

**Science Fair Paperwork Information**  
**York County Science and Engineering Fair**  
**Tabb Middle School**

You will need to complete the following paperwork: (in this order) **Paperclip only – NO STAPLES!!**

\_\_\_\_ YSCD Tidewater Science Fair Application (3 or 4 pages)

\_\_\_\_ 1. Student Application

\_\_\_\_ 2. Student Application Checklist

\_\_\_\_ 3. Media Release Form (**one for each member if a team**)

\_\_\_\_ 4. **Only if group/partner (page 4 for groups only)**

\_\_\_\_ Research Plan –Attached

\_\_\_\_ Bibliography for Research Plan – Examples attached in packet

\_\_\_\_ Abstract (follow the directions in the packet to complete)

**ALL PAPERWORK IS DUE BY DECEMBER 1!!! No  
exceptions!**

1. Make sure your name is spelled correctly, especially if you have a partner.
2. Make sure your name **matches** the name that is in Aspen, no nicknames.
3. **DO NOT** change your title. Title must match on all the paperwork and **cannot** change once the paperwork is turned in on December 1.

-----Detach here.

I understand all of the information above and have signed/dated/detached my signature.

**Parent signature** \_\_\_\_\_ **Date** \_\_\_\_\_

*York County*  
SCHOOL DIVISION

# SCIENCE & ENGINEERING FAIR

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**Science Research Project Handbook**  
Developed for Middle School and  
High School Students

## CHARACTERISTICS FOR A SUCCESSFUL SCIENCE PROJECT

1. The experiment shows a careful thought out approach and is well researched and documented.
2. Projects a problem that is solved through experimentation. See *ISEF Student Handbook page 1* for information regarding Non Inquiry Based Research such as Engineering, Computer, Math and Theoretical Projects.
3. The experiment demonstrates a working knowledge of the area of science chosen.
4. Demonstrates that sufficient and correct safety measures have been taken throughout the experimentation and presentation; no unauthorized chemicals, equipment, materials or methods have been used.
5. All necessary pre-approvals are submitted on time.
6. The experimenter keeps a logbook that shows a complete record of work.
7. The experiment has a certain amount of originality with the experimenter's own approach and ideas added to solve the problem.
8. The equipment used is appropriate and fits the needs of the experimentation.
9. Controlled experimentation with a standard and only one variable repeated for a minimum of three trials.
10. Accurate, valid and correct observations have been made.
11. The conclusion is drawn from repeated trials of the experiment or the use of a sufficient number of subjects.
12. The conclusion indicates strong points as well as weaknesses.
13. The display/backboard includes photographs, diagrams, tables, charts, figures (graphs), etc., that might be necessary in explaining your work. It is an original and attractive presentation of the information and includes a complete and appropriately documented write-up.
14. The backboard/display should have a simple, well-stated title with neat lettering; be able to stand independently; and meets the size and display requirements of ISEF (see *ISEF Rules and Regulations pages 6-8*). All work must be typed.

The audience should be encouraged to provide feedback with regards to improving the project. Sample rubrics and judging criteria are provided on pages 26-28.

### TEAM PROJECT

1. Team projects may have a maximum of three members.
2. Each team will choose a subject from any area of science, mathematics, or engineering (with prior teacher approval and using ISEF Guidelines). Please note differences between VJAS categories and ISEF categories on page 29.
3. Each team should appoint a team leader to coordinate the work and act as a spokesperson. However, each member should be able to serve as spokesperson, be completely involved in the experiment and be familiar with all aspects of the experimental design.
4. In order to compete, all members must be present at fairs or competitions.
5. The team will prepare all necessary paperwork and complete one display. The oral presentation will be prepared collectively.
6. Team projects will be evaluated using the same rules and judging criteria as individual projects. Teams will compete in the content category appropriate for their work.
7. Each team member must submit Form 1B and the Media Release Form. All other required forms may be submitted as a group.

## RESEARCH PAPER CRITERIA

In order to make an educated guess as to the outcome of your experiment, you must conduct some background research. Internet, encyclopedias, books, magazines, experts in the field and packaging labels are some of the resources available to conduct research. Evaluate the credibility of your sources to make sure they are reliable and appropriate informational resources. When conducting research, since you will have to cite where you received your information, it is important to note the topic, card number, location where you got the information, all reference documentation and any other references that the author has cited if. You will be required to use a minimum of 3 different sources.

When researching your topic, summarize important information you learned from each source. See page 11 of this handbook for a Reference template.

## COMPONENTS OF A GOOD RESEARCH PAPER (ISEF)

Title Page

Table of Contents

Introduction- Your introduction must answer the following:

- Why did you conduct the experiment? How will knowing this information be helpful to society?
- What did you hope to learn?
- What was your hypothesis?

Methods and Materials

Results

Discussion

Conclusion

Acknowledgments

References/Bibliography

Required Forms and Abstract

# 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 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~~ <sup>(3) three (for middle school)</sup> 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 and applicable.

## 1. Human participants research:

- **Participants.** Describe who populations (minors, pregnant, etc.)
- **Recruitment.** Where will you recruit?
- **Methods.** What will participate in? What is the length of time involved for each participant?
- **Risk Assessment**
  - ◊ **Risks.** What are the risks? How will you minimize them?
  - ◊ **Benefits.** List any benefits to participants.
- **Protection of Privacy.** Will you collect identifying information? Will data be confidential? What procedures will you use to protect the data? What will you do to ensure confidentiality?
- **Informed Consent Process.** Describe the process to do, that their participation is voluntary.

research plan/project summary as

composition). Identify any vulnerable populations (e.g.,

or tests? What is the frequency and

(e.g., medical, social, legal, etc.) to participants?

birth dates, email addresses) be collected? Will data be stored? Who will have access

of the study, what they will be asked

**Must meet with Science Fair  
Coordinator for these projects  
below before October 7!**

## 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.

Write Report 1st 11

## ABSTRACT CRITERIA

After finishing research and experimentation, a student is required to write a 250-word (maximum), one-page abstract. This can be easily broken down into 4 paragraphs: (1) purpose of experiment, (2) procedures used, (3) data, and (4) conclusions. The abstract should be written on the Official Abstract and Certification Form if competing in the Tidewater Fair or ISEF affiliated fair. The abstract may also include possible research applications. It should focus on work done and not include: acknowledgements, or work procedures done by the mentor.

The ISEF heading includes: Title  
Author(s)  
Home Address  
School  
Science Fair Division – Science Fair Category

VJAS format does not require a heading.

Use the following link for helpful hints and forms for writing your abstract for ISEF affiliated fairs:  
<http://www.sciserv.org/isef/teachers/abstract.asp>

## SAMPLE ABSTRACT FROM ISEF

Effects of Marine Engine Exhaust Water on Algae  
Jones, Mary E.  
302 Dare Road, Yorktown, VA 23692  
Your School Name, Yorktown, VA  
Senior Division – Environmental Science

This project in its present form is the result of bioassay experimentation on the effects of two-cycle marine engine exhaust water on certain green algae. The initial idea was to determine the toxicity of outboard engine lubricant. Some success with lubricants eventually led to the formulation of "synthetic" exhaust water which, in turn, led to the use of actual two-cycle engine exhaust water as the test substance.

Toxicity was determined by means of the standard bottle or "batch" bioassay technique. *Scenedesmus quadricauda* and *Ankistrodesmus* sp. were used as the test organisms. Toxicity was measured in terms of a decrease in the maximum standing crop. The effective concentration - 50% (EC 50) for *Scenedesmus quadricauda* was found to be 3.75% exhaust water, for *Ankistrodesmus* sp. 3.1% exhaust water using the bottle technique.

Anomalies in growth curves raised the suspicion that evaporation was affecting the results; therefore, a flow-through system was improvised utilizing the characteristics of a device called a Biomonitor. Use of the Biomonitor lessened the influence of evaporation, and the EC 50 was found to be 1.4% exhaust water using *Ankistrodesmus* sp. as the test organism. Mixed populations of various algae gave an EC 50 of 1.28% exhaust water.

The contributions of this project are twofold. First, the toxicity of two-cycle marine engine exhaust was found to be considerably greater than reported in the literature (1.4% vs. 4.2%). Secondly, the benefits of a flow-through bioassay technique utilizing the Biomonitor were demonstrated.

### Abstract directions

1. Make sure you only have 250 words or less for your abstract.
2. Follow the outline for writing the abstract from your packet. (must be 12 point font!)
3. Type abstract in a Word Document and save!!! (You do not want to have to retype on the official site/just copy and paste from your saved word document!!)
4. Use the following link for your abstract:  
<http://www.societyforscience.org/document.doc?id=24>
5. Type your title, name, and the other information from the attached example in the top box, see the packet page labeled "Abstract Criteria"
6. Copy and paste your information in the Abstract box.
7. You cannot save at this site. **Therefore you must print 4 copies of your abstract.**



# Information on Required Abstract & Certification for ALL Projects at the Intel ISEF

\* This form may not be relevant for your regional or state fair; please refer to instructions from your affiliated fair.\*

In ADDITION to the basic form requirements for ALL Projects and any other requirements due to specific areas of research, an Abstract & Certification is required at the conclusion of research. Details on this requirement follow.

EX'

## Completing the Abstract

After finishing research and experimentation, you are required to write a (maximum) 250 word, one-page abstract. This should be written on the Official Abstract and Certification Form as provided by Society for Science & the Public. The abstract should include the following:

- a) purpose of the experiment
- b) procedure
- c) data
- d) conclusions

It may also include any possible research applications. Only minimal reference to previous work may be included. An abstract must not include the following:

- a) acknowledgments (including naming the research institution and/or mentor with which you were working), or self-promotions and external endorsements
- b) work or procedures done by the mentor

## Completing the Certification

At the bottom of the Abstract & Certification form there are six questions. Please read each carefully and answer appropriately. The Intel ISEF Scientific Research Committee will review and approve the abstract and answers to the questions.

Revisions or questions will be resolved via an SRC appointment on site at the Intel ISEF. Please bring a copy of your Abstract & Certification to the fair. Only after final Intel ISEF SRC approval has been obtained via a stamped/embossed copy of this Abstract & Certification may a Finalist make copies to hand out to the judges and the public.

### Intel ISEF Sample Abstract & Certification

File # \_\_\_\_\_  
 First Name \_\_\_\_\_  
 School Name, City and State, Country \_\_\_\_\_

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Start Typing the Body of Your Abstract Here Beginning of the Left Margin

Category: Pick one and mark an "X" in box at right

- Animal Sciences
- Behavioral and Social Science
- Biochemistry
- Cellular & Molecular Biology
- Chemistry
- Computer Science
- Earth Science
- Eng. Materials & Biocomposites
- Eng. Electrical & Mechanical
- Energy & Transport
- Environmental Systems
- Environmental Management
- Mathematical Science
- Medical and Health
- Microbiology
- Physics & Astronomy
- Plant Science

  
  

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):  human subjects  potentially hazardous biological agents:  vertebrate animals  microorganisms  rDNA  tissue

2. This abstract describes only procedures performed by me/us, reflects my/our own independent research, and represents one year's work only.  yes  no

3. I/We worked or used equipment in a regulated research institution or industrial setting.  yes  no

4. This project is a continuation of previous research  yes  no

5. My display board includes non-published photographs/visual depictions of humans (other than myself)  yes  no

6. I/We hereby certify that the abstract and responses to the above statements are correct and properly reflect my/our own work.  yes  no

FOR INTEL ISEF OFFICIAL USE ONLY

This embossed seal attests that this project is in compliance with all federal and state laws and regulations and that all appropriate reviews and approvals have been obtained including the final decision of the Intel ISEF Scientific Review Committee

**NOTE: Your abstract must be on the Intel International Science and Engineering Fair Abstract & Certification form and embossed/stamped by the Intel ISEF Scientific Review Committee before it is displayed or handed out. No pasted or taped text will be permitted. No other format or version of your approved Abstract & Certification will be allowed for any purpose at the Intel ISEF.**

## CONCLUSION

The conclusion is a summary of the findings of an experiment. It should include the problem, the results of the experiment and what the results mean, suggestions for improving the experiment, and suggestions for expanding the experiment. Every conclusion should answer the following six questions.

1. What was the purpose of the experiment?
2. What were the major findings?
3. Was the hypothesis supported by the data?
4. How did your findings compare with other research?
5. What possible explanation can you offer for these findings?
6. What recommendations do you have for further study and for improving the experiment?

### TEMPLATE FOR WRITING A CONCLUSION

The purpose of the experiment was \_\_\_\_\_. The scientist found out that \_\_\_\_\_. The scientist's hypothesis was/was not supported because \_\_\_\_\_.  
\_\_\_\_\_. Compared to other research, the scientist found \_\_\_\_\_. A possible explanation for these findings is \_\_\_\_\_.  
\_\_\_\_\_. The scientist recommends \_\_\_\_\_ for further experimentation. The scientist also recommends \_\_\_\_\_ to improve the experiment.

**Note:** Notice that pronouns are not used in writing a conclusion. The word scientist or if it is a group project the word scientists should be used in place of any pronoun.

#### Example:

The purpose of the experiment was to determine if the cost of soap (brand) makes a difference when it comes to healing dry skin. The scientist found out that the more expensive brand of soap actually did help improve the condition of the dry skin while the cheapest brand helped aggravate the skin. The scientist's hypothesis was supported because the more expensive brand of soap helped improve the condition of the dry skin. Compared to other research, the scientist found that more expensive brands of soap do not use artificial additives. Based on research and the scientist's findings, a possible explanation is that the more expensive brand of soap does not use artificial coloring or perfumes which tend to irritate the skin. The scientist recommends using additional name brands for further experimentation. The scientist also recommends making sure the temperature of the water is used throughout the experiment remains constant.

## HOW TO ASSEMBLE A BACKBOARD

Title		
<b>PROBLEM</b>	<b>Visuals of procedure and data display- data table, graphs.</b>	<b>Data Analysis</b>
<b>Hypothesis</b>		<b>Conclusion</b>
<b>Materials</b>	<b>Abstract</b>	
<b>Procedure</b>		

Research Plan or Report

Log Book

When putting your backboard together, make sure that the problem, hypothesis, materials, and procedure are placed on the right side of your backboard. The title, any visuals, and your data-including your data table and graphs- should be placed in the center of your backboard. Your written analysis as well as your conclusion should be placed on the left side of the board. Notice, your report and log book are not apart of the backboard. They will be displayed on the table directly in front of your display.

### Helpful Hints for Backboard:

1. **Title:** Your title should grab the attention of your audience. (It **MUST** match the title on all paperwork submitted)
2. **Photographs:** Use pictures to show any important parts of your experiment.
3. **Organized:** Make sure your backboard follows the guidelines set above and is easy to read.
4. **Eye-Catching:** Make sure your backboard stands out. Use neat, colorful headings. Make sure all work is typed. Finally, make sure all graphs and charts are labeled and are easy to read. Back white paper with colored paper for visual interest. Do not make your backboard so busy that the important parts of the experiment do not stand out.
5. Follow the rules and regulations of ISEF regarding display regulations on pages 6-8 of the *ISEF Rules and Regulations*.

## **Backboard Checklist**

**Problem**

**Hypothesis**

**Materials**

**Procedure (numbered)**

**Pictures/Visuals (all cited)**

**Data Table**

**Graph**

**Data Analysis/Results**

**Conclusion**

**Neat**

**Font Size**