OFFICE OF ACADEMICS
and SCHOOL LEADERSHIP
SAN ANTONIO INDEPENDENT SCHOOL DISTRICT

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SCIENCE & STEM FAIR OVERVIEW

SCIENCE & STEM FAIR PURPOSE

A Science & STEM Fair Project is an exciting and meaningful learning experience for each child. Not only can children enter and compete for ribbons and medals, but more importantly children have the opportunity to apply the many skills they are learning in the various academic subjects. A Science and STEM Fair project cuts across almost every curriculum. Examples are as follows:

Thinking Skills – This is perhaps the most important product of a fair project. Students put much time, effort, and thought into a project. They see the result of their thinking in the form of a project. They have developed or utilized problem-solving skills.

Organizational Skills – Another important skill that students utilize when preparing a project is organization. Students will need the support and advice from teachers and parents, but this is an opportunity to plan, prepare, and organize a project from start to finish.

Science – Children have an opportunity to investigate a myriad of topics of interest to them in science. They apply the skills of scientific inquiry when investigating their topics. Students learn to investigate, experiment, and discover the many wonders of science.

Reading-Language Arts – Children use many language arts skills when preparing a project. They must read for information to better understand their topics. Children utilize library skills and study skills when they research the projects. Writing is also an integral part of each science fair project. Students use these skills when displaying their projects, writing for information from organizations or other sources, and/or writing a paper to accompany the projects. Oral language skills are also tapped when students interview professionals for assistance and/or seek help from parents or teachers.

Math – Measurement is an essential component of science projects. Students have opportunities to apply the use of metric measurement and organize data using tables and graphs in meaningful activities.

Social Studies – Many topics that students investigate are related to this curriculum. Mapping is a skill that may be used when preparing a project.

Art – The display of a project is almost as important as the project itself. Children get a chance to design their displays to best enhance their projects.

Technology - Technology is a powerful tool for understanding how things work. Students will be able to utilize technology in various ways through this fair.

Engineering - Engineering combines the fields of science and math to solve real world problems that improve the world around us. Engineers take a thought or abstract idea and translate it into reality such as buildings, roads, vehicles, computers, and other electronic devices.

SCIENCE & STEM FAIR OVERVIEW

PHILOSOPHY

The SAISD Science & STEM Fair provides students the opportunity to design & perform independent investigations about a science, technology, engineering, or mathematics topic that interests them. By conducting investigations or utilizing engineering design, students apply learned skills and use critical thinking to answer questions or solve real-world problems. Students practice 21st-century skills by communicating their own research and exploration through exhibition and demonstration. The Science & STEM Fair provides our students a platform to illustrate their talent and skills and bring classroom learning to life.

PURPOSE

The Science and STEM Fair is conducted for many reasons:

- To focus attention on scientific and STEM experiences in school.
- To stimulate interest in scientific and STEM investigation beyond routine class work.
- To recognize and commend youthful scientific and STEM talent and hobby pursuits.
- To offer an opportunity for display for scientific and STEM talent through exhibit and demonstration.
- To provide constructive suggestions for teachers and students of science and STEM.
- To stimulate public and community interest in the science, technology, engineering, and mathematical abilities of students in SAISD.

IMPORTANT DATES	
Tentative November 4th	Lowell Science and STEM Fair
Friday, Nov. 11	Deadline to Register Campus Winners for SAISD Science & STEM Fair; please submit one form for each winning project
December 9, 2022	Project Drop-Off and Set-up 4:30 - 6:30, Location Edison HS
December 10, 2022	SAISD Science & STEM Fair, Location Edison HS Elementary 9:00 - 11:30, Students arrive at 9:45 Secondary 2:00 - 4:30, Student arrive at 2:45
Late January/Early February	Files and Registrations due to Alamo Regional Science & Engineering Fair, Location TBD
TBD	Alamo Regional Science & Engineering Fair, Location TBD

SCIENCE & STEM FAIR OVERVIEW

JUDGING DIVISIONS & PARAMETERS
Primary Youth: Grades K - 2
Intermediate Youth: Grades 3 - 5
Junior: Grades 6 - 8
Senior: Grades 9 - 12

Primary Youth, Intermediate Youth, and Junior Divisions projects can be either an individual student or a team (up to 3 members)
Senior Division projects can only be an individual or a team of two students.

CAMPUS SUBMISSIONS TO DISTRICT FAIR
Elementary/Academy: Each campus can submit ONE Primary Youth project and ONE Intermediate Youth project
Academy/Middle: Each campus can submit TWO Junior projects
High: Each campus can submit TWO Senior projects

PROJECT CATEGORIES
Students will have the choice to develop a project from any category listed below. The categories are aligned to the Alamo Regional Science & Engineering Fair (ARSEF), the Texas State Science & Engineering Fair, and the Regeneron International Science & Engineering Fair (ISEF).

PROJECT CATEGORIES

ELEMENTARY	SECONDARY
• Earth & Space Science • Energy & Sustainability • Engineering • Life Science • Mathematics • Physical Science • Robotics	• Behavioral & Social Science • Biochemistry and Microbiology • Botany (Plant Science) • Chemistry • Computer Science • Earth & Space Science • Energy & Sustainability • Engineering (Aerospace, Chemical, Electrical/Mechanical/Civil, Materials & Bioengineering) • Environmental Science • Mathematics • Medicine & Health • Physics & Astronomy • Robotics & Intelligence Machines • Zoology (Animal Science)

SCIENCE & STEM FAIR OVERVIEW

DISTRICT EVENT LOGISTICS

Setting Up Display Projects
All projects should be dropped off and set-up at Edison High School on Friday, December 9 between 4:30 and 6:30.

Elementary projects will be set-up in the cafeteria and Secondary projects will be set-up in the mall area outside the cafeteria.

Each table will be labeled with the campus name, see District Fair Table Layout document to see where each campus will be set up.

Event Refreshments
Each participating student will receive a snack bag that will include a drink and snacks.

For fair staff, judges, and chaperones, refreshments will be available in the teacher's lounge within the cafeteria area.

Student Interview for Judging
Judges will begin walking around and interviewing students at 10:00 for elementary and 3:00 for secondary. Judges will spend approximately five minutes at each project asking the student(s) questions (see Judging Information for Interview Questions).

MORE INFORMATION TO COME AS WE GET CLOSER TO THE ACTUAL EVENT!

CAMPUS FAIR OVERVIEW

CAMPUS SCIENCE & STEM FAIR COORDINATOR

Each SAISD campus should designate one campus Fair Coordinator (the Science ACT or Department Chair) who will:

- Attend SAISD Science & STEM Fair organizational meeting(s).
- Support the SAISD ISD Science & STEM Fair Guidelines and Safety Rules.
- Inform appropriate faculty/parents/community of the guidelines and fair information.
- Maintain and provide necessary paperwork to the Science Department.
- Organize and lead a campus-based science fair.
- Complete all registration requirements for campus entry in the SAISD Science & STEM Fair.
- Review all entries for accuracy, safety, project format and overall appearance that represents a product from your school.
- Ensure that all student presenters are prepared to speak about their project.
- Make arrangements to set up student projects the day before the district event.
- Attend the SAISD Science & STEM Fair and ensure that the campus chaperone(s) are at the site on time and remains with the students during the entire event.

CAMPUS SCIENCE FAIRS OVERVIEW

- All students in grades K - 12 may enter a building science fair.
- For each division, a campus **may** award honorable mention ribbons for 3rd, 2nd, and 1st place. Ribbons would be provided at the cost of the campus.
- For elementary campuses: One winner will be chosen from the Primary Youth Division (grades K - 2) and one winner will be chosen from the Intermediate Youth Division (grades 3 - 5). There can be a total of 2 campus winners from each campus that can be moved on to the SAISD Science & STEM Fair.
- For secondary campuses: Two winners can be chosen from the Junior Division (grades 6 - 8) and two winners can be chosen from the Senior Division (grades 9 - 12).

SUBMITTING WINNERS TO DISTRICT FAIR

Once campus winners have been identified, the campus Fair Coordinator will need to submit the winners and their projects for district review using the District Fair Registration Form.

DESIGNING THE PROJECT

STEPS IN MAKING A SCIENCE & STEM PROJECT

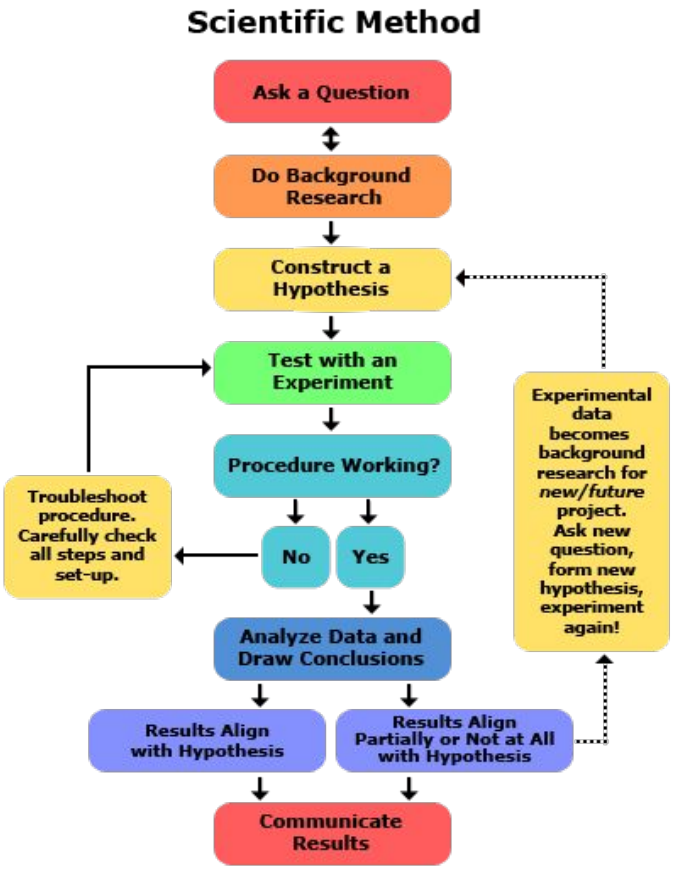
1. Students will choose a topic and discuss it with their teacher. Teachers should review, provide suggestions for improvement, etc. to help the student refine and define their project topic. Once a topic is selected, determine if they will do an experiment-based or an engineering-based project.
2. Once the student has settled on a topic, they should research as much about their topic as possible using a project notebook to record all their thoughts, preparations, and idea and design out the steps of their project.
3. Students should set up a work area somewhere around their house or classroom where they can work on their project.
4. Students should collect the materials they need for their project, checking in with their teacher for suggestions and materials.
5. Students should work on their project a little bit each day continuing to utilize their notebooks to record all observations, data, and thoughts while taking pictures throughout.
6. Once the investigation is complete, students should construct their exhibit (tri-fold poster) mounting their pictures, graphs, charts, etc.
7. Students will need to present their project to your parents, classmates, and judges so please have them practice in class prior to the event.
8. Students should have fun and enjoy the pride and satisfaction of a job well done!

SAMPLE PROJECT TIMELINE	
Week 1	Review requirements, review science fair handbook, parent/student acknowledgement letter signed/returned, and choose topic. Experiment-Based Project Planner ; Engineering-Based Project Planner
Week 2	Research your topic and create your hypothesis/possible solutions. If you are completing an experiment, begin the design process by identifying your variables and your control.
Week 3	Design your investigation. Determine what materials and procedures will need to be completed. Independent and dependent variables along with constant and control groups must be determined during this stage. Determine how many trials will occur.
Week 4 - 5	Conduct your investigation. Throughout your investigation, record and collect your observations and data. In your final investigations week, analyze your data and draw a conclusion.
Week 6	Correct investigation errors, prepare your tri-fold.
Week 7	Present your project at campus fair.

DESIGNING THE PROJECT

EXPERIMENT-BASED (SCIENCE) OR ENGINEERING-BASED (STEM) PROJECTS

While scientists study how nature works, engineers create new things, such as products, environments, and experiences. Because engineers and scientists have different objectives, they follow different processes in their work. Science perform experiments using the scientific method; whereas, engineers follow the creatively-based engineering design process.



THE SCIENTIFIC METHOD (SCIENCE)

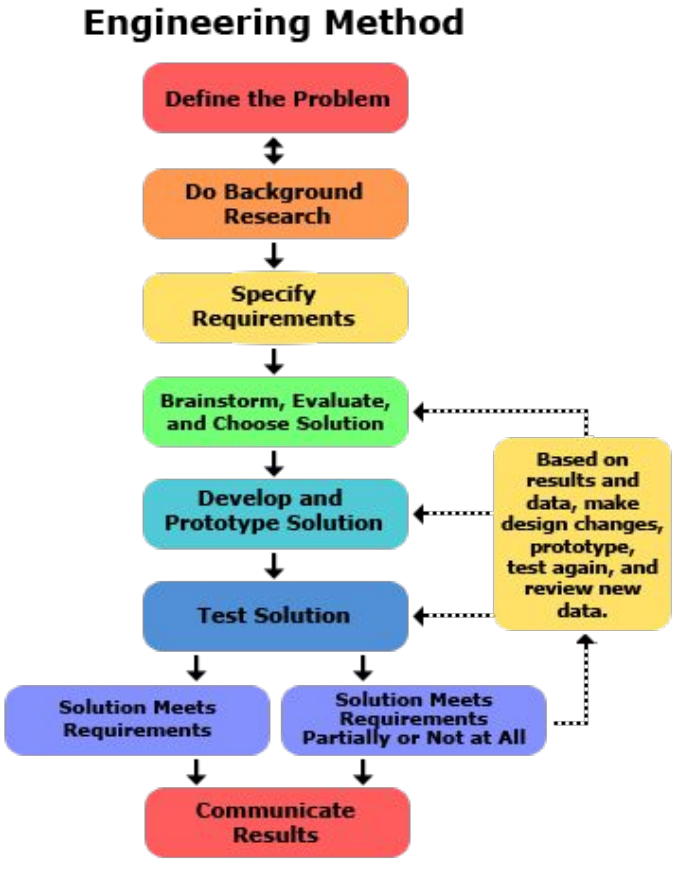
1. State your question
2. Do background research
3. Formulate your hypothesis, identify the variables
4. Design experiment, establish procedure
5. Test your hypothesis by doing an experiment
6. Analyze your results and draw conclusions
7. Communicate results

Click on the "Steps of Scientific Method" for more info!

ENGINEERING DESIGN METHOD (STEM)

1. Define the problem
2. Do background research
3. Specify requirements
4. Create alternative solutions, choose the best one and develop it
5. Build a prototype
6. Test and redesign as necessary
7. Communicate results

Click on the "Steps of the Engineering Design Process" for more information.

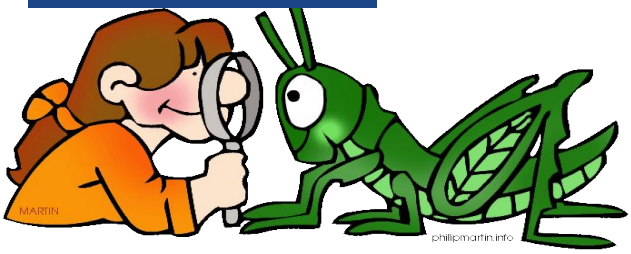


DESIGNING THE PROJECT

TYPES OF EXPERIMENT-BASED INVESTIGATIONS

COMPARATIVE

DESCRIPTIVE



EXPERIMENTAL

INVESTIGATION TYPE	
Descriptive Investigation	• Ask a question about a natural or man made system (rock formation, animal behavior, cloud, electrical circuit, bicycle). • Observe to collect and and record qualitative and/or quantitative data: > Describe the system or its parts > Communicate learning (draw conclusions) > No hypothesis - because no variables are tested or compared Example Question: What environmental conditions are best for the growth of cacti?
Comparative Investigation	• Collect data on different organisms/objects/features/ events, or under different conditions (e.g. time of year, air pressure, location) to make a comparison. • Data is gathered and used to support the comparison. Example Question: How are cacti grown in a wet environment different from cacti grown in a dry environment?
Experimental Investigation	• Ask a question to determine how changing one thing (variable) affects a measurable result (measured variable). Design a fair test so that all factors are the same, other than the tested variable. Data is collected that measures the effect of that one part (variable) of the system that is changed. The data either supports or does not support the causal relationship that students predict or hypothesize. Example: How does the addition of water to the environment of the cacti impact its growth?

DESIGNING THE PROJECT

ALL ABOUT VARIABLES

Manipulated Variable (also called the independent variable) - what you change on purpose in the course of your procedures

Responding Variable (also called the dependent variable) - what you do not change directly but rather changes by itself in response to changes in the manipulated variable during the course of your procedures.

Controls: the factors you keep constant or hold fixed. A control is held fixed so that it doesn't affect the outcome of the experiment

Students should only change ONE variable at a time, conduct repeated trials, and note their results. If they change more than one variable at a time, they will not know what affects their results.

Examples of Variables

Let's say that the following hypothesis had been selected: *The cheaper the paper towel, the less water it will absorb.*

Manipulated Variable (Independent Variable): price (Brand) of paper towel

Responding Variable (Dependent Variable): amount of water that is absorbed

Control(s): size of paper towel, amount of water poured on each towel, temperature of the water used, container in which towels are placed and method of pouring

PROJECT NOTEBOOK

This is an important part of your project. All the research conducted and data gathered during your project should be carefully recorded in a notebook.

Your notebook should include:

- A list of all the material used.
- Notes on all the preparations you made prior to starting your experiment.
- Information about the resources you use (books, people, libraries, internet, etc.)
- Detailed day-by-day notes on the project of the project.
- What you are actually doing.
- Problems you encounter during project.
- Things you would change if you were doing this project again.
- Any drawings that might help explain your work.
- Data that was gathered during the course of the experiment (notes, chart, tables, graphs).
- Be sure to date each entry in your notebook.

YOUR NOTEBOOK WILL BE DISPLAYED WITH YOUR PROJECT.

DESIGNING THE PROJECT

PROJECT SUGGESTIONS

Websites and Lists:

- Education.com Fair Project Ideas
- Sciencebuddies.com
- Science Fair Project Ideas
- ThoughtCo. Engineering Science Fair Project Ideas

SAFETY CONSIDERATIONS

- All Science fair projects must follow strict safety rules and guidelines for project topic choice and display.
- The Science Fair Coordinator or Campus ACT/DC may remove any project that does not meet safety guidelines for the project or display materials.

For safety reasons, the SAISD Science & STEM Fair does not allow experimentation using dangerous equipment or substances that may be harmful to students or others. If you are uncertain about any safety rules, contact your District Science Representative. Determinations of safety are made by the SAISD Science Fair Committee and are final.

Students are **NOT ALLOWED** to do any project or conduct any experiment that involves:

- Growing bacteria, microbial cultures, disease causing fungi, mold of any type (example: bread or tortillas) or any other possibly pathogenic substances. The only exceptions are:
  - Projects with baker's yeast so long as rDNA studies are NOT involved
  - Projects using manure with composting to test variables
  - Projects involving food preservation so long as when spoiling, rotting, or browning occurs the food is disposed of immediately
- Involved human parts, blood, or other body fluids.
- Firearms, explosives, or discharge air pressure canister devices (potato guns or rocket propellants).
- Cause or may cause harm or injury to animals or humans including ingestion or application of over-the-counter medications or controlled substances.
- Activities and substances presenting a danger to students or the environment such as hazardous chemicals or radioactive materials.

DISPLAY BOARD INFORMATION

DISPLAY REQUIREMENTS:

- The information on the display board can be provided in either English or Spanish.
- The tri-fold display board must be self-supporting, single-sided and must NOT exceed the size requirements: 30 inches deep, 48 inches wide, and 108” inches high. All components of the display must be on the table within the display space.
- Personal information including names, addresses, or phone numbers (student, teacher, parents, test or survey subjects), information identifying the student/school/district, accomplishments (previous awards), and acknowledgements may NOT be included on the display or in reports/journals.
- Display materials are NOT encouraged. Any model/apparatus included with display must fit within the dimensions of the display space provided. All materials are left at your own risk.
- When possible photographs/drawings should be used instead of actual objects or apparatus.
- Electronic exhibits are prohibited. The site does not accommodate the use of electricity for project displays.

PROHIBITED ITEMS for Display:

- Living plants or plant material, which are in their raw unprocessed, unmanufactured, or natural state such as leaves, nuts, barks, stems, or roots
- Live and preserved animals or animal tissues including eggs and egg shells
- Human/animal parts or body fluids
- Food “stuffs” (candy, gum, popcorn, etc.)
- Food or liquid containers or wrappers
- Liquids, including water
- Safety Hazards: poisons, laboratory and household chemicals, activities, and devices
- Glass including test tubes, syringes, needles, pipettes, or similar devices
- Sharp objects
- Soil, sand, clay, or waste products
- Open top batteries
- Flames, open or concealed including flammable display materials (including candles)
- Pressured Containers
- Photos of surgeries or dissections
- Lasers
- Inflated Balloons
- Photographs showing the face of the student or subjects (unless photo release provided)
- Dry ice or other sublimating solids

ENCOURAGED for Display:

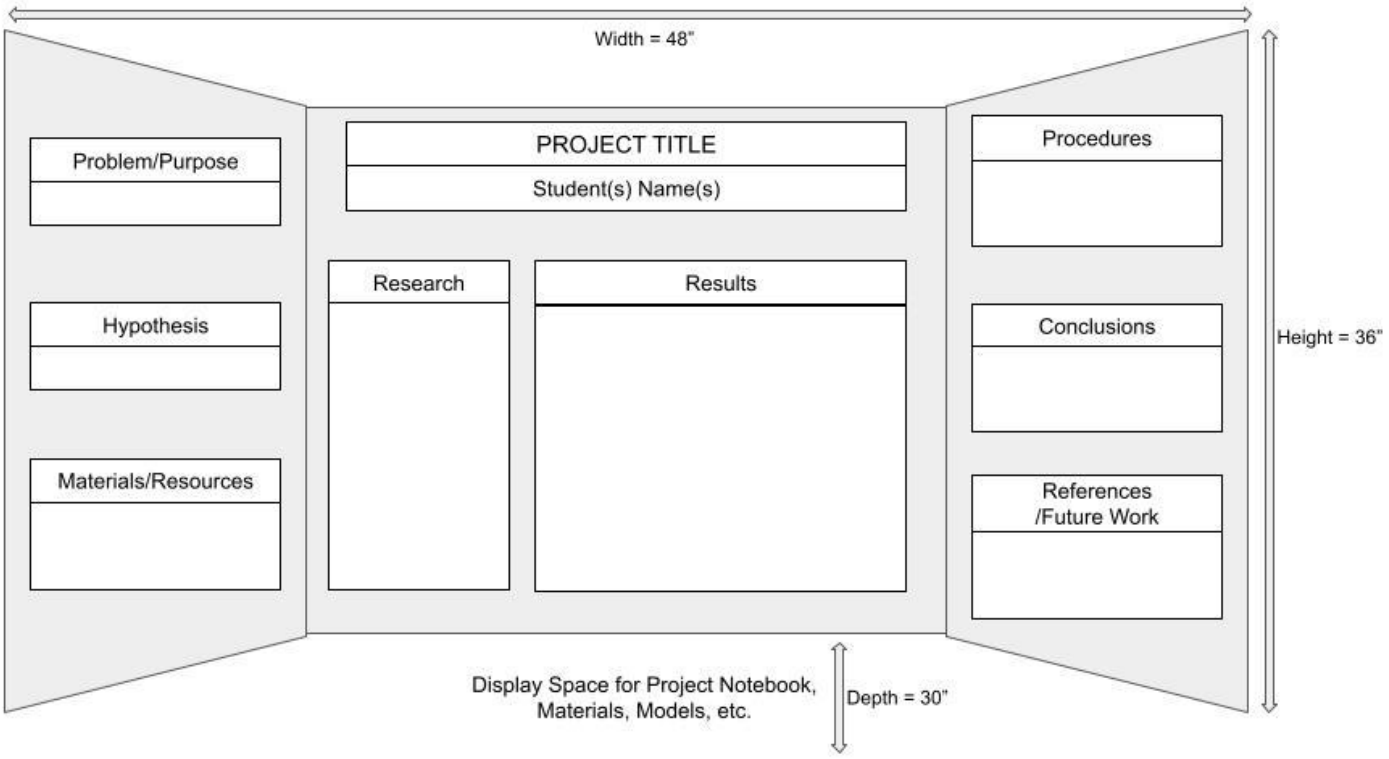
- Photographs
- Drawings
- Artificial models of prohibited items (Ex. stuffed animals or plastic fruit)
- Prototypes

REQUIRED for Display:

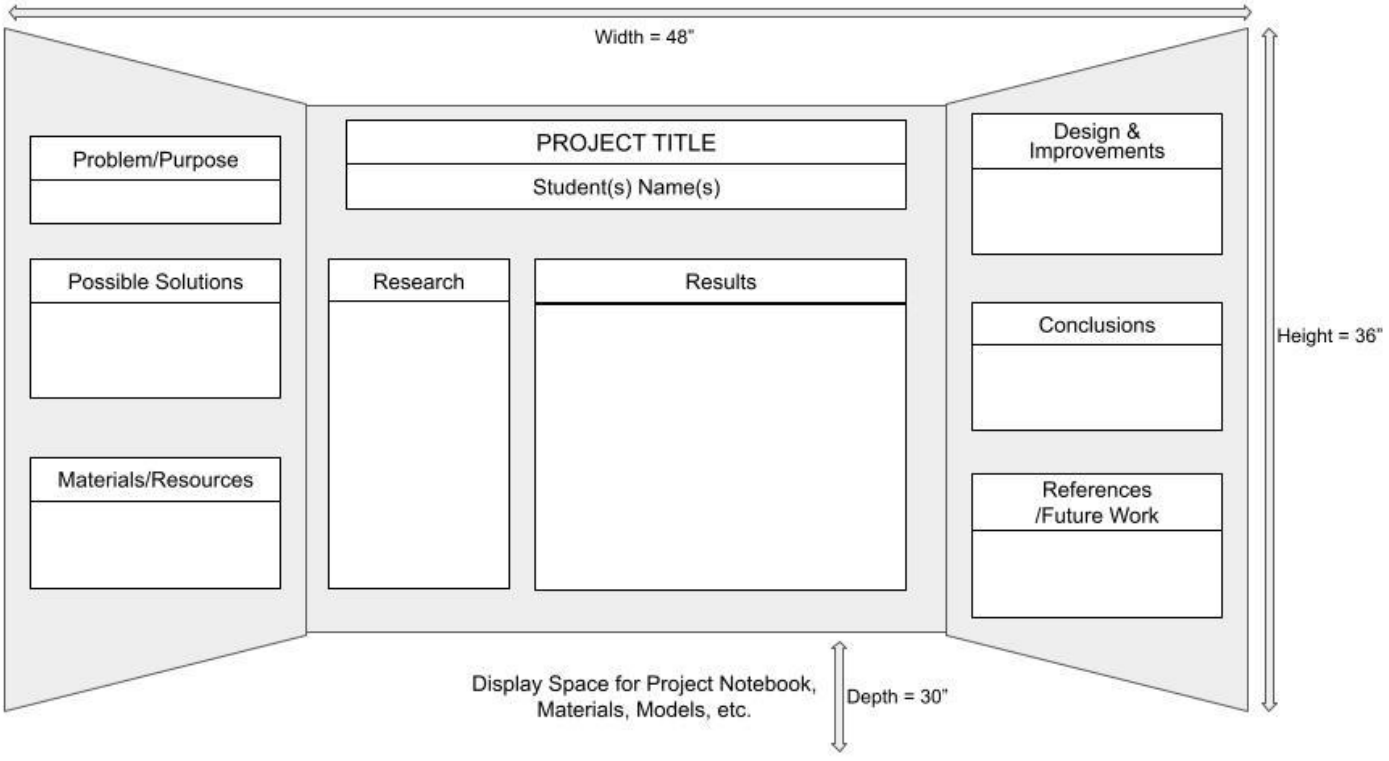
- Acknowledgement of any assistance received
- Labels indicating source of online materials or photos - website/webpage where accessed; bibliography

DISPLAY BOARD INFORMATION

EXPERIMENT-BASED PROJECT DISPLAY LAYOUT



ENGINEERING-BASED PROJECT DISPLAY LAYOUT



DISPLAY BOARD INFORMATION

HELPFUL HINTS

A GOOD TITLE
Your title is an extremely important attention-grabber. A good title should simply present your research and should make a casual observer want to know more.

TAKE PHOTOGRAPHS
Many projects involve elements that may not be safely or practically exhibited at the fair but are an important part of the project. Photographs of these phases of experimentation can be used in the display. You may NOT use photographs depicting animal dissections or other surgical techniques. You must receive permission to photograph or videotape human test subjects.

BE ORGANIZED
Make sure your display is logically presented and easy to read.

EYE-CATCHING
Make your display stand out. Use neat, colorful headings, charts and graphs.

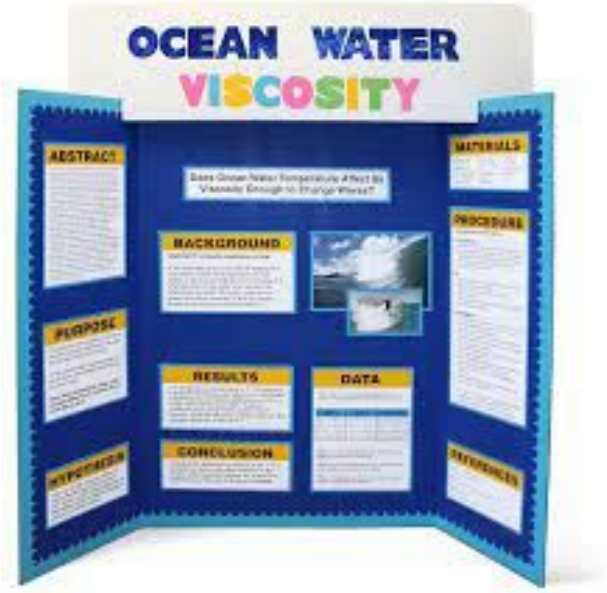
CORRECTLY PRESENTED AND WELL-CONSTRUCTED
Be sure to adhere to the size limitations and safety rules when constructing your display. Display all required forms in your project notebook.

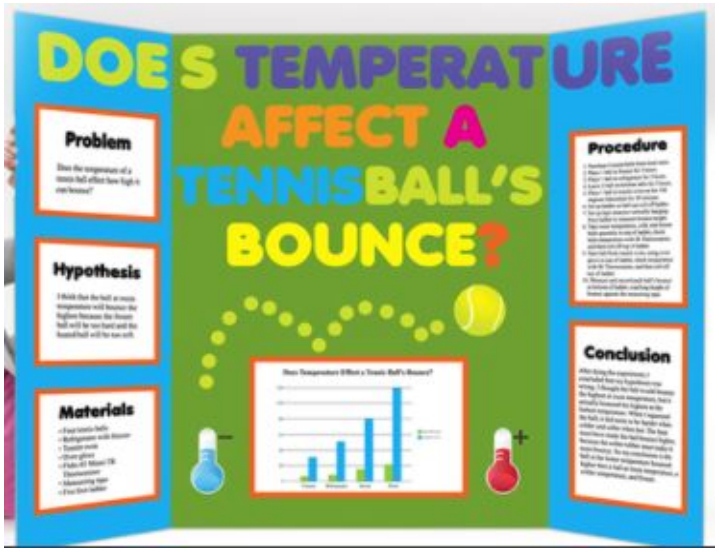
CAREFULLY PREPARE YOUR SCIENCE PROJECT NOTEBOOK
A science project notebook is your most valuable piece of work. It is a day-to-day record of the experiment. Accurate and detailed notes make for a logical and winning project. Good notes show consistency and thoroughness to the judges, and help when writing a paper.

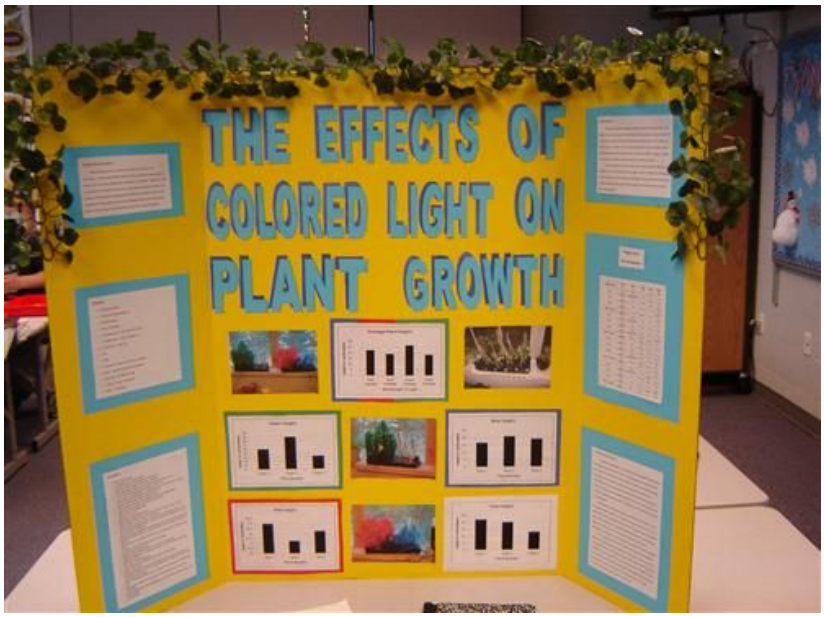
VISUAL DISPLAY
You want to attract and inform. Construct a clear and concise display. Make headings stand out and label everything clearly and correctly.

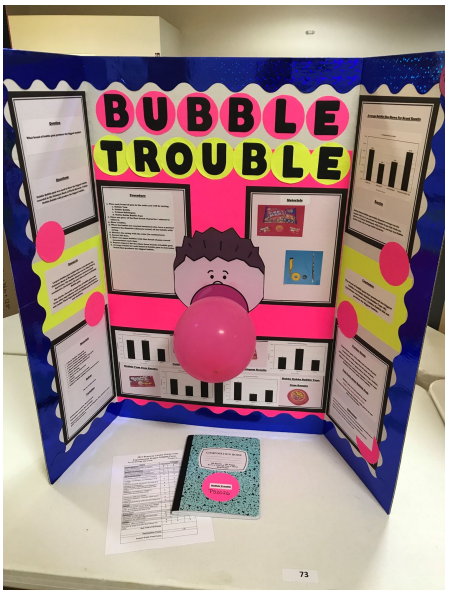
DISPLAY BOARD INFORMATION

SAMPLE TRIFOLDS









JUDGING INFORMATION

JUDGING INTERVIEWS

Talk with student(s) at each project for about 5 to 7 minutes, one judge at a project at-a-time using the scoring form as a guide. Here are some standard questions to ask:

- Please spend a minute describing your project. (Look at the board).
- How did you get the idea?
- Describe the timeline for this project.
- What are the independent and dependent variables, what are the controls?
- How did you decide the number of trials/revisions for improvement to do?
- What obstacles or unexpected results did you encounter?
- (Team Project) Who did what and how did you apportion the tasks?
- On what basis did you reach your conclusion?
- What could be done to strengthen the work?

Interview Tips:

- Look for evidence of laboratory, field or theoretical work, not just library research or a facility with gadgets.
- Interviews are the highlight of the students' fair experience and they've put in a lot of work.
- Do not negatively criticize the student; project weaknesses can be reflected in your scoring.
- Ask many questions to form an opinion of the project, rather than letting the student deliver a long prepared speech. But avoid grilling the student – be positive!
- Use phones to research more information on projects when conferring.

SCORING GUIDES:

Team Project Score Sheet Google Doc / Google Form / Scoring Spreadsheet
Individual Project Score Sheet Google Doc / Google Form / Scoring Spreadsheet

RECRUITING FOR JUDGES:

JUDGING INFORMATION

AWARDS AND RECOGNITION

PARTICIPATION AWARDS

Each student from K - 5th grades will receive a spirit stick for their participation.
Each student from 6th - 12th grades will receive a pin for their participation.
Each student will receive participation certificate.

AWARD RIBBONS

Top third scoring projects in each division will earn a blue “gold level” ribbons.
Middle third scoring projects in each division will earn red “silver level” ribbons.
Bottom third scoring projects in each division will earn white “bronze level” ribbons.

MEDALS

- A medal will be awarded for each “Best in Category” for each division.
- A 1st place, 2nd place, and 3rd place medals will be awarded for “Best in Show” for each division.

INFORMATION FOR PARENTS

- Give encouragement, support, and guidance. (Be positive!)
- Make sure your child feels it is his or her project and make sure the project is primarily the work of the child.
- Realize that the main purpose of a science fair project is to help your child use and strengthen the basic skills he or she has learned and to develop higher-level skills.
- Realize your child will need help in understanding, acquiring, and using the major science process skills (researching, organizing, measuring, calculating, reporting, demonstrating, experimenting, collecting, constructing, presenting).
- Realize that your child may be using reading, writing, arithmetic, and social skills in a creative way to solve a problem.
- Help your child plan a mutually agreed upon schedule, to prevent a last minute project and a disrupted household. A 4 to 8 week plan that uses a check-off sheet is best.
- Help your child design a safe project that is not hazardous in any way.
- Provide transportation to such places as libraries, nature centers, universities, etc. that can help find project information.
- Help your child communicate with people who can help on the science project.
- Help the child develop the necessary technical skills and/or help the child do the technical work such as building the exhibit and doing the photography.
- Help your child understand that science or STEM is not just a subject, but a “way of looking at the world around us.”
- Be sure that the child states in the paper and/or exhibit the help he or she has received from you or others. This will help judges to make a fairer evaluation of the project.
- Look over the project to check for good grammar, neatness, spelling and accuracy. Make suggestions on how it can be corrected.
- Buy or help find the necessary materials to complete the project.
- Realize that a good project doesn’t have to cost a lot of money. Many times a simple project that is well displayed and explained is the best.
- Help the child understand that a weekend chore, or one or two posters, is not a project.
- Help the child keep a record (notebook) of all they do and a list of references used.
- Find an area in the house where the child can work on the project and not have to worry about pets or other family members such as siblings.
- Explain to the child that they should consult with you or the teacher when problems arise. Set aside time for help sessions. Make them short and constructive. Be an interested and enthusiastic listener.
- Have your child present their science project to you before they take it to school.
- Help transport child and the science fair project to and from the school/district/regional science fairs.
- Be positive and supportive if your child doesn’t win an award at the science fair. The skills the child has gained are worth all the effort. Help your child to begin to plan for next year.
- Feel a sense of pride and satisfaction when the project and the science fair are finished. Share this with your child, you have both earned it!