



## ***Trebuchet Competition Rules***

*Tuesday, April 25, 2017*

### **Introduction**

The Trebuchet Competition is a team event open to all members of an NCJETS club. Each team must consist of three (3), or four (4) club members and each member may only be assigned to one team. Clubs may enter more than one team in the competition; maximum of five (5), but only the highest scoring team will be counted towards the **Overall Competition Points**. Additional to the accuracy competition, we will be conducting an “Unofficial” Secondary Distance Competition. In this second event, the same trebuchet must be used from the accuracy event. The top three scoring teams of the distance will also be awarded trophies. This event will also include awards to be given to the team with the *Most Innovative Trebuchet Design* and the team with the *Most Innovative Use of Materials*. We encourage students to use alternative materials this year. This concept of alternative materials will be a leading factor when judging for the *Most Innovative Trebuchet Design* and the *Most Innovative Use of Materials* awards. For example, instead of an all-wood structure, we would like to see innovative materials such as recycled PVC swing arm or a tested substitute material that greatly enhances the performance of the Trebuchet. A sleeker and more innovative design is what we would like to see achieved by students.

*Please do not use a Trebuchet that was tested in previous years. If this must be done, modify it enough mechanically so that judges are impressed with innovative advances.*

This year the deadline to register for the Trebuchet Event is as follows:

*The deadline for registration is Tuesday, April 11<sup>th</sup>, 2017.*

*[Note]: Lunch will not be provided. We will allow a 1.5-hour lunch period. During this time, students may purchase lunch at any on-campus restaurant.*

Any questions or concerns regarding any aspect of general or event-specific information must be submitted as an email to [jgrove4@uncc.edu](mailto:jgrove4@uncc.edu) or [agraha53@uncc.edu](mailto:agraha53@uncc.edu) before March 28<sup>th</sup>, 2017. Issues and clarifications can be found on the NCJETS website under the “FAQ” section. NCJETS staff will determine if any clarifications need to be made to the rule(s) and/or criteria. Club sponsors will be notified by email of any changes or



modifications by April 14<sup>th</sup>, 2017. Changes and modifications will also be recorded on the web page of the NCJETS website under the “For the Record”.

*No changes to the rules/criteria will occur after April 14<sup>th</sup>, 2017.*

### **Check-In Procedures**

*All* team members for *every* team must report to the Check-in station upon arrival at the competition site. Check-in will begin at 8:00 AM. When your team checks in, you must have your trebuchet. At the Check-in station, your trebuchet will be verified against specifications listed below. Each team must compete with their trebuchet, and have them ready for check in to be checked with the rules and requirements.

*Swapping out parts on the same trebuchet will result in disqualification.*

### **Trebuchet Accuracy Competition Rules**

There is only one round of competition. This round is open to all teams that meet all eligibility requirements and will be governed by the rules defined below. If compliance is contested, the NCJETS staff will be consulted and has the final decision. Full team member participation will be observed and **required**.

#### **Target and Scoring**

- A 200' line drawn a perpendicular to the launch square using an anchored tape measure will be the target. Teams will launch their tennis ball as straight as possible down this line.
- The judge assigned to the each team will make a determination of strike position.

The landing position of each projectile launch will be marked with a flag. The score for each launch will be determined as follows:

1. If the ball strikes the line, the score for the launch will be the number of feet traveled. [Example: If the ball went 80 feet and hit the tape measure, the score for the launch will be 80 ft.]
2. If the ball does not land exactly on the line, the score for the launch will be the distance in feet from the line subtracted from the distance the ball traveled.

[Example: If the ball went 80 feet straight, but were 15 feet from the line when it landed, 15 would be subtracted from 80. The score for the launch, in this case, would be 65.]

3. If the ball goes beyond the 200-foot mark, the exact position of the ball will be measured to the 200-foot mark. The resulting distance will be subtracted from 200 to give the score.

[Example: If the ball lands 30 feet beyond the 200-foot mark, and 40 feet to the right of the mark, the exact distance from the 200-foot mark to the landing position is 50 feet. The score for this shot will be 200-50 or 150 points.]

4. If the ball lands in a position that would give a negative value, a score of zero will be assigned.

*No scores below zero will be given.*

## **Launch Square**

- Trebuchets will be placed in the center of a 4' x 4' "Launch square" that will be clearly marked at the base of the target. The center of the square will line up with the center of the target threshold.

*The entire base of the trebuchet must fit within the launch square. However if a working part is to move out of the square this will be allowed.*

- The trebuchet must be remotely triggered, i.e., not released by hand within the launch square. Everyone must be at least three feet outside of the launch square before the trigger can be pulled.

*The entire team will be disqualified if anyone is within three feet of the launch square when the trebuchet is fired. This ruling is non-negotiable.*

## **Trebuchet Design Criteria**

Trebuchets will be checked for compliance at the Check-in station before the competition begins.

*The following specifications must be satisfied, or the trebuchet will not be allowed in the*

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## *competition.*

- The device *must be* a trebuchet.  
*Trebuchet: A powerful siege engine that works by counter-balancing weights to generate propulsion for a swinging arm used to launch a projectile in a sling.*
- The base of the trebuchet must fit completely within the 4' wide x 4' long "Launch square".
- With the arm relaxed (i.e., not cocked and ready to fire) the trebuchet may be no taller than 6 feet.
- The trebuchet may be made of any material, but as mentioned in the opening introduction, alternative materials are greatly expectant.
  - **There must be a remote firing mechanism installed such that the individual firing the trebuchet is, at a minimum, three feet outside the launch pad.**
  - **No wheels are allowed on the base of the trebuchet; it must be stationary. (Wheels are allowed on all other parts of construction.)**
- Starting from the moment the judge calls your team; you will be given 5 minutes to make the remaining five shots. You may adjust your trebuchet in any way needed. If you do not make at least four shots, then the average of the shots you made will be used as your score.
- You may not stake your trebuchet to the ground or place it on a different base, but you may add weights to make it more stable.
- There will be no limit on material costs. There will be no reimbursement for items purchased.

## **Bonus Points**

- Bonus diversity points will be given to each team based on their score. It will be percentage based and added after the team's top three scores have been averaged. Each minority on the team will contribute 1% bonus points.

Example: If you have two minorities on a team of 4 kids, there will be an additional 2% added to that team's final score.

## Projectiles

- Standard tennis balls will be used as projectiles. The tennis balls may not be modified in any fashion, nor may they have anything added or removed before, during or after launch. Judges will check each tennis ball before each launch.
- Once the competition begins, each team will be allowed five (5) shots. The top three (3) scores of the five shots will be averaged for the final team score.

*Any team caught firing anything besides a provided tennis ball will be disqualified. This ruling is non-negotiable.*

## Final Scoring

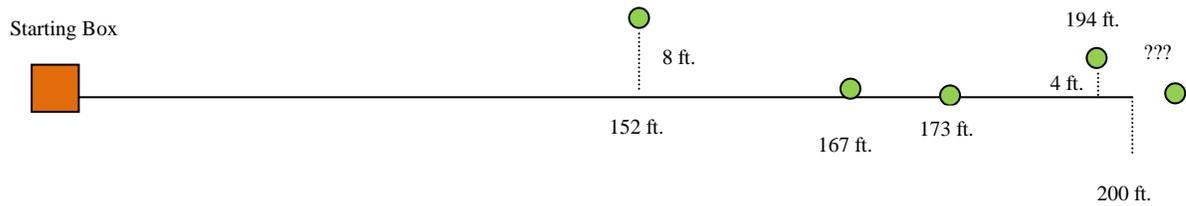
The final team's score will be the average of the team's best three scores. If there is a tie for first place, a shoot-off will occur. Teams that are tied for first place will be given an additional three shots. The high score of the sum of the three average shots will receive first place.

The following is a table that shows how points will be distributed towards the Overall Seasonal Competition. Remember; these points are solely based on place holdings for the Accuracy part of the competition.

Place	Points Earned
1 <sup>st</sup>	20
2 <sup>nd</sup>	17
3 <sup>rd</sup>	14
4 <sup>th</sup>	11
5 <sup>th</sup>	8
6 <sup>th</sup>	2
Non-participating Schools	0

## Example: Hypothetical team at competition

In this example, we'll assume a team consists of 4 members, 3 of which are minorities. This team writes a Trebuchet Analysis and submits it on the day of competition.



**Figure 1: The entire field with landing positions of projectiles**

The team's total score is the average of the three highest scores (rounded from two decimal points):

$$(173+190+200) / 3 = 187.667 = \mathbf{188 \text{ points}}$$

The team gets 3% added to its score in diversity points:

$$188 * 3\% = 5.64$$

$$188 + 5.64 = 193.64 = \mathbf{194 \text{ points}}$$

## **“Unofficial Event” Distance Competition**

*No diversity points will be given for this event. This event does not count for the NCJETS championship. However, trophies are given.*

This event will be for fun only and will not contribute to a club’s yearly score. It is setup similar to the main event, and same teams and trebuchets must be used.

### **Rules**

- Teams must use the same trebuchet for both events.
- The trebuchet must still meet requirements for the accuracy event (fit within a 4’ wide x 4’ long “Launch square” and be no more than 6’ with a fully uncocked arm).
- Trebuchet much is aligned in the starting box.

The trebuchet will be given three shots to shoot a projectile as far as possible. The best of the three will be averaged to get the final distance score. The top three teams will win trophies.

### **Honorary Mention Awards**

*No diversity points will be given for this event. This event does not count for the NCJETS championship. However, trophies are given.*

Two additional awards will be given at the event:

- Most Innovative Design
- Most Innovative use of Materials