

SCIENCE FAIR

EXPERIMENT & INVENTION

STUDENT PACKET

FRANK C. MARTIN K-8 CENTER

2019-2020

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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, December 5, 2018.**

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

Scientific Investigation: In this type of experimental project you ask a question, construct a hypothesis, test your hypothesis using an experiment and draw conclusions from your experiment. It involves using the scientific method. It must follow an experimental design.

- A. **Experiment:** In this kind of investigation, your purpose is to change something (test or independent/manipulated variable) and record the outcome of this change (outcome or dependent/responding variable). **EXAMPLE:** Which material, aluminum foil or plastic wrap, will insulate cold water better?
- B. **Experiment with a Control Group:** This kind of investigation involves a more complex investigation that is designed to test the effects of a single condition or factor on a system. For example, you might have a group of plants such as an experimental group and another group of the same type of plants as a control group.

Invention: In this type of project you design and engineer a practical solution to 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. Sometimes an invention is an improvement to an object that was already invented. You can think of a need that exists for people in general or a person with a specific handicap. Then think about a device that could make a difficult task easier or think of an inconvenience that could be made easier with a simple device. For example, if you do not like searching for the cellular phone or TV remote every day, consider developing a homing beacon for it.



Science Fair Rules and Guidelines: (School and District)

1. Only individual projects are allowed.
2. Only two types of projects may be entered into the District Fair, they are a scientific investigation or an invention.
3. Projects must fit in one of the 11 science fair project category criteria listed in this handbook.
4. **No mold growth, or bacteria projects are allowed.**
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. No Human subjects used to test (i.e., taste test, poking, pain reaction, sniffing, etc.)
8. Any projects that promote violence, weapons, or instill fear to the public, the exhibitor, or other exhibitors are PROHIBITED.
9. Project display boards must follow safety guidelines listed in this handbook.
10. Projects must be approved by the classroom teacher or a science fair committee.

SCIENCE FAIR CATEGORIES

	<p>Physical Science: Projects that study the nature and properties of nonliving matter, energy and/or force and motion.</p>
	<p>Behavioral Science: Projects that observe the behavior of invertebrate animals. The use of vertebrate animals is not allowed except for human observational projects.</p>
	<p>Botany: Projects that use subjects such as plants (mosses, seed plants) agriculture, conservation, and forestry. NO LIVE PLANTS may be displayed. Experiments using MOLD or FUNGI are NOT ALLOWED.</p>
	<p>Chemistry: Projects that examine chemical reactions, the chemistry of living things, photosynthesis, solubility, heat capacity, etc. No prescription drugs, dangerous or illegal substances should be used in the experiments.</p>
	<p>Earth and Space: These are projects investigating principles of geology (for example, weathering and erosion), geography, astronomy, meteorology, and related fields.</p>
	<p>Engineering: Projects can develop technological devices, which are useful to the global society within an engineering-related field, such as electricity, mechanical, chemical, aeronautical, and geological.</p>
	<p>Environmental Science: Projects that deal with global change, issues related to Earth, such as water, air, climate, waste and pollution, green living, human health, ecosystems and related fields.</p>
	<p>Medicine & Health: The project's emphasis will be on human health (Studies are limited to observational projects only)</p>
	<p>Zoology: Projects that observe and record the growth behaviors of animals (INVERTEBRATES). Vertebrate studies are limited to observational projects only.</p>
	<p>Mathematics: Projects are developed that demonstrate any theory or principal of mathematics.</p>
	<p>Inventions: projects that uses design and engineering processes to find a practical solution to a problem that addresses a need that exists for people in general or a person with a specific handicap.</p>

Please Note: Failure to meet the category criteria and safety guidelines will be grounds for exclusion from the school and/or District Science Fair. In addition, it will also affect the final project grade.

THE SCIENTIFIC METHOD

1. Asking a question.
2. Forming a hypothesis.
3. Designing an experiment.
 - a. Identifying variables.
 - b. Developing procedures.
 - c. Gathering materials and equipment.
4. Collecting data.
5. Analyzing data.
6. Forming a conclusion.

Step 1– Choose a Topic Decide on a Problem

Begin by exploring a scientific concept that you are interested in. This can be something that was read about or were introduced in the classroom. Go to the library or internet to learn more about your topic. Write a brief summary of the background information you gather for your science fair topic. Keep a record of where the background information came from. This information will be listed in your bibliography in Step 12.

At this point, your brain will start asking "What **if...**" questions. One of these questions is what you will use to design your experiment. It is called the "**TESTABLE QUESTION**". This will become your problem statement. Make sure that this has been approved by your teacher. Anything to do with your project should be recorded in your lab notebook.

Sample Project Topic:	Lights, Camera, Grow!
Sample Project Question:	In which light will bean seeds grow best: sunlight, red light, or green light?
Sample Project Purpose:	The purpose of this project is to determine which light is best for growing bean seeds.

Step 2 – Conduct Research

At this point, you should learn about your topic. Research experiments that may have been conducted on your topic to determine what is already known about it. Use various resources to help you understand your topic, not answer your problem statement.

Be sure to keep a record of what you research and read. This research will be used to create your bibliography.

Encyclopedia	Author's Last Name, First Name (year published). Topic. <u>Name of Encyclopedia</u> (volume #, page #) State published in: Name of Publisher.
Book	Author's Last Name, First Name (year published). <u>Title of Book</u> . City, State published in: Name of Publisher.
Internet	Give the title and internet address. Example: Battery Brands- www.Energy.com (Search engines, i.e. Google, ASK, etc. are not website addresses.)
Magazine	Author's Last Name, First Name (date published). "Title of Article." Name of Magazine. Pages.

Step 3 – Form a Hypothesis

Now that you have completed your background research you are ready to write a hypothesis. A hypothesis is an educated guess. It is a statement based on your research that you will attempt to prove or disapprove. Your hypothesis is a prediction of what you think will happen during your investigation.

A good hypothesis is a testable statement that is clear and brief.

Sample Project Hypothesis:	If bean seeds grow best in certain light, then bean seeds will grow best in sunlight.
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Step 4 – Experimental Design/Research Plan

The experimental design is a plan to confirm your hypothesis. This is not a specific item on your display board, but is determined by what your hypothesis is, the materials that you need and the procedures that you will carry out.

Scientists use the terms: subjects, variables and controls. The subject of the experiment is what is being tested. The variable is the condition that is changed. The controls are conditions that are not changed.

Sample Project Subject:	The subject is the bean seed.
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Sample Project Variable:	The type of light being used is the variables.
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Sample Project Controls:	Only the light source is changed. All other factors (container, amount of water given, temperature, soil, etc.) are controls. They are the same for every bean seed tested.
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All the factors, other than the variable, need to be the same for each subject. If factors in your experiment change, it will be impossible to determine whether your variable or some other factor caused the results.

Step 5 – Materials/Equipment

Now that you have planned your experiment, gather all the materials you will need to do the experiment. You will need to prepare a complete materials inventory. This list must include everything that you will use. Tell the size, quantity, kind and/or temperature of all items.

As you begin the experiment, make detailed observations of what is happening. Take your measurements carefully. Keep carefully written notes about what you do and how you do it.

Step 6 – Procedure

Write a detailed description of how to do your experiment. The procedure should be a step-by-step numbered list that anyone could follow to duplicate your experiment. You are writing a recipe for your science experiment.

As you work through it, you may find that you have to change it. That's OK, just make notes and change your procedure afterwards, to show the changes. Remember, any scientist should be able to take your procedure and repeat your experiment following your instructions.

- It is easier to use a numbered list, like in a cookbook rather than write a paragraph.
- **Start each sentence with an action verb: mix, stir, get, measure, etc.**
- Include quantities or amounts that you will measure using the metric units.

Step 7 – Variables and Controls

- Identify the **test variable** (independent/manipulated). This is the variable that you are changing on purpose in your experiment to observe what will happen. For example; the temperature of the water or the battery strength.
- Identify the **outcome variable** (dependent/responding variable), this is the one that reacts or changes in response to the **test** or independent/manipulated variable, i.e., amount of salt that dissolves or number of paper clips held by a magnet.
- Identify the **constant variables** in your experiment. These are the variables in your experiment that you do not change so that you can compare the effects from only one **test** (independent/manipulated) **variable**. Constant variables are quantities that a scientist wants to remain the same or be held constant. Most experiments have more than one constant variable. Some people refer to controlled variables as "constant variables."
- Use a **control group** if applicable in your experiment. A control group is the group that does not receive the experimental variable. Both it and the experimental group have what is usually considered normal conditions, i.e., room temperature, normal amount of water, normal amount of sunlight (constants). A control group helps you to be sure that what YOU DO in your experiment is affecting the test results.

Step 8 – Experiment

- Design a data table to keep track of your results.
- Carry out your experiment following your written procedures.
- Observe and record the results in a data table using metric units i.e., centimeters (cm); grams (g); or degrees Celsius (°C).
- If qualitative observations are made, a numbered scale must be developed to quantify the observations.
- Use photographs whenever possible to record observations. (**NO FACES IN PHOTOS**). These can be shown on the display board.

Then, **REPEAT THE EXPERIMENT** at least two more times. Record your results as carefully as you did the first time. **ALL** scientists repeat their experiments; we **INSIST** you repeat yours as well. All experiments must have a minimum of three trials.

Step 9 – Results

- When you have all of your results, you need to design the way that you will report the data.
- Many students use graphs, charts and written summaries of what happened in the experiment.
- Determine averages or the mean when appropriate.
- Use photographs whenever possible to show changes (**NO FACES IN PHOTOS**).
- Display all your data in charts, graphs, and/or pictures even if it does not match what you thought was going to happen under the heading Data on your display board.
- Explain your results in words and display this narrative under the heading Results on the display board.

Step 10– Compare your results with your Hypothesis

Look again at your HYPOTHESIS and at the results of your experiment. Think about what happened and why it happened that way. Write down the reasons you think the results happened the way they did.

Step 11 – Conclusion (One page Maximum)

A summary of what your experiment shows and how your work can be used for more research. Your conclusion should begin with a statement on whether or not your results agreed or disagreed with your hypothesis.

Explain what you learned from your experiment.

- Explain the importance of your results, how it contributes to making something better.
- Write comments about your project.
- Explain how you could have improved your project.

Step 12 – Abstract and Bibliography (Due with Online Registration and with submission packet)

The abstract is a complete summary of the investigation and must consist of three to five paragraphs with a total of approximately 250 words that includes the following.

- Describe your purpose and hypothesis. Briefly describe your procedure.
- Describe and explain your results and state if your hypothesis was supported or not by the results. Suggest a reason why it was or was not supported.
- Explain your conclusion and application(s).

It's important to cite your sources for a science fair project. Put your bibliography of at least 3 different sources on the same page. Here are some examples of how to cite books, online references, and conversations.

Here is an example for a book or magazine –

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

Here is an example for a Web site –

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

Here is an example for a conversation -- Smith, John, Telephone Conversation, Mar.5, 2013.

Complete Project Abstract/Bibliography form and submit to the teacher for final approval before working on the science fair board.

Step 13 – Application (1/2 page Maximum)

In the application you should explain why this experiment was important. It must be relevant to real life situations.

- How can you use the findings from this investigation in your day-to-day life? How can the investigation be improved?
- What new question(s) has your experiment lead you to ask that could be tested in a new investigation?

Step 14-- Final Display: 36 in. X 36 in. (Include First and last name and Teacher's name on back)

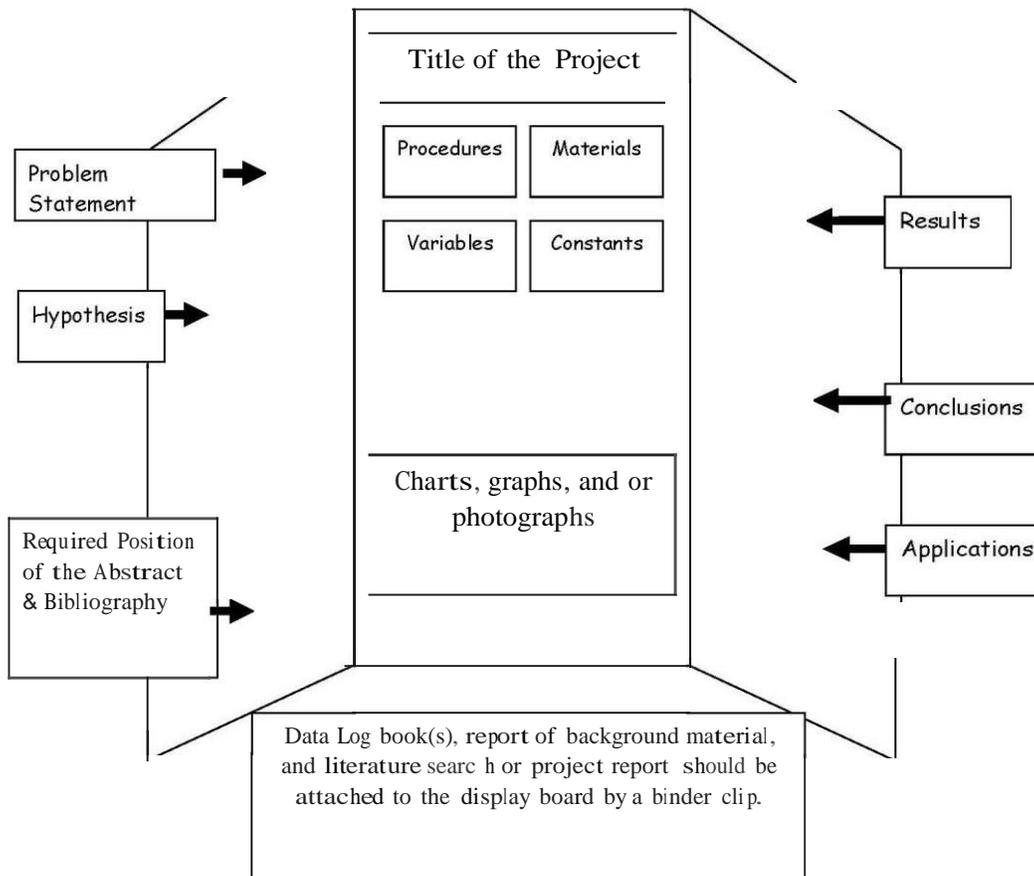


EXHIBIT GUIDELINES

EXHIBIT SPACE: Maximum size is:

Width: (side to side) 9 m (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
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- 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.**
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- All projects will be inspected for adherence to Science Fair Safety Guidelines by the classroom teacher or the school Science Fair Committee.

INVESTIGATION 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 project. Why did you choose to do this project or how did you get the idea to do it?
- State briefly what you thought would happen. Also, describe how you conducted your project.
- What happened? Tell the results of your experiment.
- What was the conclusion? Was your hypothesis correct?
- What are the applications of your project? 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 INVESTIGATION PROJECTS

CATEGORY	POINT DESCRIPTION	STUDENT SCORE				
		0	1	2	3	4
Abstract & Bibliography 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
Problem Statement To what level if the problem (objective) statement new and/or different for a student at this grade level and how well is it written?	0 =lacking problem (objective) statement 1= incomplete problem (objective) statement 2= complete problem (objective) statement, poorly written 3= complete well-written problem (objective) statement, new idea for student 4= above expectations for that level – detailed and well-written	0	1	2	3	4
Hypothesis To what degree is this a testable prediction?	0 =lacking hypothesis (objective) 1= incomplete hypothesis (objective) 2= hypothesis (objective) is present, but not completely testable 3= hypothesis (objective) is present, is well-written and testable 4= hypothesis (objective) is above expectations – detailed and well-written	0	1	2	3	4
Procedures Numbered step by step, sentences begin with verbs, quantities to measure are listed in metric units, and procedures are in a logical sequence.	0 =no overall procedural plan to validate or confirm the hypothesis 1= partial procedural plan to validate of confirm the hypothesis 2= sufficient procedural plan to validate of confirm the hypothesis 3=well-written procedural plan to validate of confirm the hypothesis 4= exemplary and detailed procedural plan including repeatability	0	1	2	3	4
Variables and Controls -Test (independent/manipulated) -Outcome (dependent/responding) -Control (if applicable) -Constants	0 =no variables are identified or controlled 1= some variables are identified or some constants are recognized 2= variables are identified but not all controls/constants 3= variables and controls/constants are identified 4= variables and controls/constants are clearly and appropriately identified	0	1	2	3	4
Materials/Equipment Were the items utilized in appropriate and/or new ways, listed in column form equipment specifically named, metric units are used?	0 =no materials/equipment identified/used 1= materials/equipment not appropriately identified or used improperly 2= materials/equipment appropriately identified but used improperly 3= materials/equipment carefully identified in column form & used appropriately 4= materials/equipment carefully identified and/or used above expectations	0	1	2	3	4
Results To what degree have the results been interpreted?	0 =no written narrative interpretation of data 1= insufficient written narrative interpretation of data 2= sufficient written narrative interpretation of data 3= comprehensive written narrative interpretation of data 4= comprehensive & significant interpretation of data above expectations	0	1	2	3	4
Conclusion To what degree are the conclusions recognized and interpreted?	0 = no problem statement or interpretation of data support for hypothesis 1= incomplete problem statement or interpretation of data support for hypothesis 2 = correct/complete conclusion/interpretation of data support for hypothesis 3 = well written conclusion/interpretation of data support for hypothesis 4 = well written conclusion/interpretation of data support for hypothesis with major findings and possible explanations for them	0	1	2	3	4
Applications To what degree are the applications recognized and interpreted? Use of findings/new question to be investigated / improvement to investigation	0 = no recommendations, applications or new questions recognized 1 = incomplete or vague recommendations, applications or new question 2 = apparent recommendations, applications or new questions recognized 3 = recommendations, applications and new questions clearly recognized 4= significant well written recommendations, applications, and new question	0	1	2	3	4
Visual Display Free standing / correct grammar / correct spelling / clear and legible /attractive visual display	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
Oral Presentation/Interview 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

INVENTIONS

Invention Project Guidelines

1. Each invention must be the product of a single inventor, this means that students may not work together on an invention.
2. Inventions must fit into the following definition:
 - 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.
 - 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.

The Invention Process

The following is 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

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.)

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

Each inventor must submit a log or report, which includes the following information:

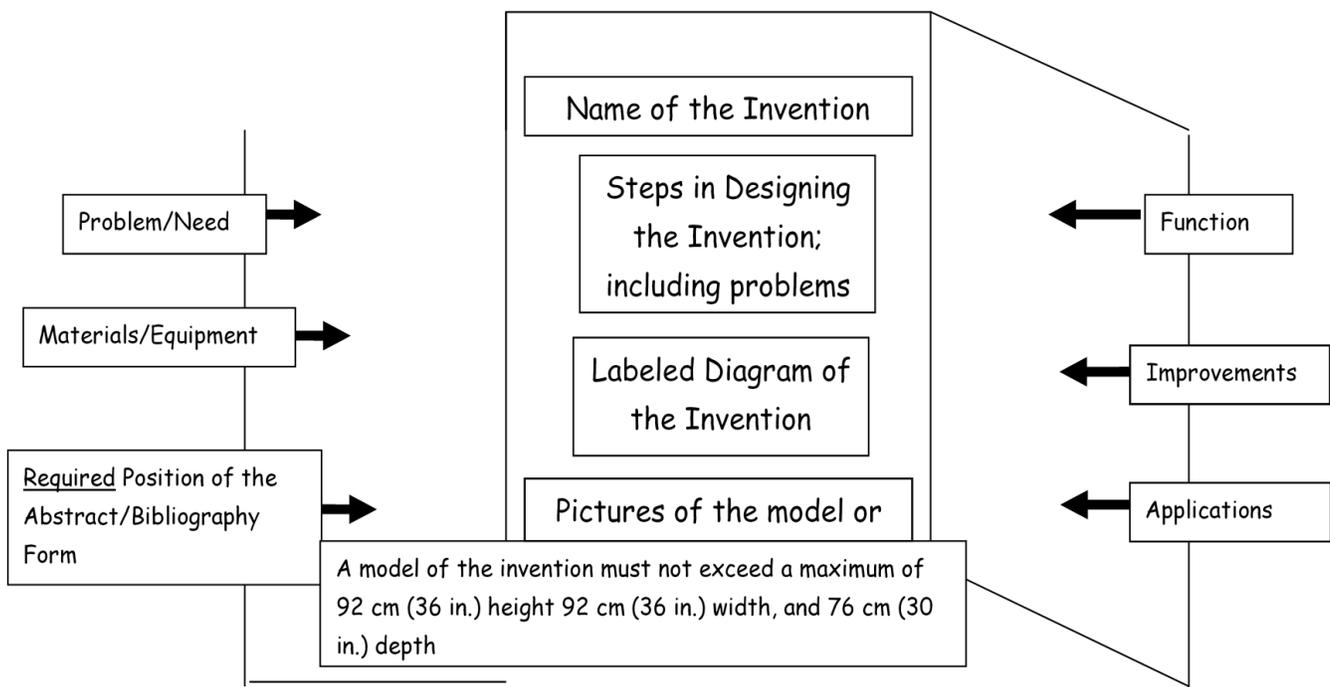
- A written statement of the purpose of the invention and the problem it solves.
- A list of materials used.
- A list of all the steps taken to complete the invention
- A description of the problems encountered and include drawings or photographs of attempts that failed

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

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.

Elementary Science, Mathematics, Engineering, and Invention Fair Board Set-up for an Invention



SCORING RUBRIC GUIDELINES FOR INVENTION PROJECTS

CATEGORY	POINT DESCRIPTION	STUDENT SCORE				
		0	1	2	3	4
Problem Does the invention identify a problem and address a problem or a need?	0 = No problem to solve or no need for the invention 1 = Poor invention or little need for it 2 = Unoriginal invention, questionable need 3 = Shows insight and address a problem or need 4 = Original, unique project/invention, that addresses or solves a real problem	0	1	2	3	4
Experimental Design Does the design/model of the invention have the functionality and practicality to address or solve the problem?	0 = No design or model to address or solve the problem 1 = Poor quality design, not functional nor 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
Experimental Procedures 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
Materials/Equipment How were the items utilized in appropriate and/or new ways?	0 = No materials/equipment identified/used 1 = Materials not appropriately identified and/or used unsafely 2 = Materials appropriately identified and used safely 3 = Materials carefully identified and used above expectations 4 = Materials carefully identified, used above expectations, and costs kept down	0	1	2	3	4
Scientific Process How well has this experimenter done research and provided evidence to show that no similar project/invention exists?	0 = No documentation of research 1 = Very little documentation of research 2 = Sufficiently documentation of research 3 = Carefully documented, but limited research 4 = Carefully documented with extensive research	0	1	2	3	4
Data Presentation Are there labeled diagrams or data tables, which represent the project/invention?	0 = No labeled diagram(s) or data tables 1 = Partially labeled diagrams or data tables 2 = Unclear or messy labeled diagram(s) or data tables 3 = Sufficiently labeled diagram(s) or data tables 4 = Exemplarily labeled diagram(s) or data tables	0	1	2	3	4
Data Analysis What problems were encountered in the development of the project/invention? What additions could be made to this project/invention to make it better?	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
Outcomes 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 it 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
Project/Invention Design/Construction How well is this invention designed and constructed?	0 = Poorly designed and constructed 1 = Poorly designed or poorly constructed 2 = Adequate design and constructed 3 = Good design and constructed 4 = Well designed and constructed, shows attention to detail	0	1	2	3	4
Visual Display How well is the invention displayed, constructed, and organized? Are spelling and sentence structure correct?	0 = Unsatisfactory quality of display - more than three attributes are missing 1 = Poor quality of display - only two or three attributes are missing 2 = Average quality- only one attribute missing with minor errors and of fair quality 3 = Good quality – all attributes present and with few if any minor errors 4 = Superior display – all attributes present and of exemplary quality	0	1	2	3	4
Oral Presentation or Interview -How clear, well prepared and organized is the presentation? -How complete is the student's understanding of the invention?	0 = Poor display, construction, and grammar 1 = One of the following attributes is done poorly: display; construction; grammar 2 = Fair display/construction/grammar 3 = Good display/construction/grammar 4 = Exemplary display/construction/grammar	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 EXPERIMENT	WORKING PLAN INVENTION	DUE DATE	PARENT INITIAL	TEACHER INITIAL
Problem/Title (Include Topic, Statement and Purpose.)	Problem/Title (Include Topic, Statement and Purpose.)	9/6/19-9/19/19		
Background/Research (Include copies of research articles)	Background/Research (Include copies of research articles)	09/20/19		
Bibliography	Bibliography	09/27/19		
Hypothesis	Hypothesis	10/11/19		
Research Plan (Include Procedures, Materials and Variables)	Invention Plan (Include Diagram, Procedures, Materials and Costs)	10/11/19-11/18/19		
Conduct Experiment (Collect Data and Record Results)	Develop Invention (Conduct interviews, construct invention & submit photos in	10/11/19-11/18/19		
Data (Include graphs, charts, pictures)	Function (Include graphs, charts, pictures)	10/11/19-11/18/19		
Results	Suggested Improvements	10/11/19-11/18/19		
Conclusion	Conclusion	10/11/19-11/18/19		
Abstract	Abstract	10/11/19-11/18/19		
Application	Application	10/11/19-11/18/19		
Final Display	Final Display	11/21/19		
Oral Presentation	Oral Presentation	11/22/19-12/03/19		

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 (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/kidspage/projectguide/>

<http://www.super-science-fair-projects.com/elementary-science-fair-projects.html>

www.kidsinvent.org

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/>

