Summer Assignment
7th Grade Science Fair

Exploring and implementing the scientific method is a major portion of the 7th grade science curriculum. As a 7th grade student, you have already been introduced to the method in previous science classes. The basic steps of the scientific process are:

1. Make an observation about the world.
2. Ask a question.
3. Research the question.
4. Form a hypothesis or make an educated guess about the answer to the question.
5. Do an experiment to test your hypothesis and collect data.
6. Analyze your data looking for patterns
7. Draw a conclusion based on the data to determine if the hypothesis was correct.
8. Communicate your results to others.

During the first semester of 7th grade, you will learn how to research and write a paper on a science topic that you would like to explore and test for your science fair project. **The St. Rita School Science Fair will be held on Saturday, January 26, 2019 from 8:30 a.m. – 12:00 p.m. It is a mandatory event so, please put it on your calendar now.** It is an invaluable experience that teaches your student many life skills and lessons. In order to begin the process upon your return in the fall, you are being asked to brainstorm appropriate science fair topics and questions over the summer.

ASSIGNMENT: Purchase a composition notebook (i.e. black/white marble) that will be used to keep accurate and detailed record of your work on the project. **EVERYTHING IS TO BE RECORDED IN THE JOURNAL**. It is evaluated at the end of the process by the judges and your teacher for completeness. The reader should be able to trace your experimental progress, which begins this summer, just by reading your log.

1. Determine **three** topics that interest you. List them in your journal.
   For example: Model cars, Plants, Weather
   (The topics do not have to be "science" topics – i.e. music, sports, dollhouses.)

2. Develop several relationships that are found within each topic.
   Model cars: speed and design, color and temperature
   Plants: plants and fertilizers, plants and pollutants
   Weather: temperature and damage, wind speed and damage
   (The more relationships you can develop, the easier it is to generate two questions?)

3. Generate **two** questions for each topic, not each relationship!
   Model cars: Does the length of the hood affect the speed of a car?
   Does the axle length affect the speed of a car?
   Plants: Will fertilizer "x" or "y" cause geraniums to grow taller?
   What % solution of fertilizer "x" will cause greatest growth in ivy plants?
   Weather: Which popsicle melts fastest in sunlight: red, orange, or purple?

At what wind speed do shingles fly off the roof of a house?
(Notice both questions do not have to come from the same relationship.)

Use the Internet, library, friends, family, T.V., XBOX, just about any resource to help you generate ideas. Using Google, "science fair" will certainly produce a variety of hits.
*** **The Ohio Academy of Science offers helpful directions on how to put together a science project** www.ohiosci.org **Explore the site!!! Check out sponsor awards from the previous State Fair.**(the Navy and soybean industry have awards for example)***
Other possible websites are: www.sciencebuddies.org, www.exploratorium.com, science.howstuffworks.com, www.nasa.gov, www.factmonster.com. I do NOT want copies of fairs that have already been presented. If necessary, try to put a unique "twist" on a previous idea to make it your own. Creativity is a big part of the process. Think outside the box! When coming up with the questions, keep in mind the following:

Does my question have a specific answer or solution? Is there a reasonable way to find that answer or solution? Has a solution already been found? If so, choose another project idea. Do I have enough time? Can I finish the work before science fair day? Can I get or make the materials I need? Can I afford them? Is my project safe? Do I really understand the topic? Can I find resources that aren't too advanced? Is my topic interesting or original in some way?

Ideas that are **NOT** valid are: Do Jupiter's moons ever collide? Do bats carry rabies? Can I test the previous ideas?

When you are finished brainstorming and all the information has been recorded in your journal, type each topic and its two questions on a piece of paper. Please type your name in the top left corner of the paper and submit it to Mrs. Wilson on your first day of school.

Please show this to your parents TODAY and come see me TOMORROW in Room 8-2 if you have any questions about the assignment. I will be happy to give you more ideas to help you get started. Any activity this summer can be the start of your science fair, if you are observant!

Peace and have a safe summer,

Mrs. Wilson

Other websites:

http://static1.squarespace.com/static/545d32b5e4b0719cb5aae580/t/548a4164e4b0fe6b75493df8/1418346852271/StudentGuide.pdf

http://www.sciencebuddies.org/science-fair-projects/project_guide_index.shtml

Steps of The Scientific Method

Your Topic

Your science fair project starts with a topic. This might be based on an observation you have made or a particular topic that interests you. Think what you hope to discover during your investigation. Record ALL your thoughts and following work in a journal (composition notebook).

Your Question/ Proposal

Your question needs to be about something you can measure and will typically start with words such as what, when, where, how or why. Your Science teacher will approve the final question on the proposal form that you will investigate when you return to school after the summer.

Summer Research

Use resources such as books and the internet to perform background research on your question. Your summer research must include at least one book, one journal, and one online resource.

Research Report

Form a report based on your research. This will be a five-paragraph expository essay including an introduction, thesis, three body paragraphs, and conclusion. You will work on this at the beginning of the school year with your Language Arts teacher and additional support by your Science teacher. Additional research will be completed at this time.

Hypothesis

Form a hypothesis with your science teacher based on what you want to investigate. Your hypothesis should be a simple if/then statement that expresses what you think will happen.

Experiment/Method/Procedure

Create a step by step procedure and conduct an experiment that tests your hypothesis. A detailed materials list should be generated as a separate document. The experiment should be a fair test that changes only one variable at a time while keeping everything else the same. Repeat the experiment a number of times to ensure consistent results.

Adapted from: http://www.sciencekids.co.nz/projects/thescientificmethod.html

Results/Data

Collect data and record the progress of your experiment. Document your results with detailed measurements, descriptions and observations in the form of notes, journal entries, photos, charts and graphs. Your computer teacher will help with table and graph development.

Conclusions

Analyze the data you collected and summarize your results in written form. Use your analysis to answer your original question Do the results of your experiment support or oppose your hypothesis? Give average data values to support your conclusion.

Comments

Describe the observations you made during your experiment. Include information that could have affected your results such as sources of errors, environmental factors, uncontrolled variables, and unexpected surprises.

Presentation

Present your findings in an appropriate form, such as a final report and a display board for a science fair competition.

Adapted from: http://www.sciencekids.co.nz/projects/thescientificmethod.html

Science Fair Research Topics for Summer Assignment

These are major categories of research to help promote science fair project ideas. The topics listed under these are not designed to be an all-inclusive list. They are just more examples of possible areas of study. Projects will fit under similar categories (i.e. botany, human behavior/biology, chemistry, etc.) on Science Fair day.

Botany

Photosynthesis
Hybrid plants
Plant growth in different environments
Plant growth affected by additives
Soil content
Plant structure
Hydroponics

Human Behavior/Biology/Medicine and Health/Microbiology

Organ structure – brain, eye, ear
Marine biology
How skill is diminished by distraction
Bacteria/Molds
Animals

Chemistry

States of matter/particle motion – density, volume
Properties of water
Heat transfer – conduction, convection, radiation
Bonding/Reactions

Physics

Newton's Laws of Motion – (for example: speed, velocity, acceleration, momentum)
Gravity
Aerodynamics
Fluid dynamics
Mechanical energy – potential and kinetic, Simple machines
Electricity
Magnetism
Friction and drag

Engineering

Materials (polymers, coatings, nanomaterials, etc.)
Strength of materials (how do different materials bend, stretch, or break when they are subjected to loads)
Structure (how does the design of a building or bridge affect how strong it is)
Alternative sources of power/energy (e.g. solar, hydroelectric, ethanol, LNG, wind, fuel cells)
Biochemical (fermentation, preservatives, food science, etc..)
Chemical (Distillation, Filtration, Mixing & Blending, Reaction Kinetics, etc…)

Biomedical (prosthetic limbs, dialysis, artificial heart, Artificial Kidney etc…)
Civil (Strength of Material, Structure design such as Roads, Bridges, Buildings…etc.)
Environmental (outdoor air quality, indoor air quality, water and soil pollution, Noise pollution, waste landfills, etc..)
Rust and corrosion

Applied Mathematics
Modeling
Statistics
Probabilities
Scaling and Measurement
Big Data Analysis & Management

Topic to Avoid	Why
Any topic that boils down to a simple preference or taste comparison. For example, "Which tastes better: Coke or Pepsi?"	Such experiments don't involve the kinds of numerical measurements we want in a science fair project. They are more of a survey than an experiment.
Most consumer product testing of the "Which is best?" type. This includes comparisons of popcorn, bubblegum, make-up, detergents, cleaning products, and paper towels.	*These projects only have scientific validity if the* Investigator fully understands the science behind why the product works and applies that understanding to the experiment. While many consumer products are easy to use, the science behind them is often at the level of a graduate student in college.
Any topic that requires people to recall things they did in the past.	The data tends to be unreliable.
Effect of colored light on plants	Several people do this project at almost every science fair. You can be more creative!
Effect of music or talking on plants	Difficult to measure.
Effect of running, music, video games, or almost anything on blood pressure	The result is either obvious (the heart beats faster when you run) or difficult to measure with proper controls (the effect of music).
Effect of color on memory, emotion, mood, taste, strength, etc.	Highly subjective and difficult to measure.
Any topic that requires measurements that will be extremely difficult to make or repeat, given your equipment.	Without measurement, you can't do science.
Any topic that requires dangerous, hard to find, expensive, or illegal materials.	We care about your safety and your parents' pocketbook.
Graphology or handwriting analysis	*Questionable scientific validity.*
Astrology or ESP	No scientific validity.
Any project in violation of state law, federal law, state science fair rules, or International Science & Engineering Fair rules.	In brief, you may not do a project that involves: • Unacceptable risk (physical or psychological) to a human subject • Collection of tissue samples from living humans or vertebrate animals • Drugging, pain, or injury to a live vertebrate animal • Use of illegal or prohibited materials

Name: _____

Summer Research

Directions: Choose three topics. Generate **two** questions for each topic, not each relationship!

Examples:

Topic Model cars

Question 1 Does the axle length affect the speed of a car?

Question 2 Does the length of the hood affect the speed of a car?

Topic Plants

Question 1 What % solution of fertilizer "x" will cause greatest growth in ivy plants?

Question 2 Will fertilizer "x" or "y" cause geraniums to grow taller?

Topic _____

Question 1 _____

_____

Question 2 _____

_____

Topic _____

Question 1 _____

_____

Question 2 _____

_____

Topic _____

Question 1 _____

_____

Question 2 _____

_____

Name: _____

Bibliography

Topic 1 _____

Directions: Find three sources: one book, one online, and one journal (online or print) that may help you with your research. If you have additional resources to list, print extra copies of this page.

Book

Title _____

Author(s) _____

Publisher _____

Place of Publication _____

Date of Publication _____

Page Range _____

Online

Website Title _____

Article Title _____

Author(s) _____

Date of Publication _____

Date Accessed _____

Journal (print or online)

Journal Title _____

Article Title _____

Series_____ Volume _____ Issue _____ Year _____

Author(s) _____

Online or Print _____ Page Range _____

Name: _____

Bibliography

Topic 2 _____

Directions: Find three sources: one book, one online, and one journal (online or print) that may help you with your research. If you have additional resources to list, print extra copies of this page.

Book

Title _____

Author(s) _____

Publisher _____

Place of Publication _____

Date of Publication _____

Page Range _____

Online

Website Title _____

Article Title _____

Author(s) _____

Date of Publication _____

Date Accessed _____

Journal (print or online)

Journal Title _____

Article Title _____

Series_____ Volume _____ Issue _____ Year _____

Author(s) _____

Online or Print _____ Page Range _____

Name: _____

Bibliography

Topic 3 _____

Directions: Find three sources: one book, one online, and one journal (online or print) that may help you with your research. If you have additional resources to list, print extra copies of this page.

Book

Title _____

Author(s) _____

Publisher _____

Place of Publication _____

Date of Publication _____

Page Range _____

Online

Website Title _____

Article Title _____

Author(s) _____

Date of Publication _____

Date Accessed _____

Journal (print or online)

Journal Title _____

Article Title _____

Series_____ Volume _____ Issue _____ Year _____

Author(s) _____

Online or Print _____ Page Range _____

Science Project Proposal Form

Student Name:

The question I plan to investigate in my experiment (*please phrase as a question*):

Science Project Question Checklist	
1. Your teacher may put some restrictions on projects. Have you met your teacher's requirements?	Yes / No
2. Is the topic interesting enough to read about, then work on for the next couple months?	Yes / No
3. Can you find at least 3 sources of written information on the subject?	Yes / No
4. Can you measure changes to the important factors (variables) using a number that represents a quantity such as a count, percentage, length, width, weight, voltage, velocity, energy, time, etc.? Or, just as good, are you measuring a factor (variable) that is simply present or not present? For example, • Lights **ON** in one trial, then lights **OFF** in another trial • **USE** fertilizer in one trial, then **DON'T USE** fertilizer in another trial	Yes / No
5. Can you design a "fair test" to answer your question? In other words, can you change only one factor (variable) at a time, and control other factors that might influence your experiment, so that they do not interfere?	Yes / No
6. Is your experiment safe to perform?	Yes / No
7. Do you have all the materials and equipment you need for your project, or will you be able to obtain them quickly and at a very low cost?	Yes / No
8. Do you have enough time to do your experiment more than once before the due date?	Yes / No
9. If you are planning to enter a science fair outside of your school: • Does your project meet all the rules and requirements for the science fair? • Have you checked to see if your science fair project will require approval from the fair before you begin experimentation?	Yes / No Yes / No

I have discussed the project idea and the checklist with my parent(s) and I am willing to commit to following through on this project.

Student Signature **Date**

I have discussed the project idea and the checklist with my student and I believe he or she can follow through with this project. I agree to supervise the safety of the project steps that my student performs at home.

Parent Signature **Date**

Parent's Guide to Science Projects

Information on the Scientific Method

Science projects should follow the six-step scientific method. These steps are shown on the chart below. A comprehensive Science Buddies Project Guide (www.sciencebuddies.org) provides direction on all of the steps.

Time Management

See your child's Student Science Project Schedule for all of the key due dates. Help your child meet these dates by getting out your family calendar and marking the interim due dates. Block out times for trips to the library and other work time. Look for any scheduling conflicts, such as vacations, and discuss issues with the teacher.

How to Help

As your child works on his or her project, he or she will likely face stumbling blocks. To help, ask questions to help your child figure things out; don't just provide the answers. Open-ended questions, such as, "What else could you try to solve this?" or "What is stopping you from going on to the next step?" are best (Fredericks & Asimov, 2001, p.xiii). Sometimes just talking it out can help children get unstuck. If not, ask the teacher for help. Respect your child's independence in learning by helping at the right level.

Helping at the Right Level at Every Step

Project Step	Helping at the right level:	Going too far:
Ask a question.	• Discussing with your child whether a project idea seems practical	• Picking an idea and project for your child: A topic not of interest will turn into a boring project.
Do background research.	• Taking your child to the library • Helping your child think of keywords for Internet searches	• Doing an Internet search and printing out articles
Construct a hypothesis.	• Asking how the hypothesis relates to an experiment the child can do	• Writing the hypothesis yourself
Test the hypothesis by doing an experiment.	• Assisting in finding materials • Monitoring safety (you should always observe any steps involving heat or electricity)	• Writing the experimental procedure • Doing the experiment, except for potentially unsafe steps • Telling your child step-by-step what to do
Analyze data and draw a conclusion.	• Asking how your child will record the data in a data table • Reminding your child to tie the data back to the hypothesis and draw a conclusion	• Creating a spreadsheet and making the graphs yourself, even if your child helps type in values • Announcing the conclusion yourself
Communicate your results.	• If a presentation is assigned, acting as the audience • If a display board is assigned, helping to bring it to school	• Writing any of the text on the display board • Determining the color scheme and other graphic elements