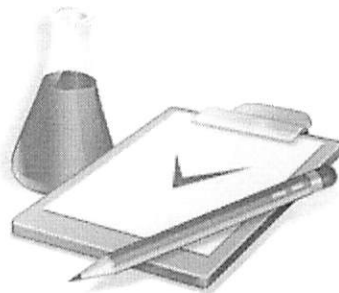


SCIENCE FAIR CHECKLIST



_____ 1. CHOOSE A TOPIC

TOPIC: _____

QUESTION: _____

_____ 2. DEVELOP A SET OF RESEARCH QUESTIONS BASED ON THINGS YOU HAVE OBSERVED OR LEARNED.

_____ 3. RESEARCH YOUR TOPIC, USING YOUR QUESTIONS AS A GUIDE.

_____ A. ENCYCLOPEDIAS

_____ B. BOOKS

_____ C. DATABASES

_____ D. OTHER SOURCES (INTERVIEW, MAGAZINE, VIDEO, ETC.)

_____ 4. MAKE INFERENCES ABOUT PATTERNS, FORCES, TRENDS, AND RELATIONSHIPS WITHIN YOUR TOPIC.

_____ 5. DEVELOP A HYPOTHESIS IN "IF..THEN" FORMAT.

HYPOTHESIS: _____

_____ 6. DESIGN AN EXPERIMENT TO TEST YOUR HYPOTHESIS.

_____ 7. CONDUCT YOUR EXPERIMENT WITH CAREFUL OBSERVATION AND DATA COLLECTION.

_____ A. ESTABLISH CONTROLS FOR YOUR EXPERIMENT

_____ B. DETERMINE MANIPULATED VARIABLES

_____ C. DETERMINE RESPONDING VARIABLE

_____ D. # OF TRIALS _____

_____ 8. REPORT YOUR FINDINGS IN A PROFESSIONAL MANNER.

_____ A. RESEARCH PAPER

_____ B. POWER POINT

_____ C. SCIENCE FAIR

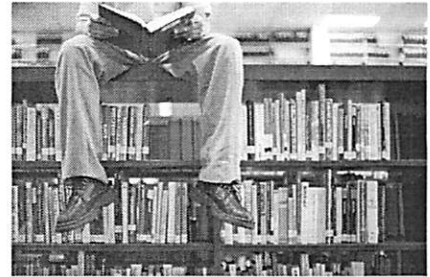
Tips for students to avoid plagiarism:

- 1) Take risks – let your writing represent your unique thoughts about your topic.**
 - a. Manage your time.**
 - b. Create a checklist and calendar with due dates and personal goals**
 - c. Communicate with your teacher if you feel you're falling behind**
- 2) Focus on the “little picture” – view large assignments as a series of smaller goals**
- 3) Own the assignment and realize its value.**
- 4) Never “cut and paste” from an internet document.**
- 5) Read research texts carefully and understand their meaning.**
- 6) When taking notes, record important details . DO NOT write in complete sentences.**
- 7) Use bullet format when taking notes.**
- 8) Record your own thoughts alongside your notes. Look for differing perspectives, trends, patterns, and unanswered questions that develop as you research.**
- 9) Learn and understand the conventions, or “tricks”, of writing for this discipline. REMEMBER: Different fields of study use different conventions.**
- 10) Work with your teacher if you are feeling confused about the processes of research and writing.**

Conducting Your Research

Research is the most important first step in any scientific endeavor. It is important to know not only background details relating to your topic, but you also want to know what other research and experimentation has been conducted in the field. There are many resources available to you to conduct your research, but it is a good idea to start with the basics.

Encyclopedias: This is a great place to start. Encyclopedias contain VOLUMES of information on just about every topic you can think of, and you can find them in EVERY library. Information in a general encyclopedia is pretty basic, but it can point you in wider directions for further research. Also, ask your librarian if your library has specialized encyclopedias for



APA Format for Citing an Encyclopedia:

Author of the article. (Year). In *Title of encyclopedia* (Vol. 1, pp. 1-2). Publishing city: Publisher.

Manzo, K. (2008). In *The Encyclopedia of Research and Experimentation* (Vol. 12, pp. 500-534). El Paso: Manzo Publications.

scientific research!

Books: Both public and private libraries stock large collections of books on science, scientists, technology, and the natural world. Most school libraries use the Dewey Decimal System of classification. Under this system, science and technology are located in the 500's and 600's. Although you may use the library's computer catalog to locate books on a particular topic, it is often more fruitful to simply go to the stacks and peruse books according to their Dewey code. When you find a book of interest, check the index to see if it addresses some of the topics you are researching.

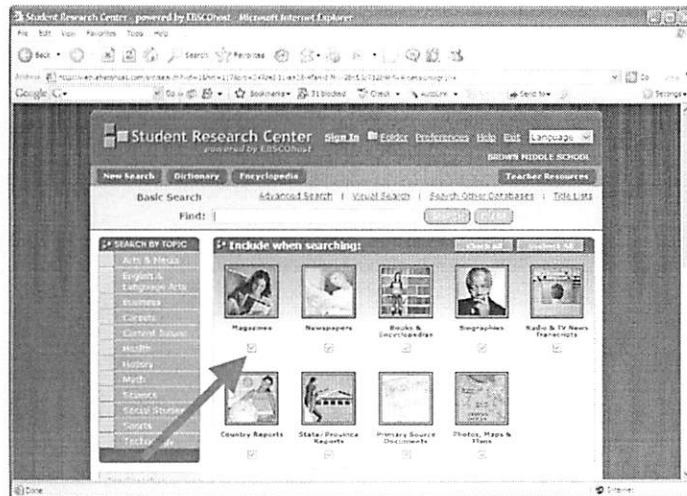
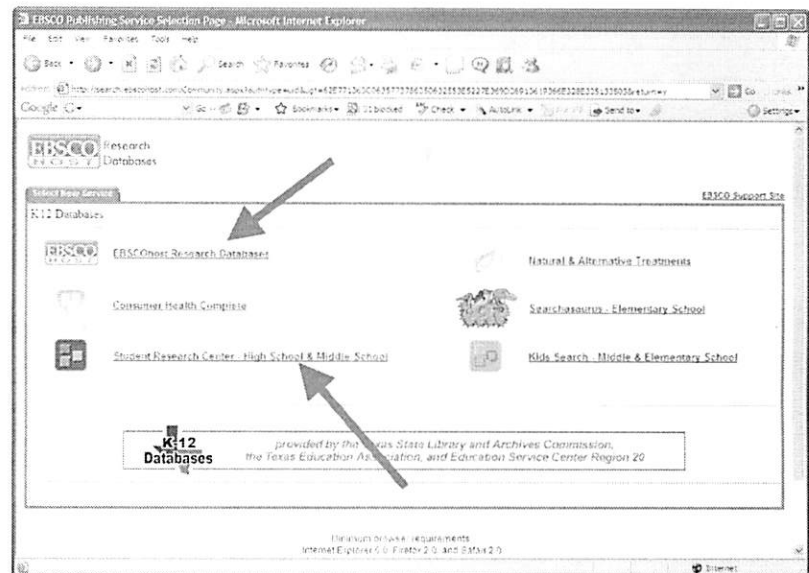
500 – Science
500 Natural sciences & mathematics
510 Mathematics
520 Astronomy & allied sciences
530 Physics
540 Chemistry & allied sciences
550 Earth sciences
560 Paleontology; Paleozoology
570 Life sciences
580 Plants
590 Zoological sciences
600 – Technology
600 Technology (Applied sciences)
610 Medical sciences; Medicine
620 Engineering & allied operations
630 Agriculture
640 Home economics & family living
650 Management & auxiliary services
660 Chemical engineering
670 Manufacturing
680 Manufacture for specific uses
690 Buildings

APA Format for Citing a Book:

Author, A. (Year). *Title of work: Use first letter capitalized for subtitle*. Publishing city: Publisher.

Manzo, K. (2008). *Complete book of research and experimentation*. El Paso: Manzo Publications.

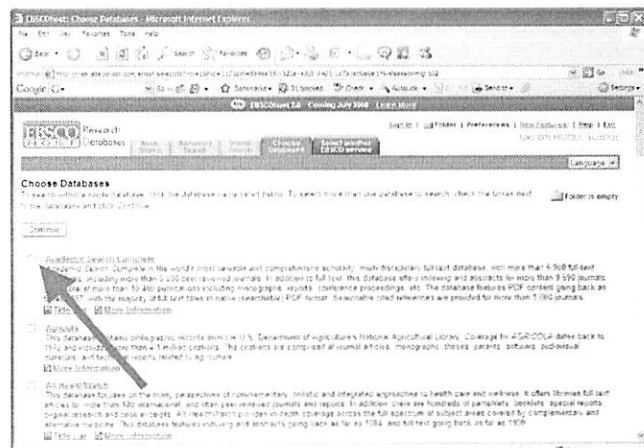
Databases: Our school libraries provide all students access to databases full of information from journals, magazines, newspapers, and many, many other sources. A database is a very large collection of data stored electronically. The information provided in database articles is very detailed and in-depth. Don't make this your first stop, or you may become overwhelmed. Once you have gotten a handle on the basics of your topic, you will be ready to jump in and explore the databases.



Start with the Student Research Center. From this database, you can search magazines, newspapers, books and encyclopedias, biographies, and more. Enter your search terms and get going! Remember – When you choose your search terms you want to be specific and concise.

Some of the articles here will provide citations for you, while others you will have to look for the information at the top of the article.

If you want to get more in-depth, try the EBSCO databases. These databases provide collections of scholarly articles from journals. Select one or two of the databases you want to search, and then hit "continue". You will be able to enter search terms here as well. Don't forget to select "Full Text" before you search!



APA Format for Citing a Database Article:

Author, A. (Year). Title of Article. *Title of Journal*, Vol(No.). Date retrieved, 2008, from EBSCO database.

Taking Notes: Index Cards

Index cards can be a very useful tool for note taking. Using index cards allows you to be able to physically manipulate the information once you have collected it. When using index cards, you must use fact cards and source cards.

Highlight key words to help in your search

FACT CARD (FRONT)

pp. 25-27

What SYSTEMS have historically been used by chemists to uncover the principles of their science?

- Lavoisier
 - recorded mass
 - assigned chemical names

scientific vocabulary: mass

DO NOT use complete sentences

Use a symbol, letter, or number to match source cards and fact cards



Write your own questions and thoughts. These can guide you to further research

(BACK)

What questions did Lavoisier ask that led him to be able to find the mass of elements?

What are the rules for assigning chemical names?

Competition among chemists probably made them work harder to make discoveries first.

Call number

SOURCE CARD

570.2
W448d

Manzo, K. (2008). *Complete book of research and experimentation*.
El Paso: Manzo Publications.

Use a symbol, letter, or number to match source cards and fact cards



Capitalize ONLY the first letter of the first word and any proper nouns

APA Style Documentation

Reference List Examples

Book by one author

Baldwin, C. (2004) *Acids & bases*. Chicago: Raintree.

Book by two or more authors

Engelmayer, J.E., Davidson, J., & Wagman, R.M. (1995). *Lord's justice*. Garden City, New York: Anchor Books.

Book with an editor or editors

Duncan, G.J., & Brooks-Gunn, J. (Eds.). (1997). *Consequences of growing up poor*. New York: Russell Sage Foundation.

Work in an anthology

Seegmiller, B. (1993) Pregnancy. In Denmark & M. Paludi (Eds.), *Psychology of women: A handbook of issues and theories* (pp. 437-474). Westport, CT: Greenwood.

Article in a journal

Lofland, L. Theory-basing and answer-improving in the study of social movements. *The American Sociologist*, 24(2), 37-58.

Article in a monthly magazine

Schuster, A.M.H. (1995, July). Colorful cotton. *Archaeology*, 48, 40-45.

Article in a weekly magazine

Dworkin, P., & Magorin, N. (1990, May 29). The incredible shrinking PC, U.S. *News and World Report*, 106, 49-69.

Signed article in a newspaper

Coleman, D. (1996, July 16). Forget Money: Nothing can buy happiness, some researchers say. *The New York Times*, p. C2.

Unsigned article in a newspaper

A freed prisoner visits his children. (1990, May 30). *Tallahassee Democrat*, p. A3.

Editorial in a newspaper

Fringes, fairness, and taxes. (1990, May 21). *The New York Times*, p.16.

Reference work

Kaufman, H.W. (1993). *The Mc-Graw-Hill encyclopedia of world biography* (Vol. 1, p.219). New York: Macmillan.

Unsigned article in a reference work

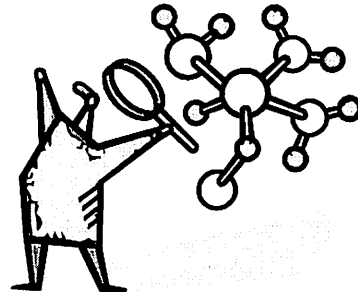
Poisons and poisoning. (1995). *Encyclopedia Britannica* (Vol. 8, p. 586). Chicago: Encyclopedia Britannica.

Article from an online database

Author, A. (Year). Title of Article. *Title of Journal*, Vol(No.). Date retrieved, 2008, from EBSCO database.

Non-periodical web document, web page, or report

Neyhart, D., & Karper, E. (2008). *APA Formatting and Style Guide: Reference List: Electronic Sources*. Retrieved July 15, 2008, from <http://owl.english.purdue.edu/>.



Experimental Design

Develop a Hypothesis: Use an "If...then..." format.

Create a list of materials: Make sure to include ALL the materials you will need, including such "incidentals" as paper and pencil.

Controls: _____

Independent Variable: _____

Dependent Variable: _____

Procedures: Your procedures must be in-depth and duplicable. (Continue on your own paper if you run out of room on this page.)

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Science Fair Abstracts

- A science fair abstract is an abbreviated report or a summary in brief of the entire project and is of great importance. It states the essential components of the project.
- The science fair abstract, in clear language, outlines the entire project.
- The abstract has a limit of 250 words.
- Science fair abstracts help judges determine if they want to read the full report.

Science Fair Abstracts

The science fair abstract should include the following components -

- Introduction—project's purpose statement
- Problem Statement—hypothesis
- Procedure—description of variables and method of investigation
- Results—specific data and synopsis of the results
- Conclusion—stated clearly

Science Fair Abstracts

Given below is an outline to write a science project abstract:

- Title
- Introduction
- Problem statement and the hypothesis
- Methodology
- Analysis of data
- Conclusion
- Application

Abstract Don'ts

While writing an abstract avoid the following –

- Uncommon scientific terms most scientists are not aware of
- Brand names
- Abbreviations and short forms
- Charts and tables
- Acknowledgements
- Colloquial language
- Humor
- Writing in first person

THE ISOLATION OF ANTIBIOTIC-LIKE PROTEINS FROM INSECT LARVAE OF MUSCA DOMESTICA, HOUSEFLY MAGGOTS, AND THREE OTHER SPECIES OF INSECTS

The purpose of our experiment was to examine the secretions from domestic housefly larvae, maggots, *Musca domestica*, and three other species of insects for antimicrobial antibiotic production. We had observed fly larvae in dead animal flesh and wondered how they could survive in the bacterial rich decomposing flesh and not be killed. We hypothesized that insect larvae, maggots or grubs, produce and secrete antibiotic-like substances that kill bacteria in the dead tissue in which the insect larvae grow, protecting the insect larvae from bacterial attack.

In this study, we used housefly larvae or maggots (*Musca domestica*), mealworm grubs (*Tenebrio*), fruit fly larvae (*Drosophila melanogaster*), and superworms (*Zophobas morio*). Fourteen different types of bacteria were streaked on agar plates. Secretions from the insect larvae cuticle were collected on sterile filter paper discs, placed on the inoculated petri plates, and incubated. Zones of bacterial inhibition were observed and measured.

Results showed that housefly larvae, mealworm grubs, and fruit fly larvae, produced and secreted from their cuticle an antibiotic like substance that inhibited several species of soil bacteria. Further characterization using denaturation by heat showed that the secreted antibiotic-like substance to be a protein.

Our research showed that insect larvae produce and secrete antibiotic-like proteins from their cuticles to protect the insect larvae from bacterial attack in the soil or rotting animal flesh in which the insect eggs were laid. These antibiotic-like proteins could possibly be of therapeutic value in the treatment of human infections as a new source of antibiotics.

PHOTOCATALYTIC REDUCTION OF HEAVY METALS: METHODOLOGY AND EFFICACY OF AN APPARATUS

Heavy metal contamination from mining or industrial waste threatens aquatic systems. The process of using titanium dioxide as a photocatalyst has been previously established, however a process using a low-cost, feasible apparatus that did not introduce chemicals to the aquatic system was still needed. This project focused on the design, assembly, and use of an apparatus that used affixed titanium dioxide on a substrate with exposure to ultraviolet light (UV) to reduce water contaminated with copper II ions.

The apparatus involves a laminar flow of water over a titanium dioxide coated substrate, with recirculation to maximize exposure to the catalyst and UV light. Several substrates and adhesives were used to find the most effective combination. In addition, variables of the apparatus such as flow rate and flow volume were adjusted to maximize ion reduction. The most effective substrate and flow characteristics yielded results sufficient to reduce the threat to aquatic organisms. In trials lasting 4 hours, copper II ions were reduced from 5.99 ppm to 1.80 ppm. The control trials, involving UV exposure without titanium dioxide, reduced ions from concentrations of 6.23 ppm to 5.86 ppm as measured by an atomic absorption spectrophotometer.

The apparatus and methodology established in this project have potential as a solution to water contamination from light industry. The apparatus is small, inexpensive, and does not introduce additional chemicals to the system due to the affixed titanium dioxide.

LUNACY THE AFFECTS OF THE FULL MOON ON HUMAN BEHAVIOR

The purpose of my science fair project is to prove that human behavior is affected by the full moon's gravitational pull. To complete this project, I first interviewed public safety personnel to see if there was a common belief that the full moon affected behavior. I then asked each department contacted for information or data on crime/incidents for the year 2002. I gathered data from the Price City Police Department, Carbon County Sheriff's Office, Price City Fire Department and the Price Communications Center. Information was also gathered from back issues of The Sun Advocate, our local newspaper. I counted the incidents from each department, including jail bookings into the Carbon County Jail, for the dates of the full moon in the year 2002. I used from sundown to sunrise the next day as my frame of reference. This information was then charted. I chose the same period of time on the third and fourth day of each month as my control date and charted this information. The number of incidents for the full moon and the control date were averaged and these numbers were compared. The results for all departments show a noticeable increase of incidents on the night of a full moon. All data and averages prove my hypothesis correct. The majority of individuals interviewed stated that they believed that the full moon affects behavior. My data also indicates that their observations were correct.