Foothill Adventist School
SCIENCE FAIR
Student Handbook

March 19, 2019

Dear Students and Families,

Some things to remember about the science fair:

- Teachers, students, and parents will collaborate to make the fair a success
- Most of the project will be completed at home, but your teacher will provide guidance in the classroom as you move through the various stages of your project
- Parents are encouraged to be part of the process, but the final product should be the work of the student
- Refer to this handbook and your teacher for guidance on the project
- Turning things in on time counts for a portion of your grade, so make sure to pay attention to due dates (found in the appendix)
- Have FUN! Pick a project topic that interests you and see how much you can learn

Sincerely,

Melinda Fletcher
Science Fair Coordinator

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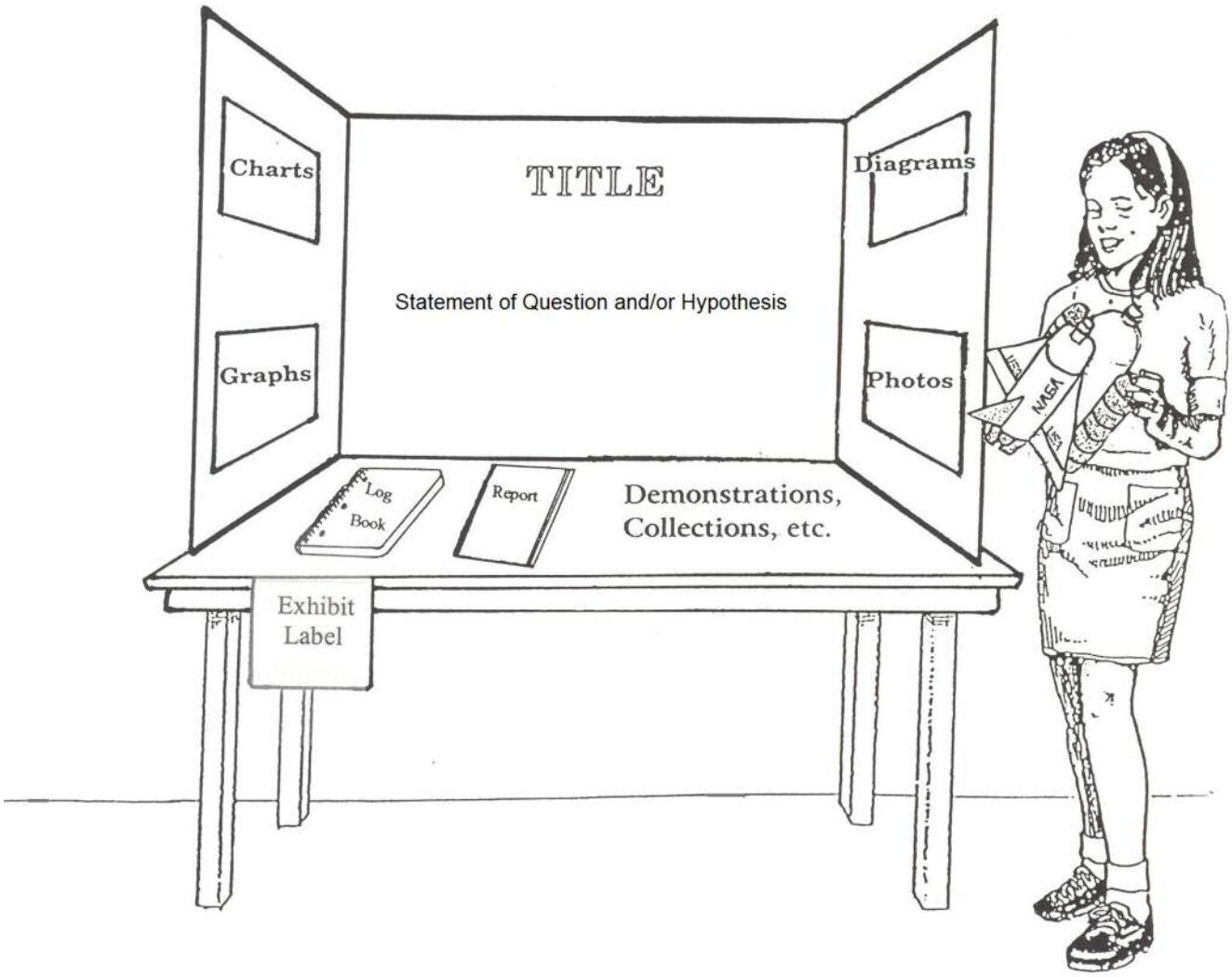
A Typical Science Fair Project



Project Levels and Types

Levels

Projects will be entered and judged at four grade levels:

Grades 1 and 2
Grades 3 and 4
Grades 5 and 6
Grades 7 and 8

Types of Science Fair Projects

Science Project: **investigates the effects of changes or answers the question "Why?".**

Engineering Project: solves a need or problem, and includes measurements of success.

Product Testing Project: tests and compares similar items using measurable endpoints.

Science Project minimum requirements

1. Define a testable question that begins Why? or What? (for example, Why does condensation form on the outside of a cold glass of water? Or What is the effect of a change in the amount of sunlight on the growth of tomato plants?).

2. Bibliography includes references from your literature research.

3. Hypothesis based on your library research and knowledge. It is your best estimate of what will happen.

4. Experimental design with steps clearly listed

5. Conclusion is clearly stated

Engineering Project minimum requirements

1. Clearly define the problem or need the engineering project will solve.

2. Include a bibliography from your literature research.

3. List design criteria and design constraints
   - Physical and functional characteristics of the design (shape, weight, etc).
   - Design constraints/limitations (cost, time, available materials, etc).

4. Clearly state success criteria. What will you measure to see if your design worked?

5. Report measurements in metric units where possible.

Product Testing Project minimum requirements

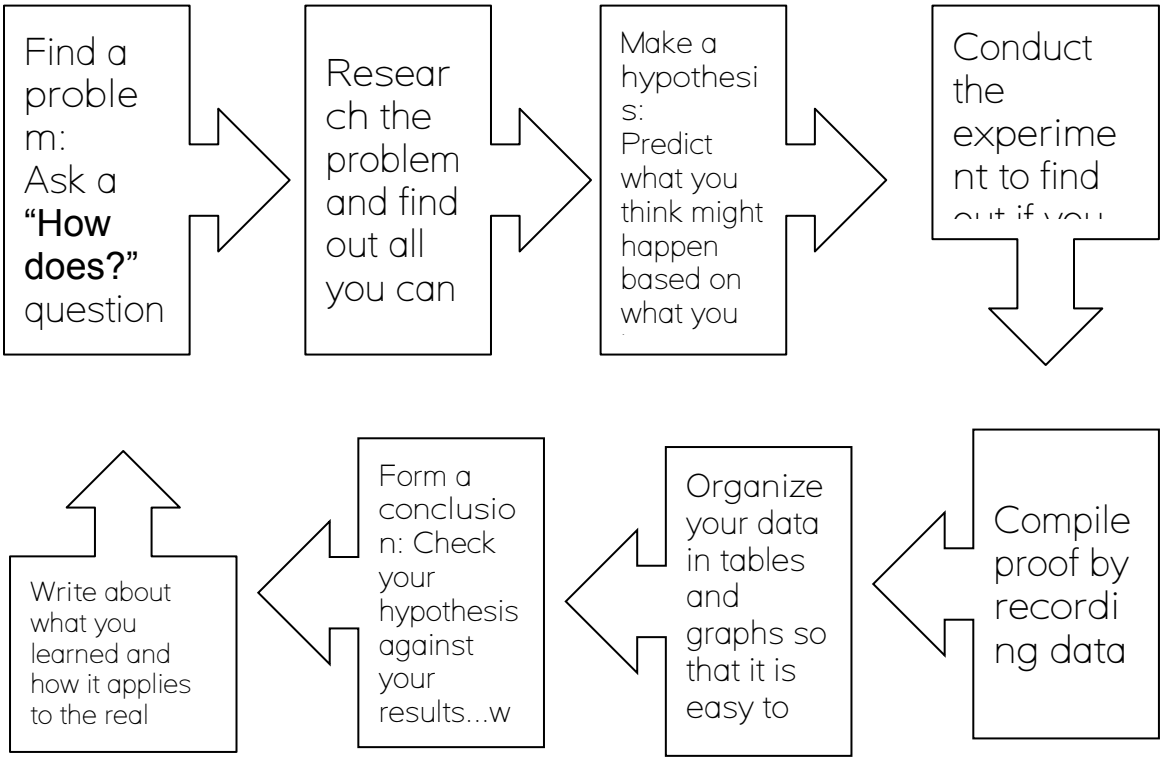
1. Clearly identify what kind of item (soap, fabric, etc.) you plan to test.

2. Define a test group of at least three similar items (Grades 1-4) or four similar items (Grades 5-8).

3. Include test criteria that:
   - Define what will be measured.
   - Describe how you will take measurements.
   - Report measurements in metric units, when possible.
   - **Define criteria for "the best" (cleanest, largest, coldest, etc).**
   - Repeat the test more than once to see if your results are reproducible.

Project Procedure

All projects should be guided by the scientific method, as outlined below:



The Scientific Method

Step 1: Come up with a good question

Think about things in nature, health, technology, etc. which cause you to wonder why or how?

Use one of these question frames to help you develop a question:

What is the effect of _____ on _____?

sunlight	the growth of plants
eye color	pupil dilation
brands of soda	a piece of meat
temperature	the size of a balloon
oil	a ramp

How does the _____ affect _____?

color of light	the growth of plants
humidity	the growth of fungi
color of a material	its absorption of heat

Which/What _____(verb) _____?

paper towel	is most absorbent
foods	do mealworms prefer
detergent	makes the most bubbles
paper towel	is strongest
peanut butter	tastes the best

Step 2: Do research

Now it is time to research your problem as much as possible. Becoming an expert at your topic is what real scientists do in real labs. How do you become an expert?

YOU READ!!!!

- Books
- Encyclopedias
- Magazine articles
- Internet articles

Take note of new science words you learn and use them. It makes you sound like a real scientist. Keep track of all the books and articles you read for your bibliography. A worksheet to help you do this is located in the appendix.

YOU DISCUSS!!

Talk to

- Parents
- Teachers
- Experts like veterinarians, doctors, weathermen, or others who work with the things you are studying

Take pictures of yourself interviewing people-they will be useful for your display board.

Step 3: Form a hypothesis

What do you *think* will happen, even before you start your experiment?

Example Problem:

Which paper towel is more absorbent?

Example Hypothesis:

I think Brand X will be more absorbent because it's a more popular brand, it is thicker and the people I interviewed said that the more expensive brands would work better.

(This hypothesis not only predicts what will happen in the experiment, but also shows that you used research to back up your prediction.)

Step 4: Conduct the experiment

- List and gather your materials

What will you need to perform your experiment? Take or draw pictures of your materials. This will come in handy when you are making your board display.

- Write a procedure

A procedure is a list of steps that you did to perform an experiment. Why do you need to write it down? Scientists do this so that people will believe that they did the experiment and also to let other people test what they found out. Take pictures of yourself doing the steps to show what happened.

- Identify your variables

The variables are any factors that can change in an experiment. Remember that when you are testing your experiment you should only test one variable at a time in order to get accurate results.

In other words, if you want to test the effect that water has on plant growth, then all the plants you test should be given the same conditions. These are called controlled variables: same type of dirt, same type of plant, same location, same amount of sunlight, etc.

The only variable you would change from plant to plant would be the amount of water it received. This is called the independent variable. The independent variable is the factor you are testing. Knowing what your variables are is very important because if you don't know them you won't be able to collect your data or read your results.

- TEST, TEST, TEST

Take pictures of the science project being done and the results. If possible, perform the experiment more than once to see if your results are consistent.

Step 5: Collect your Data

This means write down or record the results of the experiment.

Tips for collecting data:

- Keep a science logbook: A science logbook is a type of science journal that you can keep especially if your experiment is taking place over a long period of time. We suggest you do that if your experiment is over a period of a week or more. In your logbook you can record observations, collect research, draw and diagram pictures and jot down any additional questions you might have for later.

- Have the right tools to do the job: make sure you have the stuff you need to take accurate measurements like rulers, meter tapes, thermometers, graduated cylinders or measuring cups that measure volume. The recommended standard of measurement in science is metric so if you can keep your measurements in meters, liters, Celsius, grams, etc, you are doing great!

- Record what happened after each step in your procedure by writing things down and taking or drawing pictures. Be accurate and neat!

Step 6: Organize your data

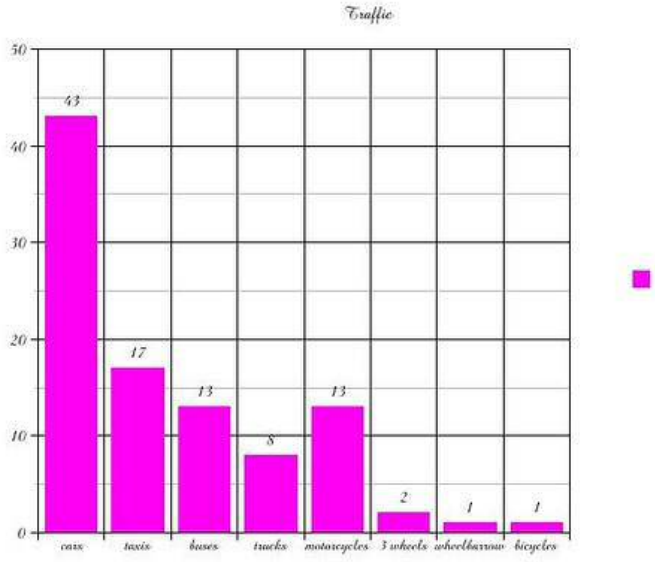
Most scientists use tables, graphs and other organizers to show their results. Organizing makes the results easy to read. Not every experiment has results that are easy to show in a graph. You may need to draw pictures or diagrams to show your results.

Tips for choosing which type of graph to use:

- Pie graphs are good to use if you are showing percentages of groups. Remember **that you can't have more than 100% and all the pieces need to add up to 100%.** This type of graph is great if you are doing surveys.

- Bar graphs are good to use if you are comparing amounts of things because the bars show those amounts in an easy to read way.

- Line graphs are good to use if you are showing how changes occurred in your experiments over time.



Step 7: Write a Conclusion

Tell what happened.

- Was your hypothesis right or wrong or neither?

- Were you successful, did it turn out okay?

- Would you change anything about the experiment or are you curious about **something else now that you've completed your experiment?**

- And most of all, what did you learn from doing this experiment?

Remember-**your experiment has not "failed," even if your hypothesis turns out to be** incorrect. 409 Cleaner had 408 tries that did not work before the perfect cleaner was found! As long as you are able to form a conclusion about what you learned, the experiment is successful.

Step 8: Write about how what you learned affects the real world

- Write about how this experiment can be used in a real life situation.

- Why was it important to know about it?

- What did you learn about God the Creator through your experiment?

Elements Presented at the Fair

The Report

- A written report, separate from the display board, is part of the project.
- Refer to the grade-specific appendix for report requirements.

Oral Presentation

- A brief oral presentation is required of all projects.
- The student displaying the exhibit must be present at the assigned time of judging to give a brief oral presentation of the project and to respond to any questions presented by the judges.
- Rehearse your oral presentation in advance.
- You will want to show the judges that you can explain each step that you took and why you took each step.
- You should be able to explain what you learned from your study, how you feel about what you learned, and what your project shows about God as the Creator.
- See the grade-specific rubric in the appendix for more information on expectations for the oral presentation.

The Display

- The display board should be a standard tri-fold board.
- These can be found at Wal-Mart, Target, and even Dollar Tree.
- The display should be clear, legible, organized, and express a degree of originality and creativity.
- If possible, avoid handwritten lettering. Typing your titles and labels will make your display look more professional and impressive.
- Any visual aids must comply with Adventist standards and federal law. At no time, under no circumstances, with no exceptions, may guns of any type, knives, weapons, explosives, gun shells (empty or not empty), or items with the <u>appearance</u> of the above-mentioned items be brought onto the Foothill campus. This violates the federal laws restricting these items from schools and school grounds. All schools are required to enforce zero tolerance on weapons violations.
- When cigarettes, drugs or drug paraphernalia are used as visual aides in a project, the items must be attached to the display board in such a manner that they are unusable if removed from the board. These items may not be displayed on the table in front of the display board. It is suggested that, where possible, pictures be used rather than the actual item.

Judging

Judges

- Each project will be judged by three different judges: one for the report, one for the display, and one for the oral presentation.
- Each judge will use a detailed rubric to award points for each section of the project.
- The science teacher will also award points for the project overall as well as the process of developing the project.

Awards

- Once the judging is complete all scores will be added together on a summary sheet for the total score.
- Awards of 1st, 2nd, and 3rd place are determined based on a student's total score.
- Judges' rubrics and the judging summary sheet, which includes the point requirements for each award, can be found in the appendix.

Overall Winner

- A trophy will be awarded to the overall winner in two categories: Grades 1-4 and Grades 5-8.
- Overall winners will be selected from among the highest scoring projects in each grade and will be chosen by the school faculty.

Appendix

Science Fair Checklist

1st/2nd Grade

Part of your grade from your teacher will be based on whether you turned things in on time or not. Use this checklist to help you keep track of your deadlines.

	TO DO LIST	DUE DATE
1	Turn in registration form	Friday, Feb. 15
2	Turn in list of materials	Friday, Feb. 22
3	Turn in list of steps	Friday, March 1
4	Turn in conclusion statement	Friday, March 8
5	Turn in display board	Friday, March 15
6	Oral presentation	Tuesday, March 19

FOOTHILL ADVENTIST SCHOOL
SCIENCE FAIR 2019

REGISTRATION FORM

Please complete this form and return to your teacher by the due date.

STUDENT'S NAME_____
(Please PRINT)

TYPE OF PROJECT (circle one)

Science Project Engineering Project Product Testing Project

PROJECT TITLE _____

GRADE LEVEL **_____1/2** **_____3/4** **_____ 5/6** **_____7/8**

Question_____

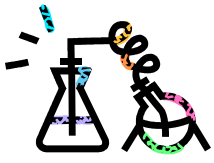
Hypothesis_____

_____

STUDENT'S SIGNATURE_____

PARENT'S SIGNATURE _____

TEACHER'S SIGNATURE _____



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LIST OF MATERIALS

Please complete this form and return to your teacher by Friday, Feb. 22

Grades 1 & 2

STUDENT'S NAME_____

LIST OF MATERIALS FOR PROJECT

_____

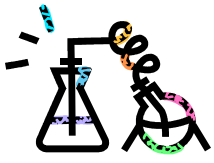
_____

_____

_____

_____

_____



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LIST OF STEPS

Please complete this form and return to your teacher by Friday, March 1

Grades 1 & 2

STUDENT'S NAME _____

LIST OF STEPS

_____

_____

_____

_____

_____

_____

_____

_____

_____

PARENT'S SIGNATURE_____

FOOTHILL ADVENTIST SCHOOL
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CONCLUSION STATEMENT

Please complete this form and return to your teacher by Friday, March 8

Grades 1 & 2

STUDENT'S NAME _____

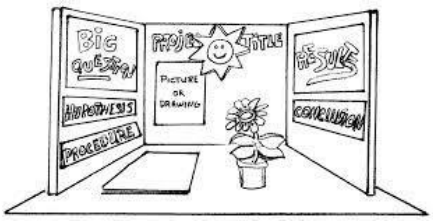
CONCLUSION STATEMENT

_____

_____

_____

PARENT'S SIGNATURE_____



Foothill Science Fair 2019

Display Rubric

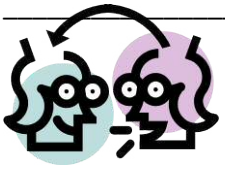
1/2nd Grade

Student Name:_____#_____

	1	2	3	4-5	Student Score
Neat and Attractive	Messy and difficult to read; title is absent or difficult to see	Somewhat neat and easy to read; title is not prominent	Mostly neat and easy to read; title clearly displayed	Extremely neat and easy to read; title clearly displayed	
Hypothesis and Conclusion Statement	Very little organization; hypothesis and conclusion statement are absent or unclear	Information is somewhat organized, but difficult to follow; hypothosis and conclusion unclear	Mostly organized and there is a hypothesis and conclusion statement present	Extremely organized and the hypothesis and conclusion are clearly stated	
Steps used to complete the project	No list of steps	List of steps is incomplete	Steps are listed, but may be somewhat unclear	Steps are clearly listed	
List of Materials	No list of materials	List of materials is incomplete	Materials are listed, but may be somewhat unclear	Materials are clearly listed	
Includes pictures/graphs or descriptive writing	No pictures, descriptive writing, or graphs are present	1-2 pictures or descriptions are present	3-4 pictures or descriptions are present	5+ pictures or descriptions are present	
What was learned	No indication of what was learned	Vague description of what was learned	A statement of what was learned is present, but slightly unclear	What was learned is clearly stated	
Creativity	No creativity—display is not visually interesting	Little creativity—uses little color or graphics	Good creativity—uses some colors and graphics	Great creativity—uses eye-catching colors/graphics	
Represents Student's own work	Display appears to have been largely completely by an adult	Display represents mainly the student's own work, with some adult help			
WOW! Point (+1)	Student's display is exemplary and deserves an extra point for the WOW! factor				
Total Score					

Judge's comments:_____

_____



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Presentation Rubric

1/2nd Grade

Student Name:_____#_____

	1-2	3-4	5	Student Score
Explain your project	Student is unable or only partially explains the steps of the project	Student may need prompting, but is able to explain the steps of the project	Student clearly explains the steps of the project without prompting	
Explain what you learned	Student has no idea or only a vague idea of what was learned	Student may need prompting, but is able to explain what was learned	Student clearly explains what was learned without prompting	
Explain what you learned about God	Student is unable to explain what they learned about God	Student may need prompting, but is able to express what he/she learned about God	Student is able to clearly express what he/she learned about God without prompting	
Represents the student's own work	**1** It appears that an adult did the majority of the work on the project	**2** It appears the student had a considerable amount of adult help	**3** The project represents the student's own work with some adult help	
WOW! Points (+3)	Student's presentation is exemplary and deserves extra points for the WOW! factor			
Total Score				

Judge's comments:_____

_____

Foothill Science Fair 2019
Teacher Evaluation Rubric
1st/2nd Grade

	1-5	6-10	Student Score
Deadlines met	Few or some deadlines met	Most or all deadlines met	
Project shows **student's own work**	Project shows little or **none of student's own** work	Project shows most or **all student's own** work	
WOW! point (+1)	Student put in extra time and effort and deserves an extra point for the WOW! factor		
Total Score			

Teacher Comments:

_____

_____

_____

Foothill Science Fair 2019

Judging Summary Sheet

1/2nd Grade

Name:_____#_____

Project Title: _____

	Points Possible	Points Earned
Display	**37 (+1 WOW! point)**	
Presentation	**18 (+3 WOW! points)**	
Teacher Evaluation	**20 (+1 WOW! point)**	
Total Points	**75 (+5 WOW! points)**	

Teacher Comments:

_____

_____

_____

1st place=68+ points; **2nd** place=60-67 points; **3rd** place= 53-59 points