

Think OUTSIDE

The Box!

**Saginaw County Science
& Engineering Fair
February 5-7, 2010**

Student Handbook

Celebrating 32 years of Scientific Exploration

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Acknowledgments

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A Letter to Parents

Science is asking a question of nature and making sense out of the answer. It is the process by which people create new knowledge to solve a problem. Scientists try to understand how nature works. Engineers try to create things that never were. Preparing a Science Fair project develops skills students will use the rest of their lives: to sense problems and find creative solutions.

Review the *2010 SCSEF Student Handbook*. It will help you answer questions about their project and the SCSEF. Talk to your child's teacher about how you can help with the project. Take your child to the library or where they can get information, and help them acquire needed materials. Listen if they want to talk through their ideas. Give honest, but positive, feedback. Don't do the work for your child. It is their project, not yours. Your role is to give encouragement and advice. Give them room to make errors; much can be learned from a mistake. The SCSEF's purpose is for students to exercise their thinking skills and scientific abilities. If you have questions, contact your child's teacher or the SCSEF Office. Parents, thank you in advance for your help in making the SCSEF a successful experience for your child.

The Value Of Science Fairs

A science fair project is the ultimate answer to the often-asked student question: "Why do I need to learn this stuff?" It integrates virtually all of the skills taught separately in schools. When brought to completion, the project is an amalgamation of reading, writing, spelling, grammar, math, statistics, ethics, logic, critical thinking, graphic arts, scientific methodology, self-learning of one or more technical or specialty fields and public speaking.

It is the educational activity that allows the students to teach themselves, to discover something exciting and new from established information. It allows them to develop the questions independently into formal, testable, solvable problems. A Science Fair project produces many benefits beyond the obvious technical and research skills. The logical processes encourage clear and concise thinking. Students develop time management and organizational skills. Science requires clear note taking and data gathering, curiosity, patience, and honesty about results and procedures and a concise reporting of work accomplished.

Science cannot be taught as a group of facts or a set of rules. Science is a process, a way of thinking. Understanding how to use the scientific method makes scientific and technological advancements possible. Students must know how to reason logically, how to hypothesize, how to observe, how to gather data and how to draw conclusions. A science fair project can be exciting because it involves the real discovery of information. It develops personal power in students. Finding the answer can be a powerful moment of discovery. *This is the value of Science Fairs.*

CRITICAL DATES TO REMEMBER

December 18, 2009 - Entry Forms Due to SCSEF Office
January 15, 2010 - Abstracts Due from Senior Division
February 5, 2010 - Set Up Projects 4:30 - 7:30 p.m. ONLY
February 6, 2010 - Judging
February 7, 2010 - Awards Ceremony 2:00 p.m. &
Project Removal must be completed by 6:00 p.m.

SCSEF 2010 Basic Information

Who can participate?

Students in grades 5-8 attending Saginaw Public Schools may participate in the Elementary (grade 5) and Junior (grades 6-8) Divisions. Students in grades 9-12 attending school in Saginaw County may participate in the Senior Division.

When and where is SCSEF?

The SCSEF is Friday, February 5 to Sunday, February 7, at the SASA building, 1903 N. Niagara. SCSEF Offices have moved to 1505 Ottawa St., Ssginaw.

What are the basic rules?

A student can enter only one project. Each project must be the work of one student; team projects are **not** allowed. Students develop and conduct a scientific experiment or engineering project on their own. They may receive advice and guidance from adults, but the project is to be their own work. The student will present the results of their experiment in three ways: by writing a report, preparing a display and making oral presentations to judges.

Students must submit their *SCSEF Entry* to the SCSEF Office at the Staff Development Building, 1505 Ottawa St., **no later than 4:30 p.m. on Friday, December 18, 2009.** Senior Division students must also submit their completed **Checklist for Adult Sponsor (1), Student Checklist (1A),** the student's research plan, **Approval Form (1B)** and any other necessary ISEF forms. Students with projects using any of the sensitive areas of experimentation: human subjects, vertebrate animals, potentially hazardous biological agents or hazardous chemicals, activities or devices **must** submit the appropriate ISEF form(s) **prior** to the beginning of experimentation.

Senior Division students **must** submit their abstract to the SCSEF Offices by 4:30 p.m. on January 15. *See page 15 for details.* Complete rules are on pages 10-12. Senior Division students must follow the rules in the *ISEF Rules book.*

What Internet resources are available?

Visit <http://pub.spsd.net/communityeducation/SCSEF.html>, the web site for the SCSEF. On our site we will have pdf versions of the *2010 SCSEF Student Handbook*, the *ISEF Rules*, all ISEF Forms, links to Science Service, Michigan SEF and San Jose ISEF sites and other useful science fair websites. We will also post news and any updated information. The SCSEF web site will also post the awards list for the SCSEF, MichSEF and Intel ISEF.

What awards can be won at the SCSEF?

All students who display a project receive a ribbon and achievement certificate. SCSEF Awards fall into four groups: Grand, Category, Special and Advancement Awards. **Grand Awards** consist of trophies for students who receive "First Class" designation. **Category Awards** are presented to the top project in each research category. **Special Award** winners are determined by the sponsoring organization, and may be a single or variety of awards.

The SCSEF provides an opportunity for **Advancement Awards.** The SCSEF will send the top two Senior students to the San Jose, CA Intel International Science and Engineering Fair. The SCSEF will send the top ten Senior students to the Michigan Science and Engineering Fair. The SCSEF nominates the top five students in each Elementary and Junior Division to participate in the I-Sweep Competition.

Have Questions?

Call the SCSEF Office at 399-6900 or
visit <http://pub.spsd.net/communityeducation/SCSEF.html>
for more information.

Office hours are 8:00 a.m. to 4:30 p.m., Monday - Friday.
You can also email the question to: mallen@spsd.net.

2010 SCSEF Schedule

SCSEF Friday - February 5

Registration and Project Set Up begins at 4:30 p.m. and no earlier. **Students should not arrive before then.** All projects must be set up by 7:30 p.m. There are **no** exceptions.

The project displays are to be set up on Science Fair Friday between 4:30 and 7:30 p.m. The display, and all items that are going to be displayed with it, must fit within the size specified for the student's division. There are many items that the student may have used in their research that can **not** be displayed at the SCSEF. A full list is on page 10, but prohibited items include: living organisms, fungi, molds, body parts, hazardous chemicals or devices. Access to electricity for the display is available only to Senior Division students.

When you arrive, find the registration table for your division. You will receive a Project Set Up Instruction Sheet and a Judging Card listing with the Judging Session and time you will need to be at the SASA building on Saturday. You will also be given a confirmation card that has your name, information and project title on it. Please make any needed corrections on that card and return it to the registration table. The staff will direct you to your project space. After your project is set up, and you have completed all steps on the instruction sheet, you are free to go.

SCSEF Saturday - February 6

Elementary & Junior Division judging schedule:

Session A	Report 8:30 a.m.	Judging 9:00 a.m. - 10:30 a.m.
Session B	Report 10:15 a.m.	Judging 10:45 a.m. - 12:15 p.m.
Session C	Report 12:00 p.m.	Judging 12:30 p.m. - 2:00 p.m.

Senior Division judging schedule:

Session S	Report 8:30 a.m.	Judging 9:00 a.m. - 2:00 p.m.
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Students should report to the auditorium for the time listed on their Judging Card for instructions. Students will stay at their projects through their judging period. Senior Division interviews will last 15 minutes. Elementary and Junior Division interviews will last between 7 and 10 minutes. Exhibitors will have multiple interviews. When their session is over, students should leave. A Parent Room will be available for parents who wish to stay during their child's judging period. **During judging, no one except students, judges and staff, will be allowed in the exhibit area.**

The exhibit area is open for Public Viewing from 3:00 - 7:00 p.m.

By 8:00 p.m., we will post the names of all students who will be recognized at the Awards Ceremony, on Sunday, on the SCSEF web site at <http://pub.spsd.net/communityeducation/SCSEF.html>.

SCSEF Sunday - February 7

The exhibit area is open for Public Viewing from 12:00 noon - 2:00 p.m. The SCSEF Award Ceremony will be at 2:00 p.m. and will be held in the SASA Auditorium.

Senior Division students who qualify for the ISEF or MichSEF must attend a short meeting after the Ceremony.

After the Awards Ceremony, all students must have their projects disassembled and removed from the SASA building by 6:00 p.m. **Anything not removed by that time will be destroyed!**

The Scientific Method

The Scientific Method is understanding how and why causes create a particular event. A carefully studied and controlled event is an experiment. You will discover cause and effect relationships. The steps of the Scientific Method will help you with your experiment. A log, or data book, is the notebook where you keep all records of your experiment. It should be part of your display. A thorough project needs accurate and detailed notes. Your log will help you write your paper and prepare your presentation.

Identify a problem.

Pick your topic. Science projects require a lot of effort. You should choose a topic you are interested in, or want to learn more about. Ideas can come from talking to experts, or reading books, magazines and newspapers, or watching educational programs. You may use your experiences and hobbies to come up with an idea. If you can test it, it could be a science fair project.

Make a timetable. You should choose a topic that not only interests you, but can be done in the amount of time you have. You should limit your experiment to one or two specific events. Make a calendar and work back from when your project is due. Sample timetables are on page 9.

Investigate your topic. Reading broadens your understanding of your project's possibilities and limitations. Your school library is a natural place to begin, but explore the public library or a nearby college or university library. Librarians will help you find the materials in your field. Libraries have science encyclopedias which provide basic facts. Use magazines like *Science News*, *Science*, and *Scientific American*. A review of the *Periodic Guide* may provide recent articles. The Internet is a great place for research. By using a search engine, you can find sites to use to gather information on your topic. Taking notes as you read will let you refresh your memory when you return the materials.

Research quickly. You will not have time to read everything you find. There are some items to decide which books are best for your research. The copyright date will show if the book is outdated. Look for information in the table of contents and index. Read the bibliography for books or articles you can use. Be sure to record the author's name, the book's title and publisher.

Develop and ask a good question. You should ask a question you can investigate, but not be able to find the answer in a book. Your topic should be the question you intend to find the answer to. It should be clear what cause you are testing to measure the effect. Questions which make good science projects often ask "How," "Do," "Which" or "What." A "How" question usually leads to a demonstration to show how an item works. You must be sure it is a research project, not just a demonstration. A "How" question could be "How can you create a magnet using electricity?" Asking a "Do" or "Does" question means you will find if two objects have a relationship and affect one another. A "Do" question could be "Does the speed of film affect lighting, color and focus of the pictures?" You make a comparison between objects with a "Which" question. A "Which" question could be "Which natural fruit juice cleans a penny the best?" For a "What" question, you find out what types of relationship different items have. A "What" question could be "What is the most efficient substance for melting ice?" This is an analysis because you measure what happens.

The questions used as examples were projects done by a fifth grader at SCSEF 2006 and received a First Class Award.

Make a hypothesis.

Answer that question. You should write a sentence which answers your question and predicts what will happen. Your **hypothesis** is an educated guess using all information you have gathered before your experiment begins to predict what will happen if you change some of the causes of your event. Causes that can change are **variables**.

Do the right type of project. A goal of the SCSEF is for students to experience conducting an experiment; answering a question using the scientific method or engineering process. Projects that are only demonstrations, collections, 'library' research or model building are not appropriate for science fairs.

Plan your experiment.

Know what you will do before you do it. Good scientists remove prejudice or bias from the experiment. You may want results to prove your hypothesis, but your experiment must be conducted so bias does not get in the way. You will write step-by-step directions explaining how to do your experiment and what it will involve. Your **procedure** is your experiment's recipe. You have to think through each step. Problems need to be anticipated. You should make rules on what to do when things go wrong. You must determine how to collect and measure data. It is best to record changes in measurable numbers rather than observations. The more tests you do, the more accurate your results are.

Know what will change. Your experiment attempts to answer a question where you find what happens when you change a variable. You must be sure the differences are caused by the changes you meant to make. There are three types of variables. The **manipulated variable** is the *one* thing you change in your experiment. For example, if you want to know how temperature affects battery life, the batteries' temperature is the only variable you change. The **responding variable** is what changes due to changes in the manipulated variable. If you test the batteries in a flashlight, the responding variable is the time the flashlight works. **Controlled variables** (controls) are the things kept the same. Controls in the battery example are the brand of battery, the package shelf-life date, the flashlight used, the time each battery had been kept at each temperature, and others. You can conduct control experiments where no variable changes.

Gather your data.

Be safe! You should perform your experiment under your sponsor's supervision unless they have said you can work alone. If you have questions, ask your supervisor before proceeding. When conducting your experiment, keep your work area clean and organized. Consider if the results are worth the risk of the experiments. Projects can pose a risk to the student or their subject(s). Know what might go wrong and take steps to prevent it.

Conduct your experiment. Your log is a record of what you did, saw and thought. You must keep detailed, thorough, accurate, consistent and dated notes of every experiment, measurement and observation. Notes should be written while results are in front of your eyes and the details are fresh. Record things you tried, even the "didn't-works" and "mess-ups." Do not remove pages; you should draw a line through errors. Errors show the process you went through. All data entries and tables belong in your notes, including calculations and graphs. You should photograph the experiment as it is done and include pictures, drawings or sketches.

Analyze your data.

Evaluate your results. Students should be skeptical of all results, especially their own. Data are only useful if you can believe them. An important test of data is obtaining similar results when you repeat the experiment. You will notice if results change each repetition. If you do not get the same result when you repeat the experiment, you may not be measuring what you thought you were. This is the **repeatability** of your data. Your experiment may have weak spots, or **limitations**, you didn't know about when you started. They should be listed when discovered. When you repeat the experiment, limitations can be compensated for or corrected.

No experiment will actually answer your question for you. You have to look at the data and do some organized thinking to arrive at an answer to your question. You should use **descriptive statistics** to review the results (average, mean, range, standard deviation, sample size, etc.) of each group and for each dependent variable. Results from each experimental group are compared with the control and differences are noted.

You must determine if you are actually finished with the experiment and if you have enough data to answer your question. If you do not have enough data, conduct additional experiments.

Draw conclusions.

Never alter a theory to fit results. Ultimately, you must decide if the data support or contradict the hypothesis. Although you may expect a certain result, you must accept an opposite result. Do not discount or ignore a result because it does not fit your expectations. If the results prove your hypothesis wrong; it may mean you either did not have enough information before you began, or you did not understand all of the information. Whether your hypothesis is proven right or wrong, you must explain why when writing about the conclusions you reached. You have a better project *if* you learn why results came out the way they did.

Engineering, Computer or Math Research

Not all areas of study are best served by using the scientific method. Engineers, mathematicians and computer programmers have different objectives than scientists, and follow a different process in their work. "Scientists try to understand how nature works; engineers create things that never were." The process used to solve a problem is different depending on their area of study.

Engineering and Computer Sciences Projects - An engineering or computer sciences project should state the goals, the development process and the evaluation of improvements. Engineering or computer sciences projects include the following:

- Define a need or "How can I make this better?"
- Develop or establish design criteria (could be more than one)
- Search what has already been done or what products exist that fill a similar need. What makes them good and what makes them weak?
- Prepare preliminary designs and a materials list. Consider costs, manufacturing and user requirements.
- Build and test a prototype or simulation of your best design or program. Consider reliability, repair and servicing.
- Retest and redesign as necessary. Product testing.
- Present results

Mathematics Projects involve proofs, solving equations, etc. Math is the language of science and is used to explain existing phenomena or prove new concepts and ideas.

A student is evaluated on how well they actually *did* the project compared to how well they *could* have done. Judges focus on:

- ◆ What the student did in the current year.
- ◆ How well a student followed the scientific methodologies.
- ◆ The detail, accuracy and documentation of the experiments.
- ◆ Whether experimental procedures were used in the best way.

Judges score projects on a scale of 1 to 100 using the criteria listed below. We use the scores to determine the student's standardized score (or Z score), and the student's normalized cumulative distribution score (or Norm). We compare the student's Norm, Z score and average ranking to the other students' in their division. The judging criteria for all divisions is as follows:

Creative Ability 30 %

Creativity is judged for the student's level. Credit is given for what the student has done, not what has been done for them. Judges are looking for innovative work. An original idea for a project shows greater creativity than a suggested project from a book. No project can be creative and original in all aspects.

Scientific Thought /Engineering Goals 30 %

Scientific Thought: The project shows depth of study and effort in employing scientific procedures in the solution of a clearly defined problem (including background study, organized procedures, appropriate sampling, orderly recording and analysis of data and formulation of logical conclusions.)

Engineering/Computer Sciences Goals: The project has a clear objective relevant to the user's needs. The project must be tested thoroughly and be practical, workable and economically feasible.

Judges look for well thought-out experimentation. They look for how significant the project is in its field. A project must involve laboratory, field or theoretical work, and not just library research or gadgeteering. Judges look for evidence of a properly organized approach to solving the problem. This includes a logical progression of work from one point to the next. A bibliography is important.

Thoroughness 15 %

The project should show work over a time. Results should NOT come from a single test. Judges look for the achievement of the stated goal. The thoroughness of the student's project reflects the background work that was done. Logging all experience, such as talking to an expert, shows the amount of work put into the project. Judges look to see if the student was thorough. Did they start with four experiments and only finish three?

Skill 15 %

The project should reflect the student's scientific ability. What was done to overcome parts of the project beyond the student's ability and resources? Students may receive advice and supervision, but not instructions. Judges examine the quality of students' work, and how well students understand the project and area of study. The display is secondary to the students' knowledge of the subject.

Clarity 10 %

The display should explain the project, from idea to conclusion. The student should be able to explain the purpose, procedure and conclusions clearly. The student must be able to answer questions about the project. Students should be able to speak freely and confidently about their project. Judges are not interested in memorized speeches. They want to talk with students to determine if the student has a good grasp of the project from start to finish.

Show & Tell: Communicate What You Discover

When you finish your project, you must be able to show and tell people what you have done. The most fascinating experiments will go unappreciated and unknown if people do not know about it. For Science Fair projects, there are four ways of to communicate what you have discovered. They are your **Report, Display, Abstract and Presentation.**

All present similar information, but in different forms and lengths. This article will explain what you need to tell the people who will see the results of your experiments. These are suggestions. Your teacher or parents may want you to use a different format.

Your report goes into great detail. You explain **everything** you did. People will need to sit down to read all of your report.

Your display summarizes your report. It highlights the important details for people who review your display. You summarize each part of your project in a few sentences or paragraphs.

Your abstract gives only the vital information about your project. It should be less than one page. It must be detailed and clear so someone unfamiliar with your project will have a general idea of what you tried to prove.

Your presentation should use your abstract and display as references you can show the judges. The differences between your presentation and the other ways you communicate your project results is that your presentation is spoken and is interactive.

Each of the ways in which you communicate your research has similar parts. At the end of the information on each section, there is a suggested length. Please remember these are suggestions. When we list "1+," we mean **at least** one sentence, paragraph or page is needed. The type of project and the depth of information may affect the amount of information you need to communicate.

You will see your report goes into the most detail, the display has less detail, your abstract is the bare essentials and your presentation is somewhere between your abstract and display. The order listed (report, display, presentation and abstract) is the order you should develop the methods of communicating the results of your experiments. You should write the most detailed piece (report) first. Use that to find the essential points you will put on your display. You must determine what is important since you can not include detailed procedure descriptions nor can you include detailed results. Condense the information you put on your display, into key points for your presentation. Your presentation lets you expand on those key items where you can point out the greater detail on your display or in your report. You can use the points of your presentation and summarize them into your abstract.

Title - What did you test?

Your title is an attention-grabber. A good title simply and accurately describes your project. The title should make an observer want to know more. Study your title carefully to *reduce* its length and *increase* the amount of information it conveys.

[Report, Display, Presentation and Abstract: 1 Sentence]

Introduction - What research did you do?

The introduction can be written before the experiment is completed. It explains your understanding of the subject when you started and how you became interested in your topic. Information you found when you researched your topic is described. You should explain the significance of the research.

[Report and Display: 1 Page+; Presentation and Abstract: 1 Sentence+]

Hypothesis - What did you expect?

Your hypothesis is what you thought would happen before you started. It should be written **before** you do your experiment.

[Report & Display: 1 Paragraph+; Presentation & Abstract: 1 Sentence+]

Procedure - What did you do?

The results of your experiment must be reproducible. You should write your procedure as a recipe. That way, another person could repeat your work step by step. The materials list must be precise. Equipment and samples you used and where you obtained them must be listed. Explain what was measured and how you measured it. You must describe what you changed (manipulated variable), and what changed as a result (responding variable), as well as what stayed the same (controls).

[Report & Display: 1 Page+; Presentation & Abstract: 1 Paragraph]

Results - What data did you gather?

This section may be called "discussion." It is important to publish the actual numbers, not just an average or a graph. Show every result you obtained. You can summarize raw data in tables and use summary data to make graphs comparing each group. This section is divided into groups so you can discuss the results of the control group and each of the experimental groups. You should use descriptive statistics to report the results of each group.

[Report & Display: 1 Page+; Presentation & Abstract: 1 Paragraph]

Conclusion - What did you learn?

The conclusion briefly summarizes your results. You should answer the question posed in your hypothesis. Use statistics to sum up the conclusion. Conclusions and implications should flow logically from data. Readers should know exactly what you did because they can follow your train of thought. You will need to explain the relevance and importance of your experiments with how it could be applied to real world problems or technologies.

[Report & Display: 1 Page+; Presentation & Abstract: 1 Paragraph]

Acknowledgments - Who helped you?

You should thank and acknowledge people and institutions which helped you, but these belong **only** in your paper. Your bibliography lists the information taken from the works of other people. There are many ways to write a bibliography, see your English or science teacher for help.

[Report: 1 Page+; Display, Presentation & Abstract: NONE]

Further Research - What is next?

You should list possible applications or experiments that follow your results. While your experiments answered some questions, it may raise additional questions. Many of the parts will go into your communications follow the steps of the Scientific Method, and should help you put materials together. Everything must be carefully reviewed and checked for grammar, spelling and content. Let an adult who is not familiar with your project read your paper and display items. If they have trouble understanding it, you may need to rewrite parts.

[Report: 1 Page+; Display: NONE; Presentation & Abstract: 1 Sentence+]

Pictures, Graphs and Apparatus

Pictures and graphs belong in both the report and on the display. You should put the most important and informative pictures and graphs on your display so they can be seen by everyone. Others should go in your report for additional reference. Many projects involve important elements that may not be exhibited. Students should photograph the steps or sequence of your experiment. Any apparatus you built should be photographed or drawn and discussed. Photographs, sketches and diagrams help to make your ideas clear. For each picture, graph, or model, write a brief caption. Human subjects must consent to be photographed.

Writing a Report

There are many formats and ways to write a report. Your teacher may have a specific way they want you to write your report. Here are some suggestions on making it look good. Each page should be numbered in the bottom right corner. You should have a table of contents listing the page number for the beginning of each section. Each section should begin on a new page. Through

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the entire report, you should use one font and font size that is easy to read.

Developing Your Display

Your display has two parts: the display board and the items you display in front of it. You should display your report, your log book, materials, models, equipment and samples showing what you did. Arrange the items will go in front of your board, and label them with folded cards. Anything potentially dangerous or so large to infringe on another exhibitor's space is prohibited. Review the SCSEF Rules on page 10. Boards must be able to stand on their own all weekend. We suggest cardboard, wooden or foam core boards.

Plan out your ideas on paper. As you assemble your display, lay everything out before attaching anything to your back board. Your display should be logically presented and easy to read. Display only materials which convey the most information. Do not staple or glue pictures to your board; mount them on cardboard. To make your display stand out, you can use neat, colorful headings and graphs to present your project. Do each panel of the board individually. Make sure all tape is secure and not showing. The lettering for any titles must be neat and readable from a distance. Everything should be assembled before you arrive at the SCSEF.

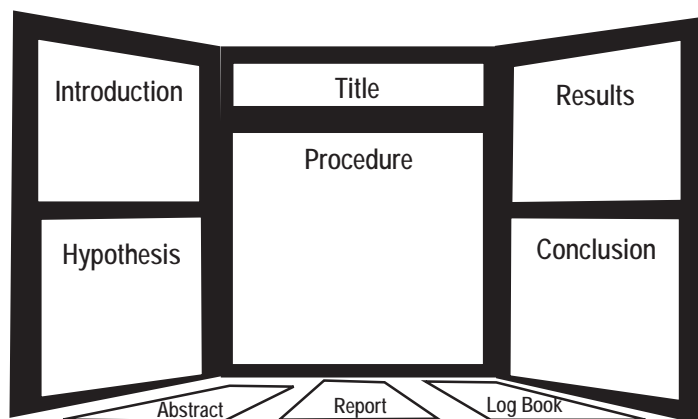
Valuable items should not be displayed unless necessary. The SCSEF assumes no responsibility for loss or damage to any project. Exhibitors must be careful in protecting equipment, especially when setting up and dismantling their displays. Notebooks should be fastened to the display with a cord. Put your name on the back of your board as well as any items that will go on display.

Preparing a Presentation

Judges will interview every student. *Don't be nervous!* Judges want to find out what you did, where you got your ideas and what you learned. Many judges have been at the SCSEF for years and enjoy coming back to see what students have done.

Your prepared presentation should last five to eight minutes. You should practice your presentation, but do not try to memorize it. Judges will interrupt and ask you questions. You can use notes or cards to refer to. Your parents, teacher or other students could listen to your presentation. Practicing makes you more comfortable. Being relaxed is the key. Your presentation should be clear, simple and accurate so everyone can understand your work.

The judges are judging your research, not the display. You are being judged on the science not the show! Initially, judges get their information from your board, abstract and research paper to learn what the project is about, but it is the *interview* that will be the final determination of your work. Judges applaud those students who can speak freely and confidently about their work.



This illustration is an *example* of an effective way to arrange your display. It is *not* a preferred or required arrangement.

They simply want to *talk* with you about your research to see if you have a good grasp of your project from start to finish. Remember, the judges need to see if you understand the basic principles of science behind your project or topic area. They want to determine if you have correctly measured and analyzed the data, and how you might apply your findings to the 'real' world. If you know what you did, and why you did it, you can answer their questions. Judges keep asking questions to test the limit of your knowledge. If they stump you, do not be afraid to say, "I don't know."

Finally, the judges seek to encourage you in your scientific efforts and your future goals/career in science. Relax, smile and enjoy your time to learn from them and accept their accolades for your fine work.

Part of the impression you will make with the judges is your appearance. You should dress neatly. You should stand straight on both feet and do not sway. Make eye contact with the judges. Speak loudly enough and clearly to be heard by your judges. Do not chew gum or candy. Smile and be polite. Be sure not to block the judge's view by standing directly in front of your project. Stand to the side so they can see your exhibit. While talking to them, be sure to point out any apparatus, charts or photographs on your display to illustrate your point. Get the judges involved in your project. Let them hold your research paper, notebook or apparatus.

Remember - Set Up and Tear Down Times!

Set Up - Students must set up their display on Friday, February 5, between the hours of 4:30 and 7:30 p.m. No projects can be set up before or after this time period.

Tear Down - After the SCSEF Awards Ceremony, students must remove their displays and materials. No displays may be stored. Anything not removed before 6:00 p.m. on February 7 will be discarded!

Brainstorming While You Read

The best way to select a topic for a Science Fair project is to find something you find interesting. What do you enjoy doing or what would you like to find out more about? A hobby can be an excellent place to start. You can also get interesting ideas from watching a science television program or reading a magazine. We will assume you found something interesting in a magazine article.

After reading an article, you should review it to pick out key ideas. This is **brainstorming**. You will develop a "Brainstorming Chart," from which Science Fair project ideas can be developed. You will begin with a clean sheet of paper.

1. Write the article's topic in the middle of the paper and draw a triangle around it. Be as specific or as general as you want.
2. Write at least three facts from the article. These can be main points, or information that grabbed your attention. Draw a box around each fact and connect it to the triangle with a line.
3. Turn a fact or topic into a question. Is it always true? Can you prove it? What if you change a variable? Those are ways you can turn a fact into a question. Draw circles around the questions and connect each to the box or triangle it originated from with a line. Your topic could be one of the questions.

For example, you may read an article on chocolate being used to as sunscreen and to counteract the effects of UV radiation. The article used is titled "Chocolate as Sunscreen," and is in the June 10, 2006 issue of *Science News*. It is also available on-line at the following website:

<http://www.sciencenews.org/articles/20060610/food.asp>.

The article is about how scientists are investigating ways chocolate can fight skin cancer and other effects of overexposure to UV radiation. Dark chocolates are rich in cocoa solids and flavonoids. People who were part of an experiment were found to have less effects from UV light if they drank flavonoid high cocoa. Other antioxidant-rich foods, such as tomatoes, have shown promise in reducing the effects of UV light on human subjects. Some research has been conducted using putting extracts of foods high in flavonoids on the skin, and have provided promising results. Researchers are unsure whether the antioxidants absorb the UV radiation, and keep it from damaging the body's cells, or if they improve blood flow to the affected areas. The researchers are also unsure if eating antioxidant and flavonoid high foods may provide better protection than using the same foods to create skin-care products.

The article's topic is:

- ▲ Foods may help prevent skin damage.

The four facts are:

- Natural biological antioxidants inhibit UV radiation damage.
- Antioxidants in tomatoes quash free radicals which cause health problems.
- Flavonoids improve blood flow when eaten.
- Dark chocolate flavonoids reduce the effects of UV radiation.

Some questions I developed about these facts are:

- Can natural antioxidants inhibit radiation damage from non-UV sources?
- Do other citrus fruits have free radical quashing antioxidants?
- What other natural biological chemicals improve blood flow?
- Can tofu be soaked in other mineral salts?
- Is eating chocolate more effective than applying it to the skin?
- Is the effect related to UV absorption or improved blood flow?

The diagram for this article is to the right.

Many other questions can be developed from this article. Not all may turn out to be good Science Fair projects. Remember, this is only an example of how you can get ideas from a scientific article.

Questions From Things You Have Read

You think of questions which could become project ideas all of the time. They come from something you saw, read or heard. You may wonder how something works or why something happened. You can develop questions from several sources in addition to reading. You may get an idea from television programs or commercials. Ideas can also come from things you have seen around your house. There may be something you have been wondering about that you can find the answer to.

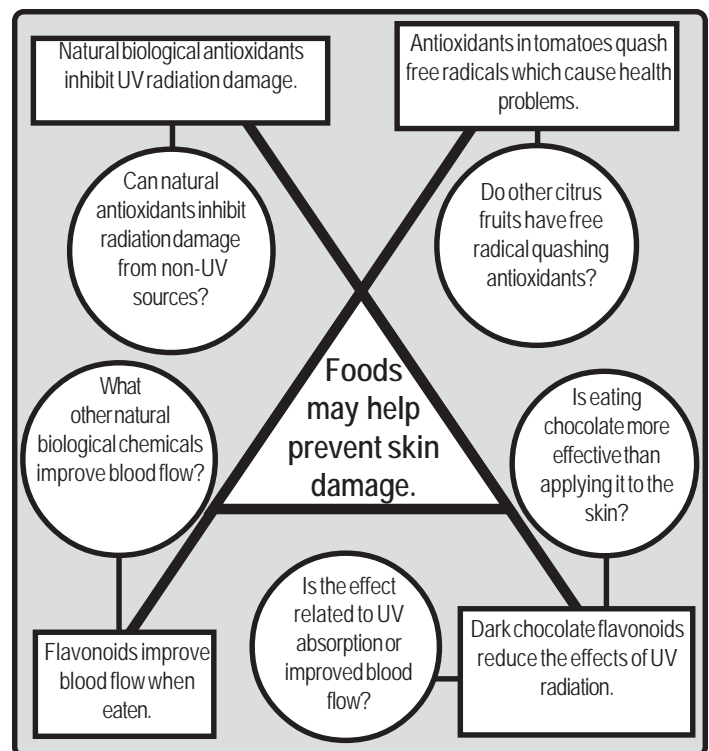
Examples of questions you can turn into a science fair project include:

An example from a book . . . I read cheetahs run 70 miles per hour. *I wonder* – Can anyone in my class run that fast?

An example from television . . . I saw a bowl filled with berries and covered with plastic food wrap turned upside down – and the berries stayed in the bowl! *I wonder* – Can a bowl covered with plastic food wrap be turned upside down without spilling what is inside?

An example from around the house . . . I saw my father cover a pot of water with a lid before putting it on the stove. *I wonder* – Does water boil faster with a lid or without a lid?

An example you may have been thinking about . . . I saw many ants covering a piece of cookie that had been dropped on the playground. *I wonder* – What kind of food from my lunch will ants like best?



Science Fair Timetables

Successful Science Fair Projects take planning. Trying to put a project and report together a few nights before the science fair leads to disaster. Besides submitting a hastily constructed project, the student fails to develop an appreciation for the time and effort a scientist needs to conduct an investigation. Planning a project in advance allows sufficient time for the necessary research, the construction of the display, the writing of the report, and the assembling of the final project. It also provides some leeway should difficulties arise in research or in obtaining vital materials.

We have used the date for the SCSEF (February 5) to develop a calendar counting back for six or twelve weeks to find when preparations should begin. Each week begins on a Monday. Students should use the twelve week schedule if at all possible. Twelve weeks provide sufficient time to design a project, gather necessary data, develop a written report, and follow through on all components of a successful science fair project. Circumstances may be such that the six week schedule must be followed.

6 Week Timetable

Week 1 - December 28

- Choose a topic or problem to investigate.
- Check resources in school or community library.
- Contact experts in the field.
- Gather all the written material you can find on the topic.

Week 2 - January 4

- Begin putting your project logbook together.
- Start collections or experiment.
- Begin designing display unit.

Week 3 - January 11

- Begin building display unit.
- Design all visual aids.
- Take the photographs you need.
- Complete your research.
- Consult with experts (scientists, college professors, teachers, parents) to check your progress.
- Write the first draft of report.

Week 4 - January 18

- Continue collecting items for display.
- Continue your experiments.
- Set up your apparatus and test it.

Week 5 - January 25

- Write second draft of report.
- Construct background for display.
- Design and assemble graphs or charts.
- Complete lettering for display unit and mount it.
- Double check your written data.
- Complete experiment and record data.

Week 6 - February 1

- Write and type final report.
- Set up display unit at home and check for any flaws.

12 Week Timetable

Week 1 - November 16

- Start a logbook for keeping records.
- Choose a topic or problem to investigate.
- List your resources (libraries, places to write, people to interview).

Week 2 - November 30

- Select your reading material. Begin preliminary investigations.
- Write for extra information from business firms, government agencies, etc.

Week 3 - December 1

- Complete initial research.
- Interview experts for more information.
- Decide how to set up your investigation or experiment.
- Set up experimental design.

Week 4 - December 7

- Read the materials sent in response to your letters.
- Decide whether you need extra material from outside sources.
- Set up your experiment. Start your experiment.
- Add information to project notebook as you get it.

Week 5 - December 14

- Learn how to use any apparatus you need.
- Continue recording notes and observations in your notebook.
- Begin obtaining materials for and start building your display.
- Set up outline for written report.

Week 6 - December 21

- Gather preliminary information in notebook.
- Work on first draft of written report.

Week 7 - December 28

- Continue recording notes.
- Check books, pamphlets, magazines for additional ideas.
- Verify information with experts: teachers, professors, parents.

Week 8 - January 4

- Begin designing charts, graphs, or other visual aids for display.
- Take any photographs you need.
- Record any observations on experiment.
- Begin preparing signs, titles, and labels for display unit.

Week 9 - January 11

- Have photographs developed and enlarged.
- Review your work to be sure it is accurate and on schedule.
- Begin writing second draft of your report.
- Continue recording observations in notebook.

Week 10 - January 18

- Write text for background of display and plan its layout.
- Complete graphs, charts, and visual aids.
- Finish constructing your display.
- Work on final draft of written report.

Week 11 - January 25

- Complete your experiment or collection.
- Write and type final copy of written report.
- Do lettering of explanations and mount them on your display.
- Mount graphs, charts, drawings, photographs.
- Assemble apparatus or collection; check against your list.

Week 12 - February 1

- Proofread your written report.
- Set up display at home and check for any flaws (leave standing for 2 days).

Have Questions?

Call the SCSEF Office at 399-6900 or
visit <http://pub.spsd.net/communityeducation/SCSEF.html>
for more information.

Office hours are 8:00 a.m. to 4:30 p.m., Monday - Friday.
You can also email the question to: mallen@spsd.net.

2010 SCSEF Rules

Rules listed here apply specifically to the students in the Elementary and Junior Divisions.

Senior Division students and projects must comply with the rules that are in the *International Rules for Precollege Science Research: Guidelines for Science and Engineering Fairs 2009-2010* published by Society for Science & the Public (referred to as *ISEF Rules*.) Students, teachers and adult sponsors should refer there for rules in specific experimental areas. Elementary & Junior Division students with experiments in some research areas may be required to follow ISEF rules. If you have any questions, call the 399-6900, or email questions to mallen@spsd.net.

SCSEF General Rules

- Saginaw Public Schools students in grades 5-8 may enter.
- Students in grades 9-12 attending school in Saginaw County may enter. Students who hold high school diplomas, or are 21 years old by May 1, are not eligible.
- A student may enter only one project and it must be their work. A student must design and carry out the project. Teachers, parents or sponsors must limit help to advice and supervision.
- The SCSEF does **not** allow group or team projects.
- Each student must have an adult sponsor (teacher/parent/mentor) who is responsible for the health and safety of the student-experimenter and any human or animal subjects.
- Students are responsible for all aspects of their project including enlisting any needed supervisory adults, obtaining necessary approvals, following the rules of the SCSEF and the ISEF, and doing the experimentation, engineering, data analysis, etc. involved in the project.
- Projects must follow federal, state and local laws and regulations.
- No student can proceed on experimentation using human subjects, nonhuman vertebrate animals, potentially hazardous biological agents, and/or hazardous chemicals, activities or devices until the SRC gives its approval. Students must submit the appropriate ISEF forms prior to beginning experimentation.
- Continuing projects must document that additional research is new and different from prior work. Students will be judged only on experimentation completed since the last SCSEF.
- Any proposed changes made to the research plan, once SRC approval has been given, **must** have subsequent SRC approval **before** the experimentation begins or resumes.

Entry Form Rules

- Elementary & Junior students must complete and submit the *SCSEF Entry* to the SCSEF office **no later than December 18**.
- **SENIOR DIVISION STUDENTS** - January 15 is the deadline for Senior Division students to submit their *SCSEF Entry* along with the following ISEF forms: **Checklist for Adult Sponsor (1)**, **Student Checklist (1A)**, the student's research plan and **Approval Form (1B)**. Additional ISEF forms may be required dependent upon the student's research area.
- **SENIOR DIVISION STUDENTS** should list only the projected starting and ending dates to answer question 6 on their **Student Checklist (1A)**. Students will list the actual dates when they register on SCSEF Friday.
- **SENIOR DIVISION STUDENTS** **must** submit their abstract to the SCSEF Office **no later than January 15**.

Ethics Statement

- Scientific fraud and misconduct is not condoned at any level of research or competition. Plagiarism, use or presentation of other researcher's works as one's own and fabrication or falsification of data will not be tolerated. Fraudulent projects will fail to qualify for competition at the

SCSEF, MichSEF or Intel ISEF.

Display Rules

- Student project displays can only be set up on the Friday of the SCSEF (February 5) between 4:30 p.m. and 7:30 p.m.
- Displays must be self supporting and stand freely. Your project may not have support from a wall or other exhibits.
- Elementary & Junior Division displays and apparatus must fit in, and can not exceed, the following dimensions: 36 inches wide, 30 inches deep and 72 inches high. Displays will be on tables. No electricity may be used for Elementary & Junior Division displays.
- Senior Division displays and all apparatus must fit in and can not exceed the following dimensions: 48 inches wide, 30 inches deep and 72 inches tall on a table, or 108 inches tall from the floor. A project over 72 inches high will be placed on the floor. Students who will not need a table should notify the SCSEF Director as soon as possible. Access to electricity is available to Senior Division students, but the student must supply an extension cord at least 9 feet long.

Prohibited materials for display include, but not limited to:

- Living creatures or organisms (animals or microbes).
- Dead or preserved animals, human or animal parts or body fluids.
- Microorganisms, fungi, microbiological cultures or mold.
- Food or substances that could be consumed.
- Liquids or chemicals, including water.
- Drugs, medicine, controlled or hazardous substances or devices.
- Explosive, corrosive, toxic or poisonous substances; Dry ice or other sublimating solids; Flames, flammable or combustible materials or their containers; or Open top cell batteries.
- Sharp objects (including syringes and pipettes) or projectiles.
- Equipment or materials with distracting sounds or odors.
- Photographs or depictions of animals in lab procedures.
- Active Internet or email connections.
- Nonfunctional apparatus.
- Prior awards or accomplishments.

These materials may be displayed, but with restrictions:

- Students must provide a written report.
- Acknowledgments are allowed **only** inside papers or data books.
- Soil and waste samples and materials must be sealed in acrylic.
- Any apparatus with belts, pulleys, chains or moving parts with tension or pinch points may not be operated.
- Bare wire and exposed knife switches may be used in 12 volt or lower circuits.
- Apparatus producing high temperatures must be insulated.
- Class II, III or IV lasers may be displayed, but not operated.

Valuables at the SCSEF

- The Saginaw County Science & Engineering Fair assumes no responsibility for the loss or damage of any display, display part or item left on or with the display. Students should secure all materials to the display for security purposes. Exhibitors must exercise care in protecting their equipment.

Have Questions?

Call the SCSEF Office at 399-6900 or go to the website at <http://pub.spsd.net/communityeducation/SCSEF.html>
Office hours are 8:00 a.m. to 4:30 p.m., Monday - Friday.
You can also email the question to: mallen@spsd.net.

Projects using Humans as Subjects

- No student can proceed on experiments using humans without SRC approval. The SRC must determine the project follows all rules and the risk is acceptable.
- Experiments with human subjects includes: human subjects participating in physical activities, behavioral observations, psychological and opinion studies (e.g., survey, questionnaire, tests) and studies in which the researcher is the subject.
- Researchers must inform their subjects and the subject's guardians of exactly what will take places, especially any substances the subject may be exposed to, or asked to ingest.
- When developing the experimental plan, students must evaluate and minimize the physical or psychological risks to their subjects. No more than minimal risk exists when the probability and magnitude of harm or discomfort anticipated in the experiment are not greater than those ordinarily encountered in **daily life** or during routine examinations or tests.
Examples of activities that may contain **more** than minimal risks include: exercise or physical exertion, the ingestion of any substance, physical contact with a potentially hazardous material, invasion of privacy, breach of confidentiality, emotional stress resulting from an activity or experimental condition. Being a member of a group that is naturally at-risk or vulnerable also exceeds minimal risk.
- Projects done by Elementary and Junior Division students must have no more than minimal risk.
- Tests, questionnaires and surveys must be submitted for review.
- The process of obtaining informed consent provides information to the subject about the risks and benefits associated with participation in the study and allows the subject to make an educated decision about whether or not to participate. Parents and guardians can deny participation in any study including those involving tests or questionnaires.
- When choosing a study group, selection criteria must be clearly defined. Students should ask questions that define their exact study population.
- You can not publish or display information or photographs that identifies the subjects without written informed consent. **Form 4 no longer serves as an informed consent document. Student researcher/Qualified Scientist may develop their own informed consent form based on sample provided on ISEF website.**
- Researcher must make every effort to protect the anonymity and confidentiality of their subjects. Information that could identify a subject must be kept secure or not even collected.
- Informed consent is not needed for experiments involving minimal risk and the research is: anonymous data collection, the observation of legal public behavior, experiments involving normal educational practices, experiments on individual or group behavior or characteristics where the researcher does not manipulate the subject's behavior, or surveys and questionnaires of perception, cognition, or game theory. Even if informed consent is not needed, the subject must consent to being part of the research.
- The practice of medicine by students is illegal.
- **SENIOR DIVISION STUDENTS** - Projects using humans as subjects require the following ISEF forms to be submitted: **Checklist for Adult Sponsor (1), Student Checklist (1A)**, the student's research plan, **Approval Form (1B)** and **Human Subjects Form (4)**. The following ISEF forms may be required if applicable: **Research Institutional/Industrial Setting Form (1C), Qualified Scientist Form (2)** and **Continuation Projects Form (7)**. Please review *ISEF Rules* page 13-16. *The student will not begin the experiment without SRC approval.*

Projects using Animals

- No student can proceed on animal experiments without SRC approval. The SRC must determine the project will be safe and follows all rules.
- An animal is any live, nonhuman vertebrate, mammalian embryo or fetus, vertebrates at hatching or birth and bird or reptile eggs within three days of hatching. This includes mammals, birds, reptiles, amphibians and fish.
- Experimentation must follow local, state and federal regulations.
- **A veterinarian must be consulted in experiments involving prescription drugs and/or nutritional supplements in a non-regulated setting.**
- The comfort and well-being of any lab animal is a prime concern. **Prohibited** types of animal research include, but are not limited to: Induced toxicity studies including those using alcohol, acid rain, insecticide, herbicide, heavy metals, etc. Studies of pain, or which cause more than momentary suffering. Procedures which are designed to kill animals. Behavioral experiments involving aversion stimuli conditioning, separation, induced helplessness or predatory/prey experiments.
- Projects with a death rate of 30% or greater in any group, by design or an unexpected result, or with a subject weight loss or growth retardation rate over 15% are not permitted and will **not** qualify for competition.
- If an experiment requires food or water restriction, it must be appropriate to the species, but may not exceed 18 hours.
- Pets are lab animals from the experiment's first to last day. Students must explain what happens to the animals after the experiment. Animals must be housed using standard guides on the care and use of lab animals appropriate for the species. Proper care and a continuous clean water and food supply must be maintained at all times, including weekends, holidays and vacations. Housing must be cleaned frequently.
- The introduction or disposal of non-native species into the environment is prohibited.
- Students must provide a detailed experiment plan.
- **SENIOR DIVISION STUDENTS** - Projects which use animals are research subjects require the following ISEF forms to be submitted: **Checklist for Adult Sponsor (1), Student Checklist (1A)**, the student's research plan, **Approval Form (1B), Qualified Scientist Form (2)** and either **Vertebrate Animal Form (5A)** or **Vertebrate Animal Form (5B)**. The following ISEF forms may be required if applicable: **Research Institutional/Industrial Setting Form (1C) and Continuation Projects Form (7)**. Please review *ISEF Rules* page 17-20. *The student will not begin the experiment without SRC approval.*

Have Questions?

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You can also email the question to: mallen@spsd.net.

2010 SCSEF Rules ... continued

Projects with Potentially Hazardous Biological Agents

- No student can proceed on experiments using potentially hazardous biological agents (PHBA) without SRC approval. The SRC must determine if the project will be safe and follows all rules.
- Projects incorporating microorganisms (including bacteria, viruses, viroids, prions, fungi and parasites), recombinant DNA technologies or human or animal fresh tissues, blood or body fluids may involve working with PHBA. Students may conduct experiments involving PHBA as long as they work safely within SCSEF/ISEF Rules. All research areas require special precautions.
- When using PHBA, students and all adults must conduct a risk assessment defining the potential harm, injury or disease to plants, animals and humans that may occur.
- All PHBA must be properly disposed of at the experiment's end.
- Studies using DNA insert molecules or PHBA organisms and host vector systems that pose low risk must be done in an appropriate lab under the supervision of a Qualified Scientist.
- The following tissues do not need to be treated as PHBA: plant tissue, established cell and tissue cultures, meat and meat by-products, hair, sterilized teeth, fossilized or archeological tissues.
- Studies using baker's and brewer's yeast are exempt from these rules unless used in rDNA studies.
- Commercially available coliform test kits require a Risk Assessment Form 3.
- Prohibited research includes: any PHBA that usually produces serious disease, propagation of recombinants with DNA coding for oncogenes or human, plant or animal toxins or viruses, and studies of microorganisms with multiple antibiotic resistance.
- Studies involving the collection and examination of fresh tissue or body fluids that may contain microorganisms, or use human or wild animal blood or blood products must be done under strict supervision in appropriate laboratory facilities.
- The introduction or disposal of pathogens into the environment is prohibited.
- The introduction or disposal of non-native species, toxic chemicals or pathogens into the environment is prohibited.
- Human tissue studies where tissue samples can be identified with a specific person requires informed consent.
- Laboratory studies utilizing MRSA and VRE are prohibited.

- SENIOR DIVISION STUDENTS - Projects which use potentially hazardous biological agents require the following ISEF forms to be submitted: Checklist for Adult Sponsor (1), Student Checklist (1A), the student's research plan, Approval Form (1B), and Potentially Hazardous Biological Agents Form (6A). The following ISEF forms may be required if applicable: Research Institutional/Industrial Setting Form (1C), Qualified Scientist Form (2), Human and Vertebrate Animal Tissue Form (6B) and Continuation Projects Form (7). Human Subjects Form 4 is no longer to be used as a photo consent; guidance on creating a photo consent is in the Display & Safety section of the rules. Please review *ISEF Rules* page 21-24. *The student will not begin the experiment without SRC approval.*

Projects with Hazardous Chemicals, Activities or Devices

- Students *should* have SRC approval of the project before beginning to experiment with hazardous substances or devices.
- Hazardous chemicals, activities and devices are chemicals or devices, or involvement with activities that expose a researcher or research subject to risk or harm. The use of hazardous chemicals and devices and involvement in hazardous activities require direct supervision. The student **must conduct a risk** assessment in collaboration with their supervisor prior to experimentation.
- The supervisor must have training and expertise in working with the substance or device. They must review proper safety standards and methods with the student for each substance, activity or device. Students must strictly adhere to safety standards.
- The introduction or disposal of toxic chemicals into the environment is prohibited.
- Experiments must follow local and federal regulations.
- A controlled substance is any substance controlled by the Drug Enforcement Administration; Bureau of Alcohol, Tobacco & Firearms; or Food and Drug Administration. Controlled substances, including DEA classed substances, prescription drugs, alcohol, and tobacco, must be used and acquired according to local, state and federal laws.
- The production of alcohol is federally regulated. Before any experiments in this area are conducted, the Bureau of Alcohol, Tobacco and Firearms must be contacted for approval.
- Federal law prohibit students under 21 from purchasing and/or handling black powder or smokeless powder for science projects.
- The student and the supervisor must obtain a permit for any experiment which requires a Federal, State or Local permit **prior** to the onset of the experimentation. A copy of the permit **must** be submitted at that time.
- SENIOR DIVISION STUDENTS - Projects which use hazardous chemicals, activities or devices require the following ISEF forms to be submitted: Checklist for Adult Sponsor (1), Student Checklist (1A), the student's research plan, Approval Form (1B), and Risk Assessment Form (3). The following ISEF forms may be required if applicable: Research Institutional/Industrial Setting Form (1C), Qualified Scientist Form (2) and Continuation Projects Form (7). Please review *ISEF Rules* page 25-27.

Remember - Set Up and Tear Down Times!

Set Up - Students must set up their display on Friday, February 5 between the hours of 4:30 and 7:30 p.m. No projects can be set up before or after this time period.

Tear Down - After the SCSEF Awards Ceremony, students must remove their displays and materials. No displays may be stored. Anything not removed before 6:00 p.m. on February 7 will be discarded!

2010 SCSEF Entry

Forms are due no later than 4:30 p.m. on Friday, December 18, 2009! Please type or print.

This form can be downloaded as a Microsoft Word file at <http://pub.spsd.net/communityeducation/SCSEF.html>

Submit this form before you begin experimenting to:
SCSEF
 1505 Ottawa
 Saginaw, MI 48602

Elementary & Junior Division Students:
 Complete Parts 1, 2 and 3
 and other sections as needed.

Senior Division Students:
 Complete Parts 1 and 3.
 Submit *ISEF 1*, *ISEF 1A*, the research plan,
ISEF 1B, and other appropriate ISEF Forms.

Part 1 - Student Information

Name _____
 School _____ Grade _____
 Home Address _____
 City _____ Zip Code _____
 Home Phone _____
 Your Science Teacher _____
 Project Title _____

Project Category *You must circle your project category. Category descriptions are on page 15.*

Ani	Beh	Bio	Env	Pla
Chem	Comp	Eart	Engn	Phys

***Students,
 Be sure all forms are
 completed, dated and signed,
 before submitting.***

Part 2 - Research Plan

Elementary & Junior Division Students ONLY. Attach extra pages as needed.

When will you start your experiment? _____

When will you end your experiment? _____

Where will you conduct your experiment? _____

Is this project a continuation of a previous year's research? Yes No

These areas of study require approval from the SRC **before** you begin experimenting. Check all areas that apply, and complete the appropriate section(s). While doing my project, I will be experimenting with:

- Humans of any age Complete **Part 4**.
- Animals Complete **Part 5**.
- Potentially hazardous biological agents (Animal or human tissue, recombinant DNA, pathogens, blood or blood products), hazardous chemicals, activities or devices (radioactive materials, chemicals, lasers or high voltage equipment) Complete **Part 6**.

What is your hypothesis? What is the problem you intend to investigate?

In detail, describe the methods or procedures you plan to use to prove the hypothesis.

Attach additional pages as necessary.

Part 3 - Signatures and Approvals

Student - I have read the rules of the SCSEF, and will obey them as I safely develop and exhibit my project. While I may receive advice and guidance from others, my project is entirely my own work. I understand the risks and dangers of this project to myself. I understand that failure to abide by SCSEF rules and procedures will result in my disqualification. I understand that my project is to be displayed throughout all public viewing times, but if it is not picked up on Sunday, February 7, by 6:00 p.m., it will be discarded. The sponsors, staff and volunteers of the SCSEF are not responsible for any loss or damage to my project. All decisions of SCSEF staff are final.

Parent/Guardian - I have read and understand the risks and possible dangers involved in this project. I consent to my child conducting these experiments. I understand that failure to abide by SCSEF rules and procedures will result in their disqualification. I understand that my child's project is to be displayed throughout all public viewing times, but if it is not picked up on Sunday, February 7, by 6:00 p.m., it will be discarded. The sponsors, staff and volunteers of the SCSEF are not responsible for any loss or damage to the project. All decisions of SCSEF staff are final.

Teacher/Sponsor - I agree to sponsor this student and assume responsibility for compliance with the existing SCSEF rules. I have approved the student's experiment plan prior to the student beginning experimenting, and have conducted a safety review with the student. The student will be given relevant information, instruction and safety precautions about the proper handling, use, toxicity and disposal of all relevant materials by an adult knowledgeable in that particular field.

Signature _____ Date _____ Signature _____ Date _____ Signature _____ Date _____

2010 SCSEF Entry - Part Two

Elementary & Junior Division Students ONLY. Attach extra pages as needed. Additional information may be requested.

Part 4 - Human Subjects

Experiments can not begin until approved.

Are you only asking survey questions of an impersonal or trivial nature?

- Yes. You do not have to answer any questions in this section. Attach a sample questionnaire.
No. Answer all questions in this section and attach a sample Informed Consent Form.

Explain why human subjects are proposed for this project.

Blank lines for explaining why human subjects are proposed for the project.

Describe any potential risk to you or your subjects.

Blank lines for describing potential risks to subjects.

What do you expect to learn from this experiment?

Blank lines for describing what is expected to be learned from the experiment.

Describe the procedures used to minimize risk to you and your subjects.

Blank lines for describing procedures used to minimize risk.

Part 5 - Animal Subjects

Experiments can not begin until approved.

Type of animal(s) to be used.

Blank lines for specifying the type of animal(s) to be used.

Describe in detail how the animal(s) will be taken care of. Include information about how many animals will be used? Where will the animals be housed? What is the cage or tank size? How many animals per cage or tank?

Blank lines for describing animal care details.

Describe in detail what will be done to the animal(s). Include information about the medicine, food or conditions that may be used in your experiments.

Blank lines for describing procedures for the animal(s).

What will happen to the animal(s) after the experiment is over?

Blank lines for describing the fate of the animal(s) after the experiment.

Part 6 - Restricted Materials

Experiments can not begin until approved.

I plan to use the following in my project:

- Human or Animal Tissues
DNA
Pathogenic Agents
Human Blood or Blood Products
Chemicals
Radioactive Materials
Lasers
High Voltage Equipment
Controlled Substances
Hazardous Devices

Material(s)/substance(s) to be used (Be Specific):

Blank lines for specifying materials to be used.

How was the sample obtained? What is the source of materials?

Blank lines for describing the source of materials.

How will the materials be used?

Blank lines for describing how materials will be used.

Who will supervise the experiment?

Blank lines for identifying the supervisor.

How will the experiment be safely supervised?

Blank lines for describing safety supervision.

SCSEF Project Categories

Students have ten categories to select from, five each in Life Sciences and Physical Sciences. Be sure that you circle the appropriate category code for your project on your *SCSEF Entry*.

Life Sciences

Code Category

- Ani* **Animal Sciences**
Zoology and the study of animals.
- Beh* **Behavioral & Social Science**
Human or animal behavior, social and community relationships.
- Bio* **Biology, Medicine & Health**
Study of life, health and the biochemistry of humans, animals and microorganisms.
- Env* **Environmental Sciences**
Study of pollution sources and their control; ecology.
- Pla* **Plant Sciences**
Botany and the study of plant life.

Physical Sciences

Code Category

- Chem* **Chemistry**
Study of the nature, composition and laws governing matter.
- Comp* **Computer Science & Mathematics**
Study and development of computer hardware and software.
Development of numerical and algebraic computations.
- Eart* **Earth Sciences**
Geology, meteorology, oceanography.
- Engn* **Engineering**
Technology; applying scientific principles to practical uses.
- Phys* **Physics & Space Science**
Theories and laws governing energy and its effect on matter.

Remember!

Students must submit their *SCSEF Entry* to the SCSEF Office at the SASA building by **Friday, December 18, 2009, by 4:30 p.m.**

Senior Division students must submit their *SCSEF Entry*, as well as their completed *ISEF 1*, *ISEF 1A*, *ISEF 1B*, their research plan and any other necessary ISEF forms. Students with projects using any of the sensitive areas of experimentation: human subjects, vertebrate animals, potentially hazardous biological agents or hazardous chemicals, activities or devices **must** submit the appropriate ISEF form(s) **prior to the beginning of experimentation**.

Senior Division Form Review

ISEF Form Index

This is a list of all ISEF forms that may be needed for Senior Division projects. The *italicized* title is how the form is referred to in the 2010 SCSEF Rules. All forms are in the *ISEF Rules* and available as pdf files at the SCSEF website (<http://pub.spsd.net/communityeducation/SCSEF.html>).

<u>Form</u>	<u>ISEF Form Title</u>	<u>ISEF Rules Page</u>
Checklist for Adult Sponsor (1)	Required for all projects	pg. 29
Student Checklist (1A)	Required for all projects	pg. 30
Approval Form (1B)	Required for all projects	pg. 32
Research Institutional/Industrial Setting Form (1C)	Required if work was done in an industrial or institutional setting.	pg. 33
Qualified Scientist Form (2)	Required for research involving humans, animals, potentially hazardous biological agents or DEA controlled substances.	pg. 34
Risk Assessment Form (3)	Required for projects using hazardous chemicals, activities or devices or regulated substances.	pg. 35
Human Subjects Form (4)	Required for research involving humans.	pg. 36
Vertebrate Animal Form (5A)	Required for animal research done at a non-regulated research site.	pg. 37
Vertebrate Animal Form (5B)	Required for animal research done at a regulated research site.	pg. 38
Potentially Hazardous Biological Agents Form (6A)	Required for research using microorganisms, rDNA, human or animal tissue & body fluids.	pg. 39
Human and Vertebrate Animal Tissue Form (6B)	Required for research using human or animal tissue.	pg. 40
Continuation Projects Form (7)	Required for projects that are a continuation of a previous year.	pg. 41

Senior Division Students Must Submit Abstracts!

All Senior Division students **must** submit a copy of their abstract to the SCSEF Offices by 4:30 p.m., Friday, January 15. Item 10 on *ISEF 1A* states that "An abstract is required for all projects after experimentation." Anyone not submitting an abstract will not be able to exhibit. Your abstract should be less than one page, not over 250 words. Be sure your name and project title are the first two lines of the file or paper. You can submit your abstract either:

- ◆ On diskette. The abstract should be saved as a text file.
- ◆ By email to mallen@spsd.net as a text file attachment.
- ◆ As a single page of paper delivered to the SCSEF Offices.
- ◆ As a single page of paper faxed to the SCSEF at 399-6900.

Do **not** use the Intel ISEF Abstract form on page 28 of the *ISEF Rules*.

2010 SCSEF Dates and Times

December 18 - 4:30 p.m. SCSEF Entry & required ISEF forms due. Late entries not accepted.
 January 15 - 4:30 p.m. Senior Division Abstracts due

February 5,6,& 7, 2010 32nd Annual Saginaw County Science & Engineering Fair

SCSEF Friday
 4:30 - 7:30 p.m. February 5 Saginaw Arts & Sciences Academy
 Registration & Project Set Up Projects **must** be set up by 7:30 p.m.

SCSEF Saturday
 8:00 - 9:00 a.m. February 6 Saginaw Arts & Sciences Academy
 Judge Orientation
 8:30 a.m. - 2:00 p.m. Judging ONLY Judges, Students and Staff are allowed in the Exhibit Area.
 3:00 - 7:00 p.m. Public Viewing of Projects
 8:00 p.m. Award List Posted <http://pub.spsd.net/communityeducation/SCSEF.html>

SCSEF Sunday
 12:00 noon - 3:30 p.m. February 7
 Public Viewing of Projects
 2:00 - 3:30 p.m. Awards Ceremony SASA Auditorium
 4:00 p.m. ISEF / MichSEF Competitors Meeting Saginaw Arts & Sciences Academy
 3:30 - 6:00 p.m. Project Removal Projects not removed by 6:00 p.m. will be **destroyed**.

Competitions for Advancing Senior Division Students

April 10, 2010 Michigan Science and Engineering Fair Kettering University, Flint
 May 9-14 International Science and Engineering Fair San Jose, California

Have Questions?
 Call the SCSEF Office at 399-6900 or
 visit <http://pub.spsd.net/communityeducation/SCSEF.html> for more information.
 Office hours are 8:00 a.m. to 4:30 p.m., Monday - Friday.
 You can also email the question to: mallen@spsd.net.

SCSEF Map

The Saginaw County Science & Engineering Fair is held at the Saginaw Arts & Sciences Academy, 1903 N. Niagara St. Saginaw Arts & Sciences Academy is near the corner of West Genesee Avenue and Niagara St.. It is marked with a "★" on the map to the right. The SCSEF Office is in the Community Education Department at the Staff Development Center, 1505 Ottawa St.. Office hours are 8:00 a.m. until 4:30 p.m. Monday thru Friday.

On SCSEF weekend, the unloading and loading of projects should be done at the East Entrance, which faces North Niagara Street.

Links to mapping sites like MapQuest, Yahoo! Maps and Google Maps are available at the SCSEF website at <http://pub.spsd.net/communityeducation/SCSEF.html>

