3rd – 5th Grade Science Fair Information

Dear Guardian(s) of a 3rd through 5th Grade Student,

St. Louis will be holding its science fair on **January 19, 2017**. 3rd through 4th graders are highly encouraged to participate by entering a project. 5th grade students are required to enter a project. **Your child's project must be brought up to school by Wednesday, January 18th**. This would be a project completed outside of the class and the responsibility of the student. Third grade and up are eligible to continue on to the Austin Regional Science Festival, in addition to participating in the St. Louis Science Fair. The St. Louis Elementary Science Fair committee will host a parent orientation meeting on **November 30, 2016 at 6:30 in the school library.** This is not a mandatory meeting. It is strictly to help parents prepare for our local fair and to assist them in preparing their child for advancement to the next level if they so choose.

Please see the section below and the following pages to find more information about each type of project that can be submitted. A step by step guide is provided for the various types of projects below.

Exhibit: Demonstration, Model, or Display	***Experiment/Comparative Investigation or Engineering Projects***
A demonstration or model describes how or why something works. A display reveals details about the topic. - Title - Research Report - Exhibit Explanation - Conclusions - References and Acknowledgements	An experiment is a test of a question to which you do not already know the answer. To test your question, you must follow the steps of the scientific method. The display board elements below list these steps. - Title of Experiment - Problem (testable question) - Definitions - Hypothesis - Background Information - Experimental Procedure - Experimental Materials - Results (Data) - Conclusion - References and Acknowledgements

Please remember that the following projects are NOT allowed:

No student will be allowed to design or conduct any science project that involves:

- firearms, explosives, or discharge air pressure canister devices (i.e. potato guns)
- **growing bacteria or mold at home**

- causing pain, suffering, sickness, or death of an animal
- any activity or substance that presents a danger to the student or the environment, including hazardous chemicals or radioactive materials

Science Fair Committee

GENERAL INFORMATION

1. Projects That Are NOT Allowed

No student in the Elementary Division will be allowed to design or conduct any science project that involves:

- **<u>growing bacteria or mold at home</u>**
    - Includes any food/materials not thrown away at the very first sign of rot, mold or bacteria growth
- Discharging firearms, explosives, or air pressure canister devices (i.e. potato guns)
- causing pain, suffering, sickness, or death of an animal
    - Do not cause injury or stress to any animal. Includes feeding with improper food or chemicals, and keeping an animal in an unusual habitat.
- any activity or substance that presents a danger to the student or the environment, including hazardous chemicals or radioactive materials

2. Project Display and Safety Guidelines

All student projects must follow the guidelines listed below to be allowed to display at the fair.

Items Not Allowed on the Board or at Project

- **No organisms; living, dead or preserved (plants or animals)**
- No human/animal parts or body fluids (for example, blood, urine)
- **No human or animal food**
- **No bacteria or mold cultures**
- **No liquids** – laboratory/household chemicals **including water**
- No poisons, drugs, controlled or hazardous substances
- No sharp items (for example: syringes, needles, pipettes, knives, tacks, nails)
- **No glass or glass objects** unless encased or an integral and necessary part of a commercial product (for example, a computer screen)
- No pressurized tanks or containers
- No batteries with open top cells (so that battery acid can be seen)
- **No dirt, soil, gravel, rocks, sand, waste products, etc.**
- No project, activity or device deemed dangerous or hazardous to student health
- No photographs or pictures of animals or people in surgical techniques, dissections, or necropsies.

(If doing a project with plants, take pictures and display those on Project Board)

Discouraged Items

Expensive, breakable, or fragile items.

Items Considered an Exception at Campus Fairs (This exception does NOT apply to Austin Energy)

1st – 3rd grade students may have **properly sealed*** specimens (dead or preserved plant or Earth/mineral materials) as part of their project display. (shells, rocks, leaves, soil)
"Properly sealed" means items cannot leak liquid, particles or odors out of their container.
*Items must be **double bagged in sturdy (freezer) bags** **OR***
*Items must be **placed in clear, plastic containers with the lid sealed using clear book tape.** All items must be dried before sealing. Freezer bags may be attached to the project board with clear book tape for safe and neat display.*

Allowed and Encouraged Items

- Photographs, drawings, stuffed animals, artificial plants, or imitation (play) food should be used to depict the prohibited and discouraged items.
- **Be sure to properly credit/acknowledge all photographers on the display board (Photo taken by…).**
- Students should always plan on taking photographs of the project steps as a visual explanation of their effort. Students must ask permission before photographing any other individuals for display on the project board.
- Students may use a computer and printer for written parts of the project.
- Electrical projects may use batteries as sources of electricity.

3. Display Board/Presentation

A project display board should be on sturdy **36" x 48" tri-fold board** available at local craft and office supply stores. Written material, drawings, and pictures should be securely attached to the display board. For ideas on creating project boards, visit **www.showboard.com**.
Projects will be displayed on tables that are 36 inches high. Size of display boards may not exceed the following measurements: 15" deep, 48" wide, and 72" high.

4. Electricity for Your Display

- Electrical projects may use batteries as sources of electricity.
- If a project requires electricity, that need should be indicated when registering the project.

5. Project Organization

A. Grade Level: Each project is categorized by grade level or grade level equivalent

B. Project Categories: There are two types of projects that students may enter. These categories are explained in detail later in this guide.
(1) Exhibit: Demonstration, Model or Display (3rd grade only)
(2) Experiment (3rd – 5th grade)

***Note:** Many students and teachers have difficulty discerning the difference between Exhibit and Experiment projects.

- **<u>Experiments/Engineering Projects (3rd – 5th Grade)</u>**
  - Follow organized steps of a scientific process.

- Clearly asks a question/problem to which you do not already know the answer without testing.
- Measures data to find out the effect of one change that was tested.

- **Exhibits (3rd Grade Only)**
  - Explain how or why something works.
  - Show details about the thing being described
  - Have a report and description – NOT a question

6. Parental Help

Some students are fortunate to have parents who have time to help them. However, parents who do the thinking or build the project for them do not really help students. Parents are encouraged to help their children in these ways:

- Read and discuss this handbook
- Select projects which are appropriate for the child's age and grade level
- Plan and manage project work times and clean-up times
- Take your child to the public library or other places for research
- Help draw straight lines for a young child
- Listen to your child's oral explanation of the project
- Ensure the child's safety

Students must list any parental help in the Acknowledgements section of the project.

HOW TO DO AN ELEMENTARY SCIENCE FAIR PROJECT – STUDENT GUIDE

Austin Energy Regional Science Festival

1. PURCHASE SPIRAL NOTEBOOK

• You will use this notebook as a journal or log book to write down everything you do. You need to date every entry and note how much time you spent on each item. Begin writing in your journal when you start brainstorming ideas.

2. BRAINSTORM GENERAL IDEAS

• What are your interests or likes? Sports, dance, computers, animals, food, gross stuff, building things… etc.
• What kind of science interests you?
• Plants (Botany)
• Animals (Zoology)
• Human Body (Anatomy)
• Electricity, Gravity, Force, Light (Physical Science)
• Chemicals, Acids/Bases (Chemistry)
• Memory, Illusions, Training (Psychology)
• Volcanoes, Rocks, Weather (Earth Science)
• Product Testing (Consumer Science)
• Surveys (Statistics)
• Look at project idea books, and/or Web sites like **www.sciencebuddies.org**

• Exhibit: Demonstration, Model, or Display* – shows how or why something works the way it does. This information can be found in a book; the facts are known.
• Experiment* – uses the steps of the scientific method to answer a question to which you do not know the answer without testing.
** See the next 2 pages for step-by-step instructions for each type of project.*
• Important – Pay attention to the difference between an experiment and a demonstration.
Many people and books confuse these two categories. Below are two examples of project ideas relating to rainbows, one as a demonstration and the other as an experiment.
Demonstration: How are rainbows formed?
Experiment: Can you form a rainbow by using a liquid other than water?

4. COMBINE YOUR FAVORITE IDEAS INTO A PROJECT

Below are outlines on how to execute each type of project. You can use each number point to break the project up into smaller tasks.

For a Demonstration/Model (3rd Grade Only):

An exhibit can be a demonstration, a model or a display. A demonstration or model describes how or why something works. A display reveals details about the topic.

****** Remember to write a notebook entry every time you do any work on your project. List the date and how much time you worked for each entry. Be sure to take pictures as you go along that can be used in your "Journal/Logbook" or on your project board. Write down your scientific thinking and brainstorming, how you selected your project.

Decide if you want to construct a model or show how something works. Be sure to leave enough time for this since some models can take a lot of time to create. If you don't make a model, decide what you'll use instead, such as photographs, drawings or objects from home.

1. Gather background research by taking notes from books, websites or articles that talk about your subject. These will be your "References." You will know you have completed your research when you can discuss your topic in your own words for about 5 minutes. Be sure you list all the resources you used for your project in the reference section.

2. Once research is completed, begin organizing all the information into paragraphs. This will be the "Background/Research" section that you'll put on your project board.

3. You'll also need to have a "Written Explanation" section on your board in which you can explain what your project is about.

4. Create a section called "Conclusions" in which you talk about what you learned and what you could improve upon with your model/demonstration.

5. Include "Acknowledgements" on your project board (names of the people who helped you with your project and how they helped).

6. Pay close attention to the layout of the project board. The order of information should make sense and be visually interesting. Be sure to include all the required elements, photos, and a log book. As a last step, add a creative "Title" and be sure to list the person who took the photos on the board. You can buy a cardboard backboard form Office Max, Walmart or Office Depot. Maximum size limits are 15" deep, 48" wide, and 72" high. No glass, open liquids, live animals, open food items, bacteria, mold cultures dirt are allowed in the exhibit. If you are using items that are not allowed on the exhibit floor take photos and paste them on your board instead.
7. Be sure you understand and are able to talk about what you've learned from your project. Practice presenting your project to an adult.

For an Experiment/Engineering Project (3rd – 5th Grade):

An experiment is a test of a question to which you do not already know the answer without testing. To test your question, you must follow steps of a scientific process.

****** Remember to write a notebook entry every time you do any work on your project. List the date and how much time you worked for each entry. Be sure to take pictures as you go along that can be used in your "Journal/Logbook" or on your project board. Write down your scientific thinking and brainstorming, how you selected your project.

1. **Choosing Your Topic**
   - Make a list of things that interest you in your Journal.
   - Ask these questions:
     Can I find enough information on this topic?
     Does the experiment need anything special?
     Do I have enough time to do the project?
   - Make sure you can experiment with the thing that you are interested in.
   - Do not just make or build something.
   - Write the topic in the form of a problem statement. See #2.

2. **Problem.** You will need to identify the problem. The "Problem" is the question that your experiment is trying to answer. *The question must be something that you're able to test.*

3. **Background Research.**
   Gathering Information.
   - Visit the library to collect information on your topic from magazines, books, encyclopedias, and internet sources.
   - Write what you find in your journal.
   - Make sure you write down the name of the book or web page, who wrote it, the year it was printed and the publisher of the book.
   - Talk with experts
   - Ask your parents or teacher to help set up an interview with someone who knows about your topic.
   - Write or email for information from companies or experts.

- These will be your "References." You will know you have completed your research when you can discuss your topic in your own words for about 5 minutes.
- 6. Once research is completed, begin organizing all the information into paragraphs. This will be the "Background/Research" section that you'll put on your project board.

4. Formulate a "**Hypothesis**." A hypothesis is an educated guess at what you think will happen when you test your experiment.
    - It will be about what will happen because of the changes you make.
    - The hypothesis will show that one thing will change another. This is called cause and effect.
    - Write your hypothesis in your Journal in this way: I predict that _____because _____.

5. **Variables and Definitions**. Find the "Definitions" of any important words that are written in your Problem Statement or your Hypothesis.
    - Variables are all things that can change in your experiment.
    - Only change ONE thing at a time.
    - Find out what causes something to happen.
    - The cause in your hypothesis is the independent variable.
    - The effect in your hypothesis is your dependent variable.
    - The only thing that you will change is the independent variable.
    - What happens is the dependent variable.

    Example: stained shirt + stain remover = clean shirt
    PROBLEM + INDEPENDENT VARIABLE = DEPENDENT VARIABLE

6. **Materials**. Make a list of the **"**Materials**"** that you will need to conduct your experiment.

7. **Procedure**. Write up your "Procedure," or the steps that you will follow when doing your experiment.

    - Be detailed so that someone reading your project board could perform your experiment, using just your instructions.
    - An experiment must consist of at least 2 groups. One group is the "Control" and the other is the "Variable." Both groups are identical, except for one specific element. The "Variable" is the specific element that is different; it is the very thing that you are trying to test. (An example experiment might be to test a stain remover to see if it removes stains any better than washing with no stain remover. The stained garments, your wash technique, and drying technique would be exactly the same for both groups, with one exception. In the Variable group, you would use a stain remover. In the Control Group, you would *not* use a stain remover.)

A. <u>Control Experiment.</u>
    a. A control will let you know if your change is really causing the results.
    b. When you do the control experiment, MAKE NO CHANGES.

    Example: Stained shirt + no stain remover = stained shirt
    PROBLEM + NO CHANGE IN ANYTHING = CONTROL

B. Experiment.

- List the steps of your experiment in your journal.

Example: stained shirt + stain remover = clean shirt
PROBLEM + INDEPENDENT VARIABLE = DEPENDENT VARIABLE

8. Use a timeline to plan how long it will take you to complete your experiment and create a project board. If you will need live subjects (people, plants, or animals), be sure to allow enough time. (Remember, plants take a while to grow.)

9. **Perform your Experiment**.
    - Do the experiment at least 3 times.
    - Follow the steps you wrote.
    - Record the "Results" which tells what happened. Remember that a good experiment will have results that you can clearly measure. Use a chart and/or a graph to clearly show your results on your project board. *(More on next page)*
    - Write down the time and date of your experiment in your journal each time you do it.
    - You may include drawings or photos of what is happening.
    - Don't ever erase mistakes in a journal. Just draw a single line through your mistakes.

10. **Organize your Results**.
    - Put what you found from your experiment in a chart or table in your Journal.
    - Make a graph from your results in your Journal.
    - Don't worry if what happens is not what you expected!

11. **Conclusion**. After you find your Results, form a "Conclusion" paragraph which answers the question in the Problem Statement and talks about what happened in your experiment. Be sure to include ways to improve your experiment.
    - Think about everything that happened.
    - What was expected? Did anything surprise you?
    - Why did these things happen?
    - Write your conclusion in your journal in this way: My results agree with my hypothesis because _____. OR my results do not agree with my hypothesis because _____.

12. Write your **Formal Report**.
    - The formal report is how people can read about what you have done.
    - The information for your formal report comes from your Journal.
    - Your report will have the following parts;
        1. Title Page – The title of your project, your name, your school and your grade.
        2. Problem- Tell the topic you are investigating in the form of your problem statement.
        3. Definitions- Define your independent and dependent variables and your control.
        4. Hypothesis – Predict what the results to your experiment will be.

5. Background information – Tell what you found out about your topic when you went to the library, researched on the internet and talked with experts.
6. Procedure – Included a list of materials you used and step by step instructions on how you did your experiment.
7. Results – The data you collected as you did your experiment shown in a graph or table. Write a few sentences about your conclusions.
8. Acknowledgements – List the names of all the people who helped you with your project and tell what they did for you.

13. Making your **Project Board**.
    - Don't forget to include "Acknowledgements" on your project board (names of the people who helped you with your project and how they helped).
    - Pay close attention to the layout of the project board. The order of information should make sense and be visually interesting. Be sure to include all the required elements, photos, and a log book. As a last step, add a creative "Title." You can buy a cardboard backboard form Office Max, Walmart or Office Depot. Maximum size limits are 15" deep, 48" wide and 72" high. No glass, open liquids, live animals, open food items, bacteria, mold cultures dirt are allowed in the exhibit. If you are using items that are not allowed on the exhibit floor take photos and paste them on your board instead.

14. Be sure you understand and are able to talk about what you've learned from your project. Practice presenting your project to an adult.

CRITERIA FOR JUDGING
DIFFERENT TYPES OF PROJECTS

A. EXHIBIT: Demonstration, Model, or Display

An exhibit can be a demonstration, a model or a display. A demonstration or model describes how or why something works. A display reveals details about the topic.

DISPLAY BOARD ELEMENTS
TITLE of Demonstration, Model or Display
RESEARCH REPORT gives background information about exhibit (may include diagrams and pictures)
EXPLANATION of what the exhibit shows
CONCLUSIONS
REFERENCES and ACKNOWLEDGEMENTS

Exhibit			Project #	Judge #
Scores follow a general continuum with Score 3 being an "expected" level and Score 5 being a "clearly outstanding" level.				
	Score 1	**Score 2**	**Score 3**	**Score 4**	**Score 5**
Title	• Not on display	• On display • Clearly relates to topic	**Score 2 is maximum score for this element.**		
Research Report *Student provides written research information.*	• Information inadequate • Not focused on topic	• Copied from resource • On topic	• Partly student generated • General information with few details	• Student generated • Information organized • Some graphics	• Student generated • Well organized • Detailed descriptions • Variety of supporting graphics
Exhibit Explanation *Student describes what the exhibit shows.*	• Little or no understanding • Does not use project elements to share information	• Some general understanding • Reads from project display	• Basic understanding • Uses project elements to share information	• Clear understanding of topic and details • Uses models and/or diagrams to support explanations	• In depth understanding of topic • Clearly describes detailed steps of process or parts of model
Conclusions *Student describes what was learned.*	• Unclear / incomplete reasoning	• Repeats facts to describe learning	• States what was learned	• Gives explanation of learning	• Relates learning to project details • Connects learning to their own life
References and Acknowledgments *Student credits all sources and assistance and includes as part of display.*	• Sources and credits not included	• Incomplete or general source • Some credits given	• Lists 2 complete sources • Credits all assistance • One type of resource used	• Lists several sources • Detailed credits of assistance • Two types of resources used	• Lists all sources • Credits all assistance in detail (i.e. photographer) • Used multiple types of sources (i.e. website, book, magazine)

EXAMPLES

Demonstration

You demonstrate how light reflects off different objects. For instance, you might arrange a set of Lucite mirrors (no glass) or even pieces of foil to show how a beam of light from a flashlight bounces from one reflective surface to another. Your report could explain that light travels in straight lines. Many demonstrations are found in books like "Mr. Wizard," which are available from the library.

Model

You might like to make a model of a bridge out of wood or sticks. Diagrams could show the parts, and your report could explain how a bridge is constructed.

Display

You might design a display about monkeys, showing pictures of different types of monkeys. Your report could explain where the monkeys live, what they eat, and describe some interesting habits.

Remember to check the list of prohibited/discouraged/allowed items before building your exhibit. ***Always plan on taking photographs of your project steps as a visual explanation of your model.***

B. EXPERIMENT/ENGINEERING

An experiment is a test of a question to which you do not already know the answer without testing. To test your question, you must follow steps of a scientific process. The display board elements below list these steps.

DISPLAY BOARD ELEMENTS

TITLE of experiment

PROBLEM: What question are you trying to answer?

DEFINITIONS: Explains the meanings of any special words stated in the "Problem."

HYPOTHESIS: This is what you think will happen before you start to test.

BACKGROUND INFORMATION: What do books, articles, and the Internet say about your topic?

EXPERIMENTAL MATERIALS: What items do you need to perform your experiment?

EXPERIMENTAL PROCEDURE: These are the steps you follow to test your problem.
RESULTS: What happened? (Use tables of data or graphs plus a description.)
CONCLUSION: What is the answer to the question in your "Problem?" How do you explain your results?
REFERENCES and ACKNOWLEDGEMENTS: Books, resource people, articles (include the title and author) or specific Web sites (not the search engine, i.e., Google, Yahoo, etc.)

CRITERIA FOR JUDGING
Experiment/Engineering

Experiment / Engineering Project			**Project #**	**Judge #**		**POINT TOTAL:**
Scores follow a general continuum with Score 3 being an "expected" level and Score 5 being a "clearly outstanding" level.						
	Score 1	**Score 2**	**Score 3**	**Score 4**	**Score 5**	**Points by Category**
Title *Problem/Question can be the project title.*	• Not on display	• On display • Clearly relates to topic	**Score 2 is maximum score for this element.**			
Problem / Question *Student asks a testable question or problem.*	• Not on display • Not stated by student	• Displayed or stated • Not relate to procedure • Cause, effect (outcome), and measurable change not included	• Displayed • Relates to procedure • Includes the effect of the test (outcome)	• Displayed • Relates to procedure • Includes cause of change and resulting effect (outcome)	• Displayed • Relates purpose of test • Clear cause (specific change), effect (specific outcome), and how change will be measured	
Definitions *Student knows the meaning of relevant vocabulary.*	• Not displayed • No understanding	• Displayed in academic language • Little understanding	• Displayed in academic language • Fair understanding when questioned	• Displayed in student language • Refers to definitions	• Displayed in student language • Uses words authentically	
Background Information *Student provides written research information.*	• None displayed or provided • No understanding	• Copied information • Poor understanding	• Mostly student-generated • Fair understanding • Reads if questioned	• Student generated • Understands concepts • Can share without reading	• Student generated • Uses to explain thinking process in development of the test or proposed solution.	
Hypothesis or Engineering Goal *Student predicts test results or states engineering goal.*	• Not given • Does not relate to problem/question • Reason not provided	• Displayed • Missing what will be tested and cause the expected result • Reason not provided	• Displayed • States expected result without test or measurement details • Reason provided	• Displayed • Includes test and expected result • Reason relates weakly to background info	• Displayed • Includes details of test and expected result with measurement • Reason supported with background info	
Experimental Materials *Student lists items needed for test.*	• None recorded • Cannot replicate	• Missing items • No quantities noted • Cannot replicate	• All items • Quantities incomplete • Cannot replicate	• All items • Quantities noted (not all metric system) • Not organized • Can replicate	• All items • Quantities noted (metric system) • Organized in a list • Can replicate	

Rubric Continued on back

2014/2015

	Score 1	Score 2	Score 3	Score 4	Score 5	Points by Category
Experimental Procedure / Design Process *Student describes steps of the testing or engineering process.*	• Steps not recorded • Cannot communicate process • Cannot replicate	• Steps incomplete • Not sequenced • Cannot communicate process • Cannot replicate	• Steps mostly complete • Some sequence • Reads board to communicate • Missing many details needed to replicate	• Steps complete with little detail • Sequenced but unclear • Uses board to communicate • Can replicate process in general	• Steps complete with strong details • Clearly sequenced using numerical list • Communicates independently • Can replicate each part of process in detail	
Results / Data *Student uses data to describe what happened.* *Displays results / data using tables, charts, and pictures.*	• Not displayed • Little or no understanding demonstrated • Does not mention data • Difficulty communicating what happened	• Incomplete • Not organized • No measurements • Unclear number of trials • Some understanding of results/data • Reads information from display	• Complete • NO graphics used • Some description of results • Measurements not labeled • 1 trial • Communicates general facts and results when questioned	• Complete • Graphics incomplete or unclear • Describes results • Measurement units labeled • 2 trials • Shares simple understanding with some prompting	• Complete • Student created graphics • Detailed description of measured change • Consistent measurement units/ labels • 3 or more trials • Independently shares in-depth understanding of process	
Conclusion *Student answers the testable question, or question posed in the problem, using their data as evidence.*	• Not displayed • Student does not connect question and results	• Displayed • Does not relate to problem/question • States results without explanation	• Displayed • Relates to problem/question • Gives explanation of results without using specific data	• Displayed • Clearly relates to problem/question • Supports explanation with data evidence	• Displayed • Answer restates problem/question • Effective reasoning with detailed data support • Makes real world application – or suggests future work	
References and Acknowledgements *Student credits all sources for background research and all assistance received.*	• Not displayed	• Notes 1 source • One type of source • Incomplete credits for assistance given	• Notes 2 – 3 source(s) • One type of source • Cites only titles • Credits who assisted	• Lists 4 – 5 source(s) • Two types of sources • Citation includes some detail (author / name of website) • Credits who and how assisted	• Detailed list of 5 or more diverse sources (i.e., website, book, personal interview) • Citations are detailed • Credits all assistance in detail	

Judge Comments:

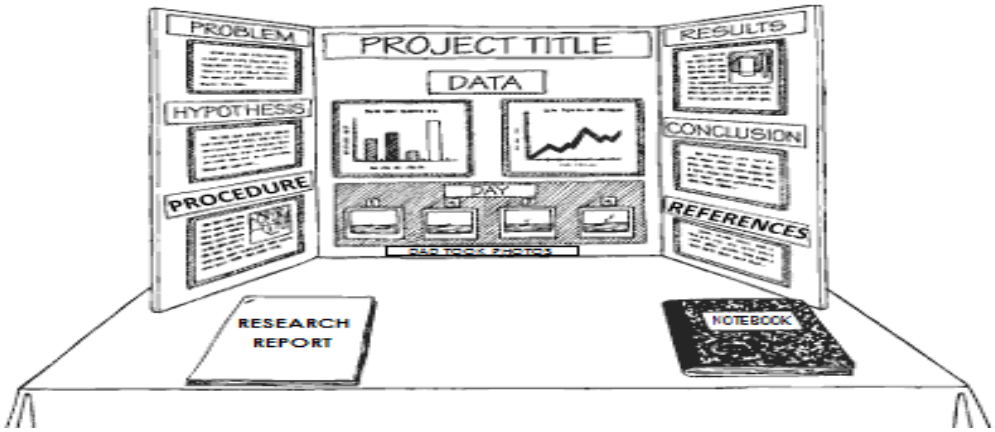
2014/2015

EXAMPLES

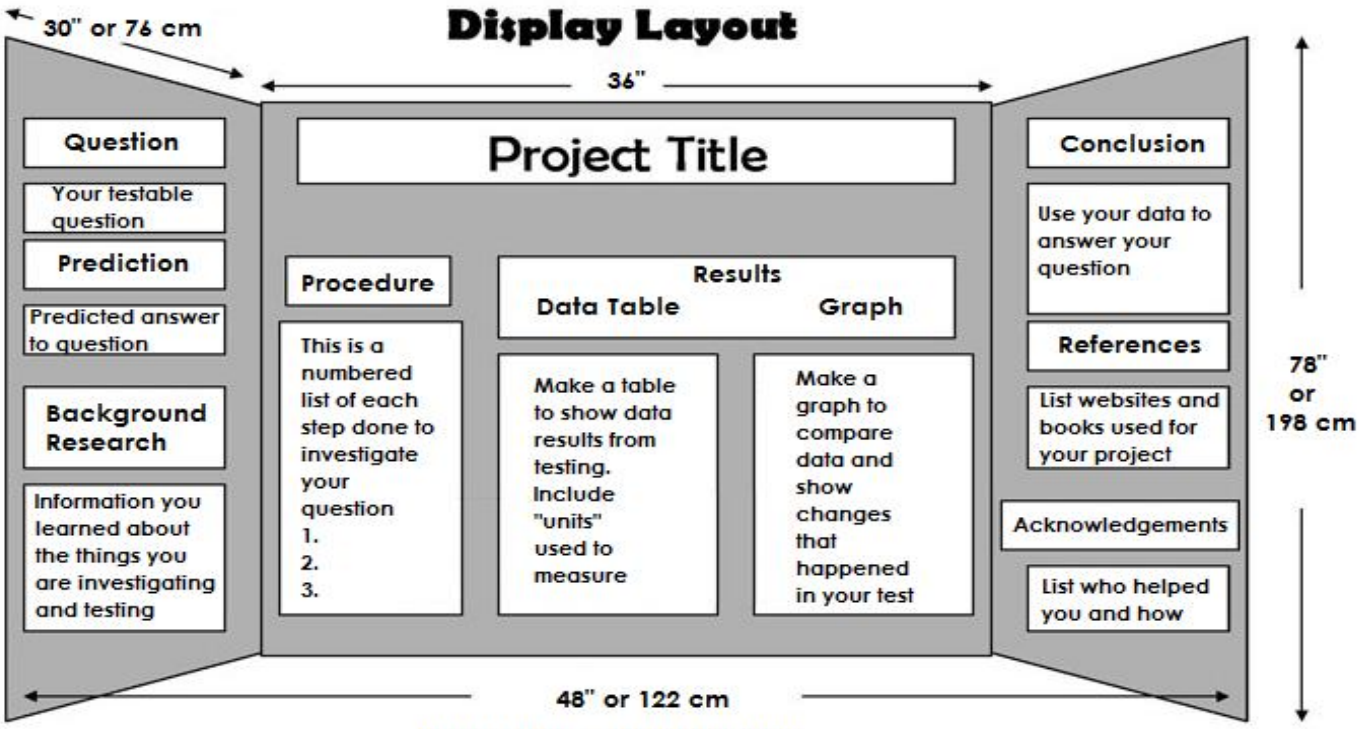
Do more ants move toward regular soda or diet soda?
Do batteries of the same brand last the same amount of time?
How does the temperature of water affect the time it takes it to freeze?
How does the mass or weight of the model car affect the distance it travels down a ramp?

Remember to check the list of prohibited/discouraged/allowed items before planning your experiment.

Always plan on taking photographs of your project steps as a visual explanation of your model.



EXAMPLES OF PROJECT BOARD LAYOUTS FOR EXPERIMENTS



Maximum Size of Project Display
Depth (front to back): 76 centimeters (30 inches)
Width (side to side): 122 centimeters (48 inches)
Height (bottom to top): 198 centimeters (78 inches)