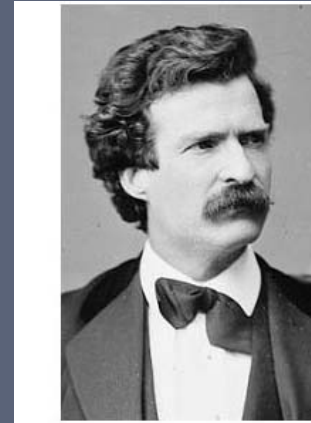




# Educational Methodology

## 1. Brief Introduction – *Open the Mind*

- What would it be like today if we did not have electricity?
- What could you not do?
- What do you plan to do tonight after school? Could you do those activities if you did not have electricity?
- What are some of the devices you have today that you would not be able to use if you did not have electricity?



**"An open mind  
leaves a chance for  
someone to drop  
a worthwhile thought  
in it."**

**--Mark Twain**

# Educational Methodology

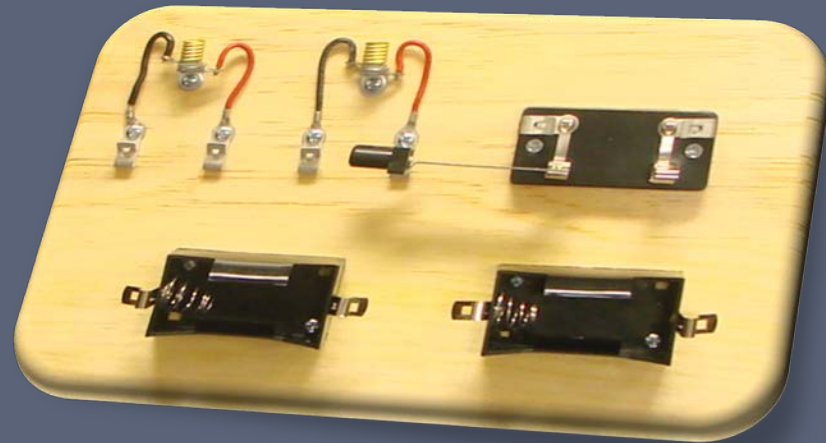
## 2. Provide basic background information

- Utilize the “Electric City” CD



# Educational Methodology

3. Break class into teams of 2 or 3. Distribute wiring board and materials



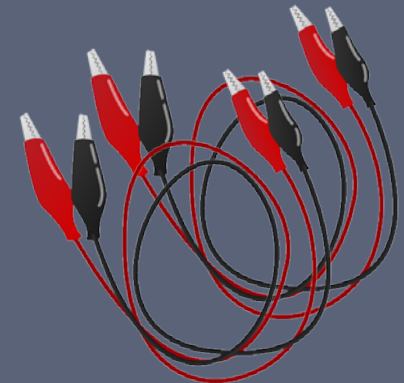
2.2 volt bulbs



Analog Voltmeter



D cell batteries



Alligator test leads

# Educational Methodology

## 4. Ask “challenge-based” questions.

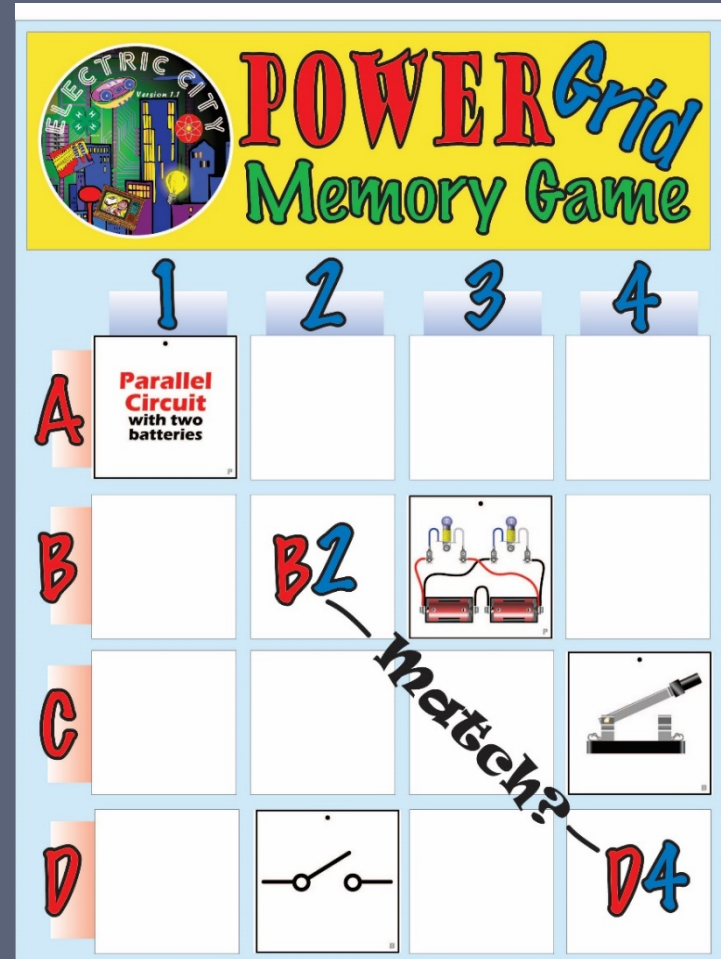
- For example, “make light.”



# Educational Methodology

## 5. Insert "game-type" activities.

- For example, conductor/insulator tester or the matching game.



# Educational Methodology



6. Engage electrical industry representatives



# Feedback/Evaluation

## Tested in two schools

- Urban setting (Greenfield, IN) – one class
- Rural setting (Hancock County, IN) – two classes. One class had seven special education students
- Fifth grade classes
- 6-day program

# Feedback/Evaluation

## Feedback from teachers

- “You have a very good curriculum that is well designed.”
- “This was a neat way to begin the unit because kids love working on computers! “ --- comment in reference to using the highly interactive CD for basic knowledge.
- “My kids were eager to participate and really loved the “hands-on” aspect of the program”

# Future Plans

## Future Plans

- Distribute as a kit
  - Classroom kit designed for 24 to 36 students. Approximately \$500.
  - Individual kit designed for use in a homeschool setting. Approximately \$50.

**Thank You**

**Questions**