Science Fair Requirements

A. Description of the Project
Students will choose a question or a problem to answer. They will then conduct a controlled experiment to answer or solve the problem/question.

- **Question/Problem:**
  - Must be testable
    - Models are not science fair projects
    - Choose a problem that you can collect data in a small window of time to answer your question or solve the problem
  - Should be of interest to the student, something you want to know more about

- **Controlled Experiment:**
  - Should have a control group and an experimental group
  - Choose an appropriate amount of time to collect data that will give you a valid result

- **Data:**
  - All data should be recorded in a journal/notebook during the entire project.
    - Make sure you make observations during the different stages.
    - Logs should be in a spiral notebook or a research journal.

- **Analyze Data:**
  - Must include charts and graphs in order to draw conclusions from the experiment.

- **Display Board:**
  - Present your data and conclusions on ONE 3-panel freestanding board. (only one board will be accepted per project)

- **Presentation (High School ONLY):**
  - Present at the ASD Science Fair to a panel of judges.

B. Written Requirements

- **Journal:** This is your hand written copy of your work as it is being done.
  - It should be in your notebook
  - Follow the lab report given in class
  - This should show progression and be a part of the scientific process

- **Report:** PowerPoint of the project.
  - Sections include:
    - **Title Page (Slide 1)** – Create a title page using a 1-15 word description of your project. The title must be specific enough for someone to know what your project is about. Also include your name, period and date.
    - **Problem (Slide 2)** – List your problem that was the topic your teacher approved
    - **Abstract (Slide 3)** – This should be one of the last things you do so leave an empty page for it. The abstract is a 250 word description of your project.
      - A brief description of why you chose this subject. Include why you chose it and what you expected to learn from it.
      - Describe what you did by giving a general description of your project.
• State whether the data proved your hypothesis right or wrong. Give some reasons as to why you think it was right or wrong. If you had a chance to do it again, what would you change and how?

- **Research/Background Information (Slide 4)** – This is where you put all the research that you found in relation to your topic.
  - The purpose of the research is to acquaint the reader with important background information about your topic and should include the following
    1. A broad overview of the general topic you are investigating.
    2. History of your topic.
    3. The specific reason you are interested in your topic.
    4. Identify your exact topic, and should end with a statement of the problem you are investigating.

- **Hypothesis (Slide 5)** – Hypothesis should be a tentative explanation based on experience of a phenomenon, event, or the nature of the object. Consider WHY you are predicting that your experiment will cause something to change enough to show numerical results. You need to use numbers or percentages to describe what you think will happen.

- **Materials (Slide 6)** – A complete list of what you used in your experiment. Write this in a numerical list. Include anything that was used to prove your hypothesis. Do not include things used to write up or display the project (i.e. journal, display board, computer). Include a diagram of your experimental set-up or an example questioning form.

- **Variables (Slide 7)** – List your manipulated variable and discuss which factors are being controlled or kept the same. Identify your control in the experiment (the situation that you are considering normal for comparison).

- **Method/Procedure (Slide 8)** – List in numerical form what you did. This is your step by step procedure that the teacher approved. Procedure should be detailed and specific so the experiment can be completed/recreated by someone else.

- **Data/Results (Slide 9)** – Here is where you list all the data collected in the experiment. Organize your data in tables so it is easy to identify the information that you present.

- **Analysis (Slide 10)** – Make a graph of your data. Remember: bar and pie graphs are for comparing, line graphs are for showing change over time (average plant growth).

- **Conclusion (Slide 11)** – In your experiment you should be trying to prove or disprove your hypothesis. In your conclusion you will state
  • Whether your prediction came true or not
  • Support your statements with your data or explain how you could tell if the hypothesis was right or wrong by referring to your data and graphs
  • Explain anything that may have affected your results (things that could have gone wrong).
  • Describe how you would do things differently if you were to do this again.

- **References (Slide 12)** – List all of the sources that you used to get information for your project in proper APA format. Should include at least 3 sources.
C. Getting Started

- Things to consider as you try to choose a problem or question (a.k.a. a topic) for your science fair project:
  - It should be an area that interests you
    - Do some research on the internet for ideas
    - Make sure you get your idea approved
  - You must be able to accurately measure both variables
  - You must have access to the necessary equipment and materials
  - You must consider the cost involved in the purchase of equipment and materials
  - Data collection must be completed within two weeks.

- Writing your hypothesis:
  - Your hypothesis is a statement of what you are testing by doing your experiment
  - It should make a measurable explanation based on experience of a phenomenon, event, or the nature of the object.
  - Your hypothesis needs to explore the relationship of the dependent variable vs. the independent variable
  - Should be based on research and consider why.
  - A hypothesis is not the same thing as a prediction, which is an expected outcome of a specific event. A hypothesis can be used to explain specific events.

D. Display Board – **students attending ASD District Science Fair, you will complete ONE display board**

There are TEN specific elements that you must have on your board. Include Abstract, Question (Purpose), Hypothesis, Background Research, Materials, Procedure, Variables, Results, Conclusions, Future Direction. Here is an example of a display board.
What is NOT allowed?

- Any topic that requires dangerous, hard to find, expensive, or illegal materials.
- Blood or bodily fluid.
- Projects where safety is a concern.
- Bacteria or fungus growth, unless working under supervised laboratory facility.
- Projects using prescription medication.
- Testing on animals where animals may potentially be harmed including drugging, pain or injury. Pre-Approval must be obtained prior to conducting the experiment involving living vertebrates.
- Projects that creates physical or psychological risk to a human subject.
- Projects that involve collection of tissue samples from living humans or vertebrate animals.

The following includes a list of props not allowed with the display:

1) Living organisms, including plants
2) Soil, sand, rock, and/or waste samples, even if permanently encased in a slab of acrylic
3) Taxidermy specimens or parts
4) Preserved vertebrate or invertebrate animals
5) Human or animal food
6) Human/animal parts or body fluids (for example, blood, urine)
7) Plant materials (living, dead, or preserved) that are in their raw, unprocessed, or non-manufactured state (Exception: manufactured construction materials used in building the project or display)
8) All chemicals including water (Projects may not use water in any form in a demonstration.)
9) All hazardous substances or devices (for example, poisons, drugs, firearms, weapons, ammunition, reloading devices, and lasers
10) Dry ice or other sublimating solids
11) Sharp items (for example, syringes, needles, pipettes, knives)
12) Flames or highly flammable materials
13) Batteries with open-top cells
14) Glass or glass objects unless deemed by the Display and Safety Committee to be an integral and necessary part of the project (for example, glass that is an integral part of a commercial product such as a computer screen)
15) Any apparatus deemed unsafe by the Scientific Review Committee, the Display and Safety Committee, or Society for Science & the Public (for example, large vacuum tubes or dangerous ray-generating devices, empty tanks that previously contained combustible liquids or gases, pressurized tanks, etc.
16) Any inadequately insulated apparatus producing extreme temperatures that may cause physical burns is not allowed.
17) Any apparatus with unshielded belts, pulleys, chains, or moving parts with tension or pinch points must be for display only.
PJAS Forms

Forms and a full description of rules may be: http://student.societyforscience.org/forms

Form 1A: Student Checklist/Research Plan
Form 1B: Approval Form
Form 1C: Regulated Research Institutional/Industrial Setting Form
Form 2: Qualified Scientist Form
Form 3: Risk Assessment Form
Form 4: Human Subjects and Informed Consent Form and Sample Form
Form 5: Vertebrate Animal Form
Form 6A: Potentially Hazardous Biological Agents Form
Form 6B: Human and Vertebrate Animal Tissue Form

For PJAS: These forms must be filled out before the students begin the science fair project. Please see the following website for the checklist of forms for any given project. http://pjasregion3.org/. For all students attending PJAS, Form 1: Checklist for Adult Sponsors, Form 1A: Student Checklist, and Form 1B: Approval Form must be filled out and submitted. The forms are attached.
Parents and Guardians:

The Allentown School District is holding a Science Fair on _________________. A Science Fair is a wonderful and exciting experience. Participation in the science fair will require students to conduct a controlled experiment, keep notes, and reflect data using graphs and displays. Some work may need to be completed at home.

In addition, we will be holding after school sessions on: ________________________________.

Please read the checklist below and sign as evidence that you understand the requirements of this project. If you have any questions or concerns, please email me at _____________ @allentownsd.org.

Thank You!

Sincerely,
Student Section:

Name: ____________________________________________

The question I plan to investigate for my project:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Please review the questions below and circle YES or NO.

1. Some experiments are restricted in a school environment. Have you discussed your experiment with your teacher to make sure you can conduct the project in school? YES NO

2. Is the topic interesting enough to research and work on for at least 2 months? YES NO

3. Can you measure changes to important factors (variables) such as count, percentage, dimensions, energy, time, weight, voltage, etc.? YES NO

4. Can you design a “fair test” to answer your questions? YES NO

5. Is your experiment safe to perform? YES NO

6. Do you need an adult to help or supervise the experiment or demonstration? YES NO

7. Will you be able to get all the materials you need for little or no cost? YES NO

8. Will your experiment be conducted “live” or will you need to record your results? YES NO

9. Will you need a computer or other electronics to present your project? YES NO

I understand I will be provided ONE display board. I have discussed the project idea and the checklist with my teacher and parent(s).

I am willing to commit the time to complete this project to the best of my ability.

________________________________________________________________________

Student Signature Date

Parent/Guardian Section:

I have reviewed the project, supply list, and the checklist with my student and I believe he/she is able to complete the project.

I understand the requirements both in and out of school and am willing to help my student meet deadlines and complete this project.

________________________________________________________________________

Parent/Guardian Signature Date

Contact phone number: ___________________________________________________
ASD Science Fair Project Supply List

Student Name_____________________________________

Project Title_______________________________________

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<tr>
<th>Item</th>
<th>Item Description</th>
<th>Item Cost</th>
<th>Qty</th>
<th>Purchase Information</th>
<th>Supplied by Student</th>
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Parent Signature: ___________________________________ Teacher Approval: ________________________
A Research Plan is a detailed experimental design that includes the rationale, question (statement of the problem), variables, all materials needed, detailed procedures, how will you measure and collect data, and a risk assessment. This should be completed at the beginning of the project and approved by before experimentation begins.

Rationale: ____________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Question: ____________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Hypothesis: __________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Variables: ____________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Materials: ____________________________________________________________

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____________________________________________________________________

Parent Signature: _______________________________ Teacher Approval: __________________________
Procedures:  ____________________________________________________________
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Data
Analysis:  ____________________________________________________________
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Assessment of Risk (Identify any potential risks and/or safety precautions needed):
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Parent Signature: __________________________ Teacher Approval: __________________
To be completed by the Adult Sponsor in collaboration with the student researcher(s):

Student’s Name(s): ____________________________________________

Project Title: _______________________________________________

1. ☐ I have reviewed the Intel ISEF Rules and Guidelines.
2. ☐ I have reviewed the student’s completed Student Checklist (1A) and Research Plan.
3) ☐ I have worked with the student and we have discussed the possible risks involved in the project.
4) ☐ The project involves one or more of the following and requires prior approval by an SRC, IRB, IACUC or IBC:
   - ☐ Humans
   - ☐ Potentially Hazardous Biological Agents
   - ☐ Vertebrate Animals
   - ☐ Microorganisms
   - ☐ rDNA
   - ☐ Tissues
5) ☐ Items to be completed for ALL PROJECTS
   - ☐ Adult Sponsor Checklist (1)
   - ☐ Research Plan
   - ☐ Student Checklist (1A)
   - ☐ Approval Form (1B)
   - ☐ Regulated Research Institutional/Industrial Setting Form (1C) (when applicable after completed experiment)
   - ☐ Continuation/Research Progression Form (7) (when applicable)
6) Additional forms required if the project includes the use of one or more of the following (check all that apply):
   - ☐ Humans (Requires prior approval by an Institutional Review Board (IRB); see full text of the rules.)
     - ☐ Human Participants Form (4) or appropriate Institutional IRB documentation
     - ☐ Sample of Informed Consent Form (when applicable and/or required by the IRB)
     - ☐ Qualified Scientist Form (2) (when applicable and/or required by the IRB)
   - ☐ Vertebrate Animals (Requires prior approval, see full text of the rules.)
     - ☐ Vertebrate Animal Form (5A)—for projects conducted in a school/home/field research site (SRC prior approval required.)
     - ☐ Vertebrate Animal Form (5B)—for projects conducted at a Regulated Research Institution. (Institutional Animal Care and Use Committee (IACUC) approval required prior experimentation.)
     - ☐ Qualified Scientist Form (2) (Required for all vertebrate animal projects at a regulated research site or when applicable)
   - ☐ Potentially Hazardous Biological Agents (Requires prior approval by SRC, IACUC or Institutional Biosafety Committee (IBC), see full text of the rules.)
     - ☐ Potentially Hazardous Biological Agents Risk Assessment Form (6A)
     - ☐ Human and Vertebrate Animal Tissue Form (6B)—to be completed in addition to Form 6A when project involves the use of fresh or frozen tissue, primary cell cultures, blood, blood products and body fluids.
     - ☐ Qualified Scientist Form (2) (when applicable)
     - ☐ Risk Assessment Form (3) required for projects involving protists, archaeb and similar microorganisms, for projects using manure for composting, fuel production or other non-culturing experiments, for projects using color change coliform water test kits, microbial fuel cells, and for projects involving decomposing vertebrate organisms
   - ☐ Hazardous Chemicals, Activities and Devices (No prior approval required, see full text of the rules.)
     - ☐ Risk Assessment Form (3)
     - ☐ Qualified Scientist Form (2) (required for projects involving DEA-controlled substances or when applicable)

Adult Sponsor’s Printed Name ____________________________ Signature ____________________________ Date of Review ____________

Phone ____________________________ Email ____________________________
Student Checklist (1A)
This form is required for ALL projects.

1. a. Student/Team Leader: ___________________________ Grade: ___________________________
   Email: ___________________________ Phone: ___________________________
   b. Team Member: ___________________________
   c. Team Member: ___________________________

2. Title of Project: ____________________________________________

3. School: ___________________________ School Phone: ___________________________
   School Address: ____________________________________________

4. Adult Sponsor: ___________________________ Phone/Email: ___________________________

5. Is this a continuation/progression from a previous year?  □ Yes  □ No
   If Yes:
   a) Attach the previous year’s □ Abstract  and  □ Research Plan
   b) Explain how this project is new and different from previous years on □ Continuation/Research Progression Form (7)

6. This year’s laboratory experiment/data collection: (must be stated (mm/dd/yy))
   Start Date: (mm/dd/yy)  End Date: (mm/dd/yy)

7. Where will you conduct your experimentation? (check all that apply)
   □ Research Institution  □ School  □ Field  □ Home  □ Other: ____________________________

8. List name and address of all non-school work site(s):
   Name: ___________________________
   Address: ___________________________
   Phone: ___________________________

9. Complete a Research Plan/Project Summary following the Research Plan instructions and attach to this form.

10. An abstract is required for all projects after experimentation.
Research Plan/Project Summary Instructions

A complete Research Plan/Project Summary is required for ALL projects and must accompany Student Checklist (1A).

The Research Plan/Project Summary is a succinct detailing of the rationale, research question(s), methodology, and risk assessment of your research project and should be completed before the start of your experimentation. Any changes you make to your study should to be added to the final document.

The research plan for ALL projects should include the following:

a. What is the RATIONALE for your project? Include a brief synopsis of the background that supports your research problem and explain why this research is important scientifically and if applicable, explain any societal impact of your research.

b. State your HYPOTHESIS(ES), RESEARCH QUESTION(S), ENGINEERING GOAL(S), EXPECTED OUTCOMES. How is this based on the rationale described above?

c. Describe in detail your RESEARCH METHODS AND CONCLUSIONS.
   • Procedures: Detail all procedures and experimental design including methods for data collection. Describe only your project. Do not include work done by mentor or others.
   • Risk and Safety: Identify any potential risks and safety precautions needed.
   • Data Analysis: Describe the procedures you will use to analyze the data/results that answer research questions or hypotheses.

d. Bibliography: List at least five (5) major references (e.g. science journal articles, books, internet sites) from your literature review. If you plan to use vertebrate animals, one of these references must be an animal care reference.

Items 1–4 below are subject-specific guidelines for additional items to be included in your research plan/project summary as applicable.

1. 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
     ◊ Risks. What are the risks or potential discomforts (physical, psychological, time involved, social, legal, etc.) to participants? How will you minimize the risks?
     ◊ Benefits. List any benefits to society or each participant.
   • Protection of Privacy. Will any identifiable information (e.g., names, telephone numbers, birth dates, 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.

2. 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

3. Potentially hazardous biological agents research:
   • 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

4. 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
Approval Form (1B)
A completed form is required for each student, including all team members.

1. To Be Completed by Student and Parent
   a. Student Acknowledgment:
      • I understand the risks and possible dangers to me of the proposed research plan.
      • I have read the Intel ISEF Rules and Guidelines and will adhere to all International Rules when conducting this research.
      • I have read and will abide by the following Ethics statement

Scientific fraud and misconduct are not condoned at any level of research or competition. Such practices include plagiarism, forgery, use or presentation of other researcher’s work as one’s own, and fabrication of data. Fraudulent projects will fail to qualify for competition in affiliated fairs and the Intel ISEF.

Student’s Printed Name
Signature
Date Acknowledged (mm/dd/yy)
(Must be prior to experimentation.)

   b. Parent/Guardian Approval: I have read and understand the risks and possible dangers involved in the Research Plan. I consent to my child participating in this research.

Parent/Guardian’s Printed Name
Signature
Date Acknowledged (mm/dd/yy)
(Must be prior to experimentation.)

2. To be completed by the local or affiliated Fair SRC
   (Required for projects requiring prior SRC/IRB APPROVAL. Sign 2a or 2b as appropriate.)

   a) Required for projects that need prior SRC/IRB approval BEFORE experimentation
      (humans, vertebrates or potentially hazardous biological agents)

The SRC/IRB has carefully studied this project’s Research Plan and all the required forms are included. My signature indicates approval of the Research Plan before the student begins experimentation.

   SRC/IRB Chair’s Printed Name
   Signature
   Date of Approval (mm/dd/yy)
   (Must be prior to experimentation.)

   b) Required for research conducted at all Regulated Research Institutions with no prior fair SRC/IRB approval.
      This project was conducted at a regulated research institution (not home or high school, etc.), was reviewed and approved by the proper institutional board before experimentation and complies with the Intel ISEF Rules. Attach (1C) and required institutional approvals (e.g. IACUC, IRB).

   SRC Chair’s Printed Name
   Signature
   Date of Approval (mm/dd/yy)
   (Must be prior to experimentation.)

3. Final Intel ISEF Affiliated Fair SRC Approval
   (Required for ALL Projects)

   SRC Approval After Experimentation and Before Competition at Regional/State/National Fair
   I certify that this project adheres to the approved Research Plan and complies with all Intel ISEF Rules.

   Regional SRC Chair’s Printed Name
   Signature
   Date of Approval

   State/National SRC Chair’s Printed Name
   (where applicable)
   Signature
   Date of Approval