

62nd Annual Colorado Science & Engineering Fair (CSEF)

2017 Grand Awards Judging Guide



**Lory Student Center
Colorado State University - Fort Collins**

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CSEF Divisions: Projects may be from any field of science, engineering, mathematics, or computer science. The projects must represent the work of a single student or a team of 2-3 students. For competition, projects will be grouped into the following Divisions based on scholastic grade level:

- **Junior Division** (Grades 6 - 8)
- **Senior Division** (Grades 9 - 12)

Only the **Senior Division** students are eligible to participate in the Intel International Science & Engineering Fair (Intel ISEF).

CSEF Categories: Finalists from the 13 Colorado Regional Science Fairs are offered the choice of 12 categories to compete in at the CSEF. All 12 categories are offered in both the Junior Division and the Senior Division. The CSEF does not offer the same number of categories as the Intel ISEF (22), but the CSEF Board of Directors has combined the 22 Intel ISEF categories to create the following 12 categories for judging.

The category in which an exhibit is entered is primarily the choice of the student or team, with input from his/her sponsor or Regional Fair Director. Prior to the CSEF, the Scientific Review Committee (SRC) and/or the Grand Awards Judging Captains may suggest a project be re-categorized per the procedure outlined in the **CSEF Policy Regarding Category Changes** (see page 5). Individual students and teams may enter a project into any one of the following 12 categories:

Animal Sciences: Studies related to all aspects of non-human animals (including insects), animal life, animal life-cycles, animal health and medicine, animal behavior, and animal interactions with one another or their environment (i.e.: structure, physiology, development & classification of animals; animal ecology; animal husbandry; nutrition & growth; genetics; systematics & evolution; entomology; ichthyology; ornithology; herpetology; cytology; histology; cellular physiology; etc.).

Behavioral & Social Sciences: Studies related to the thought processes and behavior of humans in their interactions with the environment as studied through observational and experimental methods (i.e.: clinical & developmental psychology; cognitive psychology; physiological psychology; sociology; social psychology; etc.).

Chemistry & Biochemistry: Studies related to the chemical basis of processes occurring in living organisms, including the processes by which those substances enter into, or are formed in the organisms and react with each other and the environment (i.e.: analytical biochemistry; general biochemistry; medicinal biochemistry; structural biochemistry; etc.). Studies related to the composition, structure, properties and reactions of matter (i.e.: analytical chemistry; computational chemistry; environmental chemistry; inorganic chemistry; materials chemistry; organic chemistry; physical chemistry; etc.).

Earth & Space Sciences: Studies related to the Earth systems and their evolution (i.e.: atmospheric; climate science; geosciences; petrology; mineralogy; paleontology; etc.). Studies related to anything in the universe beyond the Earth (i.e.: astronomy & cosmology; theoretical & computational astrophysics; etc.).

Energy: Studies related to biological and chemical processes of renewable energy sources, clean transport, and alternative fuels (i.e.: alternative fuels; computational energy science; fossil fuel energy; fuel cells; battery development; microbial fuel cells; solar materials; etc.). Studies related to renewable energy structures and processes including energy production and efficiency (i.e.: hydro power; nuclear power; sustainable design; thermal power; wind; etc.).

Engineering: Studies related to electrical systems in which information is conveyed via signals and wave forms for purposes of enhancing communications, control and/or sensing (i.e.: circuits; internet of things; microcontrollers; networking & data communication; optics; sensors; signal processing; etc.). Studies related to science and engineering that involves movement or structure. The movement can be by the apparatus or the movement can affect the apparatus (i.e.: aerospace & aeronautical engineering; civil engineering; computational mechanics; control theory; ground vehicle systems; industrial engineering processing; mechanical engineering; naval systems, etc.). Studies related to the characteristics and uses of various materials with improvements to their design which may add to their advanced engineering performance (i.e.: biomaterials; ceramic & glass; composite materials; computation & theory; electronic, optical & magnetic materials; nano materials; polymers; etc.). Studies related to the use of machine intelligence to reduce the reliance on human intervention (i.e.: biomechanics; cognitive systems; robot kinematics; etc.). Studies related to the application of engineering principles and design concepts to medicine and biology for healthcare purposes including diagnosis, monitoring and therapy (i.e.: biomaterials & regenerative medicine; biomechanics; biomedical devices; biomedical imaging; synthetic biology; etc.).

Environmental Sciences: Studies related to the environment and its effect on organisms/systems, including investigations of biological processes such as growth and life span (i.e.: bioremediation; land reclamation; pollution control; recycling & waste management; water resources management; etc.). Studies related to the engineering or development of processes or infrastructure to solve environmental problems in the supply of water, the disposal of waste, or the control of pollution (i.e.: environmental effects on ecosystems; water science; ecology; air pollution & quality; soil contamination & quality; bioremediation; land reclamation; pollution control; recycling & waste management; water resources management; etc.).

Mathematics & Computer Sciences: Studies related to the measurement, properties and relationships of quantities and sets, using numbers and symbols (i.e.: algebra; analysis; combinatorics; graph theory & game theory; geometry & topology; number theory; probability & statistics; etc.). Studies related to the discipline and techniques of computer science as they relate to biological systems (i.e.: computational biomodeling; computational evolutionary biology; computational neuroscience; computational pharmacology; etc.). Studies related to the development of software, information processes or methodologies to demonstrate, analyze, or control a process/solution (i.e.: algorithms; cybersecurity; databases; programming languages; operating systems; control theory; machine learning; etc.).

Medicine & Health: Studies related to the issues of human health and disease (i.e.: disease detection & diagnosis; disease prevention; disease treatment & therapies; drug identification & testing; pre-clinical studies; etc.).

Microbiology & Molecular Biology: Studies related to micro-organisms (i.e.: antimicrobials & antibiotics; applied microbiology; bacteriology; environmental microbiology; microbial genetics; virology; etc.). Studies related to the structure, function, intracellular pathways, and formation of cells. Studies involving the understanding of life and cellular processes at the molecular level (i.e.: cell physiology; genetics; immunology; molecular biology; neurobiology; etc.).

Physics: Studies related to the science of matter and energy and of the interactions between the two (i.e.: atomic, molecular and optical physics; biological physics; computational physics; condensed matter & materials; instrumentation; magnetics; electromagnetics & plasmas; mechanics; nuclear & particle physics; optics, lasers & masers; quantum computation; theoretical physics; etc.).

Plant Sciences: Studies related to plants and how they live, including structure, physiology, development, and classification (i.e.: agronomy; growth & development; ecology; genetics/breeding; pathology; physiology; systematics & evolution; etc.).

Team Projects: Studies conducted by two or three students in any discipline.

CSEF Policy on Category Changes: The purpose of this policy is to facilitate proper categorization of projects entered into the CSEF and to allow for a process to move projects between categories, if required.

1. The category descriptions used by the Intel ISEF will be used by the CSEF. If CSEF-designated categories do not coincide exactly with those of the Intel ISEF, the appropriate combined descriptions will apply.
2. The CSEF Director will review the Intel ISEF descriptions annually when the new *International Rules for Pre-college Science Research: Guidelines for Science and Engineering Fairs* is available to ensure the descriptions used by the CSEF are in alignment. The Category/Division Policy will be updated as needed to incorporate any changes made by the Society for Science and the Public to their categories.
3. The CSEF Director will communicate to the Regional Fair Directors any changes to the CSEF categories. This information will also be communicated to the Judging Team Captains/Assistant Captains via the Grand Awards Judging Coordinator.
4. The Scientific Review Committee (SRC), as part of the normal project review process, will examine all projects for proper categorization. Projects that are not properly categorized will be recommended for re-categorization. The CSEF Director will first alert the Grand Awards Judging Coordinator about the suggested re-categorization for Judging Team Captain approval before contacting the student(s), adult sponsor and regional fair director of the project in question.
5. All project abstracts will be available for review via the CSEF Abstract Database (http://129.82.204.188/csef/abs/abstract_lookup.php) by **March 10th**. At this time (review may begin earlier, but March 10th is the deadline for student registration) the Judging Captain and/or Assistant Judging Captain of each category and division will review the abstracts entered into their categories to make sure they are appropriately placed. **March 15th** is the FINAL day to recommend project moves. Discipline specific scientists may be consulted if deemed necessary by the *Judging Team Captains*.
6. Should the category of a project come into question upon review of the abstract by a Judging Team Captain, they should contact the "move to" category judging captain via email, and copy the CSEF Gatekeeper (csef.gatekeeper@gmail.com), the Grand Awards Judging Coordinator (grandawardscsef@gmail.com) and the CSEF Director (courtney.butler@colostate.edu) to ensure all proposed project moves are coordinated effectively.
7. Once the "move to" category judging captain has approved the move, the CSEF Director will communicate the re-categorization to the appropriate Regional Fair Director, adult sponsor and student researcher for approval.
8. All category change recommendations must be approved by the student researcher and he/she has the right to decline the recommended move. In these cases, the project will stay in the original category and that judging team will have to evaluate it accordingly.
9. Category placement is considered final on **April 1st**.

CSEF Student Project Rules

Pre-Judging Activities: Each project entered into the CSEF must conform to the CSEF rules, which includes all of the rules of the Intel ISEF as described in the *International Rules for Pre-college Science Research: Guidelines for Science and Engineering Fairs* with a few modifications.

There are very stringent rules, documentation, and adult/scientific supervision requirements for all projects, but in particular those using human subjects, non-human vertebrate animals, pathogenic agents and controlled substances, rDNA, human and animal tissue and hazardous substances or devices.

As a CSEF Grand Award Judge, it is **NOT** your responsibility to ensure that the students have met all of the Intel ISEF or CSEF rules and requirements. This is the role of the Scientific Review Committee (SRC) that reviews the project paperwork prior to the CSEF and the Display & Safety (D&S) Inspectors who review the exhibits/displays once they have arrived onsite at the CSEF.

The information below is provided to give you a basic understanding of the roles of the SRC and the D&S Inspectors.

Scientific Review Committee: The SRC at the regional or local/school science fair level will review projects that involve human subjects, vertebrate animals, pathogenic agents and/or tissue prior to experimentation. Then all projects are reviewed by the regional science fair SRC prior to competition to make sure they comply with all of the rules. Then those projects that move on to the CSEF are reviewed by the CSEF SRC prior to competition and any project without the required signatures and/or forms are not approved to be exhibited at the CSEF.

Display & Safety Inspections: At the CSEF, the Display & Safety Inspectors along with the CSEF SRC (as needed) review all projects for compliance with the Intel ISEF rules regarding displays and safety. During the set-up time, students must stay with their project until the D&S review is completed. Exhibits not conforming must be corrected and not allowed items removed before judging begins.

Decisions of the SRC and the D&S Inspectors and the CSEF Board of Directors are final. However, if during judging, you have any concerns or questions regarding a particular project's conformance to the ISEF/CSEF rules, please notify the Grand Award Judging Coordinator immediately - **do not confront the student directly.**

Students' Research Notebook & Intel ISEF/CSEF Forms: All projects will have on display for judging, a Research Notebook. This notebook may contain some or all of the following forms, depending on the type of project:

- Signed Original CSEF Abstract - required for all projects
- Checklist for Adult Sponsors Form (1) - required for all projects
- Student Checklist Form (1A) - required for all projects
- Research Plan Attachment - required for all projects
- Approval Form (1B) - required for all projects
- Regulated Research Institutional/Industrial Setting Form (1C) - required for projects done at a research institution or industrial setting
- Qualified Scientist/Mentor Form (2) - may be required for certain type of projects
- Risk Assessment Form (3) - required for all projects working with hazardous chemicals, devices or activities
- Human Subjects Form (4) - required for most projects using human subjects

- Informed Consent Form - required for most projects using human subjects, but at the discretion of the local/school IRB
- Non-Human Vertebrate Animal Form (5A/5B) - required for most projects using vertebrate animals
- Potentially Hazardous Biological Agents Form (6A) - required for most projects using hazardous biological agents
- Human & Vertebrate Animal Tissue Form (6B) - required for most projects using tissue
- Continuation Project Form (7) - required for all projects that are a continuation of previous student work

For more information on these forms and the review process, please visit the CSEF web site at http://www.csef.colostate.edu/ISEF_Paperwork_Guidelines.htm. **DO NOT** write in or remove, for any reason, a student's research notebook or project display.

CSEF Animal Research Guidelines: The legitimate use of animals in science fair research projects presupposes two postulates: first, the use of animals for learning is morally acceptable; and second, that humans have a responsibility to grant the animals used with every humane consideration for their comfort and well-being. The proper care and use of animals is a primary concern of the CSEF and the Intel ISEF.

The use of Protista and other invertebrates is strongly encouraged for most research that would normally involve animals. Their wide variety and the feasibility of using larger numbers than is usually possible with vertebrates make them especially suitable. This is not to say that the use of vertebrate animals should be prohibited. Certain forms of investigation can only be done with vertebrates. Under proper supervision (which the CSEF and Intel ISEF rules require), students should be permitted to use vertebrates in research.

Given that, only studies that are agricultural, behavioral, observational or supplemental nutritional in nature AND involve only non-invasive and non-intrusive methods are allowed outside of a regulated research institution. Also, students are prohibited from conducting experiments that involve toxicity; conditioning with aversive stimuli, mother/infant separation or induced helplessness; pain; or predator/vertebrate prey interactions.

To provide humane treatment of animals, an animal care supervisor who is knowledgeable in the proper care and handling of the animals in question must assume primary responsibility for the conditions under which the animals are maintained.

Parents and Adult Sponsors: Parents, mentors and adult sponsors are coaches and supervisors for the duration of the students' project. They are to teach the "how-to" and provide safety supervision, but the student must do the work. The Intel ISEF and CSEF forms provide information on mentors or designated supervisors the student may have been working with. All students are required to have an Adult Sponsor for their project, but not all students will work with a mentor or designated supervisor. There are also times when they will consult with a professional, but that person does not provide ongoing mentorship.

Grand Award Judges' Conflict of Interest Policy: As a Grand Award Judge, when you submit your registration, either online or by mail, you agree to the following policy:

I hereby acknowledge that by submitting this registration, I agree to serve as a Grand Award Judge for the 2017 Colorado Science & Engineering Fair (CSEF). I agree to act in a positive and ethical manner in which each student encountered is treated fairly and respectfully. I agree to disclose all conflicts, potential conflicts and perceived conflicts of interest resulting from direct competitive, collaborative or any other relationships with any of the students and to recuse myself from judging in such circumstances. Some examples of a conflict of interest are (but not limited to):

- mentoring a student and then judging the student's project;
- judging a project at one of the Colorado Regional Science Fairs (http://www.csef.colostate.edu/Regional_Science_Fairs.htm) and judging the same project at the CSEF;
- being a captain/judge in the same category and division you were in at a regional science fair; or
- being a sponsor, teacher, or relative to a student that you would be judging.

I agree to notify CSEF's Grand Award Judging Coordinator **immediately**, if I become aware of any circumstances that would potentially compromise my ability to attend the event or evaluate finalists' projects. (If you have **any** question regarding this Conflict of Interest Policy, please contact Nancy Vaughan at grandawardsCSEF@gmail.com.)

Grand Award Judging Guidelines/Criteria: The following evaluation criteria will be used for Grand Award Judging at the 2017 CSEF. These guidelines and criteria align with the Intel ISEF. These guidelines use different criteria for science and engineering, mathematics and computer science projects. As shown below, both criteria have five sections as well as scoring for each section. Each section includes key items to consider for evaluation, both before and after the interview. Students are encouraged to design their posters in a clear and informative manner to allow pre-interview evaluation and to enable the interview to become an in-depth discussion. Judges should examine the student's research notebook and, if present, any special forms such as Form 1C (Regulated Research Institution/Industrial Setting), Form 2 (Qualified Scientist/Mentor) and/or Form 3 (Continuation/Research Progression Projects). *Considerable emphasis is placed on two areas: Creativity and Presentation, especially the interview section and are discussed below:*

Creativity: A creative project demonstrates imagination and inventiveness. Such projects often offer a different perspective that opens up new possibilities or new alternatives. Judges should place emphasis on research outcomes in evaluating creativity.

Presentation & Interview: The interview provides the opportunity to interact with the finalists and evaluate their understanding of the project's basic science, interpretation, and the limitations of the results and conclusions.

- If the project was done at a research or industrial facility, the judge should determine the degree of independence of the finalist in conducting the project, which is documented on **Form 1C**.
- If the project was completed at home or in a school, the judge should determine if the finalist received any mentoring or professional guidance.
- If the project is a multi-year effort, the interview should focus **ONLY** on the current year's work. Judges should review the project's abstract and **Form 7** to clarify what was completed for this year's science fair.

- Please note that both team and individual projects are judged together, and projects should be judged only on the basis of their quality. However, all team members should demonstrate significant contributions to the project and an understanding of the project.

Judging Criteria for Science Projects:

1. **Research Question (10 points):** clear and focused purpose, identifies contribution to field of study, and testable using scientific methodology
2. **Design & Methodology (15 points):** well-designed plan and data collection methods and variables and controls defined, appropriate and complete
3. **Execution - Data Collection, Analysis & Interpretation (20 points):** systematic data collection and analysis, reproducibility of results, appropriate application of mathematical and statistical methods, sufficient data collected to support interpretation and conclusions
4. **Creativity (20 points):** project demonstrates significant creativity in one or more of the above criteria
5. **Presentation (35 total points):**
 - a. **Poster (10 points):** logical organization of material, clarity of graphics and legends, and supporting documentation displayed
 - b. **Interview (25 points):** clear concise, thoughtful responses to questions, understanding of basic science relevant to project, understanding interpretation and limitations of results and conclusions, degree of independence in conducting project, recognition of potential impact in science, society and/or economics, quality of ideas for further research, and for team projects, contributions to the project and understanding of project by all members

Judging Criteria for Engineering, Mathematics & Computer Science Projects:

1. **Research Problem (10 points):** description of practical need or problem to be solved, definition of criteria for proposed solution, explanation of constraints
2. **Design & Methodology (15 points):** exploration of alternatives to answer need or problem, identification of a solution, development of a prototype/model
3. **Execution - Construction & Testing (20 points):** prototype demonstrates intended design criteria, prototype has been tested in multiple conditions/trials and prototype demonstrates skill and completeness
4. **Creativity (20 points):** project demonstrates significant creativity in one or more of the above criteria
5. **Presentation (35 total points):**
 - a. **Poster (10 points):** logical organization of material, clarity of graphics and legends, and supporting documentation displayed
 - b. **Interview (25 points):** clear concise, thoughtful responses to questions, understanding of basic science relevant to project, understanding interpretation and limitations of results and conclusions, degree of independence in conducting project, recognition of potential impact in science, society and/or economics, quality of ideas for further research, and for team projects, contributions to the project and understanding of project by all members

The above-mentioned criteria highlighted in blue shows the difference between the judging criteria for science projects and the engineering, mathematics and computer science projects.

Rating Card: Two-sided, blank rating cards for each project will be provided to each judge. The same rating card will be used for individual and team projects and will have the correct weighting for each criteria pre-printed on the card. A sample rating card can be found on page 14 of this guidebook.

The “Judge’s Comment Card - STUDENT COPY” portion is reserved for Judge’s comments to the students. This portion of the form will provide judges with the additional mechanism beyond the interview to get their comments to the students. Each judge needs to take the time to give feedback to every project.

When you provide comments on the Judge’s Comment Card, please use the pre-printed name labels provided, or complete the student’s name, division, and exhibit number with your comments. Remember to keep your comments constructive and encouraging and do not give the students any information on the points or ratings you awarded. Also, please **DO NOT** give the comment cards directly to the students or leave them at the students’ displays. They will be distributed after judging has taken place. Please return **ALL** comment cards to the Grand Award Judging Coordinator. The judging coordinator will separate and shred the rating cards from the comment cards and distribute them to the appropriate students and their projects.

Judging Recommendations & Protocol:

- Students may have worked on a project for more than one year. However, for the purposes of judging, only research that has been conducted since the last CSEF is to be evaluated. Although previous work is important, it is not to be considered as part of this year’s CSEF project. (Form 7 confirms and is used for continuation projects.)
- The detail and accuracy of their data and whether their procedures were used in the best possible manner is critical in judging of the project. Be careful not to include irrelevant and inappropriate criteria such as school size, access to well-equipped laboratories, student gender, race, physical disabilities, access to well-known mentors, etc. in your evaluation of the project. The project and individual or team’s knowledge of the project must stand on its own merit.
- When research is conducted in an industrial or institutional setting, the student is required to include Form 1C with the project documentation. Judges should review in detail the supervisor’s comments on this form when evaluating research conducted in such a setting.
- Look for evidence of laboratory, field, or theoretical work and not just the library research.
- Compare projects **ONLY** with those competing in the CSEF and not with projects seen in other competitions or scholastic events.
- Judges should keep in mind that the CSEF is not only a competition, but an educational and motivating experience for students. The high point of the CSEF for many students is the judging interviews. For this reason, judges should be encouraging when asking questions, offering suggestions, or giving constructive criticism. It is important for judges to consider all projects at the CSEF as important. Off-hand negative remarks or opinions about projects around the students at the CSEF may negatively affect students, so please keep all negative comments to the privacy of the judging room. All students competing at the CSEF have made it to this level through their Regional Science Fair competition and deserve encouragement for the effort they have made and the time they have spent on their projects.
- Even though the judging schedule is hectic, please make every effort to not rush a student or team through your interview.

CSEF Awards: The Special Awards Program and the CSEF Grand Awards Program operate very differently.

Special Awards & Scholarships: In this program, over 70 professional, scientific, engineering, and federal organizations send their own judges and use their own criteria to select special award winners. The awards range from college scholarships, cash awards, internships, equipment, plaques, books, medal and trophies to subscriptions and certificates. Some companies also give awards and recognition to the winners' teachers and schools.

The Special Awards judging occurs simultaneously with the Grand Awards judging. The Special Award judges will be asked to defer access to the projects and the students for interviews to the Grand Award judges. However, **ALL** judges are asked to cooperate with one another to ensure that all judging is accomplished in the allotted time.

Grand Award Judging: Individual and team projects will compete against each other in one of twelve categories for the following awards. Cash awards are given per project (team winners will split the award) and all non-cash awards are given per student (each team member will receive a medal, certificate, plaque or ribbon). A category judging team may decide not to award all 4 places or any honorable mentions in a category, but they must not skip over any award places (i.e.: if they want to give a 2nd place award, they must also award a 1st place; if they want to award any honorable mentions, they must award a 4th place; etc.).

The awards are as follows:

- 1st Place Junior & Senior Division Category Award winners will receive \$200, a blue ribbon medal, certificate, and be eligible for the Best-of-Fair (All Fair) Project Award.
- 2nd Place Junior & Senior Division Category Award winners will receive \$100, a red ribbon medal and certificate.
- 3rd Place Junior & Senior Division Category Award winners will receive \$50, a white ribbon medal and certificate.
- 4th Place Junior & Senior Division Category Award winners will receive \$25, a yellow ribbon and certificate.
- Honorable Mention Awards may be awarded to 20% of the number of entrants (individual & team) in each category. The number of honorable mention awards is left to the discretion of the grand award judging teams. Honorable Mention Award winners will receive an honorable mention ribbon and certificate.

No ties are allowed for 1st, 2nd, 3rd or 4th place awards. If there are any questions on awards to be given, please see the Grand Award Judging Coordinator for resolution.

Best-of-Fair (All Fair) Grand Awards: The Best-of-Fair (all Fair) Grand Awards are selected from the 1st place Grand Award winners in each category for both junior and senior divisions. Best-of-Fair 1st, 2nd, & 3rd place projects are chosen for the Junior Division and an additional 4th place (at the discretion of the Board of Directors) is selected for the Senior Division.

The awards are as follows:

- 1st Place Junior Division Best-of-Fair Project Award is \$200 and a plaque.
- 2nd Place Junior Division Best-of-Fair Project Award is \$100 and a plaque.
- 3rd Place Junior Division Best-of-Fair Project Award is \$50 and a plaque.
- All Senior Division Best-of-Fair Project Awards are an expense paid trip to compete at the Intel ISEF and a plaque. (Expenses covered include: airfare, hotel, ground transportation as needed; meal coper diem of \$150; registration; and trading pins.)

CSEF Grand Award Judging Process: As a Grand Award Judge, you are expected to use the **Judging Evaluation Guidelines/Criteria**, specified herein in the selection process of awards. A **Preliminary** Judging Team assignment list will be provided prior to the actual CSEF. You are assigned to a team based on the Judge's Information form you have submitted either online at the CSEF web site or mail to the Grand Award Judging Coordinator. As more information is received regarding the number of projects in each category and division, and as judge cancellations, additions and/or substitutions occur, a **Final** Judging Team assignment list will be available during the Judge's Check-in.

Please make sure you have read and are familiar with all the materials on judging that are supplied to you. This process is suggested as it is not possible to set up specific, finite criteria for judging. The judging of exhibits is basically the process of determining the merits of each exhibit as compared with other competitive exhibits in the respective category, or in the case of Best-of-Fair, comparing all of the 1st place projects in their respective division. Judging is done on a relative and not an absolute basis. In establishing a "frame of reference" for evaluating exhibits, bear in mind that these are middle and high school students and not PhD candidates, professional scientists or working a professional. Consider the academic level of the student in math, science or other relevant subjects for the individual or team you are judging. Judges should not be concerned with minor errors in a project if the basic objectives and intent are clearly evident. While judging, the various elements and relative weights of the elements as shown on the rating card should be kept in mind. The **Judging Evaluation Guidelines/Criteria** are weights that have been adopted from the Intel ISEF.

Judging Procedure: The following procedure is a guide to assist you in judging. Each judge should make his/her judging appraisal first, however, to establish the composite judgement of multiple judging teams in a category, some give and take of initial individual and team assessments must be expected. In discussing differences in selection, the basic merits of each exhibit must be the primary consideration.

The **Category Team Captain** is responsible for coordinating times for the team members to meet back for discussion; facilitating productive discussion and assuring that **ALL** judging team members' comments are considered equally in the decision making process; ensuring **ALL** judges understand the necessity for complete confidentiality of team discussions regarding all finalists' projects, both during and after the CSEF; making sure that **ALL** students' projects (individual and team) have been interviewed and evaluated at least three times; and that finalists' placements are provided to the Grand Award Judging Coordinator by 5:30 p.m. If any unresolvable issues occur, please notify the judging coordinator immediately to assist with resolution.

Judging Schedule:

1. Each judging team will be assigned a table for the Judges' Briefing, luncheon and judging process, which will afford opportunities to meet and establish and discuss general strategy and schedule for the team prior to entering the exhibit area. The LSC Theater is to be used for the judging teams to hold conferences throughout the day. To maintain confidentiality, do not use any other area in the LSC to discuss judging, including with CSEF officials.
2. After instructions from the Category Team Captain, you will place the pre-printed project ID labels provided for your assigned projects with the Student Name(s), Exhibit Number, and Exhibit Title on the Judges' Personal rating Cards. A supply of cards will be available at Check-in in the LSC Theater.

3. At 11:30 a.m., the students will be out of the exhibit area and judges will be allowed to enter and view the projects without the students present. To form some basis for judging, it is important that each judge take this opportunity to evaluate the exhibits to form a general "frame-of-reference" for their assigned exhibits. This is also the only opportunity you will have to look at the project research reports and displays in some detail without the students present.
4. The students will re-enter the exhibit area at 1:30 p.m. and will be at their exhibits for interviews. Interviews should be conducted by each judge individually, whenever possible.
5. ALL individuals and teams MUST be interviewed by at least three Grand Award Judges (or all judges on the team if there are less than three total projects), and as many members of the judging team as possible should interview each individual or team project. Please give all projects equal time (10 minutes is recommended) and, in particular, do not abbreviate interviews for projects that seem less competitive. Personal contact between students and judges is important, both for an objective and complete evaluation of the student or team's knowledge of the project and the student or team's learning experience. This is an educational process as well as a competition. For each project interviewed, judges need to put a blue-dot sticker (provided by the judging coordinator) on the project's hang tag, located in front of the project.
6. The Judges' Rating Cards and method of rating are the personal and confidential information for each individual judge (see page 15 for an example of the Judge's Rating Card).
7. The Judges' Comment Card - STUDENT COPY (right side of Judges' Rating Card) is used to pass on constructive comments to the students, but MUST be returned to the judging coordinator (and not given directly to the student) for distribution to the students. For the students, feedback from the Judges is a very important part of the process of the CSEF competition. ALL Grand Award Judges are responsible for making sure that each interview you have with a finalist receives comments from you. Your comments may provide a possible future direction of a project or areas of study that might be very helpful to the students.
8. As soon as individual judge's ratings are completed, exchange information with the team so that the order of placement of the exhibits can be established. The Category Team Captain is responsible for setting the judging and discussion schedule for the team members to meet the deadline of 5:30 p.m. for the selection of the 1st, 2nd, 3rd, 4th places and Honorable Mention awards for each category and division.
 - a. In the case of where multiple sub-teams (Teams A and B) exist for a category, the Category Team Captain and Assistant Captain need to coordinate the team's procedure and schedule to facilitate selection of the category winners. As soon as the top three or four exhibits are selected by multiple sub-teams, the information should be exchanged with the other sub-team in the category so that further comparison and interviews may be completed. The sub-teams should then meet for the final award selection.
 - b. If additional interviews are required to facilitate team discussions, care shall be used to avoid making obvious which exhibits are being considered for the awards while students are in the exhibit area. Please be aware that students will only be available for interviews until 5:00 p.m.
9. The judging coordinator will provide the Awards Results Form to the Category Team Captain only. The captain of each category is required to sign off on the Awards Results Form before turning it in to the judging coordinator. Each Category Team Captain will submit the Awards Results Form to the judging coordinator in the LSC Theater by 5:30 p.m.

10. After submitting the category award results, the Category Team Captains or designated Best-of-Fair judging team representative for each category and each division will assemble in the Grand Ballroom and await additional instructions from the Senior or Junior Division Best-of-Fair Team Captain (depending on which division you are judging in). The 1st place project winners from all 12 categories in both divisions will then be submitted for the Best-of-Fair judging, which starts at 5:45 p.m.
11. The Best-of-Fair judging teams will determine the 1st, 2nd and 3rd place projects for the Junior and Senior Divisions per the Best-of-Fair judging instructions. A Senior Division Best-of-Fair 4th place may be awarded at the discretion of the Board of Directors.

Best-of-Fair Judging Instructions:

1. In determining the Best-of-Fair winners, only the 1st place project category winners are eligible. All of the categories are to be given equal consideration for the Best-of-Fair Award.
2. Each Category Team captain shall be required to make a presentation to the rest of the Best-of-Fair Judging Team members on the 1st place winner of their respective category and answer questions from the rest of the judging team (Animal Sciences, Behavioral & Social Sciences, Chemistry & Biochemistry, Earth & Space Sciences), Energy, Engineering, Environmental Sciences, Math & Computer Sciences, Medicine & Health, Microbiology & Molecular Biology, Physics, and Plant Sciences).
3. The Best-of-Fair judging teams shall then examine the exhibits as a group in the exhibit area. Students should be out of the exhibit area by 5:30 p.m., but if they are not, please notify a CSEF official so that we can ensure the student(s)' departure from the exhibit area. The selection of the Best-of-Fair winners shall be completed by 8:30 p.m. The Best-of-Fair winners shall be recorded on the Awards Result Form and this, along with the category winners lists shall be turned in by the Best-of-Fair team Captains to the judging coordinator. The captain of each Best-of-Fair judging team is required to sign off on the Awards Results Form before submittal to the judging coordinator.

Confidentiality & Award Ceremony: **DO NOT** discuss the projects in hallways, restrooms, restaurants, CSU lobbies or elsewhere, as students or adult sponsors may overhear your comments. Please understand that all notes that are taken and discussions you have with fellow judges are considered confidential. All results of the judging process are considered confidential until they are announced at Friday night's Award Ceremony. If you have an opportunity to speak with any of the students you have judged after the judging has been completed, the conversations and notes of your team must still be considered confidential and not to be discussed with the students. However, it is totally acceptable for you to give your own personal encouragement and constructive feedback to a student or team, but not the information that was discussed with your category judging teams.

No judge shall disclose the name of any winner to anyone, except persons authorized to receive such information. This restriction is made so that the winners' names will not be known until announced at the CSEF Award Ceremony of Friday evening. All judges are encouraged to attend the Award Ceremony. For more information on location and time, please see the CSEF 3-day Schedule.

Colorado Science and Engineering Fair
Judge's CONFIDENTIAL Rating Card

(This portion will be destroyed after judging is complete.)

Exhibit Number: _____

Exhibit Title: _____

100 Maximum Total Possible Points

1. Research Question/Research Problem (10 points):

2. Design & Methodology/Engineering, Math, Computer Sciences Goal (15 points):

3. Execution: Data Collection, Analysis, Interpretation/Construction, Testing (20 points):

4. Creativity: (20 points)

5. Poster Display (10 points):

6. Interview (25 points):

Possible Contender: _____ Total Points: _____

Colorado Science and Engineering Fair
Judge's Comment Card - STUDENT COPY
(Return completed form to the Judging Coordinator.)

Student(s) Name(s):

Exhibit Number:

Exhibit Title:

.....
General Comments:

Place Pre-Printed label w/Student Info

1. The best elements of your project/research:

2. Recommendations for improvement of your project/research:

3. The best elements of your presentation/display:

4. Recommendations for improvement of your presentation/display: