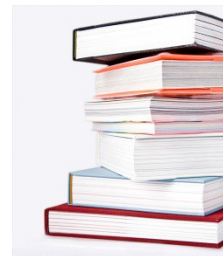


A Guide to Writing Your Research Paper

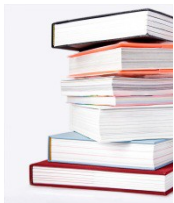
Research Paper Guidelines

The research paper is an important part of any good STEM fair project. The research paper gives you an opportunity to learn more about your topic and should be closely related to the investigation you have chosen for STEM fair. The research paper is **MANDATORY** for anyone in grades four, five and six. The research paper is not complicated and only needs to include the following **five parts**:



1. Title Page – includes the title of your project, your name, school, grade, teacher, and the date the project is due
2. Acknowledgements – a personal thank you to anyone who helped you with the project. It could include parents, teachers, siblings, librarian, scientist and any other person who assisted you with any part of your project.
3. Question – the specific question you ask for your experiment. This can be placed on its own page or right before beginning the research portion of your research paper.
4. Background Research –
 - a. Start by brainstorming topic ideas. Think of other questions you have about your topic and make a list.
 - b. Use books from the library and the internet to find out interesting and relevant information about your topic.
 - c. Rewrite the information you find in your own words. Do not copy from the book or print pages from the internet. This is **PLAGARISM** and it is illegal. If you need help, ask an adult for assistance.
 - d. Make sure to keep track of all the books, websites and articles you used to get your information so you can list your sources in your bibliography.
5. Sources/Bibliography – an alphabetical listing of books, articles, and other sources, including websites, that you used when researching your topic. Visit <http://easybib.com> for an explanation of how this should be written.
6. Follow the directions provide by your teacher to complete your research project.





Appendix C: STEM Fair: Research Paper Rubric

Student Name: _____

Category	Possible Points	Points Earned	Comments
Organization – Information is very organized with well-constructed paragraphs and subheadings.	5		
All Parts Present – All five parts of the research paper are present and complete (Title Page, Acknowledgements, Question, Background Research and Bibliography).	5		
Amount of Information – All topics are addressed and all questions answered with at least 2 sentences about each.	5		
Quality of Information – Information clearly relates to the main topic. It includes several supporting details and/or examples.	5		
Mechanics – No grammatical, spelling or punctuation errors.	5		
Sources – All sources (information and graphics) are accurately documented in the desired format.	5		
Totals –	30		Final Grade: _____



Appendix F: Sample Research Paper

Below are sample research papers written by William Beanes Elementary School students. These samples are meant to help illustrate the 5 parts to be included in the research paper. Notes inside of balloons, are added to the papers to highlight special parts of the paper. These notes and highlighted areas should not be duplicated into your own papers. The contributions of Schntae Graham (4th grade) and Venetta Bronson (6th grade) are greatly appreciated. They generously donated their research papers to be used in this journal.

This is the title page. This is the first requirement of the research paper.

Truth Decay

(Sample Research Paper 1)

Subtitle gives additional understanding of the topic.

The Truth about Tooth Decay

Schntae Graham
William Beanes Elementary School
Fourth (4th) Grade
Teacher: Ms. Ward
February 19, 2002

Don't forget to include your name, school, grade level, teacher's name and due date on your title page.

vii

This is the acknowledgements page. It is the second requirement of the research paper.

Acknowledgements

I would like to thank my mom for helping me with this project and typing the information, because it was taking me forever. Special thanks to Ms. Ward and Ms. Casbourne for encouraging me to do the project and for checking over my work. Thank you for not letting me quit even when I wanted to change projects because things were not working out the way I wanted them to.

Be sure to be specific when thanking people and say exactly how they helped you.

The question can either get its own page or be on the same page as the research.

The question is the third requirement of the research paper.

Question

Do different liquids affect the enamel of teeth (in this case the shell of an egg)? Will placing an egg in lemonade, Coca-Cola, Diet Coke, orange juice or water for seven days have any effect on the egg?

Background research about your topic is the fourth requirement of the research paper.

Research

Introduction

This research paper and STEM project taught me a lot about why my Mom always asks, “Did you brush your teeth?” I hear it every day. I see that it is important to brush your teeth, eat well and visit the dentist. That is why this project is titled, Truth Decay. This paper will give you a better understanding about why our teeth are important, how tooth decay begins, and how to prevent tooth decay.

Tooth decay can start at any age. While we are young, we should take good care of our teeth. I do not like to go to the dentist but my mom makes me go at least two times a year. My mom says it is important to go to the dentist, so when you get older you won't have a lot of problems with your teeth and spend a lot of money.

What are teeth made of?

This is a subheading. Subheadings help organize your research paper, so it is clear what will be discussed in each section.

The white covering of teeth is called enamel. The function of the enamel is to protect the tooth from pain and damage. Under the outer covering of enamel is a hard, yellow substance called dentin. Most of the tooth is made up of dentin.

What is tooth decay?

Tooth decay is a bacterial disease of the teeth. The decay is the primary source of tooth loss in people no matter what the age of the person.

Why do you get tooth decay?

Tooth decay happens when bacteria, sugary foods, and a target tooth surface work together or react against each other. Our mouths contain lots of bacteria. We eat a lot of different foods at different times of the day; therefore, the bacteria convert some of the sugary foods to acid. The bacterium that grows on our teeth is called plaque. Plaque is the sticky coat that forms on the outside of our teeth. When you do not clean or brush your teeth regularly, plaque will build. Bacteria eat through the outside of the teeth or what is called tooth enamel; this makes the tooth surface soft. Once the bacteria get through the enamel of a tooth, tooth decay can make a tiny hole in the tooth. You can tell you have a cavity when something cold (ice cream), hot (soup), or sugary (candy) may cause you to get a toothache or your teeth may feel tender. When this happens, tell a parent so you can go to the dentist.

Why was an egg used in this experiment?

A hard-boiled egg was used because this is the closest model of your teeth. The damage to the egg during the experiment is in relation to the damage that can be done to your teeth.

It is important to make connections between your project and your research.

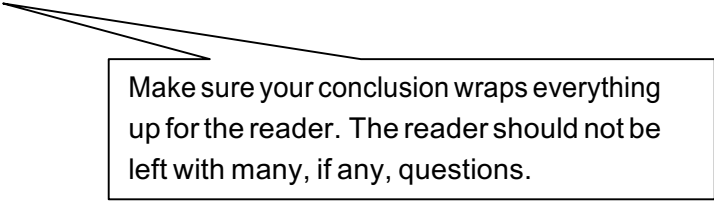
How do you prevent tooth decay?

To prevent tooth decay, it is important to brush your teeth regularly. Brushing is not just to make sure that your teeth are clean, but to remove plaque that builds up on your teeth and causes tooth decay. You should brush more than just once a day. Books and articles suggest that you brush after every meal. Use fluoride toothpaste. Fluoride helps protect your teeth from tooth decay. Visit the dentist at least twice a year. The dentist checks for problems. The dentist may

prevent small problems from getting out of control. Tooth decay may take several months to happen, but modern technology, like an x-ray, will show small problems.

Conclusion

Our teeth must last us a lifetime. One or two cavities may not seem like a big deal, but your teeth tell a lot about you. If you have rotten teeth, you may not smile a lot or it may cause you embarrassment. Now that you know what “Truth Decay” is, let’s get busy and brush “Tooth Decay” away!



Make sure your conclusion wraps everything up for the reader. The reader should not be left with many, if any, questions.

All sources should be listed in alphabetical order by author's last name.

Bibliography

The bibliography is the fifth and final requirement for the research paper. Any research paper WITHOUT a bibliography is considered **PLAGIARISM**.

Dr. Green website. 2000-2002. Online. 20 Jan. 2002. Available:
<http://www.drgreen.com>.

Silverstein, Alvin and Silverstein, Virginia. Tooth Decay and Cavities.
Danbury: Grolier Publishing, 1999.

Stay, Flora Parsa. DDS. The Complete Book of Dental Remedies.
Garden City Park: Avery Publishing Group, 1996.

Ward, Brian R. Dental Care. New York: Franklin Watt, 1986.

Try to use a *variety* of sources including both books and websites.

For assistance writing your bibliography, visit <http://easybib.com>.

What is the Effect of Thermal Inversion on Air Pollution?

(Sample Research Paper 2)

Venetta L. Bronson
William Beanes Elementary School
Grade 6
Mr. Fishkin
February 19, 2002

Acknowledgements

Thanks Mom for all your help.

Thanks Ms. Casbourne for the STEM Fair “make and take.”

Thanks Mr. Fishkin for helping me with my corrections.

Question

What is the Effect of Thermal Inversion on Air Pollution?

Background Information

Air and water are essential to life. Air pollution is caused when chemical substances are released into the atmosphere that are not normally found there. Polluted air can cause or lead to lots of health problems in people. It can also hurt animals.

Smog, the dark haze in air (smoke and fog), is the most common form of air pollution. It is a major problem for many cities around the world. Polluted air is dirty air. It can make the air smell bad and make things dirty. It can rise up into the atmosphere and be carried away for many miles by the wind. The atmosphere can be damaged by polluted air.

Many activities of human beings pollute the air. People pollute the air by allowing chemicals, poisonous gasses and tiny particles of dirt to get into the air.

My STEM Project

My STEM project is about the effect of thermal inversion on air pollution. A thermal inversion occurs when hot air is above cooler air. Hot air rises and cold air falls. If the cool air is nearer to the ground, there will be no mixing of air. This still air has no wind to carry away the pollution particles.

A thermal inversion traps the air near the ground. Pollution molecules build up in the air if there is no wind to carry them away from the city or rain to wash them out of the air. An example of how pollution and smog can be deadly is Donora, a small town in Pennsylvania. In October 1984, 6,000 people in a town of 14,000 got sick, and 20 died from pollution and smog that was so thick, people could not see across the street.

Smog is a combination of smoke and fog. A lot of pollution molecules you cannot see. However, sometimes you may see smoke combine with fog to produce smog. Estimates of deaths from pollution caused by still air, a build-up of smog, and pollution include 650 people in London in 1873, 400 people in New York City in 1963 and 4,000 again in London 1952 during 5 days of smog!

We cannot control the weather or prevent thermal inversions from occurring, but we can reduce the pollution that causes smog. We can drive more fuel-efficient cars. We can use devices to help stop pollution molecules from being released from cars, factories, and power plants.

Conclusion

This process of warm air rising and cold air falling keeps the air moving and helps carry pollution away from the source. A thermal inversion occurs when hot air is above cooler air. Hot air rises and cold air falls. If the cold air is nearer to the ground, there will be not mixing of air. This “still” air has no wind to carry away pollution particles. A thermal inversion traps air near the ground.

My hypothesis proved incorrect. I predicted that the hot air smoke would not rise out of the bottle. Instead, it would be trapped near the ground (stay in the bottom of the bottle) and the cold air would rise. I also predicted that a thermal inversion would have no effect on the air pollution at all.

In doing my experiment, I observed that the cold air smoke stayed in the bottom of the bottle for a long time instead of disappeared. At no time did it rise to the top. I was so sure that the hot air smoke would not rise; instead it would stay at the bottom of the bottle. However, it seemed once I dropped the match into the bottle with the hot air smoke, I saw the smoke rise out of the bottle and then it quickly disappeared. I did this experiment six times. Each time I got the same results. The only problem I remember was that sometimes the match would go out before I could get it to the bottle. I think this happened because I was scared of the fire. I was afraid I might get burned, but my mom said she wouldn't let it happen.

I'd like to try this experiment with a watch instead of a timer. I could check the amount of smoke in the bottles every minute to see if there was smoke in them or not.

Bibliography

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Chandler, Grey and Graham, Kevin. Protecting Our Air, Land and Water. New York: Henry Holt and Company Inc., 1996.

Stile, Darlene R. Air Pollution. Chicago: Children's Press, 1990.

