

STORM THE CASTLE

DESCRIPTION: Teams will design, construct, calibrate and operate a device capable of launching a projectile as far and as accurately as possible using only the energy of falling counterweights. All devices must be impounded prior to the deadline announced in the competition schedule. The size of the projectiles will not be announced until after impounding period.

THE COMPETITION: A TEAM OF UP TO: 2 APPROXIMATE TIME: 15 Minutes

- 1) Construction: **IMPOUND: Yes**
- a. The entire device, including the projectile and counterweight must be no more than 75cm high, 100cm wide and 100cm long when it is in the ready-to-fire position. This restriction does not apply during or after launch.
 - b. The device must operate within a 2-meter by 2-meter square launch area. However, the device must be triggered remotely from outside the launch area by pulling a string, firing pin, etc. No part of the device or counterweight may extend beyond the launch area before it is triggered or after the launch motion is complete. The device may not be anchored to the ground.
 - c. All teams will use the same projectiles, counterweights, and targets provided by the judges.
 - i) The counterweight will consist of a mass from 1-3kg with a hook on top. The counterweight and hook will fit within a 15 cm cube.
 - ii) Each of the projectiles will have a mass between 25-60 grams with a diameter not exceeding 6 cm. If multiple projectiles are provided, they will be similar in size, shape, and mass.
 - iii) The device must be constructed to accommodate the counterweight and the projectiles. Neither the counterweight nor the projectiles can be modified.
 - d. The device, without the counterweights, cannot contribute energy to the launch. This rule is violated if the center of gravity of the unloaded device drops during a launch motion, if the triggering process provides momentum to the launch, or if any other form of potential energy (compressed or stretched elastic solids, compressed air, etc.) is used. If the device can go through a launch motion without a counterweight and projectile in place, the rule is violated.
- 2) The Competition:
- a. The participants will bring their device to the launch area along with any other supplies (tools, notes, etc.) they may need when it is time for them to compete. Use of AC electrical equipment is not allowed.
 - b. Once the team begins, participants may not receive outside assistance, additional supplies, tools, coaching, etc.
 - c. Participants must give ample warning to the judges and spectators prior to each launch. Safety glasses must be provided and worn by the participants while competing. Teams will be immediately disqualified for operating the device in manner deemed unsafe by the judge.
 - d. The targets will be a 3-dimensional object at least 20 cm high, wide and long.
 - i) The participants will announce the distance (in whole meters) where the target will be placed before the launch. The judges will set the target so its center is the desired distance from the front edge of the launch area. Once during the competition, after they have hit the target, the contestants may call a time out and request a new target distance (in whole meters).
 - ii) Judges may indicate where previous successful launches have been marked. They will not provide measurements for distance or accuracy. Participants may not enter the target area to view or measure the results of a previous launch.
 - e. Teams have 5 minutes to make 3 launch attempts.

STORM THE CASTLE (CONT.)

- i) A successful launch will be scored every time the device sends a projectile into the target area (i.e. beyond the front edge of the launch area) in accordance with all rules.
 - ii) Launches will be ruled as failed attempts and will not be scored if any of the following occurs: the projectile did not land in the target area, part of the device extended out of the launch area before or after the launch, the energy rule (rule led) was violated, a participant was in the launch area when the launch was triggered, the 5 minute time limit expired prior to triggering the launch or if the device goes through an unintentional launch motion.
 - iii) It will not count as a launch attempt if the participants attempt to initiate a launch and the device does. not go through a launch motion due to a malfunction.
- f. In the event of a rule violation, the judge will call a time-out and explain the reason for the violation. The team may continue to compete after the clock has been restarted.
- g. Devices may be modified in any way while the clock is running in order to make successful launches. Only the tools and supplies brought with the contestants before time began can be used during competition.

SCORING: Each successful launch will be measured for distance and accuracy. The distance score will be measured from projectile's point of first impact to the front edge of the launching area. The accuracy score will be the distance from the projectile's point of first impact to the center of the target. Both distances must be measured in the same units. If the projectile hits the target before hitting the ground, the distance score will be the target distance and the accuracy score will be zero. The launch score will be the distance score minus the accuracy score (negative launch scores are possible). The final score will be the sum of all successful launch scores. Teams will be ranked according to the final score with the highest score winning. Teams with no successful launches will receive participation points only. In the event of a tie, preference will be given to the team with the highest individual launch score.

Sample Score Sheet for Storm the Castle - C
Division

Team Number _____ School Name _____

Names of participants: (Please write legibly!)

Attempt	Target Distance	Distance Score	Accuracy Score	Launch Score
1				
2				
3				
Final Score =(Sum of Launch Scores)				

Final Rankings

Final Score (highest wins)

Tie breaker - Best Launch Score (highest wins)

Team Ranking