ARASE 2009-2010

GUIDE

Celebrating the 54th

Alamo Regional Science
&
Engineering Fair

ALAMO REGIONAL
ACADEMY OF SCIENCE AND ENGINEERING

An Affiliate of

SOCIETY FOR SCIENCE & THE PUBLIC
Inform. Educate. Inspire.

Washington, DC

Mission Statement

To Advance A Public Understanding
Of Science Research

And

An Appreciation of Science Among
Young People

And

To Increase Opportunities For Disadvantage
Youths And Underrepresented Groups In
Science and Engineering

ARASE Objectives

Aims to provide students with the opportunity to:

- Use critical thinking skills
- Conduct literary research
- Design and conduct an experiment using the scientific method
- Conduct statistical analysis to interpret the data
- Write an organized, well thought-out scientific paper
- Summarize and display the research on a visual board
- Communicate findings to judges from the scientific community

The Alamo Regional Science and Engineering Fair is an Intel International Science and Engineering Fair (Intel ISEF) affiliate of Society for Science & the Public, Washington, DC, Discovery Channel Young Scientist Program, Texas Junior Academy of Science, I-SWEEEP, and the ExxonMobile Texas Science and Engineering Fair

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ARASE EVENTS

ARASE sponsors the Junior Academy of Science and the Alamo Regional Science and Engineering Fair. Each has a Junior Division (gr. 6-8) and a Senior Division (gr. 9-12). A *"School-Within-A-School"* and Magnet Schools may enter as separate schools if they can demonstrate their separate identity from the parent school. Home schooled students may enter as individual schools or co-ops. Independent entries will be accepted under certain conditions.

Junior Academy of Science (JAS)

Middle schools may enter **15 STUDENTS**. Middle/Junior schools with 9th grade will have 9th graders placed in the Senior Division. High schools may enter **22 STUDENTS**. Students deliver a 12-minute oral presentation or less on their scientific research before two judges within their chosen category. Vertical displays, posters, or video tapes are not used. Overhead projectors (Elmo) are provided. PowerPoint presentations are not permitted as per State Academy of Science rules. Printed material and transparencies may have PowerPoint format. The Elmo can project printed material and photos.

Two copies of the report are given to the judges at the start of the presentation. Each cannot be longer that 20 pages including the title page. The font size is 12 pt. or a minimum of 10 pt. with double spacing or 1.5 minimum line spacing. Reports are stapled in the upper left-hand corner. Binders, folders, data book, photo album, and previous reports of continuing projects or any other materials cannot be submitted.

Teachers and parents are welcome to attend presentations. There are ten or less presenters per room. Grand Prize and 1st Place winners (gr. 9–12) advance to the Texas Junior Academy of Science competition at Texas A&M University. There are no Team presentations at the Regional or State Academy.

Entry fee for the Junior Academy of Science is **$15** per student.

Alamo Regional Science and Engineering Fair (ARSEF)

Middle schools may enter **15 PROJECTS**. Middle/Junior schools with 9th grade will have 9th graders placed in the Senior Division. High schools may enter **22 PROJECTS**. Projects are classified as individual and team projects. Each school may enter no more than 3 Team Projects, one per Sub-Fair. Please refer to this booklet for the for the break down of the Sub-Fairs.

Team Projects at the science fair are optional. Teams can have **ONLY 2** members. A Team Project can not be converted to an Individual Project or vice-versa during the current year. Membership cannot be changed during a given research year.

Students compete with a vertical display for awards, scholarships, and the opportunity to advance to state and higher levels of competition following the Society for Science and the Public's *Intel International Rules and Guidelines*.

Registration fee is **$25** per student. There is a **$10** fee per projects requiring electricity.

INTEL ISEF CATEGORY DESCRIPTIONS

Behavioral & Social Sciences
Human and animal behavior, social and community relationships—psychology, sociology, anthropology, archaeology, ethology, ethnology, linguistics, learning, perception, urban problems, reading problems, public opinion surveys, educational testing, etc.

Biochemistry
Chemistry of life processes: molecular biology, molecular genetics, enzymes, photosynthesis, blood chemistry, protein chemistry, food chemistry, hormones etc.

Botany
Study of plant life: agriculture, agronomy, horticulture, forestry, plant taxonomy, plant physiology, plant pathology, plant genetics, hydroponics, algae, etc.

Chemistry
Study of nature and composition of matter: physical chemistry, organic chemistry, inorganic chemistry, materials, fuels, plastics, pesticides, soil chemistry, metallurgy etc.

Computer Science*
Study and development of computer hardware, software engineering, internet networking and communications, graphics, simulations/virtual reality or computational science (encryption, coding, data structures, information theory)

Earth & Space
Geology, mineralogy, astronomy, geography, meteorology, seismology, oceanography, climatology, physiography, etc. Astronomy, planetary sciences, etc.

Engineering
Technology; projects that directly apply scientific principles to manufacturing and practical uses: civil, mechanical, aeronautical, chemical, electrical, photographic, sound, automotive, marine, heating and refrigerating, transportation environmental engineering, etc.

Environmental
Study of pollution (air, water, and land) sources and their control; ecology

Mathematics*
Development of formal logical systems or various numerical and algebraic computations, and the application of these principles: calculus, geometry, abstract, algebra, number theory, statistics, complex analysis, probability, etc.

Medicine & Health
Study of diseases and health of humans and animals: dentistry, pharmacology, pathology, ophthalmology, nutrition, sanitation, dermatology, allergies, speech and hearing, etc.

Microbiology
Biology of microorganisms such as bacteriology, virology, protozoology, fungi, bacterial genetics, yeast, etc. These studies are prohibited in a home environment. Specimens can be collected at home as long as they are immediately transported to a lab with the appropriate level of bio-safety containment.

Physics
Theories, principles, and laws governing energy and the effect of energy on matter: solid state, optics, acoustics, particle, nuclear, atomic, plasma, superconductivity, fluid and gas dynamics, thermodynamics, semiconductors, magnetism, quantum mechanics, biophysics, etc.

Zoology
Study of animals: animal genetics, herpetology, physiology, ornithology, animal ecology, ichthyology, animal ecology, paleontology, cellular physiology, circadian rhythms, cytology, histology, animal physiology, invertebrate neurophysiology, studies of invertebrates, entomology, animal husbandry, etc.

Team Projects
Study conducted by two students in any discipline

Note: *Any project involving human subjects must be approved by an Institutional Review Board (IRB) with few exceptions. Please refer to "Rules for Human Subjects" in the Intel International Guidebook.*
Link: www.sciserv.org/isef/primer/rules.asp

**Computer Science & Mathematics are grouped as one category at the Academy & Fair.

JAS & ARSEF Categories

ARSEF consists of 3-"Sub-Fairs" which take place at same time and location.

Academy I **/** Fair I: Physical Sciences
Chemistry, Earth & Space, Engineering, Math & Computers, Physics

Academy II **/** Fair II: Health Sciences
Biochemistry, Medicine & Health, Microbiology

Academy III **/** Fair III: Biological Sciences
Behavior & Social Sciences, Botany, Environmental Science, Zoology

Team Projects at Science Fair (optional)

A school may send no more than three team projects per school (one per Sub-Fair). Teams consist of two members. A Team Project can not be converted to an Individual Project or vice versa during the current year. Membership cannot be changed during a given research year.

Continuing Projects

Students may enter a continuing project. Only the most recent year's research will be judged. Display boards must reflect current year's work only. Project title can display previous year study: "Second Year Study". A continuing project must document new and different research (e.g. testing a new variable or new line of investigation, etc.). Repetitions of previous experimentation or increasing sample size are unacceptable continuation projects.

Scientific Review Committee (SRC) and Institutional Review Board (IRB) Guidelines

Projects entering a Society for Science and the Public Affiliated Fair must meet the approval of the local (school) and regional fair's SRC/IRB. Required SRC forms must be completed with appropriate signature and dates before a student is allowed to setup the project. Certain projects require prior SRC/IR approval before experimentation.

ARASEF Display and Safety

All projects undergo a display and safety inspection to insure that the projects meet safety requirements and have been approved by the local and regional SRC/IRB. Refer to the Intel ISEF Display and Safety Regulations of the *2009/2010 International Rules and Guidelines*.

Vertical displays are required to explain scientific principles, apparatus, techniques, design, or applications. Table or floor displays should not exceed the following measurements:

Depth: 30" Width: 48" Height: 108" including table

SCIENTIFIC REVIEW COMMITTEE (SRC) INFORMATION

A school's SRC reviews the forms and the Research Plan for all projects to ensure that students follow all applicable rules. The SRC consists of professionals knowledgeable about regulations concerning experimentation in restricted areas. It reviews and approves the **Checklist** for Adult Sponsor, **Abstract**, **Research Plan (1A), Research Plan Attachment**, and **Approval Form (1B)** in addition to all other required forms for students entering the fair. SRC PRIOR approval is needed for projects involving non-human vertebrates, rDNA, tissue culture, controlled substances, pathogens, and hazardous substances or devices. Human studies do not have to be reviewed by a school's SRC if a school's IRB has approved the study. They do have to be reviewed by the regional fair SRC before competition.

Special Notes on SRC

An SRC must have a minimum of three persons. Additional members are recommended to avoid conflict of interest. If a school cannot establish an SRC, the teacher/school should contact the Regional Fair Director(s) for assistance in evaluating the above projects PRIOR to experimentation. The SRC must include:

- Biomedical Scientist(PhD., M.D., D.V.M., D.D.S., or D.O.)
- Science Educator (familiar w/animal care and not student's own teacher)
- One other member

An SRC examines projects for the following:

- Evidence of literature search and proper supervision
- Use of accepted research techniques
- Completed forms, Signatures, and Dates
- Evidence of search for alternatives to animal use
- Humane treatment of animals
- Compliance with rules and laws governing Human and Animal research
- Compliance with rules regarding rDNA, Pathogenic Agents, Controlled Substances, Hazardous Substances and Devices
- Appropriate documents and substantial expansion for Continuation Project

Note: SRC/IRB Membership Form due on or before December 12, 2009.
Mail Membership Form to :

A.R.A.S.E.
102 Windsor Drive
San Antonio, Texas 78228-3163

INSTITUTIONAL REVIEW BOARD (IRB) INFORMATION

A school's IRB should consist of a minimum of three members to evaluate the potential physical or psychological risk of research involving human subjects, including projects with surveys **PRIOR** to experimentation. Additional members are recommended to avoid conflict of interest. The IRB should include a:

- Science Educator (not the student's teacher)
- School Administrator (preferably Principal, Vice-Principal, or Dean)
- Third Member (Psychologist, Psychiatrist, M.D., P. A., R.N. or Licensed Social Worker)

If a school cannot establish an IRB, the teacher/school should contact the Regional Fair Director(s) for assistance in evaluating human research projects **PRIOR** to experimentation. *(210) 736.2716 / jeperez@swbell.net*

IRBs also exist at federally registered institutions, including prisons. An institutional IRB must initially review and approve the research conducted or sponsored by that institution. For research not performed at these facilities, the sponsoring research organization (school, regional fair, etc.) must appoint an IRB to review and approve research involving human subjects.

The regional SRC/IRB may override a school IRB just as the state SRC/IRB can override a regional decision.

Special Notes on IRB

- If the project is behavioral, a psychologist, or individual with human behavioral training must serve on the IRB.

- All Human Subject studies require **Human Subjects Form (4)** from all subjects regardless if there is minimal risk involved and anonymous data collected and is waived by the school IRB If informed consent is waived, the top part of Form (4) and the section for the IRB still needs to be filled and signed.

- Neither Adult Sponsor, Parents, Qualified Scientist*, or the Designated Supervisor* who oversees a specific project is permitted to serve on IRB reviewing that project. These adults may not sign the SCR/IRB 2(a) or 2(b) section of a student's **Approval Form (1B)**. If the project is a team, then EACH member needs **Form (1B)**.

- A sample of Form (4) is to be turned in to the regional SRC/IRB with all applicable forms for final approval. Form (4) from each human subject in the study is required to be available at the project in case asked by a judge or other official. However, they must not be displayed, only available.

FREQUENTLY ASKED QUESTIONS

1) What is the reason for SRC/IRB Forms?

Students participating in an Intel ISEF Affiliated Fair are to adhere to ALL requirements set forth by Society for Science and the Public. Download the 2010 Intel International Science and Engineering Fair (ISEF) Rules and Regulations, including forms from the Society for Science and the Public's website.

Society for Science and the Public Phone: 202.785.2255
Intel ISEF Rules & Guidelines Fax: 202. 785.1243
1719 N Street, NW
Washington, DC 20036
Email: sciedu@societyforscience.org
Website: http://www.societyforscience.org

2) Which forms are to be used?

Use **ONLY** the 2009/2010 forms. **Discard** old forms. The state fair will not accept old forms of students that advance.

The 2010 Intel International Science and Engineering Fair Rules and Regulations guides the teacher and student on the forms needed based on type of study.

The Intel ISEF Rules Wizard, will guide students with a list of forms for the chosen project. The "Wizard" is on the Science Service web site: www.societyforscience.org/isef/rules.asp

The Clarification for Forms & Dates section. It lists each form in the International Rules and Guidelines with a very brief explanation of the form's purpose and when it should be completed.

Refer to the Common SRC Problems section of the website for pointers on **WHAT NOT** to do.

3) Can SRC Forms be filled on-line?

Yes. All forms filled out by the student be done on-line. Then print and obtain signatures where needed. Forms can not be saved unless you have complete acrobat program.

4) Do we send in original copies of forms?

No! Please submit **Only Photo Copies. Keep Originals!**

5) *Does each team member submits a set of SRC Forms?*

Only one set per team with the **exception** of Form (1B) is submitted. Each member needs Form (1B)

6) When are SRC/IRB Forms Due?

SRC/IRB Forms for projects that need **prior** approval **before** experimentation are due on or before December 12, 2009.

Forms for projects that **do not** need prior SRC approval **before** experimentation are due January 15, 2010.

7) What are SRC Clinics?

Clinics are sessions whereby students, teachers, and parents are given individual assistance with the SRC forms and questions are answered. Location and times of the clinics are announced via e-mail to those schools that are on the contact list.

8) Can be bacteria and fungi projects be conducted at home?

Experimentation with potentially hazardous biological agents, even BSL-1 organisms, is prohibited in a home environment. Specimens are allowed to be collected at home. Exceptions:

1) studies involving Bakers yeast and Brewers yeast except when involved in DNA studies
2) studies involving most protists and similar microorganisms
3) research using manure for composting or other non-culturing experiments and field productions

9) Can students enter more than one project?

Only one project can be submitted by a student or a team.

10) Do team members have to be from the same school or grade?

They do not have to be from the same school or grade. However, they need to be from the same entry division (Junior or Senior Division).

Key Terms

Adult Sponsor *A teacher , parent, university professor, or scientist in whose lab the student is working; must have solid background in science and close contact with student.*

BSL –1 *BioSafety Level 1 Projects with biological agents, plants or animals that pose low risk to personnel and the environment (conducted in HS lab).*

BSL–2 *BioSafety Level 2: Biological agents pose moderate risks to personnel and environment (cannot be conducted in high school).*

BSL–3 and BSL–4 *Studies are prohibited for high school students since the biological agents usually cause serious disease and can be dangerous.*

Control Substances *Refers to alcohol, tobacco, prescribed drugs and chemicals that can be used to make illegal drugs. All studies using these substances must be supervised by a qualified scientist.*

Display and Safety *A group of qualified individuals responsible for checking compliance of exhibits with display and safety rules.*

Designated Supervisor *An adult properly trained in the specific procedures used in the investigation who will directly supervise the student.*

IACUC *An Institutional Animal Care and Use Committee that approves all animal studies at a regulated research institution prior to experimentation.*

IRB *Institutional Review Board is a committee of specific composition at an affiliated fair, high school, or institution that review research plans and consent forms to evaluate potential physical or psychological risk of research involving human subjects.*

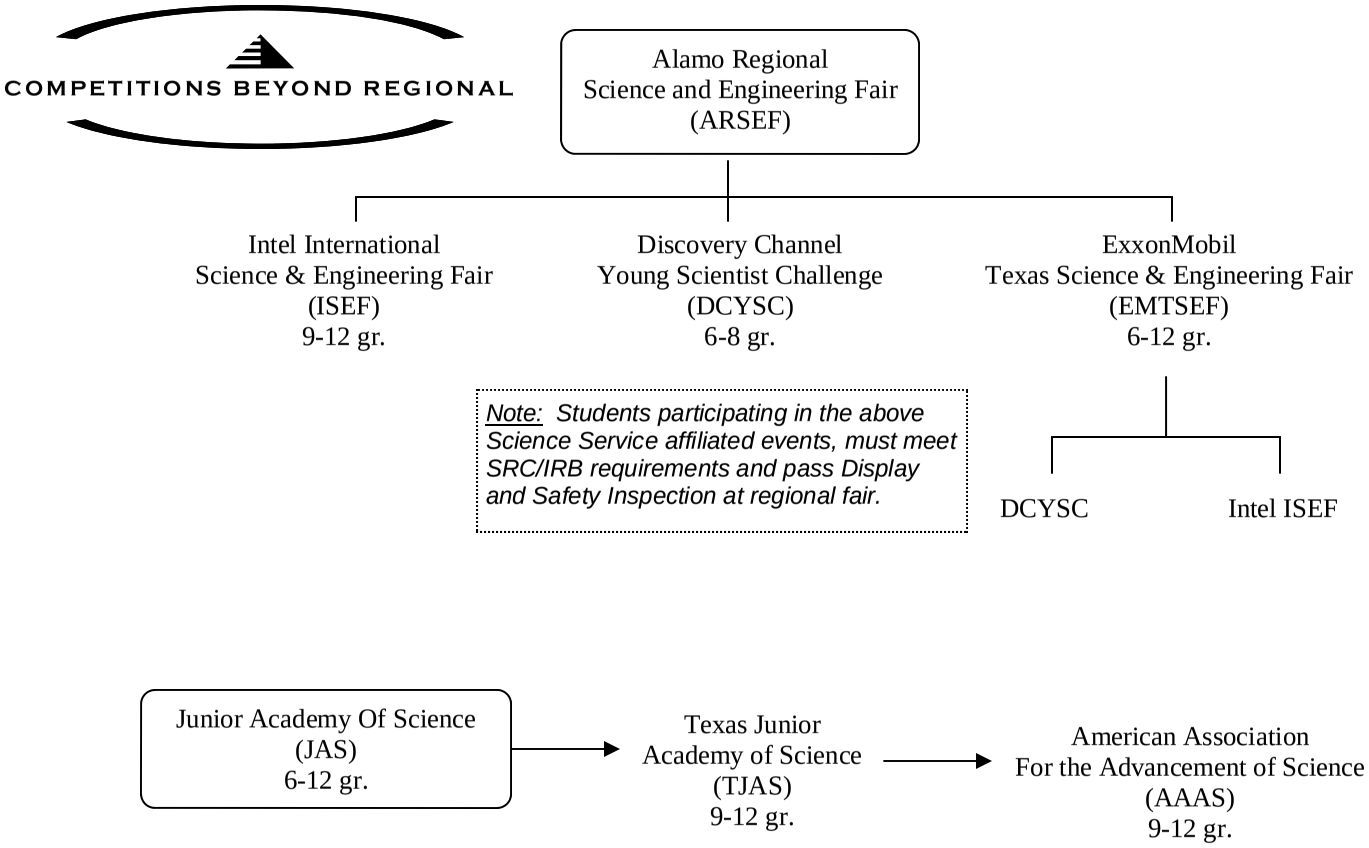
MSDS *Material Safety Data Sheets.*

Non-regulated Research Site *Include home, school, farm, ranch, in the field, etc. If the study involves behavioral observational or supplemental nutritional studies on animals and the research involves only non-invasive and non-intrusive methods that do not negatively affect an animals health or well-being.*

Regulated Research Institution *Institutions registered as research centers and may include universities.*

SRC *Scientific Review Committee is a group of qualified individuals responsible for evaluation of student research, certifications, research plans, etc.*

Qualified Scientist *individual with (1) an earned doctoral degree in science or medicine or (2) a master's degree with equivalent experience and/or expertise, and who has a working knowledge of the techniques to be used by the student.*


COMPETITIONS BEYOND REGIONAL
Alamo Regional
Science and Engineering Fair
(ARSEF)
Intel International
Science & Engineering Fair
(ISEF)
9-12 gr.
Discovery Channel
Young Scientist Challenge
(DCYSC)
6-8 gr.
ExxonMobil
Texas Science & Engineering Fair
(EMTSEF)
6-12 gr.
Note: Students participating in the above Science Service affiliated events, must meet SRC/IRB requirements and pass Display and Safety Inspection at regional fair.
DCYSC
Intel ISEF
Junior Academy Of Science
(JAS)
6-12 gr.
Texas Junior
Academy of Science
(TJAS)
9-12 gr.
American Association
For the Advancement of Science
(AAAS)
9-12 gr.