Hackettstown PTA Science Fair

Guidelines and Rules

2018

Demonstration vs. Experiment:
Which one are you planning to do?

Demonstration – is a quick science show that demonstrates some scientific concept or principle. It explains known physical phenomena by showing it in action. For a science fair project you want to demonstrate a scientific concept that interests you in a unique, safe, and exciting way. Building a model volcano and filling it with a substance that shows how it erupts is a classic example. Although there is science involved, showing how something works is not an experiment. It is a great way for younger students to get involved with the science fair.

Experiment – An experiment is a little more advanced and may work better for older students. You run experiments to answer questions like "Which mosquito repellent works best?" or "Does the amount of sugar in chocolate chip cookies cause them to become smaller when baked?". Experiments involve:

- A question related to science and our world
- A hypothesis, or prediction, about that question
- Creating variables to measure and test your hypothesis
- People, or things, to put in experimental groups to run our test on so we can compare the data between the groups
- A thoughtful process for running our test so we can run as many trials over and over generating enough data for each experimental group
- Keeping conditions as similar as possible for all experimental groups so that only the variable being tested is different for each group
- Using math, specifically statistics, to compare the results between the experimental groups to refute or confirm your hypothesis

Example of an experiment:

- Question: "Does the amount of sugar in chocolate chip cookies cause them to become smaller or larger when baked?".
- Hypothesis: The more sugar you put in the recipe the smaller the cookie
- Variables: Amount of sugar (grams) and the size of the cookie (cm)
- Test subjects: 30 cookies with different amounts of sugar in the recipe
- Experimental groups: Bake 10 cookies with half a cup of sugar in the recipe, 10 cookies with ¾ cup of sugar, and 10 cookies with 1 cup of sugar
- Control: keep all the other ingredient amounts the same for the three test groups and use the same small ice scream scoop to measure out the batter so it's the same shape and size each time before it's baked.
- Analysis: the average size of the half cup group was 10.8 cm, the average size of the ¾ cup group was 9.6 cm, the average size of full cup was 8.3 cm, so the hypothesis was correct. The more sugar you put in the recipe the smaller the cookie!

You must choose a demonstration or an experiment. There are separate prizes for demonstrations and experiments.

Demonstration and Experiment Checklists

Checklist for a demonstration:

1. Standard Tri-fold presentation board is neat and organized with your name, grade, and teacher's name on the back	
2. A catchy and clear title is boldly presented	
3. An abstract, description, or purpose of the demonstration is clearly presented on the board	
4. Any relevant research or background information is displayed on the board or in a journal	
5. All sources of information (books, websites, etc.) are visibly cited in an age appropriate manner	
6. The procedures and materials involved are explained on the display or in a journal	
7. Any data generated, or observations, are clearly displayed on the board or in a journal	
8. Any results, conclusions, or summary of findings are clearly displayed or in a journal	
9. The demonstration materials and construction are safe and work properly	
10. The demonstration makes use of images, graphics, videos, or dynamic motion to enhance the presentation	
11. Oral explanations of the demonstration have been practiced	

Checklist for an experiment:

1. Standard Tri-fold presentation board is neat and organized with your name, grade, and teacher's name on the back	
2. A catchy and clear title is boldly presented	
3. The question and hypothesis for the experiment is clearly displayed	
4. Any relevant research or background information is displayed on the board or in a journal	
5. All sources of information (books, websites, etc.) are visibly cited in an age appropriate manner	
6. The variables being tested are clearly displayed on the board or in a scientific journal	
7. The experimental or treatment groups are clearly defined	
8. The testing process and materials are clearly explained with all relevant specifics	
9. How the experiment utilizes the concept of control is displayed or in a journal	
10. The data or observations generated by the experiment are clearly displayed or in a journal	
11. Any conclusions or confirmation of the hypothesis is clearly displayed or in a journal	
12. The experiment makes use of images, graphics, videos, or dynamic motion to enhance the presentation	
13. Oral explanations of the experiment have been practiced	

Middle School S.T.E.A.M. Challenge

If you are in grades 5-8 you can participate in the middle school Science, Technology, Engineering, Arts, and Mathematics Challenge. This is an opportunity for students to utilize their scientific skills on a common problem that is provided by the science fair committee and community members at large. The requirements for the challenge change year by year, so the project requirements can be found under the community tab on the district's website. Just look under the Hackettstown PTA Science Fair tab and you will be able to click on the pdf document titled "Middle School STEAM Challenge" to see what this year's challenge requires. 1st, 2nd, and 3rd prizes will be awarded for the best project proposals as judged by roundtable discussion amongst the judges. If you decide to participate in the middle school STEAM challenge you must indicate this on the science fair application.

A Parent's Role

- The parent is the chief facilitator – hands on, but not too much. It's NOT your project! Obviously the younger the child, the more assistance the parent should provide.
- Parents may help establish the idea of the project, but try to let the child's interests guide the direction of the project.
- If research is required for the project, parents may help their child, especially if they are younger. Older students, who can read, should be doing research with just a little guidance.
- Parents may help gather materials.
- Parents may help by answering questions and guiding students through the scientific method.
- Parents may assist with computer generated work for students in grades K-4 only. We encourage some K-2 work to be hand written. All graphs, charts, and word-processing must be student generated for projects grades 5-8.
- Support your child by keeping him or her on track with deadlines.
- As the project nears, provide encouragement and support to finish the project, but DO NOT DO IT FOR YOUR CHILD!
- Play the role of the judge and ask the questions that a judge might ask.

At no point should a parent or adult be a part of the presentation. If the directors feel that a parent is too involved, or safety is a question, a project can be disqualified at the judges or directors discretion. If you're not sure about your role or about the presentation itself - just ask!

Preparing for the oral part of the presentation

The best way to prepare for the questions a judge may ask is for a child to be able to explain:

- What his/her demonstration or experiment is about
- How he/she set it up and executed the process
- What were the results or conclusions
- What did he/she learn

Here is a list of some potential questions from a judge:

1. Tell me about your project?
2. What was your conclusion?
3. How did you come up with your idea?
4. What did you learn from your project?
5. What resources did you use in preparing for this presentation?
6. What background research did you do for your project?
7. What procedures did you follow in your experiment or demonstration?
8. What were your variables, experimental groups, and controls for your experiment?
9. Were any of your results unexpected?
10. Tell me about your data?

Safety rules and regulations

Prohibited Items:

Anything potentially dangerous to the participant and/or the public is prohibited. This includes, but is not limited to the following:

- No flames or combustible materials.
- Living organisms or plants may be allowed ONLY by approval of the Science Fair Committee.
- No sharp items such as needles or syringes.
- Projects with moving parts MUST be shielded and safe to the observer and participant.
- No items will be allowed that can spill or spray, or cause damage to your or another person's project or belongings
- Foods or other materials that produce an undesirable odor or are overly messy in nature are not allowed.
- No live or preserved animals, or animal/human parts, except those that are dried and in a sealed container (teeth, hair, dried animal bones, etc.) unless approved by the directors
- No poisons, drugs, controlled substances, toxic or hazardous substances or devices may be used.
- No open flames, combustible solids, liquids, or gases. ***Dry ice isn't permitted.***
- Circuits of 12 volts or more cannot have exposed knife switches or uninsulated wire
- No live, disease causing organisms

Experiment and Demonstration limitations

- No cruel or inhumane experimentation will be permitted.
- Animal studies may not include harmful substances.
- Be sure to wear aprons, gloves, and protective eyewear if necessary
- Be prepared to keep your area clean and free of debris if you experiment is messy

While you may use charts, graphs and photos, do not include pictures of surgical procedures, dissections or autopsies in your presentation. You may, however, use a notebook containing such pictures to be used only during judging.

Adult supervision is required for the duration of the fair

If you unsure if any materials or procedures involved in your project or presentation are allowed contact Tom Gargiulo at tommygargiulo@gmail.com and ask first.

Timeline

This timeline is provided to give you a suggested schedule to organize your project around.

NOW – Start brainstorming ideas for your project. If you need ideas see the attached lists of websites, resources, and categories. The first step is to determine if you are doing a demonstration or experiment.

By February 16th – Your online application for the Science Fair is due. Hint: If you know what you are going to do, fill it out early and submit your application.

By February 23rd – Once you receive your email approval use the library and internet to research your project. Plan your demonstration or experiment and start collecting supplies.

By March 9th – Try your demonstration or conduct your experiment and collect your data / results. Analyze your results and establish your conclusion.

By March 16th – Build your display, practice for your oral presentation to the judges and add the final touches.

March 23rd – Drop off your project at the High School Old Gym between 7 and 9PM

March 24th – Science Fair opens at 9:00 am. Judges will be around to see your project from 9:00 to 11:00. We recommend that you are there to give your oral presentation to the judges and the visitors. After you are judged by 3 different judges, you may leave your project and visit other projects. The awards presentation will begin around 11:30 in the High School auditorium.

Resources

Categories for science fair projects:

Biological: Dealing with cause/effect relationships of living things. Also includes chemistry of life processes, studied of diseases and health of humans and animals, or any other projects relating to plants, animals, fungi, viruses, etc…

Chemistry: Study of nature and composition of matter and laws governing it- physical chemistry, organic chemistry (other than biochemistry), inorganic chemistry, materials, plastics, fuels, pesticides, metallurgy, soil chemistry etc…

Physical: Studies involving cause and effect relationships dealing with principles of physical laws in electricity, heat, light, sound, etc. Theories, principles, and laws governing energy and the effect of energy on matter - solid state, optics, acoustics, particle, nuclear, atomic, plasma, superconductivity, fluid and gas dynamics, thermodynamics, semiconductors, magnetism, quantum mechanics, biophysics, etc…

Engineering: Directly applying scientific principles to manufacturing and practical uses - civil, mechanical, aeronautical, chemical, electrical, photographic, sound, automotive, marine, heating, and refrigeration, transportation, environmental engineering, etc…

Earth and Space: Dealing with astronomy, planetary science, geology, mineralogy, physiographic, oceanography, meteorology, climatology, seismology, geography, etc…

Environmental: Study of pollution (air, water and land) sources and their control, ecology

Behavioral / Social: Human and animal behavior, social and community relationships – psychology, sociology, anthropology, archaeology, ethnology, linguistics, learning, perception, reading problems, educational testing, etc…

Inventions: Inventions are original devices or processes that solve or alleviate problems in everyday life.

Computer Science: Involves the use of technology to create hardware and or software devices that are useful to people. Examples of computer science projects include artificial intelligence, robotics, graphics, data management, languages, simulations, virtual reality, networking and theory.

Books:

700 Science Experiments for Everyone, Doubleday, 1985,*
ISBN 0-385-05275-8

Great Science Fair Projects, Scientific America, Marc Rosner, 2000,
ISBN 0-471-35625-5

Science Fair Projects for Dummies, M. Levaren, Wiley Publishers, 2003
ISBN 0-7645-5460-3

Sure to Win Science Fair Projects, J. Rhatigan, Lark Books Publisher, 2002
ISBN 1-57990-238-3

Hands on Science, King Fisher Publisher, 2001,
ISBN 0-755345440-8

The Science of Life, Projects and Principles for Beginning Biologists,
Frank G. Bottone Jr., 2001, Chicago review Press,

The Complete Handbook of Science Fair Projects, Revised Edition, Julianne Blair Bochiniski, 1996, Wiley and Sons Publishers,
ISBN 0-471-12378-1

Electron Herding 11, 50 Hands on Science Experiments That Explore Electricity,
BX Hixson, 2002 Loose in the Lab, Inc. Publishers

Science in Seconds for Kids, Over 100 Science Experiments you can do in Ten Minutes,
Jean Potter, Wiley and sons Publisher, 1995,
ISBN 0-471-004456-3

Mad Professor-Concoct Extremely Weird Science Projects,
Mark Frauenfelder, Chronicle Books, 2002
ISBN 0-8118-3554-5

Strategies for Winning Science Fair Projects, Joyce Henderson and Heather Tomasello, Wiley and Sons, 2002
ISBN 0-471-41957-5

Web Sites

www.sciencebob.com

www.sciencekidsathome.com

www.sciencebuddies.org

http://school.discovery.com/sciencefaircentral/scifairstudio/ideas.html

http://www.sciencemadesimple.com/

http://www.all-science-fair-projects.com

http://www.terimore.com/

http://sciencefairproject.virtualave.net/scientific_method.htm

Contact Information for Questions

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