



# 2009 Trebuchet Competition

(Updated 11/09/2009)

**OBJECTIVE:** To design & build a trebuchet that will be able to launch a standard-sized apple in a manner such that it will accurately hit a target 60 feet away.

## COMPETITION SCHEDULE:

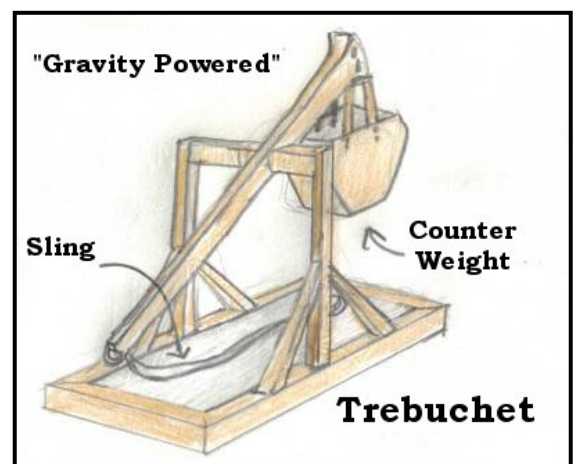
1. The competition field will open beginning at **9:00am** for trebuchet inspections and for practice on a first-come, first-served basis.
2. **The actual competition will begin at 12 noon.**
3. Prizes will be awarded at a ceremony in the Field House immediately following the conclusion of the competition and judging.

## TEAMS AND PRIZES:

1. The contest is open to all middle and high school age students (**Grades 6 thru 12**).
2. All teams must include **2 to 6** members and an adult mentor.
3. Each team must register for the competition on or before **Oct. 30th, 2009**. There is no entry fee, so please register as early as possible!
4. **Prizes for the top three teams will be a chest of Craftsman tools for each team!** Additional prize details are available on the [nhtechfest.org](http://nhtechfest.org) website. All prizes will appropriately reward the winning team as a whole, not the individual competitors.

## CONSTRUCTION CRITERIA:

1. *Materials:* The primary structural components of the trebuchet must be constructed entirely of **wood**. Other materials are allowed, but should be limited to a supporting role, such as pins, axles, hinges and fasteners. Laminates or composites are permitted, as long as they are made primarily from wood (i.e. no "plastic lumber").



2. *Size:* The trebuchet base cannot exceed **48 inches** in length, **30 inches** in width. The trebuchet arm cannot exceed **50 inches** in length, not including the sling.
3. No Catapults or Catapult/Trebuchet hybrids are allowed.
4. The projectile must be launched from one end of the trebuchet arm, powered only by the gravitational potential energy of the counterweight.
5. No electrical, explosive, elastic or other form of stored energy may be used.
6. The trebuchet counterweight must be detachable for inspection and weighing purposes, and cannot exceed **40 lbs.** total (container + weights). If the counterweights are removable, but the counterweight container cannot be easily detached from the arm, a duplicate copy of the container may be submitted for weighing, along with the actual weights themselves.
7. The trebuchet counterweight is not required to be constant throughout the competition, i.e. teams may add or subtract weights at any time, as long as the 40 lb. maximum is never exceeded.
8. The trebuchet must be able to be remotely triggered from outside the Launch Area.

#### **COMPETITION SAFETY:**

1. All trebuchets are subject to a safety and construction criteria inspection prior to competing.
2. If a team does not pass the safety and/or the construction criteria inspections, they will be given a reasonable amount of time to make the required modifications. If they are unable to pass the inspection a second time, the team will not be allowed to compete.
3. All team members must be wearing eye protection and observe all safety boundaries when their trebuchet is in the Launch Area.
4. Only when the safety judge has granted permission to launch can the trebuchet be fired.
5. Once the trebuchet is loaded and armed, no persons are allowed inside the Launch Area until firing is completed and the safety judge gives the all clear signal.
6. All trebuchets must be fully disarmed (e.g. arm in the fully vertical position and weight basket fully empty) when moving into or out of the Launch Area.

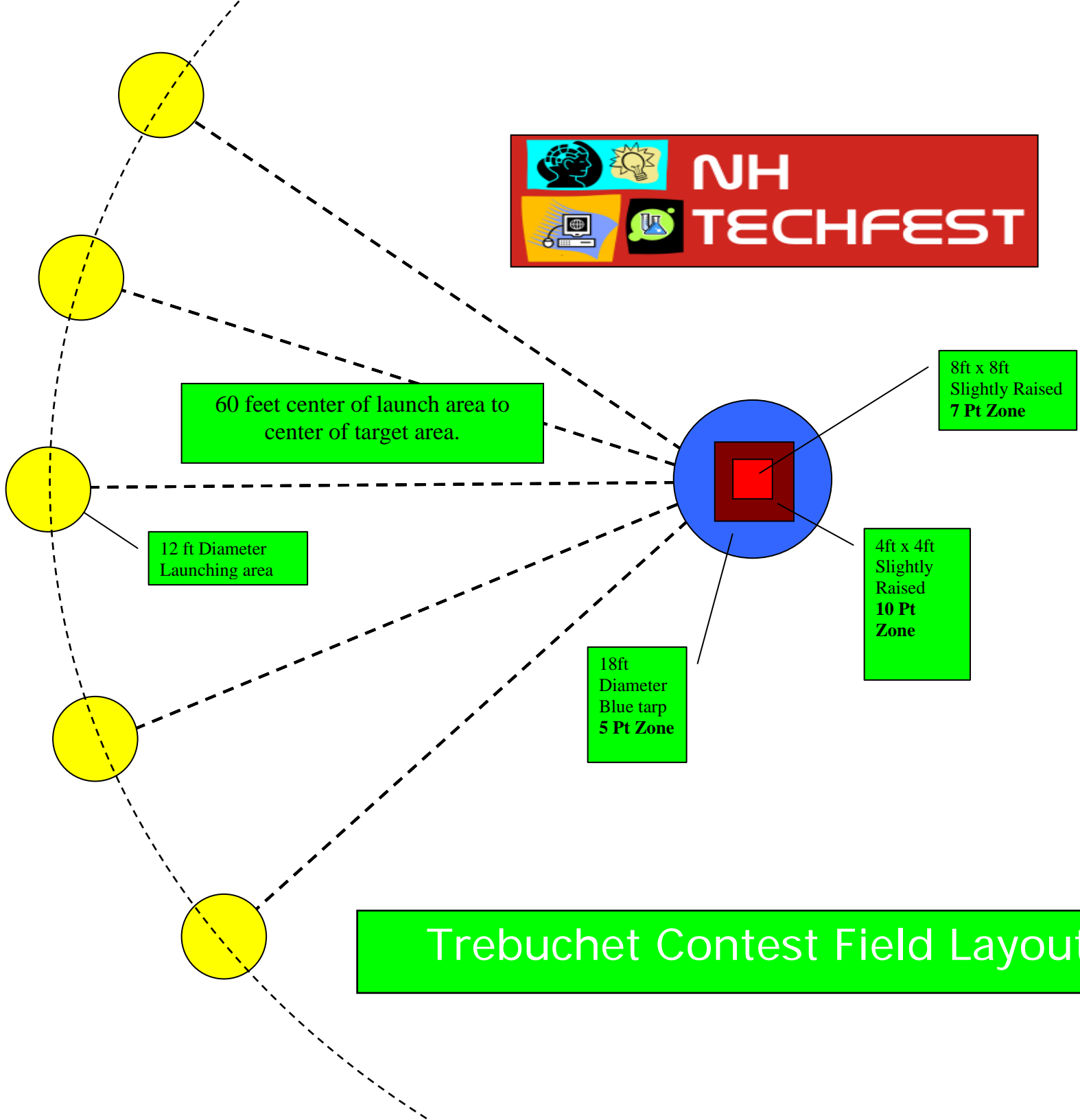
#### **COMPETITION PROCEDURES:**

1. *Projectiles:* Prescreened and weighed fresh apples will be provided as projectiles. The apples will be guaranteed to weigh **6.0 ounces (+/- 1.0 ounce)**. For scoring purposes, apples will be judged from where they first hit, and not from where they eventually come to rest.

2. *Launch Area:* A Launch Area shall be defined as a circle measuring **12 feet** in diameter. During launch, the footprint of the trebuchet (actual or projected) must rest completely inside the Launch Area. There will be five (5) separate Launch Areas set up to facilitate more orderly queuing and setup. All Launch Areas will be equidistant from the center of the target area (see diagram below).
3. *Target Area:* The primary Target Area shall be a circle measuring **18 feet** in diameter. The center of the Target Area will be located exactly **60 feet** from the center of the Launch Area. To further delineate scoring areas within the Target Area, there will be two square platforms, of successively smaller size, placed in the center of the Target Area circle, one on top of the other (see diagram below).
4. *Practice Time:* Each team will be given a reasonable amount of time to practice firing before the actual competition begins. The exact amount of time available will depend on the final number of competition entrants.
5. *Official Competition:* For the official competition itself, each team will be given the opportunity to launch up to four projectiles. The order of the Launch Area queue will be determined drawing numbers out of a hat just prior to the beginning of the official competition.
6. *Launch Area Setup:* Teams will select Launch Areas and set up their machines in numerical queue order until all five Launch Areas are occupied. Once a team has finished competing, the next team in the queue will take their place and setup in that Launch Area. A **minimum of 15 minutes** will be allotted for teams to place and setup their machines.
7. *Reload Time:* Once the initial shot has been fired, each team will have a maximum of **5 minutes** to make any necessary adjustments and to fire the next projectile. If they fail to launch within the allotted time period, they will be required to retire from the Launch Area immediately.
8. *One-Time Time Out:* After a team enters the Launch Area, *and* they require more than 5 minutes to adjust or repair their trebuchet, *and* they have not yet fired all of their allotted projectiles, they may elect to take a **one-time** "Time Out" to work on their machine. Once a team elects to take their Time Out, the following procedure comes into play:
  - a. The next team in the queue will be asked to begin their competition round.
  - b. When the next team has either finished competition or has gone into a Time Out as well, the first team will be asked if they are ready to resume competition.
  - c. If the first team is ready, then they will resume competition until they have either fired all of their allotted projectiles, or have failed to reload and fire within the 5 minute reload period.

- d. If the first team is still not ready, they may elect to continue in Time Out, and the next team in the queue will be asked to begin their competition round.
  - e. If a state is reached where all five teams in the Launch Areas are in a Time Out, then the team that has been in Time Out the longest will be required to resume play immediately.
  - f. During a Time Out, no actual projectiles may be fired, although “dry firing” is allowed for testing purposes. All “dry firings” must be performed under the observation of a safety judge, and may not be performed while the actively competing team is simultaneously firing.
9. *Scoring*: Scores will be determined at the point at which the projectile first contacts the ground or Target Area platforms. Any projectile hitting within the Target Area will receive a minimum of **5 points**. Projectiles hitting the bottom platform (8x8 ft) will receive **7 points**, and those hitting the top (and smallest, at 4x4 ft) platform will receive **10 points**.
  10. The field judges will determine the location of all projectile landings and allocate points appropriately. All decisions of the field judges are final.
  11. After each team has launched their allocated projectiles, the sum of scores for all projectile hits will determine the team's overall score.
  12. The team with the highest score after all have competed will be named the **"2009 NH TechFest Trebuchet Competition Champions"**.

**Important Note:** All Rules are subject to change. All changes will be posted in a timely manner on the NH TechFest website ([www.nhtechfest.org](http://www.nhtechfest.org)) and will be communicated by email to all teams registered at that time. During the competition, the field and safety judges have final say in the interpretation of any rules or procedures.



60 feet center of launch area to center of target area.

12 ft Diameter Launching area

18ft Diameter Blue tarp 5 Pt Zone

8ft x 8ft Slightly Raised 7 Pt Zone

4ft x 4ft Slightly Raised 10 Pt Zone

# Trebuchet Contest Field Layout

