

# **SCIENCE FAIR**



## **FIFTH GRADE INVENTION CONVENTION STUDENT PACKET**

2015

FRANK C. MARTIN K-8 CENTER

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Dear Students and Parents,

It is time to start planning the Frank C. Martin K-8 Center Annual Science Fair! The Science Fair is a school- sponsored activity that supplements the regular curriculum of classroom instruction. The classroom teacher and school administration have the responsibility to regulate the content and presentation of all student projects to assure that they are consistent with the interests of the school community. The purpose of this activity is to encourage students' interest in science, to develop their inquiry and investigation skills and to enhance children's pride in completing research projects.

The Frank C. Martin K-8 Center Science Fair will:

- Enable students to exhibit their projects and share ideas with other students and community members;
- Provide students with exciting opportunities to work with the scientific method on a topic of their own choosing which need not necessarily relate directly to the curriculum at a particular grade level;
- Recognize all students for participation or merit based on a rubric or set standard and
- Adhere to standards of effective scientific instruction. Projects that "fail" to turn out as expected are an important learning opportunity. Experimentation is a very valuable part of learning and "failure" of a project or experiment is considered a valid project for display.

All project ideas must be submitted to the school on the provided Project Proposal form. The proposal must contain a statement of problem or hypothesis and the proposed procedures for the project. The classroom teacher will approve projects. Projects without prior approval, projects inconsistent with the prior approved proposal, or projects that have been substantially changed from what was previously approved will only be displayed at the principal's discretion.

This packet will serve as a guide for a successful project. On the following pages you will find the following:

- A Science Fair Student Checklist: This is the timeline of what is due and when it is due to your teacher. Working plan grades will be earned by submitting your work in a timely manner.
- The Working Plan Pages: These pages will tell you what each portion of your project must contain.
- Safety and Display Requirements: These are the Do's and Don'ts of your final project
- Scoring Rubric Guidelines: This is a guide for your grading. A score will be determined on how well you are able to achieve the items on this rubric.

Feel free to speak with your Science Teacher if you have questions. Most importantly, have fun! All students will receive a ribbon of participation for their efforts in the Science Fair. Projects will be displayed for parents and visitors on **Wednesday, January 13, 2015**.

The Frank C. Martin K-8 Center Administration.

## Science Skills Learned and Practiced through Science Fair Participation:

**Observing** - The learner will identify objects and their properties utilizing all five senses, identify changes in various systems, and make organized observations.

**Classifying** - The learner will sort objects by their properties, match objects by their likenesses and differences, and describe the sub-components of objects.

**Measuring** - The learner will compare two like quantities where one is used as a unit of measure.

**Collecting and Organizing** - The learner will gather, describe, and record data and then order, classify, and compare the data to identify patterns and similarities.

**Predicting and Inferring** - The learner will suggest explanations for a set of collected data and then form generalizations.

**Identifying Variables** - The learner will formulate a hypothesis from a set of observations and inferences, and devise a method to verify the hypothesis.

**Synthesizing** - The learner will integrate process skills in the design, experimentation, and interpretation of an investigation of an observable phenomena.



## TYPES OF PROJECTS

**Invention:** Think of a need that exists for people in general, or a person with a specific handicap. Think about a device that could make a certain difficult task easier. Think of an inconvenience that could be made easier with a simple device. For example, if you hate searching for the toothpaste tube every morning, consider developing a homing beacon for it. You might want to look at specialty stores. This can be an improvement to an existing product or something completely brand new!





### **Invention Science Fair Rules and Guidelines:**

1. Only individual projects are allowed, students may not work together on an invention.
2. Inventions must fit into the following definition:
  - a. An inventions 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.
  - b. Sometimes an invention is an improvement to an object that was already invented. An invention must serve a purpose.
3. Inventors are encouraged to use recycled materials. The cost of the invention must not exceed \$25.00
4. Inventions may not include mold growth or the use of bacteria.
5. No use of vertebrate animals is allowed except for human observational projects.
6. No use of prescription drugs, harmful or illegal substances are allowed. Grocery items (i.e. baking soda, vinegar, salt, lemon juice, etc.) are appropriate.
7. Project display board must follow safety guidelines in this handbook.
8. Projects must be approved by the classroom teacher.

### **THE INVENTION PROCESS**

Adapted from the Connecticut Invention Convention Guidelines

#### **How do you use creative problem solving to go from problem to invention idea?**

Creative problem solving is a process for finding workable solutions to problems. However, finding the right problem to solve is often the most difficult part of the process.

#### **Getting Ideas**

It can be said that need is the mother of invention. Your idea for an invention will come from something that you or someone you know needs. There are several ways to find ideas for inventions. One way is to ask if there is anything, they may need.

Another method is called brainstorming. You can brainstorm alone or with others. Here is an example of how brainstorming works. Name an object such as a lunchbox. Take ten minutes to list everything you can that is wrong with lunchboxes. Next, find a way to correct some of the problems. Your ideas for solving the problems can be a big step toward inventing a new or improved product. Keep in mind that your invention does not have to be a product. Instead, it can be a new process for doing something. For example, it may be a better way of memorizing a list of objects or a new card game. Brainstorm a list of possible solutions and record this information. Review the list and eliminate all of the solutions that are impossible and those that already exist. Reasons for eliminating a solution include lack of knowledge, insufficient technical ability, and lack of necessary materials.

### **Find a Problem**

Focus on problems that you may have noticed during your daily life, i.e., opening a can of dog food, reaching the top shelf in your closet, having a place to sit as you wait in line.

### **Consider the Situation**

What do you already know? Focus on originality. If an inventor has an idea, it is important to know what already exists so that the inventor does not waste time “reinventing the wheel.” Call around to stores and do research in catalogs to find out if the invention already exists. Your parents may have to help you call stores because they will be taken more seriously. Be sure to record all this information in your log book.

### **Research and Planning**

Before an invention can be successful, you have to make a plan. Your plan should include all the steps you can think of, from beginning to end. When writing your plan, ask yourself questions such as these.

- What can I read about that will help me with my invention?
- Who can I talk to about solving problems and planning properly?
- What materials will I need?
- How can I control the cost of my invention?
- What steps should I follow?
- How much time should I allow for each step?
- How can I test my invention?

Do not be surprised if you have to change your plans along the way. Sometimes a plan will not work as well as you first thought it would. So keep an open mind for change. You may even discover a better way of completing a certain step.

### **Developing and Testing**

Now the work begins. Follow your plan step-by-step. If you have difficulty with a certain part of your invention, find an expert to ask questions. Try different things until you overcome the difficulty. Most of all, do not give up! As Henry Ford, one of the inventors of the automobile, once said, "Failure is only an opportunity to start again more intelligently."

If your invention is a new way to do something, describe your process in a written report. Give all the important details of your process. To show that your idea works, you should test it. The results of your test should be written into your report.

### **Naming the Invention**

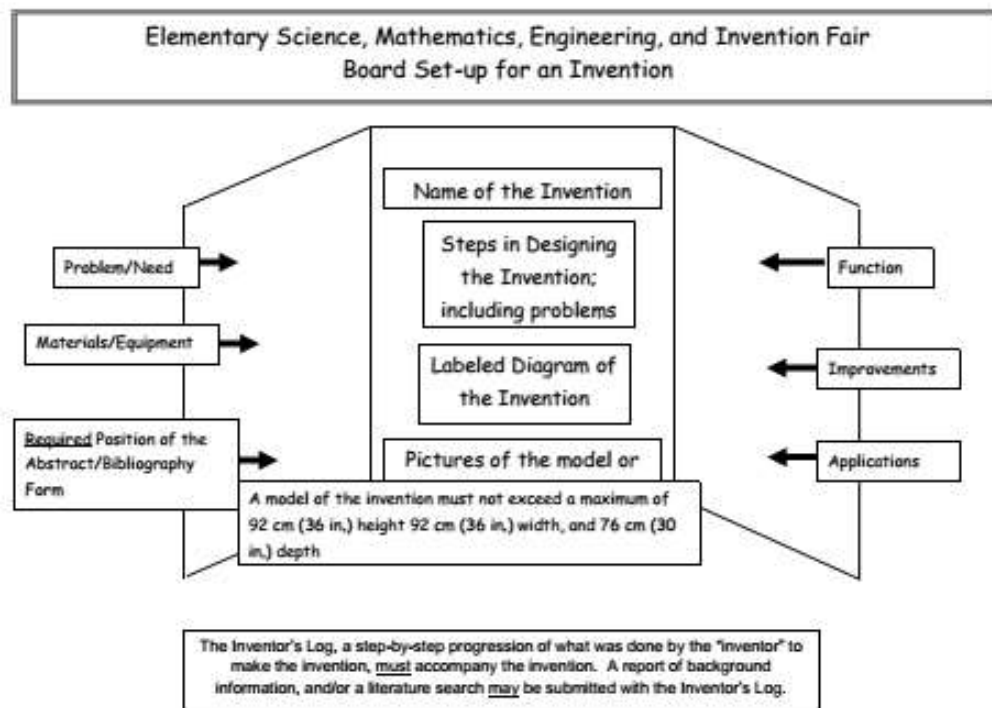
Develop a name for your product using the following guidelines:

- Do not make your brand name too similar to others.
- Do not make your brand name too descriptive. You want your name to be a unique eye-catcher.
- Be creative. Brand names that use rhyming or alliteration will grab people's attention. For example; Kit-Kat® or Cap'n Crunch®.
- Remember when you are brainstorming to go for a bunch of ideas.

## Invention Display Guidelines

1. Each invention must be accompanied by a self-standing display board.
  - Width: (side to side) 92 cm (36 in.)
  - Depth: (front to back) 76 cm (30 in.)
  - Height: Table Exhibit 92 cm (36 in.)
2. The Board needs to include the following information:
  - The title of the invention
  - A description of the problem the invention solves
  - A description of how the invention works
3. Each inventor must submit a log or report, which includes the following information:
  - A written statement of the purpose of the invention and the problem it solves.
  - A list of materials used.
  - A list of all the steps taken to complete the invention
  - A description of the problems encountered and include drawings or photographs of attempts that failed
  - A written statement proving originality, in addition to parent verification, students should also describe what they did to ensure that their invention does not already exist
4. 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.

Please note that failure to follow these invention project guidelines will be grounds for exclusion from the school and/or District Science Fair. In addition it will also affect the final project grade.



## **EXHIBIT GUIDELINES**

EXHIBIT SPACE: Maximum size is:

Width: (side to side) 9 cm (3 feet)

Depth: (front to back) 76 cm (2 1/2 feet)

Height: Table Exhibit 92 cm (3 feet)

- Keep the exhibit neat, uncluttered and to the point.
- All posters, charts, etc. must be attached to the exhibit.
- No part of an exhibit may be attached to walls or tables.
- Build your exhibit compactly. It must be self-supporting (FREE STANDING).
- Be sure to make everything sturdy so it can be safely transported.
- Fasten everything well.
- The exhibit displays your project. Use attractive lettering. Make cut-out letters since stencil letters can be hard to read.
- Use one-color printing to avoid confusion.
- Spell everything correctly.
- Main points should be large and simple. Details must be clear and legible from three feet away.
- The abstract/bibliography must be placed on the board's lower left-hand corner (as you face the board).

## Elementary Safety Display Guidelines

- Anything which could be hazardous to the public, the exhibitor, or other exhibitors is PROHIBITED.
- Nothing sharp or pointed

### **No organisms may be displayed, No vertebrates, invertebrate, fungi, bacteria, or plants.**

- No owl pellets No mice, live or dead No skeletons
- No fish, live or dead
- Microbial cultures- No fungi, live or dead
- No bread molds, bacteria, viruses, viroids, prions, rickettsia, live or dead
- No parasites, human or other, live or dead
- No insects, live or dead

### **No chemicals may be displayed.**

- No acids, dilute or strong
  - No bases, dilute or strong
  - No salt solutions
  - No insecticides
  - No repellents
  - No mercury
  - No medicines, vitamins, over-the-counter drugs
  - Flammable substances: No flammable substances may be displayed.
  - No gases
  - No solid rocket fuel
  - No flammable liquids
  - No fumes
- 
- An alternative solution to displaying the above items: Take photographs of the substances that were used or use a digital camera and create large pictures with a computer printer for display on your board. **No identifiable humans or their parts may be displayed in photos.**
- 
- All projects will be inspected for adherence to Science Fair Safety Guidelines by the classroom teacher or the school Science Fair Committee.



## INVENTION PROJECT ABSTRACT / BIBLIOGRAPHY

Student's Name: \_\_\_\_\_

Project Title: \_\_\_\_\_

### Abstract

(Complete Summary 3-5 Paragraphs with approximately 250 words)

**Be sure to include the following in the abstract of the project:**

- The purpose of the invention. Why did you choose to do this invention or how did you get the idea to do it?
- State what real life problem your invention addresses.
- State what products were used to create your invention.
- State what procedures/process was used to create your invention.
- What are the applications of your invention? How can the information you learned be used?
- How could your project be improved if you were to repeat it? If you were to continue your project, what would you do?

### Bibliography

**There should be at least three references. If the project concerns animals, there should be one reference concerning the care of that type of animal.**

#### **Book/Magazine Example:**

Jones, Jenny R., "Science Experiments to Try" Science Time, New York: Sterling Publishing Co., May 2004, Vol. 3:12-15

#### **Web Site Example: (Do not use search engines as a reference)**

Helmenstine, Anne, About Chemistry Website, <http://chemistry.about.com>, October 4, 2005.

#### **Conversation/Interview:**

Smith, John, Telephone Interview, March 5, 2013.

## SCORING RUBRIC GUIDELINES FOR INVENTION PROJECTS

CATEGORY	POINT DESCRIPTION	STUDENT SCORE				
		0	1	2	3	4
<b>Abstract &amp; Bibliography</b> To what degree does the abstract & bibliography describe the project and support the research?	0 =lacking an abstract/no documentation of research 1= poorly written and does not describe the project/ one documentation 2= poorly written /two documentations 3=well-written but does not describe all components of the project 4=well –written and completely describes the project	0	1	2	3	4
<b>Experimental Design</b> Does the design/model of the invention have the functionality and practicality to address/solve the problem?	0 =no design or model to address or solve the problem 1 = poor quality design, not functional or practical 2 = average quality design, functional but not practical 3 = sufficient quality, functional, practical design 4 = exemplary quality, very functional, practical design	0	1	2	3	4
<b>Experimental Procedures</b> How complete are sequential steps of the procedures?	0 =steps in the design of the invention are not listed or are not clear 1 = steps in the design of the invention are listed but are incomplete or vague 2 = steps in the design of the invention are clear but hard to follow 3 = steps in the design of the invention are clear and complete 4 = steps in the design of the invention are clear, complete, and easy to follow	0	1	2	3	4
<b>Materials/Equipment</b> How were the items utilized in appropriate or new ways?	0 =no materials/equipment identified/used 1= materials/equipment not appropriately identified or used unsafely 2= materials/equipment appropriately identified and used safely 3= materials/equipment carefully identified and used above expectations 4= materials/equipment carefully identified, used above expectations & costs kept minimal	0	1	2	3	4
<b>Scientific Process</b> How well has this experimenter done research and provided evidence to show that no similar product /invention exists?	0 = no documentation of research 1 = very little documentation of research 2 = sufficient documentation of research 3 = carefully documented, but little research 4 = carefully documented with extensive research	0	1	2	3	4
<b>Data Presentation</b> Are there labeled diagrams or data tables, which represent the invention?	0 = no labeled diagram or data tables 1 = partially labeled diagrams or data tables 2 = unclear or messy labeled diagrams or data tables 3 = sufficiently labeled diagrams or data tables 4 = exemplarily labeled diagrams or data tables	0	1	2	3	4
<b>Data Analysis</b> Are there labeled diagrams or data tables, which represent the invention?	0 = no improvements/additions to the invention were attempted 1 = limited improvements/additions to the invention were attempted 2 = some improvements/additions to the invention were attempted 3 = very good improvements/additions to the invention were made during its development 4 = excellent improvements/additions to the invention were made during its development	0	1	2	3	4
<b>Outcomes</b> Can the function of the invention be easily identified? How well does the project/invention meet the need for which it was created?	0 = the function of the invention is not easily identified and is does not meet the need 1 = the function of the invention can be identified, but the need is not met 2 = the function of the invention can be identified and the need is partially met 3 = the function of the invention is very good and the need is met 4 = the function of the invention is exemplary and the need is completely met	0	1	2	3	4
<b>Invention Design/Construction</b> How well is this invention designed and constructed?	0 = poorly designed and constructed 1 = poorly designed or poorly constructed 2 = adequate design and construction 3 = good design and construction 4 = well design and constructed, shows attention to detail	0	1	2	3	4
<b>Visual Display</b> How well is the invention displayed, constructed, and organized? Are spelling and sentence structure correct?	0 =unsatisfactory quality of display – more than 3 attributes missing 1= poor quality of display – only 2 – 3 attributes missing 2= average quality- only 1 attribute missing with minor errors and of fair quality 3= good quality – all attributes present and few if any minor errors 4= superior display – all attributes present and of exemplary quality	0	1	2	3	4
<b>Oral Presentation/Interview</b> How clear, well-prepared, and organized is the presentation? How complete is the student’s understanding of the experimental work?	0 =poor presentation; cannot answer questions 1= poor presentation; partially answers questions 2= fair presentation; adequately answers questions 3= good presentation; precisely answers all questions 4= exemplary presentation and knowledge; precisely answers all questions	0	1	2	3	4

## **GRADING SCALE**

Individual student projects must receive grades for each step in the research plan (See Science Fair Student Checklist). The teacher is to collect student responses to each area in the working plan no later than the date indicated. It is at the teacher's discretion to collect items earlier than the dates listed, providing students are provided adequate notice.

Overall project grades will be assigned using the scoring Rubric Guidelines form. A form will be provided for each student in third and fourth grades.

A = 44 – 39

B = 38 – 35

C = 34 – 30

D = 29 -26

F = 25 – 0

Students receiving a grade of A will be entered into the FCM Elementary Grades Science Fair Competition. Entries will be judged by guest judges and Participation, First, Second and Third place ribbons will be awarded for each grade level. The First and Second Place projects will be entered into the District's Elementary Grades Science Fair as a representative for the school.

**WE LOOK FORWARD TO OUTSTANDING WORK!**

## SCIENCE FAIR STUDENT CHECKLIST

Student Name: \_\_\_\_\_

Project Title: \_\_\_\_\_

WORKING PLAN	DUE DATE	PARENT INITIAL	TEACHER INITIAL	COMMENT
Problem/Title (Include Topic, Statement and Purpose.)	09/18/15			
Background/Research (Include copies of research articles)	09/25/15			
Hypothesis	09/30/15			
Bibliography	10/02/15			
Invention Plan (Include diagram, Procedures, Materials and costs)	10/16/15			
Develop Invention (conduct interviews, construct invention, submit photos of in progress)	10/29/15			
Function (Include graphs, charts, pictures)	11/06/15			
Suggested improvements	11/06/15			
Abstract	11/13/15			
Application	11/20/15			
Final Display	11/24/15			
Oral Presentation	11/30/15 Through 12/18/15			

Assignments may be submitted early with teacher's approval. **Each area submitted will be entered as an individual grade by the Science teacher.** Failure to submit each assignment by the date specified will result in a "0" (zero) for the assignment.

## Websites That May Be Helpful for Projects and Inventions:

<http://www.sciencebob.com/sciencefair/index.php>  
<http://www.invention-help.com/invention-help-books.htm>  
[http://pbskids.org/designsquad/pdf/parentseducators/DS\\_Invent\\_Guide\\_Full.pdf](http://pbskids.org/designsquad/pdf/parentseducators/DS_Invent_Guide_Full.pdf) (for teachers)  
<http://www.inventivekids.com/2010/10/05/step-by-step-guide-to-inventing/>  
<http://www.sciencebuddies.org>  
<http://www.showboard.com>  
<http://science.dadeschools.net/>  
<http://www.proteacher.com/110031.shtml>  
<http://www.sciedunet.org>  
<http://sciencepage.org/scifair.htm>  
<http://my.integritynet.com.au/purdic/science-fair-projects-ideas.htm>  
<http://www.ipl.org/div/kidspace/projectguide/>  
<http://www.super-science-fair-projects.com/elementary-science-fair-projects.html>  
[www.kidsinvent.org](http://www.kidsinvent.org)  
[www.howstuffworks.com](http://www.howstuffworks.com)  
<http://edweb.sdsu.edu/courses/EDTEC596/Project1/Inventors.html> (teachers only)  
<http://ctinventionconvention.org/>  
<http://library.thinkquest.org/J002783/InvCon.htm>  
<http://all-science-fair-projects.com/>

