

JUNIOR SOLAR SPRINT



OVERVIEW

Junior Solar Sprint (JSS), an Army Educational Outreach Program (AEOP), provides a hands-on opportunity for students in grades 5-8 to apply science, technology, engineering, and mathematics (STEM) concepts, along with leadership and 21st century skills such as creativity, teamwork, and problem-solving skills, as they design, construct, and race a solar-powered car.

A wealth of resources for teachers to implement the JSS program can be found on the [AEOP JSS website](#).

All components of the entry must be finished, submitted, and accessible via the Internet by 11:59 p.m. EST on May 15th.

MANDATORY REQUIREMENTS

For participation in any virtual event, chapter advisors are required to collect a completed TSA Student and Parent Consent and Release and Acceptable Use Policy form for each individual participating in a competitive event remotely, and sign off on this requirement upon affiliation. A link to the form can be found on the [TSA website](#).

ELIGIBILITY

One (1) team of two to four (2-4) students per chapter may participate; one (1) entry per team.

A. Participants must be:

1. Part of a registered Technology Student Association chapter, or
2. Part of a group that competes at an approved Army host site

ATTIRE

Shirt: The official TSA shirt (royal blue) or a plain t-shirt or polo shirt with no graphics

Pants: Dress, skirt or pants

Shoes: dress shoes worn with dark socks, hosiery, open-toed shoes, or sandals

PREPARATION

- A. Participants concentrate their efforts on designing and creating a solar-powered model car, while observing the regulations.
- B. Participants record their design processes in a documentation portfolio.
- C. Participants prepare a solar-powered model car and the documentation portfolio according to regulations.
- D. Participants prepare a video demonstrating the functionality of the solar-powered model car.

REGULATIONS AND REQUIREMENTS

Students will work to develop their leadership and 21st century skills in the process of preparing for and participating in this TSA competitive event. The development and application of those skills must be evident in their submission, demonstration, and/or communication pertaining to the entry.

A. The Documentation Portfolio

1. Documentation materials (comprising a "portfolio") are required and must be submitted as a multi-page PDF document with pages in this order:
 - a. Title page with the event title, conference city and state, the year, and the team/chapter ID number; one (1) page
 - b. Table of contents; pages as needed
 - c. Project Log (see the Competition Project Log attached to this event) that indicates preparation for the competition, as noted by date, task, time involved, obstacles/issues encountered, modifications made, team member responsible, and any comments; pages as needed
 - d. Design drawings; pages as needed
 - i. Must show the model with a minimum of two (2) views
 - ii. The drawings must be developed using standard engineering practices and procedures (including measurements/dimensions)

- iii. The drawings may be produced using traditional drafting methods or CAD
- iv. Rough sketches should be included
- e. Photographic verification; pages as needed
 - i. Digital images clearly displaying:
 - 1. Various stages in the creation of the solar-powered car
 - 2. The completed car from a top, side and front perspective (as in an orthographic drawing) as well as any other relevant perspectives.
 - 3. That the model car, with the solar panel attached, does not exceed the dimensions outlined in the regulations
- f. Design details of the model, including model size, wheel size, gear ratio, specifications of the motor and solar panel used, etc; one (1) page
- g. Components list; one (1) page
- h. Design process description, including pre-testing notes of various configurations of the model and revision notes about the model design throughout the process; pages as needed
- i. If any part of the entry contains images or video of people, the Photo/Film/Video Consent and Release Form must be provided for each person in the video. Note: Minors require parental con-sent.

B. Solar-Powered Model Car

1. The materials used to construct the model car must cost less than \$50.
2. Original receipts for all materials purchased must be recorded in the Supplied Components List
3. If using recycled materials, documentation must show how these items were obtained.
4. Recycled materials are not included in the \$50 maximum.
5. Model cars that exceed the \$50 construction cost limit will be disqualified from the competition.
6. The vehicle must be structurally sound without the solar panel attached.

7. Solar Paneling

- a. One (1) solar panel (limited to a maximum output of 3.2 W), and one (1) motor (limited to a maximum 3.0 VDC) are allowed per car.
- b. The Ray Catcher Sprint Kit sold by Pitsco (www.pitsco.com/Ray-Catcher-Sprint-Kit) or the JSS Solar Panel sold by Solar Made (www.solarmade.com/store/product/jss-kit) are the only panels that can be used in the competition.
- c. Solar panels cannot be shaved, drilled, or delaminated.
- d. Only the motor supplied in the kit can be used.
- e. Motors cannot be re wound or disassembled.
- f. If an evaluation group convened by the event coordinator determines that the solar panel and/or motor have been modified, the car and team will be disqualified from the competition.
- g. The solar panel cannot be used as the chassis, or body, of the car.
- h. The axles and wheels cannot be directly attached to the solar panel.
- i. Reflectors, supports, and power leads can be added to these components as needed, but they must fit within the required dimensions.
- j. The model car must, with the solar panel attached, not exceed the following dimensions:
 - i. 60 cm (23 5/8 inches) length
 - ii. 30 cm (11 13/16 inches) width
 - iii. 30 cm (11 13/16 inches) height (as measured from the surface the car is resting upon to the highest point of the car, with all its components attached)
- k. The team is encouraged to decorate the body of the car, but a clearly visible three (3) cm square space must be available on the car to display the team ID#.
- l. The sun's light is the only energy source that can be used to power the vehicle. Batteries, capacitors, flywheels, or any other energy storage devices are prohibited.

C. The Race Video

1. Participants create a video presentation demonstrating the functionality of the solar-powered car, that can be no more than ten (10) minutes in length.
2. Introduction:
 - a. An introduction must be included in the video. Introduce your chapter, the conference year, and the title of the competitive event; no identifying information other than the chapter ID may be used.
 - b. Demonstrate that the race lane is 60 cm wide by 20 m long and that the track is a hard, flat surface, such as a tennis court or a smooth-surface running track.
 - c. Demonstrate that the solar-powered car and panel are within the specifications outlined in this virtual guide.
 - d. Failure to include the introduction will result in disqualification from the event.
3. Timing the race
 - a. At race time, each car will be placed with the most forward part of the vehicle set even with the starting line and all of its wheels in contact with the ground.
 - b. Each solar car's panel car will be covered completely by an opaque sheet covering that does not touch the solar panel.
 - c. The opaque sheet will be removed at the start of the race, allowing the vehicle to collect solar power and start driving.
 - d. The lower right-hand corner of the video screenshot must display a visual of a stopwatch timing the vehicle during the race. The stopwatch must be visible on the screen and may not be incorporated as a separate screencast.
 - e. Race timing must stop once the solar vehicle crosses the finish line. Video needs to show the start of the watch, the start of the race, and clearly show the vehicle crossing the finish line.

- f. Video should include the fastest of the two (2) time trials.
- g. Teams will record the finish times online in the submission form.
- h. During the time trials, the video shall not be modified in any way.
- i. If it is determined that the video is modified in any way, the team will be disqualified.
- j. All video footage, graphics, special effects, and audio clips must be originally created/filmed by the participants.

D. Submission

1. Participants submit a multi-page PDF of the documentation portfolio and a hyperlink of the video demonstration to the designated submission file. Participants may choose any video hosting site, such as an UNLISTED YouTube URL of the video, as long as the video is located online and accessible for evaluation.
 2. Submission information will be provided on the [TSA website](#) under the Junior Solar Sprint (JSS) page.
 3. If a URL link is provided, the URL must point directly to the participant's entry. Entries that require a software download, or a request that access be granted, will not be judged.
 4. Entries received, or changes made to submitted entries after the deadline will not be judged.
- E. Email verification of each team's entry will be made by June 10th.
- F. Judges evaluate the entries and score the video races. Only the race scores of the top sixteen contestants will be recorded in the rubric.
- G. The top ten (10) finalists are announced via the TSA website.

EVALUATION

- A. The documentation portfolio
- B. The artisanship and engineering of the solar-powered model car
- C. The video demonstration of the model

Refer to the official rating form for more information.

STEM INTEGRATION

This event aligns with the STEM (Science, Technology, Engineering, and Mathematics) educational standards.

LEADERSHIP AND 21ST CENTURY SKILLS DEVELOPMENT

This event provides opportunity for students to build and develop leadership and 21st century skills including but not limited to:

- Communication
- Collaboration/Social Skills
- Initiative
- Problem Solving/Risk Taking
- Critical Thinking
- Perseverance/Grit
- Creativity
- Relationship Building/Teamwork
- Dependability/Integrity
- Flexibility/Adaptability

CAREERS RELATED TO THIS EVENT

This competition has connections to one (1) or more of the careers below:

- Energy efficiency technician
- Mechanical engineer
- Solar engineer
- Solar panel installer
- Solar sales consultant

COMPETITION PROJECT LOG

JUNIOR SOLAR SPRINT COMPETITION



Date	Task	Time involved	Team member responsible	Obstacles encountered	Modifications made	Comments
1.						
2.						
3.						
4.						
5.						
6.						
7.						

Advisor Signature: _____

Participant/Team ID# _____

JUNIOR SOLAR SPRINT

2021 OFFICIAL RATING FORM

MIDDLE SCHOOL

Judges: Using minimal (1-4 points), adequate (5-8 points), or exemplary (9-10 points) performance levels as a guideline in the rating form, record the scores earned for the event criteria in the column spaces to the right. The X1 or X2 notation in the criteria column is a multiplier factor for determining the points earned. (Example: an "adequate" score of 7 for an X1 criterion = 7 points; an "adequate" score of 7 for an X2 criterion = 14 points.) A score of zero (0) is acceptable if the minimal performance for any criterion is not met.

Go/No Go Specifications

- Before judging the entry, ensure that the items below are present; indicate presence with a check mark in the box.
- If an item is missing, leave the box next to the item blank and place a check mark in the box labeled ENTRY NOT EVALUATED.
- If a check mark is placed in the ENTRY NOT EVALUATED box, the entry is not to be judged.

- PDF of the documentation portfolio was submitted
- Photographs of the model are present
- The video demonstration was submitted online and is accessible
- ENTRY NOT EVALUATED

VIDEO DEMONSTRATION AND MODEL CAR (80 points)				Record scores in the column spaces below.
CRITERIA	Minimal performance	Adequate performance	Exemplary performance	
	1-4 points	5-8 points	9-10 points	
Video (X2)	The quality of the video is poor and detracts from the vehicle performance. Audio is muffled, lighting is an afterthought, and parts of the introduction are missing.	The quality of the video is adequate and demonstrates the model's specifications and performance. Certain aspects of the model car are evident. Audio is clear and all parts of the introduction are present.	The quality of the video is exemplary, includes eye-catching details, and meets the size specifications; the model's features are evident and the model performance is well-captured.	
Model Design (X2)	The design of the solar model is poor and shows little effort.	The design of the solar model is adequate but not of exceptional quality.	The design of the solar model exhibits exceptional quality.	
Model Creativity/Originality (X2)	The solar model car design lacks creativity and originality; little effort is apparent; car is an exact replica, or nearly an exact replica of purchased kit.	The solar model car design demonstrates an adequate level of creativity and originality; at least one (1) modification has been made to the car.	The solar model car design shows exceptional creativity, originality, artanship, and engineering.	
Model Construction (X2)	The solar model car lacks quality of construction.	The solar model car demonstrates adequate quality of construction.	The solar model car demonstrates exceptional quality of construction.	
VIDEO DEMONSTRATION AND MODEL CAR SUBTOTAL (80 points)				

DOCUMENTATION PORTFOLIO (50 points)			
CRITERIA	Minimal performance	Adequate performance	Exemplary performance
	1-4 points	5-8 points	9-10 points
Portfolio Components (X1)	A number of portfolio components are missing.	Most of the portfolio components are included, but the portfolio lacks overall quality.	The portfolio includes all required components; it is neat and properly organized; effort and quality are evident.
Project Log (X1)	The Project Log is lacking significant portions; it is messy and demonstrates lack of effort.	The Project Log is acceptable, with most information included.	The Project Log is complete and accurate; the presentation is neat and orderly; a great deal of effort is evident.
Design Drawings and Photographs (X1)	Some drawings and photographs are missing and are of poor quality.	Drawings and photographs are acceptable; various perspectives are depicted.	Drawings and photographs are accurate, complete and truly depict the craftsmanship of the design; all required views are present; rough sketches are included.
Design Details/ Components List (X1)	Several details of the model, such as model size, wheel size, and gear ratio are missing and/or are poor; the components list is very limited.	Most details of the model, such as model size, wheel size, and gear ratio are included; most components are included.	All details of the model, such as model size, wheel size, and gear ratio are present; all components are included.
Design Process Description (X1)	The design process description lacks detail and is poorly documented.	Most of the design process description is present.	All parts of the design process description are present.
DOCUMENTATION PORTFOLIO SUBTOTAL (50 points)			

Record scores in the column spaces below.

Rules violations (a deduction of 20% of the total possible points for the above sections) must be initialed by the judge, coordinator, and manager of the event. Record the deduction in the space to the right.

Indicate the rule violated: _____

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RACE (60 points)							
1st	2nd	3rd	4th	5th & 6th	7th & 8th	9th-12th	13th – 16th
60 Points	55 Points	50 Points	45 Points	40 Points	35 Points	30 Points	25 Points
RACE SUBTOTAL (60 points)							

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Rules violations (a deduction of 20% of the total possible points for the above sections) must be initialed by the judge, coordinator, and manager of the event. Record the deduction in the space to the right.

Indicate the rule violated: _____

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To arrive at the FINAL TOTAL score, subtract rules violation points, as necessary. **TOTAL SCORE (190 points)**

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