# 2009 Workshop

# Science

# Fair

# Know

# How

***Compiled by Karen Garza***

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# SCIENCE FAIR KNOW HOW

## INTRODUCTION

Home schooling is all about giving our children the best we have to offer. We want them to have every advantage academically, socially, spiritually, and physically. We want them to be all God wants them to be and to equip them to fulfill the calling on their lives.

Many families are intimidated to teach science, much less participate in a science fair. The unfortunate thing is that the study of science is like a key into knowing our Creator. Study the creation and you get a glimpse into the passion, creativity, diversity, love, and awesomeness of our God.

With the direction of the Lord we began our vision in 1996. The vision was to fill an area lacking in availability to our home school families, especially for high schoolers – a science fair. Today, we hope to inspire each family to look at science differently and to participate in a science fair. **:O)**

## I. What is a Science Fair Project?

- An opportunity to explore in detail a field of science and to learn more about God's awesome creation. The journey begins with a question.

- Forum to communicate the results of the project
    - Visually with a display board, exhibit, journal, and report
    - Verbally with an interview with three judges
      Malachi 4:6 is the basis we use to choose our judges and God is faithful to bring this verse to fruition every year at the fair. Look it up!

- Blessing of efforts being publicly recognized by someone other than family and a sense of accomplishment with a job well done.

## II. Project Brainstorming

- Good Web Site for details on projects beginning to end –
    - http://school.discoveryeducation.com/sciencefaircentral/

- Choose a general area of science or a topic of interest in a field of science

  Refer to "A-Z Science Topics" ***Appendix A***

- Start asking questions to narrow your topic
    - Brainstorm and list questions about your favorite areas of science
    - Highlight the one or two that most interest you
    - It does not need to be complicated – Simple is often better

- Research your topic to find clues to your answer
    - Library, Internet, interviews, articles, magazines, etc.

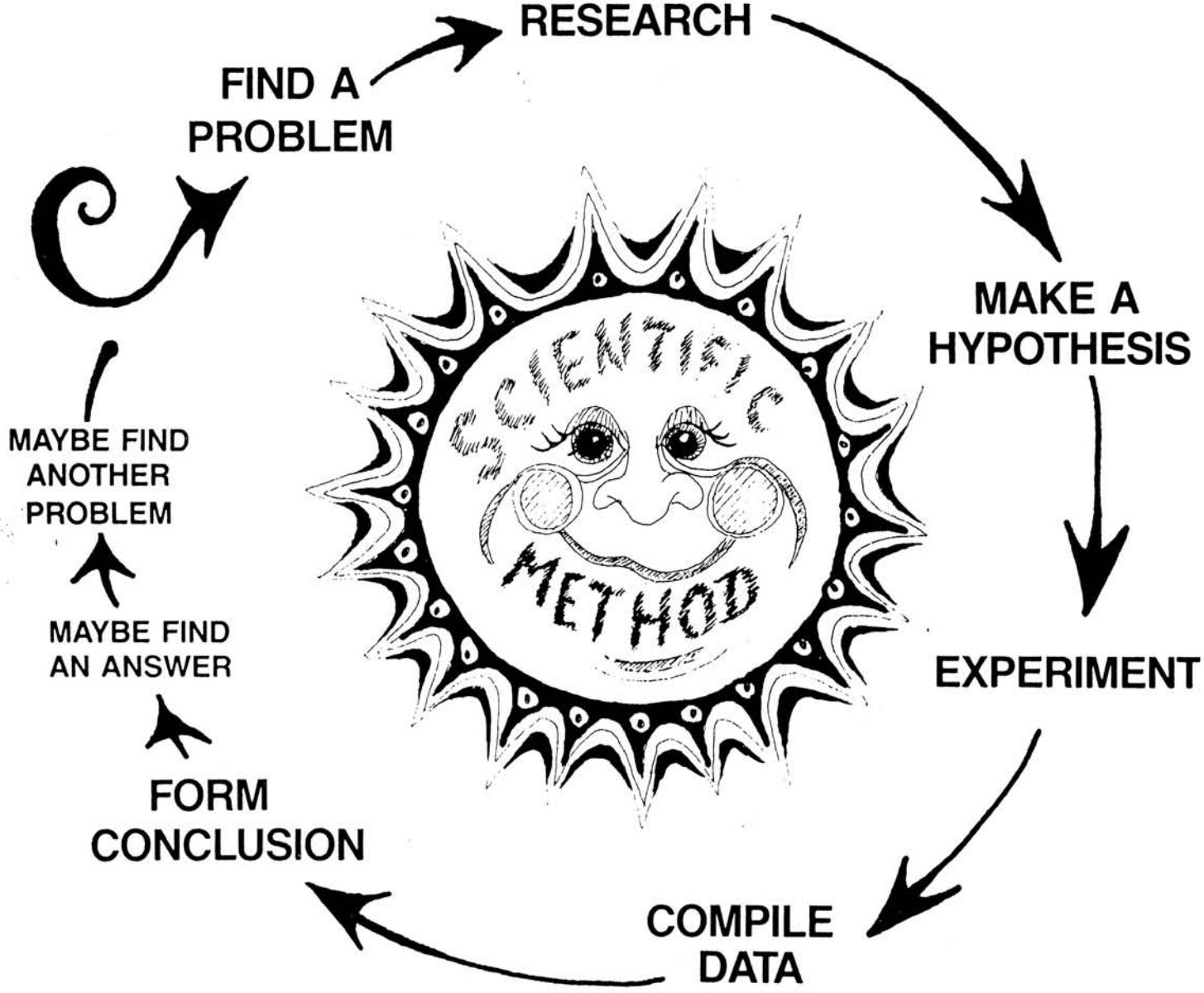
- Decide what type of project would best answer your question
    - <u>Experiments</u>
        - Biological science – deals with living things

          Topic areas include botany, bacteriology, biology, zoology, anatomy, and genetics
        - Physical science – deals with non-living things

          Topic areas include astronomy, chemistry, engineering, physics, geology, or earth science
    - <u>Model or Demonstration, which is a working model</u>
        - Examples: Heart, lung, volcanoes, solar system, robots, electrical devices, or rockets
    - <u>Collection</u>
        - Collect and scientifically name and label such things as rocks, shells, or butterflies
        - Be careful to have enough to constitute a collection

Refer to "Sample Experiment Questions" ***Appendix B***

Refer to "Samples of Science Projects" ***Appendix C***


RESEARCH
FIND A PROBLEM
MAKE A HYPOTHESIS
EXPERIMENT
COMPILE DATA
FORM CONCLUSION
MAYBE FIND AN ANSWER
MAYBE FIND ANOTHER PROBLEM
SCIENTIFIC METHOD

## III. Now What?

***Science is founded on the scientific method.***

***This is where you begin.***

***NOTE:*** The following predominantly addresses experiments. Most fairs require *all* projects types, including collections and models, to have a hypothesis that can be tested in a manner that yields results that can be graphed. The experiment is based on the purpose of the project.

We do not. See our registration packet for details on collections and models.

Scientific Method includes:

- Find a Problem
  - Research
    - Hypothesis
      - Experiment
        - Compile Data
          - Formulate a Conclusion

- Find a problem you observe in an area of science that interests you (purpose)
  - Formulate a question
  - How the question is answered becomes the project
  - The question should be specific and should identify the variables to be studied. Example:
    - Experiment – "Can plants grow without soil?"
    - Collection or models – "How much can a caterpillar eat in one day?"
      Collect and label caterpillars or make a model of a caterpillar, then choose two to three types of caterpillars to test your question.
    - Demonstration – "What type of soil filters water best?"

- Research
    - A lot more information will be collected than will actually be used.
    - The research helps narrow down the topic, formulate a hypothesis, and determine how you will test your hypothesis.
    - Remember to keep organized, so you can find what you need when you need it. This is the purpose behind logging everything you do in a journal.
        - Journal – a bound diary. Where everything for the project is logged.

- Hypothesis – An educated guess formulated to answer your question
    - Take into account your research and your opinion of what will happen when making your hypothesis.
    - State in measurable terms what results you are expecting to get.

- Experiment - To test your hypothesis
    - Procedure – *This is like a recipe. Another person should be able to perform the experiment following your procedure.*
        - Outline in detail the steps to conduct your experiment
        - Specify variable (item that changes to test hypothesis) - Keep it to one
        - Specify control (items of the experiment that do not change)
        - Detail how results will be measured to prove or disprove hypothesis
        - Include a timetable to use for measuring results or observing the subject matter (hourly, daily, weekly, etc.)
        - Record data - What is observed that is expected to change is data. (i.e. measurement of growth, color, weight, temperature, etc.)
    - Materials – List everything needed to conduct the experiment. Include precise amounts if appropriate. If you use it, list it.
    - There is time at this phase of the project to change direction either due to lack of what is needed to perform the experiment or unsuccessful experiments that do not prove or disprove the hypothesis.

**Do not give up! This is part of the learning process.**

***THERE ARE NO FAILURES IN SCIENCE –***

***ONLY NEW DIRECTIONS TO TRY.***

- Compile Data - Record observations

    - This is a key component. Utilize a journal (a bound notebook) to keep detailed notes on observations, data, and results. Charts can be a helpful way to record your measurements.
    - Research scientists utilize journals. The journal will begin with the date and time that the observations are made followed by the entry. It is how you keep all the details of your experiment from start to finish, so that someone else can understand what you have done and duplicate it.
    - Additional methods of recording observations are to take pictures and make sketches. Keep them organized.
    - The journal will be essential when it is time to draw your conclusions, write your report, and make your display.

- Formulate a Conclusion

    - The data will either prove or disprove the hypothesis. The result will either be an answer or another problem to begin the process all over again!
    - Analyze the results of your experiment and draw a conclusion based on these results.
    - Depending on what is done, this is where graphs, charts, and diagrams assist in analyzing data and being able to convey findings to others.
    - List the main points that you have learned.
    - Was your hypothesis proven or disproven? Be able to explain this.
    - Can you draw additional conclusions as to what would be the next step? Remember the point of the experiment was to test your hypothesis. This is not the type of test you take in school. It is not a pass or fail.
    - Summarize any difficulties or problems you had performing the experiment
    - If you repeated this project, what would you change?

## IV. Board Design

Your exhibit will include the following:

- Display Board
    - Exhibit
        - Journal or Log Book (may only be needed for upper grades)
            - Written Report (may only be needed for upper grades)
- Display Board
    - Generally, a tri-fold may be purchased or built. Each fair has specific size limitations.
    - Choose bright appealing colors, but not too busy.
    - Use clear and simple language.
    - The following can be arranged however desired. The information needs to neat and well organized, so as to be easily followed.
        - Title - Come up with a catchy title and display it prominently
        - Purpose – What is your goal? What is your question?
        - Statement of hypothesis
        - Theory of what results are expected
        - Materials
        - Procedures
        - Observations
        - Results of experiment
            - Charts and graphs are the best way to illustrate your data in a visual format that easily conveys a great deal of information.
        - Conclusion
        - Abstract (required by most fairs – see NOTE below)

Refer to ***Appendix D & E*** for examples of layouts for display boards
Refer to ***Appendix F*** for further details clarifying our rules pertaining to display boards
***NOTE:*** An abstract is generally required, particularly for high school students. It is a one-page brief 250-word summary. Please refer to ***Appendix G*** (2pgs.) for a simple outline and ***Appendix H*** for a detailed outline more appropriate for high school.

- Exhibit – The actual project that was done
    - Be sure to carefully check rules in regard to animal experiments, size of space available, what to do if you need electricity, and what is prohibited. In other words – **READ**!
    - Experiment – Labeled if applicable or possible. Make sure there is a control and one variable.
    - Model – Labeled
    - Demonstration of a scientific principle – Working!
    - Collection – Labeled and enough in quantity

- Journal or Log Book
    - This is like a diary and is usually a stitched or bound notebook.
    - It may not be required for all ages, but it is recommended.
    - The date is noted on each entry, then the student hand writes notes about research, books used, charts, experimental data, sketches of model, anything done or learned about their project.
    - It does not have to be in complete sentences nor re-done for the fair.
    - Some fairs require certain material in a certain order within the journal.
    - This is the method used by scientists and researchers to keep all their work in one place. It sets up good note-taking and organizational skills for future endeavors, no matter what the subject.

- Written Report
    - Generally only required for upper grades.
    - Depending on rules, it may need to be typed. **Read your rules!!**
    - Provides a formal background for your project by putting your project experiences in an organized manner.
    - Begin by copying the main ideas from your journal into a simple outline.
    - Make a rough draft.
    - Proofread as though you knew nothing about the project.
    - Final copy – make sure to check your spelling and grammar.
    - Make your abstract, which is a one-page version of your report.

## Two Examples of How a Report Can Be Organized for an Experiment:

1. Title
2. Table of contents
3. Introduction – (includes research & hypothesis)
4. Experiment - (includes materials, procedures, observations, and data)
5. Discussion of results - (begins with vocabulary page, if needed)
6. Conclusion
7. Acknowledgments
8. References

1. Title
2. Table of Contents
3. Abstract – 1 pg. summary of project
4. Introduction and review of related research
5. Statement of problem & hypothesis
6. Materials and methods
7. Observation and data
8. Discussion of results
9. New question, possible applications, and future projects
10. Conclusion
11. Appendix – can include graph, tables, and photos
12. Bibliography

For the second example refer to “Abstract Details” ***Appendix I***

## Details on a Report for a Demonstration or Model:

***Remember*** - Most fairs require <u>all</u> projects to be based on an experiment. This pertains to TRSF.

1. Title Page - Title, Name, Address, School Name, and Grade
2. Table of contents - List what your sections are and their page number
3. Introduction – Explain why you decided to do this particular subject for a project and explain what you hope to learn followed by your research
4. Demonstration (or Model) – List Materials, List Procedure, List Observations of what happened as project was done, Final Outcome of demonstration or model
5. Discussion - Vocabulary page if needed, Tie research with what happened
6. Conclusion - Briefly explain what you learned
7. Acknowledgments – Anyone who assisted you in putting your project together
8. References - List all resources (Try to have *multiple* sources, which can include books, magazines, Internet, interviews)

## V. Interview Tips

- Rehearse your presentation and have someone ask you questions!!!
- Use the scoring sheet to know what areas the judges will focus on.
- You are the one who learned and are in control. The judges are there to learn from you, so don't worry about messing up. They did not do the project. They won't know, unless you scrunch your face up and let them know!
- Remember – the most important thing is to have fun while learning and then get excited about sharing what you learned!
- Try not to put too much pressure on perfection. Science is not about perfection; it is about trying, getting results and sometimes making mistakes, learning from both, and figuring out what is the next step to take on your journey of discovery.
- RELAX!!! SMILE!!! LOOK AT THE JUDGES!!! and STAND UP!!!!

## VI. Why Participate?

- Opportunity to explore God's creation.
- Science is a window into who God is.
- Teaches:
    - Research skills
    - Goal setting
    - Public speaking
    - Visual aid presentation
- Family affair – Everyone learns, helps, grows, and gets creative.
- Stretches us – you know – gets us out of the comfort zone!

***Special Note***: For non-science based teachers – Good news!

- A *new* perspective about a science fair project:
    - It is a research paper in *disguise* supplemented with major visual aids!
    - The difference? - Only the topic being researched!

A science fair is nothing to be intimidated by.

Remember, God gave your children to you for **<u>you</u>** to train up.

You do not have to be an expert, only willing to get out of your comfort zone.

Whether you love science or do not know what to do with it,

all things are possible through Christ who strengthens us.

**Thank God!**

# SCIENCE FAIRS IN OUR REGION

*Please Note: Information is subject to change. Please contact for most current information.*

DO NOT HAVE UPDATED INFORMATION. CONTACT EMAIL TO VERIFY.

| | |
|---|---|
| Name: | **H.E.A.R.T. Science Fair** |
| Date Range: | October or November |
| Year Established: | 2000 |
| Registration Fees: | $5 per exhibit |
| Address: | 1915 FM1960 Bypass East, Humble, TX |
| Fair Location: | First Assembly of God Church |
| Contact: | Heather Farrell |
| Email: | AggiesRWe@aol .com |

| | |
|---|---|
| Name: | **Science Engineering Fair of Houston** |
| Date: | March 12-14, 2009 |
| Year Established: | 1960 |
| Registration Fees: | $15 per exhibit |
| Fair Location: | George R. Brown Convention Center, Houston, TX |
| Web Site: | http://hunstem.uhd.edu/SEFH/ |
| Comments: | Hosted by The University of Houston – Downtown Campus |

| | |
|---|---|
| Name: | **Texas Regional Science Fair** ***(This is us!!)*** |
| | ***Registration Packet is available on-line for download*** |
| Date Range: | April 4, 2009 |
| Year Established: | 1996 |
| Registration Fees: | $10 per exhibitor |
| Fair Location: | Tomball College Beckendorf Conference Center, Tomball, TX |
| Contact: | Karen Garza, Administrator |
| Email: | texasregionalsciencefair@yahoo.com |
| Web Site: | www.texasregionalsciencefair.com |

NOT SURE IF STILL IN EXISTENCE. USE EMAIL CONTACT TO VERIFY.

| | |
|---|---|
| Name: | **Southwest Houston History and Science Fair** |
| Date Range: | April |
| Year Established: | 2004 |
| Registration Fees: | $10 per exhibit |
| Fair Location: | Multi-Ethnic Community Center,<br>9819 Bissonnet, Houston, TX 77036 |
| Contact: | Leno Jerome |
| Email: | dynal@vipn.net |
| Web Site: | |