



## PA-TSA Alumni Association ACS Challenge

The ACS Design Challenge consists of 2 charity events, and is open to all Students, Advisors, Chaperones, and Alumni of Pennsylvania TSA. The events are inspired by current TSA events, but with a modified set of rules to allow wider participation.

Participants are limited to 1 entry in each of the 2 competitions run this year. The entry fee for this event is \$5 per entry. The entry fee will be a donation to the PA-TSA ACS Fundraiser.

Entries will be tested and the winners of each event will be announced during the PA-TSA State Conference.

<b>Participant Entry Information</b>	
Name:	
Organization: <i>(School or Organization)</i>	
Student/Advisor/Alumni/Other:	
Entry Type:	<input type="checkbox"/> Structural Challenge <span style="margin-left: 100px;"><input type="checkbox"/> Dragster Challenge</span>
<i>If submitting entries for both events, please use a separate form for each entry.</i>	

### Structure Results

Weight:	
Breaking Load:	
S/W Ratio:	
Entry Rank:	

### Dragster Results

Weight:	
Race Time:	
Entry Rank:	

# ACS Structural Challenge

The ACS Structural Engineering challenge follows the Structural Engineering event, but with the following rules:

## 2023 Problem

The design solution will be a bridge that will span a gap of 12".

Length:	Minimum: 12.5"	Maximum: 14"
Width (interior):	Minimum: 2"	Maximum: 3"
Height:	Minimum: 0"	Maximum: 3"
Substructure:	Minimum: 0"	Maximum: 2"

Test Block: 6" long x 2" wide x  $\frac{3}{4}$ " tall

Span: The structure tester will have a span of 12"

## Specifications

1. The solution must be made using the standard  $\frac{1}{8}$ " x  $\frac{1}{8}$ " balsa sticks used in competition.
2. Material quantity used for construction is at the discretion of the builder. There is no maximum quantity limitation.
3. The test block will be 6" long x 2" Wide x  $\frac{3}{4}$ " tall (placed with length horizontal)
4. The test block will be placed on the solution in the center. There is no minimum measurement from the bottom of the solution to the top of the test block. The solution must accommodate the placement of the test block in the center of the solution from either end or top.
5. No part of the construction may extend above 3" above, and 2" below the abutment.
6. The solution may not contact the vertical surface of an abutment below the top at any time.
7. Both Substructures (below) and Superstructures (above) may be used for the construction, at the builder's discretion.
8. Lamination refers to the combining of two or more pieces of materials with the glue grain running in the same direction. Laminations of any kind are NOT allowed in the construction of the solution.
9. Gusset materials are not permitted on joints.

## Judging

Judging for the event will consist of destructive testing of the structures and based on a Load / Weight efficiency. Assuming the above rules are followed, the structure that has the best Load to Weight ratio will win the competition.

# ACS Dragster Challenge

The ACS Dragster Challenge follows the Dragster Design competition, but with the following rules and modifications:

## 2023 Design:

1. Entries must conform to safety requirements below.
2. Dragster Body: Body must be made of a single piece using Wood, Plastic, Urethane Modeling Foam or via 3D Printing
3. Lamination of multiple pieces will result in disqualification (3D Printing will NOT count as Lamination)
4. Dragster Body Requirements:
  - a. Body length: Minimum: 200mm Maximum: 310mm
  - b. Body Mass: Minimum: 50g
  - c. Maximum Width (including Wheels): Maximum: 90mm
5. Dragster must have exactly two (2) axles per car.
6. Dragster MUST HAVE exactly four (4) wheels.
7. All wheels MUST contact the race surface.
8. Dragsters MUST have exactly two (2) screw eyes.
  - a. Inside Diameter Minimum: 3mm Maximum: 5mm
  - b. Distance Apart Minimum: 150mm Maximum: N/A
  - c. Screw Eyes must NOT contact the Race Surface
  - d. Screw Eyes must be COMPLETELY closed.
9. Power Plant for CO2 Cartridge
  - a. Power Plant MUST BE at the farthest point at the rear of the car, and parallel to the race surface to assure proper launcher function.
  - b. A minimum of 5mm thickness around the entire power plant hole must be maintained.
  - c. Hole Depth: Minimum: 45mm Maximum: 55mm
  - d. Safety Zone Thickness: Minimum: 5mm
  - e. Chamber Diameter: Minimum: 19mm Maximum: 20mm
  - f. Lowest point of chamber diameter to the race surface  
Minimum: 25mm Maximum: 40mm
10. Dragster must not contain any sharp edges, loose parts and be safe to race. The entry must stay intact for the entire length of the racetrack. If any part of the dragster comes apart or falls off, the race time will not be counted.
11. Any entry that is determined unsafe to race will be disqualified from the race at the judge's discretion.

## Judging:

If the entry meets the criteria above and is safe to race, it will be raced on the standard 20m Dragster track with a standard 8g CO2 cartridge. Each entry will be raced a single time, and it's time recorded. The entry with the best time wins the competition. In the case of a tie, the entries will be raced head-to-head to determine a winner.