



## Hacky Sack - Trebuchet / Catapult Design Challenge

**Background:** This competition is based on the medieval catapult: a device that was used to hurl large “rocks” into an opposing force’s castle. The objective of the competition is to design and construct a catapult that shoots a Hacky Sack using inexpensive and readily available materials.

### Rules: Regarding Materials to be allowed/not allowed:

1. **Not allowed: Mousetrap / rat - trap / coil spring(s), rubber or elastic bands.**

**Allowed:** Weights, or ropes may be used as a catapult energy source to throw an ordinary Hacky Sacks at a target that will raise a flag from a distance to be determined the day of the contest. *The distance to be determined the day of the competition will be between 16 and 24 feet.*

2. The competitors are allowed to use any inexpensive and readily available materials to build the catapult. *Commonly used items such as plastic pipe, string, glue, Popsicle sticks, wooden dowels, wooden strips, metal tubing etc. are common materials that may be used. In other words, no rocket launchers, no explosives, etc. are to be used. If competitors have a question about the use of a particular material, they are asked to contact the competition's sponsor to obtain a ruling.*

3. Competitors in the Hacky Sack-Trebuchet / Catapult Design Challenge *may bring and use their own commercially purchased hacky-sacks or foot-bags* in the competition if they so desire. Hacky Sack Bags must weight between 40 and 65 grams.

### Rules Regarding Design:

1. The swinging arm of the Catapult may not be assisted in the direction of throw (acceleration) by anything attached to the main body of the launch base.

2. The catapult may be attached to a wood or cardboard launching base plate or platform, no more than 1" thick. The base plate/platform can have any width or length, as long as it fits within the launching site (24” x 32” rectangle). The plate must sit firmly on the launch surface. It may be used to adjust the height of the toss and it may be pivoted (rotated) for aiming in the proper direction.

### The Competition:

1. Each team will bring their catapult to the competition site fully assembled and ready to compete.

2. The competitor's device will be placed within the launching site on the floor. No part of the device may extend outside the launching site before a shot.

3. The Bulls eye *“of the competitors creation but cannot exceed 12” in diameter.* The catapult must **throw an ordinary Hacky Sacks at a target and raise a flag without outside assistance of any type.** *Teams will receive 6 throws at the Bulls eye during the competition. The team raising the flag the most times in the 6 throws will be receive the most points.*

4. The catapult may be manually held in place on the floor to steady it; however, the participants must be completely clear of the launching arm.

5. The launching arm must be set in motion by a release lever using a rod or dowel stick or pulling a cord attached to a pin to insure the safety of the participants.

6. The *Bulls-eye target* must be free standing and *cannot be held in place or touched by any outside force other than the hacky-sack during each attempt.*

7. Each team will be given 7.5 minutes to setup the catapult, and target in the competition site and complete practice shots at the target (if desired) so adjustments may be made to the devices.

(Teams are encouraged to develop and use some method to determine the best launch parameters to use during the event.

(Room ceiling height may be a factor.)

### Scoring guidelines: During testing

1. Each shot that raises the flag will score points, for the catapult team.

Each attempt that raises the flag and the flag remain standing will score the maximum points (20 pts. per attempt).

Any attempt that strikes the target and partially raises the flag and the flag remain standing will score 12 pts.

Any attempt that strikes the target but does not raise the flag will score 7 pts

**The team with the most points after the 5 shots will be declared the winner.**

2. Ties will be broken by a "shoot-off". The teams will be given 5 min. to make the necessary adjustments to their catapult and get a single throw at a target at a distance determined by the Judge at the time of the competition.



**Hacky Sack - Trebuchet / Catapult Design Challenge Scorecard**

Name(s): \_\_\_\_\_

Division: \_\_\_\_\_ I: Jr Hi \_\_\_\_\_ II: HS

School: \_\_\_\_\_

Instructor: \_\_\_\_\_

**Catapult Specifications:**

Go / No Go 1. No mousetrap / rat-trap / coil spring(s) / elastic or rubber bands used as a catapult energy source.

Go / No Go 2. The competitors are allowed to use any inexpensive and readily available materials to build the catapult. In other words, no rocket launchers, no explosives, etc. are to be used.

**Rules Regarding Design:**

Go / No Go 1. The swinging (acceleration) arm of the Catapult may not be assisted in the direction of throw by anything except the above power source.

Go / No Go 2. The catapult may be attached to a wood or cardboard launching base plate or platform, no more than 1" thick. The base plate/platform can have any width or length, as long as it fits within the launching site (24" x 32" rectangle). The plate must sit firmly on the launch surface. It cannot be used to adjust the height of the toss although it may be pivoted (rotated) for aiming in the proper direction.

**The Competition:**

Go / No Go 1. Each team will bring their catapult to the competition site fully assembled and ready to compete.

Go / No Go 2. The competitor's device will be placed within the launching site on the floor. No part of the device may extend outside the launching site before a shot.

Go / No Go 3. The launching arm must be set in motion by pressing a release lever using a rod or dowel stick or pulling a cord attached to a pin to insure the safety of the participants.

Go / No Go 4. Each team will be given 7.5 minutes to setup the catapult in the launch site and complete 2 practice shots if so desired. Adjustments may be made to the device between shots.

(Room ceiling height may be a factor.)

**Scoring guidelines:**

**Each shot that raises the flag will score points, for the catapult team.**

Each shot that raises the flag and the flag remain standing will score the maximum points (20pts.).

Any shot that strikes the target and partially raises the flag will score 12 pts.

Any shot that strikes the target but fails to move the flag will score 7 pts

Any shot that strikes within 12" of the target will receive 4 pts.

The team with the most points after the 6 shots will be declared the winner.

\_\_\_\_\_ 1<sup>st</sup> Shot \_\_\_\_\_ 2<sup>nd</sup> Shot \_\_\_\_\_ 3<sup>rd</sup> Shot \_\_\_\_\_ 4<sup>th</sup> Shot \_\_\_\_\_ 5<sup>th</sup> Shot \_\_\_\_\_ 6<sup>th</sup> Shot

\_\_\_\_\_ : Total pts. from shots.

\_\_\_\_\_ : Reduction for rules violation above: (-0 to -20)

\_\_\_\_\_ : Total Score

\_\_\_\_\_ : Final Ranking/Place

Ties will be broken by a one shot "shoot-off" for distance. The team that can make the necessary adjustments to their catapult and get the most distance will be declared the winner.