Lake Asbury Junior High School

STEM Experimental Research Expo

2016-2017



Name/Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Dear Students and Parents,

 The purpose of the science fair project is for students to learn to problem solve on their own and practice the “…formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.” (NGSSS Science Standards SC.7.N.1 and SC.8.N.1)

In order to align with the Science Standards referenced above, this project must be experimental in nature, meaning that it is not just a model or a research report. Students must develop a question that can be answered through an experiment, a survey, a field study or a field test in the case of engineering projects. Science Fair Projects are primarily considered an “at home” individual student project with no groups or partners allowed.

We understand that Science fair projects require work by students, parents, and teachers. While we all share certain responsibilities to make sure that the project is successful and a worthwhile learning experience, the **student** is primarily responsible for completing the project and the parent and teacher should have only a supporting role.

The **LAJH Science Fair Project Guide** has been constructed to assist students in completing a successful science fair project. We also have taken the time to put worksheets, examples, and additional resources on the LAJH School Science Fair Webpage, which will help students with topic selection, background research, writing the research paper, and creating a logbook.

To make the project more manageable, it has been broken down into several stages. The due dates for each stage will be determined by your Science teacher and may be different than that of other students in other classes. It is very important that students complete each stage of the project by the given due dates and that the work is of good quality. Just doing a project does not entitle a student to a passing grade, especially if he/she does not follow directions and fails to complete all parts of the project.

Please review the entire project guide book and carefully read pages 4 on plagiarism and page 6 on project topics. Once you have read the project guide and visited the LAJH Science Fair Webpage, sign the attached receipt letter indicating that you: 1) have received the guide and visited the LAJH Science Fair Webpage, 2) have read and understand the requirements for the project, 3) read and understand the Science Department’s policy on plagiarism. Then return the receipt letter to your science teacher.

Sincerely,

The LAJH Science Department

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I have reviewed the Science Fair information and calendar with my child, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, (Printed Name of Child) and we understand the requirements for a successful Science Fair Project.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_
Parent Signature Date Student Signature Date

**General Materials**

|  |
| --- |
| **Required**Composition book or spiral notebook for use as your project log bookA 3-prong folder to hold this guide bookA Flash drive with a folder specifically for saving and downloading science fair documents. A 1 inch binder with three tab dividers A Three-sided display board\*A Camera to take photographs of your project |

\*these items may be available for purchase from LAJH, check with your science teacher.

**Project Specific Materials**

It is the student’s responsibility to provide all materials to complete the science fair project. Make sure to plan accordingly especially when ordering materials and having them shipped to your home. Teachers will not loan out materials for use at home to complete this project.

**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]](#footnote-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]](#footnote-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, writing each definition in your log book. 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 not receive credit for the part of the project that has been plagiarized.**

**Project Logbook (composition/spiral notebook)**

For many of you the logbook is a new concept. A well kept logbook is what separates good projects from great projects. A logbook is a **day to day** record of all the work you do on your project. It needs to be set-up BEFORE you have selected a topic and must be added to as you are working on the project. The logbook is PROOF of what you did! The **Log Book is** a **required** component of your project.

|  |
| --- |
| **General Logbook Criteria** |
| * Write in ink—not pencil
* Write your name, school name, and teacher name on the front cover
* Number every page
* Write the date on each page (month/day/year) that you wrote the information on that page
* Cross out mistakes neatly--Do not use white out
* You may glue pages or information you are using for your project into your logbook. This can include graph paper, graphs you make on the computer, blank data tables, MSDS sheets, instructions or resources you find on-line, pictures that you take or drawings that you make.
 |
| **Beginning of the Logbook** |
| Page 1- Write the problem question (Leave this page blank until your exact project question has been approved)Page 2- Table of contents to include all pages beginning with page 3Pages 3 and 4- List of Contacts (any person who will help you with the project including; scientists, engineers, teachers, companies where you order supplies, etc.) include phone numbers, email addresses, FAX numbers, etc.  |
| **Essential Sections of the Logbook** (You may have more than just these depending on your teacher’s requirements. Separate each section with tabs or make a title page when you are beginning a new section.)  |
| * **Research**- in this section you will include all the keywords, facts, ideas, and definitions essential to understanding your project and writing your research paper. You will also include all the bibliographical information for each of your sources. You may also want to include a copy of the rough draft of your research paper or the planning sheet for your research paper.
* **Procedural Plan**- Glue a copy of your typed procedural plan in your logbook BEFORE you write about what happened during your experiment
* **Experiment**- Before writing about what happened during your experiment, write down any equipment you may use and/or a detailed description of any equipment you will build (be sure to include the sizes, materials, etc...) Write down any solutions and/or media you will be making. Include any specific precautions for chemicals you plan on using. (You find this information from the MSDS sheet for that specific chemical)

When you begin your experiment every page should be marked with the date, time, and place where you began the experiment. Write out exactly what you did and if you had to change anything from your original procedure. Write down if you had to start over or if anything unexpected happened. Make drawings of your experiment or put photographs in your logbook of your experiment being conducted. If your experiment takes multiple days, start writing on a new page. * **Data Collection** Make a data table in your logbook to record all of your quantitative data (measurements). You can print out and glue a blank data table into your logbook, but you must hand write in the measurements. Don’t forget to record qualitative data like what you see, hear, smell, and feel).
* **Data Analysis**- Make any calculations and graphs. Write about your graph summarizing your results.
* **Discussion and Conclusion**- Answer the questions found on page 20 of this guide book.
 |

See the LAJH Science Fair Webpage for a step by step tutorial for making a logbook and resources you can use in your logbook.

# How to Select your Project Topic/Question/Problem

**Ask yourself**

1. Is it something I can do with little or no help from parents, teachers or other adults?
2. Am I really interested in this topic or do I just think it is easy?
3. Do I have enough time and resources to successful complete this project by winter break?
4. Is my project aimed at solving a “real world” problem?

 (You need to answer yes to all four of these questions; otherwise you need to think of another question)

**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 affects…?

How does \_\_\_\_\_\_\_\_\_\_\_\_ affect \_\_\_\_\_\_\_\_\_\_\_\_\_\_?

* Require experimentation with an independent variable and dependent variable
* Be completed within the amount of time allotted
* Be within your 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**
* **Follow** **all** **safety** **guidelines** according to ISEF rules and MSDS regulations

**Unacceptable Science Project Topics that will NOT be allowed**

* Any project involving vertebrates (cats, dogs, snakes, chickens, fish, etc…) that could cause harm or discomfort to the animal
* A demonstration, model, or kit
* A taste test or preference test
* Growing mold or bacteria
* Use of firearms, explosives or fire
* Having human subjects eating, drinking, exercising or completing some physical activity

Refer to the LAJH Science Fair Webpage for worksheets to help with the topic selection process.

**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 in PDF format at <https://student.societyforscience.org/forms>

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

<https://student.societyforscience.org/forms>

3. Have your project approved by the School Scientific Review Committee (SRC) consisting of the Science Fair Coordinator, an Administrator, School Nurse, Guidance Counselor, and/or Qualified Animal Scientist. Contact your science teacher for more information.

**Choosing Sources of Information for Your Background Research**

When researching information for your project, not every source is a reliable, good source to use and not every source will provide you with accurate information.

Good Sources of Information include:

* Textbooks
* Non-fiction books
* Almanacs
* Encyclopedias
* Science Journals
* Science Magazines
* Science websites like National Geographic (<http://www.nationalgeographic.com/>) or Popular Science (<http://www.popsci.com/>)
* Websites that are sponsored by government agencies like the Department of Energy (<http://energy.gov/>) the Environmental Protection Agency (<http://www.epa.gov/>) , National food and Drug Administration (<http://www.fda.gov/> ), NASA (<http://www.nasa.gov/>)
* Websites that are related to universities or educational websites like the Smithsonian (<http://www.si.edu/>)
* Websites of well known companies that are devoted to public education like Proctor and Gamble, JEA and Nemours

When in doubt as to how reliable a website is look at the web address or the domain name suffix. If it ends in .gov, .org, or .edu then most likely it is a reliable source of information. Also, another clue to help you determine if the website has reliable information is to look for the reference materials the author used to write the webpage. The sources the author of the webpage used should be listed at the end of the article.

Use Google scholar (<http://scholar.google.com/> ) to find online academic science journal articles of studies and scientific research on your topic. It will provide the links to the full text versions when available.

Poor Sources of information include:

* Wikipedia
* Wiki answers
* Answers.com
* Buzzle.com
* Blogs

Although you may want to use these web sites in the beginning to give you background on your topic, they CANNOT be used as the basis for your research paper and they CANNOT be included as one of your five sources. Instead, once you have read the information on these sites look at the end of the article for their references then go directly to those sources for your own research.

Be very careful of commercial websites that are trying to sell a product or political websites as they may be biased or express only one point of view.

**Information to Record About Each Source**

|  |
| --- |
| Title of document |
| Source (Where did the document come from?)🞎Book 🞎 Magazine 🞎 Newspaper🞎 Website 🞎Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| If the source is a website is it from a : 🞎Company 🞎 Organization (.org) 🞎 Government (.gov)  🞎Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Author of Document |
| Edition (if needed) | Volume (periodicals or encyclopedias) |  Page Number(s) |
| Date of Document/ Date Published | Publisher (books only) | Place Published (books only) |
| Last date of access | The URL is http:// |

This template can be downloaded and copied from the LAJH Science Fair webpage for you to paste in your Science Fair Log book.

**Research Paper Requirements**

The purpose of writing a research paper for a science project is so that you will have a better understanding of 1) how to conduct your experiment, 2) recognize and comprehend what is happening during the experiment, and 3) help you make inferences and identify cause and effect relationships that explain the results or outcome of your experiment. **\*Remember, this is what your teacher will be looking for when grading your paper.**

|  |
| --- |
| **Title Page- stapled to the top**Problem/QuestionYour full nameTeacher’s Name, Grade Lake Asbury Junior HighYour full nameTeacher’s Name, Grade Lake Asbury Junior High2012 |
| * The title is in the middle of the page in ALL CAPITAL LETTERS
* The tile of the paper should be your problem or experiment question
* Center your first and last name at the bottom of the page
* Underneath your name put your teacher’s name and grade
* On the last line put Lake Asbury Junior High School
 |
| **Body of Paper 2-3 pages** |
| * Typed 12 pt black print

Your full nameSponge capsules are toys made of a gelatin capsule with a foam sponge inside. Each capsule measures approximately 2 cm long by 0.8 cm in diameter. The sponges inside the sponge capsules are made in many colors with the most common colors being red, yellow, blue, and green. The foam sponges are made into different shapes such as zoo animals, fish, and dinosaurs. They come in a package of 12 and can be found at most stores in the toy department. They are also called “Magic Grow and Grow Capsules.” (Lau)The capsule of the toy is made of gelatin. Gelatin is an odorless, tasteless and colorless material made of collagen. Collagen is an animal protein that is made from the skin, connective tissue, and bones of animals, usually cows. It is solid at room temperature and has a melting point of approximately 98 degrees Celsius. Gelatin is also used in cosmetics, food, and photography and skin care products. ("Gelatin Food Science")The foam sponge inside the capsule is made of foam rubber or from cellulose, a wood product. According to eHow.com sponges are able to pick up liquids because sponges are made with loose fibers that are full of empty space. Two thirds of a sponge is empty space and only one third of the sponges’ size comes from the actual material it is made of. The holes between the fibers soak up liquid and the fiber material swells. When the fibers swell, this prevents the liquid from leaving the sponge. According to the sponge capsule package, the sponge capsules are normally put into warm or hot water that is between 40°C - 70°C. The water dissolves or breaks up the gelatin capsule. Water molecules move in between the gelatin molecules and separate the gelatin molecules. Each of the gelatin molecules is spread though out the water and seems to disappear. (Werwa, 72) As the gelatin capsule dissolves the foam sponge inside absorbs water. The sponge inside then expands, transforming into a shape that measures approximately 3-4 centimeters long. The whole process takes 3-5 minutes depending on the temperature of the water. The warmer the water temperature the faster the gelatin will dissolve and the quicker the sponge will absorb the water and form a shape.* Font used is Arial, Verdana, Times New Roman or Calibri
* One inch margins on all four sides (top, bottom, left & right)
* Double Spaced
* 1000-1500 words minimum in the body of the paper
* Contains in-text or parenthetical citations
* Written in 3rd person (avoid I, we, you!)
* Defines all key words related to project topic (**not** as a list)
* Answers key questions about the project topic and experimental groups such as what it’s made of, how it works, how it’s used, what it does, what it needs, what it interacts with
* Includes related scientific formulas, laws, theories, etc.
* Provides a purpose for the experiment
* Includes a real life application for the results as well as who would benefit from the results of this experiment and how they would benefit from the results.

Bibliography"Boiling Point Elevation - What Boiling Point Elevation Is and How It Works." *About.com Chemistry - Chemistry Projects, Homework Help, Periodic Table*. N.p., n.d. Web. 9 June 2013. <http://chemistry.about.com/od/solutionsmixtures/a/boilingpointele.-NxZ.htm>."Gelatin Food Science." *GELATIN-Bernard Cole - Gelatin Food Scientist*. N.p., n.d. Web. 12 Aug. 2012. <http://www.gelatin.co.za/gltn1.html>."How Do Sponges Absorb Water? | eHow.com." *eHow | How to Videos, Articles & More - Discover the expert in you. |* *eHow.com*. N.p., n.d. Web. 12 Aug. 2012. <http://www.ehow.com/how-does\_4661324\_do-sponges-absorb-water.html>.Lau, Wendy. "Toys That Grow in the Water | eHow.com." *eHow | How to Videos, Articles & More - Discover the expert* *in you. | eHow.com*. N.p., n.d. Web. 12 Aug. 2012. <http://www.ehow.com/info\_8103076\_toys-grow-water.html>.Manson, Elizabeth. "Properties of Carbonated Water | eHow." *eHow | How to Videos, Articles & More - Discover the* *expert in you.*. N.p., n.d. Web. 9 June 2013. <http://www.ehow.com/about\_5525338\_properties-carbonated-water.html>. "Water On Tap: What You Need To Know | Water on Tap: What You Need To Know | US EPA." *Home | Water | US* *EPA*. N.p., n.d. Web. 9 June 2013. <http://water.epa.gov/drink/guide/index.cfm>. Werwa, Eric, and Dinah Zike. *Chemistry*. New York, N.Y.: Glencoe/McGraw-Hill, 2002. Pages 64-78. |
| **Bibliography- Last page** |
| * Contains 5 sources of information, 2 of which cannot be websites*(encyclopedias and dictionaries may be used BUT they do not count towards your required resources)*
* Does not contain websites like Wikipedia, buzzle.com, wiki answers, answers.com, answers.yahoo.com
* Written in MLA format
* Entries are in alphabetical order
 |

**Research Paper Guide for Organization and Content**

This is not the only way to organize a background research paper for your project, but using this will help to make sure that you have all required information present. For examples of completed research papers see the LAJH Science Fair Webpage.

**Introduction/Beginning**

* Give the definition of the subject of your experiment (called the test subject) or the topic of the experiment (in the case of plants or animals give the scientific name)
* Give a physical description of the topic or test subject in the experiment or explain how it is used or what it does
* Provide a brief history of the topic or test subject in your experiment (This only applies to machines or inventions)

**The Science of the Project/ Middle**

Circle the box or boxes that apply to your project. Focus on finding only the information for the boxes you have circled.

|  |  |  |
| --- | --- | --- |
| If your project involves machines/inventions/ anything with different parts * Describe the major parts in detail
* Describe how specific parts work
 | If your project involves something like rocks or chemicals * Include physical properties (melting/boiling/freezing point, solubility, density, color texture, odor, state of matter)
* Describe how it reacts with things (chemical properties)
* Describe the formation of
 | If your project deals with a process like absorption, rusting, photosynthesis, heat transfer, seed germination, etc... * Describe how the process works
* Describe how or when the process is used or occurs
* List and describe the steps in the process
 |
| If your project involves human or animal behaviors* Describe the behavior in particular (characteristics that identify the behavior)
* Describe how/why the behavior occurs
* Describe the location of the brain responsible for controlling the behavior
 | If your project involves plants * Give details about the plant that makes it unique like physical adaptations for survival and features that can identify it
* Describe the conditions that the plant needs to grow (types of food, water, temperature, sunlight needs, etc...)
 | If your project involves animals* Give details about the animal that makes it unique like physical or behavioral adaptations for survival
* Describe what the animal needs to live (types of food, where they live, etc…)
* Describe where the animal is most commonly found
 |
| If your project is classified under physical science or engineering* Describe any forces at work such as gravity, drag, uplift, friction, tension, etc.
 | If your project is classified under physical science * Describe any laws, theories or principles that might relate to your project
 | If your project is classified under earth or life science * Describe any theories that might relate to your project
 |

**The Specifics of your project/ Ending**

* Describe in detail each experimental group (Refer to the chart above to help you determine the most important information to include.
* Explain the problem you are trying to solve (For instance, state your problem question and what you will be testing in your experiment.) DO NOT explain how you are going to do the project, save that information for later.
* Provide a prediction or hypothesis for what you think will happen in your experiment
* Provide a reason or explanation for your prediction based on qualities or characteristics of the things you are testing and support your decisions with information you learned in your research
* Describe what groups or individuals would benefit from the results of your experiment
* Explain how these individuals would benefit from the results.

**In-text citations**

Every paragraph in your research paper should state the source where you obtained the information written in that paragraph. By doing this, it will help to keep you from being accused of plagiarizing the work of others.

We call this citing of information In-text. In-text citations can be done in one of three ways

* Before stating the information from a source that has been summarized or paraphrased, give 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 if there is a specific page number where you got the information write that as well (author’s last name, page number)

For a website without an author it would be the page name of the website (“Title of page”)

* Put in quotation marks any direct quotes that are copied word for word from the source. This should be used sparingly and cited with a parenthetical citation at the end.

See the sample research paper on the LAJH Science Fair Webpage for examples of each of the above ways to cite a source in the text.

**Bibliography**

A bibliography describes where you found all of the information for your project. Below are instructions on how to write a bibliography in the correct format for each of the resources you used to write your background research paper. All of your resources should be listed in **alphabetical order** by the author if there is one and you should skip a line between each source that is listed.

Helpful websites include: <http://www.sciencebuddies.org/science-fair-projects/project_mla_format_examples.shtml>

You may also use websites such as [www.bibme.org](file:///C%3A%5CUsers%5CHai%5CAppData%5CRoaming%5CMicrosoft%5CWord%5Cwww.bibme.org) or [www.easybib.com](file:///C%3A%5CUsers%5CHai%5CAppData%5CRoaming%5CMicrosoft%5CWord%5Cwww.easybib.com) to make your bibliography online.

Make sure to cite the ISEF rules and guidelines booklet in your bibliography found in PDF form at <https://student.societyforscience.org/forms>

**Format instructions and examples for common resource types**

**INTERNET RESOURCES- GOOGLE is NOT a Resource!**
Author (if known). "Title of page or document on it," Title of website. date of document. Online URL <http://www.address> Date of access.

**Example**Clinton, Bill. "The Benefits of Net Day." Speeches of The President. Dec. 12, 1996. Online. <http://www.whitehouse.gov.> April 23, 1997.

**BOOK WITH ONE AUTHOR**Author. Title. City of publication: publisher, copyright date, pages used.

**Example:**Steele, Heidi. How to Use the Internet. Emeryville, CA: Ziff-Davis Press, 1996, pp. 146-149.

**BOOK WITH MULTIPLE AUTHOR’S NAME GIVEN**Author et al. Title. City of publication: publisher, copyright date, pages used.

**EExample**Buckley et al. Florida Course 2 Interactive Science. Boston: Pearson Education, Inc., 2012, pp. 493-498.

**Procedural Plan**

**(This is called the Research Plan by ISEF)**

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

The procedural plan **MUST BE TYPED** with Items A-N described using the requirements and guidelines below. You will need to make **TWO COPIES.** One copy should be given to your teacher and one copy should be glued in your log book. Look for the online template on the LAJH science Fair Webpage. **Be sure to save a copy of your procedural plan to your flash drive or computer.**

**A) Problem/Question being addressed:** What question or problem are you trying to solve? *(Use the “how does \_\_\_\_\_\_\_\_\_affect…” or “What effect does \_\_\_\_\_\_\_\_\_ or other approved format)*

**B) Hypothesis:**

 Remember a hypothesis is:

1. A prediction, based on your research, of what you expect to happen in your experiment
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. Not written using the words I think or I predict
5. Written in a way so that each of the experimental groups you will be testing is identified and not just the independent variable in general

*Example Hypothesis:* ***If*** *sponge capsule toys are placed in 50 ml of distilled, tap or carbonated water* ***then*** *the sponge capsule will dissolve and the sponge toy will form the quickest in the 50 ml of distilled water.*

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

For example, a rationale or reason for the hypothesis above would be that based on research found and reported in the research paper, *the gelatin that the sponge capsule toy is made of will dissolve quickest in the distilled water because distilled water does not have any other minerals or chemicals in it to interfere with the water molecules ability to get in between the gelatin molecules and pull them apart and spread them out in the water.*

*(If you have written your hypothesis as an If…then…because statement, the rationale is the because part of the hypothesis)*

**D) Independent Variable:**  Describe the factor you are purposely changing (i.e. the amount, the “type” etc.)

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

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

**Quantitative observations:** Explain the measurements will you take 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.

**G) Constants:** All factors which must be kept the same to make your experiment a “fair test” or a valid test. See page 17 for help in setting up a controlled experiment.

**Procedural Plan continued**

**H) List of Materials:** Describe what materials you will need.

1. Write your materials as a bulleted or numbered list
2. Write the quantity of each material that will be needed (remember you will need to do multiple trials so make sure that you plan to get enough materials
3. Write where you plan to get the materials
4. Write the expected cost

Please remember, you have to provide all of the materials for your project and you need to research where to find the materials you will need. If you need to order materials give yourself plenty of time for the materials to arrive.

**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, ex. goggles, gloves, aprons, adult supervision, hand washing, etc. 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 <https://member.societyforscience.org/document.doc?id=396>

**Materials Safety and Data Sheet**

1. Include the Materials Safety Data Sheets (MSDS Sheets) for every chemical you will be using. This includes even common household substances like vinegar, dish soap, laundry detergent, or food substances like soda, baking powder, milk, etc..)
2. In order to find the MSDS sheet the easiest way is to do an internet search typing in the search engine MSDS sheet for (complete the statement with the substance you need)

**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 water” on sponge capsule toy transformation time, you may not change the temperature or amount of water. 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.

**Procedural Plan continued**

**L) Data Table:**

* Draw out the data table that you will use to record your results.
* A data table is a chart made of columns and rows where you write down your observations as you are conducting your experiment.
* Make sure that your data table has a title
* The most common set up for a data table has the independent variable in the left most column and the dependent variable and trials in each column after that to the right. The column farthest to the right will have the mean or average of the trials for each experimental group.
* You can make a data table to record qualitative observations as well as quantitative observations
* Example 1

|  |  |
| --- | --- |
|  | Dependent variable |
| Independent variable | Trial 1 | Trial 2 | Trial 3 | Average  |
| Experimental group #1 |  |  |  |  |
| Experimental group #2 |  |  |  |  |
| Control Group |  |  |  |  |

* Example 2: Used when you are taking measurements at specific time intervals (day, minutes, hour, etc.)

|  |  |
| --- | --- |
|  | Groups |
| Time | Experimental Group 1 | Experimental Group 2 | Control Group |
| 0 Start | T1 | T2 | T3 | A | T1 | T2 | T3 | A | T1 | T2 | T3 | A |
| 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |  |  |  |  |  |  |

**M) Formulas and calculations**

* Describe the procedures or formulas you will use to analyze the data such as finding the mean of your trials.
	+ line graphs are used to show a change over a period of time,
	+ pie graphs are used to show how a part relates to the whole
	+ scatter plots are used to show the relationships between variables

**Procedural Plan continued**

**N) Graphs**

* Graphs are a visual representation of your data
* Remember when making your graph you will show the average of the trials for each experimental group and not the results of the individual trials. Graph only the mean of your trials. **DO NOT GRAPH EACH INDIVIDUAL TRIAL.**
* Draw out the set up for your graph making sure that you have the following

 T= give your graph a descriptive title that includes both the independent and dependent variables

 A= put the variables on the correct axis

* + X-axis is the independent variable
	+ Y- axis is the dependent variable

 I=decide on the intervals for the scales for both the X and Y axis

* The interval is the amount between one value and the next

 L= both axis must be labeled with the correct variables.

* The Y-axis with the dependent variable must be specific and include the units used to measure the data
* The X –axis must have each experimental group labeled as well as what the overall independent variable.

 S= each axis needs to have a scale.

* The scale refers to the minimum and maximum numbers on both the x and y axes.
* A proper scale should be at least one interval lower than the lowest value and one interval higher than the highest value.
* Explain why you chose that particular graph.
* Remember
	+ **Bar graphs** are used for comparisons of averages from experimental and control group

 Descriptive Title

Dependent variable



Independent variable

Interval

Experimental Group

Labels

Scale

**Procedural Plan continued**

**N) Graphs (continued)**

* + **Line graphs and scatter plots with lines of best fit** are used to show a change over a period of time or the relationship between variables.

 Descriptive Title

Independent variable



Dependent variable

Experimental

 & Control Groups

 Legend/Key

Time Interval when you took your measurements

* + **Pie graphs** are used to show how a part relates to the whole and are the least used graphs in science.

 Descriptive Title

 Legend/Key

**Setting Up a Controlled Experiment**

When conducting your experiment, care must be taken to make sure that the independent variable is actually what causes the change to your test subject. When planning your experiment remember to keep everything the same except for the single variable being tested.

Here is an example:

Experiment purpose: *How do different water types affect the time it takes for a sponge capsule toy to form?*

 Hypothesis with rationale: ***If*** *sponge capsule toys are placed in 50 ml of distilled, tap or carbonated water* ***then*** *the sponge capsule will dissolve and the sponge toy will form the quickest in the 50 ml of distilled water. The gelatin that the sponge capsule toy is made of will dissolve quickest in the distilled water because distilled water does not have any other minerals or chemicals in it to interfere with the water molecules ability to get in between the gelatin molecules and pull them apart and spread them out in the water.*

The independent variable is the different water types. The experimental groups are the carbonated and distilled water. The tap water is the control group. This is the type of water that is normally used with sponge capsules because it is obtained directly from the faucet in homes. That means that the following factors must be kept the same or constant:

* The type of sponge capsule *(brand, color, sponge shape)*
* The type of container the water and sponge capsule is placed in. *(100 mL glass beaker)*
* The amount of water in each beaker *(50 mL)*
* The temperature of the water *(100 degrees Celsius)*
* The number of sponge capsules placed in each beaker (*1*)
* The way the formation of the sponge capsule toy is timed *(start timer when the capsule is dropped in the water and stop the timer when the sponge figure has completely formed)*
* The distance above the water that the sponge capsule is dropped *(6 centimeters above the water level)*

|  |  |
| --- | --- |
|  | Dependent variableTime for sponge figure to form in water |
| Independent variable | Trial 1 | Trial 2 | Trial 3 | Trial 4 | Trial 5 |
| Experimental Group #1Distilled water | 6 cm100 ° C | 100 ° C6 cm | 6 cm100 ° C | 6 cm100 ° C | 100 ° C6 cm |
| Experimental group #2Carbonated water | 6 cm100 ° C | 100 ° C6 cm | 6 cm100 ° C | 6 cm100 ° C | 100 ° C6 cm |
| Control GroupTap water | 6 cm100 ° C | 100 ° C6 cm | 6 cm100 ° C | 100 ° C6 cm | 100 ° C6 cm |

**Performing the Experiment & Collecting Data**

**What to write in your logbook**

After gluing your approved research plan in your log book the next 10-15 pages need to record what actually happened during the experiment. Each page should be titled with the day of the experiment, date, and location. The day that you set up the experiment is considered Day 0. The next day is day 1, 2, 3, etc…

Day 0 (the day you set up the experiment)

* Make sure to write down exactly how you set up your experiment.
* Be sure to include any changes you had to make from your original procedure in your research plan.
* Be sure to include the time that you started.
* Take photographs showing how the experiment was set up.
* Draw out the actual data table you will be using to record your observations. Make one data table for quantitative data and one data table for qualitative data.

For each day afterwards that you are conducting your experiment

* Record the date each time you make a log book entry
* Make sure to record all observations: Record “**qualitative**” changes that you see, hear, smell, and feel, as well as “**quantitative**” changes, things you measure, in each sample of each level of your independent variable/experimental group.
* Make notes of any changes, problems, mistakes or unexpected things that happen during your experiment.
* Write down the time you make observations.
* Anything you do during your experiment should be measured and recorded. For example, if you are watering plants on certain days, make sure to record when you water each plant and how much.
* Take pictures every time you record an observation in your logbook. It is very important to take pictures that actually show you conducting your experiment.

**Taking Photographs of your project**

Taking pictures is an important part of collecting data because pictures allow individuals who were not present when you did your experiment to see what you did and it provides evidence that you actually did the experiment.

When taking your pictures you need to adhere to the following rules

* You need to have at least THREE photographs that record the start, middle, and at the end of your experiment
* Make sure that the pictures show the experiment being performed
* Try to avoid having people’s faces in the photographs.
* Make every effort to take good quality photographs that show as much detail as possible.
* Photographs should be no smaller than 7.6 cm x 12.7 cm (3 inches x 5 inches) in size.
* Make at least three copies of each photograph. You will need to have 1 copy in your log book, one in your presentation binder, and one on your backboard.
* In your log book, keep a list of who took each photo. Remember, you must give credit to the photographer(s) in your project on your project display board if you are entering the science fair.

**Analyzing Data- graphing**

**What to write in your logbook**

 M**ake a graph of your data in your logbook, be sure to refer back to your procedural plan**

* **You can draw out a graph by hand using a ruler**
* **Use Microsoft Excel to make a graph and glue it in your logbook**
* **Use** [**http://nces.ed.gov/nceskids/createagraph**](http://nces.ed.gov/nceskids/createagraph) **and glue it in your log book**

**Analyzing Data- writing about your graph**

**What to write in your logbook**

 After you have graphed the mean of your trials you then need to write out the results of what your graph shows in paragraph form. You are only recording what your graph shows, you are not trying to determine why the results occurred. Use the worksheet below to complete the paragraph.

**Writing about the graph**

Look carefully at the graphed results and write a paragraph describing the results as shown in the graph. Your paragraph should:

1. State what the graph is showing
2. Report each experimental group’s mean results as graphed
3. State the experimental group that had the greatest change
4. State the experimental group that had the least amount of change.

**Example paragraph**

 *The graph shows the average amount of time it took a sponge capsule toy to form in different types of water. On average sponge capsules placed in tap water took 52 seconds to form the sponge toy, sponge capsules placed in distilled water took 36 seconds to form the sponge toy, and sponge capsules placed in carbonated water took 70 seconds to form the sponge toy. The graph shows that by using distilled water sponge capsules formed the quickest. Sponge capsules placed in carbonated water took the longest time to form the sponge toy.*

**Discussion and Conclusion**

**What to write in your logbook**

 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. **Complete the items below in complete sentences and in third person. Use extra paper if you need more room to complete your answers to the questions.**

1. **State the original hypothesis for the project.** (*Do not change your original hypothesis to match the data and keep your hypothesis in the If..then ..because format)*
2. **Was your hypothesis supported based on the results of your experiment?** *(Summarize the results of your experiment as graphed for all the experimental and control groups. Explain how test results supported or do not support your hypothesis.)*
3. **State 3 possible reasons for the results that occurred in your project. Support each reason using information from your research.** *(Refer back to your scientific research and explain* ***Why*** *and* ***How*** *the independent variable did or did not cause a different response in each experimental group compared to the control group.)*
4. **What were some problems, changes or difficulties that you had while doing the project, which could have affected the results? Explain two possible ways these problems or changes may have affected the outcome of your experiment.**
5. **If you were to redo the project, explain two ways the process could be improved.** *(How would you fix the problems and errors reported in #4 to conduct a better controlled experiment or come up with a better explanation for the results?)*
6. **List three possible groups that could benefit from the results of your project.****Explain why the results of your project would help each group.**

*7.* **What are two new questions raised by the results of this project? Explain how you could extend this**

 **project next year to answer those questions.**

# Abstract

# The abstract can only be 250 words and must be written in 3rd person. The following will explain to you exactly what should be included in your abstract. You may also refer to the sample located online at <http://sciserv.org/isef/teachers/abstract.asp> or the example provided at the end of this section.

# Use the online form to write your abstract at <https://member.societyforscience.org/document.doc?id=24>

# Save your abstract after you have typed it on your flash drive or computer

# Make two copies of the abstract. One will go into your presentation binder and one on your backboard.

#

**The abstract body should include:**

* Purpose: The purpose is a statement about what you are attempting to find out by doing the experiment. A good format is to start out with “The purpose of this project was to answer the question……….” And then restate the problem.
* Hypothesis: State your hypothesis by writing “The hypothesis for this experiment was….”
* Experimentation: Summarize your procedures; explain how you kept the conditions controlled; identify the variables and control group; explain how data was collected and measured and state how many trials were conducted.
* Results: Explain your observations and report the mean results of each experimental group. Which test group changed most, least, etc.
* Conclusion: The conclusion should compare your hypothesis and results. State your conclusion then restate the hypothesis and whether or not it was supported by the data or not supported by the data.

**Example Abstract**

*The purpose of this project was to answer the question, “How do different water types affect the time it takes for a sponge capsule toy to form?” The hypothesis for the experiment was if sponge capsule toys are placed in 50 ml of distilled, tap or carbonated water then the sponge toy will form the quickest in the distilled water. The gelatin that the sponge capsule toy is made of will dissolve quickest in the distilled water because distilled water does not have any other minerals or chemicals to interfere with the water molecules ability to get in between the gelatin molecules and spread them out in the water. Five trials were conducted for each type of water. The control group consisted of sponge capsules placed in tap water. The amount of water, type of container, type of sponge capsule, water temperature, and distance the sponge capsule was dropped above the water were kept constant. The independent variable was the type of water used. The dependent variable was the time it took the sponge toy to form after being placed in the water. The results showed that on average sponge capsules placed in tap water took 52 seconds to form the sponge toy, sponge capsules placed in distilled water took 36 seconds, and sponge capsules placed in carbonated water took 70. Based on the data the hypothesis can be supported and sponge capsules placed in distilled water will form the sponge toy quicker than tap or carbonated water.*

*(Total word count in this example: 248)*

# In order to compete in science fair you must have

# A science binder with three dividers separating the typed version of your project into the required sections

# A display board that puts the essentials of your project into a pleasing, easy to read visual display

# Your original logbook must be placed in the front of your binder for review by judges.

1. ISEF paperwork completed in the back of your binder

# The following pages will give you the guidelines to follow to complete these parts of your project.

# Project Presentation Binder

The project binder is considered the final draft of your science fair project. Much of the binder is going to end up being reprinted in larger fonts to post on your backboard/display board later. **The binder is just as important as the board, so don’t leave out any of the components**

**General Guidelines for the Binder:**

1. One inch three ring binder with a clear front view cover.
2. Three tab dividers labeled in the following order: Introduction, Experiment, and Conclusion.
3. Use black ink and choose only one font to use for the entire notebook. Use only fonts Arial, Verdana, Times New Roman or Calibri.
4. You may use larger or bolded font for page titles, but for the general “writing” please use 12 point font.
5. Use one inch margins throughout the notebook.
6. Double space all typing in the project notebook
7. Place the page number on the bottom right of each page.
8. In the front pocket place your research/ log book.
9. In the back pocket place all of your signed paperwork.

#### Project Binder Required Contents

#### \*\*Must be in the following order:

Notice: There are no page numbers on these first pages and in your table of contents the page numbers may be different from the example given below.

Title Page

(Put your title in the middle of the page in ALL CAPITALS)

Your full name

Teacher’s Name, Grade

Lake Asbury Junior High

2012

****

Table of Contents

I. Introduction

 Problem…………….1

 Purpose……………..2

 Hypothesis ………....3

 Research Paper…….4

II. Experiment

 Variables, Control & Constants .7

 Materials…..8

 Procedure…..9

 Observations/Data….11

III. Conclusions

 Analysis/Results…….14

 Discussion/ Conclusion….16

 Acknowledgements... 18

 Bibliography ……19

Abstract

#### Project Binder Required Contents

**Divider 1: Introduction**

Remember: Your page numbers may differ from the ones shown in the example.

Hypothesis

Remember

If…. (Tell what will be tested)

 then…(tell what will happen)

because…

(Give a reason for your hypothesis based on your research.)

3

Purpose

In 1-2 paragraphs explain how you chose your project, why this project is important to other people in the world, and what you were hoping to discover in doing this project.

2

1

Problem

(What effect…)

1

Research

Place your research paper here. Make sure to also have your Bibliography here as well.

5

4

Research

Place your research paper here.

Do not include the cover page or bibliography.

4

Research

Place your research paper here. Make sure to also have your Bibliography here as well.

6

4

**Divider 2: Experiment**

Variables, Control and Experimental Groups

Constants

List out the following:

Independent variable:

Dependent variable:

Control group:

Experimental groups:

Constants in the experiment:

7

9

Research

Place your research paper here. Make sure to also have your Bibliography here as well.

10

4

Procedure & Safety Precautions

List out exactly how you conducted your experiment. This should be the procedure from your research plan with any changes or substitutions you had to make while doing the experiment.

Include Safety Precautions that were taken and MSDS sheets if required.

9

.

8

9

Materials

List out all of the materials that you used in your experiment. Be sure to include amounts and measurements in metric units.

8

9

#### Project Binder Required Contents

**Divider 2 continued: Experiment**

Pictures/Photographs

14

You need at least three photographs showing:

1. How you set up the experiment

2. You Conducting the experiment

3. The end results of the experiment

Be sure you have pictures showing each experimental group.

Include a description of what each photograph is showing

You must state who took the photos. Try to avoid pictures with people.

Observations/Data

Put data tables or charts of observations by date or time (or trial). Pictures go in this section. You must state who took the photos. Try to avoid picture with people.

15

Observations/Data

Put data tables or charts of observations by date or time (or trial). Pictures go in this section. You must state who took the photos. Try to avoid picture with people.

13

Observations/Data

Put data tables or charts of observations by date or time (or trial). Pictures go in this section. You must state who took the photos. Try to avoid picture with people.

12

Observations/Data

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

Put data tables or charts of observations by date or time (or trial).

11

**Divider 3: Analysis and Conclusions**

Conclusion

In paragraph form answer the questions from your conclusion in your log book:

(See below for exact questions)

18

9

Discussion/Conclusion

In paragraph form write the answers to the conclusion/discussion questions from page 20 of this guidebook.

Do not include the questions!

17

9

Analysis/Results

One paragraph explaining what your graph is showing and your overall results.

16

9

Analysis/Results

Here you should include **graphs** showing your results. Make sure that at least one graph shows the average results or mean of the trials.

15

9

1.

\* Make sure to cite the ISEF rules and guidelines booklet in your bibliography found in PDF form at <https://student.societyforscience.org/forms>.

Include the source of any MSDS sheets for your project.

Bibliography

Place the bibliography from your research paper here.\*

20

1

Acknowledgements

Briefly explain who helped you and how they helped you with this project. You should include your parents/family members, teacher or mentor or anyone else that provided guidance to you with the project*.*

19

1

**Science Fair Project Display Boards**

**Requirements:**

1. Maximum dimensions: Depth:30 inches, Width: 48 inches, Height: 108 inches

(Minimum: Depth: 12 in., Width/center section: 24 in., Height: 36 in.; standard tri-fold backboard)

1. Your abstract should be displayed either pasted to the bottom left corner of your board, or displayed in a Plexiglas frame in front of your project.
2. You must identify who took any of the pictures displayed in your project. If all the pictures were taken by the same person, you can include a small “tag” that says “All photos by:\_\_\_\_”. Otherwise, every picture will need to include the name of the photographer.
3. On the back of the board (top of right panel): your name, Science Teacher’s name, and class period should be written. Do this prior to turning your project into your science teacher.

**Restrictions (what cannot be on your board or in your display area):**

* No organisms, including plants (living, dead or preserved)
* No soil, rock or waste samples even if permanently encased
* No human food or animal food
* No chemicals allowed including water
* No dry ice
* No sharp objects (knives, needles, etc...)
* No flames or highly flammable materials
* No batteries with open top cells
* No awards, metals, flags, business cards or logos
* No glass or glass objects
* Avoid photographs showing people’s faces (Any person in a picture under the age of 18 must have documented parental permission.)

**Required Placement of Items on the Board**

Judges will not spend hours searching for the components of your project on the display board. Therefore, it is incredibly important that you have all required components in the order shown below.

**Title**

**Data and Analysis**

**Materials**

**Procedures**

**Conclusion**

Outcome\*

Reasons for results

Problems/Difficulties

Improvements

Real world applications/benefits

Future research

**Problem**

**Hypothesis**

**Variables, Control & Experimental Groups**

**Constants**

**Abstract**

Graph

Data table

Explanation of table

Explanation of table

Right Side

**Photographs**

Captions explaining pictures

Left Side

**\*The outcome includes explaining if your hypothesis was supported by your data**

Typed

Project

Binder

(With logbook in front pocket)

You need at least three photographs showing

1. How you set up the experiment

2. Conducting the experiment

3. The end results of the experiment

Be sure you have pictures showing each experimental group

**How to Make Your Board Stand Out**

1. Create your experiment title on a “title board” that attaches to the top of your display board or post your title on the top and center of your board.
2. Make sure to use a “color scheme” over the entire board (most likely the board color and two more colors).
3. Titles for each section must stand out and be easy to read from 3-6 feet away. (48 pt font minimum)

48 point font

1. Print information for each section in the same font. Be sure to **bold** and use larger font for the more important information. Use a minimum of 18 point font for the information in each section.

18 point font

1. Use a paper cutter, or ruler and scissors to make lines neat and attractive.
2. **LAY OUT ALL OF YOUR SECTIONS BEFORE YOU GLUE OR TAPE** to make sure your sections are evenly spaced, and there are no large empty spots or cramped sections.
3. Use double sided tape or glue sticks to mount items on your backboard project. (Liquid glue bleeds through and will ruin your presentation)
4. Include an enlarged copy of at least one graph showing the most important results.
5. Post several pictures showing the process of your experiment, but avoid showing people’s faces.
6. Remember this is a Science Project, not an Art Project, only use glitter and other “pretty things” if it directly relates to you project. You want to enhance your board, not distract from it.
7. Don’t Forget, “Neatness Counts”. A great project may be over looked if it contains a messy display board.
8. Do not paste your printed information directly on the board, make a frame for it by taking a piece of construction paper that is slightly larger and placing that behind your printed sheets so that it highlights each section. (see figure A below)
9. If one section (especially the discussion and conclusion section) has too much material to fit on one page, use multiple pages and stack them one on top of the other on the board so that the pages can be flipped to view the contents underneath. (see figure B below)

Printed material

Hypothesis

If sponge capsule toys are placed in 50 ml of distilled, tap or carbonated water then the sponge toy will form the quickest in the distilled water. The gelatin that the sponge capsule toy is made of will dissolve quickest in the distilled water because distilled water does not have any other minerals or chemicals to interfere with the water molecules ability to get in between the gelatin molecules and spread them out in the water.

**Discussion/Conclusion**

**In paragraph form answer the questions from your conclusion in your log book:**

**(See the next page for the exact questions)**

9

Glue the top page so you can flip it up to read the information on the page(s) underneath

**Discussion/Conclusion**

**In paragraph form answer the questions from your conclusion in your log book:**

**(See the next page for the exact questions)**

15

9

Construction paper

Figure A

Figure B

**Bibliography**

(MLA format)

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