

# 2023-2024 Texas Charter School Academic & Athletic League Team Science Competition

## I. Rounds & Divisions

TCSAAL Team Science contestants will compete in one (1) state level competition. Consistent with TCSAAL events, entries will be divided into two divisions by grade: i) 6<sup>th</sup> – 8<sup>th</sup> grades, and ii) 9<sup>th</sup> – 12<sup>th</sup> grades. Divisions will compete exclusively of one-another and individual students can compete amongst older division grades, but cannot compete amongst a younger division, nor can they compete in both divisions.

## II. Fees

Entry fees are set at \$150.00 per team. There is only one (1) type of entry for the TCSAAL Team Science Competition, which registers a team of one (1) to four (4) participants in three (3) competition events, as well as an *Overall Competition* event. Campuses are unlimited in the number of team entries allowed, and are not required to organize their teams in any quantitative fashion [i.e. campuses are permitted to register four (4) individual participants as four (4) different teams, should they choose to do so].

## III. Events & Rules

The TCSAAL Team Science Competition will consist of group events. Participation in all events is necessary for eligible competition for overall placements and awards (see *Awards* below). Order of events will be as follows:

### A. Timed Project: Balsa Bridge

- i. For this competition, teams will be expected to build a suspension balsa wood bridge capable of spanning a 18" (eighteen inch) gap while supporting a wooden 2" x 2" x .5" wooden plank that contains an eyehook or s-hook, and hanging from this hook a traditional plastic 5 gallon paint bucket. Teams will all begin this project at the same time and they will be given forty-five (45) minutes to construct their balsa bridge.

A. See image of wood plank below for example:

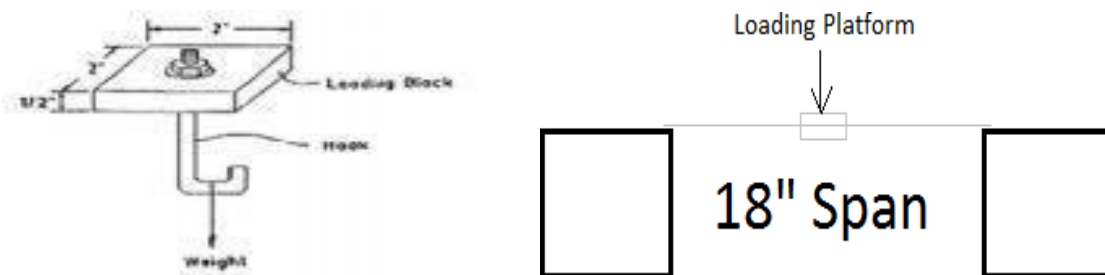


Figure 1

- ii. Teams are permitted to only use liquid super glue adhesives and balsa wood planks no wider than 0.25" (one-quarter of an inch). There will be 15 feet of 0.25"x0.25" balsa wood per team provided, in five equally sized planks that are 0.25"x0.25"x36". 0.33 oz (9g) of super glue will be provided to each team.
- iii. Teams are permitted to provide and use their own cutting and measuring supplies, but cannot use anything beyond the provided materials in the completed bridge.
- iv. Combinations of flush, parallel planks are strictly forbidden see example below:

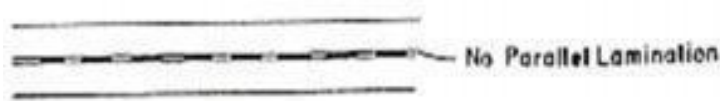


Figure 4

Exceptions:

- A. Flush, parallel planks that are overlapping are permitted a maximum overlap of 0.5" (one-half of an inch).
- a. See image for example:

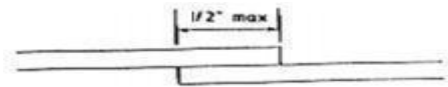


Figure 5

- B. Parallel planks that are separated by 0.25" (one-quarter of an inch) space.
- a. See image for example:

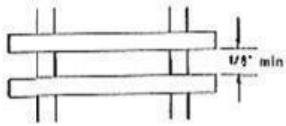


Figure 6

- v. The width of the bridge (the measurement parallel to the bridge's span) cannot exceed 24" (twenty-four inches).
- vi. The depth of the bridge (the measurement horizontally perpendicular to the bridge's span) cannot exceed 6" (six inches).
- vii. The height of the bridge (the measurement vertically perpendicular to the bridge's span) cannot exceed 8" (eight inches).
- viii. The bridge cannot butt their bridge against the support of the surface it is spanning.
- A. See image for example:

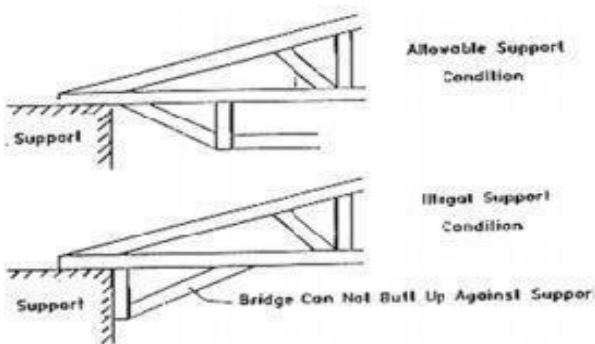


Figure 9

- ix. Bridges will be expected to support additional weights that will be added to the bucket during testing.
- A. Weights will be provided in the following varieties:
- a. 10 lbs (ten pounds)
- b. 5 lbs (five pounds)
- c. 2.5 lbs (two and a half pounds)
- i. Plate weights will vary in size, but will be part of a standard weight bench set.
- x. Bridges will also be required to have a span capable of bridging two surfaces that are 1.5' (one-and-a-half feet) or 18" (eighteen inches) apart.
- xi. One (1) team member will be required to position the bridge over the span and add the weight loading block.
- xii. Teams are required to supply one (1) team member to place the weights in the weight bucket for their team's bridge.
- xiii. Eye protection must be worn while loading the bridge. Safety glasses will be provided at the competition.
- xiv. Following weight placement, a stopwatch will count to three (3) seconds. Following three (3) seconds, if the structure of the bridge has not been compromised by the weight placement, the weight placement will be scored as successful. From there, the team will add weight(s) to the weight already placed within the bucket.
- xv. Teams will not be able to remove weights once they have been placed within the bucket. They can only add weights.
- xvi. In the event that the structure supports all allotted weight for testing, the weights will then be removed and the bridge returned to the team.

- xvii. A. Scoring will be based on which bridge holds the most amount of weight.  
The top twenty (20) rankings will be given points towards the *Overall Competition*, with the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>,...etc. highest ranking being awarded 20, 19, 18,...etc. points, with the twentieth (20<sup>th</sup>) highest ranking ratio being awarded one (1) point, and all ratios ranked twenty-first (21<sup>st</sup>) and beneath being awarded zero (0) points.

**B. Timed Project: Mousetrap Vehicle**

- i. Mousetrap Vehicle: Teams are to construct a mousetrap vehicle. The vehicle must power itself by virtue of a mousetrap, and the aim is to achieve the greatest displacement possible along a fixed, straight track. This event will be a traditional mousetrap vehicle competition, in which teams are provided materials and are expected to design and build a vehicle propelled solely by the momentum created by the physical reaction of a mousetrap spring within a maximum time of thirty (30) minutes. Teams will be provided their materials at the beginning of the round.
- ii. The materials themselves will consist of only:
- A. One (1) build-it-yourself kit, the contents of which can be reviewed or purchased for practice (TCSAAL will provide kits for teams at competition) at the following website:  
<http://www.docfizzix.com/products/partssupplies/supp700df.shtml>. Teams will use the “The Basic Kit” from Doc Fizzix. Teams can use the kit to build the mousetrap vehicle however they choose. Teams are not required to use all of their materials.
- B. And 9 oz of super glue.
- iii. At the end of thirty (30) minutes, teams will submit their car for testing.
- A. The vehicle will be tested along a room-length track, ideally a lengthy hallway; the dimensions of which are to be determined as location is secured.
- a. Participants will be signaled to release the vehicle from the center-point of the starting line by TCSAAL judge(s).
- b. Participants’ vehicles will then travel until momentum has been exhausted and the car remains at rest.
- c. At this point the total displacement traveled of the furthest back part of the vehicle (not including the 6” lever arm extending from the mousetrap) from the center-point of the starting line will be measured by TCSAAL judge(s).
- d. Participants will have two trials, with the furthest distance ranked among their competitors.
- e. Distance will be measured, with the greatest distance being awarded the highest ranking, the second greatest distance being awarded the second highest ranking, and so forth.
- f. The top twenty (20) ranking will be given points towards the Overall Competition, with the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, etc. highest ranking being awarded 20, 19, 18, etc. points, with the twentieth (20<sup>th</sup>) highest ranking ratio being awarded one (1) point, and all ratios ranked twenty-first (21<sup>st</sup>) and beneath being awarded zero (0) points.

**C. Timed Project: Straw Tower**

- i. Teams are to build a tower that supports a tennis ball at the highest point they possibly can.
- ii. For this project, teams are given fifty (50) drinking straws and one (1) roll of scotch tape. Teams will only be allowed to use the materials provided to them to construct their tower. This includes only drinking straws and scotch tape.
- iii. Teams will be given five (5) minutes to complete the tower.
- iv. Towers must be freestanding and cannot be taped to the floor.
- v. Towers must support the tennis ball for a sufficient amount of time necessary for judges to measure.
- vi. The height is determined by the distance measured between the floor and the bottom of the tennis ball.
- vii. Towers will be ranked in order of height, tallest to shortest.
- viii. The top ten (10) rankings will be given points towards the Overall Competition, with the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, etc. highest ranking being awarded 10, 9, 8, etc. points, with the tenth (10<sup>th</sup>) highest ranking ratio being awarded one (1) point, and all ratios ranked eleventh (11<sup>th</sup>) and beneath being awarded zero (0) points.

**IV. Rankings & Awards**

- A. Team scores will be totaled and the top three will be ranked, with 1<sup>st</sup> place receiving the most aggregate points amongst events, 2<sup>nd</sup> place receiving the second most aggregate points amongst events, and 3<sup>rd</sup> place receiving the third most aggregate point total amongst events. There will be team trophies awarded to the teams that come in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> place (in each age group). The participants of the 3 ranking teams will also receive individual medals.
- B. In the event that we have a tie, the tie will be broken first by virtue of head-to-head comparison of Balsa Bridge ranking. If rankings are still tied, teams will then be ranked by virtue of the Mousetrap Vehicle results. If rankings are still tied, teams will then be ranked by virtue of the Straw Tower results.