

Participating in Science & Engineering Fairs – A Practical Approach



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**When Somebody
Says "Science
Fair" What's The
First Thought That
Pops Into Your
Head??**



A Science Fair Is...



If You're A Teacher:

- A Tool
- Something To Grade On
- A Creative Outlet for Students

If You're A Parent:

- Stressful...it's a PAIN!!
- Conflicts...Helplessness
- Potential Source of Pride

If You're A Student

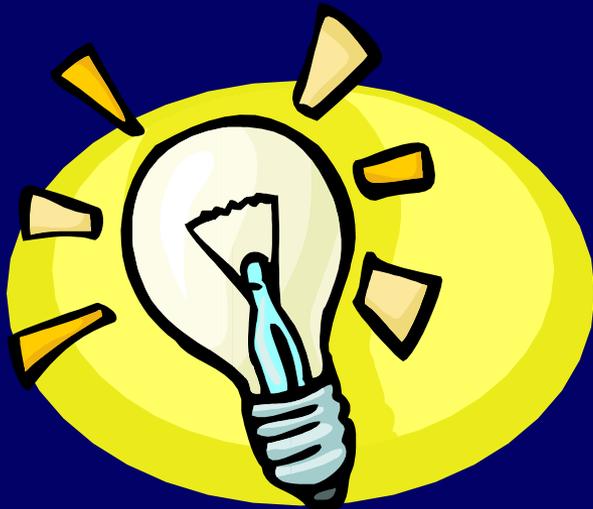
- A Requirement For A Grade
- More Work!!
- Too Many Decisions!!!
- Fear Of Unknown

What SHOULD You Think Of?



How You Will Feel After Participating In The Science Fair

- **Pride...Not Relief!**
- **Rewarded...Not Punished**
- **Reward is an Honorable Goal!!**
- **Motivator Doesn't Always Have To Be Grades!**



***If It Motivates You...
Work for the Rewards!!!***

***The Important Results
Will Be By-Products!!***

A Science Fair Project Is An Opportunity!!

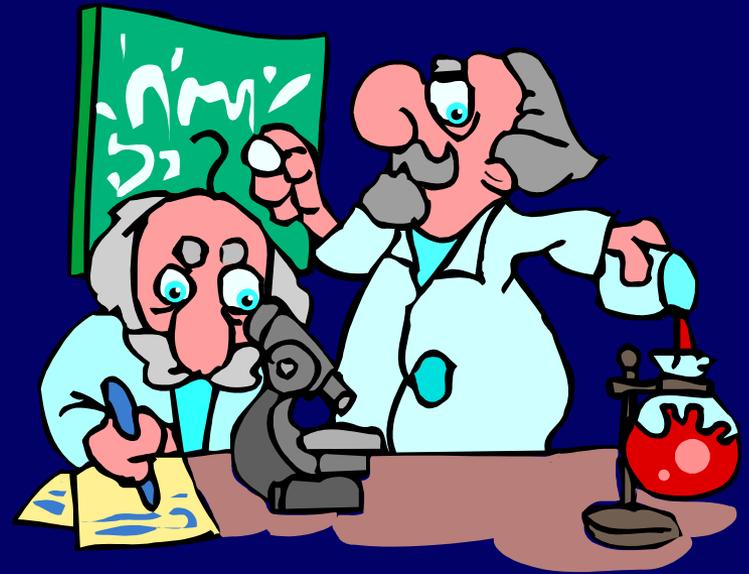


Lots of Awards!

- Prizes
- Money
- Scholarships
- Summer Jobs
- Entry Into Select Colleges

By Products:

- Organization Skills
- Critical Thinking Skills
- Presentation Skills
- Sense of Self



The Recipe - Classic Science Fair "Steps"



QUESTION

RESEARCH

HYPOTHESIS

PROCEDURE

EXPERIMENT

RESULTS

ANALYSIS

CONCLUSION

Scientific Method

Question – Developing the Best Question For You



- **Consider Your**
 - **Interests**
 - **Knowledge Base**
 - **Access to Mentors**
 - **Available Equipment**
 - **Natural Surroundings**
- **Make A List of Each**
 - **Look For Matches Between Rows**



STEP #1 - QUESTION

Question – Developing the Best Question For You



INTERESTS	KNOWLEDGE/ SKILLS	MENTOR	EQUIPMENT/ SURROUNDING
BASKETBALL	MATH	MARY – CHEMISTRY	RULERS
COMPUTER	COMPUTER GAMES	JIM – GARDENING	SCALES (BATH, FOOD, POSTAL)
BUILDING	DRIBBLING BASKETBALL	BOB – ELECTRONICS	THERMOMETERS
LEGOS	BUILDING THINGS	JANE – MECH ENG	FISH TANK
SWIMMING		BETTY – NURSE	BLOOD PRESSURE MONITOR
BIKING		ROY - PAINTER	STOP WATCH
MEDICINE			AUDIO RECORDER
			LEVEL
			RUBBER BANDS
			PRESSURE GAUGES

STEP #1 - QUESTION

Question – Developing the Best Question For You



• Websites To Spark Ideas:

- <http://www.stemnet.nf.ca/sciencefairs/>
- <http://www.scifair.org/ideas/index.shtml>
- <http://members.aol.com/ScienzFair/electric.htm>
- <http://halcyon.com/sciclub/cgi-pvt/scifair/questbook.html>
- http://madsci.org/MS_search.html
- <http://youth.net/nsrc/sci/sci.index.html>
- <http://jpl.org/div/kidspage/projectguide/projects.html>
- <http://amasci.com/amateur/sciam1.html>
- <http://scitoys.com/>
- <http://www.all-science-fair-projects.com>

STEP #1 - QUESTION

Research – Get A Notebook!



- **Make A Commitment To Document Your Work**
- **Research Underlying Scientific Principles:**
 - **To Help Make Educated Guess To Answer Your Question**
 - **To Define the Test Design**
- **Internet Searches Are Great... But Don't Forget Books and People!!**

STEP #2 - RESEARCH

Hypothesis



- **The Hypothesis Rewords Your Question In A Way To Help You Do Your Test**
 - **Predict the Answer, State Your Reason, If Possible**
 - **Select Projects With Well Formed Hypothesis**
- **Special Cases - Engineering Projects**
 - **Recommendation: Always Have Hypothesis Listed On Poster Board, Regardless of Its Quality**

Procedure/Experiment – Design Is Critical



- **Experiments Should Result in Data That Can Be Displayed in a Graph**
 - **Imagine the Ideal Graph(s) That Will Answer Your Question**
 - **Remember That You Will Need To Record The Data...How Will That Data Arrive?**
 - **How Long Will Data Point Stay Valid?**
 - **What Measurement Tools Do You Need?**
 - **Video Camcorders Can Help Slow Time**

Results – Perform The Experiment



- The Better You Plan, The Simpler The Test!
- Record All Testing – Even Failures
 - Record All Conditions
 - Record Qualitative Data Like Noises/Smells
 - Record Measuring Tool And Units Of Data
 - Label Each Data Run By Time Of Day
 - Take Pictures Of Test Setup, If Possible



STEP #6 - RESULTS

Analysis – Have No Fear!!



- **You Analyze The Data By Putting It in the Graph**
 - **Ask Questions of the Graph**
 - **Report any Interesting Answers**
 - **Indicate Reproducibility of Data - Show Multiple Runs on Graphs...or Use Statistics**
 - **Use Different Graphs to Show Different Features**
 - **Spreadsheets Are Powerful Tools**

STEP #7 - ANALYSIS

Conclusion



- **Your Conclusion is a Summary Focused On Answering Your Question/Hypothesis**
 - **If Your Hypothesis Was Incorrect or Disproved, It is NOT a Failed Experiment!**
 - **If Your Hypothesis Was Disproved, Offer An Alternative Explanation**
 - **Always Consider What More Could Be Done**
 - **Another Test**
 - **Another Project**

STEP # 8 - CONCLUSION

Checklist – What To Ask Yourself and/or Your Mentor



- ✓ **Has Something Like This Been Done Before?**
 - ✓ **Is There A “Twist” I Can Take?**

- ✓ **Do I Know The Answer To My Experiment Before I Test It?**
 - ✓ **Is It Too Obvious?**
 - ✓ **Is There A More Interesting Question?**

- ✓ **What Do I Put In My Log Book?**
 - ✓ **Everything!! Use Like A Diary!!**

Checklist – What To Ask Yourself and/or Your Mentor

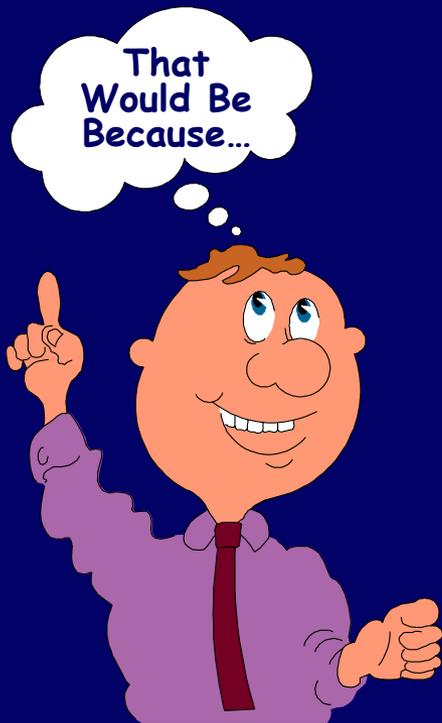


- ✓ **How Do I Analyze?**
 - ✓ **Use A Graph**
 - ✓ **Use Statistics**

- ✓ **How Much Data Should I Take?**
 - ✓ **One Run Is Not Enough!**
 - ✓ **Do At Least Three (3)**

- ✓ **How Do I Define My Experiment?**
 - ✓ **Start With Your Question**
 - ✓ **Envision Graphs That Answer Your Question**

Prepare For Presentation:



- The Focus Should Be Knowledge ... But In A Science Fair ... **IMPRESS THE JUDGES!!**
 - Anticipate Questions The Judge Will Ask
 - Research The Answer
 - Make Yourself A Note Card
 - Practice Reciting The Answer So It Sounds Natural

Preparing For The Judges:



- **Expect Questions**
- **Have Your Answer Ready**
- **Work Info Into Your Conversation**

Typical Questions

- **Where Did The Idea For This Project Come From?**
- **What Did You Learn From Your Research?**
- **What Were The Important Sources Used In Your Research?**



Preparing For The Judges – Typical Questions:



- **Where did the idea for this project come from?**
- **What did you learn from your research?**
- **What were the most important sources used in your research?**
- **How much time did you spend on the project? What took most of your time?**
- **Where did items used in your project come from?**
- **How many times did you run the experiment on each configuration?**
- **Did you use any statistics such as averaging?**
- **How constant were your conditions during experiments?**
- **What would you do differently? What more would you like to do?**

Selling Yourself – Use PIE!



- Performance
- Image
- Exposure



- Science Fairs Are A GREAT Time To Learn How To Promote Yourself
- Many Successful People Use PIE Principle
- “Performance” Already Covered
- Look At Image And Exposure...

Image – The Impression You Give in Appearance and Actions:

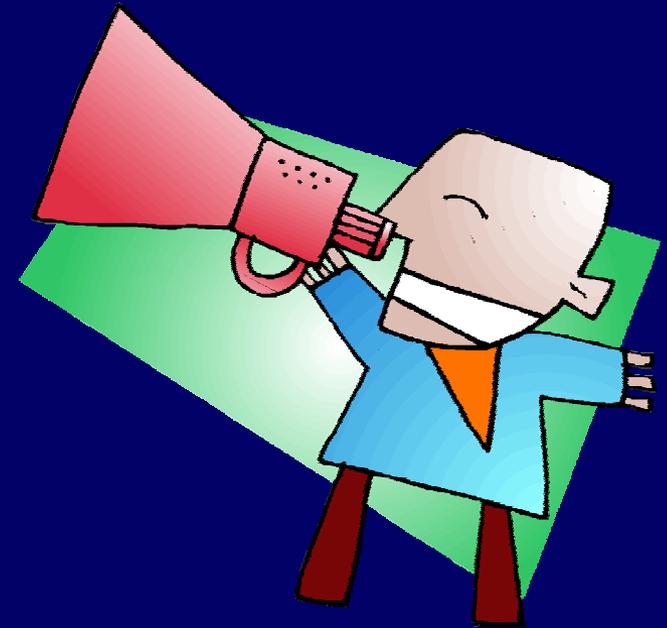


- You Want The Judges To Relate To You And See Their History In YOUR Future!
 - Project The Image Of Being A Budding Scientist Or Engineer
 - Dress Like They Would Dress
 - Show Them You Enjoy What You're Doing...tell Stories, Ask Questions
 - Play To Their Expertise...How Could I Do This Better For The Next Fair?

Exposure – Make Sure The Judges See You and Remember You:



- Use Attention Grabbing Displays and posters
 - Check the Rules!!!
- For Maximum “Traffic”, Pick A Project That Related To Today’s Public Concerns
 - Global Warming
 - Pollution
 - Water Purification
 - Security Devices
 - Genetically Altered Food,
 - Etc.



Motivation - Many Opportunities Await!



- That Future Exceptional Science and/or Engineering Student Can Be You!!
- Summer Jobs, Free Training, Camps and More Are Available Through Science Fairs!
- Places To Check:
 - Ohio Academy of Science
<http://www.ohiosci.org/>
 - International Science and Engineering Fair...
Make Participation in this Fair Your Goal!
<http://www.sciserv.org/isef/>

Motivation - Many Opportunities Await!



More Places To Check Out:

- **Junior Science and Humanities Symposium**
<http://www.biosciences.utoledo.edu/oishs/index.htm>
- **Science Talent Search**
<http://www.intel.com/education/sts/>
- **National Youth Science Camp**
<http://www.sciencecamp.org/>
- **National Gallery for America's Young Inventors**
<http://www.pafinc.com/gallery/index.htm>

IT REALLY WORKS!!!!

Did We Mention “Having Fun”? :

- People Throughout History Experimented with Science and Engineering “For Fun”
- Imagine Getting Paid For Doing Something You Enjoy Doing!!
- To Avoid Stress:
 - Start Your Project Early, Be Ready... then Kick Back and Enjoy!!



I HOPE TO SEE YOU
AT A SCIENCE AND ENGINEERING FAIR!



For Additional Information:



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