

MERRIMACK COLLEGE EGG CATAPULT DESIGN COMPETITION RULES

Sponsored by: Merrimack College, Department of Civil Engineering

The goal of this competition is to encourage high school students to discover more about the field of engineering by designing and building an egg catapult.

OBJECTIVE

Each entrant must design, build and present a catapult that will accurately propel a raw egg toward a frying pan placed at a distance between 30 to 60 feet (specific distance to be given at the competition) away from the initial position of the catapult. Scoring will be based on accuracy, design, adherence to cost restraints, and presentation. The catapult must be a TREBUCHET. See www.trebuchet.com for examples. No kits are allowed. There is software that could be used to help design your trebuchet.

GENERAL RULES

- Entrants must be enrolled in grades 11 – 12
- Application to enter must be received no later than one month prior to the competition and sent to Ms. Jean Reynolds, Department of Civil Engineering, Merrimack College, 315 Turnpike Street, North Andover, MA 01845
- The catapult may be composed of any safe material, providing the cost of materials does not exceed \$50. This limit includes the estimated cost of any donated materials. A cost analysis report must be received no later than three weeks prior to the competition.
- The catapult must fit within a 3' x 3' x 8' volume. The 3' x 3' launch pad provides the base with the 8' dimension extending vertically upward. When firing, parts of the catapult may extend beyond this volume, but may not touch the ground outside the launch area
- The catapult should be of sufficient mass to ensure that it remains behind the launch line after the projectile has been launched
- Any source of energy may be used for the catapult except electrical, human or animal, chemical or nuclear
- Catapults must be safe and controllable. Participants are responsible for the safety of the operation of their design. Prior to competition, judges will disqualify any catapult that appears unsafe.

COMPETITION FORMAT

- In turn, each entrant will set up his or her catapult on the launch pad, which consists of a 3' x 3' solid surface
- The center of the target (a frying pan) will be placed at a distance somewhere between 30 feet and 60 feet to be established at the competition, from the front edge of the launch area. The elevations of the target and launch pad are relatively the same
- The judges will supply the three projectiles for the competition: fresh, Grade A, large eggs. The first launch from the official launch area will be practice only. The next two launches will be considered competitive launches
- A launch shall be considered such when the egg leaves the forward plane of the launch area, whether intentional or not
- The best score of the two competitive launches will be recorded as the distance in inches from the center of the frying pan target to the location where the egg first touches the ground.
- The egg must break contact with the catapult when firing
- Once the egg crosses the forward plane of the launch area, contestants may no longer control the catapult

- The catapult will receive zero points for accuracy if it crosses or moves into the launch line
- **Decisions and interpretations of the rules by the judges are final.**

JUDGING

Stage 1: Judges will score teams based on the first three criteria: Accuracy, Design, and Cost Analysis. The 10 highest-scoring teams will then proceed to the Presentation portion of the competition.

The maximum points in each of the first three categories are as follows:

Accuracy (40 points possible): Scoring will be based on the following formula:
(average of best 2 out of 3)

$$P = 40\left(1 - 0.02e^{0.04D}\right)$$

P is points for accuracy,

D is the distance from center of frying pan to point of contact of egg after launch, in inches
120 is the maximum distance from the target, in inches, within which the contestant may obtain points for accuracy.

Design (30 points possible): Judge's score will be based on aesthetics, creativity and efficiency of design as described in the attached scoring guidelines.

Cost Analysis Report (10 points possible): Points will be awarded based on appearance and quality of document, reasonableness of analysis and timely submission. Include itemized list of materials with actual or estimated cost of individual parts. Reports should be well organized and typed. Presentation should be logical.

Stage 2: The top 5 to 10 entrants will participate in the presentation portion of the competition. Presentations must be at least 4 minutes, and no longer than 5 minutes, in length. Students may use PowerPoint or overhead slides. A laptop with a CD drive and USB port, and a projector will be available for PowerPoint presentations.

Presentation (20 points): Score will be based on the organization and quality of information shared, demonstrated knowledge of the material being presented, effectiveness of visuals, creativity of presentation and adherence to time window.

The winner of the competition will be the one who scores the highest value out of 80 points. Accuracy of the catapult will act as a tiebreaker.

NOTE: We encourage coaches/teachers to provide instruction and support, but students must complete all project work!