MARANATHA HIGH SCHOOL
SCIENCE FAIR GUIDELINES

What is the Science Fair Project?

 A Science Fair Project provides students with the opportunity to gain hands-on experience and knowledge in an independent field of study. It is a challenging assignment that allows all Maranatha High School students to use their own ideas to investigate science problems that interest them using a scientific method.

The science fair project will consist of four main components:
1. Developing a science fair project idea.
2. Designing and conducting an independent experiment
3. Completing a written report.
4. Completing a display board.

Please read the following pages carefully. If you follow these guidelines you will have a successful project.

Developing a Science Fair Project Idea
Tips for finding a project idea:
1. Explore your interests.
2. Research science magazines, current science news items, etc.
3. Visit museums, nature centers, science organizations (Heal the Bay, Friends of the River, etc.)
4. Visit and take notes at local, county, and state science fairs.
5. Use the internet or your local library to explore projects and project ideas.
6. Contact friends, relatives, and individuals at colleges, universities, corporations, etc. who work in fields in which you are interested in developing a project.
7. Examine the list of topics provided by your teacher.

The Maranatha High School Science Fair Written Report

Scientists always report the results of their research so that others may benefit from their knowledge. Your science fair project must also have a written component so that others may read about your research, experiment, and results. The components (parts) of the science fair written report are listed below.
Note* -- THE COMPONENTS MUST APPEAR IN THIS ORDER.

1. Title Page
- The TITLE should appear in the middle of the page. It should be centered.
- Center the following information UNDERNEATH the title:
  - Last name, First name
  - Grade
  - Teacher

  o School Name (Maranatha High School)
  o School Address (169 S. Saint John Avenue, Pasadena, CA 91105)
  o Date

2. Abstract

- Length: one to two paragraphs
- Concise summary of your entire project.
- Briefly describes your research, experiment, results and conclusion
- Abstract should be written **after** you have completed the entire science fair project

3. Table of Contents

- List all the main sections of your written report. Your report should be organized into 4 major pieces: Introduction, Experiment, Analysis , and Conclusion. Below each of these major pieces will be sub-sections. Follow the example below:

- List the page numbers where each section outlined above can be found.
- Note: your title page and table of contents do not need to be numbered, but all other pages should have a page number at the top right corner of each page, according to APA formatting rules.

4. Introduction

 A. Purpose
- Length: one paragraph
- Explain why you chose the project you did. Do not say that you had to do it, or that it was for a grade.
- You must also discuss the significance of the project. Why is this project important to society? How can others benefit from the research you are doing? Why is your project useful?

 B. Experimental Question
- Length: one sentence

- State your experimental question (For example: *"What is the effect of the amount of fertilizer used on the growth rate of strawberry plants?"*)
- All research, experimentation, results, conclusion, etc. must refer back to the problem you are trying to answer.

C. Preliminary Research
- Length: 5 paragraphs
- You will do research about topics directly related to your project. Then you will use that research to write a "research paper" that provides background information for all readers of your experiment.
- You should provide enough information so that the reader becomes an "expert" in the topics related to your experiment. For example, if you were doing an experiment on the effect of caffeine on the growth of strawberry plants you would need to provide information on caffeine, plant growth in general, strawberry plants, etc.
- You must have a minimum of 3 sources, including at least one periodical and one book.
- You must write a comprehensive paper utilizing and incorporating all of your sources in an organized manner. You cannot just copy and paste from the sources, you must put everything in your own words and then cite! (see next bullet)
- You must use parenthetical citations for all sources of information. Parenthetical citations are used within the text of the paper whenever you use information from a source, quote material, etc. Therefore remember to KEEP A COMPLETE LIST of all sources you utilize as you do conduct your research
- Voice: use impersonal 3rd person. *For example: instead of writing "In my experiment, I will test . ." use "This experiment will test . . ."* (do not use, I, me, we, you).

D. Hypothesis
- Length: one sentence
- Statement which can be tested by experiment and answers the experimental question.
- Your research should help you make an educated guess.
- Your hypothesis must have an assumption, condition and prediction.
    i. The assumption is a POSSIBLE EXPLANATION for the problem. This cannot be competed unless the researcher has developed some background knowledge about the subject.
    ii. The condition tells HOW the research will conduct the experiment.
    iii. The predictions tell WHAT the researcher thinks will happen.

EXAMPLE: *If natural selection plays a role in the type of plants found in various biomes and temperature is known to denature proteins,* **then when three chlorophyll solutions are placed in hot water baths at 20, 25, 30, and 35 degrees Celsius for 15 minutes and measured by a spectrophotometric analysis,** chlorophyll solution A from Oleander will perform best at all temperature readings because it is native to areas with higher temperature and is knows to withstand lower temperatures equally as well, while the prairie grass solution will have the best performance at the highest temperature.

5. Experiment
A. Materials
- A detailed list of all items required to perform your experiment
- Include quantity and type.

    B. Procedure
- Step by step instructions for how to carry out your experiment. Should be complete, clear, and logical.
- The experiment MUST test the variable you set out in your experimental question.
- Use impersonal 3rd person voice. *For example: Instead of writing "You fill your beakers with water" use "Fill beakers with water"*
- Include diagrams and/or photographs where appropriate.

    C. Data
- Data Tables – well organized data, descriptive title, all columns/rows labeled clearly, typed
- Graphs – appropriate type (bar vs. line etc) computer generated, all axes labeled, descriptive title, legends (if needed)
- Calculations – clearly show all formulas and actual calculations used to obtain results.
- Written Summary of Data – In a minimum of 1 paragraph, summarize your data in words. Do not analyze or give your opinion at this time. "Verbal Data Table"

6. Analysis

A. Data Analysis
- This is where you analyze your data.
- Identify relationship between dependent and independent variable.
- Identify any patterns and/or trends in your data.

B. Scientific Discussion
- Discuss the scientific theory behind your experiment. If your experiment was "supposed to" support or illustrate a particular concept (gravity, photosynthesis, etc) explain that concept. According to current scientific knowledge, how "should" your project have turned out?

C. Error Analysis
- Even if you believe you didn't make any "mistakes" there is always some possibility of error, and you must discuss all potential sources of error.
- Where might errors have occurred? What are some possible sources of error? (You must discuss sources other than just "human error")
- What impact might these errors have caused? How might your data have been altered due to these errors?
- If possible, calculate the PERCENT ERROR involved in your measurements/calculations.

7. Conclusion
- Length: approximately one paragraph
- Re-state the problem.
- Re-state the hypothesis.
- Does your data support or refute your hypothesis?
- Answer the experimental question.

8. Biblical Application
- Length: approximately one paragraph
- Provide specific scriptural text to connect your project (something scientific) to what we believe scripturally.

- Includes how the scientific concepts explored (i.e. gravity) relates to the Word of God.

9. Acknowledgements
- Length: Less than one page
- Acknowledge (thank) people who assisted you with completing the project. You may include family members, teachers, professionals, or anyone who helped you with information, materials, equipment or participated in your project.

10. References
- All sources used for your project must be listed. (books, articles, interviews, internet resources)
- Minimum of 3 sources
- You must use APA format.

11. General Information
- All papers must be typed and saved.
- Be sure to use a 12-point font, double space your paper, and keep left and right margins at 1 inch.
- Use only one side of the paper.
- The written report must be grammatically correct, free of spelling errors, and in your own words.
- Report must be attached to your display board.
- Voice: use impersonal 3rd person. *For example: instead of writing "In my experiment, I will test . . ." use "This experiment will test . . ."* (do not use, I, me, we, you).

12. Academic Honesty.
- **Plagiarized projects (in part or in whole) will receive no credit and will be dealt with according to the honor code**.
- Proof that the student actually conducted the experiment himself/herself is required.
  - Student must present either:
    1. Dated receipts for materials or
    2. Current picture of himself/herself in front of their experimental set up.

The Science Fair Display Board

http://www.taft.k12.ca.us/TUHS/academics/Science/scifair
/scifair.html#section4
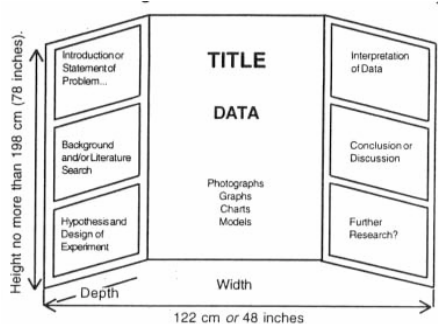
All science fair projects must also have a display board. The display board provides a summary of your project. The display board format enables a person to quickly see what the project was about, and to quickly read about the problem, how the problem was addressed, and what the results were.

1. **Display Board**
    - The display board must be a standard science project display board.
    - Boards may be purchased at the student store or any office supply or art store
    - Boards should be well organized and visually attractive with appropriate use of text, graphics and color.

2. **Board Components**
    - TITLE: The title should be centered across the top of your board. Title letters should be approximately 2-3" high (unless your title is unusually long). The title should be descriptive of your project—not cute.
    - SUBTITLES: YOU MUST HAVE THE FOLLOWING SUBTITLES ON YOUR BOARD:

        PROBLEM
        HYPOTHESIS
        PROCEDURE
        WRITTEN RESULTS
        TABLE
        GRAPH
        ANALYSIS
        CONCLUSION

http://www.corpsite.com/kidschool/sciencefair/guidelines_project_display_content.htm

    - You may include the ABSTRACT and the MATERIALS. Do not include preliminary research, personal comments, acknowledgements, or literature cited.
    - The subtitled sections listed above should be displayed in order (beginning on the upper left wing and ending on the lower right wing of the board).
    - Lettering for subtitles should be approximately 1-2" high. Written text should be a size easily read, and that best fits your display.
    - All components on this board should be computer generated (do not "free-hand").
    - Graphs and titles should be easy to read and understand.

3. **Drawings, Photographs, and Other Visuals**
    Drawings, diagrams and or photographs are important components of a visual display. They provide information about the design and setup of your experiment, and your results.
    - Visuals may be hand drawn, computer generated, or copied and cut from a legitimate source. All visuals must have TITLES and APPROPRIATE LABELS.

4. **Report Pocket**
    A report "pocket" MUST be attached to your display board.
    - Report pocket can be on the front or back of poster
    - It must strong enough to hold report without ripping or falling off

5. **General Information**

- NAME, DATE, AND PERIOD SHOULD APPEAR ON THE BACK OF THE BOARD ONLY. DO NOT shown any names on the front of the board (it will be disqualified for judging).
- USE GLUE to attach all items on your display board. Glue sticks, tape, staples, tacks, and pins ARE NOT effective or appropriate. Any items that are not securely attached and fall off will not be considered for grading.
- Before you are ready to attach items to your board, first assemble ALL materials. Carefully lay them out on your board and look at it carefully. Have your family and friends look at your written and visual materials, and get their opinions BEFORE attaching the materials to your board. Finally, ask for assistance in assembling your board. Mistakes are difficult, and can be expensive, to fix at a later time.
- **HAVE YOUR BOARD FINISHED ONE WEEK BEFORE THE FINAL DUE DATE.** This will allow you plenty of time for revisions, and to address any problems that may arise. Late projects will receive 1/2 credit, and will not be allowed revisions.

Proper Citation and Bibliography Guidelines

The "Preliminary Research" section of your report requires extensive research into your topic. You must give credit to the resources you used. These sources MUST be cited (given credit) in two different places:

   i.   Within the actual paragraph you have written that contains information from that source.
  ii.   At then end of the report – in your works cited.

Citing Sources In Your Report (within the written part of your report)

Citations are used within the Preliminary Research component of your written report in order to provide credit for the sources from which you obtained your research information. Scientific citations are placed within the paper itself, at the end of a sentence or paragraph that contains the information you gathered from another source.

1. Rules for Citing Sources

1. Cite all sources that refer to information on any aspect of your experiment.
2. Cite all sources that back up your conclusions.
3. Cite anything that brings in a fact NOT DIRECTLY TAKEN FROM YOUR OWN PERSONAL OBSERVATIONS OR EXPERIENCES.
4. Cite all quotations.
5. When in doubt, cite!

2. Examples of Proper Citing

The proper format for citing sources within the text is to place in parentheses the last name of the author, followed by a comma, and then the date of the publication.

Example: (Smith, 2000).

Example in Text:

White sharks are known to have attacked humans (Halstead, 1995). They are the only sharks that regularly preys on marine mammals for food. Some scientists believe that great white sharks attack humans by mistake. They believe that the silhouette of a surfer paddling on a surfboard may be mistaken for a seal sunning on the surface (Ellis, 1997).

Variations:

• Two authors: (both last names, date) (Walker and Maben, 1989)

• No author: (abbreviated title, date)(Insects of North America,1992)

• Internet, no author (website or address, date) (www.kuperteach.com, 2000)

How to Create a Reference List

Shown below are guidelines to use when creating a list of citations for a reference list at the end of a research paper. The format used is APA (American Psychological Association) and the examples used are taken directly from the *Publication Manual of the American Psychological Association, 5th ed.* For additional examples, please refer to that book.

1. Periodicals
Elements of a reference to a periodical

Herman, L. M., Kuczaj, S. A., III, & Holder, M. D. (1993). Responses to anomalous gestural sequences by a language-trained dolphin: Evidence for processing of semantic relations and syntactic information. *Journal of Experimental Psychology: General, 122, 184-194.*

Article authors: Herman, L. M., Kuczaj, S. A., III, & Holder, M. D.
Date of publication: (1993)
Article title: Responses to anomalous gestural sequences by a language-trained dolphin: Evidence for processing of semantic relations and syntactic information.
- Capitalize only the first word of the title and of the subtitle, if any, and any proper nouns; do not italicize the title or place quotation marks around it.
- Finish the element with a period.

Examples of references to periodicals
1. Journal article, one author:

   Mellers, B. A. (2000). Choice and the relative pleasure of consequences. *Psychological Bulletin, 126, 910-924.*

2. Journal article, two authors, journal paginated by issue:

   Klimoski, R., & Palmer, S. (1993). The ADA and the hiring process in organizations. *Consulting Psychology Journal: Practice and Research, 45(2), 10-36.*

3. Magazine article:

   Kandell, E. R., & Squire, L. R. (2000, November 10). Neuroscience: Breaking down scientific barriers to the study of brain and mind. *Science, 290, 1113-1120.*
   - Give the date shown on the publication – month for monthlies or month and day for weeklies
   - Give the volume number.

4. Daily newspaper article:

Schwartz, J. (1993, September 30). Obesity affects economic, social status. *The Washington Post,*
    p. A1.

- If an article appears on discontinuous pages, give all page numbers, and separate the
    numbers with a comma (e.g., pp. B1, B3, B5-7).

2. Books and Book Chapters
Elements of a reference to an entire book

Beck, C. A. J., & Sales, B. D. (2001). *Family mediation: facts, myths, and*
    Future prospects. Washington, DC: American Psychological Association.

Book authors or editors: Beck, C. A. J., & Sales, B. D.
Date of publication: (2001)
Book title: *Family mediation: facts, myths, and Future prospects.*
Publication information: Washington, DC: American Psychological Association.

Examples of references to an entire book
1. Book, third edition, Jr. in name:

    Mitchell, T. R. & Larson, J. R., Jr. (1987). *People in organizations: An introduction to*
        organizational behavior (3rd ed.). New York: McGraw-Hill.

2. Book, group author (government agency) as publisher:

    Australian Bureau of Statistics. (1991). *Estimated resident population by age and sex in statistical*
        local areas, New South Wales, June 1990 (No. 3209.1). Canberra, Australian Capital
        Territory; Author.
    - Alphabetize group authors by the first significant word of the name.
    - When the author and publisher are identical, use the word Author as the name of the
        publisher.

3. Edited Book:

    Gibbs, J. T., & Huang, L. N. (Eds.). (1991). *Children of color: Psychological interventions with*
    minority youth. San Francisco: Jossey-Bass.

4. Book, no author or editor:

    Merriam-Webster's collegiate dictionary (10th ed.). (1993). Springfield, MA: Merriam-Webster.
    - Place the title in the author position.
    - Alphabetize books with no author or editor by the first significan tword in the title (Merriam
        in this case).
    - In text, us ea few words of the title, or the whole title if it is short, in place of an author
        name in the citation: (Merriam-Webster's Collegiate Dictionary, 1993).

5. Encyclopedia or dictionary:

Sadie, S. (Ed.). (1980). *The new Grove dictionary of music and musicians* (6th ed., Vols. 1-20). London: Macmillan.

3. Electronic Media

Examples of references to electronic media

1. Multipage Internet document created by private organization:

   Greater New Milford (Ct) Area Healthy Community 2000, Task Force on Teen and Adolescent Issues. (1998, March 6). *Who has time for a family meal? You do!* Retrieved October 5, 2000, from http://www.familymealtime.org
   - When an Internet document comprises multiple pages (i.e., different sections have different URLs), provide a URL that links to the home page for the document.
   - Use n.d. (no date) when a publication date is not available.

2. Stand-alone Internet document, no author identified, no date:

   GVU's 8th WWW user survey. (n.d.). Retrieved August 8, 2000, from http://www.cc.gatech.edu/gvu/user_surveys/survey-1997-10/
   - If the author of a document is not identified, begin the reference with the title of the document.

3. Computer software:

   Miller, M. E. (1993). The Interactive Tester (Version 4.0) [Computer software]. Westminster, CA: Psytek Services.