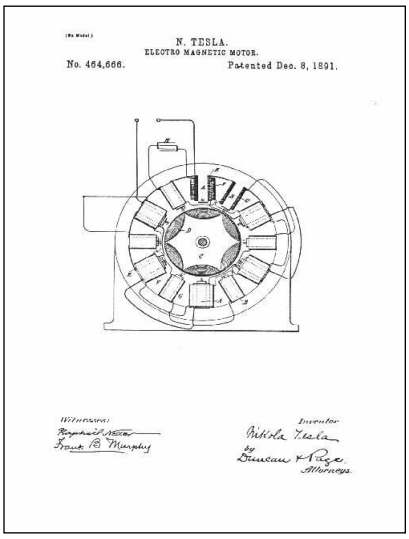
Student & Teacher Inventor's Handbook

Grades 4-8


(No Model.)

N. TESLA.

ELECTRO MAGNETIC MOTOR.

No. 464,666. Patented Dec. 8, 1891.

Witnesses: Raphael Netter, Frank P. Murphy

Inventor: Nikola Tesla, by Duncan & Page, Attorneys.

A Guide for Creating, Documenting, and Displaying Invention Projects
at the
Greater Kansas City Science & Engineering Fair

TABLE OF CONTENTS

For The Teacher:

For The Student:

A Word to the Teacher

Why inventions? The answer lies in the fact that the same creative, problem-solving, communication and decision-making skills that we value so highly in science, are the foundations of the invention process. One can neither create an idea nor develop an invention without making use of these important educational tools. These are skills that we want all students to master as a basic part of their education.

This is why we encourages students to get involved in the invention process, and why we have a section of the Greater Kansas City Science & Engineering Fair (GKCSEF) specifically set aside for student inventions in Grades 4 -8. Students in grades 9-12 will find that these types of projects fit well in one of several engineering categories within the Fair.

Why have invention programs for children?

1. To Raise Self-Esteem
Too often, children are not given opportunities to get involved in projects that recognize their own personal achievement. When children invent, their self-esteem is enhanced through recognition as creative and productive individuals.

2. To Increase Parent Involvement
Invention programs successfully involve parents. As children attempt to invent and problem solve, they enthusiastically interact with family members at home to relate their invention ideas. Parental involvement helps children learn more effectively.

3. To Assist Children With the Application & Synthesis of Knowledge and Skills
When applying the invention process children use hands-on experience to apply and synthesize the knowledge they acquired through textbooks and lectures.

4. To Experience the Scientific Process
Children use the scientific process as they invent by observing, collecting data, organizing, generalizing, predicting, revising, and applying laws and theories.

5. To Encourage Creative Thinking
Inventing stimulates creativity. Inventing provides the opportunity for children to channel their creative skills. Encouragement from parents and teachers enforces this interest.

6. To Motivate Students to Learn
Motivation to think, read, write and illustrate becomes more fun when children have an exciting project to look forward to. Invention projects allow them to choose topics based on their individual interests or need to explore new ideas.

7. To Integrate the Curriculum
Teachers and children can naturally integrate the curriculum, which saves time and gives purpose and meaning to learning. Children combine science, language arts, social studies, library skills, art, math and more—depending on the type of problem they are trying to solve.

8. To Develop Higher Order Thinking Skills
When children invent, they move quickly through the taxonomy by using previous knowledge, comprehension skills, application, analysis, synthesis and evaluation.

9. To Enhance Library and Research Skills
Children must use both primary sources (people) and secondary sources of information. Older children also use their research skills and their library's resources.

Suggested Activities for Teaching Creative and Inventive Thinking

If you are looking for a fresh approach to start students thinking, try these activities. They are bound to bring out the inventor in each of your students!

1. Inventing With Limited Supplies

Have the students work in pairs. Give each pair one toilet paper tube. They are to make a "new product" from this tube using only the standard school supplies required by your school. Allow a limited amount of time (15-30 minutes). Let the class share their products. This activity is appropriate for a beginning creative exercise. By using supplies limited to those on hand, children will be allowed to draw conclusions that materials on hand can be enhanced by having to use creative and inventive thinking. Another conclusion can be that if more supplies are available, there are more possibilities for creative, interesting and complex products. Use the word "products" at this stage because it is less threatening than "inventions".

2. Inventing a Scrounge Box

Once the students have discovered the limitations placed by a small amount of supplies, allow them to use other materials. These may be items in the room (with teacher's permission), the contents of their desk (after several months accumulation), or they may choose to develop a Scrounge Box for their room. Ask each student to bring some outdated, commonplace, useless items from home. These should not be valuable or dangerous. Have the students work in pairs again. Give them a toilet paper tube and have them make a new product. Set the same time limit as in exercise 1. Let them comment on the difference the Scrounge Box made.

This is a beginning list...really anything goes:

Paper plates	Paper cups	Beads	Necklaces	Kitchen Utensils
Toilet paper rolls	Hangers	Balloons	Spools	Wheels
Assorted Knobs	Nuts & Bolts	Cellophane	Rings	Cork stoppers
Bottle & Jar caps	Belts	Button & Snaps	Cotton balls	Cans
Paper Towel Rolls	Brushes	Toothbrushes	Paper clips	Pipe cleaners
Yarn & String	Clay	Pegboards	Socks	Q-tips
Tubes	Zippers	Boxes & Cartons	Hinges	Tin foil
Plastic containers	Springs	Netting	Keys	Dowels
Shoelaces	Clothespins	Cardboard	Styrofoam	Velcro
Magnets	Silverwares	Rubber bands	Straws	Levers & pulleys
Combs	Brushes	Umbrellas		

3. How Many Products Can You Make From A Coat Hanger?

For this activity, each student or pair of students will need a metal coat hanger. They are asked to make a new product using the coat hanger. It can either be something totally different from the original use, or an improvement upon the hanger itself. For example, enlarge the capacity of the hanger to hold clothes, improve its looks, or have it be the basis of an entirely new product.

4. With Mother Nature's Help

Take the class outside and find examples of how nature is used to make human life better. This may range from simple things such as using trees for lumber, furniture, pencils, etc. to herbs and grasses used for medication, clothing, food, etc. Look for nonliving objects as well as living.

5. Zagging and Zigging

This activity is based on the creative process of "reversing." That is, try opposite approaches, changing things around, turning things upside down and inside out. Try this with a math lesson by giving students the desired answer such as the number 15. They are to find as many ways as possible to obtain this answer. It can be by adding, subtracting, dividing, multiplying, or using placeholders. This is good practice for math facts, as well as a sponge activity when there are a few minutes to fill.

6. Opting for Options or Alternatives

Have students suggest options or alternatives for common problems: forgetting to bring schoolbooks home, having no pencil or notebook, remembering to do the laundry, etc. Let them "discover" some common problems they have and suggest alternatives. You will hear some very unique solutions to these problems.

7. Visualizing and Imaging

Give students some situations and have them close their eyes and imagine what is happening. "Describe what signs and sounds would be around if you were an apple seed inside an apple" or "Pretend you could be very small and climb inside a computer. What would you see and do? Would you help the computer work or stop it from working?" You can make up situations from social studies content, language activities, or reading stories. The students can tell their ideas or develop them and write them on paper. Avoid making this a long assignment, however, as some students may find this difficult to do.

8. New Uses for Old Things

Bring some common items (clothespin, comb or brush, funnel, hammer, etc.) and ask students to tell how these could be used to make something new or different. Then have them draw their ideas and label the parts. This activity requires flexibility in students' thinking. This activity also requires students to go beyond the idea stage by drawing a model. The drawing serves as their design for a product.

9. Toad or Prince

Think of some ordinary items at home or school and ask students to redesign or improve them. These items may be an eraser, coffee cup, sidewalk, bathtub, pencil sharpener, bookshelf, wheelbarrow, high chair, etc. Encourage students to "elaborate" and make the item fancier or more interesting. Let the students work together to help make up lists.

10. Word-In-A-Box

Have students write words on 3 X 5 cards and place in a box. The words can be vocabulary they are studying. Assign the students a task such as improving the family car. They are to draw out a specified number of words (4 or 5) from the box and define or tell the function of the words. Using associations from these words, the students will then fulfill the task. For example, if the words are "machine, lever, wheel, and work," they might say, "By adding a wheel to the machine the lever will work." They do not need to use all the words drawn, and if really stuck, they can draw out more. This is a good way to practice vocabulary.

11. What'll it Be?

Let students make up new food dishes (on a piece of paper, of course!) A simple item to design is a sandwich, a cookie or breakfast dish. For the most promising items, let the students try them on the whole class.

12. Everyone Wants To Be an Inventor…

Have the students brainstorm ideas for inventions that will be used in the future. When the class has compiled a large list, ask them to do the following: Identify listed items that have already been invented, do a patent search on an invention idea that has yet to be invented, and list those things they feel could never be invented and why.

Ten Steps for Successful Inventing

Inventing takes time on the student's part. There is not a set amount of time required, but a minimum of four weeks should be anticipated. During this time encourage your students to work at their inventing on a daily basis both in and out of the classroom.

Step I: Keep a Journal

A journal should be kept and submitted by each student. The journal documents the "work in progress." Included in the journal are ideas for what they want to invent, thoughts they generate, and proof of dates for actions taken.

Step 2: Brainstorm

An invention starts with an idea for something that may make a job or activity easier, faster, safer, or even more enjoyable. Ask them, "What would make some part of your life easier, more fun or more efficient? What problem do you have that an invention could solve?" Encourage them to think about school, work, leisure time, etc. Helping their pets is a popular choice, but *remember, students are not allowed to use any vertebrate animals (with the exception of humans) during the development and testing of their inventions. All prototypes must be tested on something other than a vertebrate animal. We suggest stuffed animals.*

Step 3: Research the Idea

The student must find out if their idea for an invention is already in use. They will need to visit pertinent stores, check in magazines and catalogs, and do research in the library and Internet. They cannot invent something that has already been invented and is in use.

Step 4: Customer Survey

Have the student ask friends and relatives what they think of his/her proposed idea. If there is no desire for an invention then there is no reason to build it.

Step 5: Invention Design

The student needs to sketch what they think the invention will look like. They should label all of the different parts of the invention. The drawing does not have to be perfect, but it does have to be good enough to help them build a working model.

Step 6: Invention Construction

The student now builds a working model. They should be aware that very few inventions work the first time.

Step 7: Invention Testing

The student should test their invention several times in as real a situation as possible, although live animals may not be used. The invention may not work the first time. If so, ask the student to analyze why the invention failed. Allow the student to redesign and construct a new model. The new model should be tested just as thoroughly. Repeat steps 5, 6, & 7 until the invention works.

Step 8: Cost Analysis

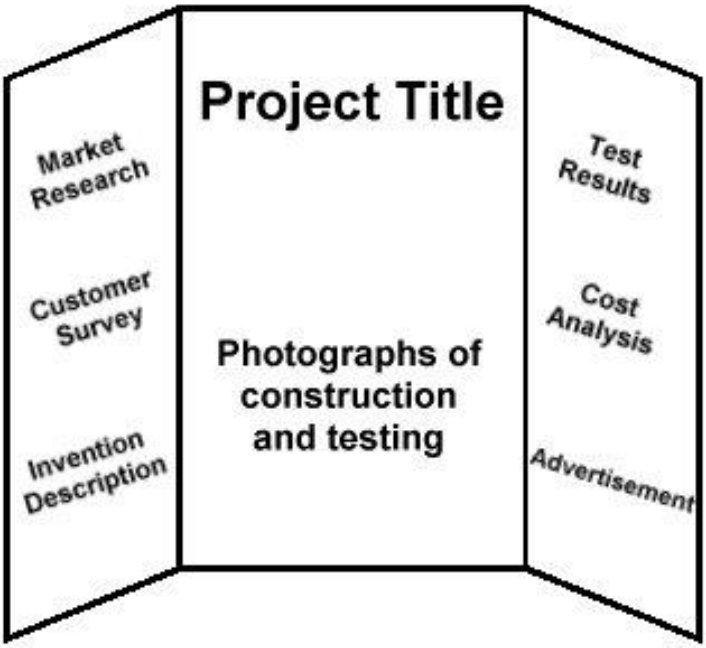
An invention must have a manufacturing cost that is less than its selling price if it is to be successful in the marketplace. Have the student total the cost of all materials used to make their invention. Have them calculate a selling price based on this total and by asking friends and family members what they would pay for the invention.

Step 9: Prepare Report

The student must document their invention in a formal report. This is the primary way they will be judged at the Greater Kansas City Science & Engineering Fair. Appendix A - F of this handbook includes pages that can be copied and used by each student to prepare their report.

Step 10: Display

Each student should prepare a display to showcase his or her invention. The display can be no larger than *76cm (30") deep, 81cm (32") wide, Grades 7-12 may be 122 cm (48") wide.*



Pre-Project Planning

Please read this section carefully before you begin any experimentation relating to your project.

The Greater Kansas City Science and Engineering Fair is an affiliate of the International Science and Engineering Fair (ISEF). ISEF has developed (following strict national scientific and educational guidelines) a set of regulation forms that must be signed prior to experimentation. These apply to students in grades 9-12 and these forms can be found on the website https://sciencecitygkcsef.stemwizard.com/ or at https://student.societyforscience.org/international-rules-pre-college-science-research

Students in grades 4-8 are not required to use regulation forms unless they have designed a project using participant subjects, human cells, tissue, teeth, organs, or body fluid.

All Intermediate and Junior Projects that use human or animal cells including blood, blood products, teeth, primary cell cultures, and body fluids must have (This form must be signed by Science Review Committee) See Form.

Human or Animal Tissue Form (1)

All Intermediate and Junior Projects that use participant subjects (including the student doing the experiment) must include:

Human Participant Form (2)

All Intermediate and Junior Projects that involve hazardous materials must include:

Hazardous Materials Form (3)

All Intermediate and Junior Projects that involve bacteria must include:

Bacteria Form (4)

Projects not following proper protocol as described by ISEF will be rejected.

All students from schools that do not have science fairs can enter as a single individual or team. To be allowed to do so students must fill in this form and submit to Science City for approval.

Prior approval to Enter as an Individual or team (non-school sponsored)

Fair Rules and Regulations

GENERAL RULES

1. Any invention that has been previously entered in the Greater Kansas City Science & Engineering Fair may not be reentered in the competition.

2. An invention may be done by an **individual** student or a team of no more than **three (3) students.**

3. Inventions that are designed to be used by pets or farm animals will be accepted. However, **NO** INVENTION WILL BE ACCEPTED THAT USES VERTEBRATE ANIMALS (WITH THE EXCEPTION OF HUMANS) DURING ITS DEVELOPMENT OR TESTING. YOU MUST FIND AN ALTERNATE WAY TO TEST YOUR INVENTION. If humans are used in the development of an invention (including the student inventor), Human Participant Form 2 must be used and signed. This form can be found on the website at www.sciencecity.com/education. **All forms must be completed prior to beginning the invention process**.

4. Games are not considered inventions and will not be accepted.

5. A copy of the forms in **Appendix A-F** at the back of the student section, or a similar version completed by the student, should be completed and included in the notebook accompanying the invention model at the fair.

6. You may not enter more than one project in the fair.

7. Your exhibit dimensions are not to exceed a maximum size of 76cm (30") deep X 81cm (32") wide i*ncluding 36" table for grades 4-6. Grades 7- 12 may be 122 cm (48") wide.*

8. Your exhibit must be completely self-contained and self-supporting. Note that the display board should be sturdy enough to withstand wind currents present in the exhibit hall.

10. **Do not place valuables or sensitive equipment as part of a display.** Union Station and Science City are not responsible for stolen or damaged equipment or other valuables.

SAFETY RULES

1. All electrical equipment must be constructed according to standard electrical safety laws. Exhibits requiring electrical current for operation, or illumination, must be designed for operation on alternating current at 110 volts. If batteries are used, they should be storage batteries to ensure continuity of operation.

2. Ordinary doorbell push buttons and open knife switches may not be used to control 110-volt apparatus. Only suitably rated UL 110 volt toggle or push button type switches, mounted on panels or switch boxes are allowed.

3. All wiring, switches and metal parts carrying 110 volt current must be grounded properly and out of reach of visitors

4. All electrical points must be soldered and taped properly (following UL regulations.)

5. Nails, tacks and un-insulated staples may not be used for fastening wires. Use porcelain or other approved types of insulators.

6. All wiring must be **properly insulated** for voltage used.

7. Dangerous chemicals in open containers, open flames, flammable liquids, and explosives are strictly prohibited.

8. If bacteria are displayed, they **must** be in sealed containers.

9. No live animals, vertebrate or invertebrate, are to be displayed at the Fair.

NOTE: THE FAIR SAFETY COMMITTEE RESERVES THE RIGHT TO INSPECT AND DISQUALIFY ANY EXHIBIT THAT DOES NOT CONFORM TO THE RULES AND REGULATIONS IN THIS BOOKLET.

Entering the Fair

NUMBER OF ENTRIES PER SCHOOL

Each school is allotted an initial 20 entries per division (ex. Intermediate, Junior). If the school has more than 20 projects of **HIGH QUALITY**, the school may request approval to send additional projects by contacting the Fair director at 816-460-2261.

APPLICATIONS

1. All GKCSEF registrations are now ONLINE at https://sciencecitygkcsef.stemwizard.com/public_site/home/sciencecitygkcsef.

2. Registrations should be completed **no later than the deadline date at 5:00 pm.**

3. All registrations should be completed and accompanied by the **registration fee and a copy of any and all required forms.**

    - Be sure to have all certification forms filled out and signed by the appropriate people (e.g., teacher/sponsor, parent, etc.) ***before*** you begin experimentation.

    - **Registrations received without the proper forms attached will be disqualified.**

    - All registrations should include:
        a. An adequate abstract (experimental) or description (engineering). The description of the project provided on the entry form is the only means the review committee has to evaluate and classify your project.
        b. A clear description of the problem.
        c. The type of data collected (experimental) or testing done (engineering).

Teachers: The GKCSEF Team may notify you about questions on registrations, please share with your students ASAP, if we do.

Setting Up At the Fair

1. For detailed information regarding dates and times of this year's fair, please refer to the fair schedule on the website, https://sciencecitygkcsef.stemwizard.com/.

2. The student, parent or teacher can set up the project between 8am and 3pm on set up day. ***(Note: project set-up requires approximately 15-20 minutes.)***

3. When setting up your project, you must bring:
   - Your paper
   - Any required forms
   - Display board and any accessories or models
   - The project number sent to your teacher by the GKCSEF Team. This number identifies the placement of your project. Maps will be at the entrance for your assistance. **Please ensure that your project number matches your table location exactly.**

Judging and Awards

Each project is reviewed by at least two judges:

Academic Judges evaluate each project based on how well experimental, computer science, engineering or invention processes and principles were followed. See the scoring guides for a complete description of how your project will be judged. Each project will be given a **gold, silver or bronze rating** based on the marks received on the scoring guide, and the appropriate ribbon will be awarded. In addition, the top projects in each grade level and category will be selected for **Academic Awards**. Students winning Academic Awards will receive a blue rosette on their project and will be asked to attend the Charles N. Kimball Awards Ceremony to receive recognition for their accomplishments.

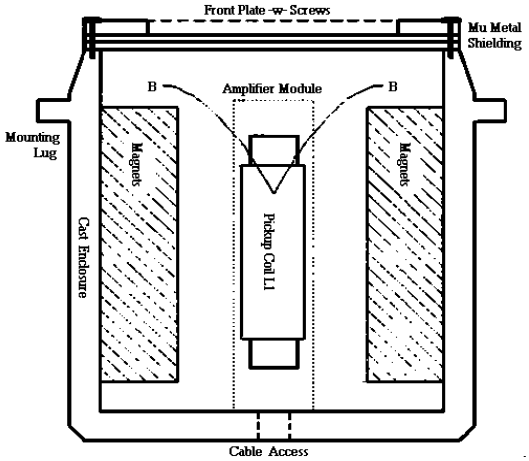
Students Interview will be for students **ONLY** in grades 7-12. Students are asked to participate in the interview timeframe of the judging night to explain your project. (**Attendance is requested, but not mandatory**.) Students will be released to their project at 7:30pm the night of judging and asked to stand by their project until 8:30pm. During this time, judges will be coming around asking questions and details about your project. The interview process will help all students start preparing for the International Science & Engineering Fair, if their project is one of the top 3.

The **Pioneers in Science Awards** are given to the top five senior level projects. This award is to recognize outstanding examples of student research, innovation and design.

The **Grand Award** is given to the three best ISEF eligible projects in the Senior Level. Students winning the Grand Award will receive an all-expense paid trip to the International Science & Engineering Fair (ISEF).

Over 60 organizations present Special Awards at the Fair. **Special Award Judges** evaluate the projects based upon their organization's interests and priorities. Each organization determines its own awards including plaques, prizes and cash. Students winning Special Awards are asked to attend the Charles N. Kimball Awards Ceremony to receive their award from the sponsoring organization. A list and description of Special Awards organizations may be found on the website at www.sciencecity.com/education

The Student Inventor's Notebook



A Student Guide for Invention Projects

Each project is to include a **report**, **display**, and **working model** (or photograph) of the invention.

- The **report** is to explain the invention in detail to the judges.
- The **display** allows you to visually present your invention in a concise manner, allowing a judge to easily determine its merits.
- The **working model** is where you put your ideas, planning, and construction abilities into action to demonstrate your invention.

The following are ten steps to guide you through the requirements of Invention Projects at the Greater Kansas City Science & Engineering Fair.

Step 1 - Inventor's Journal

Inventors must maintain a journal to document what they invented, the ideas they generated, and proof of dates for these actions. The journal provides evidence that an inventor came up with an idea first. Don't worry about grammar or spelling when you make your notes, but do make sure that the notes are legible.

The following information should be included in your journal:

- The dates, times and places where you worked on your invention.
- Any problems, solutions, tests and results.
- A drawing of the first idea, changes and final design. This drawing must have all the parts labeled.
- A list of materials used.
- The initials of an adult who saw you working. This can be a teacher or parent. This witness can prove the work and ideas are yours.

Begin a journal using the format shown in **Appendix A or similar document**. This form may be copied, as additional pages are needed.

Step 2 - Brainstorming Ideas for Inventions

An invention starts with an idea for something that may make a job or activity easier, faster, safer, or even more enjoyable. The invention process involves transforming that initial idea from your brain into an actual working device in your hands. Ideas for most inventions are generally spontaneous. However, for this project, you may have to brainstorm an idea. Start by asking the following questions:

What bugs you?
Is there a better way to do something you normally do?
What problems occur in your daily life that you could solve?
Do your parents, brothers/sisters, grandparents, friends or neighbors know of anything that they would like to see improved?

Write down in your journal all of the ideas you come up with. Select one of them to pursue for this project. It is important to have a witness initial the entry for documentation purposes.

Remember that you are not allowed to make use of any vertebrate animals (with the exception of humans) during the development and testing of your invention. Inventions that are designed to be used by vertebrate animals will be accepted. However, you must find an alternate way to test your invention.

Step 3 - Researching the Idea

Before you start working on the invention, you need to see if it already exists. This may include visiting stores, looking in catalogs and magazines, asking friends and relatives, or doing research in a library or the Internet. You cannot invent something that already exists. Write down in your journal the places you've checked, the dates you checked them, and the results. The format shown in **Appendix B** is suggested, not required.

Step 4 - Customer Survey

Ask friends and relatives what they think of your proposed idea. This will help determine if it is worth the effort of development. Write down in your journal who you asked and what their comments were. The format shown in **Appendix C** is suggested, not required.

Step 5 - Invention Design

Sketch what you think the invention might look like. Label all of the various parts of the invention. At this point, the drawing doesn't have to be perfect, but does have to be good enough to help you build a working model. It is acceptable to ask for advice from your family and friends as long as they are acknowledged in the final report. (In a real situation, depending upon how much help they actually provided, they could become a co-inventor.) This sketch should be dated and go into your journal. Have the entry initialed by someone who understands it.

Step 6 - Invention Construction

Now you can actually build a working model, based on the sketch in your journal. Remember that very few inventions work the first time and problems are common. For inventors, this is the challenging (and sometimes frustrating) part of the invention process. When a problem does arise:

Think about ways to overcome it.
Ask for advice and ideas from friends, family or neighbors.
Modify the working model until you're satisfied with the results.

Write down in your journal what problems were encountered and how they were overcome. Have the entry initialed by an adult.

Step 7 - Invention Testing

This is the fun part. Determine an appropriate way to test the invention. The best way to test the invention is by actually using it for the intended purpose. However, in some cases, you may have to devise a special test using artificial conditions.

It is important to test the invention more than once and have other people test it more than once. Write the test results in your journal. The format shown in **Appendix D** is suggested, not required.

The invention may not work the first time you try it out. If it does not, analyze why the invention failed. Perhaps one of the materials was not strong enough. Perhaps a piece of the invention was not the correct length. Decide what part of the invention needs to be modified. Think how to improve the design of the part that failed.

After you've decided what modifications to make, repeat step 6 and reconstruct the invention. Then repeat step 7 to test the invention again. This may take several attempts. (It helps to keep in mind that this point is where Thomas Edison worked for a long time testing different filaments for electric light bulbs.)

Step 8 - Cost Analysis

An invention must have a manufacturing cost that is less than its selling price if it is to be successful in the marketplace. Remember that the main reason for most inventions is to make money. Add the cost of all materials used to make the invention. Calculate a selling price or ask friends and family what they would be willing to pay for the invention. Subtracting the manufacturing cost from the sales price will give your profit (or loss). The format shown in **Appendix E** is suggested, not required.

Step 9 - Prepare Report

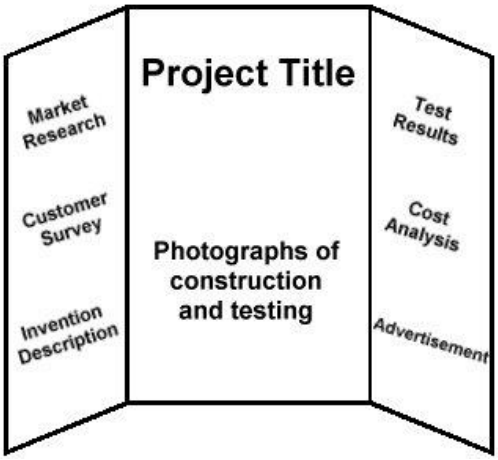
It is important to document your invention in a Formal Report for those people who will be judging your work at the Greater Kansas City Science & Engineering Fair.

Organize the information for the report as shown in **Appendix F**. You will find that much of the information required has already been written down in your journal and it is simply a matter of copying it neatly into the appropriate section of the final report. As a matter of fact, the organizational style found in **Appendix F** is based on a technical report style used by most scientists and engineers.

Step 10 - Display

Last but not least, prepare a display to showcase your invention. The display needs to be neat, concise and visually appealing to attract the attention of judges and other interested people. The display must convey the concept of your invention in a matter of seconds.

For readability, it is best to use large font sizes on signs and labels.



Working Model

Appendix A - Inventor's Journal

*Date*_____

*Date*_____

Appendix B – Market Research

Date	***Place Checked***	***Person Contacted***	***Result***

Appendix C – Customer Survey

Date	***Person Contacted***	***Result***

Appendix D – Test Results

Date	***Person Testing***	***Test Results***

Appendix E – Cost Analysis

Proposed Sales Price **$_____**

Materials

Item 1…….. $_____ Item 5…….. $_____

Item 2…….. $_____ Item 6…….. $_____

Item 3…….. $_____ Item 7…….. $_____

Item 4 …….. $_____ Item 8…….. $_____

Total Materials …….. $_____

Estimated Labor …… $_____

Total Manufacturing Cost $_____ (Total Materials plus Estimated Labor)

Profit **$_____** (Sales Price minus Total Manufacturing Cost)

Appendix F – Final Report Format

Title Page
Title of Invention & Date

Table of Contents Page
List the sections of your report and the corresponding page numbers.

Summary Page
Briefly describe what you invented and why you think there is a need.

Documentation of Originality Search
Copy the information gathered in **Step 3**, including who you talked to, what stores you called, magazines you reviewed, what library research you did, and other sources of research or information you used.

Documentation of Customer Survey
Copy the information gathered in **Step 4**, listing the persons you talked to and their comments.

Invention Description
In one or two paragraphs, describe the problem solved, how the invention works or is used, and the advantages over existing technology or products.

Drawings and/or Schematics
Redraw the sketch from **Step 5**. It may be hand or computer drawn into a clear, detailed drawing of the invention, with all parts clearly labeled.

Testing of Invention
Organize the test results gathered from **Step 7** in this section. Describe how the invention was tested and the results. Include all test results on the invention that other people had done, and what comments they had. Include graphs to clearly show the test results.

Cost Analysis of Invention
Show the cost information gathered in **Step 8**, including the predicted selling price, the estimated manufacturing price, and your net profit.

Advertisement (with slogan)
"Sell" your invention in a one-page advertisement.

Journal Notes
This section should contain all the notes exactly as written in your journal so the judges can follow the progress of your project. Do not retype them.

Acknowledgments
Give credit to those who helped you and mention how they helped.

Bibliography
Cite your sources used in background research, if any.