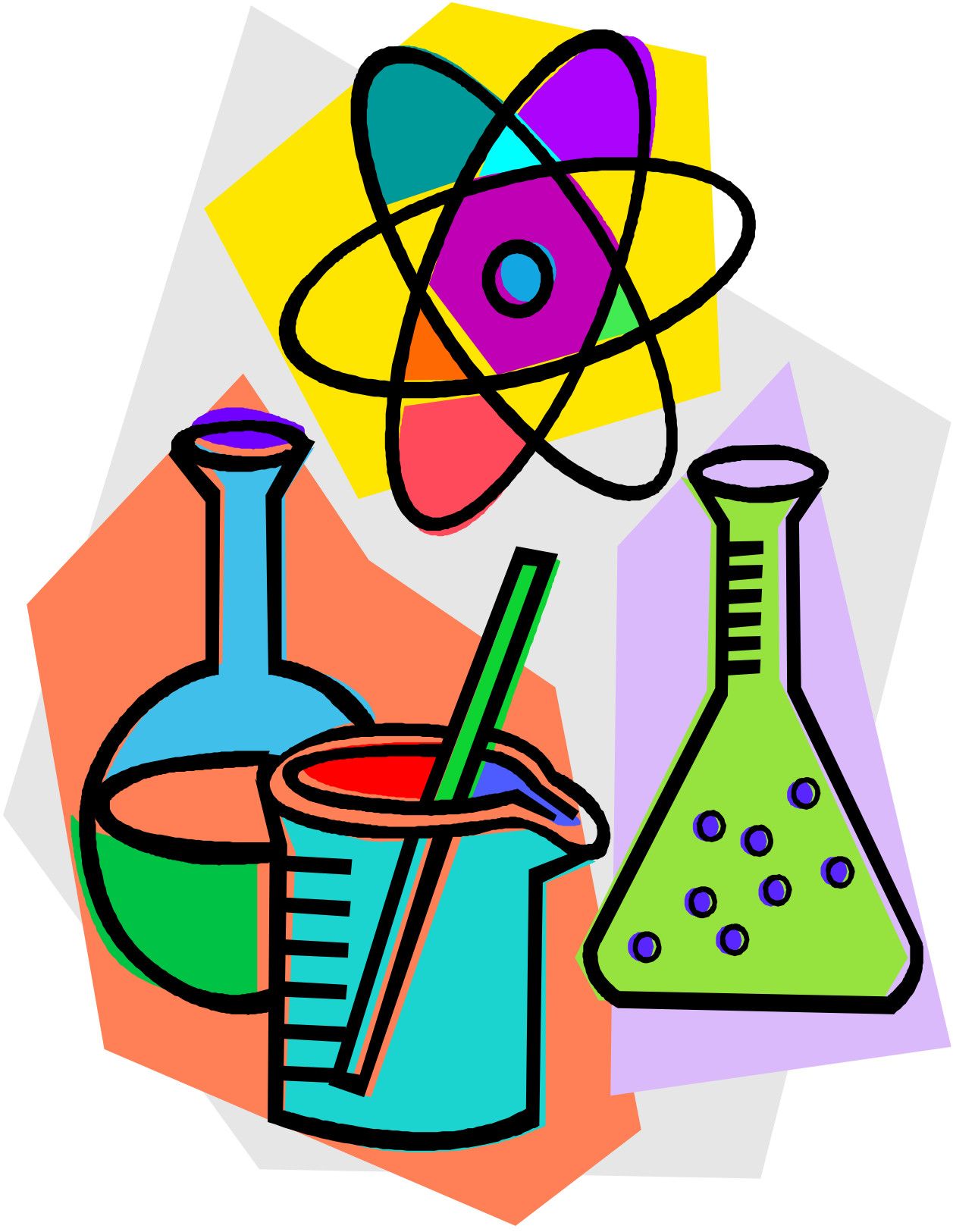
Heards Ferry Elementary Science Fair

February 21-24, 2012



Dear Parent and Student,

HFE will be holding a school science fair the **week of February 21-24, 2012**. Participating in the science fair will be all 3rd -5th grade students. This packet was developed to facilitate student's successful completion of their science fair project. Enclosed you will find everything you need to develop and produce a proficient science fair project. Parents, you are encouraged to go through this packet with your child, supporting his or her pursuit of a topic of interest and encouraging him or her to put forth excellence in its completion. Pay close attention to the forms that must be filled out and the guidelines that must be adhered to. Rules are apart of the scientific process; they help teach the student discipline and responsibility. Therefore, emphasis should be placed on timelines and due dates.

By performing a science fair project you will develop skills in the following areas: research, logical and creative problem solving, critical thinking, communication, and self-direction. Students are directly responsible for the following: the completion of all forms, log books, work in and outside of the classroom, remembering to bring folders and log books to class on the designated science fair lesson days, providing the materials they will need for their experiments, choosing a project, question or problem in which they are genuinely interested.

Of course, teachers will guide students as much as possible to facilitate each child's learning of the scientific method. Teachers will provide clear information about deadlines, how to conduct research, how to do an experiment and how to organize and analyze data. **However, learning and application of the methods are the responsibility of the student.** The packet is a wonderful resource for providing any additional information that may be needed by students and parents. ***We will also have first, second and third place prizes for students that exemplify outstanding scientific reasoning within their projects and adhered to all assignment deadlines.***

If you have any questions you can contact Mr. Hutton or your child's science teacher for further assistance.

Mr. Hutton
Talented & Gifted

Heards Ferry Elementary School Science Fair

Assignment	Date Due	Student Initials	Parent Initials	Teacher Initials
Choose topic and write a project question	**January 12, 2012**			
Research the topic by using books, the internet, and other resources. This could be the reference page **(a minimum of 5 references: 2 books and 3 internet sources)**	**January 12, 2012**			
Write a hypothesis	**January 19, 2012**			
Design an experiment to test the hypothesis	**January 19, 2012**			
Conduct the experiment and record observations in log notebook	**January 26, 2012**			
Make a table, or chart, for data. Draw one or more graphs of the data.	**February 2, 2012**			
Write the project report (Must be typed and approximately 250-300 words)	**February 9, 2012**			
Make the project display, or exhibit (please submit a photograph of your display board)	**February 16, 2012**			
Present the project at science fair	**February 21-24,2012**			
My Science Fair Self-Evaluation Form	**March 1, 2012**			

Parent Signature _____

Science Project _____

Potential 6 Week Science Fair Timetable

Date of the Science Fair _____

WEEK 1

- **Choose a topic or problem to investigate**
- **Check resources in school or community library**
- **Contact experts in the field**
- **Gather all written materials you can find on the topic**

WEEK 2

- **Begin pulling your project notebook together**
- **Start collections or experiment**
- **Begin designing display unit**

WEEK 3

- **Continue designing display unit**
- **Design all visual aids**
- **Take the photographs you need**
- **Complete your research**
- **Consult with your experts (scientists, college professors, teachers, parents) to check your progress**
- **Start writing rough draft project report**

WEEK 4

- **Continue collecting items for display**
- **Continue your experiments**
- **Set up your apparatus and test it**
- **Continue writing rough draft project report**
- **Construct background for display**

WEEK 5

- **Design and assemble graphs or charts**
- **Complete lettering for display unit and mount it**
- **Double check your written data**
- **Complete experiment and record data**
- **Type final report**

WEEK 6

- **Set up display unit at home and test**
- **Practice presentation at home**
- **Transport display to science fair site, set it up, and test**

Judging Criteria for the Science Fair

Sample statements to be addressed under **SCIENTIFIC INVESTIAGATION**-40 points

- The study was well thought out and the student showed initiative in though and designs.
- The purpose for doing the study was well defined.
- The scientific literature (background information) was examined.
- A logical hypothesis was developed for this study.
- The data collected relate to the hypothesis and supports the conclusion.
- The conclusion follows logically.
- The data log provides evidence of student work and commitment throughout.

Sample statements to be addressed in **THROUGHNESS**-20 points

- The student collected all data available.
- The student identified all the controls.
- The sample sizes and population sources were clearly defined.
- Replications and duplications were utilized.
- The student anticipated the problems encountered.
- The data were collected in quantitative units.
- Several experiments were done, not just one.
- The study was completed or bought to a logical stopping place.
- The data were thoroughly analyzed.

Sample statements to be addressed under **SKILL**-15 points

- The experimental protocols were handled with skill.
- The experiments were designed with care and anticipation.
- Data measurements were done precisely.
- The study was skillfully designed and was not too complicated.
- Technical problems were overcome and not merely avoided.
- A detailed notebook and log were kept.
- This study was the student's and excessive help was not utilized.

Sample statements to be addressed under **CREATIVE ABILITY/ORGINALITY**-15 points

- There was a question asked and the answer was not originally known.
- The approach to answering the question was creative.
- The creativity of the study was within the creative ability of the student.
- Data is originally presented.
- The student utilized the scientific method in experimentation rather than only descriptions and observations.
- The display is creative.

Sample statements to be addressed under **CLARITY/NEATNESS**- 10 points

- The student is able to explain what was done.
- The student clearly understands the research.
- The student understands the meaning of the results obtained.
- The student understands where the research can lead in the future.
- The student understands how this study can be improved.
- It is clear to the student whether the data supports or fails to support the hypothesis.

Science Fair Project Report

Name _____ Date Due _____

Your project report communicates to others how you did your experiment and what you found out from it. This is where you use your notes and observations from your experiment. Remember this report must be typed and place in a clear folder!

An outline for your project report

1. **Cover Page-** In the upper middle of the page, write the title of your project or project question. Also include your name on the cover page.

2. **Project Question-** Begin your report by stating your project question.

3. **Hypothesis-** State your hypothesis.

4. **Research-**Write about what you found out from books, the Web, and other resources that helped you design an experiment and answer your project question.

5. **Experiment Plan-** Describe the design for your experiment. Be sure to describe the variables and how you set up a fair test.

6. **Procedure-** Describe how you carried out your experiment and what you found out.

7. **Present Data-** Include your data tables and graphs.

8. **Conclusions-**Compare your results to your hypothesis. Did your findings support your hypothesis or not?

9. **Bibliography/Reference Page-** Write your bibliography. A bibliography includes the names of books, magazines, websites, and resources for your project. Your report should have a minimum of **5 sources cited (2 books and 3 internet sources)**.

Display Board Titles/Captions

Project Question /Title:

Project Description-Briefly tell what you did and what happened

Materials

Procedure

Observations-Include a brief written summary of observations. You will want to make large, colorful displays of graphs of any data you collected

Conclusions

Suggestions for Follow-Up Experiments

Experiment Log

Name: _____ Date: _____

Use these pages to plan and conduct a science experiment to answer a question you may have.

1. Observe and Ask Questions

Make a list of questions you have about a topic. Then circle a question you want to investigate.

_____

_____

_____

2. Form a Hypothesis

Write a hypothesis. A hypothesis is a suggested answer to the question you are investigating. You must able to test the hypothesis.

_____

_____

_____

3. Plan an Experiment

******Identify and Control Variables***

To plan your experiment, you must first identify the important variables. Complete the statements below.

The variable I will change is_____

_____

_____

The variable I will observe or measure is _____

_____

_____

The variables I will keep the same, or control, are _____

_____

_____

Develop a Procedure and gather Materials

Write the steps you will follow to set up an experiment and collect data.

Materials List

Look carefully at all the steps of your procedure and list all the materials you will use. Be sure that your teacher approves your plan and your materials list before you begin.

4. Conduct the Experiment

Gather and Record Data

Follow your plan and collect data. Make a table or chart to record your data. Observe carefully. Record your observations and be sure to note anything unusual or unexpected. Use the space below and additional paper, if necessary.

Interpret Data

Make a graph of the data you have collected. Plot the data on a sheet of graph paper or use a software program.

5. Draw Conclusion and Communicate Results

Compare the hypothesis with the data and the graph. Then answer these questions.

1. Do the results of the experiment make you think that the hypothesis is true? Explain.

_____

_____

_____

2. How would you revise the hypothesis? Explain.

_____

_____

_____

3. What else did you observe during the experiment?

_____

_____

My Science Fair Self-Evaluation Form

Name: _____ Date: _____

My project taught me

_____
_____
_____
_____

The hardest thing to do on my project was

_____
_____
_____
_____

I enjoyed most

_____
_____
_____
_____
_____

I could have improved on

_____
_____
_____
_____
_____

Next year I think I will

_____
_____
_____
_____
_____

The Scientific Method

Step-by-Step preparation for the science fair

Topic

- Select a topic that can be answered only by experimenting.
- Write your topic as a question to be investigated

Purpose

- Write 1-3 sentences that explain why you are doing this investigation.
    - The purpose can be stated like this:
      "The purpose of this project is…."

Hypothesis

- A hypothesis states what you think is going to happen when you investigate your question.
    - Here is an example:
      Question: Does light affect the way plants grow?
      Hypothesis: Plants will grow toward the light.

Procedure

- **Materials**
    - List all materials used in your investigation. Include what, how much, and what kinds of materials you used. Keep in mind quantities are important. Be sure to use only metric units.

Good Listing	**Bad Listing**
3-15x15cm. squares of Scott paper Towels	Paper towel

- **Variables (3 Types)**
    1. Manipulated: What you change on purpose in an investigation
    2. Responding: The responding variable is what changes by itself because you changed something in your investigation.
    3. Constant: Everything else in your investigation must be kept the same.

- **Step-By-Step Directions**

    Data/ Log

    - Data refers to the information gathered during your investigation.
    - Writing in a spiral notebook is the best way to keep a log.
    - Your log should include the following:
        1. A list of all the materials you use.
        2. Notes on all preparation you made prior to starting your investigation.
        3. Information about the resources you use.
        4. Detailed day-by-day notes on the progress of our project
        5. Any drawings that you feel might help explain your work.
        6. Data that you gather from your investigation (notes, tables, graphs & charts).
        7. Date each entry in your log.

- **Display Data**
    - Graphs: Bar & Line graphs are the best for displaying information on a display board.

      Bar Graph- Displays data that does not occur over a period of time.

      Line Graph- Displays data to show a change over a period of time.

    - ***Make sure to give your graph a title & label the horizontal & vertical axes. Also, plan your graphs so that your data will be evenly distributed across the horizontal & vertical axes.***

Conclusion

- Your conclusion should include the following:
    1. Statement of support or non-support of the original hypothesis
    2. Description of any problems or unusual events that occurred during your investigation.
    3. What you would do differently next time.
    4. Revised hypothesis (if data did not support your original hypothesis).

Student Project Checklist

Check	Item
	Does your project deal with problem solving skills and not model building?
	Can your question be answered through an investigation process?
	Why are you doing this investigation? Do you have an intended purpose?
	Did you state what you expected to happen before you began the testing?
	What are your variables? Manipulated: Responding: Held constant:
	Can your investigation be measured in a specific unit?
	Are you taking pictures? Making drawings?
	Are you keeping an investigation log?
	Have you determined your graph set-up?
	Does or will your data allow you to draw conclusions and/or support your hypothesis?
	Did you read the rule book to make sure your project follows all requirements?
	Did you read the judging criteria?
	Is your project sturdy and free standing?

Science Fair Project

Name: _____ **Judge:** _____

Project Title: _____

Objectives	4 Another Einstein	3 Senior Scientist	2 Junior Scientist	1 Lab Assistant
1. Shows **knowledge of the Scientific Method**	4 - Can explain all 6 parts of an experimental science project; and justify conclusion.	3 - Can explain at least 5 parts of an experimental science project with understanding	2 - Can explain most parts of an experimental science project with the help of the display board.	1 - Tries to answer questions (posed by judge) and/or has some steps missing.
2. Shows enthusiasm and **interest in the project**	4 - Student eager to tell all about the project.	3 - Student is pleasant and willing to share information.	2 - Student tells about the project only when asked a question.	1 - Student answers some of the about the project.
3. Speaks knowledgeably about the project	4 - Student able to share many details about the project through the scientific process.	3 - Student shows an understanding of the project.	2 - Students know about the project and offers minimal explanation.	1 - Student can answer some questions when asked.
4. Written document clearly demonstrates use of research, experimentation and analysis skills	4 - Booklet has Cover, Table of Contents, Research Data, Experiment Data, Bibliography.	3- Booklet has Cover, Table of Contents, Research Data and some of the Experiment Data.	2 - Booklet has Cover, Some Research, and Some Data.	1- Booklet is minimal or does not exist.
5. Presents data on a **board** that **is well organized and visually appealing**.	4 - Board shows data in a organized, neat manner, complete with charts, tables and pictures that are labeled.	3 - Board is neat and attractive and has limited charts, tables and pictures.	2 - Board list major headings of the scientific process and some data.	1 - Board list major headings of the scientific process and limited data.
Total Score:				

Positive Comments:

Positive Suggestions:

Instructions: Bibliography Basics

Remember you should have a minimum of 5 resources cited

1. Write "Works Cited" at the top of the page, and center it.
2. Alphabetize all citations by the first word in each citation. Usually this will be the author's last name, but when there is no cited author, it might be the first word of another piece of information.
3. Double-space the entire page, but do not leave additional spaces between citations.
4. Start each citation against the left margin. The second and subsequent lines of each citation should be indented.

Citing a Print Source (Book or Magazine)

1. Write the author's last name, and then put a comma. Write the author's first name and middle initial, and then put a period.
2. Write the title of the article (if applicable) in quotation marks, with a period at the end.
3. Write the name of the book or magazine in italics, followed by a period.
4. Write the place of publication, and then put a colon.
5. Write the publishing company's name, and then put a comma, the date of publication and a period.

Citing an Online Source

1. Write the name of the author or editor (if you can find it on the website), and then put a period.
2. Write the name of the article, and put it in quotation marks. Then put a period.
3. Write the name of the overall website in italics, and then put a period.
4. Write the name of the publisher, if available. If this information is not available, write "n.p." (no publisher). Then write the date of publication, if available. If this information is not available, write "n.d." (no date).
5. Write the word "Web" to show that you got the information from the Internet, and then put a period.
6. Write the date that you accessed the website, in the form [day] [month] [year]. For example, you might write "17 Jan. 2010." Then put a period.

Possible Internet Sources

http://School.discovery.com/sciencefaircentral

- A comprehensive guide to creating your science Fair project
- Tips for parents to help with the project
- Projects ideas

http://www.all-science-fair-projects.com/

- Science fair projects with complete instructions

http://www.ipl.org/div/kidspace/projectguide/

- Science fair resource project

http://faculty.washington.edu/chudler/fair.html

- Steps for a successful science fair project

Display Safety Standard Rules

Note: The following rules only apply to what is included in the actual display. The following items can be used for the project only if they are represented by photographs, drawings, or artificial items in the actual display.

A. Not Allowed in Project Display

Anything potentially dangerous to the public is prohibited in your Science Fair display, including, but not limited to, the following as determined by the science fair committee:

- No living organisms, including plants
- No taxidermy specimens or parts
- No preserved vertebrate or invertebrate animals
- No human or animal food
- No human/animal parts or body fluids (for example, blood, urine)
- No plant materials (living, dead, or preserved) that are in their raw, unprocessed, or non manufactured state (exception: manufactured construction materials used in building the project or display)
- No laboratory/household chemicals, including water (exceptions: water that is integral to an enclosed apparatus)
- No poisons, drugs, controlled substances, hazardous substances or devices (for example, firearms, weapons, ammunition, reloading devices)
- No dry ice or other sublimating solids
- No sharp items (for example, syringes, needles, pipettes, knives)
- No flames or highly flammable materials
- No batteries with open-top cells
- No photographs or other visual presentations depicting vertebrate animals in surgical techniques, dissections, necropsies, or other lab procedures
- No active Internet or email connections as part of displaying or operating the project at the Science Fair
- No glass or glass objects unless deemed by the entrant's adult sponsors and event chair to be an integral and necessary part of the project (exception: glass that is an integral part of a commercial product such as a computer screen)
- No equipment deemed unsafe (for example, large vacuum tubes or dangerous ray-generating devices, empty tanks that previously contained combustible liquids or gases, pressurized tanks)

B. Allowed in Project Display *but* with the Restrictions Indicated

- Soil samples if permanently encased in a slab of acrylic
- Postal addresses, World Wide Web and email addresses, telephone numbers, and fax number of the entrant only
- Photographs and/or visual depictions if
    a) They are not deemed offensive
    b) Their origins are credited (such as the photographer, a website, magazines, newspapers, journals)
    c) They are photographs or visual depictions of the participants science experiment/study
- Rockets or any apparatus with unshielded belts, pulleys, chains, and moving parts with tension or pinch points if for display only and not operated

C. Electrical Regulations at the Science Fair

- Entrants requiring 120 or 220 Volt A.C. electric circuits (maximum allowed and as available at facility) must provide a UL-Listed 3-wire extension cord that is appropriate for the load and equipment.
- All electrical connectors, wiring, switches, extension cords, fuses, etc., must be UL-listed and must be appropriate for the load and equipment. Connectors must be soldered or made with UL-Iisted connectors. Wiring, switches, and metal parts must have adequate insulation and over-current safety devices (such as fuses) and be inaccessible to anyone other than the entrant. Exposed electrical equipment or metal that possibly may be energized must be shielded with a non-conducting material or with a grounded metal box to prevent accidental contact.
- There must be an accessible, clearly visible on/off switch or other means of disconnect from the 120 or 220 Volt power source.

Projects & Ideas for Elementary School Projects

Experiments

Magnetic and nonmagnetic materials
Which magnet is strongest?
Which materials conduct electricity best?
Which materials conduct heat best?
Sounds from different rubber bands (or glasses of water)
Which toy ear rolls farthest?
Which materials dissolve in water?
Which paper towel absorbs the most water?
Will an ice cube melt fester when crushed up?
Do coins corrode more is salt or fresh water?
How vinegar affects egg shells?
How a shadow changes throughout the day?
Measuring rainfall, with a rain gauge
Depth of snow at ten different locations
Testing a sundial with a clock
Which brand of raisin bran has the most raisins?
What & plant needs to grow
Do plants prefer tap water or distilled water?
How temperature affects plant growth
Do plants give off water?
In which soil do plants grow best?
Growing potatoes at different locations
Haw fast do kidney beans grow?
Do large apples have more seeds than, small ones?
Do different kinds of apples have different amounts of seeds?
What conditions do pill bugs prefer (light or dark, moist or dry)?
Can as earthworm detect light and darkness?
How far does a mealworm (or snail) travel in one minute?
What is the best condition for the growth of mold?
Which bread molds most quickly?
Which color liquid do hummingbirds prefer?
What food does a hamster prefer?
Can people identify flavors of Kool-Aid when blindfolded?

Observations

Fingerprints
Shadows
Crystals
Properties of solids, liquids, and gases
Objects that block and **pass** light
Gravity
Shapes of magnetic fields

Parts of a flame (candle observation)
Socks and minerals
The moon
Planets you can see
Our sun
Spring constellations
Local weather
How to read a weather map
Clouds
All about horses (or dogs, frogs, fish, etc.)
A beaver home
Local wildlife
How animals hide and defend
Animals tracks
Raising finches (or rabbits, gerbils, etc.)
Fish prints What makes a bird a bird
The crayfish.
All about crickets (or bees, beetles. ants, etc]
Earthworms
Spider webs

Demonstrations

How heat is transmitted
As energy-efficient home
What makes a hot air balloon rise?
Expansion of solids, liquids & gases when, heated
How a thermostat works:
How a toaster works
The steam engine
The periscope
Kaleidoscopes
How binoculars work
How a microscope works
How a telescope works
What makes rainbows?
Different types of minors
Lenses and what they do
How a camera works
How Polaroid glasses work
What causes light to bend?
How photo cells work
How a prism works
The pinhole camera
The Doppler effect
What causes echoes
How a record player works

How an electric motor works
How a generator works
Batteries, how they work
The telegraph
What is a transformer?
What is a transistor?
Electronic components and their functions
Hydroelectric power
The series circuit and the parallel circuit
How airplanes fly
How a wing works
Hero's engine
How rockets fly
Looping roller coasters - how they work
How a canal lock works
Primitive clocks
Distillation
Solar still
Water filtration
pH and how to measure it
Acids, bases, and pH
How elements combine to make compounds
Capillary action
Radioactivity and Geiger counters
What is density?
What is surface tension?
Weather forecasting
How a barometer works
Cloud chamber
Effects of air pressure
Osmosis
Phases of the moon (working mode!)
Eclipses
How a geyser works