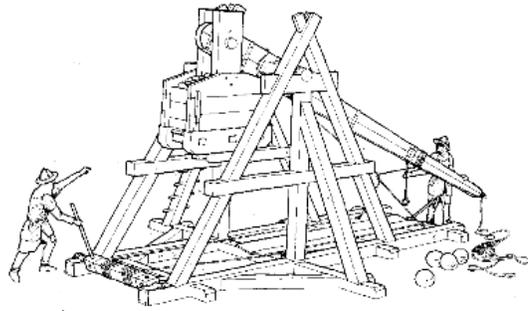


# Heights Trebuchet Tournament | Physics

The Evil Panthers have been lurking around the Noble Heights on the Hill for months. War is inevitable! It has been brought to us by King Sting himself to design and test the newest kind of siege equipment, a Trebuchet! We need as many different designs as possible to test in order to find the best one. At that point, we can bring the fight to the Prowling Panthers and bring peace to our land.



## Rules and Guidelines:

1. Trebuchets shall not exceed 1m by 1m by 1m. when locked and loaded.
2. Must be constructed by independent parts, no kits are to be used.
3. No springs or elastic parts can be used.
4. The trebuchet can only be powered by a system of counter weights not to exceed 2.3 kg (5lbs) (so basically using gravity)
5. You will need to make a side and top view scaled diagram of your trebuchet
6. It must be free standing and safely launch the projectile
7. Due to safety concerns your trebuchet must be triggered by a remote firing device (i.e. firing pin with string). You must have a way to secure your trebuchet to the ground (weights will be available if your trebuchet is too light and could flip over).
8. **You may not use any power tools in the construction of this. You must be monitored by a parent or guardian during the build at all times.**

## Presentation Board Contents

1. Team members names (You may have an optional picture beside your Trebuchet), date & periods should be clearly placed on your presentation.
2. Picture of and name of both the tennis ball and the trebuchet (If not pictured no creativity bonus will be considered. Take pictures from vantages that give the full picture and describe any of the meanings behind your creativity - slogans etc....)
3. Essay describing the history of trebuchet (At least 600 words) (This may be broken into different parts). Some items to consider is as follows (include pictures to add life to your presentation):
  - a. Development and designs
  - b. Scientist/Eras and dates associated with development
  - c. Famous Trebuchets
  - d. Famous battles with trebuchets
4. Bibliography – Reference at least three sources (on back of presentation).
  - a. At least one source must be from print and cannot be an internet source.
5. Calculations
  - a. Calculations of the angle of launch and initial velocity of launch based on distances of launch and times in the air for your trebuchet. (Minimum of 4 trials) Real data is preferred; you must get your trebuchet operational in time to finalize calculations.
  - b. Find the following for the trebuchet Angular Velocity, Angular Acceleration, torque, Tangential Acceleration and Tangential Velocity (be sure to show the calculations).
  - c. Momentum of the projectile at the instant it is released and impulse of the ball during the swing of the trebuchet.
6. Scaled Diagram with all measurements labeled and attached to your presentation.
7. Build pictures of your trebuchets.

## Battle Day:

1. On January 10<sup>th</sup> (weather permitting), the trebuchets will duel it out for first place.
2. Deliver your machine to Mr. Miller's room before school.
3. Scoring distance will be determined by seeing which tennis ball travels the farthest (and measuring it).
  - a. The tennis ball that travels the furthest (including roll and bounce) wins that heat.
4. You will supply your own tennis ball, feel free to decorate it.

All aspects regarding this project are subject to change at the teacher's discretion.

