

OVERVIEW

Participants in this event have the opportunity to demonstrate their understanding of CAD fundamentals as they create a two dimensional (2D) graphic representation of an engineering part or object. For example, participants may be given an isometric drawing and would be expected to generate the required 2D views, complete with dimensions.

ELIGIBILITY

Two (2) individuals per state may participate.

TIME LIMITS

PRELIMINARY ROUND

1. Thirty (30) minutes set-up time
2. Two (2) hours to develop the drawing(s)
3. One (1) hour for evaluation

LEAP PROGRAM

An individual LEAP Response is required for this event and must be submitted at event check-in.

ATTIRE

TSA competition attire is required.

PROCEDURE

PRELIMINARY ROUND

1. Participants report to the event area at the time and place stated in the conference program and submit a hard copy of the LEAP Response with no report cover.
2. Each participant, with one (1) assistant (an instructor, fellow student, or adult chaperone), is allowed thirty (30) minutes to set up and test equipment. At the end of the thirty (30)-minute set-up period, assistants are required to leave the area.
3. Participants are given a design problem to solve during a two (2)-hour work session.
4. Participants work independently, without assistance from judges, teachers, fellow participants, other students, or observers.

5. At the end of the session, participants save their work on their hard drives and back up saved work on a USB flash drive. All USB Flash drives become the property of TSA and will not be returned.
6. One (1) additional hour is spent interviewing participants and evaluating the entries from each participant's computer monitor.
7. Participants break down and remove their equipment.

SEMIFINAL ROUND

1. The LEAP Response will be judged for semifinalists.
2. Ten (10) finalists will be announced during the conference awards ceremony.

REGULATIONS AND REQUIREMENTS

PRELIMINARY ROUND

- A. Participants provide:
1. Their own system, including hardware and CAD software.
 - a. Only one [1] CPU and one [1] monitor are allowed per student
 - b. Laptop computers are recommended
 - c. Computers must be equipped with a USB port
 2. One blank USB flash drive labeled with the registered student identification number, for submission (to become property of TSA)
 3. Power strip/surge protector
 4. 20' extension cord
 5. Reference materials, which must be printed resources; no online resources will be allowed
 6. Pencils
 7. It is not necessary to bring a printer for this event.
- B. Participants will be provided with sketching paper and electricity.
- C. Participants are advised to save their work onto their hard drives every fifteen (15) minutes.

- D. TSA DOES NOT provide internet for students. The software students intend to use for the competition MUST be pre-loaded directly on their machines.
- E. Participants are not permitted to:
 - 1. Leave the event room without permission from the event coordinator. If a participant must use the restroom he/she is accompanied by an escort.
 - 2. Share solutions to problems, reference materials, hardware, or software.
- E. Participants identify their work using only their student identification number.
- F. Breakdown of equipment is permitted only after the work of all participants has been evaluated.

SEMIFINAL ROUND

- A. The LEAP Response:
 - 1. Participants document the leadership skills they have developed and demonstrated while working on this event, and on a non-competitive event leadership experience.
 - 2. Find the specific LEAP Response regulations in the LEAP Program section of this guide, and on the [TSA website](#).

EVALUATION

- 1. The quality of the entry submitted for the on-site problem
- 2. The content and quality of the LEAP Response

Refer to the official rating form for more information.

STEM INTEGRATION

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

CAREERS RELATED TO THIS EVENT

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

- Engineer
- Automobile designer
- CAD professional
- Machine designer

CAD FOUNDATIONS

2020 & 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.

- Computer/monitor or laptop, CAD software, extension cord, power strip, and a flash drive are present.
- Completed LEAP Response is present
- ENTRY NOT EVALUATED

LAYOUT (70 points)				Record scores in the column spaces below.
CRITERIA	Minimal performance	Adequate performance	Exemplary performance	
	1-4 points	5-8 points	9-10 points	
Geometry and Drawing Orientation (X2)	The correct views, constructive geometry, and orientation have not been selected or used throughout the drawing process and final layout.	Most of the views, constructive geometry, and orientation selected and used are correct and in the proper layout.	All of the views, constructive geometry, and orientation that have been selected and used are correct and in the proper layout.	
Line Conventions (X2)	Proper line types have not been used throughout the drawing process.	Most of the proper line conventions have been used, with one or two mistakes.	All of the correct line types are used in the correct locations.	
Dimensioning (X2)	Many of the necessary dimensions are missing or placed incorrectly.	Most of the required dimensions are included and placed correctly.	All of the necessary dimensions are included and correctly placed; this includes hole & thread notes (if applicable).	
Title Block (X1)	The title block is missing or is missing scale, title of drawing, student ID, or date.	The title block is present, but is missing either scale, title of drawing, student ID, or date.	The title block is present and contains all required elements: scale, title of drawing, student ID, and date.	
LAYOUT SUBTOTAL (70 points)				

SOFTWARE UTILIZATION (30 points)				Record scores in the column spaces below.
CRITERIA	Minimal performance	Adequate performance	Exemplary performance	
	1-4 points	5-8 points	9-10 points	
Application of Drawing Knowledge (X1)	There is little evidence that the student is able to read and interpret mechanical drawings.	There is some evidence that the student is able to read and interpret mechanical drawings.	There is overwhelming evidence that the student can read and interpret mechanical drawings.	
Use of CAD Features and Functions (X2)	There is little evidence of an understanding and application of CAD functions.	There is evidence of a general understanding and effective application of CAD functions.	A complete and effective understanding and application of CAD functions is evident.	

SOFTWARE UTILIZATION SUBTOTAL (30 points)

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: _____

PRELIMINARY SUBTOTAL (100 points)

SEMIFINAL LEAP RESPONSE (10 points)

CRITERIA	Minimal performance	Adequate performance	Exemplary performance
	1-4 points	5-8 points	9-10 points
LEAP Response (10% of total event points)	The individual's efforts are not clearly communicated, lack detail, and are unconvincing; few, if any, attempts are made to identify and incorporate the SLC Practices.	The individual's efforts are adequately communicated, include some detail, are clear, and are generally convincing; identification and incorporation of the SLC Practices are satisfactory.	The individual's efforts are clearly communicated, fully-detailed, and convincing; identification and incorporation of the SLC Practices are excellent.

Record scores
in the column
spaces below.

SEMIFINAL LEAP RESPONSE SUBTOTAL (10 points)

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

Indicate the rule violated: _____

SEMIFINAL SUBTOTAL (10 points)

To arrive at the TOTAL score, add any subtotals and subtract rules violation points, as necessary.

TOTAL (110 points)

Comments:

I certify these results to be true and accurate to the best of my knowledge.

JUDGE

Printed name: _____ Signature: _____

CAD FOUNDATIONS

EVENT COORDINATOR INSTRUCTIONS

PERSONNEL

- A. Event coordinator
- B. Judges:
 1. Preliminary round, two (2) or more
 2. Semifinal round, two (2) or more (preferably the same judges who completed the preliminary round)
- C. Assistants, one (1)

MATERIALS

- A. Coordinator's packet, containing:
 1. Event guidelines, one (1) copy for the coordinator and each judge
 2. TSA Event Coordinator Report
 3. List of judges/assistants
 4. Results envelope with coordinator forms
- B. One (1) ream of 8½" x 11" white copier paper
- C. Statement of problem as a hard-copy sketch; copies, as needed
- D. Tables and chairs for event coordinator, judges, and participants

RESPONSIBILITIES

AT THE CONFERENCE

1. Attend the mandatory event coordinator's meeting at the designated time and location.
2. Report to the CRC room and check the contents of the coordinator's packet.
3. Review the event guidelines and check to see that enough personnel have been scheduled.
4. Inspect the area(s) in which the event is to be held for appropriate set-up, including room size, chairs, tables, outlets, etc. Notify the event manager of any potential problems.
5. At least one (1) hour before the event is to begin, meet with judges and assistants to review time limits, procedures, regulations, evaluation, and all other details related to the event. If questions arise that cannot be answered, speak to the event manager before the event begins.

PRELIMINARY ROUND

1. Check the registration list and assign participants to work stations.
2. Late entries are considered on a case-by-case basis and only when the lateness is caused by events beyond the participant's control.
3. In order to compete, participants must be on the entry list or must have approval of the CRC.
4. All participants and judges should be in the room at this time. Participants not present may be disqualified.
5. Allow thirty (30) minutes for participants and their assistants (no more than one [1] per participant) to set up equipment.
6. At the end of the thirty (30)-minute set-up time, non-participants are required to leave the event area.
7. Review the time limits, procedures, regulations, and protocol of the event with the participants.
8. Distribute copies of the CAD problem.
9. Remind participants to save their work at regular time intervals.
10. Answer any appropriate questions concerning the CAD problem.
11. Begin the event and announce the ending time.
12. Judges and assistants monitor and evaluate participant progress and work.
13. Announce the time remaining to work at one (1) hour, thirty (30) minutes, fifteen (15) minutes, and five (5) minutes before time is called.
14. When time is called, participants stop, save their work on their hard drives, and back-up on their USB flash drives.
15. Each entry must include the student's identification number.
16. Participants are required to remain in the area while their entries are being judged, but may be asked to leave the room while judges discuss entries.
17. Judges independently assess the entries.

18. Decisions about rules violations must be discussed and verified with the judges, event coordinator, and the CRC manager to determine either:

- To deduct twenty percent (20%) of the total possible points in this round
- To disqualify the entry

The event coordinator, judges and CRC manager must all initial either of the violations on the rating form.

19. Breakdown of equipment is permitted only after the work of ALL participants has been evaluated.

20. Judges determine the twelve (12) semifinalists.

SEMIFINAL ROUND

1. Judges independently evaluate the LEAP Response for each semifinalist participant using the official rating form.
2. Discuss rule violations (e.g. 20% deduction, disqualification) and have all relevant parties initial the rating form.
3. Judges determine the ranking of the ten (10) finalists and discuss and break any ties.
4. Submit the finalist results and all related forms in the results envelope to the CRC room.
5. If necessary, manage security and the removal of materials from the event area.