2020 SARSEF Fair
Judging Guidebook

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Welcome and Thank You

Dear 2020 Judges,

2,227 projects.

Over 7,500 students with their work represented.

Nearly 350 judges volunteering their time to ensure that those students know how much their hard work matters. Rewarding the best and encouraging the rest.

That's just a snapshot of the SARSEF Fair. But there’s so much more to it.

Today, there will be many students who realize that they're smart enough and creative enough to pursue science or engineering.

Today, many students will realize that their project is something they can be really proud of.

Some students will walk away with the first award they’ve ever received. Others will receive scholarships that will increase their chances of attending college.

And none of this could happen without you.

While this is my first year as SARSEF Judging Chair, I’ve been Judging Chair for Arizona’s State Science and Engineering Fair for a year and a Category Co-Chair for ISEF for three years. And I am amazed at all that SARSEF students, judges, volunteers, and staff accomplish in a year. It is a true honor to be a part of it.

I know that I am taking part in a Tucson tradition. In its 65th year, SARSEF Fair has grown to its largest size yet. I hope that you feel that sense of pride, too.

Remember to be kind and to encourage every student. It means the world to them.

Sincerely,

Julie Euber, COO, Judging Chair, SARSEF
About SARSEF

Our Past
SARSEF is a 501(c)(3) organization with a rich history in Arizona. Our mission is creating the next generation of critical thinkers and problem solvers through science and engineering research. SARSEF encourages ALL citizens to make decisions based on data and form conclusions based on evidence.

Formed in 1955 to encourage the next generation of scientists and engineers, SARSEF has grown from a modest event with 100 research projects to over 100,000 K-12 students from 32 cities throughout Arizona. SARSEF's year-round programs culminate with the top 2,200 research projects advancing to the Tucson Convention Center for further consideration by YOU, the SARSEF Judges!

Our Future
According to the U.S. Bureau of Labor Statistics, STEM-related occupations will grow to more than 9 million by 2022. In addition to the strong technical skills necessary for STEM fields, employers acknowledge the advantages of coupling those skills with the ability to make logical decisions through problem solving and critical thinking. SARSEF knows, students who learn to consider problems in different ways and explain a solution will be well-prepared for educational and later career success. And YOU are making that happen by generously contributing your time and expertise. For example, 83% of female students stated that participating in SARSEF made them consider a STEM career. The need for STEM professionals is skyrocketing. And since entering a STEM-related field eventually also means a higher than average salary, this increased interest is not only good for each child, but long-term for our community. Together, we will help shape our future workforce and community leaders!

Our Present
SARSEF has focused on reaching more broadly into Title 1 (low income) and rural schools to ensure all students are exposed to higher level critical thinking, problem solving and STEM learning. This past year, SARSEF staff traveled over 2,585 miles across Arizona to teach and meet the needs of teachers, parents and students. As a SARSEF Judge, YOU are also helping to close Arizona’s achievement gap, which disproportionately affects minorities by encouraging the hard work of ALL students and recognizing their research. SARSEF is becoming increasingly representative of our diverse community. The 6,600 students who participated in the 2019 Fair were:

54% female and 46% male;
59% of the students are minority
60% of the students qualify for free & reduced meals.

Thanks to advocates and representatives like you, SARSEF has established trust with 237 companies and foundations that choose to contribute to furthering the organization’s mission.
SARSEF’s Major Programs:

- The SARSEF in-school and out-of-school Programs directly teach critical thinking and problem solving through research, impacting over 20,000 underrepresented (minority/female) students each year as well as 960 teachers, and 1,005 parents.

- S.T.A.R. Outreach Lab has opened in a partnership between SARSEF and the University of Arizona, giving high school students more resources to conduct their research.

- ACES (Applied Career Exploration in Science) is a 4-day summer camp for 50 middle school girls each year designed to expose them to a wide variety of careers, provide a path to potential success, and spark their interest in high education in the STEM fields. ACES stresses teamwork, use of technology, and hands-on learning, while giving our students a feel for the college experience at a critical time in their lives.

- Arizona STEM Adventure is an annual event, giving 1,000 4-8grade students a glimpse into the world of STEM research. Over 80 STEM professionals from the community share their world to motivate children to complete a research project of their own. Professional Development provides 50 teachers with best practices in guiding their students through the research process, and $100 in materials.

- Racing the Sun is a year-long program that challenges high school teams to design, build, and race solar-powered go-karts. Students must solve real-world problems, applying physics, engineering, and energy along the way. They are challenged to develop leadership skills as the ability to collaborate. The entire project culminates in Race Day in April, where all Arizona teams come together to race their karts.

- SARSEF Science and Engineering Fair enters its 65th year with 53,873 PreK-12 students completing projects, conducting research requiring critical thinking and problem solving. The top 2,000 projects and 6,000 students advance to this weeklong celebration of their achievements, competing for over $100,000 in prizes and an opportunity to compete at the International Science and Engineering Fair.
Schedule

Judging Day is Thursday, March 12th, 2020

We listened to your feedback! You will notice a few schedule changes this year in order to maximize your time. Reminders and updates for Elementary and Middle School Judging will begin at 8:00am and judging will begin promptly at 8:30am. For High School Judges, judging reminders and updates will be at 9:00am and judging will begin promptly at 9:30am.

7:30 - 8:00 a.m.: Elementary School and Middle School Judges arrive to check-in. Please arrive at or before 7:45am to ensure you have adequate time to meet your judging team — and to enjoy a light breakfast that we serve in thanks for your time.

8:00 a.m.: Judging instructions. You will receive a brief reminder of important points from the Guidebook and set up meeting times with your team.

8:30 a.m.: Project review and judging begins.

8:30 - 9:00 a.m.: High School Judges arrive and check-in. Please arrive at or before 8:45am to ensure you have adequate time to meet your judging team — and to enjoy a light breakfast that we serve in thanks for your time.

10:00 a.m.-11:30 a.m.: Interviews: ALL K-12 “Grand Award” and “Sponsored” judges will need to stop what they are doing and interview middle school students during this time period. These interviews are for practice only, and will not affect results but they are very important for teaching students how to speak to professionals and answer spontaneously. We need all of your help to make these future scientists feel special and support them. Do be kind!

11:30 - 12:15 a.m.: Lunch in Ballroom (Provided for High School Judges or may be picked up by ES/MS Judges if purchased in advance)

12:30 p.m.: Elementary and Middle School Grand Award results turned in to HUB.

12:30-3:00 p.m.: Interviews with high school students. High school judges follow their interview schedules to judge their assigned projects, and projects in their specialty. All others may leave once their team has completed judging, however you are welcome to stay to encourage our high school students!

4:00 p.m.: All Sponsored and Grand Award results must be turned in to the HUB.

4:00 p.m.: High School Top Award Team Leader Caucusing begins
Directions and Parking

The SARSEF Fair is held in the Exhibition Halls of the Tucson Convention Center, located on the Southwest side.

The TCC is located downtown at 260 S. Church Ave. You can access the area easily via Interstate 10, Broadway, or Stone Avenue.

Parking is Free!

Please proceed to Parking Lot B, immediately west or north of the Exhibit Hall building. You can reach that parking lot from Cushing Street or Granada Avenue.

Please tell the attendant you are here for SARSEF, and do not pay for parking!

The TCC’s doors should be open by 7:00 a.m. for registration. Proceed through to the main lobby, and our judge registration table will be set up outside the ballroom, where you will pick up your assignment, judging packet and name tag.
Your Role as a Judge

The role of a science fair judge is challenging, but it is a very rewarding and worthwhile effort. As a judge, you are given the unique opportunity to impact the lives of some very talented young people. Consider this: For many of these students, you may be the first professional they have ever met who is engaged in a science or engineering job for a living. You are an ambassador for your profession. You may very well influence their career choices.

- **Inspire:** Take care in what you say and do, as you are an example of the professionals that are involved in science, engineering and technology in our community! You are seen as someone with expertise and as a leader in the community. Show them you are someone to emulate. Be a role model.

- **Encourage:** The goal is to motivate and encourage students of all grade levels to continue in the science, engineering and technology fields. Positive and constructive comments are essential. At no time should a judge criticize a project or a student — however, suggestions are helpful and encouraged when kindly offered.

- **Evaluate:** Score the areas of the project per the judging criteria (see page 12), and based upon the grade level. The areas involved include:
  - Grades K-5: Curious investigation, statement of the problem and question, appropriate procedures, organization, as well as learning experience.
  - Grades 6-8: Creative ability, scientific though/engineering goals, thoroughness, skill level (tools/techniques), and clarity (can the process be followed?)
  - Grades 9-12: Creativity/ingenuity, scientific thought, thoroughness, skill, clarity. High school students should be conducting a thorough literature review, and an appropriate statistical analysis of data, or describing a sound engineering goal.
Ethics

- Ideally, judges will not sign up for a category of grade level where a student or a project may already be known — however, it may come as a surprise. If you become aware of a conflict of interest please let Julie Euber know right away. Any judge who knows a student personally — and has any indication that this knowledge may affect a decision (either positively or negatively) — should recuse him or herself from scoring or interviewing that student.
- At no time should personal agendas or competing organization’s agendas be a factor in any judge’s decision.
- All decisions should be fairly made without discrimination of any kind for race, gender, class, creed or affiliation.

Procedure for Judging

Assignments
At check-in, you will be given a list of projects assigned to you in your category. These assignments are made to ensure that each project is judged by a minimum of three judges, which makes the competition fair for the students!

If you have additional time after you have judged every project you were assigned, please continue to judge projects in your grade level and category that are in your area of specialty.

Criteria
ALL categories are judged using the same criteria. You may choose to evaluate any project using either the science or engineering rubric. Please select the rubric that you feel will be most advantageous to the project. These criteria are provided in your folder and at the end of this guidebook.

Elementary and Middle School Judges: Please judge the projects in their current category. We will not move or reassign projects. Since we use the same rubrics between categories, the best science and engineering will rise to the top! Please just score the project like the others in your category, and do not punish a student for making an inappropriate selection (often it is an honest mistake made by the wonderful teacher who entered the project in).

High School Judges, adjustments can be made if the change is advantageous to the project.

Group/Class Projects
Students in groups of more than four are doing Group/Class Projects. These are distinguished by the letter "C" in their locator number and are judged separately from all other projects. If you have more than one Group/Class Project in your category, judge them against each other and give out first, second, and third place awards as you see fit - these awards are separate from the grand award number at the top of your project sheet. If you only have one Group/Class Project in your category, you have an additional placement (first, second or third) that you can award to the project as you see fit.
Middle School Interviews
At 10:00am ALL Judges will take a break from scoring projects and speak to the excited young students in the hall. Middle School interviews are optional for the students, but if the student is present, middle school judges can consider the interview in their scoring process. If the student is not present, they should not be penalized. These interviews are very important for teaching students how to speak to professionals and answer spontaneously.

A sign-in sheet will be placed in front of each project, sign your name or initial when you interview a student. Then, when selecting the next student to interview, look for a sheet with fewer signatures than others. To help ensure that each student gets at least one interview, please look for projects in your corresponding category first (Elementary or High School Animal Science judges would go to 6th-8th grade Animal Science). Since interviews are optional, we want this to be a positive experience for every student! If you are unsure about what to ask during an interview, please read over Tips for Interviewing on page 13.

High School Interviews
All judges are welcome to stay to encourage our high school students!

High School Judges, you will receive a blank interview schedule in your folder. This sheet will correspond to a blank schedule in front of each project. As you score each project in the morning, we ask that you put your name down in one of the timeslots on the student's sheet, and put the project number in the corresponding time slot on your own sheet. Interviews will be broken up into 10 minute periods, allowing you about 8 minutes to talk to each student, and a few to finish writing notes or scores as you go on to the next project.

After you have scheduled yourself for each of the assigned projects, we encourage you to use your free periods to schedule additional interviews with projects in your category that were not assigned to you (especially if they are in your specialty), or to go back and ask more questions of a student you have already interviewed. Make sure to leave one slot empty so you remember to take a break and hydrate! Students will be on the floor from 12:15pm to 3:00pm.

For Tips on Interviewing, please see page 13.

Scoring and Awards
You will be provided with score sheets to help you identify your top projects. During Caucus, each judge will read their top three to five projects for each category or grade level while the team leader takes notes. This helps initially rank the projects, as those that appear multiple times are clearly a good place to start your discussion. Please do not base your caucus on scores alone, some judges may consistently score higher, or lower, than others, which is why we ask you to convert these scores to rankings. You may choose to visit your top contenders as a team to help inform your decision determining awards.

You will be provided with a suggested number of awards per category at the top of your awards sheet. These numbers are calculated as a percentage of each category. The number of each award is flexible! If you have two projects that are equally deserving of first- give it to them! But then don't award one of your seconds or thirds. And, if you have a tie of two equally deserving projects, we can always add an additional award.
Sponsored Awards
Some of you may have some extra sheets in your folder when you arrive. We are very fortunate to have Organizations that donate Special Awards to the students. We all know just how much it means to a student to be recognized for using their brain, and each of these organizations provides an additional opportunity for them to be recognized. Some of the organizations provide judges, while others would rather have YOU choose the winners! So, we are hoping you and your team are willing to help!

Important Reminders while Judging

● Please do not judge on display quality or access to resources. Great scientific or engineering research does not depend on access to a lab, computer, or printer. Many of the best projects are done at home. As for the project display, please judge based on the logical organization and content of the board, not the appearance or spelling errors.

● Please assume that ALL work is Student Work!
  ○ The teachers and schools have already judged projects and have determined what is student work and what isn’t- and they know best!
  ○ We encourage mentorship and parent involvement (for example, we tell parents it is OK if they transcribe for their students, but they should use their child’s language and stop typing the moment their child is quiet.) But handwriting is OK too!
  ○ You will be amazed by what students can do. Keep in mind you are judging projects done by natives to technology- kindergarteners really can use Microsoft Excel!

● Please do not reward an “Out of the Book” project unless there was a very unique twist added that made it “their own.” There are some projects we see every year that are straight from the internet. We tell students, teachers, and parents during outreach NOT to do the old standbys while training them how to come up with an original idea. It is OK to use these as a basis for a new or exciting idea, but it’s not okay to copy the project. If the student doesn’t care- why should we?

The use of a non-novel idea should be accounted for in the “creativity” score.

Here are a few examples of projects to watch out for:
  ○ Playing music to plants
  ○ Comparing paper towels, laundry detergent, batteries, nail polish, etc
  ○ Mentos and Diet Pepsi
  ○ Flipping water bottles

● The Research Process is Changing! There are many trends in research and education that come and go. You may notice that project boards are organized differently than what was the standard scientific method- that is OK! Hypotheses are not taught as much now
as “Questions” so please do not mark a project down for something like not having a stated hypothesis or using the metric system, we are looking at the process as a whole.

- All projects have been cleared by the Scientific Review Committee (SRC) and Display and Safety. You do not need to worry about whether a student has followed proper safety procedures. Either a school, or SARSEF level SRC has cleared the projects.

**Helpful Hints While Judging**

Although you will be using the judging criteria to score projects, here are a few helpful general thoughts about what makes a winning project.

- When you deliberate on the projects, use a few simple criteria for your decisions. Then use the more-detailed criteria for those that you have narrowed down.
- The quality of the student’s (or group of students’) work is what matters.
- Team projects and individual projects are judged the same. It is the quality of the work that matters.
- A less-sophisticated project that the student understands gets higher marks than a more sophisticated project that is not understood (this can be determined through interviews at the High School Level).
- Access to sophisticated lab equipment and endorsements from professionals do not guarantee a high-quality project. (Ask yourself: Did the student really understand what was going on?)
- It is acceptable if the student ended up disproving the objective or hypothesis of the experiment.

In general, high marks go to:

- “Early starters” who took a longer period of time to collect data
- Genuine scientific breakthroughs
- Discovering knowledge not readily available to the student
- Correctly interpreting and analyzing data
- Repetitions to verify experimental results — and enough subjects to adequately test
- Predicting and/or reducing experimental results with analytical techniques
- Experiments applicable to the “real world” (for engineering projects)
- Ability to clearly portray and explain the project and its results

In general, low marks go to:

- Ignoring readily available information (e.g. not doing basic library research)
- An apparatus (e.g. model) not useful for experimentation and data collection
- Improperly using jargon, not understanding terminology, and/or not knowing how equipment or instrumentation works

Please do your best to make sure that all of the participants remember the science fair as a positive experience in their lives.
Tips for Interviewing

Meeting the Student
When you first approach a student, please do so in a friendly, professional manner. Be sure to introduce yourself, explain your affiliation and offer a brief description of your background.

Conveying Fairness
As a judge, it is most important to show the students that you are fair and knowledgeable.

Your fairness is indicated by a few simple actions:
- Spend about the same amount of time with each student, and the same goes for group projects. Make sure you’re spending about the same amount of time talking with each student in the group.
- Listen carefully to the student’s explanation of the project.
- Find out more about the project and how it was done.

The questions you pose should not embarrass or intimidate the student. This sounds obvious, but oftentimes can be challenging to implement.

Asking Questions
The best tool in judging is your ability to ask questions. Be sensitive to what the student knows. You can always ask questions that the student can answer, and keep a conversation going for at least 5 minutes.

Some questions/variations all students should be able to answer:
- How did you come up with the idea for this project?
- What did you learn from your background research?
- How much time (or how many days) did it take to run the experiments — such as growing the plants, or collecting data points?
- How many times did you run the experiment with each configuration?
- How many experiment runs are represented by each data point on the chart?
- Did you take all data (run the experiment) under the same conditions (in other words, at the same temperature, time of day or lighting conditions)?
- How does your apparatus (equipment or instrument) work?
- What do you mean by [terminology or jargon used by the student]?
- When did you start this project, or how much of the work did you do this year? (NOTE: Some students may bring the prior year’s winning project back, with minimal enhancements.)
- What is the next experiment to do in continuing this study?
- What would you do differently if you had to do this again?
- What are the real-world applications of your findings?
- Are there any areas that we not have covered which you feel are important?
- Do you have any questions for me?

PLEASE NOTE: These are only suggestions to keep the conversation going.
Guiding the Discussion
Sometimes we come across projects in technical areas with which we are intimately familiar, but the student just didn’t get it. They made some incorrect assumptions, missed a key indicator in the data, came up with a false conclusion, or didn’t look at or understand some common principles.

It can be tempting to share your knowledge about the topic, to help the student appreciate what happened (or should have happened) in the experiment. Some judges have been observed to enthusiastically pontificate while a student stood idly listening. Before you do this, please consider that these students are smart, and the next judge may hear the student parroting back the knowledge you imparted.

You may try with your questions to lead the student toward the right answers, but you should not provide the answers. If you really feel compelled to make explanations, save them until near the end of the judging time when your knowledge will not be relayed to judges following you. Alternatively, you may give the student your card and invite future discussion about the project.

Be sure that your discussion meets the following science fair objectives to involve the student in discovery:

- Your conversation should resemble a discussion with an esteemed colleague who is having difficulty with some research. Together, you talk through the situation to mutually arrive at improved answers.
- The student should do most of the talking.
- Coax and/or coach the student into realizing and describing the correct conclusions. (Remember, it’s the student’s project, not yours!)
- Encourage the student to conduct more experimentation in order to verify the new conclusions.

Improving Communication
Since you are a judge, most students instinctively think of you as an intimidating figure. The more you can dispel this image, the more likely you are to help the student be less nervous, and engage in a better discussion. Again, simple things can make a difference:

- Make eye contact with the student.
- If the student is shorter than you, try to stoop, bend or squat down to lower your eye level.
- Tip your head to the side to indicate interest. (This is a universal nonverbal form of communication.)
- If you wear glasses, look at the student through them, not over the top of the frames.
- Whenever a student shows a good idea, be sure to use a compliment.
- Use a tone of voice that indicates interest or inquisitiveness — not skepticism or contempt.
To assure the perception of fairness, you also need to make sure that one student doesn’t monopolize your time. Some have a well-rehearsed pitch that may prevent you from having a chance to interact with the student. You have to find some way to break the pattern — and again, your tool is questioning. Politely interrupt with a question, usually in the form of “I'm sorry, I didn’t quite catch the relationship between that adjustment and this result” — or even some of the “any student can answer” questions, like “How many times did you run the experiment with each configuration?”

The idea is not to stop the student from talking, but to get the student to interrupt the “tape recording” and think about what is being communicated to you.

Many of these students are exceptionally bright. It is easy to think, when facing an incredibly impressive display and a supremely confident student that this student’s research is beyond your knowledge. If a project is really and truly completely outside your experience, you are still knowledgeable in the area of problem solving and the Scientific Method. Concentrate on these aspects rather than the details of a particular project.

If a student continues to use jargon, or refer to processes you are not familiar with, feel confident in stopping them and asking them to explain what it means. Not only is it important for them to be able to communicate their project with the public, asking basic questions is a great test of their understanding and many students see it as a “test” rather than a lack of understanding. Never assume the student knows what the technical terms mean or what a piece of equipment does, how it works, or why it was used.

Personal Tip: Sometimes I walk up to a student and am lost in the first 15 seconds. In these cases, I politely interrupt them and say that communication science to the masses is important. I then ask them to explain their project to me like I was a five-year-old, in four sentences or less. It is one of the hardest questions you can ask a student because it challenges them to think differently about their language, meanwhile you create common dialogue!

Keep in Mind -You Are Changing Lives
Although the most obvious reason for your being a judge at the science fair is to assist in assessment of the entered projects, a good judge knows that this is an important experience in the life of every participant. Please do your best to make sure that all of the participants remember the science fair as a positive experience in their lives.
Caucus Tips

These help keep the decision making the process faster, and less controversial, but are very formal. Smaller judging groups might not need these, while larger ones might find them handy.

Work from the Top, Down (start with first place, and work down to third)

- There is a reason that more than one person liked a project- so start the discussion there
- Then ask, are there other projects we should consider for first place?

Focus on one project at a time

- Start with the project with the most votes, and ask for a volunteer to briefly describe why they gave it a high mark.
- Then ask if anyone has anything to add about THAT project that has not yet been mentioned (in the positive or negative) in one minute.
- Establish that each judge may speak once about a project for no more than one minute, and may not speak about the project again until everyone else has had a chance to comment.
- Once everyone has contributed something NEW to say, ask for a vote for that project to be considered for first place (this is NOT decided to award it first, just establishing that it is in the "pool" of contenders).
- Then ask if another project should be considered for first place, and repeat this process above.

*Pro Tip*: Do not let this process get out of hand, if you have two first-place awards available, you should not have more than four contenders in your "pool."

- Once you have established a "pool" of first place projects, you will vote on each one individually. Ask "Who thinks this project (title and locator number) deserves a first place?" and count the number of votes. Repeat for each project in the "pool". Those with the highest number of votes, get the award spots.
- This is where you might want to rearrange the number of places. If you only have one first place, and the group feels two are worthy (and there votes show it), open up another spot at first place. But keep in mind you will either need to take a 2nd or 3rd away, or ask Julie Euber for another spot. *Note, this is important because if you have two projects that are of ISEF quality you want to be sure they each get a first place.*

Once a decision is made, it is Final! If this process is run well, there should be no reason to look back. You might need to remind a judge about the group’s vote.
Your Time Makes a Difference!

From 4th Grade Winner to Forbes 30 Under 30

Jeremiah Pate, who participated in the SARSEF Fair throughout his entire childhood, was recently named on the Forbes 30 Under 30 – Manufacturing & Industry 2020 List at the age of 21 and credits SARSEF for his success.

The research Jeremiah conducted for SARSEF as a high school student-led him to compete on the international level at ISEF and eventually found his own company, Lunasonde.

“SARSEF is really the only thing that added an experiential component – that allowed me to develop and to be an innovator. I can’t overstate this: SARSEF is an incredible organization and it’s had a huge impact on my life. I might have been a scientist or engineer before but wanting to change the world I owe to SARSEF,” Pate shared.

The Fair provides opportunity for students to be recognized for their intelligence and encourages them to explore questions that are important to them.

*Thank You for Creating the Next Generation of Critical Thinkers and Problem Solvers!*

**Judging Criteria**

The following evaluation criteria will be provided to you and used for judging at SARSEF. Judging is conducted using these guidelines, with approximate values assigned to the research question, design and methodology, execution, creativity, and presentation. Each section includes key items to consider for evaluation. Judges should take into consideration the grade level when scoring. Examine the student notebook, if present.

For Group/Class Projects, look for evidence that every child in the class had some responsibility or did part of the project.
The following evaluation criteria will be used for judging at SARSEF. This may assist you in evaluating each of these categories, however, the points are provided as guidelines only. Each section includes key items to consider.

I. Research Question (15 pts.)
___ question is something that this child or group of children genuinely might want to know
___ gives a reason for why this child (or children) wants to do the project
___ is authentic to this age level
___ question is asked clearly and is something that might be possible for a child to answer with assistance
___ question is narrowed down in scope (specific, not too broad or too many other parts)

II. Design and Methodology (25 pts.)
___ evidence that the child/children thought of what needs to happen in sequence/order (“First, I will...” “Then I will...”)
___ plan for how the child can collect data – i.e. place to make tally marks, drawing pictures along the way
___ appropriate # of subjects i.e. plans to watch more than one anthill, measure speed of 2-3 toy cars
___ plans adequate # of trials i.e. sends each car down ramp several times, watches ants in morning and afternoon
___ cares about safety of others, nature, self

III. Execution: Data Collection, Analysis and Interpretation (25 pts.) NOTE: adult help is allowed but somewhere in the project there should be evidence that it some or most of it was done by or with the child.
___ followed same idea each time - not too much variation i.e. does not change mind each time
___ uses basic touch counting strategies up to ten “1, 2, 3...”
___ makes a comparison, conclusion – using words like “More” or “Less” and “Bigger” or “Smaller”
___ evidence that each child had their “hands-on” most parts of the project
___ says what the answer to their question was (more points if based on their collected data)
___ recognizes the meaning of what was found - mentions why they did the project in the first place
___ when asked, can say what they wish they could do next time or if there were no limits (i.e. money, time)

IV. Creativity (20 pts.)
A creative project demonstrates imagination and inventiveness. Such projects are ones that the student personally cares about, have not been frequently listed in Science Fair idea books or web.
___ project demonstrates particular creativity for a young child in one or more Criteria I, II, III or V
___ idea appears novel - at least to this child
___ idea appears to be what student genuinely cares about as evidenced by reason given for doing project
___ there is passion the project: reason, discussion of the plan, or end results

V. Poster Board (15 pts.)
___ evidence the child experienced a science-related concept or skill and enjoyed the process
___ evidence that a child did part of this project on their own
___ evidence of the basic scientific process (question, test, results, conclusion)
___ colorful, creative and logical organization of display (drawings only are fine, expected)
___ hand drawn illustration of some part of the process, graph made out of Legos, M&M’s, etc.
The following evaluation criteria will be used for judging at SARSEF. This may assist you in evaluating each of these categories, however, the points are provided as guidelines only. Each section includes key items to consider.

I. Research Problem (15 pts.)
___ problem is something that this child or group of children genuinely might want to solve
___ gives a reason for why this child (or children) wants to solve this problem
___ problem is authentic to this age level
___ problem is actually something that might be possible for a child at this level to solve with assistance
___ problem is narrowed down in scope (specific, not too broad or too many other parts)

II. Design and Methodology (25 pts.)
___ identifies a possible solution after observing/studying the problem
___ comes up with an idea (drawing or note about their plan)
___ develops a prototype/model that is different from what exists already
___ evidence that the child thought of what needs to happen in sequence (“First, I will...” “Then I will...”)
___ plans at least one model variation, retrial
___ plans for how to collect data – i.e. chart for tally marks, simple journal for drawings
___ appropriate # of subjects i.e. plans to measure if 2-3 different tire sizes changes speed of toy car
___ plans adequate # of trials i.e. tries different tire sizes several times

III. Execution: Construction and Testing (25 pts.)
___ prototype/model follows plan each time without too much variation, tried to “stick to the plan”
___ evidence that each child had their “hands-on” most parts of the project, follows safety rules
___ uses basic touch counting strategies up to ten “1, 2, 3...”
___ makes a comparison, conclusion – using words like “More” or “Less” and “Bigger” or “Smaller”
___ shows changes made based on results
___ says what the best solution to their problem was (more points for if based on their collected data)
___ recognizes the meaning of what was found - mentions why they did the project in the first place
___ when asked, can say what they wish they could do next time

IV. Creativity (20 pts.)
A creative project demonstrates imagination and inventiveness. Such projects are ones that the student personally cares about, have not been frequently listed in Science Fair idea books or web.
___ project demonstrates particular creativity for a young child in one or more Criteria I, II, III or V
___ idea appears novel - at least to this child
___ idea appears to be what student genuinely cares about as evidenced by reason given for doing project
___ there is passion about the project: reason, discussion of the plan, or end results

V. Poster Board (15 pts.)
___ evidence the child experienced an engineering-related concept or skill and enjoyed the process
___ evidence that a child did part of this project on their own
___ evidence of the basic engineering design process was followed (research, design, execution)
___ colorful, creative and logical organization of display (drawings only are fine, expected)
___ hand drawn illustration of some part of the solution, graph made out of Legos, M&M’s, etc.
The following evaluation criteria will be used for judging at SARSEF. This may assist you in evaluating each of these categories, however, the points are provided as guidelines only. Each section includes key items to consider.

I. Research Question (15 pts.)
___ question is something that this child or group of children genuinely might want to know
___ gives a reason for why this child wants to do the project
___ is authentic to this age level
___ question is asked clearly and is something that might be possible for a child to answer at this level
___ question is narrowed down in scope, specific (can include other parts but not too many)

II. Design and Methodology (25 pts.)
___ evidence that the child thought of what needs to happen in order, numbered step by step plan (“1., 2., 3….“)
___ plan for collecting data – i.e. place to record time or number observed, or illustrations
___ appropriate # of subjects i.e. plans to watch more than one girl and boy race, measure several ages’ reactions
___ plans adequate # of trials i.e. rolls different balls several times, watches birds in trees for several days
___ cares about safety of others, nature, self

III. Execution: Data Collection, Analysis and Interpretation (25 pts.)
___ followed the plan without too much variation i.e. does not switch ways of doing things each time
___ evidence of counting up to 100, basic math such as adding to find totals and subtracting to find differences
___ compares using words like “Greater than” and “Less than” or “More” and “Fewer” or “Larger” and “Smaller”
___ evidence that each child had their “hands-on” most parts of the project, were actively present, involved
___ says what the answer to their question was, forms conclusion (more points if based on their collected data)
___ recognizes the meaning of what was found - mentions why they did the project in the first place
___ when asked, can say what they wish they could do next time or if there were no limits (i.e. money, time)

IV. Creativity (20 pts.)
A creative project demonstrates imagination and inventiveness. Such projects are ones that the student personally cares about, have not been frequently listed in Science Fair idea books or web.
___ project demonstrates particular creativity in one or more Criteria I, II, III or V
___ idea appears novel - at least to this child
___ idea appears to be what student genuinely cares about as evidenced by reason given for doing project
___ there is passion about the project: reason, discussion of the plan, or end results

V. Poster Board (15 pts.)
___ evidence the child experienced a science-related concept or skill
___ evidence that a child did some parts of this project on their own or was actively engaged in all parts
___ evidence of the basic scientific process (question, test, results, conclusion)
___ colorful, creative and logical organization of display (handwritten is fine, expected)
___ student-made illustration of some part of the process, graphs can be made out of Legos, M&M’s, etc.
The following evaluation criteria will be used for judging at SARSEF. This may assist you in evaluating each of these categories, however, the points are provided as guidelines only. Each section includes key items to consider.

I. Research Question (15 pts.)
___ problem is something that this child or group of children genuinely might want to solve
___ gives a reason for why this child wants to solve this problem
___ problem is authentic to this age level
___ problem is actually something that might be possible for a child at this level to solve with assistance
___ problem is narrowed down in scope, specific (can include other parts but not too many)

II. Design and Methodology (25 pts.)
___ identifies a possible solution after observing/studying the problem
___ comes up with an idea (drawing or notes about their plan)
___ develops a prototype/model that is different from what exists already
___ evidence that the child thought of what needs to happen in order, numbered step by step plan ("1., 2., 3…."")
___ plans at least one model variation, retrial
___ plan for collecting data – i.e. place to record times or numbers observed, or illustrated changes to prototype
___ appropriate # of subjects i.e. plans to measure how angle of ramps changes distance of several different balls
___ plans adequate # of trials i.e. tries different angle of ramp, each several times, several trials for each ball

III. Execution: Construction and Testing (25 pts.)
___ prototype/model follows plan each time without too much variation, tried to “stick to the plan”
___ evidence that each child had their “hands-on” most parts of the project, observes safety checks
___ evidence of counting up to 100, basic math such as adding to find totals and subtracting to find differences
___ compares using words like “Greater than” and “Less than” or “More” and “Fewer” or “Larger” and “Smaller”
___ shows changes to prototype made, based on results
___ says what the best solution to their problem was (more points for if based on their collected data)
___ recognizes the meaning of what was found - mentions why they did the project in the first place
___ when asked, can say what they wish they could do next time, what hope to find/do some day

IV. Creativity (20 pts.)
A creative project demonstrates imagination and inventiveness. Such projects are ones that the student personally cares about, have not been frequently listed in Science Fair idea books or web.
___ project demonstrates particular creativity in one or more Criteria I, II, III or V
___ idea appears novel - at least to this child
___ idea appears to be what student genuinely cares about as evidenced by reason given for doing project
___ there is passion about the project: reason, discussion of the plan, or end results

V. Poster Board (15 pts.)
___ evidence the child experienced a science-related concept or skill
___ evidence that a child did some parts of this project on their own or was actively engaged in all parts
___ evidence of the basic scientific process (question, test, results, conclusion)
___ colorful, creative and logical organization of display (handwritten is fine, expected)
___ student-made illustration of some part of the process, graphs can be made out of Legos, M&M’s, etc.
The following evaluation criteria will be used for judging at SARSEF. This may assist you in evaluating each of these categories, however, the points are provided as guidelines only. Each section includes key items to consider.

I. Research Question (15 pts.)
   ___ clear and focused purpose
   ___ states what is the question/problem that needs solving in their life, community, world?
   ___ follows rules, gets permission, question is testable using scientific process
   ___ the answer is not already obvious or out there if a simple search is conducted
   ___ is reasonable, follows safety rules, asks for and receives appropriate permission

II. Design and Methodology (25 pts.)
   ___ has a step by step plan and data collection methods that are consistent
   ___ has a test group and a control group (if appropriate), or multiple groups for testing
   ___ identification of variables that cannot be controlled but could affect the results
   ___ clearly written, numbered step by step plan to follow so other could do the same test
   ___ considered the appropriate # of subjects, adequate # of trials are planned

III. Execution: Data Collection, Analysis and Interpretation (25 pts.)
   ___ followed same planned method/process each time - not too much variation
   ___ enough data collected to reasonably answer question, allow for analysis of data
   ___ appropriate application of mathematical methods for comparison – use of fractions, averaging
   ___ forms a conclusions based on the data and evidence, refers to data
   ___ recognition of potential impact of what was done
   ___ refers back to the original question or problem, ideas for further research
   ___ include what challenges were presented, can say what they wish they could do next time

IV. Creativity (20 pts.)
A creative project demonstrates imagination and inventiveness. Such projects are ones that the student personally cares about, have not been done hundreds of times before or frequently listed in Science Fair idea books or web.
   ___ project demonstrates particular creativity in one or more Criteria I, II, III or V
   ___ idea appears novel – at least to the student (not almost the same or seen repeatedly)
   ___ idea appears to be something that student genuinely cares about, passion or enthusiasm is communicated

V. Poster Board (15 pts.)
   ___ understanding of basic science relevant to project, evidence of process that was followed
   ___ colorful, creative and logical organization of display (handwritten is still acceptable)
   ___ graphics (photo or drawing) including a basic graph of some kind
   ___ extra points for mentioning references, supporting documentation listed on board or notebook
SARSEF ENGINEERING
Judging Guidelines Gr. 3-5

The following evaluation criteria will be used for judging at SARSEF. This may assist you in evaluating each of these categories, however, the points are provided as guidelines only. Each section includes key items to consider.

I. Research Problem (15 pts.)
___ project has a clear and focused purpose
___ states what is the question/problem that needs solving in their life, community, world?
___ the answer is not already obvious or out there if a simple search is conducted
___ is reasonable, follows rules, asks for and receives appropriate safety precautions
___ definition of criteria for proposed solution, limitations

II. Design and Methodology (25 pts.)
___ exploration of several alternatives to answer an actual need/problem
___ identification of a possible solution that is practical, reasonable, doable
___ realistic plan for development of an actual prototype/model for testing
___ step by step plan and consistent data collection methods
___ recognition that there are variables that may NOT have been anticipated but could affect the results
___ plans appropriate # of models, adequate # of planned trials and retrials

III. Execution: Construction and Testing (25 pts.)
___ prototype actually demonstrates the intended design or variation
___ prototype was tested in more than one condition, and in multiple trials
___ followed the plan for testing, not too much variation in conditions, tried to do the same thing each time
___ documents changes made based on results
___ forms final conclusions based on the data
___ can say what they wish they could do next time, may include what challenges were presented

IV. Creativity (20 pts.)
A creative project demonstrates imagination and inventiveness. Such projects are ones that the student personally cares about, have not been done hundreds of times before or frequently listed in Science Fair idea books or web.
___ project demonstrates significant creativity in one or more Criteria I, II, III or V
___ idea appears novel – at least to the student (not almost the same or seen repeatedly)
___ idea appears to be something that student cares about, passion and enthusiasm is communicated

V. Poster Board (15 pts.)
___ clear communication of basic engineering design relevant to overall project
___ colorful, creative and logical organization of display (handwritten is still acceptable)
___ graphics (photo or drawing) including a basic graph or chart of some kind
___ extra points for references mentioned, listed on board or in notebook
SARSEF SCIENCE
Judging Guidelines for Middle School Gr. 6-8

The following evaluation criteria will be used for judging at SARSEF. This may assist you in evaluating each of these categories, however, the points are provided as guidelines only. Students are encouraged to design their posters in a clear and informative manner to allow thorough evaluation. Examine the student notebook.

I. Research Question (15 pts.)
___ project has a clear and focused purpose
___ idea is a question/problem that needs solving in student’s life, school, community, world
___ idea is testable using a scientific process, can be retested
___ the answer is not already obvious or out there if a simple search is conducted
___ is reasonable, follows safety rules, asks for and receives appropriate permission

II. Design and Methodology (25 pts.)
___ well-designed plan and data collection methods that will ensure consistent recording or results
___ control group and variables are identified
___ identification of variables that cannot be controlled but might affect the results
___ reproducibility of results, i.e. clearly written, step by step plan to implement
___ considered what would be the appropriate # of subjects, adequate # of planned trials and retrials

III. Execution: Data Collection, Analysis and Interpretation (25 pts.)
___ systematic data collection and analysis - same procedure each time, little variation conditions of testing
___ sufficient data collected to support interpretation and conclusions - several trials, many subjects in the study
___ appropriate application of mathematical methods for comparison - averaging, percentages, etc.
___ understanding limitations of results and conclusions, constraints
___ makes conclusions based on the data and evidence, refers to data
___ implications for larger community are thought about, ideas for further research, links to other studies
___ states whether question was answered, or if not, what challenges faced

IV. Creativity (20 pts.)
A creative project demonstrates imagination and inventiveness. Such projects are ones that the student personally cares about, have not been done hundreds of times before or frequently listed in Science Fair idea books or web. Creative projects offer different perspectives that open up new possibilities or new alternatives.
___ project demonstrates significant creativity in one or more Criteria I, II, III or V
___ idea appears novel – at least to the student (not copied or seen repeatedly)
___ idea appears to be something that student genuinely cares about, passion or enthusiasm is communicated

V. Poster Board/Interviews (15 pts.) New in 2019: If a student is present, interviews MAY be counted as a part of a student’s score. If not present, judge the board, alone (do not penalize the score.)
___ clear communication and evidence of understanding basic science concepts relevant to project
___ colorful, creative and logical organization of display facilitate communication of project
___ clarity of graphs, legends & graphics – at this level more than one graph or chart is expected
___ supporting documentation displayed – multiple references listed on board or in notebook
SARSEF ENGINEERING
Judging Guidelines Middle School Gr. 6-8

The following evaluation criteria will be used for judging at SARSEF. This may assist you in evaluating each of these categories, however, the points are provided as guidelines only. Students are encouraged to design their posters in a clear and informative manner to allow thorough evaluation. Examine the student notebook.

I. Research Problem (15 pts.)
___ project has a clear and focused purpose
___ problem is one that needs solving in student's life, school, community, world
___ the answer is not already obvious or out there if a simple search is conducted
___ is reasonable, follows rules, asks for and receives appropriate safety precautions
___ definition of criteria for proposed solution
___ explanation of constraints

II. Design and Methodology (25 pts.)
___ exploration of several alternatives to answer an actual need/problem
___ identification of a possible solution that is practical, reasonable, doable
___ well-designed plan and data collection methods that are as consistently implemented
___ realistic plan for development of an actual prototype/model
___ recognition that there are variables that may NOT have been anticipated but could affect the results
___ reproducibility of results i.e. clearly written step by step plan to construct or implement
___ plans appropriate # of models, adequate # of planned trials and retrials

III. Execution: Construction and Testing (25 pts.)
___ prototype actually demonstrates the proposed design
___ prototype was tested in multiple conditions, and in multiple trials
___ prototype demonstrates an engineering skill
___ systematic data collection and analysis - same procedure each time, little variation in conditions of testing
___ appropriate application of mathematical methods for comparison – averaging, ideally percentages
___ understanding limitations of results - mentions constraints
___ forms conclusions based on the data, refers to results
___ implications for broader community are thought about, ideas for further research explored
___ answers what problem was solved, or if not, what challenges faced

IV. Creativity (20 pts.)
A creative project demonstrates imagination and inventiveness. Such projects are ones that the student personally cares about, have not been done hundreds of times before or frequently listed in Science Fair idea books or web. Creative projects offer different perspectives that open up new possibilities or new alternatives.
___ idea demonstrates significant creativity in one or more Criteria I, II, III or V
___ idea appears novel – at least to the student (not copied or seen repeatedly)
___ idea appears to be something that student cares about, passion or enthusiasm is communicated

V. Poster Board/Interviews (15 pts.) New in 2019: If a student is present, interviews MAY be counted as a part of a student’s score. If not present, judge the board, alone (do not penalize the score.)
___ clear communication and evidence of understanding basic engineering relevant to project
___ colorful, creative and logical organization of display facilitate communication of project
___ clarity of graphs, legends & graphics – at this level more than one graph or chart is expected
___ supporting documentation displayed – multiple references listed on board or in notebook

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SARSEF Judging Guidelines
High School - Science Research Project

The following evaluation criteria will be used for judging at the Intel ISEF and SARSEF. Awards judging is conducted using a 100-point scale with points assigned to the research question, design and methodology, execution, creativity, and presentation. Following please find information that will assist you in evaluating and scoring in each of these categories.

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 notebook and, if present, any special forms such as Form 1C (Regulated Research Institution/Industrial Setting) and Form 2 (Qualified Scientist). Considerable emphasis is placed on two areas: Creativity and Presentation, especially the Interview section.

I. Research Question (10 pts.)
   ___ clear and focused purpose
   ___ identifies contribution to field of study
   ___ testable using scientific methods

II. Design and Methodology (15 pts.)
   ___ well-designed plan and data collection methods
   ___ variables and controls defined, appropriate and complete

III. Execution: Data Collection, Analysis and Interpretation (20 pts.)
   ___ systematic data collection and analysis
   ___ reproducibility of results
   ___ appropriate application of mathematical and statistical methods
   ___ sufficient data collected to support interpretation and conclusions

IV. Creativity (20 pts.)
   (A creative project demonstrates imagination and inventiveness. Such projects often offer different perspectives that open up new possibilities or new alternatives. Judges should place emphasis on research outcomes in evaluating creativity.)
   ___ project demonstrates significant creativity in one or more of the above criteria

V. Presentation (35 pts.)
   (Presentation/Interview: The interview provides the opportunity to interact with the finalists and evaluate their understanding of the project’s basic science, interpretation and 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 and Form 2.
   · If the project was completed at home or in a school laboratory, 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 (Intel ISEF Continuation Projects) to clarify what progress was completed this year.
   · 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 and an understanding of the project.)

a. Poster (10 pts.)
___ logical organization of material
___ clarity of graphics and legends
___ supporting documentation displayed

b. Interview (25 pts.)
___ 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
___ for team projects, contributions to and understanding of project by all members
SARSEF Fair Judging Guidelines
High School - *Engineering Design Project*
*(See Reverse for Science)*

The following evaluation criteria will be used for judging at the Intel ISEF and SARSEF. Awards’ judging is conducted using a **100-point scale** with points assigned to the research question, design and methodology, execution, creativity, and presentation. Following please find information that will assist you in evaluating and scoring in each of these categories.

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 notebook and, if present, any special forms such as Form 1C (Regulated Research Institution/Industrial Setting) and Form 2 (Qualified Scientist). Considerable emphasis is placed on two areas: **Creativity** and **Presentation**, especially the *Interview* section.

I. Research Problem (10 pts.)
   ___ description of a practical need or problem to be solved
   ___ definition of criteria for proposed solution
   ___ explanation of constraints

II. Design and Methodology (15 pts.)
   ___ exploration of alternatives to answer need or problem
   ___ identification of a solution
   ___ development of a prototype/model

III. Execution: Construction and Testing (20 pts.)
   ___ prototype demonstrates intended design
   ___ prototype has been tested in multiple conditions/trials
   ___ prototype demonstrates engineering skill and completeness

IV. Creativity (20 pts.)

* (A creative project demonstrates imagination and inventiveness. Such projects often offer different perspectives that open up new possibilities or new alternatives. Judges should place emphasis on research outcomes in evaluating creativity.)
   ___ project demonstrates significant creativity in one or more of the above criteria

V. Presentation (35 pts.)

* (Presentation/Interview: The interview provides the opportunity to interact with the finalists and evaluate their understanding of the project’s basic science, interpretation and 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 and Form 2.
  · If the project was completed at home or in a school laboratory, 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 (Intel ISEF Continuation Projects) to clarify what progress was completed this year.*
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 and an understanding of the project.

a. Poster 10 pts.)
   ___ logical organization of material
   ___ clarity of graphics and legends
   ___ supporting documentation displayed

b. Interview (25 pts.)
   ___ 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
   ___ for team projects, contributions to and understanding of project by all members