Science and Engineering Fair

Student and Parent Booklet

Washington County School District
*revised August 2022 - Karen Webb
WCSD Fair - May 11, 2023
CVES Fair – March 28, 2023
School Coordinator – Scott Thieme

PURPOSE of this booklet:

In these pages you will find the rules and links to [Your School's Name] Elementary Science Fair Entry forms [Link form here]. Students in grades K - 5 can participate in this year's Science Fair. Students in grades 3-5 can participate in this year's Engineering fair [Link form here]. All students participating in will need to follow the rubric for the Science Fair [See Page 9]

WHY do science and engineering projects?

Almost daily some favored snack is identified as "cancer-causing", or some detested vegetable is labeled "cancer-fighting". Scientists make these determinations by experimentation. Scientific research is often cited in newspapers and then contradicted. Why? Because even the simplest experiment can become complex and the experiment's validity is shadowed by doubt. This explains much of the controversy surrounding "scientific facts", and an important lesson to learn from our own experiments.

At the same time there are many complex problems in today's society that require an object to help solve the problem. Imagine where we would be if crafty engineers didn't design cell phones, printers, airplanes, or even the wheel! Engineering design takes the scientific processes, and allows the students to create something that can be demonstrated for others. It is real-world problem solving at its finest.

Although a student's science or engineering fair project is going to be far simpler than a professional engineer/scientist's, it still follows the same basic procedure called the Scientific Method or the Engineering Design Process. This booklet will cover both in detail later on. Finally, properly done, science and engineering projects provide a rare opportunity for students to combine a number of academic skills to produce an end product.

Science Project (Experimental Design)

What science projects *ARE*:

Science projects should involve students in an experiment where the result can be guessed at but isn't known for sure. This experiment should solve a problem. This is actually an advantage over the demonstration projects. The best part of a science fair project is that *if something unexpected occurs with an experiment, or it doesn't turn out the way you had hoped, the project doesn't need to be trashed*! In fact, some of the best projects were the ones with the most unexpected results because the student learned far more than he or she would have if the experiment ended the way they had been expecting it to. It is completely *acceptable* in an experiment for the conclusion to contradict the hypothesis.

To conduct a proper experiment for the District Science and Engineering Fair, you MUST follow the Scientific Method. The Scientific Method requires:

- PURPOSE / QUESTION
- HYPOTHESIS
- PROCEDURE
- DATA / OBSERVATIONS
- RESULTS
- CONCLUSIONS
- SUMMARY
- BIBLIOGRAPHY

PURPOSE / QUESTION

The question should be very simply stated. What is the scientific experiment all about? What are you trying to prove or disprove? What is the reason you are doing the experiment? With the battery-operated bunny, the question is "Which battery lasts longer, Duracell or Eveready?" If you choose diapers for the experiment, the question is "Which diaper lasts longer, Luvs or Pampers?"

HYPOTHESIS

The hypothesis is also very simply stated. This is your "educated guess". It is YOUR expected outcome of the experiment. Example: You've always liked the Luvs brand of diapers and you've always encouraged everybody to use them. Now you are going to prove to any doubters out there that Luvs are better than Pampers. Your hypothesis is "Luvs diapers absorb more liquid than Pampers." Remember: it is okay if your result is different from your hypothesis.

PROCEDURE

This procedure is the instruction process to complete the experiment. You may write this out in step-by-step instruction format or in paragraph form. Make sure to be as detailed as possible as your experiment needs to "stand alone", which means somebody who has never heard of your experiment should be able to do it themselves because of your description. This would be a great place to include supplies used to perform your experiment.

DATA / OBSERVATIONS

Data and observations can include notes, errors found while experimenting, or **anything** that you watched and observed while doing the experiment.

RESULTS

Results are the specific results of the experiment. This is a GREAT place to include charts and graphs. If Duracell batteries lasted longer than the Eveready batteries, the results of the experiment would be: "The Duracell batteries continued to power the toy 22 minutes longer than the Eveready batteries."

CONCLUSION

The conclusion relates back to your hypothesis. You will make reference to your hypothesis. Were you wrong or right? Why do you think you were wrong or right? To go along with the battery results, the conclusion example would be: "From my experiment, I determined that my hypothesis was correct (or incorrect). Duracell batteries last longer than Eveready."

SUMMARY

Each project is required to have a summary. The summary is the final bit of exhausting work, and yet it is among the most important tasks your child undertakes. Your child has to write the most important information accumulated during the entire science project. It's important because this is about all the judges have time to read. They will look at the display, interview the child and read the summary. Make sure the summary includes: the question/purpose, the hypothesis, why you chose this experiment, the data/observations, the results and conclusion, and what you learned. Keep it short and simple.

BIBLIOGRAPHY

This provides a "thank you list" to books you used as references or people and stores that helped you with supplies.

What science or experimental projects are *NOT*:

Too often, science projects are equated with science demonstrations. It's cute to see that vinegar and baking soda together cause a reaction and if the reaction occurs in a mock-up volcano, it's a rather distinctive demonstration. But that's all it is; a demonstration! No new information was discovered.

Science fair demonstrations ARE NOT accepted at any School Science Fair or at the District Science Fair. It isn't a science *experiment* and if your child chooses to do a demonstration, it will harm your child's score.

Some popular science demonstrations include: showing how clouds form, showing how electricity is conducted, showing how caterpillars become butterflies, showing how a volcano erupts, etc. *These are not acceptable for the purpose of the science fair.* Models and collections also hurt a child's chances of winning. They do NOT follow the Scientific Method. They cannot be experimented upon. They involve much money, time, and research if they are done well. Quite frankly, they stand NO chance of winning. Here is a link to find acceptable science fair activities:
https://www.sciencebuddies.org/science-fair-projects/project-ideas/list

Experiment Ideas

Other Ideas:

- *Have a spot in the garden where nothing grows? Try a couple of different plants.*
- *Do you think you may be over-watering the lawn? Take a patch of out-of-the-way grass. Water it carefully with different amounts of water. What are the results?*
- *Which type of house plant will do better under a skylight? In a kitchen window? In a dark corner?*
- *Does an aluminum bat hit a ball farther than a wooden bat?*
- *Does saccharine attract ants like sugar does?*
- *Which diaper is really more absorbent?*

Before you decide on a science experiment, brainstorm a long list. Get silly about it! Write them down. Discuss these with your child. Then decide.

Engineering Project (Engineering design)

Just like the science fair experiment, an engineering design project should be a learning activity. You are going to figure out a real-world problem that you may have, and you are going to design a solution for it. Your solution should be created mostly by you as a student, but because of the hands-on nature of building, parent supervision is always a great idea. Remember: The design and idea should be all yours! You should be creating something NEW or redesigning something in a completely new way in order to solve a problem. The problem can be very simple, like a device that makes coiling your garden hose go faster, or more complicated like designing a new type of garden hose that coils up on its own. Both solve a problem with the garden hose, in a new and unique way.

This is the time for a demonstration. You are going to create an invention prototype that can be used to demonstrate the solution to your problem. Your prototype should work, and should be safe. When engineers design a solution, they always want to make sure that it will not harm anyone who uses it. If it is not safe, it doesn't solve a problem, it creates a new one.

Engineers also work like scientists. They do not always get it right the first time. In fact, sometimes they have to try over and over again to get the result they want. And sometimes by trying things, they discover a totally different and better idea for solving the same problem! If that happens to you, it is okay, because that is built into the Engineering Design process.

Your Engineering Fair project will be required to follow the Engineering Design Process (just like the experiment does), and it must be clearly displayed on your board.

The Engineering Design Process goes as follows:

- Ask
- Imagine
- Plan
- Create
- Improve
- Recreate (if needed)
- Conclusion/Summary
- Bibliography

Ask:

This is the part of the design that should always come first. This is where you find something that needs to be made better. You need to solve a problem by creating and design for it. This is where you ask the question, "What am I trying to solve or fix?" Thomas Edison created many designs and he ended up with many inventions, one of which is the lightbulb.

Imagine:

During this part you should use your imagination to figure out all the ways you could solve your problem. You should be asking questions and trying to answer them. This is the time to be creative and start figuring things out.

Plan:

Choose the best solution from all your ideas. You should choose the idea that will be the easiest to accomplish, but is also interesting, and creative. You want your prototype to work, but you also want it to be attractive to the judges. At this point it would be a great idea to draw a diagram of what your prototype will be. Save that diagram! Your judges will want to see it displayed on your board to show your work.

Create:

This is the step where things get really fun! You get to actually make your prototype! Try to keep it small, simple, and interesting, but also try your very best to get it to work. The goal is a working prototype, but sometimes things don't go to plan. In that case, make sure to document your design and tell the judges why you think it did not work. If your prototype is too big, then please take pictures or video of it working, but remember showing a prototype is much more powerful than telling about one.

Improve:

During this step you see what you can do to make it better. Is there a better solution altogether? What changes did you make? This step is actually done throughout the process. Any time you make a change to make it better, you are doing the improvement step. Make sure to tell the judges what you liked about your prototype, and how well it worked or did not work. It is also okay if your prototype worked out perfectly the first try. It is super uncommon for that to happen, but it is a possibility.

Conclusion/Summary:

What did you learn from this? Tell us all about the new discoveries that you made during this fun process. Make sure to let us know all the things you researched in order to be successful with your project.

Bibliography:

Just like in the experimental design. This is where you are going to cite all of your sources. Thanks to those extra helpers who gave you a hand, and make sure you give credit where credit is due.

What an engineering project is NOT:

Just like with a science fair project, an engineering fair project is not a demonstration. This is tricky because you are demonstrating things, but it must be an ORIGINAL design of your OWN creation. Looking up a hovercraft on the internet is not the same as designing a better version of a scooter, or figuring out a new device to help save water. The judges will mark your score down if you simply make a project that you saw on YouTube, or out in the world. You need to be the creator of the design, and you need to be the builder. It is acceptable to improve an existing design, but the work must be all yours.

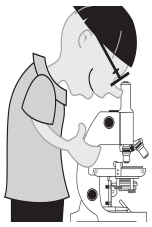
KEEP IT SIMPLE!

Science projects can become complex, so keep the experiment simple! This is actually very important to the Scientific Method. **Remember this: The simpler the experiment, the less likely that some unknown variable caused the result.** It's like starting a homeowner's project: you replace the drapes and the carpet suddenly looks awful; you replace the carpet and the tiling looks out of place; you replace the tiling…. Etc. So, if you start simple, hopefully the experiment will stay manageable.

What is simple? Using a battery example, choose two types of batteries – not every battery on the market. Which lasts longer, Duracell or Eveready? For detergent, the same thing applies: Which cleans better, Tide or Bold? If the experiment involves plants, choose two types of plants. What grows better in damp soil, marigolds or periwinkles?

A FEW FINAL WORDS

Please make sure you have read the rules very carefully!!! Many have changed and it is important that you know of the changes before starting. You will be judged by grade level band (k-1, 2-3, 4-5). Remember that you **MUST** have a project that follows the Scientific Method or uses Engineering Design.



District Science Fair Rules: Experimental Design

The rules outlined below **must be adhered to without exception**. Please follow all rules listed so you will not experience disappointment or surprise on the day of the fair. ***The use of the steps in the Scientific Method are required and must be demonstrated, and visible on your display.***

NOTE: Photographs and illustrations are considered equal to or better than actual project or demonstration materials as long as the exhibit is accompanied by identification labels.

1. Plants, (except [c] below), molds, vertebrates, environmental pollutants and items listed below which are used in an experiment cannot be exhibited, but the project may be demonstrated through photography, illustrations, and/or diagrams.
2. Exhibit size is **limited** to 30 inches deep, front to back; 48 inches wide, side to side, and 96 inches high, floor to top. (Tables are 30 inches high.) **There can be NO exceptions.**
3. Only **ONE** student per project will be permitted. NO team projects are allowed.
4. Proper attention to safety is required of all science fair participants. **Anything which could be hazardous to the public is PROHIBITED FROM BEING DISPLAYED**. Specifics are outlined below:
   a. **NO OPEN CONTAINERS WHATSOEVER!!!**
   b. Live organisms pathogenic to man or live vertebrates (i.e. cultures of bacteria or fungi are prohibited; invertebrates can be displayed only in safe, enclosed containers)
   c. Plants will be allowed if they fit within the project dimensions. Plants must be pre-watered. Poisonous or toxic plants are prohibited.
   d. Vertebrate animals, living or dead, and their parts are prohibited.
   e. Food, either human or animal, may only be displayed in sealed containers.
      Note: The public must NOT sample food.
   f. **DO NOT** display syringes or any similar devices.
   g. Any flames, open or concealed, are prohibited.
   h. Hot plates are prohibited. Do not use any highly flammable display material.
   i. Dangerous chemicals, including caustics and acids, are not allowed. **Safe chemicals** such as table salt, sugar, or bicarbonate of soda **may be displayed** in quantities of less than 1 tablespoon.
   j. Highly combustible solids, liquids, or gasses are prohibited.
   k. Do not use tanks which contain combustible gasses, including butane and propane, both of which are prohibited.
   l. Bare electrical wires/exposed knife switches may be used only with circuits of 12 volts or less.
   m. **NO electrical outlets of any kind will be provided, nor will they be available.**
5. **The student may not display his/her name or school on the project.** All projects will be identified only by an assigned number.
6. **A contestant may enter only ONE exhibit.** The exhibitor must do all work on exhibits. Teachers, sponsors, parents, etc. may participate only in an advisory capacity. Judges will give special attention to displays using children's language and drawings. Avoid using technical terms that are not understood by the student.
7. **Scoring will be based on understanding and work done by students, NOT on the value of accessory equipment, either borrowed or purchased.**

Criteria for judging will be based on creative ability, scientific thought, understanding, dramatic value and technical skill, and clarity. Decisions of the judges will be final. *updated October 2018 – Jessica Jones

CREATIVE ABILITY Rubric (15 pts.)

Uniqueness
Project is truly unique and well thought out. This has not been seen at other fairs.
Project is completely appropriate for the age of the student.
Thinking
Project shows the student's thinking and process. The student has adapted and molded the project to make it his/her own.
Student Work
Project depicts the student's own work.

SCIENTIFIC THOUGHT / METHOD Rubric (30 pts.)

Purpose / Problem is clearly addressing a valid scientific or mathematical concept. It is obvious that the idea is the student's own.
Hypothesis is complete, testable, and uses precise wording. It is directly addressing the stated problem and reflects prior knowledge.
Procedure is well-constructed and tests the problem. Steps are outlined in a step-by-step fashion that anyone could follow. All materials are listed.
Observations / Results are clear. Data is summarized in a way that describes what was discovered. Project discusses connections/similarities or differences between data found. Charts, graphs, and/or other visuals are used.
Conclusion
completely answers the problem and states if the hypothesis was successful or rejected. If rejected, there is evidence or reasoning to explain why.
Bibliography
Sources are cited appropriately.

UNDERSTANDING Rubric (30 pts.)

Information
Project is very explicit, indicating what the student has learned throughout the experiment.
Research
The Student has used research and literature appropriately, with lists available of who helped, bibliography, books or articles used, etc.
Tell a Story
The Student has a precise understanding of the project. The Student is able to relate the experiment in an appropriate manner when talking to the judges.

DRAMATIC VALUE / TECHNICAL SKILL Rubric (10 pts.)

Construction
Project is neatly done. Project is creative and organized. Attention has been paid to detail.
Project is well written and easy to follow. Grammar is used correctly with no mistakes.
Spelling and punctuation are correct.
Sentences are structured, concise and detailed.
Charts, graphs and/or other visuals are neatly organized, used, and arranged.
Work is definitely the thoughts and ideas of the student.
Appearance
Project holds the attention of the viewer at all times.
Project uses color appropriately and is exciting.
Headings are used consistently throughout the project.

CLARITY Rubric (15 pts.)

Communication

Student distinctively communicates the purpose of the experiment, how the experiment was handled, and how it concluded.

Information

Project information is explicit and in the appropriate logical order.

Student's work is accurately displayed.

Understanding

Project is easy to follow and understand. Another person could follow the experiment.

2018 Jessica Jones
2022 Karen Webb

Scientific Method

Score:

_____ **CREATIVE ABILITY (15 pts.)**

- Project is truly unique and well thought out. This has not been seen at other fairs. It is not a copy of a design found on the internet. Project is completely appropriate for the age of the student.
- Project shows the student's thinking and process. The student has adapted and molded the project to make it his/her own. Project depicts the student's own work.

_____ **SCIENTIFIC THOUGHT / METHOD Rubric (30 pts.)**

- **Purpose / Problem** is clearly addressing a valid scientific or mathematical concept. It is obvious that the idea is the student's own.
- **Hypothesis** is complete, testable, and uses precise wording. It is directly addressing the stated problem and reflects prior knowledge.
- **Procedure** is well-constructed and tests the problem. Steps are outlined in a step-by-step fashion that anyone could follow. All materials are listed.
- **Observations / Results** are clear. Data is summarized in a way that describes what was discovered. Project discusses connections/similarities or differences between data found. Charts, graphs, and/or other visuals are used.
- **Conclusion** completely answers the problem and states if the hypothesis was successful or rejected. If rejected, there is evidence or reasoning to explain why.
- **Bibliography** Sources are cited appropriately.

_____ **UNDERSTANDING (30 pts.)**

- Project is very explicit, indicating what the student has learned throughout the experiment.
- The Student has used research and literature appropriately, with lists available of who helped, bibliography, books or articles used, etc.
- The Student has a precise understanding of the project. The Student is able to relate the experiment in an appropriate manner when talking to the judges.

_____ **DRAMATIC VALUE / TECHNICAL SKILL (10 pts.)**

- **Construction**
  - Project is neatly done. Project is creative and organized. Attention has been paid to detail.
  - Project is well written and easy to follow. Grammar is used correctly with no mistakes.
  - Spelling and punctuation are correct.
  - Sentences are structured, concise and detailed.
  - Charts, graphs and/or other visuals are neatly organized, used, and arranged.
  - Work is definitely the thoughts and ideas of the student.
- **Appearance**
  - Project holds the attention of the viewer at all times.
  - Project uses color appropriately and is exciting.
  - Headings are used consistently throughout the project.

_____ **CLARITY (15 pts.)**

- Student distinctively communicates the purpose of the experiment, how the experiment was handled, and how it concluded.
- Project information is explicit and in the appropriate logical order.
- Student's work is accurately displayed.
- Project is easy to follow and understand. Another person could follow the experiment.

Total:

_____**Comments:**

District Science Fair Rules: Engineering Design

The rules outlined below **must be adhered to without exception**. Please follow all rules listed so you will not experience disappointment or surprise on the day of the fair. ***The use of the steps in the Engineering design cycle are required and must be demonstrated, and visible on your display.***

All engineering design prototypes should follow the same basic rules as the experimental design in regards to exhibit size and safety. All engineering design prototypes should be working creations, made by the student, that solve a specific problem listed on the exhibit. Demonstrations of the prototype are acceptable so long as the student is the sole demonstrator. **In the event that the prototype is unable to be demonstrated, the prototype must still be displayed and may be demonstrated through video, photography, illustrations, and/or diagrams.** ***If a student chooses to use video footage to demonstrate the prototype, the student will be solely responsible for providing the viewing device and associated power source.***

1. Exhibit size is **limited** to 30 inches deep, front to back; 48 inches wide, side to side, and 96 inches high, floor to top. (Tables are 30 inches high.) **There can be NO exceptions.**
2. Only **ONE** student per project will be permitted. NO team projects are allowed.
3. Proper attention to safety is required of all science fair participants. **Anything which could be hazardous to the public is PROHIBITED FROM BEING DISPLAYED**. Specifics are outlined below:
    a. **NO OPEN OR CONCEALED FLAME WHATSOEVER!!!**
    b. Prototypes that require the student to ride, balance, or perform movements that would cause a falls risk will be prohibited from being demonstrated.
    c. Prototypes must be free of exposed sharp edges, points, and/or corners that may inadvertently cause harm or damage.
    d. Demonstrations must not use organic materials (food or plants) that may decompose as part of the prototype.
    e. Engineering prototypes must be free from leaks and cannot use any caustic or flammable materials in order to operate.
    f. Prototypes that include motors must be powered by 12v electricity or less. **ABSOLUTELY NO GAS POWERED MOTORS OF ANY SORT.**
        i. **Highly combustible solids, liquids, or gasses are prohibited.**
        ii. **Do not use tanks which contain combustible gasses, including butane and propane, both of which are prohibited.**
        iii. **Bare electrical wires/exposed knife switches may be used only with circuits of 12 volts or less.**
    g. If a prototype includes any sort of projectile or throwing motion (read: something must become airborne in any way), demonstration of the actual launch of projectile or object will be prohibited. Video footage of a safe launch will be permitted.
    h. Prototypes that hover, fly, or otherwise become airborne may not be demonstrated at the Fair. Video footage of a previous safe demonstration off site will be permitted.
    i. To avoid a tripping hazard prototypes that move or roll may not be operated or demonstrated during the Fair. Video footage of a safe demonstration will be permitted.
    j. NO electrical outlets of any kind will be provided, nor will they be available.
    k. Without notice, the committee reserves the right to disqualify any prototype if there is a question to its safe demonstration.
    l. Dangerous chemicals, including caustics and acids, are not allowed. **Safe chemicals** such as table salt, sugar, or bicarbonate of soda **may be displayed** in quantities of less than 1 tablespoon.
4. **The student may not display his/her name or school on the project.** All projects will be identified only by an assigned number.
5. **A contestant may enter only ONE exhibit.** The exhibitor must do all work on exhibits. Teachers, sponsors, parents, etc. may participate only in an advisory capacity. Judges will give special attention to displays using children's language and drawings. Avoid using technical terms that are not understood by the student.
6. **Scoring will be based on understanding and work done by students, NOT on the value of accessory equipment, either borrowed or purchased.**

Criteria for judging will be based on creative ability, engineering design, understanding, dramatic value and technical skill, and clarity. Decisions of the judges will be final. *updated October 2018 – Jessica Jones

CREATIVE ABILITY Rubric (15 pts.)

Uniqueness
Project is truly unique and well thought out. This has not been seen at other fairs. It is not a copy of a design found on the internet. Project is completely appropriate for the age of the student.

Thinking
Project shows the student's thinking and process. The student has adapted and molded the project to make it his/her own.

Student Work
Project depicts the student's own work.

ENGINEERING DESIGN Rubric (30 pts.)

Problem/Question (Ask) is clearly addressing a valid problem that applies to the real world. It is obvious that the idea is the student's own.

Imagine is complete, diagrammed and uses precise wording. It is directly addressing the stated problem and reflects prior knowledge.

Plan/Design is well-constructed and tests the problem. Steps are outlined in a step-by-step fashion that anyone could follow. All materials are listed.

Create Model is created and an attempt to make it completely functional has been made. If the model should fail, the reasons should be addressed in the Improve section.

Improve completely discusses the design and actual model and how well it worked towards solving the task at hand. If the model should be redesigned, there is adequate information about how it could be improved, and a diagram included if necessary with reasoning to explain why the redesign is better. All results should be clear and discuss any discoveries made.

Bibliography Sources are cited appropriately as needed.

UNDERSTANDING Rubric (30 pts.)

Information
Project is very explicit, indicating what the student has learned throughout the design.

Research
The Student has used research and literature appropriately, with lists available of who helped, bibliography, books or articles used, etc.

Tell a Story
The Student has a precise understanding of the project. The Student is able to relate the experiment in an appropriate manner when talking to the judges.

DRAMATIC VALUE / TECHNICAL SKILL Rubric (10 pts.)

Construction

- Project is neatly done. Project is creative and organized. Attention has been paid to detail.
- Project is well written and easy to follow. Grammar is used correctly with no mistakes.
- Spelling and punctuation are correct.
- Sentences are structured, concise and detailed.
- Charts, graphs and/or other visuals are neatly organized, used, and arranged.
- Work is definitely the thoughts and ideas of the student.

Appearance

- Project holds the attention of the viewer at all times.
- Model is good working order and has attractiveness to its appearance.
- Headings are used consistently throughout the project.

CLARITY Rubric (15 pts.)

Communication
Student distinctively communicates the purpose of the experiment, how the experiment was handled, and how it concluded.

Information
Project information is explicit and in the appropriate logical order. Student's work is accurately displayed.

Understanding
Project is easy to follow and understand. Another person could build the model by using the available information from the student.

Engineering Design

CREATIVE ABILITY (15 pts.)

_____

- Project is truly unique and well thought out. This has not been seen at other fairs. It is not a copy of a design found on the internet. Project is completely appropriate for the age of the student.
- Project shows the student's thinking and process. The student has adapted and molded the project to make it his/her own. Project depicts the student's own work.

ENGINEERING DESIGN (30 pts.)

_____

- **Problem/Question (Ask)** is clearly addressing a valid problem that applies to the real world. It is obvious that the idea is the student's own.
- **Imagine** is complete, diagrammed and uses precise wording. It is directly addressing the stated problem and reflects prior knowledge.
- **Plan/Design** is well-constructed and tests the problem. Steps are outlined in a step-by-step fashion that anyone could follow. All materials are listed.
- **Create** Model is created and an attempt to make it completely functional has been made. If the model should fail, the reasons should be addressed in the Improve section.
- **Improve** completely discusses the design and actual model and how well it worked towards solving the task at hand. If the model should be redesigned, there is adequate information about how it could be improved, and a diagram included if necessary with reasoning to explain why the redesign is better. All results should be clear and discuss any discoveries made.
- **Bibliography** Sources are cited appropriately as needed.

UNDERSTANDING (30 pts.)

_____

- Project is very explicit, indicating what the student has learned throughout the design.
- The Student has used research and literature appropriately, with lists available of who helped, bibliography, books or articles used, etc.
- The Student has a precise understanding of the project. The Student is able to relate the experiment in an appropriate manner when talking to the judges.

DRAMATIC VALUE / TECHNICAL SKILL (10 pts.)

_____

Construction

- Project is neatly done. Project is creative and organized. Attention has been paid to detail.
- Project is well written and easy to follow. Grammar is used correctly with no mistakes.
- Spelling and punctuation are correct. Sentences are structured, concise and detailed.
- Charts, graphs and/or other visuals are neatly organized, used, and arranged.
- Work is definitely the thoughts and ideas of the student.

Appearance

- Project holds the attention of the viewer at all times.
- Model is good working order and has attractiveness to its appearance.
- Headings are used consistently throughout the project.

CLARITY (15 pts.)

_____

- Student distinctively communicates the purpose of the experiment, how the experiment was handled, and how it concluded.
- Project information is explicit and in the appropriate logical order. Student's work is accurately displayed.
- Project is easy to follow and understand. Another person could build the model by using the available information from the student.

Total:

_____

Comments: