

Lake Asbury Junior High School Science Project Workbook



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Plagiarism

What is plagiarism?

It is very important to understand exactly what it means to plagiarize. You may think plagiarizing means simply copying or borrowing the words of someone else, but in truth understand that plagiarism "... involves both stealing someone else's work and lying about it afterward." ¹

Why do most students plagiarize?

According to plagiarism.org, students plagiarize for the following reasons:

- Student's get overwhelmed and confused with the project
- Students do not understand the information they are gathering for their project
- Students wait until the last minute or procrastinate to complete the project
- Students do not take good notes or write down the source of the information
- If the source is a website it becomes very easy to just "cut and paste" thinking that taking a few sentences is no big deal

How to avoid Plagiarism?²

1. Read the requirements of the project in your project packet and ask questions when you don't understand something.
2. Sometimes it is difficult to find information about science topics that are written at your reading/grade level. As you read information highlight any words that you do not know the definition of and look them up. Mark items that you find confusing and ask your teacher or parent to help simplify or explain it in a way that will make more sense to you so that you will have an easier time putting the idea into your own words. If you are using an internet search engine, like Google or Bing, be sure to add the words "For kids" in your key word search. For example: solar power for kids or information on measles for kids.
3. Plan your time wisely. For the majority of the components of this project you cannot write a good final copy in one night or even a weekend. You need to make roughs drafts and plan things out.
4. Take good notes for everything that you do on your project. Write down all the information needed to put the source in your bibliography before writing any notes. Write only key ideas in bulleted form, instead of complete sentences. If you have to copy a sentence or an idea word for word put it in quotation marks. For your project make observations and record dates, and take pictures to show that you actually did the experiment yourself.
5. When it comes to the background research paper, write a rough draft and proofread your paper. Check to make sure that it is written in your own words and that you understand the information that you have written.
6. USE QUOTES and cite your resource within the text (In other words, make sure to let the reader know where you got the information.) if the information is crucial and cannot be changed. For example, this may be necessary when stating the definition of a science vocabulary term or process. Keep quotes to the minimum (two to three sentences). Use resources like bibme.org and easybib.com to learn to properly cite your references within the text and in the bibliography.

What are the consequences of Plagiarism?

We take plagiarizing very seriously. If you are caught plagiarizing, you will receive no credit for the part of the project that has been plagiarized.

¹ "Plagiarism.org." *Plagiarism.org*. N.p., n.d. Web. 24 July 2012. <<http://www.plagiarism.org/>>.

² "Purdue OWL: Avoiding Plagiarism." *Welcome to the Purdue University Online Writing Lab (OWL)*. N.p., n.d. Web. 24 July 2012. <<http://owl.english.purdue.edu/owl/resource/589/02/>>.

Project Topic/Question/Problem

The four most important questions to ask yourself before choosing any project are

- Is it something I can do with little or no help from parents, teachers or other adults?
- Am I really interested in this topic or do I just think it is easy?
- Do I have enough time and resources to successfully complete this project by winter break?
- How can I apply what I have learned to the “real world”?

Acceptable Science Project topics must:

- Be expressed as a problem question beginning with a phrase such as
What is the relationship between...?
What is the effect of...?
What affect does...?
- Require experimentation and identifies the intended test subject, independent variable, and dependent variable
- Be completed within the amount of time allotted
- Be within your scope of ability in terms of your age and expertise, access to materials, and testing facility constraints such as working space, and financial expense involved.
- have results that are quantitatively measurable in **metric, SI Units**
- **Not** harm vertebrates
- **Not** be a demonstration, model, or kit
- **Not be a** consumer product test,
- **Not** use mold or bacteria
- **Not** use weapons, explosive or fire
- **Follow all safety guidelines** according to ISEF rules and MSDS regulations

The next three worksheets will help you to narrow down an actual project question or problem that you can then use to design an experiment to test. All you need to decide is your test subject or the topic for your experiment (plants, electricity, baseball, etc...).

Information about Special Project Topics

Special Projects are those projects involving certain chemicals, human participants, vertebrate animals (horse, dogs, cats, birds, fish, etc...) or human tissue. These projects have more regulations and paperwork requirements than other projects. If you are seriously interested in doing one of these types of projects you must do **all** of the following before you can begin your experiment:

1. Read the pages associated with your project topic in the Intel International Science and Engineering Fair rules and guidelines found at

<http://www.societyforscience.org/document.doc?id=396>

2. Review the paperwork that must be completed and approved prior to experimentation found at

<http://www.societyforscience.org/isef/document/>

3. Attend the Evening Science Fair meeting with your parents

4. Attend one of the Thursday after school workshops in the science computer lab to review paperwork prior to the school science review committee

5. Have your project approved by the School Scientific review committee consisting of the Science Fair Coordinator, an Administrator, School Nurse, Guidance Counselor, and/or Qualified Animal Scientist.

Worksheet 1: The Four Question Strategy “Brainstorming”

Directions: Complete the information below.

Science project test subject: _____ (ex. Seeds, pond water, mosquitoes, etc.)

1. What are 12 materials or things you need that are readily available for conducting experiments on _____?
(Write test subject here)

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |

2. List 3 possible ways that _____ can respond/change, act or work.
(Write test subject here)

| | | |
|--|--|--|
| | | |
|--|--|--|

3. Pick three of the main materials that you listed above in question 1 and list how they can be changed to affect the response of _____.
(Write test subject here)

| | | |
|--|--|--|
| | | |
| | | |

4. How can you measure the subject’s response to the changes listed in #2? (A minimum of three ways is required)

Resources

"ROOTING INTO INQUIRY: Student-Designed Projects, the Four Question Strategy." *Coastal Roots*. Louisiana Marine Education Resources, n.d. Web. 30 July 2012. <http://lamer.lsu.edu/pdfs/CR_RootingIntoInquiry.pdf>.
Bryan, Leslee. "Windmill Problem Worksheet" September 2010. July 30, 2012.

Worksheet 2: The Four Question Strategy Creating a Project Question

Directions: to create a Problem/ Question to investigate, refer back to worksheet 1. Select an item from your answers listed for #3, and relate it to a possible response from an answer in #4.

Use this format to help:

What affect does ____ (fill in a choice from question #3) *have on* ____ (fill in a choice from #4)?

Note: You are not trying to answer a question you are only making up questions.

What affect does _____ have on _____ ?

Which question/problem from above is the most feasible? Why? _____

Which question/problem from above is the most interesting? Why? _____

Which question/problem are you going to choose to investigate? Write it down again.

My Problem Question is:

Approval of Teacher: _____ Date: _____

Approval of Parent: _____ Date: _____

Resources

"ROOTING INTO INQUIRY: Student-Designed Projects, the Four Question Strategy." *Coastal Roots*. Louisiana Marine Education Resources, n.d. Web. 30 July 2012. <http://lamer.lsu.edu/pdfs/CR_RootingIntoInquiry.pdf>.

Bryan, Leslee. "Windmill Problem Worksheet" September 2010. July 30, 2012.

Worksheet 3: Identifying the Variables, Control & Constants

Title (Problem/Question): _____

1. Identifying Variables: Complete the chart below

| | | | | | |
|---|----------------------------|----------------|----------------|----------------|----------------|
| Independent Variable: _____ (Remember, the independent variable is the "If" part of the hypothesis and is the subject of your experiment) | | | | | |
| Levels of the <u>Independent</u> Variable (Be sure to include units of Measure ex. Grams, parts per thousand, liters, etc.) | | | | | |
| Control Group | Experimental Groups | | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
| | | | | | |

2. What is the dependent variable in your experiment? (What will change as a result of your experiment? What change in the experimental groups are you measuring?)

3. What tools do you need to use to measure your dependent variable? (Stopwatch, meter stick, thermometer, etc.)

4. What units will you be using to measure the dependent variable? (Meters, liter, grams, etc.)

5. List all the variables in your experiment that need to be controlled or kept constant.

| | | | |
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| | | | |

Resources

"ROOTING INTO INQUIRY: Student-Designed Projects, the Four Question Strategy." *Coastal Roots*. Louisiana Marine Education Resources, n.d. Web. 30 July 2012. <http://lamer.lsu.edu/pdfs/CR_RootingIntoInquiry.pdf>.

Project Background Research

The purpose of Background Research for Science Experiments is to:

- Find scientific definitions for your test subject and each of the levels of the independent variable.
- Learn background history and information on your test subject and the levels of the independent variable (including, but not limited to what it's made of, how it works, how it's used, what it does, what it needs, what it interacts with, etc)
- Find information about any similar experiments conducted by other people on your topic/test subject, describing their results and conclusions (www.juliantrubin.com/fairprojects.html is a great resource to help you find this information)
- Find out about the people or groups that would benefit from the results of your project experiment and how your project results could be useful in the real world.

Write the question you are trying to answer with your experiment in the space below?

List the key words and phrases from your question.

Key words are words that are important to understanding your project. This includes your test subject and each level of your independent variable as well as your dependent variable.

Use the chart on the next page to create questions that you will then answer when you complete your background research using the Document Analysis Sheets. Fill in the blanks with one of the key words you listed above. Make at least two or three questions from each "question word." You are not expected to know the answers to these questions before researching. Note: Some questions may not make any sense so get rid of those and focus on answering the ones that do make sense.

Questions to Guide Your Background Research

Use the chart below to help make questions that you will research to answer.

| Question Word | Possible Questions | Questions with your keywords |
|---------------|--|------------------------------|
| What | What is _____? What is _____ used for? What causes _____ to increase/decrease? What are the characteristics of _____? | |
| How | How does _____ happen? How does _____ work? How does _____ measure _____? How do we use _____? | |
| Where | Where does _____ occur? Where is _____ used? | |
| When | When was _____ discovered? When does _____ happen? When does _____ cause _____? | |
| Why | Why does _____ happen? Why do we use _____? | |
| Who | Who uses _____? Who needs _____? Who discovered _____? | |

What formulas or equations are needed to analyze the data from your experiment?

Document Analysis Sheet

(Name and Date)

| | | |
|---|---|----------------|
| Title of document | Source (Where did the document come from?) Book <input type="checkbox"/> Magazine <input type="checkbox"/> Newspaper <input type="checkbox"/> Website <input type="checkbox"/> Other _____ | |
| Date of Document/ Date Published | Author of Document | |
| Place Published (books only) | Publisher (books only) | |
| Edition (if needed) | Volume (periodicals or encyclopedias) | Page Number(s) |
| Website is a Company <input type="checkbox"/> Organization <input type="checkbox"/> Government <input type="checkbox"/> Other _____ | | |
| The URL is http:// | Last date of access | |
| Primary Source <input type="checkbox"/> Secondary source <input type="checkbox"/> | Possible Author Bias/Point of View | |

After you read over the document, fill in the columns below.

| What important facts can I learn from this document? | What inferences can I make from the document? | What questions does this document answer? |
|--|---|---|
| | | |
| | Overall, what is the main idea of the document? | |
| | | |

Document Analysis Sheet

(Name and Date)

| | | |
|---|---|----------------|
| Title of document | Source (Where did the document come from?) Book <input type="checkbox"/> Magazine <input type="checkbox"/> Newspaper <input type="checkbox"/> Website <input type="checkbox"/> Other _____ | |
| Date of Document/ Date Published | Author of Document | |
| Place Published (books only) | Publisher (books only) | |
| Edition (if needed) | Volume (periodicals or encyclopedias) | Page Number(s) |
| Website is a Company <input type="checkbox"/> Organization <input type="checkbox"/> Government <input type="checkbox"/> Other _____ | | |
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| What important facts can I learn from this document? | What inferences can I make from the document? | What questions does this document answer? |
|--|---|---|
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| | Overall, what is the main idea of the document? | |
| | | |

Document Analysis Sheet

(Name and Date)

| | | |
|---|---|----------------|
| Title of document | Source (Where did the document come from?) Book <input type="checkbox"/> Magazine <input type="checkbox"/> Newspaper <input type="checkbox"/> Website <input type="checkbox"/> Other _____ | |
| Date of Document/ Date Published | Author of Document | |
| Place Published (books only) | Publisher (books only) | |
| Edition (if needed) | Volume (periodicals or encyclopedias) | Page Number(s) |
| Website is a Company <input type="checkbox"/> Organization <input type="checkbox"/> Government <input type="checkbox"/> Other _____ | | |
| The URL is http:// | Last date of access | |
| Primary Source <input type="checkbox"/> Secondary source <input type="checkbox"/> | Possible Author Bias/Point of View | |

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| What important facts can I learn from this document? | What inferences can I make from the document? | What questions does this document answer? |
|--|---|---|
| | | |
| | Overall, what is the main idea of the document? | |
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Document Analysis Sheet

(Name and Date)

| | | |
|---|---|----------------|
| Title of document | Source (Where did the document come from?) Book <input type="checkbox"/> Magazine <input type="checkbox"/> Newspaper <input type="checkbox"/> Website <input type="checkbox"/> Other _____ | |
| Date of Document/ Date Published | Author of Document | |
| Place Published (books only) | Publisher (books only) | |
| Edition (if needed) | Volume (periodicals or encyclopedias) | Page Number(s) |
| Website is a Company <input type="checkbox"/> Organization <input type="checkbox"/> Government <input type="checkbox"/> Other _____ | | |
| The URL is http:// | Last date of access | |
| Primary Source <input type="checkbox"/> Secondary source <input type="checkbox"/> | Possible Author Bias/Point of View | |

After you read over the document, fill in the columns below.

| What important facts can I learn from this document? | What inferences can I make from the document? | What questions does this document answer? |
|--|---|---|
| | | |
| | Overall, what is the main idea of the document? | |
| | | |

Document Analysis Sheet

(Name and Date)

| | | |
|---|---|----------------|
| Title of document | Source (Where did the document come from?) Book <input type="checkbox"/> Magazine <input type="checkbox"/> Newspaper <input type="checkbox"/> Website <input type="checkbox"/> Other _____ | |
| Date of Document/ Date Published | Author of Document | |
| Place Published (books only) | Publisher (books only) | |
| Edition (if needed) | Volume (periodicals or encyclopedias) | Page Number(s) |
| Website is a Company <input type="checkbox"/> Organization <input type="checkbox"/> Government <input type="checkbox"/> Other _____ | | |
| The URL is http:// | Last date of access | |
| Primary Source <input type="checkbox"/> Secondary source <input type="checkbox"/> | Possible Author Bias/Point of View | |

After you read over the document, fill in the columns below.

| What important facts can I learn from this document? | What inferences can I make from the document? | What questions does this document answer? |
|--|---|---|
| | | |
| | Overall, what is the main idea of the document? | |
| | | |

Research Paper Requirements

(This is what your teacher will be looking for when grading your research paper)

| Format |
|--|
| Title page- Problem/Question centered on the center of the page. Lower right hand corner has Name Date and Period. |
| Typed 10 or 12 pt black print |
| Font used is Arial, Verdana, Times New Roman or Calibri |
| One inch margins on all four sides |
| Double Spaced |
| Written in third person (do not use I, we, you, etc.) |
| Has at least 5 sources |
| Does not use contractions (don't, won't, etc.) |
| 1000-1500 words in the body of the paper (this does not include the title page or bibliography) |

| Content of paper |
|--|
| Defines all key words related to project topic |
| Answers key questions about project topic and all levels of your independent variable such as what it's made of, how it works, how it's used, what it does, what it needs, what it interacts with, etc |
| Includes a description of experiments that were similar in nature to yours and what the results of those experiments were. |
| Provides a hypothesis written in the correct format |
| Provides an explanation or rationale for hypothesis based on research |
| Provides a purpose for the experiment and a real life application for the results |
| Describes who would benefit from the results of this experiment and why they would benefit from the results. |

| Resources, Citations and Bibliography |
|---|
| Contains 5 sources of information, 2 of which are books or magazines <ul style="list-style-type: none">• Two of the five sources MUST be BOOKS (<i>encyclopedias and dictionaries may be used BUT they do not count towards your required resources</i>)• Use websites that are teen friendly and provide reliable and factual information. This includes:<ul style="list-style-type: none">○ Government agencies like the Environmental Protection Agency, Dairy Farmers of America, National food and Drug Administration, NASA, Smithsonian○ Well known companies and institutions like Proctor and Gamble, JEA, and Nemours○ Sites that have domain name suffix or web address that end in .gov, .org, or .edu |
| In text citation or parenthetical citation |
| Before stating the information from a source that has been summarized or paraphrased gives credit to the source by saying: According to ... or As written in... |
| Use a parenthetical Citation by putting the author's name or source title in parentheses after the summarized or paraphrased information from the source. |
| Direct quotes that are put in quotation marks are used sparingly and cited |
| Bibliography is written in MLA format |
| For examples see website: http://www.sciencebuddies.org/science-fair-projects/project_bibliography.shtml . You may also use websites such as www.bibme.org or www.easybib.com to make your bibliography online. |

| Mechanics & Revisions |
|---|
| Written without grammar and spelling errors |
| Revised according to comments made by teacher |

Procedural Plan

(This is called the Research Plan by ISEF)

The research plan is the proposal for your experiment. It explains everything you plan to do for your project in great detail. **Your Research Plan must be approved by your teacher before you begin to perform the actual experiment.** Refer to the information below to complete your Research Plan.

A) Problem/Question being addressed: What question or problem are you trying to solve? (Use the "What affect..." or other approved format)

B) Hypothesis: Example: If acidic water is placed on soil then the amount of nutrients in the soil will decrease. Remember a hypothesis is:

1. A prediction based on your research
2. Written as an "If... (This is changed or tested). then...(this will happen)"
3. Very detailed and specific; does not use words like best, bigger, etc.
4. Does not use the words I think or I predict

C) Rationale for hypothesis: Give a reason based on your research for your hypothesis

D) Independent Variable: Describe the factor you are purposely changing, the amount, the "type" etc.

E) Control Group: Describe the group you are using to compare to your experimental groups.

D) Independent Variable: _____
 (remember, the independent variable is the "If" part of the hypothesis and is the subject of your experiment)

Levels of the Independent Variable
 (Be sure to include units of Measure ex. Grams, parts per thousand, liters, etc.)

| E) Control Group | Experimental Groups | | | | |
|------------------|---------------------|---------|---------|---------|---------|
| | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
| | | | | | |

Number of repeated trials x sample size = total number of individuals per experimental group
 Ex. 3 trials x sample size of 3 = 9 individuals per experimental group

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
|--|--|--|--|--|--|

F) Dependent Variable: Explain what you will measure during the experiment in order to determine if your hypothesis is proven or not.

Quantitative observations: Explain the measurements will you make to determine if your hypothesis is supported or not.

Qualitative observations: Explain what other observations you will be making to determine if your hypothesis is supported or not. Such as color change or the presence or absence of something.

| | |
|----------------------------------|---------------------------------|
| F) Dependent Variable | |
| Quantitative Observations | Qualitative Observations |
| | |

G) Constants: Factors in the experiment which must be kept the same and cannot be changed.

H) List of Materials: Describe what materials you will need, the quantity of each material, where you plan to get them, and the expected cost. Please remember, you have to provide all of the materials for your project.

| Quantity Amount | Item | Quantity Amount | |
|-----------------|------|-----------------|--|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
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| | | | |

I) Location: Describe where you will complete the experiment, example: in your garage, back yard, etc. Make sure to include a physical address.

J) Safety Precautions: Be sure to write down all safety precautions you will take when conducting your experiment. If your project uses potentially hazardous biological agents, humans or other vertebrate animals and/or hazardous chemicals, be sure to read the **Intel ISEF** rules and guidelines concerning your project at <http://www.societyforscience.org/document.doc?id=311>

K) Experiment Procedures: Write down step by step detailed instructions of what you plan to do. The procedure must:

1. Be written as a list of numbered steps (1, 2, 3, 4....).
 2. Begin by explaining exactly how you plan on setting up your experiment. If you are making something you must give step by step directions as to how you make the item.
 3. Include amounts of materials and metric measurements (centimeters, liters, grams, etc.)
 4. Have at least three trials for the control group and each experimental group/testing group.
 5. If you are using plants or animals you must have a sample size of at least 3 individuals in each experimental/testing group.
 6. Test only one variable. (Example: If you are measuring the effect of “Different types of soil” on plant growth, you may not change the amount of light exposure for the plants. This would invalidate your test.)
 7. Describe how and when you will make qualitative and quantitative observations (how and when you will measure changes in your control and experimental groups and what conditions will you record items such as air temperature, lighting, etc.)
 8. Describe the duration of your experiment. In other words, how long will it last? For example, if you are doing an experiment involving plant growth how long will you observe the growth of the plant 4 weeks, 8 weeks, etc?
 9. Be detailed enough to enable another scientist to repeat your experiment exactly as you did.
-
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Collecting Data- Quantitative Data & the Data Table

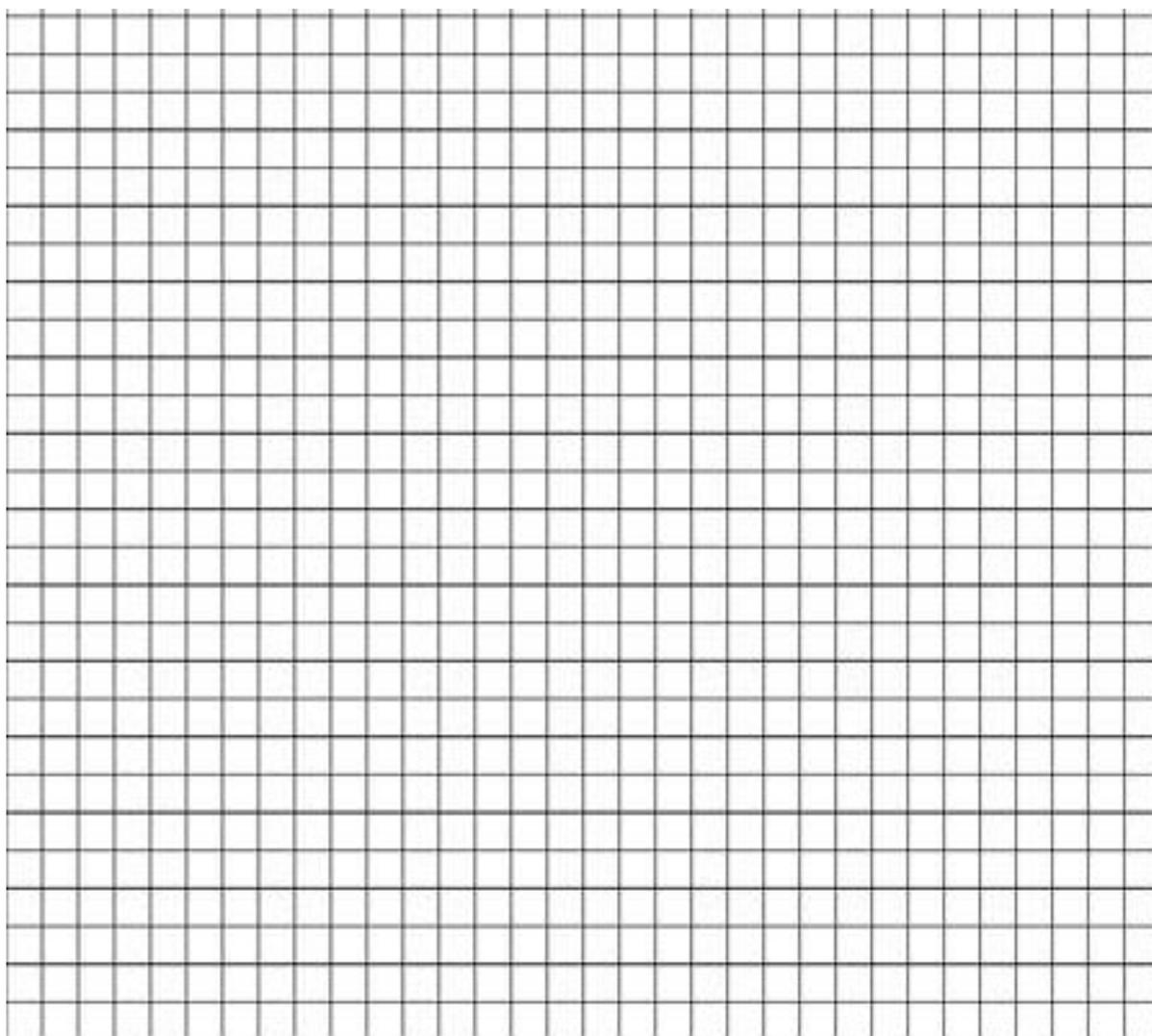
Quantitative data is information that uses numbers, measurements, and amounts. After you have received feedback from your teacher and approval to begin your experiment, use the space below to make a data table to record your quantitative data.

Analyzing Data

The purpose of analyzing data is to determine if your hypothesis can be supported by the data collected during your experiment. When analyzing data you organize data into graphs and charts and try to find relationships or patterns with the data you have collected.

Once you have stopped your experiment you must analyze the data collected as specified in your Research Plan. Be sure to:

1. Find the **mean** for all the trials for each level of your independent variable
2. Graph only the mean of your trials in the space below or on a separate sheet of paper
3. Don't forget graphs need a descriptive title that explains what information is being shown in the graph and labels on the x and y axis (refer to your textbook for more information on graphing).



Discussion and Conclusion

The purpose of the conclusion is to show what you have learned from your project and communicate the results of your experiment and analysis. The conclusion summarizes the whole project and offers explanations for your results. Answer the questions below in complete sentences and in third person.

1. *What was the problem you were investigating or the purpose of your experiment?*

2. *What was your original hypothesis for the experiment?(Do not change your hypothesis to match the data*

3. *What were the average (mean) results for each level of the independent variable?*

4. *Was your hypothesis supported based on the results of your experiment? (Did the data collected match what you thought would happen?)*

5. *Why do you think the experiment results turned out the way they did? (Think back to all the research. What was different about each level of the independent variable that could account for the results of the experiment?)*

Discussion and Conclusion continued

6. *What were some problems or difficulties that could have affected the results? What did you change while doing the experiment?*

7. *If you were to redo the experiment, how could it be improved in the future?*

8. *If you did another science project next year, how could you expand or extend this current project?*

9. *Who would benefit from the results of your experiment? How could what you learned be applied to the real world?*

What happens next?

At this point your science teacher will decide how you will proceed. If you are in the Advanced Science classes or competing in science fair you will be required to complete a project binder and a backboard. You will be provided with another guide to complete these requirements. If you are in Standard Science classes, your teacher may assign another way for you to communicate and present your science project. This may include, but is not limited to, a class presentation, display board, poster, written paper or PowerPoint.

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