What is an Invention?
An invention is commonly considered a new device or process. However, some inventions are improvements on pre-existing devices, processes or ideas. Inventing takes insight. It may begin with a question, doubt or hunch. It may begin by recognizing that something unusual or accidental may be useful or that it opens a new avenue for exploration. Inventions almost never work the first time they are created. They require a lot of trial and error, so students have to learn to be patient as they try out their ideas to see what works. (Wikipedia http://en.wikipedia.org/)

Ideas can be new and original (an "invention"), or an improvement on an already existing invention (an "innovation"). The term "Invention" will be used in this document, but students can do either one.

Above all — building an invention should be fun for students. So, they should keep that in mind when they start thinking about what they want to do.

Planning the Invention

STOP! Are any of your students using animals or human subjects?
Review possible risks in your students’ proposed invention and discuss them with your students. If any student is working with animals or humans, they must have their methods reviewed and preapproved by your school’s Institutional Review Board (IRB) BEFORE they begin work on their project. In fact, it’s FEDERAL LAW that they do this. See the requirements for an Institutional Review Board on this website.

Creating the Invention Logbook
Before students begin their invention, they should start their Invention Logbook, which will be a very important part of the project. You are encouraged to ask your students to use a “Composition Book” for the logbook (right). These can be found at any store carrying office or school supplies.

Students should leave the first page of the logbook blank so that they will have room to write a Table of Contents on this page after they finish their invention. Students should keep the logbook nearby to record all ideas, thoughts, experiments and activities. The notebook serves many purposes:
• the place to keep notes while they plan their invention;
• the place to keep notes while they build their invention;
• the place to illustrate the quality of work they perform and show the amount of time and effort that went into their project.
Students should hand-write everything into this book that pertains to the project, no matter how insignificant it might seem. You never know when that piece of information will come in handy. They should write in ink and not erase or tear out pages just because they made a mistake.

When students enter notes in their logbook, they should try to:
- be as complete and clear as possible;
- write neatly enough that other people can read it;
- use correct grammar and spelling;
- enter the date and time of day every time they have ideas, at the time they think of them, or when they are working on their invention;
- have their entries witnessed at least once a week, either by the you or a parent, depending on where they are building the invention.

This logbook must be included with the Science Project Display Board and if the project is sent forward to the regional fair, the quality of the logbook will be part of the judging criteria.

**Originality**
This is the student’s invention. That means that the ideas and the work must be THEIRS—not their parents. The invention should represent original, creative thought by the student. The invention should be a novel or unique solution to a specific problem. Age-appropriateness and originality will be part of the judging criteria.

**Usefulness**
Students should think about who needs the invention and its purpose.
- Does the invention have a marketable value?
- Students might want to think of an inconvenience or need that could be made easier with a simple device or process. Usefulness of the invention will be part of the judging criteria.
- Students should describe their ideas in great detail in their logbook.

**Research**
Getting information from existing sources helps students develop their ideas. Here are some suggestions:
- Students should talk to lots of people, including teachers, parents and friends, or experts in their area of interest. They should read scientific magazines and books, and other written material.
- Students should research the Library and the Internet.
- Refer students to the Librarian for help in their research.
- Students should write down their sources (“citations”) in their logbook.
- Students should explain if their invention idea is new and original (an “invention”), or if it is an improvement on an already existing invention (an “innovation”).

Students should record their thoughts, investigations and citations in their Invention logbook. The time and effort spent on this research will be part of the judging criteria.

**Building the Invention**
Students should begin to build their invention as follows:
- As they build their invention, they should describe what they are doing and list all materials they use and/or try in the construction of the invention and their cost.
- Students should build their invention out of sturdy materials.
- Students should write about the problems they find and how they solve them. Trial and error is a good thing!
- Students might want to find a friend to help test the invention for “bugs” (things that cause it to not work right).
- Students should perform many tests to ensure their invention is reliable.
• Students should include the results of each stage of work on the invention. Include sketches, diagrams, and/or photographs of their work whenever possible.
• Students should record the methods and results in the Invention Logbook. They must write clear and concise directions to use their invention.

Results of the Invention
Students should make a final summary describing the results of the invention, clearly expressing the purpose of the invention and how it accomplishes this purpose. The results should include the name of the invention, its function, and operation. This description should be written in the Invention Logbook and included on the Invention Display Board. The content and age appropriateness of the description will be part of the judging criteria. Students should:
• describe their ideas, tests and results in great detail;
• write about the problems they find and how they solve them; include the results of each test;
• include sketches and diagrams of their work whenever possible;
• explain what their invention does and how it works;
• describe all materials used and their cost;
• include photos of the inventions-in-progress — they’re excellent proof of the process;
• explain why the idea is new and original (an invention) or if it is an improvement on an already existing invention (an innovation).

Model or Illustration of Invention
A model OR illustration of the invention should be made.
• An illustration is a detailed drawing of the invention with all parts neatly labeled in a clear, attractive, visual explanation of the invention. The Illustration should include a Title. Illustrations should be part of the Invention Display Board.
• A model is an actual replica of the idea. Models do NOT need to actually work or be a prototype — they only represent the invention idea. Students should use everyday materials from around their home or school to make the model. A guide to the illustration or model should be included on the Invention Display Board.

Creating the Invention Display Board
Students should create their Invention Display Board according to the guidelines that appear on this website. They must include the on the board the steps that they followed, including whether the project is an Invention or Innovation, description of the Research, including Citations, the Usefulness of the invention, a description of Building the Invention, a description of the results, and an illustration or model with accompanying guide.

Models should be placed on the table in front of the Invention Display Board. The Invention Title should appear on the model and be visible to judges. To prevent misplacement, the Student’s Name should appear somewhere on the model in a place NOT visible to judges, and the model must be secured to the Display Board.

Students do not need a computer at home in order to do a Science Fair project. The display of the completed project does NOT need to be typed. Student’s Display should be age appropriate.

Citations for this Inventions Guideline
Wikepedia http://www.wikipedia.org/
Western Nevada Regional Science & Engineering Fair: http://www.nevadasciencefair.net/. A special thanks to George Ochs, Director, in Reno, for his generous help with re-inventing the Southern Nevada Regional Science & Engineering Fair.