

Name:

Period:

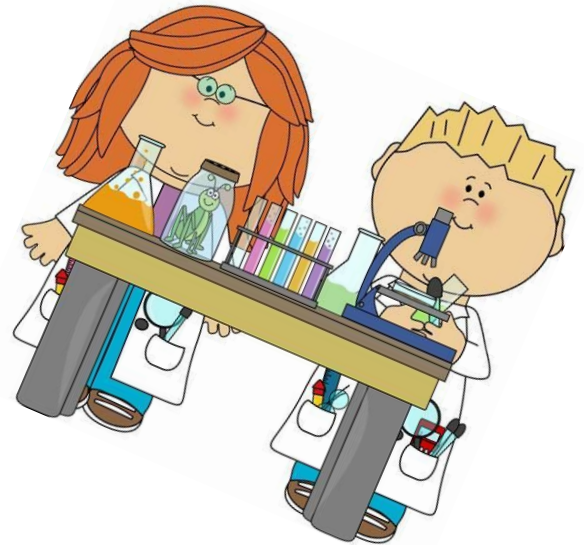
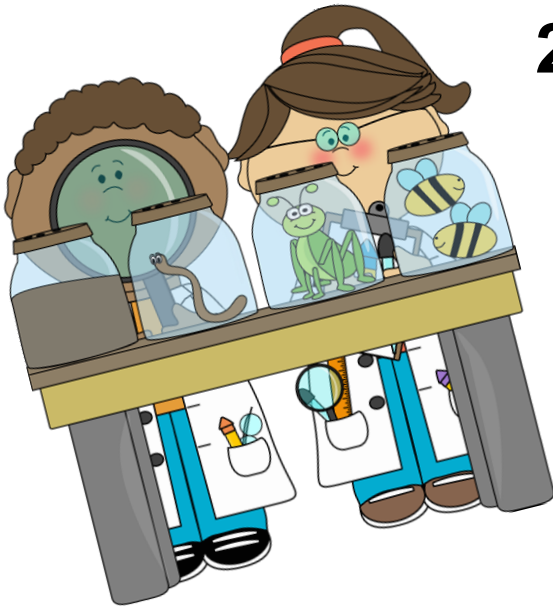
Date:

Baylor College of Medicine Academy at James D. Ryan

STEM Investigation Handbook

In it to Love it

2023-2024



We are committed to foster student scientific and engineering growth. Every year, students submit proposals to investigate their own scientific/engineering question. Now it is your turn to complete a science or engineering investigation to contribute to the world around you! An electronic copy may be found here:

<https://www.houstonisd.org/Page/130646>.



Your family and friends can help by listening to your ideas and questions and helping you find where to research information. The following resource is helpful as you work: <https://sefhouston.org/for-participants/#Engineering-Curriculum>. Make sure to have your parents/guardians read the “It Takes a Village” letter! All specific guidelines can be found here: <https://sefhouston.org/for-participants/>

Let's begin...

Name:

Period:

Date:

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IT TAKES A VILLAGE

(Independent Investigations Project, IIP, Requirements)

Dear Parents/Guardians and students,

All Baylor College of Medicine at James D. Ryan students will be completing Independent Investigation projects (science or engineering based) this school year! The project manuscript is due **November 27, 2023** and the poster and presentation are due **December 4, 2023**. We will be utilizing Renzulli to submit documents and other important information regarding the project to help them stay on track and organized. A suggested project timeline is attached, your student will receive final dates from their teacher directly. Due dates have been spread out as to allow ample time for students to complete the work at a steady, but comfortable pace. A grade will be issued for each item due.

An Independent Investigation project challenges a student to solve a problem/answer a question using the scientific practices or engineering design process. It is a great way to excite children about science, teach them to think like scientists, develop organizational skills, and enhance their writing and oral-presentation skills. Lessons have been worked into the curriculum to explain the process of conducting a science investigation to guide them on their way. All work must be completed by the student. Parents/Guardians can help by offering students support and encouragement, fostering discourse at home, as well as monitor the student's progress in the coming weeks. In class, we will discuss evaluating websites, researching topics of interest, and how to write a testable question and conduct investigations.

It should be noted that a successful project does not have to be expensive. Some of the best projects can be completed using materials found around the home. **The project must be experimental in nature.** We encourage students to choose a topic that they are interested in. Projects should be meaningful and relate to **real-world experiences**. Students should explore problems they see in the world around them to create a project.

We are very excited to be hosting our 8th annual STEAM Symposium in the fall! All projects will be entered in the **BCMAR STEAM Symposium** and top projects will advance to state and national competitions. The school-wide STEAM Symposium will be a big event enjoyed by parents/guardians, students, teachers, and alumni. This year, we plan to have light refreshments, judges, and MANY awards. We are looking for guest speakers that have a background in science. We are also in need of volunteers to help with the refreshments and general help the evening of the event. Awards will be issued in each category during an awards ceremony. Several projects will be selected to move on to the regional Science and Engineering Fair of Houston (SEFH)! Be on the lookout for the date and additional information about the STEAM Symposium in the upcoming months.

We are looking forward to working with you to make this a valuable learning experience for your child. Thank you in advance for supporting your child in such an exciting process of discovery! Please sign below.

Student Name: _____

Student Signature: _____

Parent Name: _____

Parent Signature: _____

Name:

Period:

Date:

IMPORTANT DATES AND DEADLINES

DUE DATE	ACTION ITEMS	GRADE	PARENT INITIALS
September			
/ /	Parent letter returned with parent signature		
/ /	Brainstorming Proposal Preparation (students will work on creating testable questions in class)		
/ /	IIP Proposal Due What is your testable question/problem? How are you going to test it? What data are you going to collect?		
October			
/ /	Manuscript Introduction (draft)		
/ /	Complete research, begin projects & collect data		
/ /	Science Notebook check		
November			
/ /	Science Notebook check		
/ /	Updated Research Plan Writeup and Abstract rough draft due		
/ /	Final research, abstract, notebook check & teacher sign off on board checklist		
/ /	Manuscripts Due		
/ /	Prepare project boards and presentations		
December			
/ /	Poster and Presentation Due		
January			
/ /	STEAM Symposium		

Name:

Period:

Date:

RESOURCES

Science Fair Resources

<http://student.societyforscience.org/intel-isef> (main site for the INTEL ISEF)

<http://www.madsci.org/libs/areas/reagents.html> (purchasing materials)

<https://www.competitionsscience.org/competitions/google-science-fair/> (ages 13 – 18)

<http://www.jpl.nasa.gov/edu/teach/activity/how-to-do-a-science-fair-project/>

<https://sefhouston.org/>

<https://txsef.tamu.edu/>

Project Ideas

Some of the links below show the types of data and projects scientists are doing and the people like you are contributing to and may offer inspiration for a project idea.

ISEF has a comprehensive searchable index of ISEF project abstracts from 2003-present. The direct URL to this is <http://www.societyforscience.org/isef/absonline>.

<https://sciencefaircentral.com/>

<https://scistarter.org/>

<https://www.citsci.org/CWIS438/Websites/CitSci/Home.php?WebSiteID=7>

Animals/Behavior: <https://www.zooniverse.org/projects/marckuchner/backyard-worlds-planet-9>

Animals/Birds: <https://www.birds.cornell.edu/citizenscience>

Space: <https://www.nasa.gov/specials/nasaathome/index.html>

Space: <https://www.nasa.gov/osiris-rex>

Health: <https://www.cdc.gov/datastatistics/index.html>

Health: <https://www.cdc.gov/os/technology/innovation/ccs.htm>

Environmental Health: <https://aqicn.org/city/houston/>

Environmental Health: <https://www.publicworks.houstontx.gov/water-quality-report>

Environmental Health: <https://www.locss.org/>

Environmental: <https://www.globe.gov/globe-data>

Environmental: <https://www.inaturalist.org/>

Name:

Period:

Date:

RESOURCES Continued

Science Literature

<https://www.jstor.org/> (search engine for articles- you can gain access to free open source articles)

<https://scholar.google.com/> (search engine for scholarly articles)

<https://www.hcpl.net/homepage> (Harris county public library, get a free library card for free access to a lot of science news journals)

<https://www.nytimes.com/section/science>

<https://www.npr.org/podcasts/2047/science>

<http://www.sciencedaily.com>

<http://www.enn.com>

<http://www.newscientist.com>

<http://www.chem4kids.com>

<https://www.discoveryeducation.com/>

<https://www.nature.com/news>

<https://www.sciencenews.org/>

<https://www.pbs.org/wgbh/nova/brand/science-now/>

<https://www.nbcnews.com/nightlykids>

<https://www.wired.com/category/science/>

<https://www.technologyreview.com/>

<https://www.science.org/news>

Data Collection and Statistics

Data Collection Tools for iphone/ipad: <https://apps.apple.com/us/app/arduino-science-journal/id1518014927> An app that can use your phone to measure light, sound and more.

Data Collection Tools for android device:

<https://play.google.com/store/apps/details?id=cc.arduino.sciencejournal>

Statistics: <https://nces.ed.gov/nceskids/>

Statistics: <https://ncalculators.com/statistics/sample-size-calculator.htm>

Name:

Period:

Date:

STEM Research Ice Breaker (In class)

List three inventions that you think are important to society:

1. _____
2. _____
3. _____

List the name of two scientists you know and their scientific advancement:

1. _____
2. _____

Now, find other students in the class who agree with each “I” statement below. You cannot repeat names (unless the class size is less than 20). The first person to fill their list with signatures wins. Good luck!

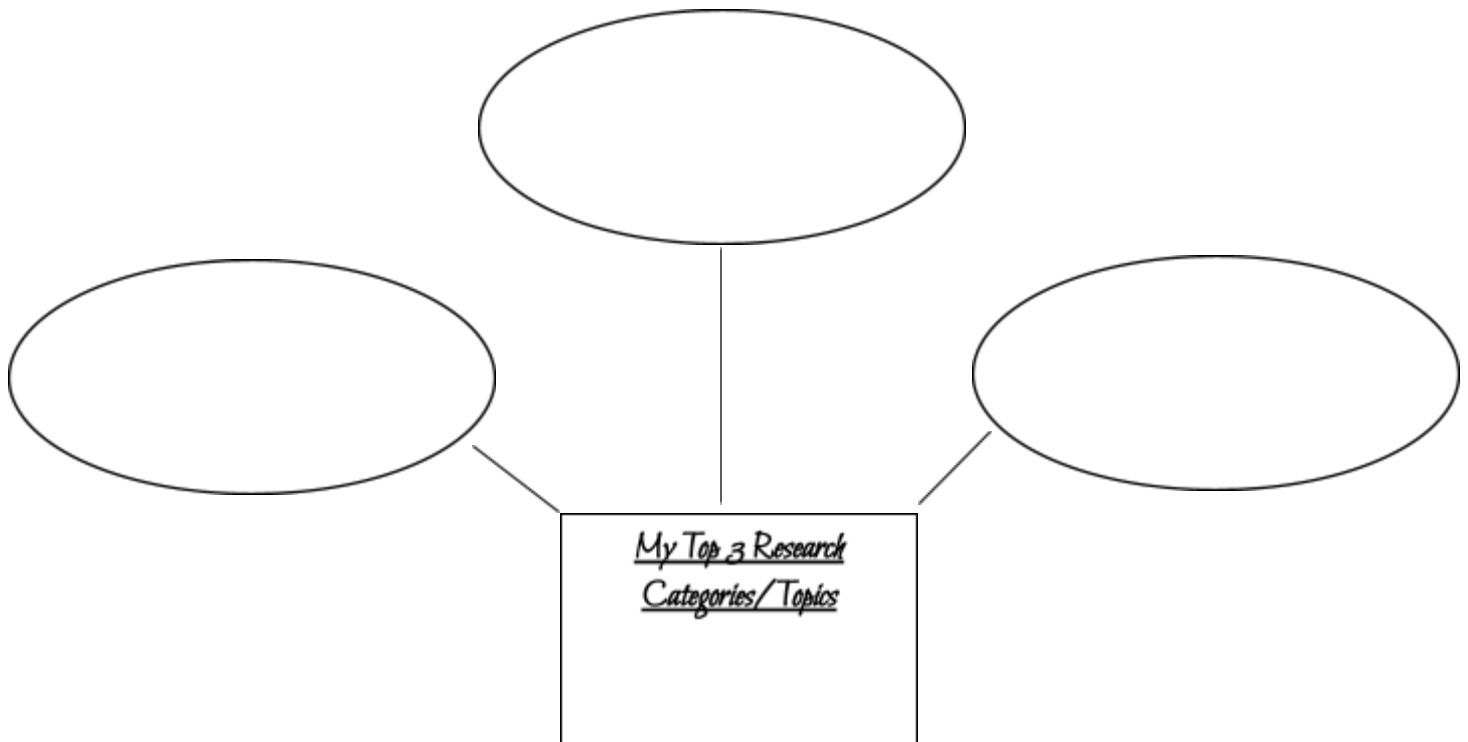
1. _____ I have done a science fair project
2. _____ I have cited an article in MLA format
3. _____ I have worn a lab coat and goggles
4. _____ I listed 1 of the same inventions
5. _____ I listed 1 of the same scientist
6. _____ My favorite subject is science
7. _____ I have used a beaker or graduated cylinder
8. _____ I am very organized
9. _____ I will become a doctor one day
10. _____ I enjoy learning new things
11. _____ I support the “A” (art) in S.T.E.A.M
12. _____ I have visited a science museum
13. _____ I can name 5 elements on the periodic table
14. _____ I know how many grams are in a kilogram
15. _____ My favorite subject is math
16. _____ I work well with other people
17. _____ I will work in the STEM field one day
18. _____ I am open to new ideas and topics
19. _____ I will complete this research project (on time)

Name:

Period:

Date:

PROPOSAL PREPARATION: Step 1. Brainstorm! Using the SEFH Project write down 3 categories that are interesting to you



Pick one category/topic (of the 3 you chose above) that you are most interested in and write it below.

Category/Topic: _____

Write why you chose the topic in the box below.	Write anything you know about the topic.	Write anything you wonder about.

PROJECT CATEGORIES

It is time to think and organize our thoughts and ideas. Below is a list of categories that your research project will fall into. Read the brief descriptions and then use the graphic organizer to select your top category of interest.

The categories from SEFH (<https://sefhouston.org/for-participants/#Project-Categories>):

Animal Science (ANIM): This category includes animals (mammals, reptiles, birds, insects, etc.), animal life, animal development, animal life cycles, animal interactions with each other and/or their environment, and the study of animals at the cellular and the molecular level.

Behavioral and Social Science (BEHA): This category includes the study of psychology, sociology, anthropology, archeology, etiology, ethnology, linguistics, animal behavior (learned or instinctive), learning, perception, urban problems, gerontology, reading problems, public opinion surveys, and education testing, etc.

Biochemistry and Microbiology (Bio): This category includes molecular biology, molecular genetics, enzymes, photosynthesis, blood chemistry, protein chemistry, food chemistry, hormones, bacteriology, virology, protozoology, fungal and bacterial genetics, yeast, etc.

Medicine and Health (MED): This category includes medicine, dentistry, pharmacology, veterinary medicine, pathology, ophthalmology, nutrition, sanitation, pediatrics, dermatology, allergies, speech and hearing, optometry

Plant Sciences (PLNT): This category includes agriculture, agronomy, horticulture, forestry, plant biorhythms, palynology, plant anatomy, plant taxonomy, plant pathology, plant genetics, hydroponics, algology, mycology, etc.

Chemistry (CHEM): This category includes physical chemistry, organic chemistry (other than biochemistry), inorganic chemistry, materials, plastics, metallurgy, soil chemistry, etc.

Earth and Environmental Sciences (EAEV): This category includes studies of the environment and its effect on organisms/systems, including investigations of biological processes such as growth and life span, as well as studies of Earth systems and their evolution.

Energy and Transportation (EGTR): This category includes aerospace, aeronautical engineering and aerodynamics, alternative fuels, fossil fuel energy, green energy science & technology, vehicle development, renewable energies, etc.

Mathematics (MATH): This category includes calculus, geometry, abstract algebra, number theory, statistics, complex analysis, probability, topology, logic, operations research, and other topics in pure and applied mathematics.

Physics and Astronomy (PHYS): This category includes the science of matter and energy and of interactions between the two. Astronomy is the study of anything in the universe beyond the Earth.

Systems Software (SOFT): This category includes the study or development of software, information processes or methodologies to demonstrate, analyze, or control a process/solution.

Aerospace Engineering (AERO): Aerospace Engineering is the branch of engineering that deals with the study and design, development, testing, improving and production of aircraft and related systems (aeronautical engineering) and of spacecraft, missiles, rocket propulsion systems and other equipment that operate beyond the earth's atmosphere (Space Engineering). It includes the direction of the technical phases of their manufacture and operation.

Biomedical Engineering (ENBM): The projects that aim to improve human health and longevity by translation novel discoveries in the biomedical sciences into effective activities and tools for clinical and public health use.

Chemical Engineering and Materials Science (CEMS): Materials science is study of the integration of various materials forms in systems, devices, and components that rely on their unique and specific properties. Chemical engineering includes the application of the principles of chemistry, biology, physics, and mathematics to solve problems in the production, transport, or use of chemicals, fuel, drugs, food, and other products.

Embedded Systems (EBED): Studies involving electrical systems in which information is conveyed via signals and waveforms for purposes of enhancing communications, control and/or sensing.

Engineering Mechanics (ENMC): Studies that focus on the science and engineering that involve movement or structure. The movement can be by the apparatus or the movement can affect the apparatus.

Environmental Engineering (ENEV): Studies that engineer or develop processes and infrastructure to solve environmental problems in the supply of water, the disposal of waste, or the control of pollution.

Robotics and Intelligent Machines (ROBO): This category includes studies in which the use of machine intelligence is paramount to reducing the reliance on human intervention.

Name:

Period:

Date:

PROPOSAL PREPARATION: Step 2. Read About Your Topic

Look up what is known about you wonder about in your topic. Record your notes here and include the link. Then choose one article that you want to reach much more about.

What you wonder about	What you learned	Website (source) of the article you read

Name:

Period:

Date:

PROPOSAL PREPARATION: Step 3. Read More About Your Topic

Write a question you have about your topic article that you want to learn even more about. Closely read your topic article (be sure to look up new vocabulary). Then, try to answer your question when reading a second time and record at least 4 of the most important pieces of information that help answer your question.

Before you begin, what question(s) do you have about your topic article. Record the question(s) in the square on the right.	<u>General Question:</u>
--	---------------------------------

A quote from your readings on something you learned about your topic	Questions you have about what you read or wrote	Anything you wonder about or would like to learn more about after reading and writing what you learned

Name:

Period:

Date:

Possible Testable Questions from Your Reading

After reading about your topic, pose two possible investigation questions. Remember a testable question requires an investigation (experiments or specific observations) not just reading:

1. _____

2. _____

Name:

Period:

Date:

PROPOSAL PREPARATION: Step 4. Read About Possible Testable Question(s)

Topic:

Possible Question:

Look for and Record Information that Helps Answer Your Possible Testable Questions. Record at least 4 of the most important pieces of information that answered or helped answer your question.

A quote from your readings that helps answer or address your favorite question	A paraphrase of the quote (rewrite the quote in your own words)	Source: Website Link

Name:

Period:

Date:

PROPOSAL PREPARATION: Step 5. Read More to Develop and Find an Answer to Your Testable Question

Record information that provides background knowledge about your question that helps describe why your project is important and interesting and that provides reasons why you are making your hypothesis/prediction. You may use easybib (<http://www.easybib.com/>).

A quote from your readings that helps answer or address your favorite question	A paraphrase of the quote (rewrite the quote in your own words)	Source: Website Link

Name:

Period:

Date:

Now you are ready to write your proposal...

Proposal

Testable Question (the question needs to include the independent, and dependent variables)

What I will change (independent variable): _____

What I will measure (dependent variable/s): _____

Testable Question:

Research

What have people learned about:

Name:

Period:

Date:

Hypothesis

What I think will happen is (what do you predict the answer to your question is):

This is why I think so (write your because statement):

Project Design (Procedures/Methods)

What will stay the same (control variable(s)): _____

What will I collect and record in a data collection table?

Note: *Subjects/Samples (what you are experimenting on or observing like an organisms) and replicates usually go in the first Columns (you can have more than one column for the independent variable and control variable if needed).*

Sample of the setup of a table

Samples, Subjects	Trial, Replicate	Date	Name of Independent Variable	Name of Dependent Variable

Name:

Period:

Date:

My table (use the sample set up to create your own table):

Steps in my procedure

What I will do:

Materials (what will I need to do my procedure)

What do I need:

Name:

Period:

Date:

Validation

- ☐ My project is safe
- ☐ I can get the materials
- ☐ I have enough time to build, test and report the project
- ☐ My project will not harm organisms
- ☐ My project will not harm or bother other people
- ☐ I need special approval from the school committee because I am using microbes
- ☐ I need special approval from the school committee because I am using chemicals or combustion
- ☐ I need special approval from the school committee because I am studying animals
- ☐ I need special approval from the school committee because I am studying humans

Final Approval to Begin Project

Project Approved: _____

(Signature)

(Date)

Notes from approver:

Upon proposal approval, you are ready to start collecting data in your notebook!

NOTEBOOK

The scientific laboratory notebook is a bound composition or spiral book with pages that are not removable (the validity of documentation partly depends upon ensuring the work has not been tampered with or pages removed) and is a critical part of scientific and engineering investigations. Every experiment, trial, observation should be recorded. The entries in the notes should be sufficient for someone else to reproduce the experiment or trial. It must include the following:

- a. Table of contents in the front two pages.
- b. All pages numbered after the table of content on the top right corner.
- c. Dates are recorded each time observations and/or experimentation/trials occur.
- d. The purpose and reason for each data measurement, trial or observation is recorded each time.
- e. The procedures (what you did)
- f. Materials you used- Including equipment and chemical information.
- g. Appropriate mathematical formulas/calculations are used.
- h. Scientific notation and measurement is used (ml for example, not tablespoons).
- i. Computer print outs, photographs, or other material is taped/pasted into lab notebook if present.
- j. All graphs and table are clearly labeled
- k. All entries are written in ink and mistakes have a clear single line drawn through them.

Name:

Period:

Date:

NOTES ON RESEARCH: ANNOTATED BIBLIOGRAPHY (CITATIONS)

Write your testable question here:

Once your proposal is approved, continue to research your question on any related work others have done. You may include information you previously found as you were preparing your proposal. Use these notes for your introduction and to explain your results.

1. Source (ex. Weblink):

Quote	Paraphrase of the quote

How will you use the information (as background or as part of your hypothesis because statements for your hypothesis)?

Write the source in MLA format.

2. Source (ex. Weblink):

Quote	Paraphrase of the quote

How will you use the information (background or because statement for your hypothesis)?

Write the source in MLA format.

Name:

Period:

Date:

3. Source (ex. Weblink):

Quote

Paraphrase of the quote

How will you use the information (as background, as part of your because statements for your hypothesis)?

Write the source in MLA format.

4. Source (ex. Weblink):

Quote

Paraphrase of the quote

How will you use the information (as background, or as part of your because statements for your hypothesis)?

Write the source in MLA format.

Name:

Period:

Date:

--

5. Source (ex. Weblink):

Quote	Paraphrase of the quote

How will you use the information (as background or as part of your because statements for your hypothesis)?

Write the source in MLA format.

6. Source (ex. Weblink):

Quote	Paraphrase of the quote

How will you use the information (as background or as part of your because statements for your hypothesis)?

Write the source in MLA format.

INTRODUCTION

What is an introduction?

The introduction leads the reader from a general subject area to a particular topic of inquiry. It establishes the scope, context, and significance of the research being conducted by summarizing current understanding and background information about the topic, stating the purpose of the work (why is it important, for example), the questions or problems you are addressing and the hypothesis, as well as the reason for the hypothesis. Specifically, include the following:

1. Background- What is known about the topic, question or hypothesis you are addressing and why is it interesting.
 2. The problem or the question
 3. The hypothesis
 4. Because statement- report on related findings that led you to your hypothesis.
-

Write your draft here

PROCEDURE/METHODS

What is a procedure?

The procedure or methods section describes the materials used and actions taken to investigate a research problem and the rationale (the reason) for the application of specific procedures or techniques used to identify, select, process, and analyze information applied to understanding the problem, thereby, allowing the reader to critically evaluate a study's overall validity and reliability. The methodology section of a manuscript answers two main questions: How was the data collected or generated? And, how was it analyzed? The writing should be direct and precise and always written in the past tense. Specifically, include the following:

1. **Materials-** Including equipment and chemical information.
2. **Steps** taken to test the hypothesis or address a problem/question.
3. **Variables** and controls included in the investigation.
4. The International System of Units (SI) must be used with measurements.

Write your draft here

RESULTS

What are results?

The results section is where you report a summary of the findings of your study based upon the methodology [or methodologies] you applied to gather information. The results section should include tables and graphs and state in sentences the findings of the research arranged in a logical sequence without bias or interpretation. Specifically include the following:

1. Variables and controls for the investigation.
 2. Scientific notation
 3. Tables and Graphs/Charts, properly titled graphs and tables and properly labeled graphs/charts on the X and Y axis.
 4. A written summary of observations
-

Write your draft here

DISCUSSION AND CONCLUSION

What is the purpose of a discussion?

The purpose of the discussion is to interpret and describe the significance of your findings in light of what was already known about the research problem being investigated, and to explain any new understanding or insights about the problem after you've taken the findings into consideration. The discussion will always connect to the introduction by way of the research questions or hypotheses you posed and the literature you reviewed. The conclusion states if the hypothesis was supported or refuted. Specifically include the following:

1. What are your main findings?
 2. How do the results answer the question you had?
 3. Do the results support or refute the hypothesis?
 4. How do the results compare to what is already known (be sure to reference citations)?
 5. Why the findings matter?
 6. Recommend next steps or new areas for future research based on the findings (what might you do next in relation to your project?).
-

Write your draft here

ABSTRACT

What is the purpose of an abstract?

An abstract summarizes, usually in one paragraph, the major aspects of the entire paper in a prescribed sequence as follows:

- i. 1-2 sentences summarizing the introduction- What is your project on and why is it interesting or important? What is your question and/or hypothesis?
- ii. 1-2 sentences summarizing the methods or procedures- How did you do it?
- iii. 2-3 sentences summarizing the results and conclusions- What did you find out? Why is it important?

The abstract needs to be 250 words or less

Write your draft here

Name:

Period:

Date:

REFERENCES: BIBLIOGRAPHY (CITATIONS)

This only list the resources that you used to get information for your introduction, procedures/methods and discussion and conclusion. Do your best to follow MLA format (See SEFH Guidelines. You may use easybib (<http://www.easybib.com/>) to help you. You should only use reliable resources from scientific magazines or organizations.

Write your draft here

Name:

Period:

Date:

RESEARCH: ACKNOWLEDGEMENTS

Remember to keep track of those who helped you and thank them in your manuscript. Gratitude is the best attitude! However, as per SEFH rules, do not include acknowledgements in your poster.

Checklist of the Manuscript and Poster Components

1. Format

- ☐ **Manuscript:** Typed, 12 pt. Times New Roman font, double spaced, 1- inch margins with the following headings for each section: Introduction, Procedures, Results, Discussion and Conclusions, References, and Acknowledgements.
- ☐ **Poster:** Minimum 14 pt. Times New Roman font (or another easy-to- read font). Exceptions: The title should be minimum 20 pt. font size and references can be a minimum of 10 pt.
- ☐ **Poster:** The following headings for each section must be included and in the following order: Introduction, Procedures, Results, Discussion and Conclusions, and References

2. Abstract

- ☐ A condensed description of the project, including the results.
- ☐ 1–2 sentences summarizing the introduction: What is your project about and why is it interesting or important?
- ☐ 1–2 sentences summarizing the methods or procedures: How did you do it?
- ☐ 2 sentences summarizing the results and conclusions: What did you find out?

3. Introduction (Project Objectives and Project Design)

- ☐ **Background:** What is known about the topic, question, or hypothesis you are addressing?
- ☐ The problem or the question
- ☐ The hypothesis
- ☐ Research and/or observations that support the hypothesis.
- ☐ The purpose: Why is this research important?

4. The Procedure/Methods (Project Design)

- ☐ Materials (including equipment and chemical information).
- ☐ Steps taken to test the hypothesis or address a problem/question.
- ☐ Variables and controls for the investigation
- ☐ Scientific notation

5. Data and Results (Project)

- ☐ Graphs and/or tables
- ☐ Summarize in words the graphs and/or tables
- ☐ Graphs and tables with titles/labeled
- ☐ Graph axis properly labeled

6. Discussion

- ☐ How do the results answer the question you had? Do the results support or refute the hypothesis?
- ☐ How do the results compare to what is already known?

7. Conclusion

- ☐ Main findings
- ☐ Why the findings matter
- ☐ If applicable, recommend new areas for future research based on the findings (what might you do next in relation to your project?).

8. References/Citations

- ☐ Five references in MLA format (references include the title, author [when available], and date of the source, at the very least).

9. Acknowledgements (For manuscript only. Do not include in your poster.)

- ☐ Include a thank you statement to those who helped you.

Poster And Presentation Additional Components

It is usually easiest to create your poster by making slides in powerpoint. Here is a template to guide: <https://tinyurl.com/2uhrnbyx>. You will need to make a copy of the guide in order to edit it.

You may use your choice of font and colors as long as your poster is easy to read and not distracting. You may copy paste from your manuscript and increase the size of your font. Your slides will need to be printed and pasted to a poster. You will use your poster to present. You may use your abstract to write your presentation and add more to the presentation to help your audience understand why you did your project and what you discovered.

- ☐ The project content is presented in the following order, and each section is clearly labeled as follows: Introduction, Procedures, Results, Discussion and Conclusions, and References/Citations (MLA format).
- ☐ Use a font size (minimum 14 pt.) large enough to allow your poster to be read from 5 feet away, except the references (these can be 10–12 pt. font size).
- ☐ Presentation is a short summary of your poster that includes what interested you about the topic and why is the topic important, what you hypothesized and why, what did your research involve, and what you found out.
- ☐ Presentation is 5–7 minutes long.

Name:

Period:

Date:

Manuscript and Poster					
Student's Name:					Grade:
Project Category:					Date:
Project Title:					
Teacher's Name:					Score:
Manuscript: Provides readers with a comprehensive look at the project. A 4 is excellent, a 3 is good, a 2 is needs work, and a 1 is attempted.					
1. Cover page: All group members, title, date, teacher, grade level, period	4	3	2	1	0
2. Abstract: A 250 word or less summary of the project including the purpose and question investigated, hypothesis, procedure, results, and conclusion	4	3	2	1	0
3. Introduction: Included the purpose, hypothesis, problem or question, project goals, background information including an explanation of why the research was done	4	3	2	1	0
4. Introduction: Included because-type statement that explains why the prediction/hypothesis was made and references previous related studies (work done by others) that led you to make your hypothesis	4	3	2	1	0
5. Procedures: Provided all relevant variables (independent, dependent and control)	4	3	2	1	0
6. Procedures: Provided a list of specific items used in the experiment	4	3	2	1	0
7. Procedures: Provided a greatly detailed step by step description for how investigation was completed (including trials completed)	4	3	2	1	0
8. Results: Included clear tables and/or graphs of the data. Included a summary of the tables and graphs that is consistent with the data obtained and provided sufficient number of trials	4	3	2	1	0
9. Discussion and Conclusion: Provided an answer to the question based upon results and included whether or not the hypothesis was supported	4	3	2	1	0
10. Discussion and Conclusion: Included an explanation of what caused the results, how the results relate to similar work done by others, and either any possible errors or next steps	4	3	2	1	0
11. Discussion and Conclusion: Explanation and conclusion was consistent with the results	4	3	2	1	0
12. Provided correct formatting: Typed, 12 Pt. Times New Roman font, double spaced, 1 inch margins) with headings (Introduction, Procedures, Results, Discussion, Conclusions and Acknowledgements)	4	3	2	1	0
13. Limited grammar and spelling errors (1 or fewer errors is excellent...7 or fewer is attempt made or better)	4	3	2	1	0
14. Bibliography: All sources cited correctly using MLA format	4	3	2	1	0
15. Acknowledgements: Students thank those who helped (students: keep track of those who help you so you don't forget and show gratitude)	4	3	2	1	0
Opportunities for Improvement:					

Name:

Period:

Date:

Poster and Oral Presentation				
Student's Name:			Grade:	
Project Category:			Date:	
Project Title:				
Teacher's Name:			Score:	
Poster: The visual display board is meant to attract attention, provide information and should challenge onlookers to want to know more about the project. A 4 is excellent, a 3 is good, a 2 is needs work, and a 1 is attempted.				
1. Displayed the Introduction, Procedures, Results, Discussion, Conclusion and Citations from their manuscript and labeled each section appropriately	4	3	2	0
2. Neat, well organized, and visually appealing (text on poster is legible from a distance of (font size/color and visuals are not distracting)	4	3	2	0
3. Visual aids like photos from the investigation, observations or data table, and graphs from data analysis are displayed on poster as needed	4	3	2	0
4. Poster and project demonstrates high level of creativity/originality	4	3	2	0
Oral Presentation: The purpose of an oral presentation is to share your work and demonstrate content knowledge of the independent research conducted. The presentation should describe each part of the project listed in number 6 below-- It is important to relay this information to the listener(s).	4	3	2	0
5. The presentation includes an introduction (with the question or purpose and hypothesis, background information, why the student chose the project and how the student came upon the idea), short summary of the methods/procedures, results and conclusion	4	3	2	0
6. Movement is fluid and helps the audience visualize or enhances articulation and student demonstrates a strong positive feeling about the topic	4	3	2	0
7. The presentation is coherent and clear and student demonstrates content knowledge	4	3	2	0
8. Student uses a clear voice, precise pronunciation of terms, and audience can hear the student	4	3	2	0
9. Presentation is within the time allotted (5-7 minutes)	4	3	2	0
10. Student makes eye contact consistently	4	3	2	0
Opportunities for Improvement:				

Name:

Period:

Date:

The Laboratory Notebook				
Student's Name:			Grade:	
Project Category:			Date:	
Project Title:				
Teacher's Name:			Score:	
Laboratory Notebook: The scientific laboratory notebook is a bound or spiral book with pages that are not removable (the validity of documentation partly depends upon ensuring the work has not been tampered with or pages removed) and is a critical part of scientific and engineering investigations. Every experiment, trial, observation should be recorded. The entries in the notes should be sufficient for someone else to reproduce the experiment or trial.				
ORGANIZATION				
1. Table of contents is located in the front of the notebook (first two pages)	4	3		0
2. Pages are numbered correctly in the top right corner after the table of contents	4	3		0
3. Dates are written down when measurements (data), trials or observations are recorded and executed	4	3		0
CONTENT				
4. The purpose and reason for each measurement, trial or observation recorded is clearly stated	4	3		0
5. The procedures (what you did) are clearly written for each measurement, trial or observation.	4	3		0
6. Appropriate mathematical formulas/calculations, SI when measurements are taken and materials used for each recording are referenced or included	4	3		0
ILLUSTRATION & DIAGRAMS				
8. Graphs and tables (and if helpful, photographs) are included	4	3		0
9. All entries are entered in ink with single line drawn over errors	4	3		0
NOTEBOOK				
10. A composition notebook is used (bound) with no pages removed	4	3		0
Opportunities for Improvement:				

Name:

Period:

Date:

CONSENT FORM GUIDES: Students who do projects on animals, microbes, humans or hazardous materials are required to get approvals from Scienteer. Scienteer has the below forms in electronic format.

<http://www.sefhouston.org/rules-guidelines>

ALL PROJECTS REQUIRE PRIOR APPROVAL OF THE ADULT SPONSOR/ FORM (#1), STUDENT CHECKLIST (1A), RESEARCH PLAN AND APPROVAL FORM (#1B) AT THE LOCAL SCHOOL LEVEL. Continuation projects will need the continuation projects form (#7).

Does your project have to do with VERTEBRATE ANIMALS, HUMAN SUBJECTS (including surveys), HAZARDOUS CHEMICALS ACTIVITIES OR DEVICES, or POTENTIALLY HAZARDOUS BIOLOGICAL AGENTS (microbes)? If so, we need to get some more consent forms. Please see the quick chart below to ensure that you receive and submit any forms in addition to Forms 1, 1A, 1B. All forms are submitted through Scienteer.

	Form #1	Form #1A	Form #1B	Form #1C	Form #2	Form #3 (SRC)	Form #4 (IRB)	Form #5A or 5B (SRC)	Form #6A or 6B (SRC)	Form #7
Any Project										
ANY Continuation Project										
Project with Vertebrate Animals										
Project with Human Subjects										
Project with Hazardous Chemicals										
Project with Hazardous Activities										
Project with Hazardous Devices										
Potentially hazardous Biological Agents										

Any relevant consent and additional approval forms apart from Forms 1, 1A and 1B will be sent home after the project is provisionally approved. In these cases, final approval is contingent on additional consent and approval forms. ALL these forms are located at the Science Fair Rules and Guidelines Form #1-Adult Sponsor Form, Form #1A-Student Checklist, Form #1B-Research Plan and Approval Form, Form #1C-Regulated Research Institution Form, Form #2-Qualified Scientist Form, Form #3-Risk Assessment Form, Form #4-Human Participants Form, Form #5A or 5B-Vertebrate Animal Form, Form #6A-Hazardous Risk Assessment Form, Form #6B-Human and Vertebrate Animal Tissue Form, Form #7-Continuation Project

Name:

Period:

Date: