Collier Regional Science & Engineering Fair 2020-2021

Rule Book

Student projects must comply with Collier Regional Science Fair rules and SSEF rules and ISEF rules. Collier Regional Science Fair rules supersede both SSEF and ISEF rules. SSEF rules supersede ISEF rules.

Collier Regional Science & Engineering Fair website:

Student signature _____ Date _____

Parent signature _____ Date _____

COLLIER RULES

1. Students are responsible for reading, understanding and adhering to ALL RULES that apply to their project. Students must comply with Collier, SSEF and ISEF rules. Collier Rules supersede both SSEF and ISEF rules. SSEF rules supersede ISEF rules. All rules available https://www.collierschools.com/Page/1271

2. Some project topics must be approved by the Collier SRC before students may begin to work on that project. Use the ISEF FORMS WIZARD!

- THE COLLIER SRC PRE-APPROVAL PROCESS CAN TAKE OVER A MONTH because the process often requires students to resubmit forms and documentation multiple times in order for the project to comply with all applicable rules and regulations and be approved. Be advised that few students are successful in completing the Collier SRC pre-approval process because of the time and effort that this process requires of the student.
- PROJECTS THAT REQUIRE COLLIER SRC PRE-APPROVAL MUST ALSO CITE SPECIFIC REFERENCE RESOURCES that are listed in the ISEF rules in order to demonstrate the knowledge of and an understanding of all mandatory safety procedures, science protocols and disposal procedures.
- DO NOT SELECT TOPICS THAT REQUIRE COLLIER SRC PRE-APPROVAL without first carefully considering the extra time and effort they demand.
- THE TOPICS BELOW REQUIRE COLLIER SRC PRE-APPROVAL & ADDITIONAL SPECIALIZED FORMS that must to be completed and approved by the Collier Scientific Review Committee (SRC) or the Collier Institutional Review Board (IRB) ***BEFORE*** any data has been collected and NO LATER than Friday November 6, 2020 of the current school year. Individual schools may NOT create their own SRC or IRB.

Hazardous Activities, Devices, Substances *(Firearms, projectiles, rockets, explosives, radiation, lasers, industrial/construction power tools, etc.)* Controlled Substances *(Alcohol, tobacco, medicines, prescription drugs, etc.)* Recombinant DNA	Forms required for all projects **plus** the following forms: ✓ Registered Research Institutional / Industrial Setting Form (1C) *(Required if work was completed at a lab, hospital, etc.)* ✓ Qualified Scientist Form (2) (MD or IRB approved)
Human* *(surveys, observations, using humans to test a product or invention, etc.)* *Junior projects cannot compete at CRSEF	Forms required for all projects **plus** the following forms: ✓ Qualified Scientist Form (2) (MD or IRB approved) ✓ Human Subjects and Informed Consent Form (4) *(attach all surveys, questionnaires, etc.)*
Non-human Vertebrate Animal* *Junior vertebrate projects cannot compete at CRSEF	Forms required for all projects **plus** the following forms: ✓ Qualified Scientist Form (2) *(MD or IRB approved)* ✓ Vertebrate Animal Form (5A & 5B) ✓ SSEF Mortality Form
Potentially Hazardous Biological Agents* *(Bacteria, rotting, mold, virus, etc.)* and Human & Vertebrate Animal Tissue* *Junior projects cannot compete at CRSEF	Forms required for all projects **plus** the following forms: ✓ Qualified Scientist Form (2) *(MD or IRB approved)* ✓ Potentially Hazardous Biological Agents Form (6A) ✓ BioSafety Level 2 Facilities &Operations Assessment Form ✓ Human and Vertebrate Animal Tissue Form (6B)
Archeology *(Finding, collecting or excavating fossils, etc.)*	Forms required for all projects **plus** the following forms: ✓ Qualified Scientist Form (2) (MD or IRB approved) ✓ All necessary permits, documentation, and required forms
Continuation Project *(covers 12+ months)*	All forms required for project during previous year(s) ✓ All forms required for project during the current year ✓ Continuation Projects Form (7)

☺ All projects require these forms. ☺ All forms must be completed prior to experimentation (before data collection begins).	✓ Checklist for Adult Sponsor (1) ✓ Student Checklist (1A) ✓ Include typed research plans for each of the following: ⇒ Question / Problem ⇒ Hypothesis ⇒ Variables (independent, dependent, control, constants) ⇒ Detailed step-by-step description of experiment procedure ⇒ Data analysis procedure ⇒ Bibliography must cite references for risk assessment and should cite all major references and ISEF rules ✓ Approval Form (1B) ✓ Risk Assessment Form (3) ⇒ Must identify even minimal risks ⇒ Cite each credible source for each safety procedure ✓ SSEF Abstract Form ✓ SSEF Entry Form (only if attending Collier Regional Fair) ✓ Collier Regional Science and Engineering Fair Rule Book

- Failure to comply with all Collier, SSEF and ISEF rules may result in the project being disqualified and not being allowed to compete.
- Complete forms online, save, print and only sign in blue ink.
- All proper safety protocols, techniques and procedures must be researched and cited.
- Chemicals that have a Safety Data Sheet (SDS) risk level of 2 or higher require SRC pre-approval, SDS safety protocols must be in the experiment's procedures, the SDS must be attached to the Risk Assessment form #3 and the SDS source must be cited.
- The phrase "This project year. . . ." includes research conducted over a maximum of a continuous 12 month period.
- Continuing research: All research which is in the same field of study as a previous project. The research plan (1A) and Abstract for this year's work must not include details, data, or discussions of the previous work except as background information.
- Each member of a team project must submit a SSEF Entry Form & Form 1B. Team jointly submits forms 1, 1A, abstract, and other required forms. Full names of all team members must appear on the abstract and forms.
- Human Subjects Form 4 and Informed Consent Form is required for all projects involving humans other than the student conducting the experiment. Required for all projects involving more than minimal risk to the student conducting the experiment. A copy of any test, survey, or questionnaire must be provided for parental review for subjects under 18 years of age. Required for photos of people other than yourself. Junior human subject projects cannot compete at CRSEF.
- The use of alcohol, acid rain, insecticide, herbicide, and heavy metal in toxicity or behavior studies on live vertebrates is prohibited.
- The culturing of ANY microorganism or mold in the home is prohibited. All culturing must be done in a registered laboratory. Specimens may be collected in the home, but not cultured, grown, or studied in the home. Exception: Bread mold may be studied at home or a school lab if the bread is disposed of as soon as mold is present.
- Non-invasive behavior studies involving pets/livestock may be done at home with Collier SRC pre-approval.
- To certify human blood or tissue free of AIDS and Hepatitis B and C, the authority must have certified expertise and training (not a school nurse).
- A vertebrate project with a death rate > 0% will be disqualified. Junior vertebrate projects cannot compete at CRSEF.
- Archeology/Fossil Projects require supervised excavation. Permits are required for excavations on public land.

Students must keep copies of all your forms. For questions about forms:
Collier SRC Chair: Kandi Follis folliska@collierschools.com (239) 377-1037

WHY A SCIENCE PROJECT?

It's natural for people to be curious about the world around them. Science projects attempt to nurture this natural curiosity. Science projects allow students to:

⇒ Design an experiment that will enable students to measure and record quantitative data and draw a conclusion to a hypothesis.
⇒ Take an open and creative approach to problem solving.
⇒ Apply the basic science skills to a specific area of interest. These skills include: communicating, time/space relationships, measuring, observing, classifying, inferring, predicting, interpreting data, identifying variables, formulating hypotheses, and experimenting.
⇒ See relationships and arrive at satisfactory conclusions based on observations and experiments.
⇒ Talk about findings and conclusions.
⇒ Expand interests while new curiosities develop.
⇒ Develop feelings of self-confidence and accomplishment.
⇒ Earn recognition, awards, scholarships, and trips.
⇒ A science fair project may be part of the portfolio for both the high school laureate diploma and PRIDE award.

EXPECTATIONS

The expectations for this science project include:

1. Maintaining a scientist's Data Notebook *Try Microsoft OneNote!
2. Researching a selected topic
3. Developing an experiment design, conducting the experiment, collecting quantitative data and analyzing the data
4. Making a display board that includes the problem, background, hypothesis, independent variable, dependent variable, control, constants, materials, step-by-step procedure, graph(s), results, conclusion
5. All safety procedure sources must be cited in their bibliography
6. All research sources (minimum of 5) must be cited in their bibliography
7. Preparing an abstract with a maximum of 250 words
8. Orally presenting the project
9. Writing a research report is suggested but not required

STUDENT SCIENCE FAIR PROJECT TIMELINE 2020-21

1. Select a topic	_____	Sept. 2020
2. Background Research	_____	Sept. / Oct.
3. Research Plan	_____	Sept. / Oct.
4. Required Forms/ Prior SRC Due	_____	Sept. / Nov. 6
5. Begin Experiment	_____	Oct. / Nov.
6. Data Notebook	_____	Oct. / Nov.
7. Finish Experiment	_____	Dec.
8. Virtual Project Display	_____	Dec.
9. Turn in Project	_____	Dec.
10. (Virtual) Local School Science Fair	_____	Dec. / Jan.
11. Deadline for CRSEF virtual project entry	_____	Jan. 25, 2021
12. (Virtual) Regional Science Fair(CRSEF)	_____	Jan. 29, 2021
13. (Virtual) State Science Fair (SSEF)	_____	Mar. 30-Apr 2, 2021
14. International Science & Engineering Fair (ISEF)	_____	May 2021 (HS only)

CHOOSING A SCIENCE PROJECT TOPIC

When choosing your topic you may want to consider, hobbies and interests, questions you could answer, new approaches to doing things, problems to solve, and products to test.

⇒ Browse the Internet
- http://www.sciencebuddies.org/mentoring/project_ideas.shtml
  - https://backyardbrains.com/experiments/
  - ISEF ALL Project support: "Research @ Home"

⇒ Read science magazines, books, newspapers.

⇒ At school, check the library for experiment books, check with your science teacher for topic lists.

Science Project Categories

The intention here is to mimic the categories that are used at the FL SSEF and to judge them as they are judged at the state level: by the content area experts.

This should better prepare students for the next level(s) of science and engineering fair competition as well as a scientific focus for the future.

1. BMED: BIOMEDICAL HEALTH (focus of project is on health or biochemistry)
   a. BEHA: Behavioral and Social Sciences: clinical & development, psychology, cognitive psychology, physical psychology, sociology & social psychology
   b. CMBI: Biochemistry: analytical biochemistry, general biochemistry, medicinal biochemistry, structural biochemistry, etc.
   c. BMED: Biomedical and Health Sciences: disease diagnosis, disease treatment, drug development & testing, nutrition, physiology & pathology, etc.
   d. Biomedical Engineering: biomaterials & regenerative medicine, biomechanics, biomedical devices, biomedical imaging, cell & tissue engineering, synthetic biology, etc.
   e. CMBI: Cellular and Molecular Biology: cell physiology, genetics, immunology, molecular biology, neurobiology, etc.

f. IMRS: Computational Biology and Bioinformatics: biomedical engineering, computational pharmacology, computational biomodeling, computational evolutionary biology, computational neuroscience, genomics, etc.

2. BIOLOGY (focus of project is on animals, plants or fungi)
   a. ANIM: Animal Sciences: animal behavior, cellular studies, development, ecology, genetics, nutrition & growth, physiology, systematics & evolution, etc.
   b. PLNT: Plant Sciences: agronomy, ecology, genetics/breeding, growth & development, pathology, physiology, systematics & evolution, etc.

3. CHEM: CHEMISTRY (focus of project is on chemical reactions)
   a. Chemistry: analytical chemistry, computational chemistry, environmental chemistry, inorganic chemistry, materials chemistry, organic chemistry, physical chemistry, etc.
   b. Energy (chemical): alternative fuels, computational energy science, fossil fuel energy, fuel cells & battery development, microbial fuel cells, solar materials, etc.

4. EAEV: EARTH / ENVIRONMENTAL (focus of project is on abiotic and/or biotic environmental factors)
   a. Earth and Environmental Sciences: atmospheric science, climate science, environmental effects on ecosystems, geosciences, water science, etc.

5. ENMS: ENGINEERING (focus of project is on which design functions more effectively and/or efficiently)
   a. Engineering Mechanics: aerospace & aeronautical engineering, civil engineering, computational mechanics, control theory, ground vehicle systems, industrial engineering-processing, mechanical engineering, naval systems, etc.
   b. Environmental Engineering: bioremediation, land reclamation, pollution control, recycling & waste management, water resources management, etc.
   c. Materials Science: biomaterials, ceramic & glasses, composite materials, computation & theory, electronic & optical & magnetic materials, nanomaterials, polymers, etc.
   d. Energy (physical): hydro power, nuclear power, solar, sustainable design, thermal power, wind, etc.

6. MACO: MATH / COMPUTER PROGRAMMING / ROBOTICS (focus of project is on math or technology)
   a. Embedded Systems: circuits, internet of things, optics, sensors, signal processing, networking & data communications, microcontrollers, etc.
   b. Mathematics: algebra, analysis, probability & statistics, number theory, combinatorics, graph theory, game theory, geometry, topology, etc.
   c. IMRS: Robotics and Intelligent Machines: Biomechanics, Cognitive Systems, Control Theory, Machine Learning, Robot Kinematics, etc.
   d. Systems Software: Algorithms, Cybersecurity, Databases, Operating Systems, Programming Languages, etc.

7. PHYS: PHYSICS / ASTRONOMY (focus of project is on the science and interactions of matter and energy or space)
   a. Physics and Astronomy: astronomy & cosmology, atomic & molecular & optical physics, biological physics, computational physics & astrophysics, condensed matter & materials instrumentation, magnetics & electromagnetics & plasmas, mechanics, nuclear & particle physics, optics & lasers & masers, quantum computation, theoretical physics, etc.

Click here for more help with selecting a Category

DATA NOTEBOOK

The Data Notebook is your project log where you write step by step everything you do in your experiment and everything you observe during your experiment. This notebook is NOT to be recopied. The pages are all numbered and you record the date you did the work. The Data Notebook should be placed on the table in front of your display. *(you can take pictures of your handwritten notebook or display images of your typed notebook files in your presentation)*

EXAMPLE NOTEBOOK PAGE

October 5, 2020
I purchased 25 coleus plants from a local garden shop. The plants were grouped by research variable, labeled for control, numbered and initial heights measured.
Group A (GROUP B GROUP C GROUP D)
Plant #1A - 10 cm
Plant #2A - - ~~11 cm~~ 13 cm
Plant #3A - - - 12 cm
Plant #4A - - - 7 cm
Plant #5A - - - 9 cm
Plant #6A - - - 11 cm

Plants from GROUP A were placed in the controlled light box. GROUP B were placed outside in the recommended sunlight area as the CONTROL. GROUP C were…. GROUP D….
Data collection is every other day in this data table: .

CHECKLIST:

- ☐ Title Page
- ☐ Date on every page; time of day if applicable
- ☐ Number your pages
- ☐ All measurements in Metric
- ☐ Write in detail everything you do!!! (Judges will ask)
- ☐ Write everything in ink
- ☐ Strikethrough errors ~~with a line~~. Do not erase anything.

ABSTRACT

Format Rules

a. YOU MUST USE THE SSEF ABSTRACT FORM (66th Annual SSEF)
b. A COPY OF THE *ACTUAL COMPLETED SSEF FORM* MUST BE DISPLAYED AT OR JUST ABOVE TABLE LEVEL AT YOUR DISPLAY BOARD.
c. SSEF Abstract form must be used. Must be formatted with font size 12 and black ink.
d. The abstract summary must be a maximum of 250 words in length and fit within the space provided on the form.
e. Write in the third person (use the words "the researcher", "the scientist", "the investigator", "the exhibitor"). Do not use "I", "we", or "you".
f. Write in the past tense (hypothesized, measured, recorded).
g. Do Not list any references on the abstract (no bibliography).

The abstract must include:

- TITLE
  a. Must use the same exact title that appears on your display board and must be written in ALL CAPITAL LETTERS.
  b. Finalist's Name
  c. School Name, City and State, Country

- SUMMARY OF PROJECT
  a. Maximum 250 words in paragraph form
  b. A statement of the hypothesis
  c. Methods and Procedures (what you did)
  d. Observations, results, conclusions, and other important information about measurements, predictions, variables, etc.

NOTE: No reference(s) should be listed on the abstract!

Make copies of the Abstract as follows:

- One copy on the display board
- Keep the original in your report
- Extra copies may be handed out to Judges and/or the public

THE RESEARCH REPORT

An optional research report may be included to enhance the information that is presented directly on the display backboard itself. For example, a research report may be used as way to include additional pictures, details, relevant research findings, relevant newspaper articles or any other additional type of information that may not fit or be appropriate to openly display directly on the board. If you will be including a research report it should be typed and may be displayed on the table in front of the display board.

CHECKLIST:

- ☐ Title page (name, category, school identification)
- ☐ Table of contents
- ☐ Background (An detailed explanation of your background research)
- ☐ Problem (What is the question that the experiment will answer?)
- ☐ Hypothesis (Answer the problem and explain the scientific reason for the predicted results) *DO NOT Change later if your experiment does not work as planned*
- ☐ Variables (Explain variables: independent, dependent, control, constants)
- ☐ Materials (Supplies used in the experiment)
- ☐ Procedure (The steps to do the experiment written in the present tense)
- ☐ Data and Statistical Analysis (Describe the data analysis calculations, show correctly labeled graphs)
- ☐ Results (The results should explain the averaged data of each experimental group, interpret the trends of the graphs and explain what the experiment demonstrated in answer to the problem)
- ☐ Conclusion (Compare the hypothesis and the results and explain the scientific reason for the experiment's results)
- ☐ Application (How this experiment can benefit us or be used in a real-life)
- ☐ Recommendations (Possible improvements which could be done to make the experiment more valid and additional experiments that may further investigate the results of this experiment)
- ☐ Summary Interviews/Credits (Interviews of professionals who have given you some insight into your experiment. These are optional)
- ☐ Glossary (We suggest a minimum of 10 (ten) words defined to help understand technical terminology involved in the experiment)
- ☐ Bibliography (ALL resources used as a reference must be cited.)

website help~ http://www.noodletools.com/login.php

Sources for all risk assessment form safety procedures must be cited. Sources for all topic research must be cited. You must cite at least 5 research sources. The ISEF rules should also be cited. Citations should follow APA style, not MLA.

BIBLIOGRAPHY

How to do your APA citations:

1. You MUST have at least 5 sources in your citation section of your research report and also have them posted on your board or PPT slide.
2. *NEW* In PPT presentations, you MUST include footnotes[1] with references within the slide with the information you are presenting.
3. For all books, magazines, newspapers, etc., include the authors (last name first), title of article, title of publication, volume number, place of publication, publishing company, date of publication, page numbers used.
4. For online sources, include, if known, the authors (last name first), title of page or article, name or data base or project, name of organization posted by, date posted, type or resource, electronic address, and date accessed.

APA Resources:

- Academic Tips on APA references
- OWL Purdue University support on APA Style
- [1]OWL Purdue University support on Footnotes

Reference examples:

Book, one author, multiple editions:

Hawking, S. W. (1998). A brief history of time: From the big bang to black holes (10th ed.). New York: Bantam Doubleday Dell Publishing Group.

Ebook, online only:

Tyler, G. (2016). Evolution in the systems age. Retrieved from http://www.onlineoriginals.com/showitem.asp?itemID=142&action=setvar&vartype=history&varname=bookmark&v1=1&v2=46&v3=2

Journal article, three authors, with a DOI:

Fernández-Manzanal, R., Rodríguez-Barreiro, L., & Carrasquer, J. (2007). Evaluation of environmental attitudes: Analysis and results of a scale applied to university students. Science Education, 91(6), 988–1009. doi:10.1002/sce.20218

SCIENCE FAIR *digital* DISPLAY

THE FOLLOWING ITEMS ARE REQUIRED TO BE IN YOUR DISPLAY

TITLE: This should be to the point using scientific terminology.

BACKGROUND: This is a one page summary of the research information learned about the topic being investigated.

PROBLEM: This is the specific problem the student is investigating. It should be stated in a way that clearly states the question or problem to be addressed by the hypothesis and the project itself.

HYPOTHESIS: Predict an "If..., then..." answer to the problem and explain the scientific reason for the predicted results. This is an "If..., then..." statement made BEFORE doing the experiment telling what you think will happen and why. This is based on what you learned from the background information. (i.e. IF I place radish seeds in the dark, THEN they will not germinate because...) *SOME experiments do not lend themselves to an “If-Then” and that is OK. Just be sure it is clear.

INDEPENDENT VARIABLE: The factor or condition in the experiment which the student changes on purpose to test (and therefore measure as the dependent variable).

DEPENDENT VARIABLE: The factor or condition in the experiment that has a measurable effect caused by the independent variable and can be measured quantitatively to answer the problem. (What you actually measured.)

CONTROL: The experimental group with the independent variable left out or not included. (Used for comparison to the dependent variable)

CONSTANTS: All variables (factors) and techniques in the experiment which the student attempts to keep the same so they do not change. (There should be a lot of these! Think of every little detail that you need to keep the same).

MATERIALS: All equipment, supplies, measurement devices, and safety equipment needed to conduct the experiment. (ALL and every little thing)

PROCEDURE AND STEPS: These are detailed steps, in the present tense, on how you actually did the experiment. The steps should be written so that anyone could use them to repeat your experiment. Labeled and mounted pictures can help clarify each step. Your procedure should indicate how many trials to conduct with the minimum being 5 trials (or 30 trials for valid statistical analysis).

DATA: Tables with titles, labels, and units summarizing quantitative data measurements collected throughout the experiment. You must conduct a minimum of 5 trials (or 30 trials for valid statistical analysis).

DATA ANALYSIS: Neat graphs with titles, labels, and units summarizing the calculations for the statistical data analysis.

RESULTS: Paragraph(s) summarizing the averaged data of each experimental group, interpreting the trends of the graphs and explaining what the experiment demonstrated in answer to the problem.

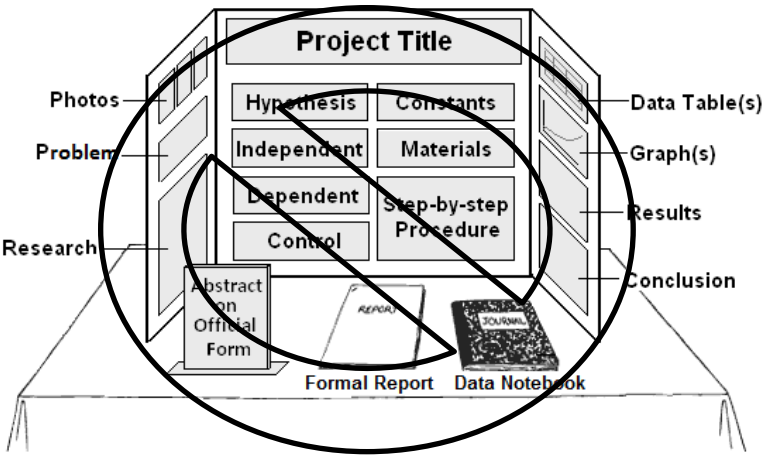
CONCLUSION: Paragraph(s) comparing the original hypothesis and the results. Information from the data analysis is included to prove or explain why the original hypothesis is supported or not supported by the data and results. The paragraph should also explain the scientific reason for the experiment's results.

APPLICATIONS: Who may be able to benefit from the information contained in your project and how they could benefit.

RECOMMENDATIONS: How you could improve your project and further investigations you could do related to this project.

ABSTRACT: (see p. 9) Summarize your project by explaining the purpose of the experiment, procedure, data and conclusions. Use a maximum of 250 words and the required form and format. Write in the third person and in the past tense. Certified abstracts are to be attached or displayed vertically at display board.

EXAMPLE OF SCIENCE FAIR DISPLAY (Digital display via PowerPoint)



DISPLAY CREDITS

All photographs and graphic materials including graphs and data tables must be credited directly under the item. If all pictures were taken by one person then one citation may be given and displayed in a prominent place.

CONSTRUCTING THE DISPLAY

MATERIAL: You may be able to purchase a Display Board at your school or any place that sells office and school supplies. Some students prefer making their own out of any sturdy material. It must stand by itself. Plywood, pressed board, heavy weight cardboard, Styrofoam sheets would also be a good choice. Assemble any sections with hinges or strong wide tape.

DIMENSIONS: DO NOT make your display any larger than necessary. Contest rules give the following maximum dimensions: 4 feet wide (122 cm); 9 feet from the floor (274 cm); and 30 inches deep (76 cm). Table height is 76 cm from the floor. Your display may be smaller than this, but will be disqualified if any larger.

COLOR: Before you go any further, decide what colors you will use. If your backboard needs painting, an enamel paint works best. Choose contrasting colors for lettering. Also choose contrasting colors for mounting your pictures, written material and graphs.

LETTERING: The title to your project and the titles to the parts of your experiment should be easily readable from a distance. Lettering may be cut out of construction paper or poster board and attached to the blackboard. Vinyl lettering comes in various sizes and colors and may be used on the display.

NOTE: Before attaching anything to your backboard, place your board flat on the floor and lay out all the lettering and written material, graphs, pictures, etc. DO NOT attach anything until you are sure that you have room for everything and that all of your material looks neat and centered. Then use a spray glue such as 3M Super 77 Multipurpose Adhesive to attach everything to your board.

DISPLAY CAUTIONS

NEW * NO BRAND NAMES: Any brand name used in an experiment must be covered and re-labeled for display as *"Brand X, Brand Y, et."* Brands can be revealed in the student notebook.
* NO GLASS- (NO unsecured glass of any kind- lenses, glass containers, frames, etc.) (Abstract Picture frames should be acrylic)
*NO TISSUE: organisms or organic tissue, living or dead, including plants, animals, fungi, molds, bacteria, and all other microbes, histological sections, or wet mounts
* NO SOIL sand, rock and/or waste samples even if permanently encased in acrylic
* NO LIQUIDS- unless they are a critical part of an engineering operative apparatus and must be approved before judging. NO chemicals, including water.
* NO FOOD -human or animal food
* NO SHARPS or sharp edged items (i.e. staples, tacks, syringes, needles, pipettes, edges)
* NO poisons, drugs, controlled substances, hazardous substances or devices
* NO gases under pressure or super-cooled gases, including dry ice
* NO flames or highly flammable materials, or temperatures in excess of 75 °C
* NO lighting for display purpose only, lights can only be used if part of the experiment
* NO unshielded high-voltage equipment, large vacuum tubes or ray-generating devices
* NO batteries with open-top cells, car batteries, motorcycle batteries
* NO bare wires or exposed knife switches
* NO unshielded lights, belts, pulleys, chains, or moving parts that pose a hazard
(Unless for display only- CANNOT BE OPERATED)
* NO lasers (or other scientific instrumentation) which do not meet ISEF standards (Class II, student-operated, sign, protective housing, and power disconnect) (NO Class III and IV lasers operated. MUST have original readable class label)
* NO nonfunctional apparatus or chemical containers, empty or otherwise
* NO equipment producing any bright lights and/or loud sounds
* NO small objects that are not encased or attached securely to the project
* NO awards- NO medals, business cards, flags, or acknowledgements
* NO packing material, personal items must be removed from exhibit hall
* NO photographs of animals in other than natural (outdoors) conditions (Dissection, etc., photographs are allowed if kept in a notebook that is only presented during judging)
* NO visually offensive photographs or visual depictions of invertebrate or vertebrate animals, including humans are not allowed
* NO photographs of humans without consent form which grants permission for use (citations!)

NOTE: While security is provided at both the regional and state fairs, the responsibility for all equipment and materials for a project lies with the student/participant.

Your teacher or school science and engineering fair coordinator has a complete listing of the SSEF Display and Safety Rules

JUDGING RUBRIC

Category: Judge _____ Project #: Project Title:		√ CHECKLIST RECORD	JUDGE COMMENTS AND NOTES	CIRCLE FINAL SCORE
CREATIVITY & THOUGHT	**BOARD PRESENTATION**: creative, clear layout that fits the experiment topic			7
	DO IT YOURSELF: student built, made, or designed a method to tackle the hypothesis			13
	PROJECT PROBLEM is **UNIQUE**: this project has not been done in this way before (To the best of your knowledge- or according to the student research).			18
	ANALYSIS or **SOLUTION** of experiment is especially thoughtful, innovative or insightful			22
	REDESIGNED or **IMPROVED**: redesigned an existing device, product, procedure, technique			26
	REVERSE ENGINEER: take something apart and figure out how to make it yourself **PROTOTYPE/INVENTION**: invent, design, make an original creation, procedure or technique			28
RESEARCH	**HYPOTHESIS STATEMENT** is explained/clarified using information supported with research			7
	EXPERIMENTAL DESIGN is referenced with cited research source			13
	PUBLISHED RESEARCH REFERENCED IN CONCLUSION: published research is compared with the results of the experiment (must be visibly cited/ noted by student in presentation)			22
	EXPERIMENT SAFETY PLAN: protocols, techniques and procedures researched and cited			25
	FOLLOW-UP RESEARCH: new questions raised by results or **NEW PROBLEM** uncovered or narrowed the scope with an answer unknown to the student at the start of project			28
EXPERIMENT DESIGN	**EXPERIMENTAL DESIGN** and **METHODS** are presented/explained clearly			5
	VARIABLES: independent, dependent, control, constants are all presented correctly			8
	REPEATED TRIALS: experiment uses a significant number of trials (minimum is 10)			13
	SYSTEMATIC CONTROLLED EXPERIMENT GROUPS: testing at least 4 experiment groups (with/including 1 control group)			17
	JOURNAL/DATA NOTEBOOK: documents dates and progress of science project			21
	RANDOMIZATION OF SAMPLES and/or **RANDOMIZATION OF EXPERIMENT** **NULL** (H_0) and **ALTERNATIVE** (H_A) **HYPOTHESIS**: Student uses (H_0) &/or (H_A) correctly			24
DATA & STATISTICAL ANALYSIS	**GRAPHS**: type, labels, units, title, explanation are clearly presented			5
	DATA CHART: Data taken in experiment is represented in one or more charts for explanation			10
	STATISTICAL ANALYSIS (95% CI error bars, p-value, R^2)			15
	INFERENTIAL STATISTICAL ANALYSIS: R^2 regression, T-Test, p-value (reject/accept H_0)			
	SPREAD: conduct exploratory data analysis (min/max, range, standard deviation)			
	SHAPE & CENTER: conduct exploratory data analysis (normal/skewed, mean/median)			20
	LEVEL OF DATA: type of data collected (nominal/categorical, ordinal, interval, ratio)			
	OUTLIERS: conduct exploratory data analysis to identify and remove **POTENTIAL DIFFERENCES/LINEAR RELATONSHIPS**: conduct exploratory data analysis			

Total Score _____/100

Projects will compete by category. The total number of PLACE AWARDS and HONORABLE MENTIONS given in each category will be determined by the relative number of projects entered into each category. Best of Show projects will advance and compete at the Florida State Science Fair. Projects that are determined by the Collier County Scientific Review Committee Chair to be ineligible for the state science fair will not be eligible to be awarded Best of Show and will not advance to the state level.

INTERNET RESOURCES

A computer can make your job in completing a science project much easier in many ways, including helping you:

⇒ Write Research Reports http://collierschools.com/research/
⇒ Create Data Tables
⇒ Create Graphs
⇒ Write an Abstract
⇒ Create Display Titles for Display Boards
⇒ Create Report Covers

The internet is another indispensable tool which can help you:

⇒ Locate ideas, information, data, and people from around the world
⇒ Ask questions via E-mail
⇒ Ask a scientist a question on-line
⇒ Communicate with other students from around the world about projects

Ask teachers and the media center specialists to help you get started. You may also access the Internet at any Collier County Public Library.

Use your search engines to find helpful web sites on the internet. Some possible key words you might try in different combinations are as follows:

science	information	exchange	advice
fair	help	topic	question
project	ideas	expert	ask
experiment	steps	interactive	*your topic*

Here are just a few web sites that provide science fair information that you may visit
http://www.sciencebuddies.org/mentoring/project_ideas.shtml
http://school.discoveryeducation.com/sciencefaircentral/Getting-Started.html
http://www.ipl.org/div/projectguide/
http://collierschools.com/gch/media/ccpsresearch/index.html (Research Process)

Rules, as well as interactive forms that allow you to enter information and then print out the completed form, are available at:
http://www.collierschools.net/ScienceFair
http://www.floridassef.net
http://www.societyforscience.org/isef/students/rules_regulations.asp
http://www.societyforscience.org/isef/students/wizard/index.asp

GLOSSARY OF TERMS

Abstract: The student's written summary of the experimental investigation. *See page 9.*

Background: Learning about the topic by reading books, newspapers, magazines; searching the Internet; watching TV or films; and interviewing people who are knowledgeable of the topic. Information gathered by the student is to be incorporated into a 2-5 page formally written report.

Conclusion: A paragraph written by the student which compares his/her original hypothesis and the results. Include information from the data analysis to prove or explain why the original hypothesis is supported or is not supported by the data and results. The paragraph should also explain the scientific reason for the experiment's results

Constants: All variables (factors) in the experiment which the student attempts to keep the same so they do not change.

Control: The experimental group in which the independent variable is left out or not included.

Data: The student's observations of everything that happens during the experiment. Quantitative measurements should be included whenever possible, even if the student has to create a form of measuring (such as Jane's Rust Scale 1 - 10). Repetition of the experiment provides more convincing results so your project must have a minimum of 5 trials (or 30 trials for valid statistical analysis).

Data Analysis: Mathematical calculations and graphs that simplify the data to make it easier to understand. The most common example is calculating the mean (average). Other more advanced statistical analysis calculations include the chi square test and confidence intervals. The data analysis information is often displayed in the form of graphs, tables, photographs, etc.

Data Notebook: The student's personal record of all his/her science project ideas, information, notes, events, data, diagrams, timelines, etc. Even errors and "disasters" are to be included. (Example: Plant #3 fell off table and broke on Oct. 3.) This must be written in ink and kept in its' original form with the original data recordings and must not be recopied. *See page 8.*
*Note: The data notebook is **not** recopied into the research report.*

Dependent Variable: The factor or condition in the experiment that has a measurable effect caused by the independent variable and can be measured to answer the problem.

Display Board: A comprehensive visual representation of the project. *See page 11.*

Hypothesis: Predict an "If..., then..." answer to the problem and explain the scientific reason for the predicted results. This is an "If..., then..." statement made BEFORE doing the experiment telling what you think will happen and why. This is based on what you learned from the background information. (i.e. IF I place radish seeds in the dark, THEN they will not germinate because...)

Independent Variable: The factor or condition in the experiment which the student changes on purpose.

Materials: A list of everything used while running the experiment including chemicals, equipment, organisms, etc.

Procedure: The step-by-step detailed description of the entire experiment. The procedure should be written like a recipe so that another scientist could duplicate your results. Include directions for safety precautions, all necessary measurements, techniques used, etc. Write the procedure in the present tense.

Problem: This is the specific problem the student is investigating. It should be stated in the form of an "If..., then..." question.

Purpose: This is a statement about what the student is attempting to find out by doing the experiment.

Research Report: An optional report with a table of contents that contains all of the above information plus any other additional type of information that may not fit or be appropriate to openly display directly on the display board. Use formal writing and be as neat as possible.

Results: Paragraph(s) summarizing the averaged data of each experimental group, interpreting the trends of the graphs and explaining what the experiment demonstrated in answer to the problem.

Topic: The general area of interest explored through the project investigation.

AWARD$ AND OPPORTUNITIES

Each year thousands of Florida students participate in science fairs across the state and around the world. A student who is interested in science as a subject and possibly as a career should be aware of the benefits available.

- The chance to travel to new areas for competitions.
- Meeting new people, including student scientists, professional scientists, and representatives from science-related businesses.
- Winning place awards or special prizes.
- Receiving scholarships of all amounts to study science at a wide variety of colleges and universities.
- Offers of summer jobs or internships with business.

Previous Collier Regional Science & Engineering Fair Awards:

Scholarships	Trips to State Science Fair
Sponsorships	
Cash	Ribbons
Savings Bonds	Trophies
Gift Certificates	Plaques
Shirts	Books

Previous Florida State Science and Engineering Fair Awards:

Summer jobs with NASA, Lucent Technologies, SONY
Scholarships totaling over $335,000
Military recognition
Savings bonds, equipment, plaques, and other prizes

COLLIER REGIONAL
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