

# Creative Component: Scientific Discovery

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OSU EXTENSION  
4-H YOUTH DEVELOPMENT

## 4-H Design and Construction

*General Skills to be mastered in project/product in ADC, IDC and HTDC:*

- **Structural Design:**  
Construction technique, size, form, color and texture suited to the materials and product end use.
- **Elements of Design:** The finished product illustrates the member is mastering the basic elements of design - lines, shapes or forms, textures, colors, and space.
- **Principles of Design:** The finished product illustrates an understanding and application of the principles of harmony, proportion, balance, rhythm and emphasis adding dimension, interest and/or appeal to the finished product.
- **Decorative Design:** Any lines, shapes, colors, textures, or materials applied to structural design that creates an emotional or personal quality, individuality and creative expression without disturbing initial/end purpose.

**Projects being exhibited for competition** are being evaluated on the 4-H members "mastery" of skill(s) and subject matter. The 4-H Fashion and Fabrics Member's & Leader's Guides provide basic information members are to learn (master) and demonstrate in their project work. Members are encouraged to seek out other valid resources which teach proper technique and knowledge in the areas of design and construction.

4-H members "learn by doing." We want you to develop the life skill of "Learning to Learn." A part of your project work will be looking up terms and techniques when selecting a 4-H project, as well as seeking out reliable and valid resources which teach proper technique and knowledge in the areas of design and construction. This guide is a starting point. It will outline the basics and then allow for personal creativity and innovation.

The purpose for this creative component is for youth to learn and apply the scientific method to an experiment focused in Interior Design and Construction. The same concept can be used by any age with any Design and Construction area and reported in the portfolio.

In 4-H, science can be defined as "learning by doing."

Every day, consciously and unconsciously we practice decision making for tasks as simple as cooking, laundry and budgeting.

4-H members who learn and practice the life skill of decision making become better at their project work. They are more focused in asking questions, constructing new idea/hypothesis/theory, as well as designing, executing and evaluating project work. A series of steps used to solve problems or answer questions simply put is a scientific method.

"Scientia," in Latin meaning "knowledge."

The "scientific method" is important because personal and cultural beliefs influence our views and our understandings of natural occurrences. The scientific method attempts to minimize the influence of bias or prejudice when testing a hypothesis, theory or idea.

### STEP 1 – The Question or Problem

Ask yourself: What topics interest me? What about this topic interests me most? Why is this problem or question necessary to solve/answer? What is the purpose of asking this question? What will the answer tell me? These questions help narrow the possible questions, topic and or direction for the experiment.

The “question” needs to be very specific, as your whole experiment revolves around producing an answer to the “question” or “solving a problem.”

## STEP 2 – Background information and/or research

Research may produce an answer, change the question or redirect the experiment.

After having thoroughly researched the question, you should have an educated guess about how things work. Organize the information by compiling and classifying what was learned so a hypothesis can be written.

## STEP 3 – Write Hypothesis

A hypothesis is an educated guess founded on the known, in an attempt to find the unknown.

Ask yourself: How do the concrete and abstract ideas of the research weave together to test or explain my question/problem? What can be inferred from the information that leads to a prediction/explanation/hypothesis?

Most of the time a hypothesis is written like this: “[I do this], then [this] will happen.”

Remember that a hypothesis should be something that can be tested. In other words, you need to be able to measure both “what you do” and “what will happen.”

## STEP 4 – Experiment

**A) Define the Variables** - A variable is a part of the experiment that can change.

**B) Set-Up a Controlled Experiment** - In the experiment’s design, **have only one variable that changes**. The variable that changes is the one being tested. If more than one variable changes, it becomes an uncontrolled experiment. An uncontrolled experiment is an experiment that will not produce an answer to the question OR may give the wrong/false answer.

Use a list of identified variables to make sure none of them change, except the one being tested!

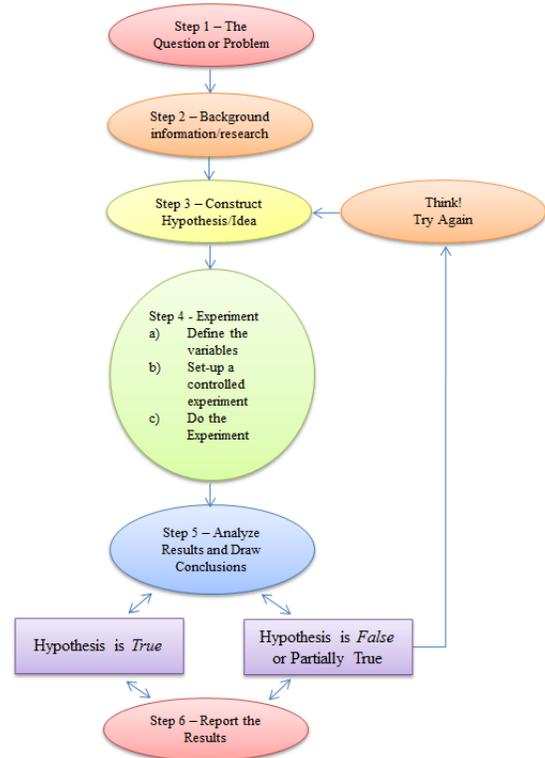
**C) Doing the Experiment** - This is the easiest part of the scientific method. Make a list of materials. Consider any and all safety precautions that need to be taken. If the experiment could be dangerous, make sure an adult is informed.

**Ask yourself:** What resources are available to me--time, equipment, people, money, facilities, etc.? Where will I conduct this research? Where are the organisms or events I want to study?

## STEP 5 – Analyze Results and Draw Conclusions

Organize the information by compiling and classifying what is learned. Apply the 7 pieces of the scientific method: observing, communicating, comparing, organizing, relating, inferring and applying. All are defined on page 3.

**Ask yourself:** In what way(s) did I prove or disprove my hypothesis? Did the results lead to another question? How can the results be applied to a real-life situation?



## STEP 6 – Report the Results

A Multi-media Presentation will document the scientific discovery process and the results of an experiment(s) conducted to prove a hypothesis. It is a report of what was learned and observed from the experiment, as well as what you learned through the process of doing the experiment.

The report must narrate and illustrates (pictures, tables, graphs, etc.) the experiment using a recognized model of scientific discovery. Both the results of the experiment and the application of a scientific model are important in the reporting process. The 4-H member will also be expected to complete the Skill Mastery Sheet as related to the experiment.

**Multimedia Presentation** refers to content that uses a combination of text, audio, still images, animation, video, or interactivity content. Multimedia content is recorded and played back on electronic media devices – via flash drive or CD. Examples of Multimedia presentations: Movie, PowerPoint, Prezi, etc. For more information see the *Design and Construction Multimedia Presentation guide*.

- For exhibit purposes the **movie must be published as WMV** (Windows Media) or **MP4** (Multimedia Format).
- The presentation must be saved on a flash drive or CD.
- Documentation in a PowerPoint presentation can be narrated verbally or by a written explanation in the “Notes” section of the PPT. *If the PPT is not narrated then a print copy of the presentation in “Notes” format must accompany the CD or flash drive securely attached in a binder.*

## Project/Product Ideas

This guide was developed with Interior Design and Construct (IDC) projects in mind. The same concept can be applied to any of the Design and Construction areas at any age. As a project is determined, focus on need and the “Skills” to be acquired for your age/level found on the Skill Mastery Sheet.

- Efficient and effective lighting
- Energy Efficiency – windows, coverings, awnings, etc.
- Fabric Selection – appropriate fiber content, color, care for furniture, carpet, etc.
- Furniture or cabinet design – handles/pulls, finish, etc.
- Possibilities surround us – use your senses.

## Portfolio

4-H members are encouraged to have a portfolio for project work, ideas, resources and skill mastery sheets. See “Design and Construction Portfolio” guidelines for more information.

## Project/Product Exhibit Description

Description found in the 2014 Fair book, subject to change annually.

	Interior Design and Construction
Level 3	<b>Interior Design Creative Component – “Science”:</b> Illustrates a science experiment related to interior design. Might include the comparison of energy use/options for the home, lighting, water efficient processes or products, sun or landscaping to heat or cool homes, any other similar item not stated. Exhibit will consist of a multimedia presentation or notebook which narrates and illustrates (pictures) the members science experiment using a recognized model of scientific discovery.
Level 4	<b>Interior Design Creative Component – “Science”:</b> Illustrates a science experiment related to interior design. Might include the comparison of comparison of energy use/options for the home, water efficient processes or products, sun or landscaping to hear or cool homes, furniture/cabinet design, any other similar item not stated. Exhibit will consist of a multimedia presentation or notebook which narrates and illustrates (pictures) of the members science experiment using a recognized model of scientific discovery.

## Report Outline

The outline below is not all encompassing; it is a place to start. Each 4-H member will be responsible for developing a report which uniquely showcases their experience. There is no one way or right way for a report as long as it illustrates the mastery of scientific discovery.

### What happens in the scientific process?

- Observing – Using all of the senses, one comes to know about the characteristics of objects and their interactions.
- Communicating – Humans name objects and events so they can tell others about them. Communicating is essential to humans because it allows us to learn more about a greater range of information.
- Comparing – This is a process where we systematically examine objects and events in terms of similarities and differences. By comparing the known to something unknown, one gains knowledge.
- Organizing – The reason researching is important is that we learn to compile, classify and organize that which we are learning.
- Relating – Relating is the process where the concrete and abstract ideas are woven together to test or explain a phenomena. By comparing one variable/fact with another we begin to be able to describe actions/reactions/data.
- Inferring – The process of realizing ideas that are not directly observable is called inferring. It leads to predictive explanations and/or an understanding of simple and complex phenomena.
- Applying – Inventing, creating, problem-solving, as well as determining possibilities are ways we use the information or knowledge learned to get answers to questions, and/or possibly improve some part of life.

### Project/Product Idea:

- **Title of the Experiment:**
- **Date(s) of the Experiment** - The date will begin with the idea through to the report being completed. *Example:* January 31, 2014 – March 1, 2014.
- **Inspiration for this experiment.**

#### STEP 1 – The Question or Problem

#### STEP 2 – Background Information and/or Research

(Can include but not limited to sources, resources, what was learned, if the information changed the direction of your original idea, etc.)

#### STEP 3 – Hypothesis

Example: "If \_\_\_\_\_ [I do this] \_\_\_\_\_, then \_\_\_\_\_ [this] \_\_\_\_\_ will happen."

#### STEP 4 – Experiment

- Variable Identified- The part of the experiment that will change.
- Experiment Controls
- Experiment – Explain experiment and document results.

#### STEP 5 – Analyze Results and Draw Conclusions

Organize the information by compiling and classifying what is learned.

Conclusion as a result of the experiment(s)

What was learned using scientific discovery.

How I can apply scientific discovery to other aspects of my life.

# Creative Component of Scientific Discovery Report

Example

**Title of Experiment** – Selection of a Lamp Shade

**Date of the Experiment** – January 31 - March 1, 2014

**Inspiration for the experiment** - I inherited a lamp from my grandparents that was a wedding present in 1953. The lamp is brass and it will be used as a study lamp at the desk in my bedroom.

**Step 1 – Question or Problem**

The lamp is 24 inches high and 5 ½ inches in diameter at the base.

The wiring is fine but it will require a new shade.

Constant - size of lamp base, bulb wattage and location.

**STEP 1 – The Question or Problem**

I need a study lamp in my bedroom. The overhead light does not provide enough light at my desk. The room has one window, but my study time is at night so natural light is not an option. The lamp I inherited needs a new lamp shade. I want to replace it with one which will provide good light, match my bedroom décor and compliment the lamp style.

**STEP 2 – Background Information and/or Research**

A lamp shade's purpose is to diffuse light or to block it so it doesn't shine in one's eyes, as well as to add to a room's decor. Lamp shades are made of various materials - fabric, metal, plastic or glass. A shades scale, shape, trim and lining differ.

When selecting a lamp shade, three things should be considered:

1. The role of the lamp and its location
2. The shape and proportion of the lamp
3. The style of the lamp and the room in which it is located

If the lamp is to create focused light for reading or doing tasks, the shade should be large enough for a higher-wattage bulb and should have a large enough bottom to cast light on the book or area where work is being done.

There are several "rules of thumb" when choosing a lamp shade.

The lamp shade should be large enough to cover the socket and hardware of the lamp. The shade and the lamp should not compete with one another. This means an ornate lamp will have a simple lamp shade. A simple lamp base may have a more decorative lamp shade.

The shade and lamp should be in proportion, the size and shape of the lamp shade should be similar to the size and shape of the lamp. The exception would be when the finished look is to be dramatic or attention getting. Always make sure that the bottom of the lamp shade is wider than the widest part of the lamp base.

Safety is important in choosing a lamp shade. The opening of the lamp shade must always be wide enough to adequately vent the heat from the light bulb. Generally, the narrower the opening of



before



after

the lamp shade, the light bulb should be of lower wattage. If a lamp shade is hot within ten minutes of the lamp being turned on, it's a good indication that a lower wattage bulb is required. In addition, there should always be about three inches of clearance between the lamp shade and the light bulb.

Sources:

- <http://www.shadesoflight.com/inspired-spaces/tips-and-techniques/lighting-tips-techniques/lampshade-selection-rules/>
- <http://lamp-shades.us/>

### STEP 3 – Hypothesis

If I place the lamp in the location where it will be used and then select an appropriate lamp shade I will have good lighting for studying at my desk.

### STEP 4 – Experiment

Variable Identified - Lamp shade - material, shape and size

Experiment Controls- lamp base, bulb wattage, lamp location

Experiment – Will take the lamp to the store to select a couple of lamp shades that will make it good for reading/studying, be proportional to the base and compliment the style of the room. Will purchase shades and return home to see which one will provide the best light, be safe and complement my bedroom décor.

### STEP 5 – Analyze Results and Draw Conclusions

We purchased three possible options. As shown in my pictures only one really worked. My favorite, #1, did not provide enough light and did not look right once in place on my desk in the bedroom. The proportions were not right. I also noticed that the lamp shade got really warm after the lamp had been on for 10 minutes. #2 was not my top choice in the store but when in place it looked great on the desk and with the bedroom. The proportions were good for the lamp, location and use. It provided a lot of light and it would be easy to keep clean. The shade stayed cool to the touch after the lamp was turned on for 10 minutes. #3 was my second choice in the store. It looked great on the desk and in the bedroom for the same reasons as #2, but it cost more than #2 and would be hard to keep clean.

I concluded lamp shade 2 would provide good light, match my bedroom décor and compliment the lamp style. It also fit in my budget.

In the future I will be more open-minded when making purchases. I learned, what I "think" I want might not be the best option when in place with its surrounding.



**#1**

**\$69.99**



**#2**

**\$39.99**



**#3**

**\$49.99**