Science Fair Project 2017

Destination Los Angeles California!
Universal Studios & Hollywood
Science Fair Projects require skills consistent with the common core

- Researching for information
- Written communication skills
- Creative thinking skills
- Problem solving techniques
- Data collection and analysis
- Graphing and interpreting graphs
- Verbal communication
Topic Selection

- What are your interests?
- Are any of my family members scientists?
- Do I know any Scientists, who could help?
- What research facilities do I have access to?

- Students have access to the Sanford Research lab in Sioux Falls and may also obtain equipment from the lab see Mr. Gross for details.
What category is my project in?

- Medicine and Health
- Plant science
- Physics
- Environmental science
- Microbiology
- Animal Science
- Behavioral/Social Science
- Biochemistry
- Energy Transportation
- Earth/Space Science
- Engineering
- Mathematical/computer Science
Web Sites that can help

- http://www.sciencebuddies.org/
- https://student.societyforscience.org/sciencenews-students
Research Topic

- Research allows you to narrow the topic.
- Research teaches you how to do the procedure.
- Research teaches new vocabulary.
- Research teaches you everything you need to know about your topic of study.
- Research is not using other students science Fair projects off the internet.
How to conduct research?

- Use Science Search engines, not google.
- Save your research information to a flash drive. You will need reference information for making a bibliography later in the project.
- Read and Highlight important information from your research. Having knowledge about your topic earns points with the judges.
Scientific Process

1. Ask Question
2. Do Background Research
3. Construct Hypothesis
4. Test with an Experiment
5. Analyze Results
   - Draw Conclusion
   - Hypothesis Is True
   - Hypothesis Is False or Partially True
   - Report Results

6. Think! Try Again
Question

- **Ask a Question:** The scientific method starts when you ask a question about something that you observe: How, What, When, Who, Which, Why, or Where?
- And, in order for the scientific method to answer the question it must be about something that you can measure, preferably with a number.
Hypothesis

- **Construct a Hypothesis:** A hypothesis is an educated guess about how things work:
  "If [I do this] _____, then [this] _____ will happen." *You must state your hypothesis in a way that you can easily measure, and of course, your hypothesis should be constructed in a way to help you answer your*
Procedure

- This is a step by step plan that includes details about how you are going to conduct your experiment.
- Description in detail of method or procedures (The following are important and key items that should be included when formulating ANY AND ALL research plans.)
  - Procedures: Detail all procedures and experimental design to be used for data collection
  - Data Analysis: Describe the procedures you will use to analyze the data that answer research question or hypothesis
Procedure for human projects must include:

Human participants research:
• Participants. Describe who will participate in your study (age range, gender, racial/ethnic composition). Identify any vulnerable populations (minors, pregnant women, prisoners, mentally disabled or economically disadvantaged).
• Recruitment. Where will you find your participants? How will they be invited to participate?
• Methods. What will participants be asked to do? Will you use any surveys, questionnaires or tests? What is the frequency and length of time involved for each subject?
• Risk Assessment
  o Risks. What are the risks or potential discomforts (physical, psychological, time involved, social, legal etc) to participants? How will you minimize the risks?
  o Benefits. List any benefits to society or each participant.
• Protection of Privacy. Will any identifiable information (e.g., names, telephone numbers, birthdates, email addresses) be collected? Will data be confidential or anonymous? If anonymous, describe how the data will be collected anonymously. If not anonymous, what procedures are in place for safeguarding confidentiality? Where will the data be stored? Who will have access to the data? What will you do with the data at the end of the study?
• Informed Consent Process. Describe how you will inform participants about the purpose of the study, what they will be asked to do, that their participation is voluntary and they have the right to stop at any time.
Procedure for Animals must Include:

- Vertebrate animal research:
  - Briefly discuss potential ALTERNATIVES to vertebrate animal use and present a detailed justification for use of vertebrate animals
  - Explain potential impact or contribution this research may have
  - Detail all procedures to be used
    - Include methods used to minimize potential discomfort, distress, pain and injury to the animals during the course of experimentation
    - Detailed chemical concentrations and drug dosages
    - Detail animal numbers, species, strain, sex, age, source, etc.
  - Include justification of the numbers planned for the research
  - Describe housing and oversight of daily care
  - Discuss disposition of the animals at the termination of the study
Procedure for Potentially Hazardous Biological Agents

- **Bacteria, Blood, Tissue, Animal waste, Mold**
- Describe Biosafety Level Assessment process and resultant BSL determination
  - Give source of agent, source of specific cell line, etc.
  - Detail safety precautions
  - Discuss methods of disposal
Procedure For Hazardous Chemicals, Activities & Devices:

- Describe Risk Assessment process and results
  • Detail chemical concentrations and drug dosages
  • Describe safety precautions and procedures to minimize risk
  • Discuss methods of disposal
Once the Question, Hypothesis and Detailed Procedure are completed, you are ready to complete ISEF Forms.

One forms are completed, they are sent to SDSU for project approval. Deadline is Dec. 1

Forms may be sent anytime before Dec. 1

With SDSU professors concentrating on finals, mid December and because SDSU has a longer Christmas break students must meet this deadline.
Link to ISEF Forms and Rules

- Form 1, 1A, and form B must be completed by all projects.
- By filling out form 1 you will know what other forms are required of your project.
- Read rule book for additional information on the linked site.
Link to Brookings Science Fair

- [http://www.sdstate.edu/sciencefair/application/index.cfm](http://www.sdstate.edu/sciencefair/application/index.cfm)
Experiment

- Once SDSU has approved your project you may begin experimenting.
- Some experiments may only be done at a regulated research facilities (BSL 2 or 3).
- Some experiments must be completed in the Science Lab (BSL 1)
ISEF Vocabulary

- Adult Sponsor - Mr. Gross, Mrs. Adair or Mr. Palo
- Qualified Scientist - Doctor, Vet, Professor, Nurse
- Designated Supervisor - Mr. Gross, parent, Etc.
The Institutional Review Board (IRB) is a committee that, according to federal regulations (45-CFR-46), must evaluate the potential physical and/or psychological risk of research involving humans. All proposed human research must be reviewed and approved by an IRB before experimentation begins. This includes review of any surveys or questionnaires to be used in a project.
A Scientific Review Committee (SRC) is a group of qualified individuals that is responsible for evaluation of student research, certifications, research plans and exhibits for compliance with the Rules and pertinent laws and regulations. Local SRCs may be formed to assist the Affiliated Fair SRC in reviewing and approving projects. The operation and composition of the local and Affiliated Fair SRCs must fully comply with the International Rules. Contact your fair for information on how to receive pre-approval.
Data Collection & Analysis

Construct data tables for data collection
Build graphs from your data tables for analysis
Graphs

- Junior High Students may use the following link for graphing data:
  - https://www.google.com/#q=easy+graphs+for+kids
  - http://www.mathsisfun.com/data/graphs-index.html
Results

- Include what you wanted to accomplish and prove during your experiment.
- Describe and report what you discovered. Be sure to include any data that might have been collected. It is important to show this data even if it did not support your hypothesis. The process of completing the experiment with true data is what is important.
- The function of the Results section is to objectively present your key results, without interpretation.
Conclusion

- Your conclusions summarize how your results support or contradict your original hypothesis: Summarize your science fair project results in a few sentences and use this summary to support your conclusion. Include key facts from your background research to help explain your results as needed.

- State whether your results support or contradict your hypothesis. (Engineering & programming projects should state whether they met their design criteria.)

- If appropriate, state the relationship between the independent and dependent variable.

- Summarize and evaluate your experimental procedure, making comments about its success and effectiveness.

- Suggest changes in the experimental procedure (or design) and/or possibilities for further study.
Abstract

• An **abstract** is an abbreviated version of your science fair project final report. For most science fairs it is limited to a **maximum of 250 words** (check the rules for your competition). The science fair project **abstract** appears at the beginning of the report as well as on your display board.

• Almost all scientists and engineers agree that an **abstract** should have the following five pieces:
Abstract Part 1

- **Introduction.** This is where you describe the purpose for doing your science fair project or invention. Why should anyone care about the work you did? You have to tell them why. Did you explain something that should cause people to change the way they go about their daily business? If you made an invention or developed a new procedure how is it better, faster, or cheaper than what is already out there? **Motivate** the reader to finish the abstract and read the entire paper or display board.
Abstract Part 2

- **Problem Statement.** Identify the problem you solved or the hypothesis you investigated.
Abstract Part 3

- **Procedures.** What was your approach for investigating the problem? Don't go into detail about materials unless they were critical to your success. Do describe the most important variables if you have room.
Abstract Part 4

- **Results.** What answer did you obtain? Be specific and use numbers to describe your results. Do not use vague terms like "most" or "some."
Abstract Part 5

- **Conclusions.** State what your science fair project or invention contributes to the area you worked in. Did you meet your objectives? For an engineering project state whether you met your design criteria.