



Ten Steps in the Science Project Process

Step #1: Student writes a proposal that includes: Question, hypothesis, prior knowledge, a brief experimental plan and identification of variables. It is strongly suggested that each student start a **logbook** to keep track of all work leading up to the project and document ALL activities during the experimentation. See a possible LOGBOOK setup below which is written as instructions to students.

Logbook

Please keep an electronic notebook for the Virtual STEM Fair! - It is optional but can be critical to competitions!

The electronic "LOGBOOK" will include not only your thoughts as you contemplate a problem for your science project, but also the pertinent information as you prepare for the experiment. During the experiment, you will record your data and analyze that data after experimentation.

ALL entries must include a date and specific information about your experiment. A word document or Excel spreadsheet can be used to track and record details. This information can be submitted electronically along with the PowerPoint.

Below are suggestions and ideas for the LOGBOOK:

Number each page in the lower, outside corners of the page.	John Brown's Logbook July 18 2018 –	
Page 1 is the "Title Page" which would include your name and first date of use		1
Page 3 is the "Table of Contents" and includes the first three sections of the logbook with the page number on which that section begins. You will NOT list every page on the Contents page. Please don't skip lines.	Table of Contents Timeline 5 Project Ideas 11 Proposal 15	3
The next 3 right-hand pages will be labeled "Timeline". Each day you work on the logbook should be documented with a brief ONE LINE description of what was done. Only write down information about the project. Many judges like to see how you developed your project and how long you worked on the project. These pages don't need a date in the upper	Timeline 7/18 – received assignment 7/20 – purchased logbook 7/22 – previous projects	
As you develop ideas for a project use a new page and label the top of the page with the <u>date</u> when you write on the page. The first place to look for an idea is to possibly continue a previous project. Continuing projects can NOT just collect more data. There must be a new question and changes in procedure.	Projects Ideas 7/22/18 In 6 th grade I..... (give question, a brief description of the experiment and conclusions. Also add a statement about the feasibility of continuing.)	
Proposal should include the Question, what is already known, possible hypothesis, possible Method to perform the experiment. The variables can also be identified.	Proposal 8/20/18 Do seeds germinate more in the light or the dark?	15
This is an example of a page during experimentation. Data charts should be prepared before experimentation and data inserted daily. The date of entry should be on the line. If an adult or team member is present during data collection their name should be written on the	Data – Germination (example) Day Light Dark 9/12 0 0 9/13 2 0	31



Step #2: The teacher, which is the adult sponsor, reviews the proposal and writes comments on the left page opposite the proposal.

ALL projects MUST follow the rules and guidelines of BOTH the Intel International Science & Engineering Fair (ISEF) AND the State Science & Engineering Fair of Florida (SSEF). These rules and guidelines are available online: (Please use the pages of the pdf and NOT the separate html sites.)

Intel International Science & Engineering Fair: International Rules & Guidelines 2021 (ISEF Rules) available at <https://sspcdn.blob.core.windows.net/files/Documents/SEP/ISEF/2021/Rules/Book.pdf>.

State Science and Engineering Fair of Florida 2020-21 Rules Supplement (SSEF Supplement) and forms are found at https://ssefflorida.com/wp-content/uploads/2016/10/2020_21-SSEF-Rules-Supplement8.19.2020-Autosaved.pdf and the addendum to the SSEF Supplement at https://ssefflorida.com/wp-content/uploads/2016/10/2020_21-SSEF-Rules-Supplement8.19.2020-Autosaved.pdf.

The adult sponsor provides the student information regarding the *ISEF Rules*, the required forms that WILL need to be completed, and the additional people or committees that must review the research plan and/or supervise the experiment for the proposed project.

Initial Comments on Proposal -

The checked information below is related to your proposal.

It is the researcher's responsibility to read the Rules related to your project. Guidelines for every project can be found on pages 3-6, 24-26 and the instructions for the research plan on page 31 of the *ISEF Rules*. ALL projects require FIVE references in addition to the *ISEF Rules* and *SSEF Supplement* and any other required references which are listed on pages 21-23 of *ISEF Rules*. Use a bibliographic style that includes the page numbers and complete urls for websites.

All projects with **human** participants, even just the researcher, must be approved by an IRB committee **PRIOR to contacting ANY** other potential participants and/or experimentation. Read *ISEF Rules* pages 7-9 (21). Describe the process of contacting participants and their participation as outlined on page 31 of *ISEF Rules* within the research plan. Complete the top of Form 4 and prepare an Informed Consent Form (much of the information on the Informed Consent is also included on the Research Plan). Some projects may require Form 2 or 3. Also Read *SSEF Supplement* pages 3- 4.

All projects dealing with **hazardous chemicals, activities or devices, microorganisms, tissue, and/ or vertebrate animals** must be approved by the SRC (committee) **BEFORE** any experimentation.

All projects dealing with **vertebrates** must read *ISEF Rules* pages 10-12 (21-22) in addition to completing the forms 5A or 5B and possibly Form 2. Be sure to describe possible alternatives to vertebrates in the Research Plan (*ISEF Rules* page 10) and all animal care information on form 5 MUST also be described within the research plan (*ISEF Rules* page 31). **Be aware** that if a vertebrate animal dies or loses too much weight you must have a veterinarian examine it or the body, at your expense. Also read *SSEF Supplement* page 4.

All projects dealing with **microorganisms or tissue** (PHBA) must read *ISEF Rules* pages 13-16 (22) and complete Forms 6A and/or 6B and possibly Forms 2 and 3. All safety precautions and disposal must be described on both the forms and research plan. Also read *SSEF Supplement* pages 4- 5. The laboratory supervisor must complete the appropriate BSL Safety Assessment (on SSEF website) of the facility to be included with the student's paperwork. (Most of these projects also require HCAD forms below.)

All projects dealing with **hazardous chemicals, activities and devices** (HCAD) must read *ISEF Rules* pages 17-19 (22-23). Safety precautions and disposal must be described on both Form 3 and within the research plan. The designated supervisor MUST directly supervise the experiment, a parent may meet the requirements for this position. Also read *SSEF Supplement* pages 5-6.



Step #3: Student finds a minimum of five (5) references, reviews the pages of the *ISEF Rules* and *SSEF Supplement*, and completes the Research Plan following the instructions on page 31 of the *ISEF Rules*.

It is the responsibility of the Adult Sponsor to help the student write the Research Plan and discuss ALL potential risk factors. We suggest that the student attempt writing the research plan and email it to the teacher/sponsor. The teacher should edit what they can and leave blanks and instructions for the student to correct the rest of the items. It is beneficial if the student and teacher/sponsor can sit together to finalize the Research Plan.

The **Research Plan** MUST be typed and should include the heading and footer on EVERY page:

2020-2021
Research Plan

Student Name _____

Manatee STEM Competition

A. Rationale: Include at least 3 sentences of background information and why it is this important.

B. Question and Hypothesis (If...are compared then...) or Engineering goals and expected outcome.

C. Method

Materials: List all materials in columns, NOT a paragraph

Procedure: List each step separately and include all safety precautions when needed. Do NOT include "gather materials," "produce graphs," or "prepare board". For human projects describe the population first after the materials (see page 31 of *ISEF Rules* for required information. Vertebrate projects must describe the care of the animals and reasons why vertebrates must be used.

- 1.
- 2.

Data Analysis - state the type of data that will be collected and how it will be analyzed with graphs or inferential statistics (Chi square, t-test, z score, Pearson product moment correlation coefficient, etc.)

D. Bibliography - At least 5 bibliographic citations of the references related to the experiment. Also list the relevant pages of the *ISEF Rules*, *SSEF Supplement*. The following types of projects require an additional reference: (Examples of references are listed in the *ISEF Rules* pages 21-23)

Human projects

Vertebrate animals

Potentially Hazardous Biological Agents

Hazardous Chemicals, Activities, and Devices (a safety reference for EACH chemical, activity or device that is not the normal activity of the person. No matter the experience, fire is hazardous.)

(The blanks in the footer are completed by the SPONSOR.)

Reviewed by (adult sponsor's name) _____ Date: _____ Page ___ of ___



Step #4: Student submits the Research Plan and required forms (1A, 1B) to the Adult Sponsor for review.

- If correct, the Adult Sponsor completes Form 1 (and initials and dates each page)
- If forms and/or Research Plan are incomplete, the Adult Sponsor returns the forms to the student with suggestions to correct and resubmit.

Comments on ISEF Forms

Form 1A - Student Checklist (print in ink or type)

Item 2 – This does NOT need to be the final title that will be on the board. It can be a working title, the question, or the topic. After the board is made, this title does NOT need to be changed.

Item 4 – This MUST be the teacher of the student and NOT a parent.

Item 5 – The tentative start date is ONLY needed if the project will require SRC/IRB pre-approval

Item 7 – DO NOT type these dates, this is completed ON or the after the first day of experimentation

Form 1B – Approval Form (print and sign in ink)

Only after the student and parent understand the potential risks and dangers of the project, do the student and parent sign this form which MUST be PRIOR to experimentation.

Form 1 – Checklist for Adult Sponsor (this is completed by the Sponsor and NOT the student)

The sponsor completes this form ONLY AFTER the Forms and Research Plan are correct. Item 4 – SSEF requires all HCAD projects to complete a Form 3 and be approved by SRC.

Human Participants – An Informed Consent Form must be reviewed by the IRB, SSEF requires all nonexempt human projects to have signed Informed Consent forms prior to participation.

Hazardous Chemicals, Activities and Devices – Please list the hazardous item(s) on this form after “Risk Assessment Form (3)”. Sponsors sign this form and then submit the papers to the appropriate committee for review

Form 1C – Regulated Research Institutional/Industrial Setting (any site other than school, home, or field) This is completed AFTER experimentation by a supervising adult at the facility. A copy of this form will need to be on the board or vertical on display.

Form 2 – Qualified Scientist (this is NOT required for most projects).

The person must meet the criteria as outlined on page 5 of *ISEF Rules*. The person MUST be knowledgeable in the area of the project.

Form 3 – Risk Assessment (this is completed by the student with the help of the designated supervisor) Item 5 – Use the complete bibliographic citation for each safety reference (SDS for chemicals), these must also be listed in the Bibliography of the Research Plan

Form 4 – Human Participants (students just complete the top box, the IRB completes the rest)

Human Informed Consent Form – Please use the district form and edit the bottom portion based on the participants. BE SURE THAT THIS FORM ACCURATELY DESCRIBES ALL OF THE PARTICIPANTS' ACTIVITIES, POTENTIAL RISKS, and POTENTIAL BENEFITS.

Form 5A – Vertebrate Animal – Students complete the top half. Usually the parent can be a designated supervisor and a veterinarian usually does not need to sign this form. (Form 5B is for RRI)

Form 6A & 6B – Human and Vertebrate Animal Tissue – The designated supervisor should help the student complete this form. SRC chair MUST sign Form 6A prior to experimentation.

Form 7 – Continuation/Research Progression Projects – The student must clearly identify the differences in the projects. Many projects have failed to qualify since there were not significant changes in the question and/or method. A copy of this form is required on the board.



Step #5: If the project must be reviewed by the Institutional Review Board (IRB) for human projects or Scientific Review Committee (SRC) for projects dealing with hazardous chemicals or activities, microorganisms and/or vertebrates, the Adult Sponsor gives the STEM Area Leader the forms to forward to the appropriate committee.

- If correct: The IRB approves the project, signs Form 4 and the IRB Chair signs the Form 1B and the Informed Consent Form.

The SRC chair would sign Form 1B for all projects, Form 5A for Vertebrate projects, and 6A for Potentially Hazardous Biological Agents projects.

- If corrections are needed the IRB or SRC must identify areas to be corrected with suggestions to the Adult Sponsor and/or student. Once the corrections are made the student/sponsor resubmit the corrected research plan and corrected forms.

Step #6: After approval the student begins experimentation and records the actual start date on Form 1A line 7. The student records data accurately in the logbook in addition to the activities and other observations during experimentation.

See the page 31 on the sample logbook setup with Step #1.

Step #7: If the student finds that procedure must be revised they should discuss proposed changes with the sponsor.

If the revision would require IRB/SRC approval a Research Plan Addendum is prepared and all of the required approvals are repeated. Just list the new information and explain the need for the revision in part A for rationale. The signature lines can be on this same sheet except when a new Informed Consent Form is needed, in this case a new Form 4 must be used for the Addendum and labeled that way.

2020-2021 Research Plan Addendum		
Student Name _____	Manatee STEM Competition	
A. Explain the reason why revision was needed		
C. Revised Method		
Only write the new materials and procedures		
D. Additional References – only include this, if needed		
Student Acknowledgment: _____		
Printed name	Signature	Date
Parent/Guardian Approval: _____		
Adult Sponsor's Review: _____		
IRB/SRC Chair Approval: _____		

If the revision does NOT require approval from a committee a summary can be written after experimentation. The sponsor should be involved PRIOR to the change in experimentation to make sure that they knew the changes, this should be documented in the logbook. The summary should be written in past tense, explain the reasons for the changes including the dates when the revisions were started. The sponsor and student should sign and date this form after the experimentation. (See example in step 8)



Step #8: When experimentation is finished, the student writes the actual end date on Form 1A, analyzes the data, and draws a conclusion.

The student writes an Abstract on the current form available on <https://ssefflorida.com/rules/>. Abstract help is available below.

The student must include a Form 1C, documented by appropriate personnel at the facility, if any part of the experimentation was completed in a Research Institutional/Industrial setting or a facility other than school or home.

A Mortality Report, which is available from <https://ssefflorida.com/rules/>, must be completed if the project involved vertebrate animals.

Any projects which dealt with human participants and collected Informed Consent Forms require a Verification of Informed Consent Form (VICF) which is completed by the sponsor and the student, and a “redacted” copy of an Informed Consent Form. The redacted copy is prepared by copying and blacking out the printed name(s) and signature(s), but not the date. The original signed Informed Consent Forms should be kept in the “closet” or “file cabinet” as determined by the student. When setting up at the State Science & Engineering Fair, the student needs another copy of the VICF and redacted form. PLEASE use the district form and not the form available on the SSEF website.

Abstract Guidelines

The **abstract** is a review of the entire project and does NOT exceed 250 words. See the suggestions below to write the abstract in PAST tense. **Five copies of the final abstract are required: one on the board and four with forms.**

<p>TITLE of project EXACTLY as written on the board and on SSEF Entry form</p> <p>Student name</p> <p>Full School Name, City, Florida</p>
<p>The first paragraph should be about the importance of the project. Include the most important information about the question, and why it is important to solve the problem. Include the Question and Hypothesis. (Do NOT include mentor, test facility, or acknowledgments.)</p> <p>The second paragraph should be a brief summary of the method and the type of data that was collected using complete sentences. Do NOT write out each step instead write something like this - "A total of sixty bean seeds were planted in three groups: control, salt water, and pool water. Germination was recorded for the first 10 days and heights were measured every three days." Include the data analysis sentence from the research plan.</p> <p>The last paragraph gives the most important information from the discussion. Report any significant results, the conclusion, and suggestions for the future and/or discussion of possible errors.</p>

If a summary is required due to revisions in the method that didn't require IRB/SRC Approval, the student must describe these in a Summary as shown below.

2020-2021 Project Summary	
Student name(s)	Manatee STEM Competition
During the experimentation (Describe the changes to the method that were used and the new data that was collected. This would be written in past tense.)	
Student Acknowledgment: _____	
Printed name	Signature
Adult's Sponsor's Review: _____	
Date	



Step #9: For STATE and/or INTERNATIONAL Competition, student prepares the display board following the guidelines on pages 26 of the *ISEF Rules*. The research paper which usually accompanies the display should be finalized. Below is a general plan for a tri-fold project display board. Other than the abstract all other printed materials should be printed in 20pt font so it is easier to read. **The REGIONAL competition is virtual and requires a PowerPoint presentation (see PowerPoint Template posted on the STEM Manatee County STEM Fair Website!**

<p>State Abstract Form</p>	<p>Title (<u>Must</u> match Abstract and Entry Form)</p>	<p>Analysis/Results Discussion: Include ranges and averages of the different groups with units. Include the types and results of statistical analysis in the discussion.</p>
<p>Problem/Question</p>	<p>Data (data tables, charts, maps, graphs, photos)</p>	<p>Conclusion (Did the results support the hypothesis? Discuss possible extensions or improvements to the project)</p>
<p>Hypothesis</p>	<p>A citation is required: "All charts, graphs, and photos were made by the researcher." Include separate citations for the various items if multiple sources are used. A COMPLETE URL is required for online sources.</p>	
<p>Method (List all Materials & Procedure; no brand names)</p>		<p>Copies of Forms 1C and Fo 7 need be</p>

Step #10: Student or sponsor submits all forms the STEM Area Leader (SRC) for review PRIOR to the competition. Students should have the original copy of all forms at the competition after the Regional STEM Competition.

For Entry into the Manatee STEM Competition ALL projects require:

- SSEF Entry Form (completed in ink, if not typed)
- SSEF Abstract (5 copies)
- Form 1- Checklist for Adult Sponsor Form 1A – Student Checklist Research Plan
- Form 1B – Approval Form (1 for each student if a team project)

Continuing projects also require Form 7 and the abstract and research plan of the previous project Projects working in facilities other than home or school require Form 1C

Human Projects also require Form 4, Redacted Informed Consent form and Verification of Informed Consent Form

Vertebrate Animal projects also require Form 5 and Mortality Report

Potentially Hazardous Biological Agents projects also require Form 3 for chemicals, Form 6A, and the BSL Safety Assessment completed by the lab supervisor

Hazardous Chemicals, Activities, and Devices project also require form 3.



Alternative projects

Often students will not complete the requirements of a science project in a timely basis. To prevent failures it is beneficial to have alternative assignment prepared. The alternative project should be related to the course work and may give fewer points for some assignments if the parents and students are aware of these differences.

Examples of alternative projects used for Biology students where students will collect data, produce graphs, and analyze the data similar to a science project.

Country project related to the ecology unit where students collect data for an assigned country and compare results with the United States. Data includes area, human population, environmental problems, numbers of endangered species, and causes of endangered species.

Trihybrid cross related to genetics where the student designs an organism with three traits and produces a trihybrid Punnett square. The student simulates the F2 generation and then compares the expected numbers from the Punnett square to the number from the simulation.

Genetic Disorder is related to DNA and genetics where the student researches cause, symptoms, effect, prevalence, and treatment. The student produces a graph based on prevalence by ethnicity and pedigree that could show the passage of the disorder through a family.

Examples of alternative projects used for Chemistry students where students conduct research on: Chemical, structural and physical properties of pharmaceuticals.
Medicinal plants with the chemicals produced and their effects.