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## How to Prepare and Present a Science Fair Project


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July 11, 2009

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## Outline

- What is a science fair ?
- Why include a science fair project in your curriculum?
- Steps in creating a science fair project
- Resources

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## WHAT IS A SCIENCE FAIR?

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## What is a science fair?

- An opportunity for students to:
  - Identify a scientific problem
  - Develop a scientific approach to test solutions
  - Conduct an experiment
  - Analyze results
  - Present results to other people

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## Science Fairs differ in their style and scope

- From sharing results informally with friends and family


To...

- Following formal ISEF (International Science and Engineering Fair) rules in order to compete at regional, state, national and international levels

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## Common project topic categories

- BIOLOGICAL
- EARTH
- TECHNOLOGICAL
- PHYSICAL



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### Common age divisions

- ELEMENTARY DIVISION (GR. K-2)
- ELEMENTARY DIVISION (GR. 3-5)
- JUNIOR DIVISION (GR. 6-8)
- SENIOR DIVISION (GR. 9-12)



### WHY INCLUDE A SCIENCE FAIR PROJECT IN YOUR CURRICULUM?

### Science-related benefits for your student

- Allows an immersion into one topic with limited scope
- Teaches a structured approach to experimental science
  - Scientific method
- Provides hands-on experience with experimental design
  - Identifying/controlling variables
  - The importance of asking precise questions

### General, non-science benefits for your student

- Encourages the student to ask questions
- Fosters logical thinking
- Importance of doing background research before tackling the problem
- Requires keeping good records
- Develops time management skills
  - External deadlines and expectations
- An opportunity to be an expert

### Benefits for *all* high school students: Part 1

- Learning about themselves
  - Academic interests and disinterests
  - Their own strengths and weaknesses
  - Their growth in skill areas
- Building people skills
- Experiencing competition
  - They CAN compete effectively with peers
  - Learn to deal with judges' decisions
- Experience with rules and forms

### Benefits for *all* high school students: Part 2

- Exposure to other students and experts with similar interests
  - Build mentoring relationships
- Write a research report that someone else will read
- Practice formal interview/presentation skills
- Scholarship, award opportunities
- Great addition to a transcript



## STEPS IN CREATING A SCIENCE FAIR PROJECT

## Brainstorm an idea

- Solve a problem that makes sense and is interesting to the student
  - Does putting glow sticks in the freezer make them glow longer?
  - Do different types of toilet paper plug the toilet easier?
  - How does the road surface affect safe car speeds?
  - What type of computer password is most secure?
- Don't use a "canned" science project – try for original work

## Research the topic


- Understand the background of the problem
- Read
- Set up a field trip
- Talk to experts
- Do some preliminary experiments
- Write down what you've done and learned

## Form a hypothesis

- Hypothesis:
  - A **statement** explaining an **observation or scientific problem** that can be tested by further **observation and/or experimentation**
- Examples:
  - Storing glow sticks in the freezer make them glow longer.
  - Luxury toilet paper disintegrates slower in water.
  - Concrete has a smaller co-efficient of friction than asphalt, making it less safe at higher speeds.

## Design an experiment


- Key terms to keep in mind:
  - Independent variable
    - This is what you control or vary
  - Dependent variable
    - This is what you measure and is the result of your experiment
  - Replication
    - When possible, do the experiment more than once or have multiple measurements



## Check the experimental design

- Discuss your design with an expert to make sure you are:
  - Making the appropriate measurements
  - Controlling all the important variables
- Double check all rules/regulations for the Science Fair you're entering
  - ISEF: Human Subjects, Vertebrates, Biological, Chemical or Physical Hazards

## Gather materials and conduct the experiment




- Write down all specific materials
- Follow the experimental design exactly
  - If you have to alter it, record any deviations
- Write down data and be precise

<http://www.ck12.com/physics/airliftfamily>

## Analyze the data and draw conclusions

- Statistics
- Charts
- Talk over results with an expert to make sure the conclusion matches the data
- Identify any uncontrolled variables
- Have some suggestions for future research or what to try next


## Plan your display



- Check with rules on whether or not specific items can be displayed with the project
  - Examples:
    - Living plants and/or organisms
    - Water
    - Pulleys/movable objects

<http://www.ck12.com/physics/>

## Prepare a display board




- Use a tri-fold science board to lay out the experiment
- Clearly label major steps in the scientific method
- Include photos
  - Photo credit line
  - Check on whether or not consent form is needed for anyone shown in the photos

## Prepare written documentation

- Required documentation **may** include:
  - Project/data book
    - A log of all background research, data collection, etc.
  - Abstract
    - A one-page summary of the project
  - Research report
    - A full research report (more typical for older students)

## Prepare for the interview



- Review background information
- Summarize your project in 2 minutes or less
  - "Elevator speech"
- Practice interview questions
- Review basic public speaking skills
  - Body language
  - Speaking clearly

How much time does this take?????

- Time depends on:
  - The age of student
  - The type of materials (plants, physical)
  - The complexity of the project
- Is it incorporated in your curriculum?
  - Treat it as a separate project
  - Or, work on it weekly for several months
- Start thinking about it now!

RESOURCES



Books

- Early elementary years – check your library for a resource!
  - Janice Van Cleave books
  - Many “how to do a science fair project” books

Websites

- Dayspring/Cary Homeschoolers Science Fair website
  - <http://caryareasciencefair.org>
- Greater Philadelphia Homeschool Science Fair website
  - <http://www.fair.science-resources.org/>
- NC State Science and Engineering Fair
  - <http://www.ncsta.org/sciencefair/>

WHAT NEXT?

