

# 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

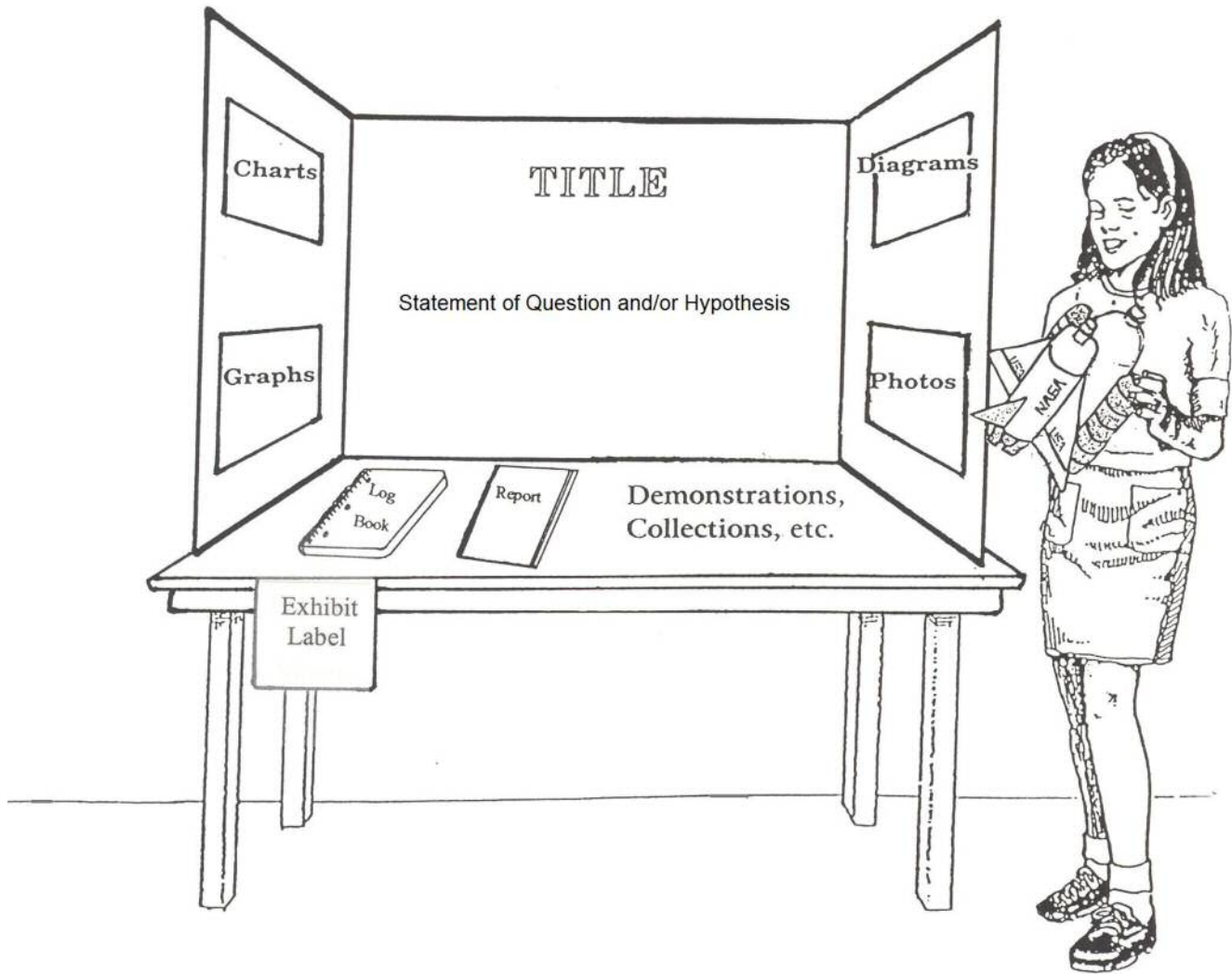
Sincerely,

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.

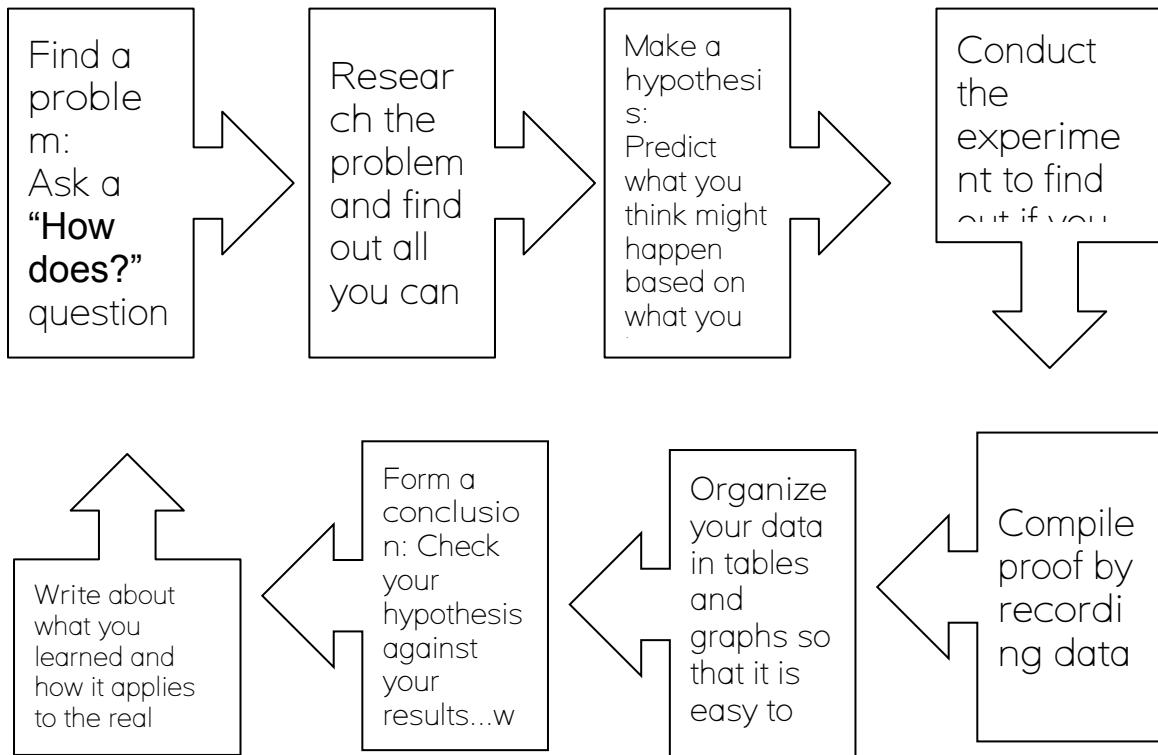
2. Include a bibliography from your literature research.
3. List design criteria and design constraints
  - Physical and functional characteristics of the design (shape, weight, etc).
  - Design constraints/limitations (cost, time, available materials, etc).
4. Clearly state success criteria. What will 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!

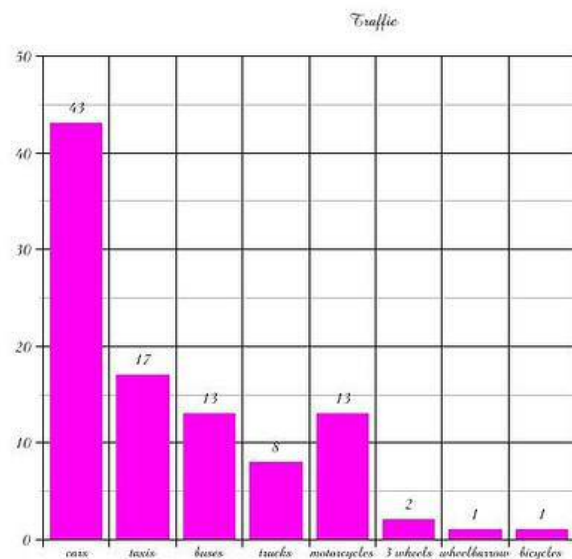


## Step 6: Organize your data

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 appearance 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 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> **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

5th/6th 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	COMPLETED DATE
1	Turn in registration to teacher		
2	Prepare results and conclusion		
3	Complete report for editing		
4	Complete final copy of report		
5	Complete display board		
6	Display and report turned in for set-up	March 18	

# Guidelines for the Written Report

## **The Basics**

- The written report is a summary of everything that you did to investigate your topic.
- Usually the body of the report is 3-8 pages in length (not including title page, acknowledgments, or table of contents)
- Reports should be neatly bound
- Report must be typed, doubled spaced. One inch margins and 12 pt Times New Roman font
- Remember to put headings/titles on graphs/charts/tables
- All photographs should have captions explaining their significance
- Before you hand in your report make sure to reread, revise, and rewrite
- Recheck your calculations, spelling, and grammar.

## **Elements to Include:**

✓ **Title Page:** The first page in the report should include the title of the project as well as the name and grade of the student.

✓ **Acknowledgments:** Here is where you thank everyone who helped to make your project successful (including Mom and Dad.) Everyone that you interviewed, including teachers, scientists, and other experts in the field should be mentioned here.

✓ **Table of Contents:** List the different parts of the project and the page number on which each section can be found.

✓ **Question and Hypothesis**

✓ **Materials:** List all the materials and supplies used in the project.

✓ **Main Body:** This should include your procedure, your observations, and a summary of the information that you researched.

✓ **Conclusion and Results:** Explain what happened and state your conclusion

✓ **Reference Page:** The bibliography should list all the printed materials you used in your research. Items should be listed in alphabetical order in a standard format. Use the bibliography worksheet or resources suggested by your teacher to help you list your references in a standard format.

# Bibliography Worksheet

## Resource #1:

Type of Resource: \_\_\_\_\_

Website: http://\_\_\_\_\_

Author: \_\_\_\_\_

Title: \_\_\_\_\_

Publishing Company: \_\_\_\_\_

Location of the Publishing Company: \_\_\_\_\_

Date of Publication: \_\_\_\_\_

Information found in your own words: (This part is for your own note-taking only and should not be included in your bibliography)

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## Resource #2:

Type of Resource: \_\_\_\_\_

Website: http://\_\_\_\_\_

Author: \_\_\_\_\_

Title: \_\_\_\_\_

Publishing Company: \_\_\_\_\_

Location of the Publishing Company: \_\_\_\_\_

Date of Publication: \_\_\_\_\_

Information found in your own words: (This part is for your own note-taking only and should not be included in your bibliography)

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**Resource #3:**

Type of Resource: \_\_\_\_\_

Website: http://\_\_\_\_\_

Author: \_\_\_\_\_

Title: \_\_\_\_\_

Publishing Company: \_\_\_\_\_

Location of the Publishing Company: \_\_\_\_\_

Date of Publication: \_\_\_\_\_

Information found in your own words: (This part is for your own note-taking only and should not be included in your bibliography)

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**Resource #4:**

Type of Resource: \_\_\_\_\_

Website: http://\_\_\_\_\_

Author: \_\_\_\_\_

Title: \_\_\_\_\_

Publishing Company: \_\_\_\_\_

Location of the Publishing Company: \_\_\_\_\_

Date of Publication: \_\_\_\_\_

Information found in your own words: (This part is for your own note-taking only and should not be included in your bibliography)

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**Resource #5:**

Type of Resource: \_\_\_\_\_

Website: http://\_\_\_\_\_

Author: \_\_\_\_\_

Title: \_\_\_\_\_

Publishing Company: \_\_\_\_\_

Location of the Publishing Company: \_\_\_\_\_

Date of Publication: \_\_\_\_\_

Information found in your own words: (This part is for your own note-taking only and should not be included in your bibliography)

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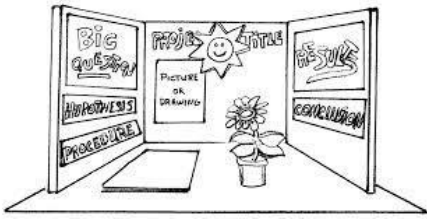
## **Guidelines for the Oral Presentation**

A lot of kids are scared of speaking in public or to a teacher/judge. Just imagine the judge is a fellow scientist who just wants you to share what you learned.

Relax, smile, and have fun. Remember, you are the expert and you had fun doing the project.

### **Helpful Hints:**

- Look sharp, feel sharp, and you will be sharp. Dress nice that day, be polite, and speak clearly. You will show that you have confidence. Don't forget to look at the judge.
- Introduce yourself. Point to the title of your display. Tell the judge why you chose this topic
- State the problem that you studied (your question.) Tell them about your hypothesis (what you thought might happen.)
- Talk about what you learned while researching your topic.
- Talk about the sources (books, websites, and interviews) that helped you understand your topic.
- Tell about your project and explain the steps you took to conduct your experiment.
- Be sure to explain what your data means. Make sure you can read your graphs and tables. Let the judge know if you were surprised by the results, or if you knew what would happen because you studied about it.
- Make sure you sound like an expert on your topic. Always use the appropriate vocabulary especially by using words from the Scientific Method, like: Problem, Hypothesis, Procedure, Results, and Conclusions.
- Explain what you learned about our amazing Creator God through this project



# Foothill Science Fair 2019

## Display Rubric

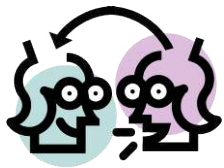
5/6<sup>th</sup> Grade

Student Name: \_\_\_\_\_ # \_\_\_\_\_

	0	1	2	3	4	Student Score
<b>Neatness</b>	Extremely messy and difficult to read	Messy and difficult to read	Somewhat neat and easy to read	Mostly neat and easy to read	Extremely neat and easy to read	
<b>Organization</b>	No organization and information is impossible to follow	Very little organization and information is hard to follow	Information is somewhat organized, but difficult to follow	Mostly organized and information is able to be understood	Extremely organized and information is easy to follow	
<b>Creativity</b>	No creativity— layout and color/graphics choices display no care or thought	Very little creativity— layout and color/graphics choices very bland, show little care or thought	Some creativity— layout and color/graphics choices show some care and thought, but still a little bland	Good creativity— layout and color/graphics choices show careful care and thought	Great creativity— layout and color/graphics choices show careful care and thought, making the display eye-catching	
<b>WOW! point (+1)</b>	Display shows awesome student creativity and deserves an extra point for the WOW! factor					
<b>Total Score</b>						

Judge's comments: \_\_\_\_\_

\_\_\_\_\_



# Foothill Science Fair 2019

## Student Presentation Rubric

5/6<sup>th</sup> Grade

Student Name: \_\_\_\_\_ # \_\_\_\_\_

	0	1	2	Student Score
<b>State your question and your hypothesis</b>	Student is unable to give any answer	Statement is partial or unclear; requires prompting	Clear statement without prompting	
<b>Explain each step and why you took them</b>	Student is unable to give any answer	Statement is partial or unclear; requires prompting	Clear statement without prompting	
<b>Explain what you learned from your project</b>	Student is unable to give any answer	Statement is partial or unclear; requires prompting	Clear statement without prompting	
<b>List the results of your project</b>	Student is unable to give any answer	Statement is partial or unclear; requires prompting	Clear statement without prompting	
<b>Explain why you obtained these results</b>	Student is unable to give any answer	Statement is partial or unclear; requires prompting	Clear statement without prompting	
<b>Explain what you learned about God as the Creator</b>	Student is unable to give any answer	Statement is partial or unclear; requires prompting	Clear statement without prompting	
<b>Explain what you enjoyed most and what was most difficult about your project</b>	Student is unable to give any answer	Statement is partial or unclear; requires prompting	Clear statement without prompting	
<b>Student confidence and articulation</b>	Student does not speak clearly or in complete sentences, does not answer questions	Student is hesitant, but answers questions clearly, in complete sentences	Student is confident and speaks clearly, in complete sentences	
<b>WOW! point (+1)</b>	Student's presentation is exemplary and deserves an extra point for the WOW! factor			
<b>Total Score</b>				

Judge's comments: \_\_\_\_\_

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# Foothill Science Fair 2019

## Report Rubric

5/6<sup>th</sup> Grade

Student Name: \_\_\_\_\_ # \_\_\_\_\_

				Student Score
<b>Title Page—title, student's name, teacher's name, and date of fair</b>	<b>0</b> Only some elements are present, or is not on a separate page	<b>1</b> All 4 elements are present; and is on a separate page		
<b>Table of Contents—listing of contents and page numbers</b>	<b>0</b> Only some elements are present or is not on a separate page	<b>1</b> Contains listing of contents and page #'s and is on a separate page		
<b>Question and Hypothesis</b>	<b>0-1</b> Neither element is present or are not clearly stated on a separate page	<b>2</b> Only 1 element is present or statement is not on a separate page	<b>3</b> Both elements are clearly stated on a separate page	
<b>List of Materials</b>	<b>0-1</b> List of materials is not present or is not on a separate page	<b>2</b> List of materials is incomplete or not clearly labeled	<b>3</b> Complete list of materials is given on a separate page	
<b>Main Body—procedure, observations, researched information</b>	<b>0-2</b> Only 1 element is present or elements are poorly covered	<b>3-4</b> Only 2 elements are present, or not all elements are thoroughly covered	<b>5-6</b> All 3 elements are present and thoroughly covered	
<b>WOW! point (+1)</b>	Students' observations are exemplary and deserve an extra point for the WOW! factor			
<b>Conclusion and results—hypothesis proved or disproved</b>	<b>0-1</b> Not present or very unclear and not on a separate page	<b>2</b> Present but only partially clear or not on a separate page	<b>3</b> Clearly states results of hypothesis proved/disproved; on a separate page	
<b>WOW! point (+1)</b>	Student's conclusion and statement of results is exemplary and deserves an extra point for the WOW! factor			
<b>Bibliography</b>	<b>0</b> No bibliography	<b>1</b> Works not correctly cited; less than 6 sources; not on separate page	<b>2</b> At least 6 sources correctly cited; on separate page	
<b>WOW! point (+1)</b>	Student's bibliography contains an exemplary selection of sources and deserves an extra point for the WOW! factor			
<b>Typed</b>	<b>0</b> Not typed	<b>1</b> Typed		
<b>WOW! point (+1)</b>	Student's report is exemplary and deserves an extra point for the WOW! factor			
<b>Total Score</b>				

Judge's comments: \_\_\_\_\_

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Foothill Science Fair 2019  
Teacher Evaluation Rubric  
5th/6th Grade

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

**Teacher Comments:**

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# Foothill Science Fair 2019

## Judging Summary Sheet

5/6<sup>th</sup> Grade

**Name:** \_\_\_\_\_ # \_\_\_\_\_

**Project Title:** \_\_\_\_\_

	Points Possible	Points Earned
Report	20 (+ 3 WOW! points)	
Display	12 (+1 WOW! point)	
Presentation	16 (+1 WOW! point)	
Teacher Evaluation	20 (+1 WOW! point)	
Grade Level Differential	2	2
<b>Total Points</b>	<b>70</b> (+ 6 WOW! points)	

### Teacher Comments:

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**1<sup>st</sup>** place=63+ points; **2<sup>nd</sup>** place=56-62 points; **3<sup>rd</sup>** place= 49-55 points