



**Background:**

Energy can be classified into two main forms: potential and kinetic. Simply stated, potential energy is when the object is not in motion and energy is stored, while kinetic is the energy of motion. When an athlete pole vaults, they experience potential energy at the maximum height of the jump, just for a moment, before it becomes kinetic energy during the free fall. To protect the athlete, the kinetic energy they experience during the fall must be absorbed. The objective of this challenge is to design and construct a safe landing zone, minimized in height, for a water balloon dropped from a height of  $30 \pm 5$  ft.



**Specifications:** *(Any project not meeting specifications will be allowed to attempt but will earn a score of zero.)*

1. Each school may have an unlimited number of teams (max 2 per team) or individuals participating. Each design must be unique and must clearly be labeled with the names of each team member and school. A student may only participate once.
2. The competitors may use any inexpensive and readily available materials to build a landing zone. In other words, no titanium shafts, gases, motors, purchased kits, etc. may be used.
3. Materials which are not allowed in the construction include cotton-based products like tissue or fabric, gels, pastes, potentially explosive/combustive/dangerous/hazardous materials, anything that can house a gas other than air, and packaging materials (bubble-wrap, soft Styrofoam, peanuts, etc.). Examples of other restricted materials include those that will leave residue. A team member must be able to easily remove the water balloon from the landing zone for inspection.
4. The landing zone must remain intact after impact and may not have components that “fly out”.
5. The landing zone must sit freely on the ground and must not exceed a footprint of 2 ft x 2 ft.
6. All contestants and observers must remain outside of landing area during the drop for safety reasons. At least one team member must be present for their team’s drop.
7. The water balloon will be “Bunch O Balloons” by ZURU and filled following package specifications.

**The Competition:**

1. Landing zones must be brought to the competition fully assembled. Water balloons will be provided on the day of the event.
2. Height of the ground to the highest point of the landing zone as well as the largest width will be measured prior to the competition. The winning team will have a vessel, which has the smallest height. Those with surviving water balloons will be ranked above those with damaged water balloons, regardless of the height. A surviving balloon is classified as one that does not pop or leak.
3. The team will have 1 minute to place the landing zone in the drop area. A single water balloon will be dropped from a bucket truck. If a vessel is not set once the time has elapsed the team will receive a score of zero.
4. Once the team indicates they are ready for the drop, the team must exit the landing area and no modifications may be made. If elements such as wind, movement of the platform, etc. cause a water balloon to miss the projected target, another water balloon will be dropped at no penalty. If the re-dropped water balloon misses the vessel the team will score 0 points; the goal is to create a robust design. No practice drops will be allowed.
5. In the event of a tie, a first tie break of shortest length of vessel at largest width will be used. If a tie still stands, the second tie break will be a coin toss.