Madison School
Science Fair 2019

Packet for Students and Parents

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Introduction

Have you ever wondered if all rocks weather the same? Or what is the most common eye color in animals? Perhaps you've been wondering what's in the bounce of a ball. It's time to find answers to these and other questions in the minds of our students. The Madison School Science Fair is gearing up and it's time to create a hypothesis and experiment. The event is scheduled for **Wednesday, February 20, 2019 and Thursday, February 21, 2019.**

All Madison students, including Kindergartners, are encouraged to participate. The idea may be intimidating at first to you and your child, but please don't let that be a deterrent. Your child's project does not have to be earth-shattering or fancy, and the display doesn't require a glitzy poster. The project should be focused on something your child is interested in exploring. A science project can be an observation, a collection, a model, or an experiment. **A project may be individual or can be worked on with a partner.** Partners do not have to be from the same class, grade, or family. To make it easier for students to participate and for parents to help them, some of the frequently asked questions are addressed in this packet.

Overview

First, remember this is not a parent project; you are the *assistant*. Guide your child to explore his or her interests while keeping the experiment simple and fun. The Science Fair is not a competition, but rather a celebration and sharing of learning. Students are not awarded ribbons or prizes, and their work is not graded or judged.

The second step is to find out what your child already knows about the chosen topic, then visit the school or public library, or the Internet to expand their knowledge. Spend time trying to figure out what they do not know; the project should center around something new that they could discover.

The third and most exciting step for your child will be actually conducting the experiments. It will be in your best interest if you plan ahead. You might want to perform the experiment over a several days to keep them interested. You may also want to do a trial run of an experiment. This will provide an opportunity to think the procedure completely through or redesign it, if needed.

The final step is to draw a conclusion. Sometimes one experiment cannot answer the question, but just spawn new questions or more experiments and that is a good thing! The conclusion is just a statement of what you learned as the result of conducting the one experiment. *Remember, sometimes more can be learned from what didn't go well than from what did go well. Negative data is still data!*

Tips for Parents

As a parent, you have several important roles to fulfill. Remember that you are the guiding force behind the project. The following are some tips to help smooth your path.

The Time Line (on page 4) offers an estimation of time to spend creating a Science Fair project by grade level. It lists ongoing questions and written activities, which if completed along the way will help make the creating of the final display board easier. You may want to create a calendar for the

project starting with the completion date and work backwards. The time does not have to necessarily follow consecutive days. Take winter holidays into consideration when planning activities.

When collecting information it is important to write it down and label everything while you are working. It might be helpful to keep an informal logbook to help collect data and record results. Take photos while performing an experiment to use for the display. Parents can be a "ghost writer" for younger participants. Be sure to give proper credit. Illustrations, photos, tables, charts, and graphs are great tools for the display.

Allow your child to explore the topic, but it is important to consider safety. As your "lab" is being created think of small pieces younger children or animals could get a hold of, and solutions that should not be eaten. Be mindful of carelessness or rough housing that could lead to spills, fires, or broken equipment. If working with chemicals use goggles or gloves. If you are using live animals, be sure to consider their safety and what will happen to them after the experiment. (If you're going to raise a butterfly garden, will it be too cold to let them free?). **In accordance with school guidelines, no live animals will be allowed at the Madison School Science Fair.**

Science Fair Schedule

Date	Time	
1/14	8:30 am-3:00 pm	Science Fair kicks off with in-school STEAM event for all classes.
1/14	8:30am	Registration begins. Example science display boards are in the MRC for students and parents to view.
2/13	3:15 pm	**Registration ends**
2/20	3:05 pm-4:00 pm	Science Fair project set-up in the gym
	(**Please do not drop off project in the morning!)**	
	6:00 pm-6:30 pm	K-2nd grade present their exhibits
	6:30 pm-7:00 pm	3rd-5th grade present their exhibits
2/21	8:40 am-2:45 pm	Participants present to their own classes
	2:45 pm-3:15 pm	Projects must be taken home immediately after school

Please complete the registration form found on the PTO website. The form can be returned to the registration box in the school office.

Contacts for Questions

Any questions can be directed to your teacher or the 2019 Season of Science Co-Chairs at seasonofscience@madisonpto.org.

Choosing a Topic

There are a few suggestions below solely based on topics of study that your child has experienced in the classroom. By no means are these to be the only topics of study. This is only a springboard for you and your child. If you choose a project, such as working with plants, adjust the time line so you have adequate time to make observations.

Not all Science Fair exhibitions need to be in experiment form. There are many topics that can be researched and presented in report form. If your child is interested in studying the planets, a model of the solar system would be an appropriate entry. A collection of rocks identified and displayed would be a proper entry. The life cycle of a frog might best be studied by starting with tadpoles and watching them grow. **Please remember that no live animals will be allowed at the Madison Science Fair.**

Conducting the Experiment

Scientific Method

The most common way to approach a Science Fair project is to follow the Scientific Method. These are the basic steps:

Brainstorm ideas or questions that interest your child. After selecting a topic:

- Identify what is known
- Identify the unknown (to be discovered through an experiment)
- Develop a hypothesis (make a prediction of the results)
- Create the procedure (identify variables, plan and conduct the experiment)
- Collect and analyze data (record conditions, numbers, phenomena, etc.)
- Draw a conclusion (what was found out through the experiment)

The two most important scientific concepts for the Science Fair are **hypothesis** and **variable**. The ***hypothesis*** is the best guess of what will happen. A ***variable*** is anything that can change the outcome of an experiment. There should be three variables to consider. The *independent variable* is the one that is changed in the experiment. The *dependent variable* is the variable measured to determine if it is affected by the independent variable. The *controlled variable* is the one that is held constant. It is the interaction of these scientific principles that will power the experiment.

Examples

One simple project:

- Known -- I know that ice melts.
- Unknown -- How long does it take an ice cube to melt?
- Hypothesis -- I think it will take 20 minutes.
- Variables and Procedure -- I will use an ice cube from the freezer, place it in a bowl, and leave it on the counter. When I can't see any more ice, it will be melted.

- Data -- Complete several trials of melting an ice cube. Record the time it took for the ice to melt.
- Conclusion -- I thought it would take 20 minutes for an ice cube to melt. I was not very close, it took 35 minutes. I thought that it would melt faster." It would be fine to stop your experiment at this point.

A question has been asked and answered in the above example. However, this could also be your starting point. Different constants and independent variables can make the experiment more interesting. What if you use the same size ice cube and the same container (controlled variable) and change where the ice melts in the fridge, outside, and in a glass of water (independent variable)? Or what if you change the size of your ice cube, but keep the place and container the same? Or what if you keep the size and place the same but change the container. Will the time of day change your results--maybe but probably not. It's not easy or necessary to control all the variables. Concentrate on the ones that will directly affect your experiment.

Another Example

1. Identify a Problem

   I want to study botany. I want to find out what things affect the growth of plants. My Study Question is "What effect will prolonged periods of rock music have on the growth of plants?"

2. Collect Information

   I collected information by talking to my neighbor who is a gardener, reading three books on plants, visiting a nursery, and reading two pamphlets that I got from the Farm Bureau. I also talked to the owner of the local music store, but he didn't have any information.

3. Develop a Hypothesis

   I think that when I expose some plants to rock music they will grow less than similar plants that are not exposed to rock music.

4. Conduct the Experiment.

   Materials: *bean seeds, potting soil, flowerpots, radio*
   Procedure: *Using 10 flowerpots, I planted 2 bean seeds in each one. I put 5 pots on a window sill away from the radio. I put 5 pots on a window sill where they got the same amount of light as the first group of 5 but were close to the radio. I exposed the second set of pots to rock music for 2 hours each day. I kept a daily journal for each pot and was sure all plants got the same amount of light and water.*

5. Conclusion

   There was no difference between the plants that were exposed to rock music and the ones that weren't. Music is not one of the variables that affects plant growth. This means that when you place your plants in your house, you don't have to worry about whether they are close to the stereo. You can also put plants in a teenager's room.

Presenting the Results

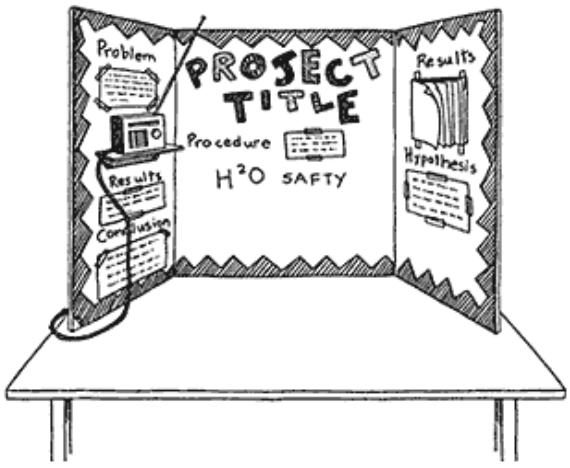
During the presentation period (6:00 pm-6:30 pm, Kindergarten through 2nd grade; 6:30 pm-7:00 pm, 3rd grade through 5th grades), each student should stand next to his/her exhibit and speak with parents, teachers, and other students who visit the Science Fair. Some parents, students and teachers will ask questions and others will simply comment on the exhibit. Students may want to prepare a few sentences to present about their project. ("My question was…, I studied…., I learned…) Parents may want to help their students by practicing using their board prior to the Thursday set up time. If your time for a presentation is not convenient, you may select another time. During the remaining time for the Science Fair, students enjoy visiting their friends' presentations. It is a great time to see what upper grades are studying and get ideas for future science fairs.

Tri-fold display boards can be purchased at local stores. A section of tabletop (a typical school table) will be provided for you to set up the board of approximately 2.5 feet (length) by 1.5 feet (wide). There will be another presentation on the other side of the table. Your may also bring sample materials, equipment, log book, etc. to be displayed in front of your board.

Students are welcome to demonstrate aspects of their experiment as long as they do not distract from the presentations of other students or create unsafe situations. If displaying water or liquids, students should have any materials needed to clean up from any accidents (paper towels, etc.).

Display Board Example

A Well-Organized Display Board



A Confusing Display Board

Helpful Hints

- Place all typed material on a colored backing, such as construction paper. Leave a border of 1/4 to 1/2 inch around the edges of each piece of typed material. You may want to use a paper cutter so that the edges will be straight.
- Make the project title stand out by using larger letters for it and smaller letters for the headings.
- To arrange the letters on the backboard, first lay the letters out on the board without attaching them. Then, use a yardstick (meter stick) and pencil to draw a straight, light guideline where the bottom of each letter should line up. This will help you keep the lettering straight. Before adhering everything, ask the opinion of other students, teachers, or family members.
- If you need electricity for your project, be sure the wiring meets all safety standards. Also, be sure to let someone on the Science Fair Committee know so that the project can be placed close to an outlet.
- Bring an emergency kit with extra letters, glue, tape, construction paper the color of the backboard, stapler, scissors, pencils, pens, touch-up paint, markers, and so forth. This kit should contain anything that you think you might need to make last-minute repairs to the display.
- Before standing your backboard on the display table, cover the table with a colored cloth. Choose a color that matches the color scheme of the backboard. This will help to separate your project from other projects displayed on either side.

Safety Guidelines

Before performing an experiment, plan it carefully with an adult. Decide together whether an adult should be there during the experiment. If an experiment calls for something electrical, hot, or sharp, an adult must be present.

Get permission to use materials and equipment from home. Also get permission before you purchase any materials or supplies.

Know your tools and ingredients. Have each ready before you begin.

Keep your work area clean and dry. If necessary, cover work surfaces with newspaper.

Do no harm to any living creatures. Please **do not bring live animals** to school. Instead, take pictures of your experiment in progress.

Use safety goggles, gloves, or other appropriate protective clothing while conducting your experiment. Tie back long hair in a ponytail or pin it up. Never put an unknown material in your mouth or eyes. Never use an electrical appliance near water.

Ask for help if something unexpected happens.

Check with an adult before mixing or disposing of any chemicals.

Wash your hands after the experiment, and clean your work area.

Requests for electrical outlets and cords needed for exhibits must be approved by the Science Fair Committee. You will need to bring an extension cord if you need an electrical outlet. Once the project is set up, ask for assistance from a Science Fair Committee member so that any loose cords can be appropriately taped down.

The following items are prohibited from displaying at the Science Fair: **foods to be tasted**, animals, valuables, breakables, combustible materials, unsealed liquids and/or powders, open or concealed flames, sharp items, and any equipment or device that would be hazardous to other students.

All projects with liquids or other messy substances must be displayed on a tray. A towel or a roll of paper towel must be brought to the Science Fair, to be used for rapid clean up in case of a spill. These should be kept under the table under the science fair project. Please no goo!

APPENDIX:

Suggested Time Line - *Grade K-2*

	Kindergarten	First Grade	Second Grade
Decide on Topic (visit libraries, stores, internet)	1-2 days		
Research on Topic (read gathered information)	1-2 days		
Organize Thoughts (I learned … I want to know...What happens if)	1-2 days		
Gather Supplies	1-2 days		
Procedure (plan/write/draw steps of what to do)	1-2 days		
Conduct Experiment (Do the experiment, collect data, results)	1-3 days	2-5 days	5-7 days
Summary/Conclusion (I learned … I was surprised when …)	1-2 days	1-2 days (3-5 sentences)	1-2 days (paragraph)
Display/Presentation (Complete display board, practice "presentation"- explaining project and answering questions)	1-2 days		

Grade 3-5

	Third Grade	Fourth and Fifth Grade
Decide on Topic (visit libraries, stores, internet)	1-2 days	
Research on Topic (read gathered information)	3-5 days	
Organize Thoughts (I learned … I want to know … What happens if …)	1-2 days	
Gather Supplies	1-2 days	
Procedure (plan/write/draw steps of what to do)	3-5 days	
Conduct Experiment (perform the experiment, collect data, results)	Time Spent depends on the experiment	
Summary/Conclusion (What I learned … I was surprised when …)	2-3 days	3-5 days
Display/Presentation (Complete display board, practice "presentation"- explaining project and answering questions)	2-3 days	3-5 days

Some Grade-Level Topics

Kindergarten

Hot & Cold	What happens when you refreeze the melted ice? How much water can you measure from an icicle? From a cup of snow? How long does it take for hot tap water to freeze? Cold tap water?
Seeds & Bulbs	Which brand of seeds flower the best? Can all flower bulbs be "force bloomed" with a grow light?
Senses	Create a sense box, place objects inside, can you feel them? What happens if you wear gloves? Can you feel the objects with your feet? Taste different foods with a blindfold on, what happens if you pinch your nose? Play telephone, what happens when you add more people? Does closing your eyes affect your sense of touch? "Watch" sound waves as you drop objects into a shallow pan of water-what happens with different size objects.
Lights & Shadows	How long is your shadow at 8am? 12pm? 4pm? Can you tell what time it is with the sun and a stick?

First Grade

Air, Water, Weather	Can you predict the weather? Make a guess for each day and record the actual weather. Use pH strips to test different kinds of water. What can air move? Create a boat and investigate designs or motion in water.
Measurement	Collect a variety of containers, predict which will hold the most liquid and the least. Do you use more water taking a bath or a shower?
Butterflies	Send away for caterpillars and watch them grow. Study symmetry-is every letter or number symmetrical? What about houses? Leaves?

Second Grade

Rocks to Soil	Do all rocks weather the same? What weather affects rocks? Do worms help the soil? How does pollution affect the soil and plants? Do plants weather rocks?
Magnetism	Experiment with static electricity. Rub objects with a woolen cloth, newspaper, or your hair, how does it effect them? Create a compass. What objects are attracted to magnets?
Kitchen Science	What brands of popcorn pop more kernels? Can you taste the difference with lower sodium foods? What dissolves in water?
Plants	What plants have the most pollen? How does acid rain affect the growth of plants? What works best to grow plants-a dark box, natural sunlight or a grow light? What happens when you cover up leaves with paper'? Plastic wrap? Tin foil? Petroleum jelly?

Third Grade

Sound	Create sound tunnels with different lengths of paper towel tubes. Can you really make a telephone with string and 2 cans? What's the furthest you can stand and still hear a message?
People & Animals	What is the most common eye color? What is the average height in people's families? Create a worm farm or an ant farm. Make predictions on what happens in their environment.
States of Matter	Does every liquid evaporate? What solids can be turned into liquids? Study the water cycle or cloud formation.
Space	Make a model of the solar system. Experiment with gravity. Create a balloon rocket on a string and experiment with acceleration and velocity.

Fourth Grade

Mystery Powders	Which antacid works the best? Which laundry soap works best?
Earth Science	Experiment with pH paper-saliva, drinking water, rainwater, skin, animal fur. Create a landfill, what happens when you add worms?
Machines & Motions	Which super ball has the best bounce? What design of an airplane will travel the farthest? How many times do you need to practice to perform the tablecloth trick?
Life Cycles	Study optimum conditions for plants then observe what happens when the amount of water, sun, or air is changed?

Fifth Grade

Weather	What causes changes in the weather? How does air pressure affect weather patterns? How does air pressure affect passengers inside of airplanes or helicopters?
Electricity & Energy	What energy source is most efficient? Which objects are good conductors or insulators of electricity?
Buoyant Forces	Examine different objects and determine properties of objects that sink and float.
Forces of Flight	What airplane design will travel the farthest?

More Topics and Questions

Topics

Here is a list of general topics that you could consider for a science project. It will start you thinking about all the many areas of science you could investigate. Once you decide on a general topic, you will have to decide on a specific question to ask.

acids and bases
aerodynamics
airplanes
amphibians
astronomy
atoms and molecules
automations
birds
bones
camouflage
cells
chemistry
color
computers
conservation
constellations
crystals
digestive system
earth and
ecology
electricity
energy and engines
fish
flowers
food chains
geology
gravity
heart
heat
insects
invertebrates
learning
light
liquids
machines
magnetism
mammals
matter
muscular system
nervous system
nutrition
oceanography
parasites
photosynthesis
planets
plants
pollution
reptiles
respiratory system
rockets
rocks
senses
shells
solar system
sound
tides
trees
vertebrates
vocal cords
water
weather
worms
yeast

Questions

Below is a sample of questions you might use for a science experiment.

<u>Behavioral Science</u>
What effect does music have on memory?
How can a pet be taught to run a maze faster?
What effect does food have on a pet during training?

<u>Biochemistry</u>
What is the salinity of tears?
What foods have starches?

<u>Botany</u>
What things affect plant growth?
Do some plants drink more water than other plants?

<u>Chemistry</u>
What is the effect of acid rain on plants?
What conditions affect the rate of chemical reactions?

Consumer Science
Which product works the best? (paper towels, antibacterial soap, stain removers, etc.)

Energy and Electricity
What is the best conductor and why?
What material is the best insulator?
How is steam used to work?

Microbiology
What things will biodegrade?
Why does food spoil?

Earth Science
How do crystals grow?
How can we predict weather?
How much pollution is in our air?

Health Science
How do video games affect heart rate?
How does smoke affect living things?

Physics
How does color affect temperature?
How does sound travel?
What factors determine how far a baseball travels?

Other Resources

- Madison School Library
- Hinsdale Public Library
- Scientifics Catalog for Science and Engineering Enthusiasts scientificsonline.com
- BrainCake braincake.org
- BrainPop brainpop.com
- Did you Ever Wonder? lbl.gov/wonder
- Dragonfly TV pbskids.org/dragonflytv
- Engineer Girl! engineergirl.org
- Extreme Science extremescience.com
- Girls Go Tech! girlsgotech.org
- How Stuff Works howstuffworks.com
- NASA for Kids Only kids.earth.nasa.gov
- National Geographic for Kids kids.nationalgeographic.com
- Science Museum of Minnesota smm.org/explore
- Try Engineering tryengineering.org/play.php
- Try Science tryscience.org
- Adler Planetarium adlerplanetarium.org
- The Field Museum fieldmuseum.org
- Kohl Children's Museum kohlchildrensmuseum.org
- Museum of Science and Industry msichicago.org
- Scitech Hands-On Museum scitechmuseum.org
- www.ipl.org/div/kidspace/projectguide
- www.sciencenewsforkids.org
- www.sciencebuddies.org
- www.exploratorium.edu/science_explorer/index.html
- www.tryscience.org/experiments/experiments_home.html
- www.sciencebob.com
- www.pbskids.org/zoom/activities/sci/
- www.scienceclub.org/scifair.htm
- www.scifair.org/dr.shawnsideabank.html