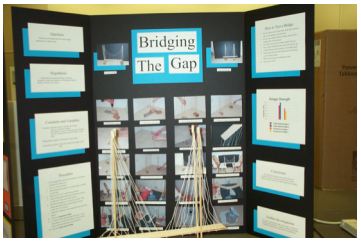
# Engineering Design Science Fair Packet (ED-SFP) For 5th and 6th Grade Students




**"How Does a Student Do a Meaningful Science Fair Project Using the Engineering Design Process?"**

**In this packet is information for students showing the steps on how to complete a meaningful science fair project using the Engineering Design Process. This packet tells what is recommended and required when students do a science fair project for the school science fair.**

| Enclosed are the following: | Page |
|---|---|


**If you have any questions about the Engineering Design process, ask your teacher or call Paul Nance, the Jordan District Elementary Science Teacher Specialist, at 801-244-6479 or email him at paul.nance@jordandistrict.org.**

# Three Science Fair Processes To Choose From For A Science Fair Project

One of the major objectives of students doing a science fair project is to acquire more knowledge about the world around them. Students are able to choose from three processes, namely, the Scientific Method process, the Engineering Design process, and the Computer Design process for their projects.

1. **The Scientific Method process:**
   Using this process you will: write a question; form a hypothesis; plan an experiment; gather the materials needed; perform the experiment; examine the results; write up a conclusion showing what you learned and can apply the knowledge to real world situations.

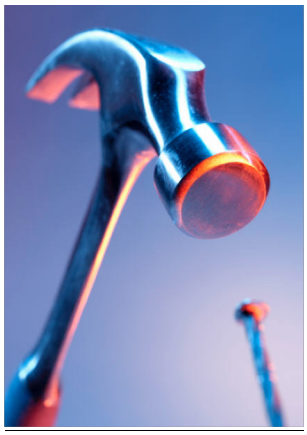
2. **The Engineering Design process:**
   Using this process you will: define a need for the product; connect the need to a design goal; establish the requirements needed for product development; write up a procedure with preliminary designs; gather the materials needed; build a prototype (a model of the product) according to the designs; test the prototype; redesign, if necessary, to meet the stated design goal; and connect or apply the value of the prototype to real world situations.

3. **The Computer Design process:**
   Using this process you will: define a program need; connect the need with a design goal; establish the requirements needed for program development; write up a series of operations for the program code; develop the program with a test plan; conduct several tests according to the test plan for debugging, rewriting, and optimizing the code; and connect or apply the value of the program to real world situations.

**How much work that is put into each step of one of these processes will result in a higher score on the judging sheet.**

**In this packet the Engineering Design process is the only one presented to you. If you want any information on how to do a project using the Scientific Method or Computer Design processes, go the Jordan District Elementary Science webpage and download the desired packet.**

# Choosing a Topic of Interest for Your Science Fair Project Using the Engineering Design



Choosing an area of interest is the hardest part of the science fair project. For ideas as where to start, look at this Engineering Design science fair category below and what it entails.

## Engineering Design

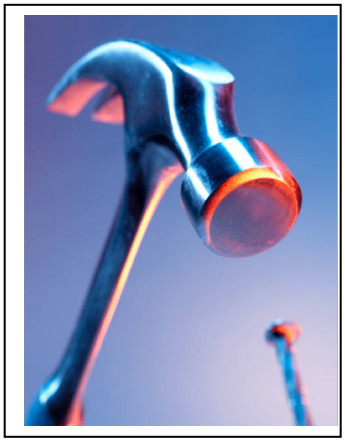
Engineering is the designing, building, and testing of a made-at-home product. It is the invention category of the science fair. A prototype is built according to the requirements set up by the student. After the prototype is built, it needs to be tested to see if it works. The data is analyzed. It is to be compared to the design requirements. If it doesn't perform according to the design requirements, the student needs to go back and redesign the prototype on paper. Adjustments are made on the prototype and retested. This process of redesigning and making adjustments continues until it works according to the design requirements. The product results have to be useful and apply to real world situations. **The prototype cannot be made from a kit.**

**If you want any information on how to do a project using the Scientific Method or Computer Design processes, go the Jordan District Elementary Science webpage to download the desired packet.**

# Here are some ideas to help you choose a topic for your science fair project using the Engineering Design process.

**airplane wings**
**air quality**
**alarms**
**animal tricks**
**blindfolding**
**blood pressure**
**bugs**
**chemical reactions**
**cleaning**
**clouds**
**color**
**computer programs**
**concentration**
**conservation**
**coordination**
**designing & building**
**dieting**
**different age skills**
**dissolving**
**ecology**
**electricity**
**energy**
**environments**
**erosion**
**evaporation**
**exercising**
**feeling**
**food nutrition**
**habits**
**heat**
**heredity**
**illusions**
**inventions**
**light**
**listening**
**magnets**
**music**
**memory**
**noises**
**optical illusions**
**pH**
**puzzles**
**recycling**
**rockets**
**rocks**
**pollution**
**smelling**
**snowboarding**
**soaps**
**soil**
**soil quality**
**solar power**
**sounds**
**sports**
**stress**
**tasting**
**temperature**
**video games**
**voices**
**water**
**waterpower**
**water quality**
**weather forecasting**
**weathering**
**weight**
**wind**

# The Engineering Design Outline

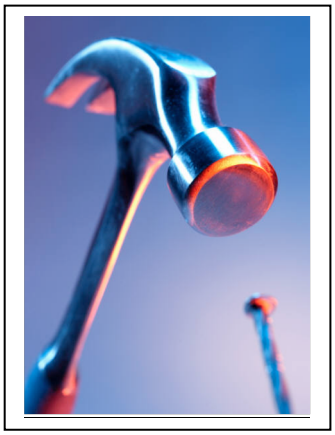


**When using the Engineering Design process while doing a science fair project, all of these steps listed below are required in the order shown. During the process of completing each step, each step needs to be written in your journal and later put on your display board. A judge will ask you about the Engineering Design process in your interview.**

- **Define a Need**
- **Research**
- **Design Requirements**
- **Preliminary and Final Designs**
- **Materials Needed**
- **Step-by-step Procedure**
- **Build and Test the Prototype**
  - **Build the Prototype**
  - **Test the Prototype**
  - **Record the Data**
  - **Analyze the Data**
  - **If it doesn't work according to the "Design Requirements" then…**
- **Redesign and Retest as Necessary**
- **Conclusion**

**In the next section, The Engineering Design "The Procedure" (pages 4a-4b), gives a detailed description of what to do for each step of the Engineering Design process. Please read the next section carefully to know what to do for each step.**

# The Engineering Design
# "The Procedure"



A type of process students can use for a science fair project is the Engineering Design process. The major objective is to understand the process of designing something and building a prototype (model of the product). The engineering project should be one that is a novice idea. It cannot be a purchased kit. The materials are to be raw materials found around the house and/or purchased at a store.

Students who want to build a prototype for the science fair are required to follow The Engineering Design process described below. As students follow the Engineering Design Process, they must write about each of the following steps in a journal. **The interviewer can question anything that is in the journal.**

1. **Define a Need:**
   Begin by writing a need for something you want to construct and to explain its purpose. It could be for a problem that needs to be solved or a situation that needs improvement. Write it so the need is clearly understood. The goal of this engineering project is to design and construct a prototype for someone to use to perform a useful function. Example: "The goal of this project is to design, build, and test a way to minimize waiting time at stop lights in the city."

2. **Research:**
   You need to research your topic using library materials, Internet sites, magazines, textbooks, encyclopedias, experts, and other available and reliable sources. **At least three sources must be used for the research.** A fairly lengthy paragraph should be written telling what you learned from your three research sources. Be sure the paragraph goes deep into the content learned and you are not just telling knowledge that is already known. Copying a page from a book or Internet and placing it in the journal is not research. **The research needs to be hand or type written. The interviewer can question anything that is written in the journal.**

3. **Design Requirements:**
   Next, you need to establish the requirements needed for the development of the prototype to decide how it will be built. Typical requirements relate to shape, size, weight, appearance, physical features, performance, use, cost, time and money. Another part of the design requirements is to tell the prototype expectations and how it will be tested to meet the desired expectations.

4. **Preliminary and Final Designs:**
   - **Beginning designs**
     Here you need to draw the beginning designs of the prototype with labeled parts. They can be brainstorming designs showing two or three ideas.
   - **Final designs**
     As you focus into one type of design, you need to show the changes needed as the designs get closer to the requirements and expectation of the prototype. The changed designs need to show progress from design to design.
   - **List of materials**
     Make a list of all the materials and equipment you will use for building the prototype. Using descriptive words to describe the materials and equipment are important. Any materials that are measured should have the measurements listed. (Ex. wooden board 2" x 4" x 8")

- **Step-by-step procedure**
  Write a step-by-step procedure you will follow to build the prototype. Write it in the order you want to follow. Be very descriptive in your writing.

## 5. Build, Test and Record, and Analyze the Results of the Prototype

- **Building the prototype**
  Build a prototype according to the design requirements, drawn designs, list of supplies and equipment, and the step-by-step procedure. You need to write about the experience building the prototype.
- **Testing and data recording**
  After it is built you need to test the prototype to see if it works according to the testing procedure stated in the design requirements. You need to write down what is actually happening during the testing. You should be as descriptive as possible. Testing the prototype two or three times is important to make sure the test data is accurate.
- **Data is analyzed if redesigning is necessary**
  Analyze the data. See if the results match the design requirements. If not, redesigning is necessary.

## 6. Redesign, Retest, Record, and Analyze As Necessary

- After the first tests you may need to make adjustments by redesigning parts of the prototype that need adjusting. You need to show the adjustments with diagrams and labeling. Keeping accurate notes of the changes is very important in this part of the engineering project.
- Retesting is always necessary after redesigning has occurred. When you are retesting, you need to write down data as to what is happening.
- Analyze the data. See if the results match the design requirements. If not, redesigning is necessary.

**(Redesigning and retesting of the prototype is a major part of the project. Keeping notes of the changes and the results are very important. You should be able to can see at a glance what changes have been made and what happened when these changes are retested. You need to be able to recall the changes and results if needed.)**

- When you feel that the prototype has reached its greatest efficiency according to the design requirements, you can then go on to the conclusion. If you feel that more designing and testing is needed, then you need to continue to redesign and retest, writing down the data until you feel the prototype is finished. The prototype needs to work and meet the design requirements.

## 7. Conclusion:

- When writing your conclusion you need to show evidences of what was learned. The conclusion summarizes the learning by answering some of these questions: How do the results validate what was expected to happen? What was learned from building the prototype? In what ways is this prototype important? Are there more things that could be done to improve the prototype? How does this prototype help people understand the world better? How can this information be applied to real life? What new insights were discovered? What knowledge was gained by designing and building to prototype?
- The conclusion needs to show the value of the project and the prototype and how it can apply to life and/or the real world. Write about the final prototype by looking at its merits, originality, and usefulness.

## Please note:

**Any other project that is done by testing a product that does not involve the Engineering Design process should be done by using the Scientific Method process.**

# The Engineering Design
# "The Journal"

All students entering an engineering design project in the school science fair must have a journal (log). The journal is the literacy that connects the writing, thinking, research, planning, building, testing, and conclusion to engineering design project. **The interviewer can question everything that is written in the journal.**

## The journal consists of four main parts:

- **Title page**
- **Table of Contents page**
- **The Engineering Design pages**
- **The Bibliography page**

## 1. Title Page

The title page consists of the project title, student name, school, and date.

## 2. Table of Contents

Make a table of contents that shows where the pages of the Engineering Design process steps are found with page numbers so these steps are easily found.

- Define a need
- Research
- Design Requirements
- Project Prototype Designs
  - Beginning Prototype Designs
  - Final Prototype Designs
  - List of Materials
  - Step-by-Step Procedure
- Building, Testing and Recording, and Analyzing the Prototype
- Redesigning, Retesting and Recording, and Analyzing the Prototype
- Conclusion

## 3. The Engineering Design

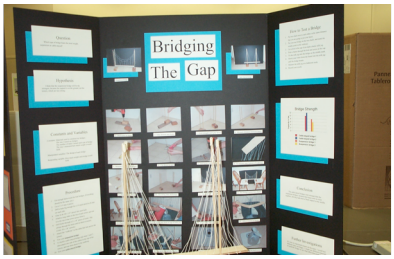
In this section you will write what you did or discovered by following each part of the Engineering Design process. See the Engineer Design process pages (4a and 4b) to know what should be written on each page.

- Define a Need page
- Research page
- Design Requirement page
- Project Designs
  - Beginning Designs page
  - Final Designs page
  - List of Materials page
  - Step-by-Step Procedure page
- Building, Testing and Recording, and Analyzing the Prototype
  - Building the Prototype page
  - Testing and Recording page
  - Analysis page
- Redesigning, Retesting and Recording, Analyzing the Prototype
  - Redesigning page
  - Retesting and Recording page
  - Analysis page
- Conclusion page

## 4. Bibliography

Write a list of the three or more sources you used for research by telling the type of source, title, and page numbers (if applicable).

# The Engineering Design
# "The Display Board"




Create a display board so your findings can be shown at the science fair. It is a summary of your project and reflects your journal. This is your showcase. Make it creative and colorful. Below are ideas for a good display board.

- Physically sound and durably constructed, able to stand by itself.
- Title of your project at the top.
- Show all the steps of the Engineering Design process (except the research) with a brief explanation of each: the need, design criteria, preliminary and final designs, building, testing results and the analysis, redesigning and retesting results and the analysis as needed, and the conclusion. The research will be in the journal.
- Well-organized and easy to follow from one idea to the next.
- Neat, edited, and without scribbles and misspelled words.
- Creative, pleasing to look at, colorful, with different font sizes to show emphasis.
- Photos of the developing experiment. (Only the student doing the experiment and family members can be displayed on the board. Others need parent permission if under 18 years of age.)
- Drawn pictures, artwork, and icons that bring out the ideas of the experiment.
- The journal should be in front of the display.

**Students like to display items they used when doing their experiments. For reasons of safety the following items <u>cannot</u> be displayed at the school and district fairs. This is also found on the last page of the 2014 Central Utah Science and Engineering Fair (CUSEF) Registration Form.**

- Living organisms
- Plant material (living, dead, or preserved)
- Taxidermy specimens or parts
- Preserved animals including embryos
- Human or animal food including seeds
- Human or animal parts or body fluids
- Soil, sand, or waste samples
- Laboratory/household chemicals including water
- Poisons, drugs, hazardous substances or devices
- Sharp items, scissors, glass, syringes, needles
- Dry ice or other sublimating solids
- Flames or high flammable materials
- Empty tanks that previously contained combustible liquids or gases
- Batteries with open top cells
- Photographs of children under 18 other than yourself or your family without parental written permission
- Photographs or other visual presentations depicting vertebrate animals in surgical techniques, dissection, necropsies, other lab techniques, improper handling methods, improper housing conditions, etc.

**Pictures of these items can be placed on the board except the last bullet.**

**Schools and the district have the right to remove these things above and anything else that may be dangerous to the public.**

# The Engineering Design
# "The Interview"

The judge's interview gives you the opportunity to explain your project. The judge wants to know how much you know about your project.

- How you received the idea
- How you personalized it to make it unique
- How you prepared it
- How you set it up
- What information you discovered
- What the information means
- What your conclusion is

The judge also wants to know your background knowledge about the subject you chose. Some of the judges' questions may not be about your project. He/she may ask questions related to your topic. For example, if you built a tsunami model to test the destruction a tsunami could cause, it would be well to know about tsunamis and the damage they can do, how they can do so much destruction, and places tsunamis have happened. Even though this information is not entirely what your project is about, it shows you have done research about tsunamis.

Some questions that might be asked:

- Explain where you got your idea for the project.
- What did you do to personalize it and make it unique?
- Explain the project method you used.
- Why did you choose this subject?
- Explain your results.
- Explain your conclusion.
- How does the result relate to your background knowledge?
- How does the result help you in understanding the world better?
- How does your project have practical applications?
- Specific background knowledge about your subject.
- What problems did you run into?
- How could you have improved your project?
- If you did it again, what would you change?
- What questions do you have now?
- Tell some ideas you learned from your research.
- How did the research help you with your project?
- How much time did you spend on your project?
- How did others help you or give you ideas?
- How did you test your prototype?

Be excited about your project when you speak. Don't talk too fast. Elaborate on your answers. Help the judge understand your project by speaking clearly in an organized manner so it's not confusing. **You need to show evidences of learning.**

**Judges do not want you to redo your experiment for them. Their interest lies in your knowledge of the Engineering Design process, the display board, the results, and the knowledge you acquired.**

# 5TH AND 6TH GRADES SCHOOL SCIENCE FAIR ENGINEERING JUDGING SHEET

**Name(s)_____ School _____**

**Project Title_____**

| Category | Comments | Excellent | Good | Fair |
|---|---|---|---|---|
| **I. Journal/Log (Engineering Design)** | | **5** | **3-4** | **1-2** |
| **Title Page/Table of Contents:** Title, name, school, date, and the table of contents | | | | |
| **Need:** A need for the project is defined | | | | |
| **Research:** Three different sources cited with well-written notes | | | | |
| **Design Requirements:** Clear statement of the requirements for prototype development | | | | |
| **Preliminary and Final Designs:** o Beginning and final designs drawn and labeled showing changes to meet the design requirements | | | | |
| o Materials' list and step-by-step instructions clearly written | | | | |
| **Building and Testing the Prototype** o Prototype built according to the design requirements | | | | |
| o Sufficient data gathered during the first testing. Data is analyzed if redesigning is necessary. | | | | |
| **Redesigning and Retesting:** Redesigning and retesting done showing gathered data and analysis. | | | | |
| **Conclusion:** Reveals evidence of learning | | | | |
| **II. Display** | | | | |
| o Neat, edited, and physically sound | | | | |
| o Engineering method displayed, easy to follow, and self explanatory | | | | |
| o Journal and display showed a close relationship | | | | |
| o Creative Board Design | | | | |
| **III. Interview** | | | | |
| o Student shows a basic knowledge of field studied and able to elaborate | | | | |
| o Student is able to explain how the engineering method was used | | | | |
| o Student shows interest, enthusiasm, and a passion toward the project and could tell how it was personalized | | | | |
| **IV. Project Follow Through** | | | | |
| o Creative, procedural approach with ingenious use of materials and equipment to solve the problem | | | | |
| o Project shows in-depth thought and work to solve the problem | | | | |
| o Results show a well, thought out, reasonable conclusion showing a useful connection to the world | | | | |

**Score** Ex. 5 Gd. 3-4 Fair 1-2

| **Sub scores** | | | | **Total Score** | **/100** |
|---|---|---|---|---|---|

# What an Engineering Design Science Fair Project Is and Is Not

## A Science Fair Project using the Engineering Design is Not:

- Just building a product
- A report about an engineering design
- A simulation or demonstration to show how something works
- A survey of what people think or feel about something
- A design that shows common knowledge that everyone knows
- A design that is copied from of a book or off the Internet
- Gathering statistics from a news source and reporting on the daily changes

## A Science Fair Project using the Engineering Design is:

- Thinking of a problem to solve by means of the building a prototype using the Engineering Design process
- Planning a design to construct a prototype to solve the problem
- Follow through with constructing something that works
- Testing the prototype and analyzing data to reach a goal
- Using the knowledge learned to make a connection to higher-level ideas and to understand those new ideas to see how to apply them to the real natural world.

# Science Fair Resources

## Online Resources for Science Projects Ideas

- http://cusef.byu/edu
- www.sciencebuddies.org
- http://www.stevespanglerscience.com/content/experiment/science-fair-survival
- www.sciencebob.com

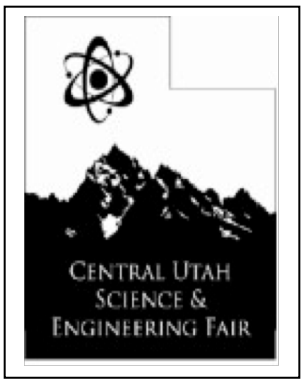
## Online Resources for Environmental Science Projects

- http://www.isd77.k12.mn.us/resources/cf/SciProjIntro.html
- www.isd77.k12.mn.us/resources/cf/SciProjIntro.html
- www.detroit.lib.mi.us/is/science_fair.htm
- http://faculty.washington.edu/chudler/fair.html

# STUDENT SCIENCE FAIR PROJECT SUGGESTED TIMELINE USING THE ENGINERING DESIGN

| Week | What is going to be accomplished? | Done |
|---|---|---|
| **Week 1** | Student becomes familiar with the Engineering Design process. Student gets the science fair journal ready. Student comes up with a topic and need for his/her science project design and writes it in the journal. | |
| **Week 2** | Student researches the topic by finding at least three sources and reading about them. He/she writes detailed paragraphs in the journal of specific details of what was learned. | |
| **Week 3** | Student writes his/her design requirements in the journal. Student begins the preliminary designs and narrows it down to the design desired.<br>Student writes up a list of the materials needed. | |
| **Week 4** | Student writes up the final step-by-step procedure of the prototype in the journal. Student acquires the materials needed to build the prototype. | |
| **Weeks 5-6 (or longer if needed)** | Student builds the prototype according to the design requirements. Sets up a plan on how to test it. Student tests the prototype. He/she gathers data and writes the data in the journal. Student analyzes the data if it worked or not according to the design requirements. | |
| **Week 7** | If the prototype doesn't work according to the design requirements, then redesigning and retesting is necessary. Data is gathered and analyzed again. A conclusion is written up. | |
| **Week 8** | Student makes a creative display board using colors, decorative paper, different font size, pictures, and designs. It displays all parts of the engineering design (except the research). Student writes a brief explanation under each design step on the board. Student practices what he/she is going to say about each step for the interview. | |

# Directions for Filling out the 2014 Central Utah Science & Engineering Fair Registration Form For 5th and 6th Grades




**All 5th and 6th grade students entering their respective school science fairs in Jordan District must fill out the 2014 Central Utah Science and Engineering Fair (CUSEF) Registration Form for 5th and 6th grades to give to their teachers prior to beginning their science fair projects. There are certain rules that students must follow in doing a science fair project. If these rules are not followed the project can be disqualified at the district and regional levels. Filling out this form correctly and completely will guarantee admittance to all science fair levels of competition.**

After you have chosen a topic and prior to beginning your project, the next step is to fill out **completely** the Central Utah Science and Fair (CUSEF) Registration Form for 5th and 6th Grades. **Your teacher will either give you the CUSEF Registration Form or you can download it off the Jordan District website: jordandistrict.org—Faculty and Staff—Departments—Science Elementary—Science Fair Information.**

Below are the directions on how to fill out the CUSEF Registration Form. Completion of this form does not guarantee advancement to CUSEF but it will show that you have followed all the science fair rules for all competition levels.

Once you have filled it out, give it to your teacher for approval. If it is not complete he/she will give it back for you to complete. If you change your science fair research plan, then you must submit a new plan to your teacher. **If you are doing this project as a group (maximum of three students per project) you will only need to fill out one form.**

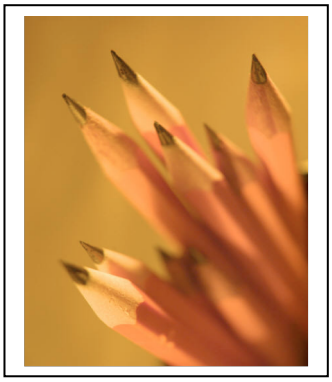
# Directions For Filling Out the Four-Page, 2014 Central Utah Science and Engineering Registration Form

## Page One—Student and Project Information

1. **Student Information**
   - This is to be filled out by you and anyone else who are doing this project with you. You can have up to three per project.
   - All the information needs to be filled in just in case you need to be contacted either by phone or mail.
2. **Project Information**
   - Fill out all information including teacher's name and his/her email. Your teacher's email will be the first and last name with a period between the first and last names ending with "@jordandistrict.org".
   - Mark the box of which category your project is under. If you have problems knowing, look on pages "1a" and "1b" of the student packet, ask your teachers, or call Paul Nance at 801-244-6479 or email him at paul.nance@jordandistrict.org**.**
   - Mark the boxes on the right if you are going to be experimenting on any of the things listed. If you are, you need to get some signatures before starting your experimentation found on page two of the registration form. If not, mark "none of these".
   - Answer the "yes" or "no" questions at the bottom.

# Page Two—Science Fair Project Rules*

**(This page is for the those projects that need Special Signatures)**



**Some projects require special signatures from professionals before you can begin them. These experiments may cause harm to humans and vertebrate animals without being screened. Laws have been set up to protect humans and animals from being hurt, disgraced, or diseased.**

**The following projects need special signatures from certain professional people listed below with the date they signed it.**

- **If you are working with humans as subjects,** you must get **prior approval** from a science teacher, a school administrator, and one of the following: a psychologist (could be from your school), psychiatrist, medical doctor, physician's assistant, or registered nurse. Have each sign on the lines provided on the form. **Also, if any of your subjects are under 18, you need to get written permission from a parent of each child. A form to use is included in this packet.**
- **If you are working with non-human vertebrate animals as subjects,** you must get **prior approval** from two science teachers and a veterinarian. Have each sign on the lines provided on the form. Proper animal care must be provided daily and there cannot be any pain or discomfort.
- **If you are working with controlled substances,** you must get **prior approval** from two science teachers and a school administrator. Have each sign on the lines provided on the form. All laws in handing the controlled substances must be followed. An adult must be present and supervise the experiment.
- **If you are working with hazardous substance or devices,** you must get **prior approval** from two science teachers and a school administrator. Have each sign on the lines provided on the form. Students must follow the laws in handling these substances or devices. An adult must be present and supervise the experiment.
- **If you are working with potentially hazardous biological agents (bacteria, mold, fungi, viruses, parasites, fresh human or animal tissues),** you must get **prior approval** from two science teachers and a biomedical scientist (usually found at a university or lab office). Have each sign on the lines provided on the form. Growing of unknown microorganisms must be grown in a sealed, unbreakable container such as a Petri dish and stayed sealed during the whole experiment. **The containers must be kept in a lab for observation and not in the home. If this experiment is done at home the project will be disqualified.**

**If you have questions about these signatures ask your teacher or call Paul Nance at 801-244-6479 or email him at paul.nance@jordandistrict.org.**

***It is important to get these signatures before the experimentation begins, otherwise, it may cause the project to be disqualified for further competition.**

# Page Three—The Science Fair Project Research Plan

**After you have chosen a topic, the next step is to write up the research plan for your teacher. There are a couple of reasons a research plan needs to be written.**

- **There is pre-work that needs to be done before the actual experimentation. Knowing the steps you need to take to complete a science fair project will help you do a completed project.**
- **Your teacher can look at it and know that your project will be a safe and meaningful project.**

Filling out the Science Fair Project Research Plan includes the following:

1. Coming up with a question that can be answered by science experimentation.
2. Doing research on your topic.
3. Writing a hypothesis and write about how you came up with that hypothesis by using background knowledge acquired during the research.
4. Writing a list of supplies needed for the experimentation.
5. Telling where your experiment will be conducted.
6. The name of your adult supervisor.
7. Writing up the actual procedure, in detail, how you plan to do your experiment.

- **Be sure to be complete when you write up your plan so you, your teacher, parents, supervisor and those who may need to sign it know exactly what you will be doing.**
- **If you change your science fair research plan, then you must submit a new plan to your teacher.**

# Page Four—Display and Safety Rules and Student And Parent/Guardian Signatures

1. **Display and Safety Rules**
   - Be sure to read and understand all the display and safety rules. They must be followed when displaying your project. Anything that is on the list that is with the display board will be removed.

2. **Student, Parent, and Teacher Signatures**

   All student, parent/guardian, and teacher signatures must be acquired before entering the school, district and CUSEF fairs. Have each person read the statement above each respective signature line to know what each person is signing. It is important that everyone knows the rules and what is expected when you enter the different science fairs.
   - There is a place for the student to sign the registration form to show he/she has followed all the rules of the science fair.
   - There is a place for the parent/guardian to sign the registration form to show that all the rules of the science fair has been followed.
   - There is a place for the teacher to sign the registration form to show that all the rules of the science fair have been followed.
   - There is a place for parent signatures if child and project information can be appropriately used for publicity purposed.
   - You don't need to have the "CUSEF Approval for Completion" at this time.

# What Parents Can Do To Help With a Science Fair Project And What Students Need To Do When Doing a Science Fair Project

**It is very important that a student do as much as he/she can when doing a science fair project.** This is how the student learns first hand what is involved in the planning, the experimenting, and the writing of a science fair project. A rule of thumb is if the student can do it the student should do it.

**Parents can act as a coach, but they shouldn't be in the "game" playing. In other words, the student should do all the work that is part of the project.** Parents can brainstorm, share ideas, and help bring out the knowledge learned of the student. Parents can help build things that are hard for the student. After the parent help, final decisions should rest with the student. With this idea, the playing field is leveled where all students are doing the same work for their science fair projects.

## Below is a list of ways parents can help the student with the science fair project.

### Pre-science Fair Experiment Help

Parents can help by sharing ideas on how to set up a journal. They can help with brainstorming questions or problems for a science fair project experiment. They can brainstorm with the student of which books, encyclopedias, Internet sites, people for interviews, etc. to use for the research. The parent and student could read the research together if needed. After the reading parents can help bring out the information of the research so the student can understand it.

### Science Fair Experiment Help

Parents can help with brainstorming ways to design the science fair project experiment. They can make sure the experiment is safe and the student is following all the science fair rules. They can help the student understand controlled and experimental variables. Parents can help with the purchase of supplies needed for the experiment. They can coach and assist the student in building things that are needed for the experiment.

### Post-science Fair Experiment Help

Parents can teach the student computer techniques to make charts, graphs, and downloading pictures off the computer. They can help the student understand the gathered data of what it means. Parents can help bring out the ideas as to what was learned in the experiment so the student can come up with a conclusion. They can help with brainstorming ways to put together an effective display board, such as, ideas of what to put on the display board and where to effectively place the important information. Parents can help the student practice for the interview.

# What the Student Needs to Do Mostly By Themselves With Some Parent Guidance For The Engineering Design Science Fair Project

- The student should do most or all the writing in the journal whether it is hand written or typed on the computer.
- The student should mostly come up with the final decisions for 1) the need of the engineering project, 2) the design requirements, 3) and the prototype design (i.e. list of items needed, and the step-by-step procedure).
- The student should mostly acquire the professional signatures for the project.
- The student should mostly acquire the parent signatures of children used in the experiment.
- If things need to be purchased for the experiment, the student should mostly be with the parents during the purchase of the supplies.
- If something needs to be built and tools are needed, parents should let the student help as much as possible at the discretion of the parents for the sake of safety for the student. The student should help with measuring, sanding, gluing, building, and anything else the student is able to do. The student shouldn't leave the project for the parent to finish.
- During the prototype testing, the student should be there the whole time measuring and writing down the data in the journal. The parent should oversee the experiment for the sake of safety.
- The student should mostly have the final say for the analysis and conclusion writing.
- The student should mostly come up with the final decisions as to how the display board should look.
- The student should mostly do all the computer work that is going on the display board.
- The student should mostly do all the pasting of the words and pictures on the display board.

# Parent Consent Form To Use Children Under 18 As Participants in a Science Fair Project

Date:

Dear Parents,

For my school science project this year I am using children under 18 and I would like you use your child as a participant. Therefore, I need to get your permission to do so. I am not doing anything or using anything that would be harmful to people. I have gotten permission, by signature, to do my project using people from my science teacher, my principal, and a psychologist.

Here is what I am doing for my project and how I am using people.

If what I am doing is all right, please sign below that I can use your child in my science fair project and date it. Please return it to me.

Thank you,

_____
(signature of student doing the science fair project)

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I give my permission to have my child _____
(name of child participating in science fair project)

to participate in _____ science fair project.
(name of student doing science fair project)

Signed:

_____ _____
(Signature of Parent) (Date)

# Ways a Science Fair Project can be Disqualified

Because CUSEF and SLVSEF are affiliated with the Intel ISEF, the rules and regulations used by CUSEF and SLVSEF must match those established for ISEF. Though they may seem pesky, these rules help ensure student safety and compliance with applicable international, federal and state laws. The complete ISEF rules can be found here:
http://www.societyforscience.org/isef/document/completerules2010.pdf

The ISEF website has a very handy Rules Wizard, which asks a series of questions about your project and then tells you what, if any, additional forms you will need to fill out in addition to the ones that CUSEF and SLVSEF require. The Wizard can be found here:
http://www.societyforscience.org/isef/students/wizard/index.asp

**I. The following is a list of things, based on the ISEF, CUSEF, and SLVSEF rules that are not allowed. These *will* get your project disqualified.**

- Not growing microorganisms in a BSL 1 lab.
- Growing any microorganisms at home.
- Failing to complete and submit the required forms. Make sure that you have all the required signatures and be certain that your dates are correct. For example, if your form says you started your project on November 1st, but you didn't get approval until November 15th, then we have a problem.
- Failing to get pre-approval *if* your project requires it.
- Do a project involving human subjects without getting pre-approval.
- Using children under eighteen without parent approval unless they are part of your own family.
- Doing a project with hazardous chemicals, activities, or devices without a Designated Supervisor.
- A demonstration project. (If your project is simply showing how something works, it is probably a demonstration. Change it into an experiment by selecting and manipulating a variable.)
- Plagiarism, fabrication of data, or any other form of ethical misconduct.
- A project where a vertebrate animal has died.

**II. The following things are not allowed with the project. If they are not removed the project will not be judged.**

- The entire project display, including notebooks, pictures, gadgets, and papers, must fit within the required dimensions of 30" deep, 48" wide, and 108" tall (from floor to top).
- No living organisms, taxidermy specimens, preserved animals; human/animal body parts or body fluids are permitted.
- No pictures showing vertebrate animals during laboratory procedures are allowed.
- **No food is permitted at the display.**
- No raw plant materials, living, dead, or preserved are permitted.
- **No chemicals (including water), no hazardous substances or devices, highly flammable material, sharp items, or glass are allowed at the display.**

Resolving problems with the project display is usually possible, but it is best to avoid violating any of the display and safety rules. Use pictures to show items not allowed at the project display; it ***will not*** negatively affect the judging scores and it ***will*** make life much easier. The required items at the project in addition to the display board are a lab notebook. The student should bring their research report if they have one.