

Science Fair Project

Information Packet

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Safety Contract

I, ______, hereby certify that on this day of ______, I have successfully completed a review of safety procedures for a science project. I agree to follow the safety guidelines listed below, and I will take every necessary precaution to operate safely throughout my experiment.

- I will follow the safety guidelines of my teacher and my school.
- I will keep my work area neat and free of unnecessary papers, books, and materials. I will keep my clothing and hair neat and out of the way, and I will wear a safety apron and/or gloves if necessary.
- I know the location of all safety equipment (such as the fire extinguisher and first-aid kit) and the nearest telephone.
- I will wear safety goggles when handling chemicals, working with a flame, or performing any other activity that may cause harm to my eyes.
- I will not use chemicals, heat, electricity, or sharp objects until my teacher or parent instructs me to do so, and I will follow the adult's instructions carefully.
- I will be especially careful when using glassware. Before heating glassware, I will make sure that it is made of heat-resistant material, and I will never use cracked or chipped glassware.
- I will wash my hands immediately after handling hazardous materials. I will clean up all work areas before I leave the laboratory, put away all equipment and supplies, and turn off all water faucets, gas outlets, burners, and electric hot plates.

I understand and agree to the above and all other safety precautions presented to me in class. I am hereby ready to undertake my science project with safety from this day forward.

Student's signature

Broward County Science Fair

Individual Contract

Science Fair Due: <u>11/21 or 11/22, 2019</u>

The science fair will count for 200 points.

Student Acknowledgement:

I will complete an individual entry into the Broward County Science Fair. I understand that along with the freedom and independence of conducting and experiment, I will have to complete all aspects of the project without help from other students or adults. I have reviewed the rules and regulations with my parents/ guardians and understand all the requirements of the project.

Student signature: _____ Date: _____

Parent Acknowledgement:

I have received the Science Fair Project rules and regulations and have reviewed them with my son/daughter.

He/she will complete a science fair project and has my permission to enter the district/school competition. YES NO

He/she will complete a science fair project but does not have my permission to enter the district/school competition. YES NO

Parent/ Guardian: _____ Date: _____

Please note that the science fair project is a mandatory assignment for all science classes at Stranahan High School. This project will account for about 200 points.

What does My Project Need to have?

- 1. Topic
- 2. Research Paper
- 3. Research Plan
- 4. Research Log Book
- 5. Lab Report
- 6. Power Point Presentation

Break Down

1. **Topic:** Make sure it is one that interests you (not one that is easy or that you found online and you don't feel like thinking anymore). Try to answer a questions that you have been asking yourself that is testable. If you are not sure how to do an experiment on it, you will research that for your research paper.

2. <u>Research Paper</u>: Research the topic: How can you do the experiment? What safety precautions (yes you have them) do you need to take? What background information do you need to know (or will be helpful) to understand the experiment? <u>You must have a bibliography!</u>

3. <u>Research Plan:</u> How are you going to conduct the experiment? What materials will you need? What safety precaution are you taking? <u>There is a form for this</u>.

4. **Research Log Book:** Make sure you have one! That it is set-up and that you record everything in it!!

The research log is a day-to-day record of everything that you did in your project. It is PROOF of what you did. It must be in a composition book.

- 5. **Lab Report:** This is the formal report of the research and experiment that you conducted. It should include: Abstract, hypothesis, materials, methods, data, data analysis, and conclusion.
- 6. **<u>Power Point Presentation</u>**: This is a quick reference guide to your project. Follow the template given you.

DON'T leave everything until the last minute. Ask for <u>help!!</u>

When is My Project Due?

Topic Due: October 8th/9th, 2019

- Your topic must be in the following categories:
 - Animal Sciences
 - Behavioral and Social Sciences
 - o Biomedical and Health Sciences
 - Cellular/Molecular Biology and Biochemistry
 - o Chemistry
 - Earth and Environmental Science
 - Engineering
 - Environmental Engineering
 - o Intelligent Machines, Robotics, and Systems Software
 - o Mathematics and Computational Sciences
 - Microbiology
 - o Physics and Astronomy
 - Plant Sciences
- Your topic will be approved after submission. If topic is not approved, you will have one week to submit a new topic
- You <u>CAN NOT</u> change your topic once approved (If you turn in a project that is different from your submitted topic it will not be graded)

Research Paper Due: October 24th/25th, 2019

- You will submit your research paper through Canvas (using turnitin.com) found in the "Science Fair Project" module the assignment is called "Research Paper".
- Include background research on your topic and/or the individual pieces of the topic: ex. A project with the topic "The effect of acid rain on plant growth" will have background research on acid rain (sources, amounts in particular areas, etc.), as well as research on the type of acid and plants being used in the actual experiment.
- Safety precautions need to be addressed in your experiment. For example, if I am using baking soda there is a material safety data sheet (MSDS) on this. You do have safety precautions and they are not just wearing goggles.
- Any other information regarding your topic (If you had to Google it, it should be addressed in your paper).
- Bibliography in APA or MLA format.

Research Plan Due: November 6th/7th, 2019

- Information included on the form is:
 - o Question
 - o Hypothesis
 - Rationale (summary of background information from your Research Paper)
 - o Materials List
 - o Procedures

- o Safety Risk and Procedures
- Data Analysis (How will you analyze your data)
- Bibliography (Same as for Research Paper)

Research Log Book Due: November 21st/22nd, 2019

- Your Research Log Book will be turned in, in class directly to your teacher.
- Your Research Log Book should include:
 - Notes on all of your research
 - Your bibliography
 - Notes your experiment

- o Data tables with data recorded in them
- Notes on data analysis
- \circ Notes on conclusions.

Lab Report Due: November 21st/22nd, 2019

- Your lab report will be turned in on Canvas (via turnitin.com) found in the module "Science Fair Project" the assignment is called Lab Report
- Your lab report should include the following
 - o Title
 - Abstract
 - Problem/Purpose Statement*
 - Hypothesis*
 - o Research
 - o Materials

- Methods (Procedures)
- Observations/Data/Results
- Data Analysis (including graphs)
- Conclusion
- o Bibliography

*Engineering project see Teacher for Engineering Plan details

Power Point Presentation Due: November 21st/22nd, 2019

- Your Power Point presentation will be turned in on Canvas (via turnitin.com) in the module "Science Fair Project" the assignment is called "Power Point Presentation"
- Use the template provided on Canvas in the assignment titled "Power Point Presentation"

How Will I be Graded?

Topic	-
The topic should be in the following format:	
Name:	
Topic:	
How I plan to test it?	

Topic: Should be in the form of a problem question or purpose statement. Ex. How does acid rain effect plant growth?

How do I plan to test it? Give a one to two sentence summary of how you plan to investigate your topic. Ex. Water different plants with various levels of acid in the water.

RUBRIC FOR TOPIC

	4	3.5	2.5	1.5	0
Name	Name is clearly placed in the document as instructed				Name is not included in the document.
Торіс	Topic is in the	Topic is in the		Topic is	No topic
	form of a	form of a		included.	included.
	problem	problem			
	question or	question or			
	purpose	purpose			
	statement that	statement.			
	clearly shows				
	the variables of				
	the experiment.				
How do I plan	Explanation in	Explanation is	Explanation is	Explanation is	Explanation is
to test it?	clear and	clear and long.	unclear but no	unclear and	not included.
	concise and is		more than two	long.	
	no more than		sentences		
	two sentences.				

Research Paper

- The research paper should be on the Topic that you provided during the Topic assignment. If it is not it will not be graded.
- A title should be established here. This will be your title for the remainder of the project. Avoid flashy titles, just stick to the science. Ex. Instead of the title, "CRUMBLE" use "Using Echolocation to Determine the Effect Automobile Traffic has on Fossils"
- Make sure to research and explain terms and ideas. Ex. In the above example in the title the author may want to define and explain echolocation and how and what it is used for.
- Explain your purpose for the choice, what interested you and/or what question did you want an answer to.
- The research should summarize any current or past research that has been done on the topic.
- Safety precautions MUST be discussed and should include:
 - Any chemical that you are using should have an MSDS referenced in the bibliography. Ex. Vinegar has an MSDS.
 - Any plants or animals should be researched, and risks assessed to both the researcher and the plant/animal
 - Any tools or equipment that can be hazardous or dangerous should be addressed. Ex. Knives used to cut material or space heaters used to change the temperature
 - Safety precautions should be addressed. Ex. Will you use gloves, safety goggles, etc.?
- Bibliography in APA or MLA format.

	20 Points	15 Points	11 Points	7 Points
Title	Is clearly stated at the top of the paper is scientific in nature and is on the approved topic	Is clearly stated at the top of the paper and is on the approved topic		Is on the paper and is on the approved topic
Introduction	Exceptional introduction that grabs interest of reader and states topic. Explains relevant science and the authors reason for choice of topic	Proficient introduction that is interesting and states topic. Explains relevant science and the authors reason for choice of topic	Basic introduction that states topic but lacks interest. Explains relevant science or the authors reason for choice of topic	Weak or no introduction of topic. No or weak explanation of science or the authors reasoning for topic choice.
Quality of Research	Paper is exceptionally researched, contains at least 3 peer reviewed journals/articles and research is presented in a logical manner.	Information relates to the main topic. Paper is well-researched in detail and from 3 good sources.	Information relates to the main topic, but few details and/or examples are given. Shows a limited variety of sources.	Information has little or nothing to do with the topic.
Safety Precautions	Safety precautions are thoroughly researched including all necessary MSDS sheets, materials and precautions are addressed and referenced.	Safety precautions are researched and most of the necessary MSDS, materials and precautions are addressed and referenced.	Safety precautions are included by many MSDS or materials or precautions are missing	Little to no safety precautions are discussed.
Bibliography	Is titled and clear to read. Is in APA or MLA format and has at least 3 Scientific Journals and 2 other sources referenced.	Is titled or clear to read. Is in APA or MLA format and has at least 3 scientific sources and two other sources.	Is in APA or MLA format with at least one scientific source	Bibliography is included.

RUBRIC FOR RESEARCH PAPER

RESEARCH PLAN

Fill out the form on Canvas, with the following information:

- Name (Your full Name)
- School (Hallandale High School)
- SSEF Category: (Use the categories given to you in the "When is My Project Due?" section of this packet under Topic)
- Question or Problem being Addressed (Title)
- Hypothesis (Should clearly show the relationship between the variables in the experiment)
- Rationale (Summary of your Research Paper (except the safety precautions)
- Materials List (List all materials you plan on using for your experiment)
- Procedures (Detail all procedures you will be using during your experiment)
- Safety and Risk Procedures (Copy the safety precautions section of your research paper)
- Data Analysis (Describe how you will analyze your data, you are not actually collecting data here or analyzing any actual data. It is just a plan on how you will analyzed the anticipated data you will be collecting in your experiment)
- Bibliography (Copy your bibliography from your research paper here)

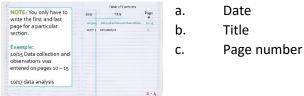
RUBRIC FOR RESEARCH PLAN

	4	3.5	2.5	1.5	0
Biographical	Name, school, and	Missing one element	Missing two elements		Not complete
Information	category are complete				
Question/Problem	Question/Problem is clearly stated and matches the approved topic	Question/Problem is stated and matches the approved topic.			Question/Problem statement is not included or does not match the approved topic.
Hypothesis	Clearly addresses the question/problem. Relationship between the variables is established & rational for prediction is given	Clearly addresses the question/problem. Relationship between the variables is established.	Hypothesis is stated, somewhat addressed the question/problem and both variables are included.	Hypothesis is stated but variables are unclear.	Hypothesis is not included.
Rationale	Exceptional synopsis of background that supports your research problem and explains researcher's choice of topic.	Good synopsis of background that supports your research problem and explains researcher's choice of topic.	Somewhat clear synopsis of background that supports your research problem and explains researcher's choice of topic.	Incomplete synopsis of background that somewhat supports your research problem.	Rationale not included.
Materials List	Complete list of all necessary materials needed to conduct research includes concentrations and all equipment used.	Complete list of all necessary materials needed to conduct research and all equipment used.	Mostly complete list of all necessary materials needed to conduct research and all equipment used.	Materials list of some of the materials needed to conduct research.	No materials list included.
Procedures (Methods)	Details all procedures and experimental design to be used for data collection.	Lists procedures and experimental design to be used for data collection.	Mostly lists procedures and experimental design to be used for data collection.	Somewhat lists procedures and experimental design to be used for data collection.	Procedures not included.
Safety and Risk Procedures	Detailed description of procedures for limiting any risks, maintaining safety and proper disposal if needed.	Description of procedures for limiting any risks, maintaining safety and proper disposal if needed.	Mostly describes procedures for limiting any risks, maintaining safety and proper disposal if needed.	Somewhat describes procedures for limiting any risks, maintaining safety and proper disposal if needed.	Safety and Risk Procedures not included.
Data Analysis	Detailed description of the procedures you will used to analyze the data in order to answer the research problem/question.	Description of the procedures you will used to analyze the data in order to answer the research problem/question.	Mostly describes the procedures you will used to analyze the data in order to answer the research problem/question.	Somewhat describes the procedures you will used to analyze the data in order to answer the research problem/question.	Data Analysis not included
Bibliography	Is in APA or MLA format and has at least 3 Scientific Journals and 2 other sources referenced.	Has at least 3 Scientific Journals and 2 other sources referenced.	Has at least 2 Scientific Journals and 3 other sources referenced.	Has at least 4 references.	Bibliography is not included.

Research Log Book

- Cover (Hard cover of composition book):
 - Project Title
 - o Full Name
- Number all pages.
 - 1. Title page:
 - a. Project Title
 - b. Full Name

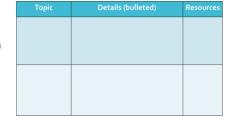
2-4. Table of Contents



- 5. Question or Problem:
- a. State research question or problem.
- 6. Hypothesis
- 7. Rationale:
 - a. Why is this research important?
- 8-9. Materials List and Procedures

10. Variables and Controls

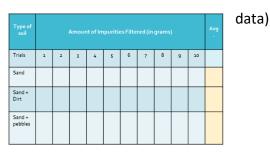
- a. Independent (Test) Variable
- b. Dependent Variable
- c. Constants
- d. Control description
- 11-18. Research Organizer
 - a. Topic
 - b. Details (bulleted)
 - c. Resources



19. Bibliography in APA or MLA format

c. Date of Experiment (the actual experiment not research) start.

- b. Explain why question/problem was chosen.
- b. How is the project applied to the real world?



- 21 (or more) Observations
 - Each page should be one day of research and all qualitative data should be recorded here. Ex. If you conducted your experiment for 10 days then you will have 10 pages of Observations.
 - b. Date every entry
 - c. Documented for every trial.
 - d. Discuss if data collected was what you predicted.

- e. Document any problems that occurred or things that happened that may affect the results.
- f. Take note of any trends observed.
- g. Data that is consistently the same.
- h. Data that steadily increased or decreased
- State if any data is nowhere near the other data collected (outlier). Explain why you think this happened.
- j. Show calculations for each trial.
- k. Describe any reactions

Next Pages: Data Analysis

- a. Graph
- b. Discuss if data collected was what you predicted.
- c. Document any problems that occurred or things that happened that may affect the results.
- d. Take note of any trends observed.
- e. Data that is consistently the same.
- f. Data that steadily increased or decreased
- g. State if any data is nowhere near the other data collected (outlier). Explain why you think this happened.

#Next Pages: Conclusion

- a. Re-state the hypothesis.
- b. Indicate if the hypothesis WAS supported or WAS NOT supported.
- c. Use data to indicate (the specific data that let you know) whether the hypothesis was or was not supported.
- d. Compare test and control data.

RUBRIC FOR RESEARCH LOG BOOK

	50 Points	45 Points	35 Points	25 Points
Organization	Every section	Mostly all	Some sections	Few sections
	required is in	sections are in	are in the book	are in the book
	the book and	the book and	and recorded in	and recorded in
	recorded on the	recorded on the	the table of	the table of
	table of	table of	contents	contents
	contents	contents		
Details	Log book is	Log book is	Most sections	Few sections
	exceptionally	detailed with	are completed	are completed
	detailed with	almost every	with some	and very little
	every section	section	details included	detail is
	complete	complete	in each section.	included in
				each section.

Lab Report

Abstract: An abstract is a one-page, summary that gives the essence of the project in a brief but complete form. It should not exceed 250 words. Anyone who reads it should have a fairly accurate idea of the project after reading the abstract.

Paragraph #1 - Purpose of the Experiment (Background)

• Why does this study matter? Use basic current information on the topic. Start with a hook; current stats are always good.



• A statement of the problem and hypothesis being studied.

Paragraph #2 - Procedures Use (Experimentation)

A summarization of the key points and an overview of how the investigation was conducted BE CLEAR AND SPECIFIC!

- An abstract does not give details about the materials used unless it greatly influenced the procedure or had to be developed to do the investigation.
- An abstract should only include procedures done by the student. Work done by a mentor or work done prior to student involvement must not be included.

Paragraph #3 - Observation/Data/Results

- This section should provide key results that lead directly to the conclusions you have drawn.
- It should not give too many details about the results nor include tables or graphs.
- Conclusion, including statistical analysis and significance.

Bonus Tips

Don't use "I, me, we, us". Instead say "the researcher"

*adapted from SSEF 63rd State Science & Engineering Fair of Florida

Problem/Purpose

- What is your goal?
- What idea are you trying to test?
- What is the scientific question you are trying to answer? (must be answering a question or solving a problem/models are not accepted unless they are answering a question or solving a problem)

<u>Hypothesis</u>

- Explain how you think your project can demonstrate your purpose.
- Make a prediction regarding the outcome of your experiment.
- State the results you are predicting in measurable terms.

Research

<u>Summarize current research</u> being done on your topic or any other information that had to be looked up such as:

- Safety precautions
- Information about one or more components of your experiment.

Procedure

- Give a detailed explanation of how you will conduct the experiment to test your hypothesis.
- Be clear about the variables (elements of the experiment that change to test your hypothesis) versus your controls (elements of the experiment that do not change).
- Be **very specific** about how you will measure results to prove or disprove your hypothesis. You should include a regular timetable for measuring results or observing the projects (for example, every hour, every day, and every week).
- Your procedure should be like a recipe Another person should be able to perform your experiment following your procedure. Test this with a friend or parent to be sure you have not forgotten anything.
- Must be in paragraph (narrative) form. Should be in 3rd person and past tense. Example: *The* researcher placed 5ml of baking soda in the beaker with 10ml of vinegar.

Materials

- Include all materials and equipment that were used.
- Your paragraph of materials should include all of the ingredients of the procedure recipe.
- Must be in paragraph (narrative) form. Should be in 3rd person and past tense. Example: *The scientist used* 10*ml of water and 5ml of ascorbic acid, each of which were placed in a 25ml beaker.*

Observations/Data/Results

- If appropriate, photograph your project results or phases of the project to help your analysis and possibly to demonstrate your experiment on your exhibit board.
- Graphs for measurable (quantitative) data must be included and charts should be used to present both qualitative and quantitative data.
- When appropriate utilize relevant statistical analysis such as:
 - Mean/Median
 - o Standard Deviation/Standard Error
 - Chi-Squared Analysis

<u>Analysis</u>

- Explain your observations, data, and results. This is a summary of what your data has shown you.
- List the main points that you have learned.
- Why did the results occur? What did your experiment prove?
- Was your hypothesis correct? Did your experiment prove or disprove your hypothesis? This should be explained thoroughly.

• Any other information that you had to look-up (if you Googled it put it here)

Conclusion

- Answer your problem/purpose statement. Including accepting or rejecting your hypothesis <u>based on</u> <u>your data.</u>
- What does it all add up to? What is the value of your project?
- What further study do you recommend given the results of your experiment? What would be the next question to ask?
- If you repeated this project, what would you change?

Reference Page:

- The bibliography should list all the printed materials the student used to carry out the project. Items should be listed in alphabetical order in <u>APA or MLA format</u>.
- These website are a great place to go to find the proper way of writing a bibliography. <u>http://www.bibme.org/</u>, <u>http://www.easybib.com</u> or <u>http://www.knightcite.com</u>. Also <u>http://www.lcyte.com</u> lets you "tag" information from Internet sources as you research.

Section	Excellent	Points	Total Points		
	The purpose of the study or the question being addressed by the study	3			
Abstract	Summary of the procedures	3	10		
	Summary of the major results of the study	3	12		
	Summary of the conclusion of the study	3			
	Problem/Purpose Statement	6			
Introduction	States hypothesis 6				
Introduction	Identify independent and dependent variables	6	24		
	Necessary research about problem/purpose is included	6			
	3 rd person, past tense	2			
Procedures	Methods explain how to gather information used in results	3	8		
(Methods)	Clearly shows the variable and control in the experiment and gives measurable explanations when needed	3	ð		
N d = t = u' = l =	3 rd person, past tense	2			
Materials	All materials used in Methods section included	2	- 4		
	Raw data is organized into a chart	6			
Data/Results	Quantitative data is graphed	6			
	Trends in charted data discussed	6	24		
	Tends in graphed data discussed	6			
	Hypothesis is supported or not supported based on the data	4			
Canalusian	Value of experiment explained	4	10		
Conclusion	Recommendations for further research/questions made	4	16		
	Recommendations for changes and/or correcting errors made	4	-		
Marilya Cita d	All necessary citations listed	2			
Works Cited	All citations are in APA or MLA format	2	4		
	Any and all necessary safety precautions addressed	4			
Format & Protocols	Research Log Book Included	2	8		
	Research Log Book Includes recording of project work		1		

LAB REPORT RUBRIC

Power Point Presentation

- Utilize the template available on Canvas to complete the following:
 - o Title
 - Question/Problem Statement
 - Hypothesis
 - o Variables
 - Abstract
 - o Materials
 - o Procedures
- Present summary of project

- o Data Tables
- o Graphs
- Pictures
- o Data Analysis
- o Conclusion
- Research Application
- o Recommendations
- \circ ~ In seven minutes explain what your project is about and the major results of the project.

RUBRIC FOR POWER POINT PRESENTATION

	4	3.5	2.5	1.5
PowerPoint	All slides are completed	All slides are completed	Most slides are completed	Few slides are completed
	and organized			
	Holds attention of entire	Consistent use of direct	Displays minimal eye	Holds no eye contact with
	audience with the use of	eye contact with	contact with audience,	audience, as entire report
	direct eye contact, seldom	audience, but	while reading mostly from	is read from notes
Delivery	looking at notes	still returns to notes	the notes	
				Speaks in low volume
	Speaks with fluctuation in	Speaks with satisfactory	Speaks in uneven volume	and/
	volume and inflection to	variation of volume and	with little or no inflection	or monotonous tone,
	maintain audience	inflection		which causes audience to
	interest			disengage
	and emphasize key points			
Enthusiasm/Audience	Demonstrates strong	Shows some enthusiastic	Shows little or mixed	Shows no interest in topic
Awareness	enthusiasm about topic	feelings about topic	feelings about the topic	presented
	during entire presentation		being presented	
		Raises audience		Fails to increase audience
	Significantly increases	understanding and	Raises audience	understanding of
	audience understanding	awareness of most points	understanding and	knowledge of topic
	and knowledge of topic;		knowledge of some points	
	convinces an audience to			
	recognize the validity and			
	importance of the subject			
Questions	Fully able to answer	Able to answer relevant	Somewhat able to answer	Not able to answer most
	relevant and topical	and topical questions	relevant and topical	questions about project
	questions about project	about project.	questions about project.	
Timing	Fully presents summary of	Presents project in seven	Presents project in nine	Presents project in ten
	project in less than seven	minutes.	minutes or less	minutes or more.
	minutes			

Project To Do List

Use this to do list to keep on schedule!! It's easy to procrastinate! Don't fall into the trap!

Project Due Date:

Item	Due Date	Teacher Initials when completed
Pick Topic-Proposal		-
Purpose Statement		
Variables (independent, dependent, control)		
Hypothesis		
Research Paper (optional)		
Materials		
Procedures		
Experiment completion proof (pictures to prove to Ms Thomas)		
Analysis & Discussion		
Conclusion		
Bibliography		
Acknowledgements		
Table of Contents		
Print Project		
Board Layout		

Science Fair Timeline

Week 1- Research Project Topics

Week 2- Write and submit proposal

Week 3- Type purpose statement (and research paper)

Week 4- Type hypothesis and materials

Week 5- Type procedures and safety concerns

Week 6- Perform experiment and collect data/observations

Week 8- Type observations and create graphs and charts from data

Week 9- Type conclusion

Week 10- Complete bibliography

Week 11- Organize science fair paper for submission

Week 12- Create science fair board