



# PROBLEM SOLVING

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## OVERVIEW

Participants use their skills in problem solving to develop a finite solution to a stated problem provided on site. Participants work as a team to provide the best solution, which is measured objectively.

## ELIGIBILITY

One (1) team of two (2) members per chapter may participate.

## TIME LIMITS

Two (2) hours for the design and construction of the solution are permitted.

## LEAP

A team LEAP Response is required for this event and must be submitted at event check-in (see LEAP Program).

## 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 their LEAP Response.
2. The problem, the evaluation criteria, and the materials are distributed.
3. Teams are allowed two (2) hours to design and construct a solution.
4. Each solution is tested as soon as possible after the construction phase is completed. (Some problems may require teams to be present for testing.)
5. A list of twelve (12) semifinalist teams (in random order) will be posted.

### Semifinal Round

1. The LEAP Response will be judged for semifinalist teams.
2. Ten (10) finalists are announced at the awards ceremony.

## REGULATIONS

### Preliminary Round

- A. All work must be completed in the event area during the time specified for the event.
- B. Specific materials related to the on-site problem will be provided by TSA.
- C. Only the materials issued to each team by the event coordinator, or the items that students are required to bring, may be used in the development of the solution.
- D. Participants are required to provide their own tool box/container:
  1. Must include identification (school name, address, and advisor cell phone number)..



2. Must not exceed twenty (20) inches (508 mm) length x ten (10) inches (254 mm) width x ten (10) inches (254 mm) height.
  3. Must contain all tools and materials needed to fabricate the solution. The following is a suggested list, with some required materials indicated:
    - a. Cutting devices; NONE may be electric
    - b. Adhesives
      - i. aerosol and electric applicators are not allowed
      - ii. a bottle of Uncure or Debonder is recommended
    - c. Temporary fastening devices
      - i. straight pins
      - ii. clamps
      - iii. tape (only masking tape may be used as construction material, all other tape may only be used as a temporary fastening or hold down device)
    - d. A cutting surface that prevents table-top marring (required)
    - e. Rulers, straightedges, and/or measuring scales
    - f. Abrasives sheets, sponges, boards
    - g. Marking devices (pens, pencils, etc.) and sharpener
    - h. Sheet of wax paper, as large as is needed for the competition (required)
    - i. Pliers, wrenches, nut drivers, as needed
    - j. Safety glasses and side shields, as required
  4. Suggested materials (to be used to produce the solution):
    - a. one (1) roll 3/4" masking tape
    - b. twelve (12) 3" x 5" index cards
    - c. twelve (12) Popsicle sticks or tongue depressors
    - d. six (6) 8 1/2" x 11" sheets of printer paper (20 lb bond)
    - e. three (3) feet of string
    - f. six (6) drinking straws
    - g. ten (10) #1 paper clips
- E. Participants without a tool box will not be allowed to compete.
- F. Sharing tools between teams is not permitted.
- G. Participants are required to provide and wear safety-approved eyewear for this event.
1. Safety eyewear shall be worn at event check-in.
  2. Prescription eyewear will need to have side shields to be considered safety eyewear.
  3. Should a team member remove his/her eyewear, he/she will be reminded once to replace it. If there is a second infraction, the team will be disqualified.
  4. Sunglasses are not suitable eyewear.



## **Semifinal Round**

H. The LEAP Response:

1. Teams document the leadership skills the team has 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. Each team's solution is evaluated objectively.
2. A finite measure, such as elapsed time, horizontal or vertical distance, and/or strength, is used to determine the best solution.
3. Solution designs will be used to break ties.
4. Only as a last resort does the event coordinator use subjective measurement, such as originality, to evaluate solutions.
5. The content and quality of the LEAP Response will be evaluated.

Refer to the official rating form for more information.

## **STEM INTEGRATION**

This event has connections to the STEM areas of Science, Technology, Engineering, and Mathematics.

## **CAREERS RELATED TO THIS EVENT**

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

- Computer network specialist
- Detective
- Mechanical engineer
- Nurse
- Project manager



# PROBLEM SOLVING

## EVENT COORDINATOR INSTRUCTIONS

### PERSONNEL

- A. Event coordinator
- B. Judges:
  - 1. Preliminary round, two (2) or more
  - 2. Semifinal round, two (2) or more
- C. Timekeeper/monitors, one (1) or more

### 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. Stick-on labels for identifying entries
  - 5. Copies of the tool template, as needed
  - 6. Stopwatch for timekeeper
  - 7. Results envelope with coordinator forms
- B. A well-written, technologically appropriate problem that can be objectively measured; one (1) for each team
- C. Adequate conditions (inside or outside), on-site problem materials, monitoring, and testing devices for the designated problem
- D. Tables and chairs for participants
- E. Tables and chairs for event coordinator and judges

### RESPONSIBILITIES

- A. At the conference:
  - 1. Attend the mandatory 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 judges/assistants have been scheduled.
  - 4. Inspect the area or room 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 scheduled to begin, meet with judges/assistants to review time limits, procedures, and regulations. If questions arise that cannot be answered, speak to the event manager before the event begins.
- B. Preliminary Round:
  - 1. Distribute materials as appropriate, prior to the start of the event.
  - 2. Begin the event at the scheduled time by closing the doors and checking the entry list.
  - 3. All participants and judges should be in the room at this time.



4. In order to compete, participants must be on the entry list or must have approval of the CRC.
  5. Each team will display its tools using the tool template (paper template) provided, as necessary.
    - a. Only tools displayed will be permitted.
    - b. Tool boxes must be removed from a team's work table prior to when participants begin the design and construction of the solution.
  6. Once teams are seated (checked against the entry list) and general announcements have been made, the event problem will be distributed, reviewed, and time will be started.
  7. Judges and monitors observe the entire construction phase, with judges measuring solutions as soon as appropriate.
  8. Judges will collect the solution design when the team's solution is submitted for testing.
  9. Judges will use the designs to break any ties in order to determine the twelve (12) semifinalists.
  10. Decisions about rules violations must be discussed and verified with the judges, event coordinator, and CRC manager to determine either
    - to deduct twenty percent (20%) of the total possible points in this round or
    - to disqualify the entry
    - The event coordinator, judges and CRC manager must all initial either of these actions on the rating form.
  11. Submit the semifinalist results and all related forms in the results envelope to the CRC room.
  12. If necessary, manage security and the removal of materials from the event area.
- C. Semifinal Round:
1. Judges will independently evaluate the LEAP requirements and discuss and break any ties in order to determine the ten (10) finalists.
  2. Decisions about rules violations must be discussed and verified with the judges, event coordinator, and CRC manager to determine either
    - to deduct twenty percent (20%) of the total possible points in this round or
    - to disqualify the entry
    - i. The event coordinator, judges and CRC manager must all initial either of these actions on the rating form.
  3. Submit the finalist results and all related forms in the results envelope to the CRC room.
  4. If necessary, manage security and the removal of materials from the event area.



Participant/Team ID# \_\_\_\_\_

# PROBLEM SOLVING

**2018 & 2019 OFFICIAL RATING FORM**

**MIDDLE SCHOOL**

## 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 blank and place a check mark in the box labeled ENTRY NOT EVALUATED. This will disqualify the entry and it will not be judged.

- Toolbox/container and required materials are present
- Safety glasses are worn on each team member
- Completed LEAP Response is present
- ENTRY NOT EVALUATED

## Testing of Solutions (50 points)

**Evaluation**

[A finite unit of measure, such as elapsed time, linear distance, and/or strength, etc. is used to determine ranking for this event.]

|                 |                 |                 |                 |                 |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1st - 50 points | 2nd - 45 points | 3rd - 40 points | 4th - 35 points | 5th - 30 points |
| 6th - 25 points | 7th - 20 points | 8th - 15 points | 9th - 10 points | 10th - 5 points |

### TESTING OF SOLUTION SUBTOTAL (50 points)

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

Indicate the rule violated: \_\_\_\_\_

### PRELIMINARY SUBTOTAL (50 points)

## Criterion Performance Levels

| CRITERIA | Minimal performance<br>1-4 points | Adequate performance<br>5-8 points | Exemplary performance<br>9-10 points |
|----------|-----------------------------------|------------------------------------|--------------------------------------|
|----------|-----------------------------------|------------------------------------|--------------------------------------|

Evaluators: Using minimal (1-4 points), adequate (5-8 points), or exemplary (9-10 points) performance levels as a guideline, record the scores earned for the event criteria in the column spaces to the right. The X1 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.) A score of zero (0) is acceptable if the minimal performance for any criterion is not met.

## Semifinal LEAP Response (5 points)

|  |   |   |   |
|--|---|---|---|
| <b>LEAP</b><br>(10% of the total event points) | The team'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 team's efforts are adequately communicated, include some detail, are clear, and are generally convincing; identification and incorporation of the SLC Practices are satisfactory. | The team's efforts are clearly communicated, fully-detailed, and convincing; identification and incorporation of the SLC Practices are excellent. |
|--|---|---|---|

### SEMIFINAL LEAP SUBTOTAL (5 points)

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

Indicate the rule violated: \_\_\_\_\_

### SEMIFINAL SUBTOTAL (5 points)

(To arrive at the TOTAL score, add the PRELIMINARY SUBTOTAL and the SEMIFINAL SUBTOTAL.) **TOTAL (55 points)**

Comments:

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

Evaluator

Printed name: \_\_\_\_\_

Signature: \_\_\_\_\_

Record scores in the column spaces below.