

Dear PS 39 Families,

Exciting news: This year, students will have the option to participate in either a traditional Science Fair project or create an Invention project. Participation in either project is not mandatory. Students in grades 3-5 will have an opportunity to explore, apply, and share their science knowledge through self-selected projects. This year our Science Fair Share has a new name; STEM Fair! This is because students will be sharing both Science Fair and Invention projects at our school share day. **Display boards and logs are due on April 30<sup>th</sup>, and any inventions or models are due the morning of the share, Friday, May 1, 2020.** The projects will be shared at Camp Friendship and viewing times will be sent out closer to the date.

**Why are STEM Fair Projects important? Because they...**

- o Motivate students to learn to use the scientific method
- o Explore the practice of science, the characteristics of science, and the role of theories, laws, hypotheses, and models
- o Promote real world application of science knowledge
- o Engage students in hands-on learning
- o Ask students to engage in higher order thinking
- o Stimulate student's own interests
- o Provide a foundation for discovery, understanding, and problem solving skills



## Science Fair Guidelines

- Students may work independently or in a small group (4 max).
- Students may work with students from another class as long as it is in the same grade level.
- Students' first/last name and class should be on their display boards, logs, and any models.
- Models are optional and must fit in a standard size paper bag (or equivalent) so that all items can fit in front of their board and go home in the same bag they arrived in.
- Students are expected to only view the display boards and models, but items may get touched or moved by accident. Please do not bring or place any monetary/sentimental items on your display boards or models.
- Please do not have any "live experimentation" during the share...all models should be for viewing only.
- Please do not hand out "samples" for students to take.

## Invention Project Guidelines

Inventions must fit into the following definition:

- o a. An invention can be anything that solves a real problem. It is something that no one has ever thought of before. It cannot be purchased in a store or found in a book.
- o b. Sometimes an invention is an improvement to an object that was already invented. An invention must serve a purpose.
- Inventors are encouraged to use recycled materials.
- Inventions may not include mold growth or the use of bacteria.
- No use of prescription drugs, harmful or illegal substances are allowed. Grocery items (i.e. baking soda, vinegar, salt, lemon juice, etc.) are appropriate.
- Each invention must be accompanied by a self-standing display board and Inventor's Log.
- Table display space is limited to the area in front of your display board. A working model should represent inventions that are too large for the display.

I will be reviewing this information with students in grades 3-5 during our science classes so that they are ready to complete their optional STEM Fair projects at home. Students will have from now until April 30<sup>th</sup> to work on their projects before the school STEM Fair; see attached suggested timelines. All projects will be judged by a panel of parents and staff members, and only **two** Science Fair and **two** Invention projects will go to the **District 15 Science Fair on May 2<sup>nd</sup> at PS 130 from 2-4.** Honorable Mention awards will also be given out in each grade level. All display boards, logs, inventions, and models will go home the same day as the STEM Fair, except for the four finalist projects.

Please feel free to contact me with any questions you may have; I'm happy to help! My email is [slong@ps39.org](mailto:slong@ps39.org).

Check out <https://www.ps39.org/science-fair.html> for photos of some of last year's amazing projects.

All STEM Fair resources, websites, sample logs, and suggested timelines can be found at <https://www.ps39.org/science.html>.

Sincerely,  
Mrs. Long ☺

## INVENTION PROCESS

### **WHO, ME? AN INVENTOR?**

Yes! People from every corner of the world, of different ages, with different levels of education invent by identifying problems, pursuing ideas, and developing new solutions. The key to inventing is identifying a need and devising an original solution. Maybe a better question is, "Is there anyone who isn't an inventor?" Everyone has the capacity for invention. We all solve problems through inventive thinking, whether it's figuring out a way to prop open a window, stay dry in a rainstorm, or build a playhouse from scrap materials. Creative problem solving, improvisation, flexibility, and tinkering drive the inventive spirit.

### **WHAT'S AN INVENTION?**

An invention is a useful creation that didn't exist before.

- An invention usually fills a need or solves a problem.
- Inventions often make the world a better place.
- Inventions can be things (e.g., a cell phone or backpack) as well as ideas (e.g., a new method for tying a knot, or a story).
- An invention often makes something better (e.g., faster, stronger, cheaper, easier, safer or more efficient, attractive, useful, accurate, fun, or productive). But as long as it's a new way to do something, it's still an invention even if it isn't necessarily better than what existed before.

### **WHY INVENT?**

Inventing is a process. It starts with a need and ends up with something new—the actual invention.

- To solve problems: Inventors are skilled at spotting ways to improve a situation or process.
- To improve our world: Imagine how different our lives would be without inventions, such as computers, refrigerators, electricity, plastic, and medicine.
- To enjoy the creative process: Invention involves both thinking and doing.

### **THE PROCESS OF INVENTION INVOLVES:**

- identifying a problem and/or realizing that something can be improved.
- talking to people who might use the invention.
- brainstorming creative solutions to a problem, which often involves making imaginative connections between seemingly unrelated things.
- devising and testing solutions (i.e., experimenting).
- applying science and engineering concepts.
- using tools, materials, and techniques to make workable solutions.
- trying again when things don't work out.
- seeing a project through by being motivated, persistent, and dedicated.

### **INVENTION RESOURCES**

- National Invention Convention: [nationalinventioncurriculum.org](http://nationalinventioncurriculum.org)  
*All lessons, handouts, PowerPoints, and resources for the invention process*
- Discover Engineering: [discoverengineering.org](http://discoverengineering.org)  
*Find a host of projects, games, online activities, and videos about cool things engineers do and design.*
- Howtoons: [Howtoons.com](http://Howtoons.com)  
*Uses a cartoon format to step kids through 15 fun build-it-yourself projects.*
- The NASA Science Files: [scifiles.larc.nasa.gov/text/kids/D\\_Lab/acts\\_invention.html](http://scifiles.larc.nasa.gov/text/kids/D_Lab/acts_invention.html)  
*Includes invention experiments and simulations.*
- U.S. Patent and Trademark Office: Kids' Pages: [uspto.gov/go/kids](http://uspto.gov/go/kids)  
*Offers an interactive kids' page with games, puzzles, and links.*

Steps for Science Fair Project	Suggested Timeline	Log Checklist
Brainstorm Topics	Week of January 27th	<input type="checkbox"/> I am interested or excited about this topic. <input type="checkbox"/> I have chosen to work by myself or with a small group (4 max). <input type="checkbox"/> I can do most of this project on my own or with my group. <input type="checkbox"/> I have started writing in my log with dated entries.
Create a Testable Question and Hypothesis	Week of February 3rd	<input type="checkbox"/> My question cannot be answered yes or no. <input type="checkbox"/> My question tells me what I need to measure. <input type="checkbox"/> My question is not based on opinions. <input type="checkbox"/> My question does not involve experimenting with animals. <input type="checkbox"/> My hypothesis is based on research.
List Manipulated (Independent), Responding (Dependent), and Constant (Control) Variables	Week of February 10th	<input type="checkbox"/> I am only changing <b>one</b> manipulated variable in my experiment. <input type="checkbox"/> I know what I am changing on purpose (manipulated variable). <input type="checkbox"/> I know what I am measuring and the science tool I will use to measure it (responding variable). <input type="checkbox"/> I know what I am keeping the same (constant variable).
List Materials and Step-by-Step Directions (Procedures)	Weeks of February 17- March 2nd	<input type="checkbox"/> I have collected and listed all materials. <input type="checkbox"/> I have included how much and which types of materials. <input type="checkbox"/> My step-by-step directions are numbered and specific. <input type="checkbox"/> My step-by-step directions show repeated trials.
Begin Experiment and Collect Data (Taking pictures along the way are great for your board!)	Week of March 9th	<input type="checkbox"/> I have created a data table or chart. <input type="checkbox"/> I have collected data from multiple trials.
Create graphs	Week of March 16th	<input type="checkbox"/> I have created a graph with labels to display my data.
Write your conclusion	Week of March 23rd	<input type="checkbox"/> I have explained why my hypothesis was supported or not supported by the data. <input type="checkbox"/> I have explained patterns or trends in my data. <input type="checkbox"/> I have explained any challenges or unusual events. <input type="checkbox"/> I have explained how my project is important to the real world. <input type="checkbox"/> I have explained how I might do this project differently next time.
Work on your display board/model	Weeks of March 30 <sup>th</sup> -April 27th	<input type="checkbox"/> My display board is neat and organized. <input type="checkbox"/> My display board contains all important labels and information. <input type="checkbox"/> My display board has my first/last name and class.
Display boards and logs due	<b>Due: April 30th</b>	<input type="checkbox"/> I have turned in my display board and log with my first/last name and class on both.
<b>STEM Fair</b> Optional Models due	<b>Due: May 1st</b>	<input type="checkbox"/> I have brought my optional model to Camp Friendship and all parts are labeled inside of my bag with my first/last name and class.

Steps for Invention Project	Suggested Timeline	Log Checklist
Explaining the Problem and Identifying a Solution (Identifying and Understanding)	Week of January 27th	<ol style="list-style-type: none"> <li>1. What problem are you trying to solve?</li> <li>2. What is the result you are trying to achieve?</li> <li>3. What are some possible solutions and which one did you choose to do?</li> <li>4. Has this solution been done before?</li> </ol>
Creating and Improving the Design (Ideating and Designing)	Weeks of February 3 <sup>rd</sup> -February 10th	<ol style="list-style-type: none"> <li>5. Make a model (drawing) of the invention.</li> <li>6. What problems might you encounter with this design?</li> <li>7. How will you fix those problems?</li> <li>8. Repeat steps 5 to 7 until you have a design that you think will work.</li> </ol>
Building the Invention or Prototype (Designing, Building, Testing)	Weeks of February 17-March 16th	<ol style="list-style-type: none"> <li>9. What parts and materials will you need to make the invention?</li> <li>10. Where will you get those parts and materials?</li> <li>11. What additional skills will you need to make the invention?</li> <li>12. Who can help you do those activities?</li> <li>13. Get the parts and materials and build the invention. Get any help you need to build it.</li> <li>14. Test and evaluate the invention.</li> <li>15. Identify any problems with the invention.</li> <li>16. Repeat steps 5 to 15 until the invention works as planned.</li> </ol>
Naming the Invention (Communicating)	Week of March 23rd	<ol style="list-style-type: none"> <li>17. Name the invention.</li> </ol>
Planning and Creating the Invention Display Board (Communicating)	Weeks of March 30 <sup>th</sup> -April 20th	<ol style="list-style-type: none"> <li>18. Plan and create the Invention Display Board.</li> </ol>
Practicing What You Will Say About Your Invention (Communicating)	Week of April 27 <sup>th</sup>	<ol style="list-style-type: none"> <li>19. Practice what you will say about your invention in the Judging Circle.</li> <li>20. Be proud of what you have done!!!!</li> </ol>
Statement of Originality	Week of April 27 <sup>th</sup>	___ I promise that the ideas in this Invention Log are my own. (If a team, all should complete.)
Display boards and logs due	<b>Due: April 30th</b>	___ I have turned in my display board and log with my first/last name and class on both.
<b>STEM Fair</b> Optional Models due	<b>Due: May 1st</b>	___ I have brought my optional model to Camp Friendship and all parts are labeled inside of my bag with my first/last name and class.