Lyles Middle School Science Fair 2019-2020 Feb. 20-21, 2020

Mandatory for all Honor Science Students

(Major Project Grade)

Optional for all Regular Science Students

(Extra Credit Project Grade)

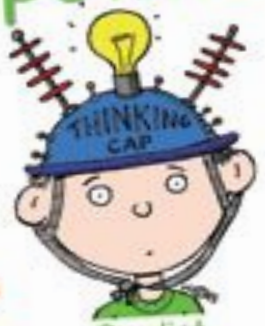
Science Fair Project Outline...

Scientific Method

1 Question

2 Research

3 Hypothesis



Predict
Guess

4 Experiment

Materials
Procedure

5 Data

Chart

6 Observations

What did
you see?

7 Conclusion

Hypothesis
correct?

What did
you infer?

Science Fair Project Outline...

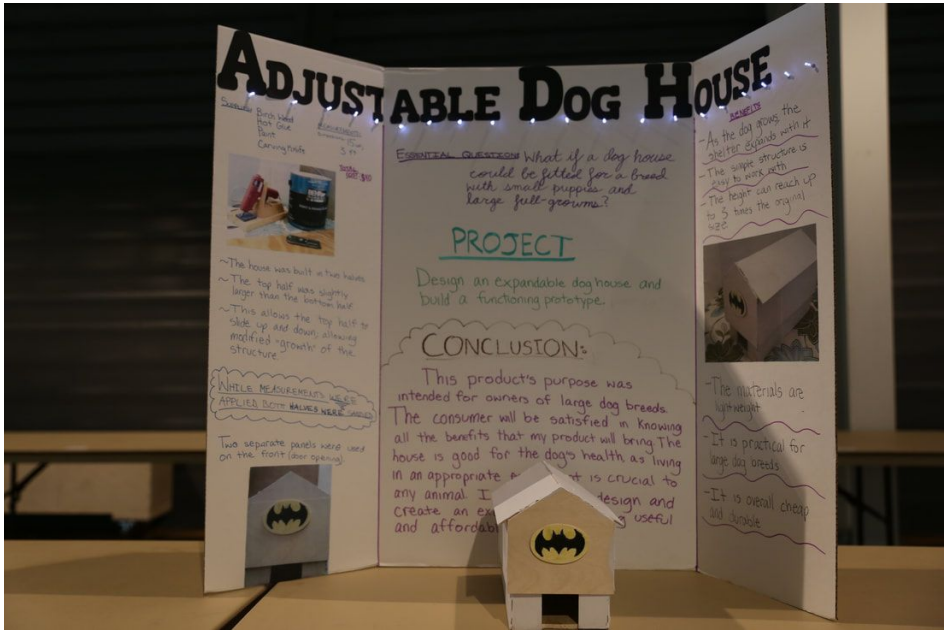
Science Fair Description Via Garland ISD Steamposium website

Students are asked to develop an investigation and report results on a self-supporting display board. Students may participate as individuals or in teams of no more more than 3 students.

Students may enter the regional competition, STEAMposium or both. Unlike the regional fair, students will have the opportunity to present and share their project with the community.

Top 3 Projects from School Science Fair will Continue onto the Steamposium Event

Steamposium Date: Saturday, April 18, 2020



Information via Garland ISD STEAMPOSIUM Website

Science Fair (Steamposium)

40 projects will be accepted on a first come, first served basis. Please use the form below to submit teams of up to 3 students. All students who contributed to the project are considered a team member even if they are not able attend the STEAMposium event.

Lyles will send the top 3 projects from each grade level.

Teacher must register the top 3 teams by Feb. 24th, 2020 for them to be able to compete on April 18, 2020.

Projects Rules will be based off of the link below.

https://drive.google.com/file/d/1ClHguG-6Fnq9QLBFjgPzuvcqfE9sFwcD/view

https://www.smu.edu/Lyle/Institutes/CaruthInstitute/K-12Programs/DRSEF/Students

Great Resource with step by step directions on how to do a science fair project below...

https://www.sciencebuddies.org/science-fair-projects/science-fair

Student Science Fair Timeline and Checklist

- Students are responsible for getting teachers initials on each checkpoint date.
- This form will be turned in / kept in the project composition book, 1 page per student.
- Students are responsible to complete this activity at home and/or during teacher tutoring hours, NOT during the class.
- Coach Pease's Tutoring: Tues. 8am to 8:45am / Weds. 5pm to 6pm
- Student is responsible for ALL supplies / cost on own.
- Student(s) groups can be up to 3 people, may work with student in another class period
- This sheet must be initialed EACH time an assignment is due. If a student, loses this sheet, it will be replaced, but the student will lose 10% of his/her total overall points.

Student Name: _____ Class Period: __

Student Science Fair Timeline and Checklist

Description	Date Due	Points Possible	Early Bird (+5 points)	On Time	Late (-5)	Teacher Initials
Topic Title	2/3/2020	20				
Group Members Info (Names, class period.)	2/3/2020	20				
Background Research Info: Composition Book (data)	2/3/2020	60				
Total Points, check/grade 1		100				

Description	**Date Due**	**Points Possible**	**Early Bird (+5 points)**	**On Time**	**Late (-5)**	**Teacher Initials**
Detailed Material & Procedures List	2/5/2020	50				
Hypothesis	2-5-2020	20				
Analysis & Conclusions	2/10/2020	50				
Total Points, Check/Grade 2		120				

Description	Date Due	Points Possible	Early Bird (+5 points)	On Time	Late (-5)	Teacher Initials
Display Board Proposal (blueprint layout)	2/10/2020	25				
Written Report	2/14/2020	100				
Composition Book	2/14/2020	75				
Display Board Completed	2/14/2020	100				
Total Points, Check/Grade 3		300				

Description	Date Due	Points Possible	Early Bird (+5 points)	On Time	Late (-5)	Teacher Initials
Final Project Overall Presentation (In Class)	2/17-20/ 2020	100				
Total Points, Check/Grade 4		100				
Top 15 Projects from Honors and Regular Science Optional Projects Final Judging (In Rm. TBA)	2/20-21/2020 Must be set up / on display by 8:45am on 2/20/2020	Top 3 Projects proceed to Garland ISD Steamposium				

Steps to the Scientific Method Resources

- https://www.sciencebuddies.org/science-fair-projects/science-fair/steps-of-the-scientific-method
- Video: https://www.youtube.com/watch?v=yi0hwFDQTSQ
- https://www.thoughtco.com/steps-of-the-scientific-method-p2-606045
- https://sciencebob.com/what-are-the-steps-to-the-scientific-method/ Awesome Site for Science Fairs

Scientific Method Overview

- Seven steps:
  1. Choose problem
  2. Research problem
  3. Develop hypothesis
  4. Write procedures
  5. Test hypothesis
  6. Organize data
  7. State conclusions

Composition Book Layout:

Page 1: Title Page

Page 2: Table of Contents

Page 3: State the Question

Page 4-10: Collect Data / Background Research

Page 11: Hypothesis

Page 12: Materials

Page 13-20: Test / Procedure

Page 21-30: Record Data Collected from Procedure/Test

Page 31-35: Conclusion

Page 36-38: Student Timeline / Checklist

Remember to make this book your own. This is where you not only keep your information, but it is also another place you can show organization skills, knowledge of topic and creativity.

Steps of the Scientific Method Explained

https://www.sciencebuddies.org/science-fair-projects/science-fair/steps-of-the-scientific-method

Step 1. Ask a Question (Due 2-3-2020)

The scientific method starts when you ask a question about something that you observe: How, What, When, Who, Which, Why, or Where?

For a science fair project some teachers require that the question be something you can measure, preferably with a number.

For detailed help with this step, use these resources:

- Your Question
- Laboratory Notebook

Step 1 : Form / As a Question

Finding an Idea for Your Science Fair Project

One of the most important considerations in picking a topic for your science fair project is to find a subject that you consider interesting. You will be spending a lot of time on it, so you do not want your science fair project to be about something that is boring.

We know that finding a topic is the hardest part of a science fair project, and sometimes you just need a little help focusing on what sorts of topics would be of interest to you. To help you find a science fair project idea that can hold your interest, Science Buddies has developed the Topic Selection Wizard. By answering a series of questions about everyday interests and activities, you will help us identify an area of science that is best for you. If your teacher has assigned a specific area of science (like "biology" or "earth science") for your science fair, you can also browse our whole library of projects by subject.

If you are coming up with your own topic, or have a topic idea from somewhere else, be sure to look at our list of Science Fair Topics to Avoid. Steering clear of these will ensure you have a high-quality science fair project that is easier to complete!

Teacher Tool Box

Assign these with Google Classroom:

- Scientific Questions Quiz
- My Science Project Question (Student Worksheet)

Links for Project Ideas...

http://www.projects.juliantrubin.com/science_fair_project/award_winning_projects.html

https://www.pinterest.com/pin/263671753164470441/?lp=true

https://www.sciencebuddies.org/science-fair-projects/science-projects

https://www.education.com/science-fair/middle-school/

https://www.thoughtco.com/6th-grade-science-fair-projects-609028

https://www.theedadvocate.org/43-of-the-best-7th-grade-science-projects-and-experiments/

These are just a few..google search “science fair projects for middle schoolers” for even more ideas!

Step 1 Continued...

Your Science Fair Project Question

Once you have chosen a topic of interest, you will need to create a related scientific question. Without a good question, your whole science fair project will be much harder, if not impossible! It is important to select a question that is going to be interesting to work on for at least a few weeks and that is specific enough to allow you to find the answer with a simple experiment. A scientific question usually starts with: How, What, When, Who, Which, Why, or Where. Here are some characteristics of a good science fair project question:

- The question should be interesting enough to read about, then work on for the next few weeks.
- There should be at least three sources of written information on the subject. You want to be able to build on the experience of others!
- The question should contain one factor (variable) that you can change in your experiment and at least one factor (variable) that you can measure.

Now, for something like a science fair project, it is important to think ahead. This will save you a lot of stress and unhappiness later. Visualize the experiment you might perform to answer your question. How does that possible experiment stack up against the following issues?

- The experiment should measure changes to the important factors (variables) using a number that represents a quantity such as a count, percentage, length, width, weight, voltage, velocity, energy, time, etcetera. Or, just as good might be an experiment that measures a factor (variable) that is simply present or not present. For example, lights *on* in one trial, then lights *off* in another trial, or *use* fertilizer in one trial, then *do not use* fertilizer in another trial. If you cannot observe or measure the results of your experiment, you are not doing science!

Step 1 Continued...

- You must be able to control other factors that might influence your experiment, so that you can do a fair test. A "fair test" occurs when you change only one factor (variable) and keep all other conditions the same.
- Is your experiment safe to perform?
- Do you have all the materials and equipment you need for your science fair project, or will you be able to obtain them in a reasonable amount of time at a cost that is okay for your family?
- Do you have enough time to do your experiment before the science fair? For example, most plants take weeks to grow. If you want to do a project on plants, you need to start very early! For most experiments you will want to allow enough time to do a practice run in order to work out any problems in your procedures.
- Does your science fair project meet all the rules and requirements for your science fair?
- Have you avoided the bad science fair projects listed in the Science Fair Topics to Avoid table in this project guide?

If you do not have good answers for these issues, then you probably should look for a better science fair project question to answer.

Keep in mind that science fair projects that involve human subjects, vertebrate animals (animals with a backbone) or animal tissue, pathogenic agents, DNA, or controlled or hazardous substances, often need approval from your science fair's Scientific Review Committee **beforehand**. Check with your teacher or the science fair coordinator for rules specific to your science fair. You can also read more about common science fair rules on our Scientific Review Committee page.

State the Question Proposal form: https://www.sciencebuddies.org/science-fair-projects/science-fair/project-proposal-form.pdf

Step 1: State the Question Checklist

What Makes a Good Science Fair Project Question?	For a Good Science Fair Project Question, You Should Answer "Yes" to Every Question
Is the topic interesting enough to read about, then work on for at least the next few weeks?	Yes / No
Can you find at least three sources of written information on the subject?	Yes / No
Can you measure changes to the important factors (variables) using a number that represents a quantity such as a count, percentage, length, width, weight, voltage, velocity, energy, time, etcetera? Or, just as good, are you measuring a factor (variable) that is simply present or not present? For example, ● Lights **ON** in one trial, then lights **OFF** in another trial, ● **USE** fertilizer in one trial, then **DO NOT USE** fertilizer in another trial.	Yes / No
Can you design a "fair test" to answer your question? In other words, can you change only one factor (variable) at a time, and control other factors that might influence your experiment, so that they do not interfere?	Yes / No
Is your experiment safe to perform?	Yes / No
Do you have all the materials and equipment you need for your science fair project, or will you be able to obtain them quickly and at a low cost?	Yes / No

Step 2.: Collect Data/ Do Background Research

(DUE 2-3-2020)

Rather than starting from scratch in putting together a plan for answering your question, you want to be a savvy scientist using library and Internet research to help you find the best way to do things and ensure that you don't repeat mistakes from the past.

For detailed help with this step, use these resources:

- Background Research Plan
- Finding Information
- Bibliography
- Research Paper

What is Background Research???
Step #2: Collect Data about Question

Key Info

Background research is necessary so that you know how to design and understand your experiment. To make a **background research plan** — a roadmap of the research questions you need to answer — follow these steps:

1. Identify the keywords in the question for your science fair project. Brainstorm additional keywords and concepts.
2. Use a table with the "question words" (why, how, who, what, when, where) to generate research questions from your keywords. For example:
   What is the difference between a series and parallel circuit?
   When does a plant grow the most, during the day or night?
   Where is the focal point of a lens?
   How does a java applet work?
   Does a truss make a bridge stronger?
   Why are moths attracted to light?
   Which cleaning products kill the most bacteria?
   Throw out irrelevant questions.

3. Add to your background research plan a list of mathematical formulas or equations (if any) that you will need to describe the results of your experiment.
4. You should also plan to do background research on the history of similar experiments or inventions.
5. Network with other people with more experience than yourself: your mentors, parents, and teachers. Ask them: "What science concepts should I study to better understand my science fair project?" and "What area of science covers my project?" Better yet, ask even more specific questions.

https://www.sciencebuddies.org/science-fair-projects/science-fair/writing-a-science-fair-project-research-plan

Step 2: Collect Data

Sample Background Research Plan

Background research plan for the science fair project question: Does drinking milk help decrease spiciness better than water or Pepsi?

Keywords —

- Milk
- Spiciness
- Pepsi
- Water

Research questions —

- Why do spicy foods taste hot?
- How does the tongue detect spiciness?
- How does one measure spiciness?
- What causes spiciness to increase (or decrease)?
- What are the properties and characteristics of spicy substances?
- Where in the body does spiciness occur?
- What is the composition of milk, Pepsi, and water?
- What are the properties and characteristics of milk, Pepsi, and water?

Science concepts and/or areas of science —

- Taste buds

Background Research / Step 2: Collect Date Worksheet / Step by Step Guide to assist

https://www.sciencebuddies.org/teacher-resources/science-fair/project-background-research-worksheet.pdf

Click on the above link / print out to help set up project for Step 2: Collect Data

Background Research / Step 2 Collect Date Check List

Background Research Plan Checklist

What Makes a Good Background Research Plan?	For a Good Background Research Plan, You Should Answer "Yes" to Every Question
Have you identified all the keywords in your science fair project question?	Yes / No
Have you used the question word table to generate research questions?	Yes / No
Have you thrown out irrelevant questions?	Yes / No
Will the answers to your research questions give you the information you need to design an experiment and predict the outcome?	Yes / No
Do one or more of your research questions specifically ask about any equipment or techniques you will need to perform an experiment? (if applicable)	Yes / No
If you are doing an engineering or programming project, have you included questions from Engineering & Programming Project Tips?	Yes / No

Step 3: Hypothesis (DUE 2-5-2020)

(Educated guess to answer the question stated for the project)

3. Construct a Hypothesis

A hypothesis is an educated guess about how things work. It is an attempt to answer your question with an explanation that can be tested. A good hypothesis allows you to then make a prediction:

"If _____*[I do this]* _____, then _____*[this]*_____ will happen."

State both your hypothesis and the resulting prediction you will be testing. Predictions must be easy to measure.

For detailed help with this step, use these resources:

- Variables
- Variables for Beginners
- Hypothesis

Step 4: Test / Experiment (Due 2-5-2020)
(materials & procedure)

4. Test Your Hypothesis by Doing an Experiment

Your experiment tests whether your prediction is accurate and thus your hypothesis is supported or not. It is important for your experiment to be a fair test. You conduct a fair test by making sure that you change only one factor at a time while keeping all other conditions the same.

You should also repeat your experiments several times to make sure that the first results weren't just an accident.

For detailed help with this step, use these resources:

- Experimental Procedure
- Materials List
- Conducting an Experiment

Step 5: Analyse Data / Collect Data (Due 2-10-2020)
(data collected from lab procedure)

5. Analyze Your Data and Draw a Conclusion

Once your experiment is complete, you collect your measurements and analyze them to see if they support your hypothesis or not.

Scientists often find that their predictions were not accurate and their hypothesis was not supported, and in such cases they will communicate the results of their experiment and then go back and construct a new hypothesis and prediction based on the information they learned during their experiment. This starts much of the process of the scientific method over again. Even if they find that their hypothesis was supported, they may want to test it again in a new way.

For detailed help with this step, use these resources:

- Data Analysis & Graphs
- Conclusions

Step 6: Draw your Conclusion (Due 2-10-2020)

6. Communicate Your Results

To complete your science fair project you will communicate your results to others in a final report and/or a display board. Professional scientists do almost exactly the same thing by publishing their final report in a scientific journal or by presenting their results on a poster or during a talk at a scientific meeting. In a science fair, judges are interested in your findings regardless of whether or not they support your original hypothesis.

For detailed help with this step, use these resources:

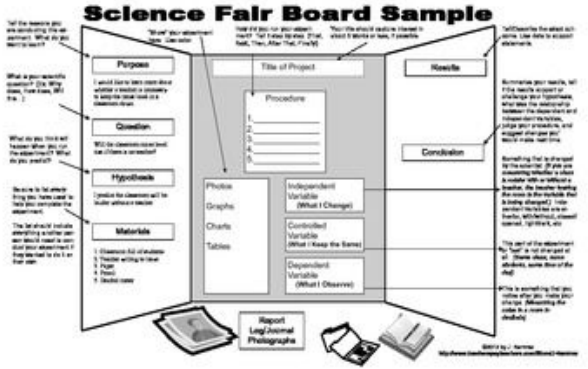
- Final Report
- Abstract
- Display Board
- Science Fair Judging

Display Board Proposal (Due 2-10-2020)

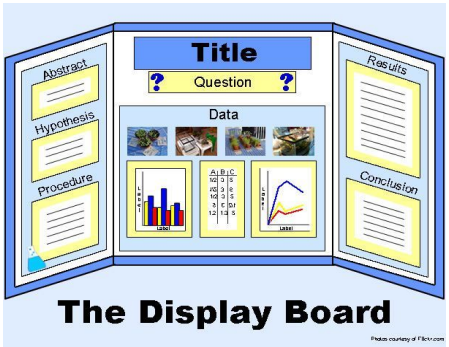
Rough Draft of what board will look like.

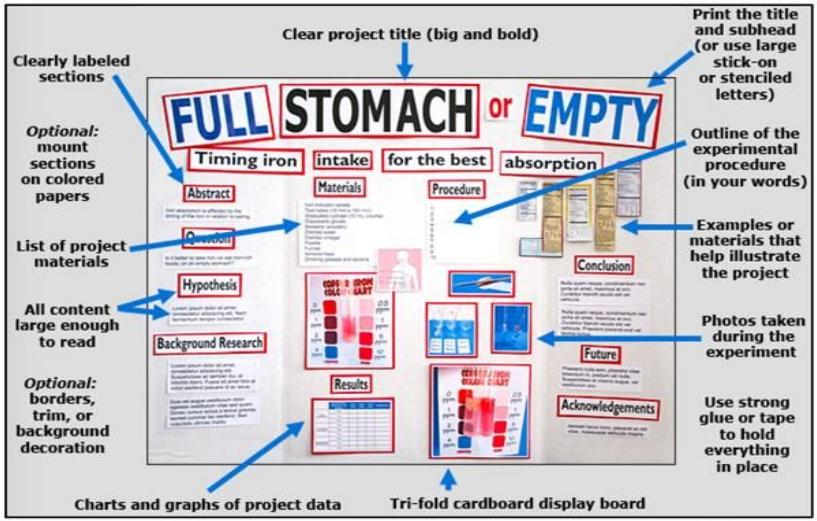
A blueprint / map of how the board will be set up.

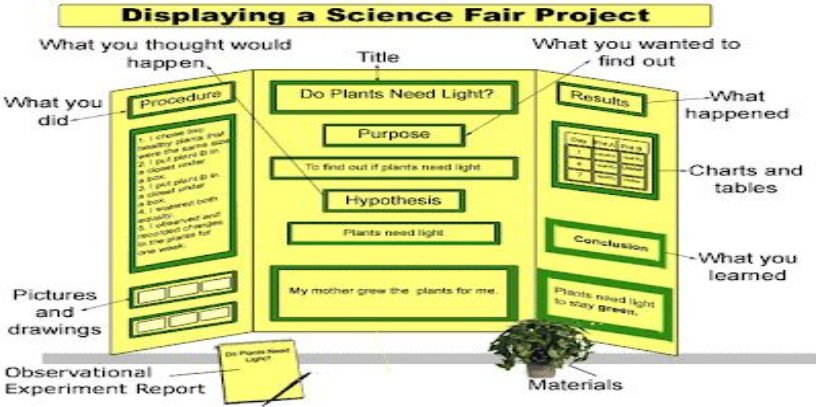
Examples of boards for reference



https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.teacherspayteachers.com%2FProduct%2FScience-Fair-Display-Board-Sample-527453&psig=AOvVaw2kUXbxB78Ssmo_nDPUD1AZ&ust=1580913420739000&source=images&cd=vfe&ved=0CA0QjhxqFwoTCIiC7cmPuOcCFQAAAAAdAAAAABAx







Proposal Display Board Grading Rubric (Due: 2-10-2020)

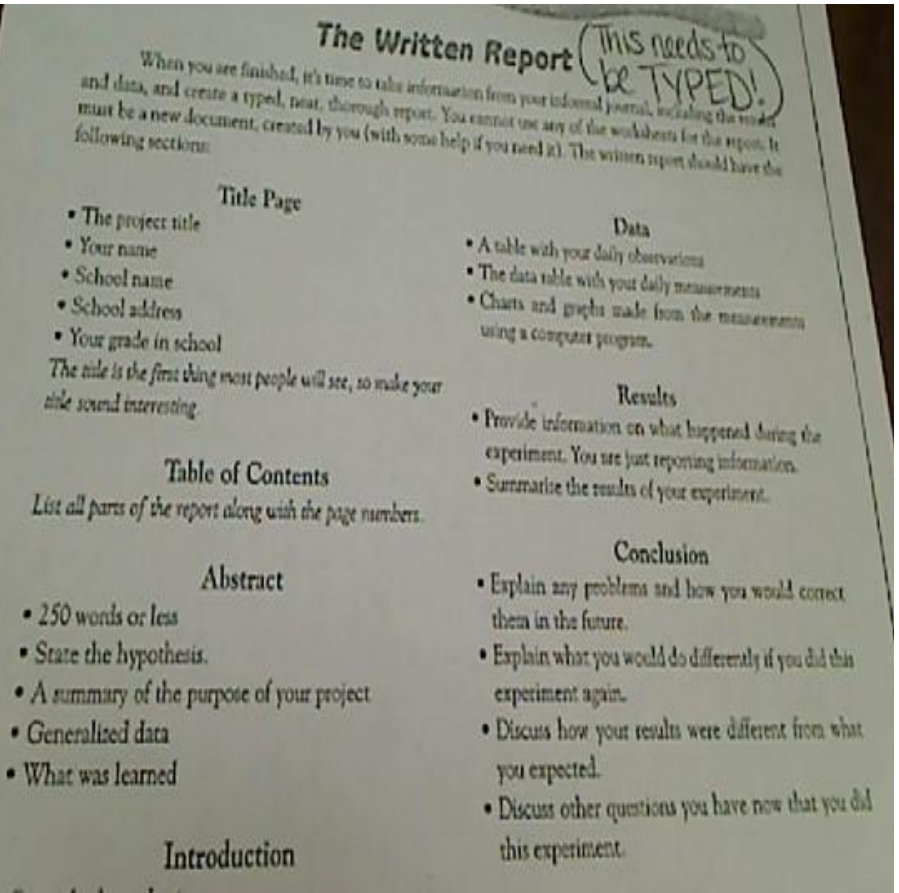
Description	Points Possible	Points Earned
The title catches people's attention. Locations for all sections are organized and easy to follow. Locations for Pictures and diagrams that will be used to effectively convey information are presented.	25	
All but 1 are presented: The title catches people's attention. Locations for all sections are organized and easy to follow. Locations for Pictures and diagrams that will be used to effectively convey information are presented.	20	
All but 2 are presented: The title catches people's attention. Locations for all sections are organized and easy to follow. Locations for Pictures and diagrams that will be used to effectively convey information are presented.	15	
Display proposal is not complete or is very difficult to read and follow.	10	
No display board proposal presented	0	
Total Points Earned	25	

Final Display Board Grading Rubric (Due: 2-14-2020)

100 points possible

Description	Points Possible	Points Earned
The title catches people's attention. All sections are organized and easy to follow. The text is large/neat enough to be read easily. Pictures and diagrams used to effectively convey information. Proper Spelling and capitalization was used.	100	
Display includes a title. Display is divided into sections that are easy to follow. Text is large/neat enough to read. Pictures and diagrams are used effectively. Proper spelling and capitalization was used.	75	
Display is complete, but is difficult to follow and/or read.	40	
Display is not complete or is very difficult to read and follow.	20	
No display board presented	0	
Total Points Earned	100	

Written Research Paper: DUE 2-14-2020
Information to assist



The Written Report (This needs to be TYPED!)

When you are finished, it's time to take information from your informal journal, including the results and data, and create a typed, neat, thorough report. You cannot use any of the worksheets for the report. It must be a new document, created by you (with some help if you need it). The written report should have the following sections:

Title Page

- The project title
- Your name
- School name
- School address
- Your grade in school

The title is the first thing most people will see, so make your title sound interesting.

Table of Contents

List all parts of the report along with the page numbers.

Abstract

- 250 words or less
- State the hypothesis.
- A summary of the purpose of your project
- Generalized data
- What was learned

Introduction

Data

- A table with your daily observations
- The data table with your daily measurements
- Charts and graphs made from the measurements using a computer program.

Results

- Provide information on what happened during the experiment. You are just reporting information.
- Summarize the results of your experiment.

Conclusion

- Explain any problems and how you would correct them in the future.
- Explain what you would do differently if you did this experiment again.
- Discuss how your results were different from what you expected.
- Discuss other questions you have now that you did this experiment.

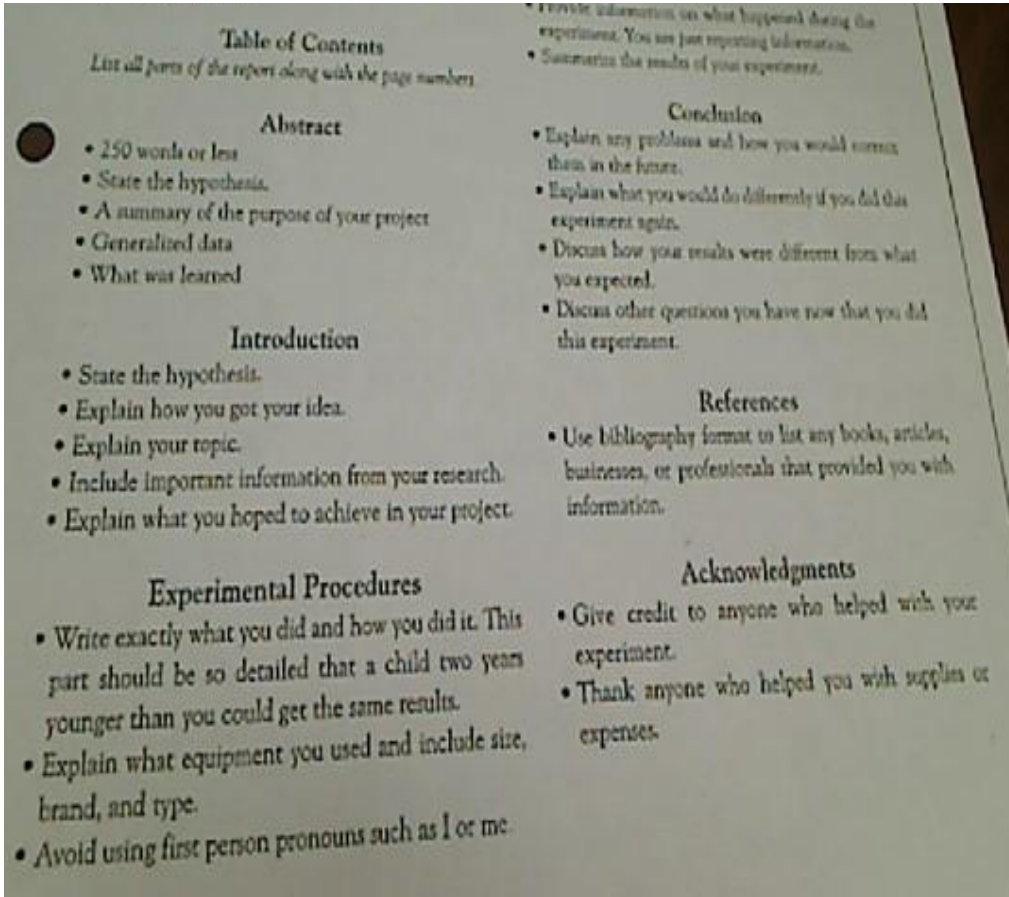


Table of Contents

List all parts of the report along with the page numbers.

Abstract

- 250 words or less
- State the hypothesis.
- A summary of the purpose of your project
- Generalized data
- What was learned

Introduction

- State the hypothesis.
- Explain how you got your idea.
- Explain your topic.
- Include important information from your research.
- Explain what you hoped to achieve in your project.

Experimental Procedures

- Write exactly what you did and how you did it. This part should be so detailed that a child two years younger than you could get the same results.
- Explain what equipment you used and include size, brand, and type.
- Avoid using first person pronouns such as I or me.

- Provide information on what happened during the experiment. You are just reporting information.
- Summarize the results of your experiment.

Conclusion

- Explain any problems and how you would correct them in the future.
- Explain what you would do differently if you did this experiment again.
- Discuss how your results were different from what you expected.
- Discuss other questions you have now that you did this experiment.

References

- Use bibliography format to list any books, articles, businesses, or professionals that provided you with information.

Acknowledgments

- Give credit to anyone who helped with your experiment.
- Thank anyone who helped you with supplies or expenses.

Written Report for Science Fair Rubric

Title	0=Missing 1=Poor 2=Fair 3=Excellent	Total Earned / Total Possible
Title accurately describes the experiment and is centered on page	0 1 2 3	_____/ 3
Name,School, Class Period,grade are at top right corner	0 1 2 3	_____/ 3
Total Possible for Title		_____/ 6
Table of Contents	0=Missing 1=Poor 2=Fair 3=Excellent	Total Earned / Total Possible
Highlights all of the major sections of the paper with page numbers items are found on	0 1 2 3	_____/ 3
Total Possible for Table of Contents		_____ / 3

Introduction	0=Missing 1=Poor 2=Fair 3=Excellent	Total Earned / Total Possible
Introduction sentence is catching and sets scene for paper	0 1 2 3	_____/ 3
Hypothesis clearly states the expected outcome. If _____ the _____ because_____.	0 1 2 3	_____/ 3
Explanation of what prompted the research	0 1 2 3	_____/ 3
Explanation of why this experiment is relevant and important to the intended audience	0 1 2 3	_____/ 3
Explanation of what hope to achieve through project	0 1 2 3	_____/ 3
Total Points for Introduction		_____/15

List of materials	0=Missing 1=Poor 2=Fair 3=Excellent	Total Earned / Total Possible
Essential materials listed with appropriate units/amounts	0 1 2 3	_____/ 3
Procedure	0=Missing 1=Poor 2=Fair 3=Excellent	Total Earned / Total Possible
Steps listed in sequential order including appropriate measurements and units when necessary. Including any relevant safety information	0 1 2 3	_____/ 3
Procedure in complete and written in a manner that the reader could repeat the experiment	0 1 2 3	_____/ 3
Includes multiple (3) trials for each variable or demonstrates the importance of adequate sample size	0 1 2 3	_____/ 3

Procedure	0=Missing 1=Poor 2=Fair 3=Excellent	Total Earned / Total Possible
If there are independent and dependent variables in the experiment, they are identified	0 1 2 3	_____/ 3
Explanation of the management of outside variables in the experimental procedure. (How were other variables kept constant?)	0 1 2 3	_____/ 3
Method of observation and data collection are clear.	0 1 2 3	_____/ 3
No grammar or spelling errors (try to write in third person with no pronouns)	0 1 2 3	_____/ 3
Total Possible for Procedure		_____/21

Conclusion	0=Missing 1=Poor 2=Fair 3=Excellent	Total Earned / Total Possible
Briefly summarize results	0 1 2 3	_____/ 3
Conclusion wraps up the paper	0 1 2 3	_____/ 3
No new information was introduced	0 1 2 3	_____/ 3
Stated if hypothesis was correct / not correct and why	0 1 2 3	_____/ 3
Total Possible for Conclusion		_____/12

Bibliography	0=Missing 1=Poor 2=Fair 3=Excellent	Total Earned / Total Possible
3 or more sources listed correctly 2 (NON-Internet)	0 1 2 3	_____/ 3
2 of 3 sources are not from internet (book, newspaper and so forth)	0 1 2 3	_____/ 3
Total Possible for Bibliography		_____/ 6
Data Collected		
All data displayed in the form of a chart with correct labels and proper titles	0 1 2 3	_____/ 3
Relevant Data displayed in the form of a graph with proper labels (Titles for graphs and tables, axes labeled, correctly scaled)	0 1 2 3	_____/ 3
Total Possible for Data Collected		_____/ 6

Paper Format	0=Missing 1=Poor 2=Fair 3=Excellent	Total Earned / Total Possible
Neat, readable and double spaced	0 1 2 3	_____/ 3
No Grammar or spelling errors	0 1 2 3	_____/ 3
Total Possible Paper Format		_____/ 6
Turned in On Time		_____/22
Total Possible Overall (Entire Paper)		_____/ 100

Composition Book GRADING RUBRIC MECHANICS POINTS VALUE POINTS EARNED

Description	Points Possible	Points Earned
Name & Topic on Front	2	
Numbered Pages	2	
Legible / Readable	4	
Book Intact (nothing falling out)	2	
Dates/Times on all entries	4	
Table of Contents	4	
Total Content Points	18	

Composition Book GRADING RUBRIC MECHANICS POINTS VALUE POINTS EARNED

Description	Points Possible	Points Earned
Problem/Purpose (State the question)	5	
Research / Data	10	
Hypothesis	10	
Method / Materials	5	
Test / Experiment / Procedure	10	
Collected Data (from experiment)	10	
Conclusion	10	
Neatness / Creative	5	
Total Points	65	

More To Come