Science Fair Guide to Background Research, Note Cards, and Research Paper

Background Research

Why the Need for Background Research?

In order to design an experiment, you need to research what techniques and equipment might be best for investigating your topic. Rather than starting from scratch, you will want to use the library and Internet research to help find the best way to do things. You want to learn from the experience of others rather than repeat their mistakes.

Background research is also important to help you understand the theory behind your experiment. In other words, science fair judges like to see that you understand why your experiment turns out the way it does. You do the library and Internet research so that you can make a prediction of what will occur in your experiment, and then whether that prediction is right or wrong, you will have the knowledge to understand what caused the behavior you observed.

What am I researching?

The background research will need to include key definitions and explanations of concepts, history of similar experiments, mathematical formulas with explanations you will need to describe the results of your experiment, and answers to any research questions. See the steps below:

Steps to Follow When Conducting Research:

1. Identify the keywords in the question for your science fair project. Brainstorm additional keywords and concepts.

2. Use a table with the "question words" (why, how, who, what, when, where) to generate research questions from your keywords. Throw out irrelevant questions.

For example:
What is the difference between a series and parallel circuit?
When does a plant grow the most, during the day or night?
Where is the focal point of a lens?
How does a java applet work?
Why are moths attracted to light?
Which cleaning products kill the most bacteria?

2. Add to your background research plan a list of mathematical formulas or equations (if any) that you will need to describe the results of your experiment.

3. You should also plan to do background research on the history of similar experiments or inventions.
Note Taking

How do I document my research?

As you read the information, you will want to take notes. You will be taking notes on index cards. Each card contains the source number at the top right and the key word or topic at the top left. Key points are listed or quoted underneath about one idea. The page number is listed at the bottom right.

<table>
<thead>
<tr>
<th>Key Word/Topic</th>
<th>Source Number</th>
</tr>
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<tbody>
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<td>Summarized Facts about idea and/or &quot;direct quote about idea. “</td>
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<td>Page Number</td>
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</tbody>
</table>

You will need enough note cards for a research paper of between 1-1.5 pages (typed, double-spaced, 12 pt Times New Roman font)

At minimum you should have 15 index cards.

At minimum you will need 3 different sources. At least one must be a written source of information about your topic from a book, encyclopedia, or periodical. You may have additional information from credible sources on the Internet.

You will document your sources using a number system. You will record bibliographic information about each source on the Bibliography Worksheet.

Research Paper

What is the Purpose of the Research Paper?
The purpose of your research paper is to give you the information to understand why your experiment turns out the way it does. The research paper should include all the information you wrote on your note cards. Remember this should include the key definitions and explanations of concepts, history of similar experiments, any mathematical formulas you will need to describe the results of your experiment, and answers to any research questions.
What is the written layout of the paper?

Your paper should begin with an introductory paragraph. The first sentence needs to hook the reader and can begin with an interesting fact, statistic, or story. Then follow with information about your project including why it is important and what you are testing.

The main body of your paper covers the information from your research on your note cards. Elaborate on the information you discovered!!

Your last paragraph is your concluding paragraph. This summarizes all the important concepts from the paper in a new way. Relate back to your first sentence of the paper if possible.

Remember this is a research paper, so it needs to be written in 3rd person, meaning do not use “I”, “you”, or “me” in your writing.

What are the formatting requirements?

- **Page Margins:** 1” all sides
- **Font:** 12 pt. Times New Roman
- **Spacing:** Double Spaced (including citations and Works Cited Page)
- **Heading:** On the first page in the upper left corner, place on separate lines, double spaced: Your Name and Date
- **Title:** Underneath heading, center the title, which is your Science Fair Question. Use regular title capitalization rules and no underline. Start the report immediately below the title.
- **Required Length:** Typed, double-spaced 1-1.5 pages

How do I document my sources within my paper?

For every fact in your research paper you should follow it with a citation telling the reader where you found the information. For a book, a citation is the last name of the author and the page number all in parentheses (Last Name of Author Page Number). If it is a citation from a website and no page number is available then just list the author’s last name in parentheses. See the Reference Citation Format below for more special circumstances.

Its purpose is to document a source briefly, clearly, and accurately. Remember, if you copy text from one of your sources directly, place it in quotations marks in addition to following it with a citation. Be sure you understand and avoid plagiarism!
<table>
<thead>
<tr>
<th>Type of Citation</th>
<th>Parenthetical Reference MLA Format (Author - page)</th>
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<tbody>
<tr>
<td>Work by a single author</td>
<td>(Bloggs 37)</td>
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<tr>
<td>Direct quote of work by single author</td>
<td>(Bloggs 37)</td>
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<tr>
<td>Work by two authors</td>
<td>(Bloggs and Smith 37)</td>
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<tr>
<td>Work by three to five authors (first time)</td>
<td>(Kernis, Cornell, Sun, Berry, and Harlow 183-185)</td>
</tr>
<tr>
<td>Work by six or more author</td>
<td>(Harris et al. 99)</td>
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<tr>
<td>Two or more works by the same author</td>
<td>(Berndt, Shortened First Book Title 221) then</td>
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<td>Two or more works in the same parentheses</td>
<td>(Berndt 221; Harlow 99)</td>
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<td>Authors with same last name</td>
<td>(E. Johnson 99)</td>
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<tr>
<td>Work does not have an author, cite the source by its title</td>
<td>(Book Title 44) or</td>
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<td></td>
<td>(Shortened Book Title 44)</td>
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</tbody>
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How do I document my sources at the end of my paper?

Following your paper, you will type your Works Cited Page, which lists all your sources used in your paper. The format is to center the title **Works Cited** at the top of the page. Then list all the sources used in your paper in alphabetical order by the author’s last name and include the required information you recorded on your Bibliography Handout. If the author’s name is unknown, alphabetize by the title, ignoring any A, An, or The. Use the information below to cite each source using the proper MLA format.

Format Examples

**Books**

Format:

Author's last name, first name. *Book title*. Additional information. City of publication: Publishing company, publication date.

Examples:


**Encyclopedia & Dictionary**

*Format:*
Author's last name, first name. "Title of Article." *Title of Encyclopedia*. Date.

*Note: If the dictionary or encyclopedia arranges articles alphabetically, you may omit volume and page numbers.

*Examples:*


**Magazine & Newspaper Articles**

*Format:*
Author's last name, first name. "Article title." *Periodical title* Volume # Date: inclusive pages.

*Note: If an edition is named on the masthead, add a comma after the date and specify the edition.

*Examples:*


**Website or Webpage**

*Format:*
Author's last name, first name (if available). "Title of work within a project or database." *Title of site, project, or database*. Editor (if available). Electronic publication information (Date of publication or of the latest update, and name of any sponsoring institution or organization). Date of access and <full URL>.

*Note: If you cannot find some of this information, cite what is available.

*Examples:*


What does a finished Works Cited Page Look Like?

**Works Cited**


*Background research, note-taking, and citation information was modified from www.sciencebuddies.com.*