AZSEF

ARIZONA SCIENCE & ENGINEERING FAIR

Starting a School or District Fair
January 7, 2025

Agenda

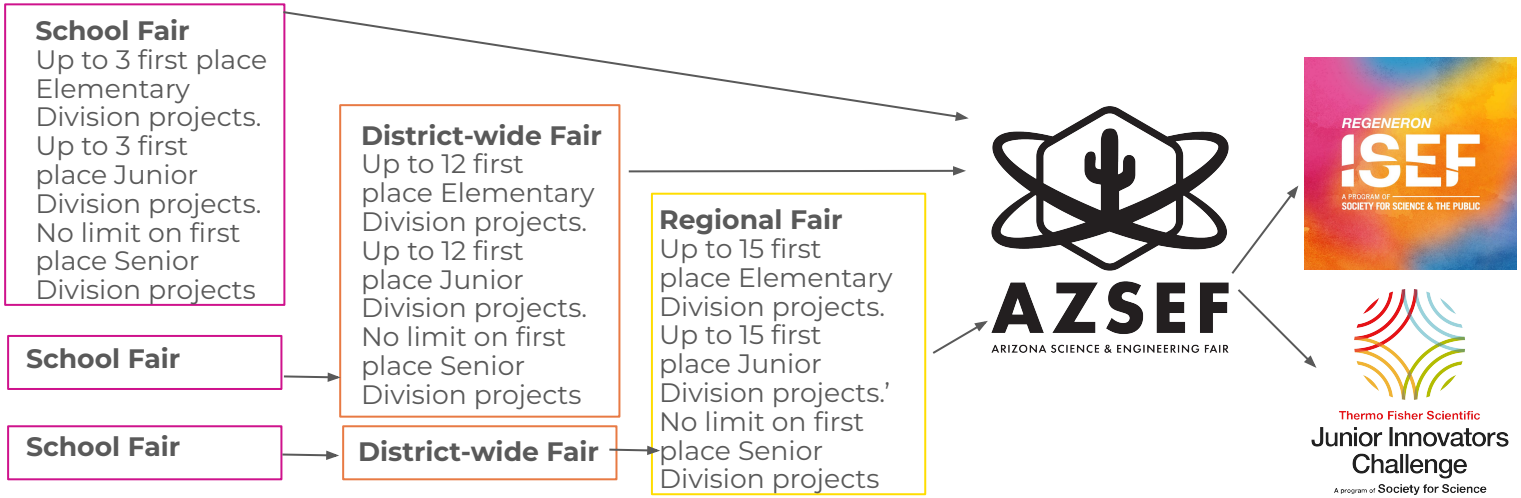
- Quick AzSEF Overview
- Why start a science fair?
- Timeline & Decisions
- Judging Rubrics
- IRB/SRC/D&S
- Resources

General AzSEF

- Date: March 27 - 29, 2025
  - March 27 - Elementary & Junior Division Judging
  - March 28 - Senior Division Judging
  - March 29 - Celebration Day & Awards Ceremony @ Arizona Science Center
- Location:
  - March 27 & 28 Dessert Financial Arena in Tempe, AZ
  - March 29 - Arizona Science Center
- Registration fee $25/student
- Important Dates
  - Registration Opens: February 3, 2025
  - Registration Closes: March 12, 2025
  - Last Day to hold a feeder fair: March 8, 2025

What is AzSEF?

- AzSEF is the state science fair for Arizona
- First-place winners from school, homeschool, district, county, and regional science fairs across Arizona
- Top winners from the Senior Division move on to Regeneron International Science & Engineering Fair
- Top 10% of 6th-8th grade are nominated for the national MS competition



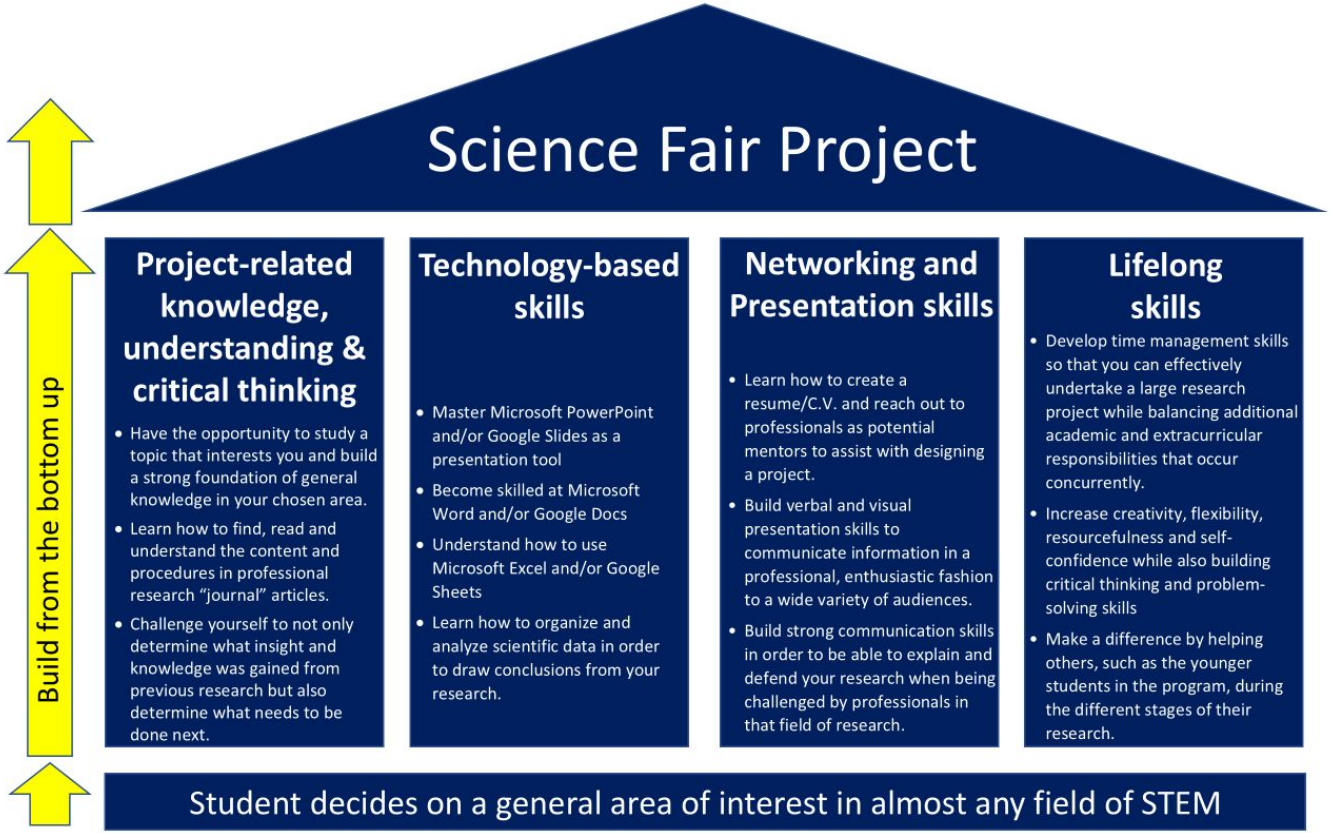
A “school” can include: public, private, home school, charter, or online.

Why Science Fair?

- A science project **integrates many diverse skills**, including reading, writing, math, statistics, ethics, critical thinking, and use of computers, graphics, scientific methodology, and public speaking.
- The journey to and through Science Fair is one of self discovery. It **teaches** children to develop questions into formal, testable, and solvable problems; it helps **prepare** them to approach life's challenges systematically. Learning outcomes and finding answers offer **powerful self validation**.
- Students are highly **engaged in learning** about something that is relevant and meaningful to them.

Typical model

ASRT model


Science Fair Project
Build from the bottom up
Project-related knowledge, understanding & critical thinking
• Have the opportunity to study a topic that interests you and build a strong foundation of general knowledge in your chosen area.
• Learn how to find, read and understand the content and procedures in professional research "journal" articles.
• Challenge yourself to not only determine what insight and knowledge was gained from previous research but also determine what needs to be done next.
Technology-based skills
• Master Microsoft PowerPoint and/or Google Slides as a presentation tool
• Become skilled at Microsoft Word and/or Google Docs
• Understand how to use Microsoft Excel and/or Google Sheets
• Learn how to organize and analyze scientific data in order to draw conclusions from your research.
Networking and Presentation skills
• Learn how to create a resume/C.V. and reach out to professionals as potential mentors to assist with designing a project.
• Build verbal and visual presentation skills to communicate information in a professional, enthusiastic fashion to a wide variety of audiences.
• Build strong communication skills in order to be able to explain and defend your research when being challenged by professionals in that field of research.
Lifelong skills
• Develop time management skills so that you can effectively undertake a large research project while balancing additional academic and extracurricular responsibilities that occur concurrently.
• Increase creativity, flexibility, resourcefulness and self-confidence while also building critical thinking and problem-solving skills
• Make a difference by helping others, such as the younger students in the program, during the different stages of their research.
Student decides on a general area of interest in almost any field of STEM

TIMELINE

Now

Meet with School Administration

- Who will participate
- Date, time, location
- planning committee members
- Define expected outcomes
- Familiarize yourself with IRB and SRC rules

3 months before

- Introduce science fairs and projects to students and families
- Determine needs (IRB/SRC) needs based on projects allowed
- Help students determine the question to answer/problem to solve
- monitor student progress
- Communicate!

2 months before

- Recruit judges and volunteers
- Finalize judging rubrics
- Continue monitoring progress
- Registration/Sign-ups
- Communicate!

Month of

- confirm judges and volunteers
- Plan and hold judge training
- Project reports finalized
- Data display - Charts, graphs, photos,
- Discuss/review presentation board layouts
- Let everyone know!
- Celebrate student success!

Post Fair

- Celebrate!
- Winners to register for AzSEF
- Debrief

Elementary & Junior Division Categories

ANIMAL SCIENCES
CODE: AS

Study of animals and animal life, including their structure, function, life history, interactions, classification, and evolution.

BEHAVIORAL AND SOCIAL SCIENCES
CODE: BE

The science or study of the thought processes and behavior of humans and other animals in their interactions with the environment studied through observational and experimental methods.

CELLULAR AND MOLECULAR BIOLOGY
CODE: CB

The study of the structure and formation of cells.

CHEMISTRY
CODE: CH

The science of the composition, structure, properties, and reactions of matter.

COMPUTER SCIENCE
CODE: CS

The study of information processes, the structures and procedures that represent processes and their implementation in information processing systems. It includes systems analysis and design, application and system software design, programming, and datacenter operations.

EARTH AND PLANETARY SCIENCE
CODE: EA

The study of sciences related to the planet Earth (Geology, mineralogy, physiography, oceanography, meteorology, climatology, speleology, seismology, geography, atmospheric sciences, etc.).

ENGINEERING
CODE: EN

The application of scientific and mathematical principles to practical ends such as the design, manufacture, and operation of efficient and economical structures, processes, machines and systems.

ENVIRONMENTAL SCIENCES
CODE: EV

The analysis of existing conditions of the environment.

MATHEMATICAL SCIENCES
CODE: MA

The study of the measurement, properties, and relationships of quantities and sets, using numbers and symbols. The deductive study of numbers, geometry, and various abstract constructs, or structures.

MEDICINE & HEALTH SCIENCES
CODE: ME

The science of diagnosing, treating, or preventing disease and other damage to the body or mind.

PHYSICS AND ASTRONOMY
CODE: PH

Physics is the science of matter and energy and of interactions between the two. Astronomy is the study of anything in the universe beyond the Earth.

PLANT SCIENCES
CODE: PS

Study of plant life, including their structure and function, life history, growth, interactions with other plants and animals, classification, and evolution.

TECHNOLOGY ENHANCES THE ARTS
CODE: TECA

The use of technology to ignite new concepts, visualization tools and/or media to enhance our enjoyment of the arts.

Your fair can have 1 or 13 categories - you choose!

Senior Division Categories

ANIMAL SCIENCES

BEHAVIORAL & SOCIAL SCIENCES

BIOCHEMISTRY

BIOMEDICAL & HEALTH SCIENCES

BIOMEDICAL ENGINEERING

CELLULAR & MOLECULAR BIOLOGY

CHEMISTRY

COMPUTATIONAL BIOLOGY & BIOINFORMATICS

EARTH & ENVIRONMENTAL SCIENCES

EMBEDDED SYSTEMS

ENERGY: SUSTAINABLE MATERIALS & DESIGN

ENGINEERING TECHNOLOGY: STATICS & DYNAMICS

ENVIRONMENTAL ENGINEERING

MATERIALS SCIENCE

MATHEMATICS

MICROBIOLOGY

PHYSICS & ASTRONOMY

PLANT SCIENCES

ROBOTICS & INTELLIGENT MACHINES

SYSTEMS SOFTWARE

TECHNOLOGY ENHANCES THE ARTS

TRANSLATIONAL MEDICAL SCIENCE

Category Descriptions

Judges

Judge Recruitment

Where do you recruit your judges?

- Faculty, staff, and students from host university; seek state fair judges from regional fair judging pool
- Advertise through sponsors and special award organizations (corporate, research labs, industry)
- Professional organizations and university/college student organizations; create a database of external associations
- School district personnel who don't have students participating

What qualifications do they need? (EL/MS vs HS, lead judges/captains?)

- Junior Division (middle school): currently pursuing an undergraduate or graduate degree; or relevant industry experience
- Senior Division (high school): bachelor's degree (master's or doctoral degree preferred) or relevant industry experience

What system/platform do you use to collect judge registration information?

- Google or Microsoft Form, or Z-fairs (or other)?

What information about judges do you collect?

- Identifying potential conflicts of interest: mentor, teacher sponsor or relative of a participant; or a lower fair category judge
- Preferred Division, preferred category (top 3 choices), qualifications (degree, experience, specialization), employer (a source of potential funding in the future?), whether they were a fair finalist in the past (special ribbon on name badge), years of experience as a judge (to determine lead judges/judge captains)

How do you communicate with your judges?

- Emails (text vs. image-based), postcards, listservs, student organizations

Judging Rubrics

Scientific
vs
Engineering
Projects

Criteria	Points	Scientific	Engineering
Research Question/Problem	10	clear & focused purpose; testable	description of practical need or problem to be solved; proposed solutions, explanation of constraints
Design & Methodology	15	well designed plan; data collection; variables identified	exploration of alternatives; identifies a solution; develop a protoype
Execution	20	systematics data collection; reproducible; was there sufficient data collected to support the conclusion	prototype demonstrates intended design; prototype tested multiple times/conditions; prototype demonstrates engineering skills
Creativity	20	demonstrates imagination and inventiveness; new possibilities or alternatives	demonstrates imagination and inventiveness; new possibilities or alternatives
Presentation Poster	10	logically organized, easy to read; graphs, charts, etc. clear	logically organized, easy to read; graphs, charts, etc. clear
Presentation interview	25	consise and thoughtful responses, demonstrates an understanding of the science relevant to the project, degree of independence; recognition of potential impacts in scince/society; ideas for further research	consise and thoughtful responses, demonstrates an understanding of the science relevant to the project, degree of independence; recognition of potential impacts in scince/society; ideas for further research

Rules & Regulations

Science Fair Rules & Regulations

Committee	Membership	Responsibility
Institutional **R**eview **B**oard (IRB)	3+ Member Committee • Science Teacher • School Administrator • Individual capable of evaluating the physical and/or psychological risks	Evaluates potential physical and/or psychological risk of research involving human participants. All projects involving human subjects must get approval before beginning the research.
Scientific **R**esearch **C**ommittee (SRC)	3+ Member Committee • A biomedical scientist with an earned doctoral degree • An educator • At least one additional member	Evaluates safety and ethical research of projects that includes vertebrate animals and potentially hazardous biological agents. All projects involving the above must be approved by the SRC prior to beginning experimentation.
Display & **S**afety (D&S)	No # requirement	Evaluate projects to ensure they meet safety guidelines.

Institutional Review Board

IRB

What is an IRB?

Why is it important?

- Evaluates potential physical and/or psychological risk of research involving human participants
- All projects involving human subjects must get approval before beginning the research
- Includes surveys and questionnaires

School Level IRB must have a minimum of 3 members, and must include:

- A science teacher not involved with projects being reviewed
- A school administrator (preferably the principal or assistant principal)
- One of the following who is knowledgeable and capable of evaluating the physical and/or psychological risks:
    - Physician
    - Psychiatrist
    - Physician's Assistant
    - Registered nurse
    - Psychologist
    - Licensed social worker

Projects requiring an IRB Pre Approval

- Any project involving humans
- Examples
  - Collecting data through surveys, interviews, observations, or experiments that involve participant engagement
  - Accessing medical records, student records, employment data, or other sensitive information that could identify individuals.
  - Studies that may cause any level of psychological or physical discomfort to participants, even if minimal.

Projects Not requiring IRB Pre Approval

1. Student-designed Invention, Prototype, Computer Applications or Engineering/Design Project in which the student is the only person testing the invention, prototype or computer application and the testing does not pose a health or safety hazard.
2. Data/record review studies (e.g., baseball statistics, crime statistics) in which the data are taken from preexisting data sets that are publicly available and/or published and do not involve any interaction with humans or the collection of any data from a human participant for the purpose of the student's research project.
3. 3. Behavioral observations of unrestricted, public settings (e.g., shopping mall, public park) in which all of the following apply:
    a. the researcher has no interaction with the individuals being observed
    b. the researcher does not manipulate the environment in any way and
    c. the researcher does not record any personally identifiable data.
4. Projects in which the student receives verified pre-existing/retrospective data in a **de-identified/anonymous** format.

Scientific Review Committee

SRC

What is an SRC?

Why is it important?

- A group of adults knowledgeable about regulations concerning experimentation especially with vertebrate animals and potentially hazardous biological agents.
- All projects involving any of the above must be approved by the SRC prior to beginning experimentation.
- The adult sponsor, parent, qualified scientists, nor designated supervisor may review projects in which they have a conflict of interest
- An Affiliated Fair SRC must include a minimum of three people
  - A biomedical scientist with an earned doctoral degree
  - An educator
  - At least one additional member
- Additional membership is recommended in order to have additional expertise and to avoid conflict of interest situations.

Requires Paperwork & Prior SRC Approval

Potentially Hazardous Biological Agents**

- Microorganisms such as bacteria, viruses, viroids, rickettsia, prions, fungi, parasites)
- Recombinant DNA (rDNA)
- human/animal flesh, blood tissue, bodily fluids
- Hazardous Chemicals, devices, and radiation

https://www.societyforscience.org/isef/international-rules/potentially-hazardous-biological-agents/#allrules

**Not an exhaustive list

Vertebrate Animals

- Animals with a backbone or spinal column (vertebrae)
- Fish
- Birds
- Amphibians
- Reptiles
- mammals

Display & Safety Regulations

- Ensures the safety of participant, judges, and visitors
- Sets standards on how project can be presented
- Protects the integrity of the research
- Ensures ethical guidelines for scientific experimentation are followed

Display Requirements

- **Display Dimensions and Construction**
  - may not exceed 108” high, 48” wide and 30” deep
  - nothing can be attached to the table or wall
- **Project ID Number on the front of the Board**
  - Assigned in zFairs, once registration is complete
- **ALL images must be properly credited**
  - This includes all graphs, photos, tables, charts, etc. on the project display
  - No blanket statements are allowed, even if the student created all of the images.
- **Photographs**
  - Can not be considered offensive or inappropriate
    - images/photos showing vertebrate animals/humans in surgical, necrotizing or dissection situations)
  - Photographs, other than the participant
    - Must have a photo release signed by individual and/or guardian
    - OR faces are covered

Safety Requirements

Items **not** allowed include

Pictures are highly encouraged!

☐	Living organisms, including plants	☐	Glass (including light/heat sources)
☐	Taxidermy specimens or parts	☐	Preserved vertebrate or invertebrate animals
☐	ALL chemicals including water. Absolutely no liquids can be utilized in the project display	☐	Flames and highly flammable materials. Any materials that were previously flame or fire tested.
☐	Plant materials (living, dead, or preserved) that are in their raw, unprocessed, or non- manufactured state	☐	Any apparatus with belt, pulleys, chains, or moving parts with tension or pinch points that are not appropriately shielded
☐	Human or animal food	☐	3D Printers unless the power source is removed
☐	Human/animal parts or body fluids	☐	Batteries with open-top cells or wet cells
☐	Soil, sand, rock, cement, concrete, and/or waste samples, even if permanently encased in acrylic	☐	Inadequately insulated apparatus capable of producing dangerous temperatures
☐	Sharp items (examples: syringes, needles, pipettes, knives)	☐	Any display items that are deemed distracting (i.e. sounds, lights, odors, etc.)
☐	Items that may have contained or been in contact with hazardous chemicals (Item ***may*** be permitted is professionally cleaned and documentation for such cleaning is available)	☐	All hazardous substances or devices (examples: poisons, drugs, firearms, weapons, ammunition, reloading devices, grease/oil and sublimating solids such as dry ice)
☐	Drones or any flight capable apparatus unless the propulsion power source is removed	☐	Brand names, logos, copyrighted /trademarked images **UNLESS** integral to the project
☐	Incandescent and fluorescent light bulbs or any other heat generating light source	☐	Any apparatus or project material deemed unsafe by the Display & Safety Committee

Tips for a Good Science & Engineering Fair

- Begin with the end in mind - What is the ultimate goal?
  - Judging and expectations should reflect the goal
- Make the experience one kids will want to repeat
  - All students should feel a sense of accomplishment - even if their project “failed”
- Begin in the classroom
  - Teachers should help students determine the question (or problem) their project will solve
  - Brief, weekly check in’s (status reports) to monitor progress
- Cross curricular in nature
  - Involve all subjects - language arts, math, science, are, computer science, etc.
  - Show students how to analyze data
  - Visual Presentations - creativity mixed with facts/data
  - Presentation Skills - both oral and written

Monthly Fair *Coordinator Meeting Dates & Topics

Third Wednesday of each month

Each month will consist of a short workshop reviewing fair information, followed by updated AzSEF info.

- September 18th, 2024 - Science Fair 101 - Who What, How, and Why
- October 16th, 2024 - Research Ethics & Methodology
- November 20th, 2024 - Science Fair Rules - IRB, SRC, and Display & Safety
- December 18th, 2024 - How to Start a School Fair
- January 15th, 2025 - zFairs: Registration and Project Material upload
- February 19th, 2025 - Judging Tips & Tricks
- March 19th, 2025 - Final AzSEF Updates

*Coordinator can be school, district, or regional individuals working with students on science fair.

Office Hours

During the registration period, students, teachers, and parents have the opportunity to join and ask questions about registration, project materials & submission, and paperwork.
All Office Hours will be from 4-5 p.m.

- Elementary & Junior Division Dates
  - February 17
  - March 3
  - March 11

- Senior Division Dates:
  - February 10
  - February 24
  - March 10

LINK TO RESOURCES

AZSEF
ARIZONA SCIENCE & ENGINEERING FAIR

AzSEF Website

www.azsef.org

Image Only Slide Example

Image + Text Slide Example

- Date
- Location
- Registration fee $25/student
- Important Dates
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AZSEF

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All Registration

www.az.zfairs.com