

STORM THE CASTLE

Science, Math, & Engineering



DESCRIPTION: Prior to the competition, teams will design, construct, and calibrate a single device capable of launching projectiles onto a target.

A TEAM OF UP TO: 4 per grade level

EVENT PARAMETERS:

- a. Each team may bring tools, supplies, writing utensils, and stand-alone calculators of any type for use (these items need not be impounded). Each team must impound only one launch device.
Items must be moveable by the competitors without outside assistance.
- b. Event Supervisors will provide the projectiles, counterweights, and target.
- c. Participants must wear eye protection during device setup and operation.

CONSTRUCTION PARAMETERS:

- a. When ready-to-launch, the launch device, projectiles, stabilizing weights, counterweights, and all other device components (except for tools / supplies) must fit in a 65.0 cm per side cube, in any orientation chosen by the team.
- b. The triggering device is not considered part of the device and activating it must not contribute significant energy to the launch. It must extend out of the launch area, allow for competitors to remain at least 75 cm away from the launch area, and does not need to return to the launch area after launch. The triggering device must not pose a danger due to flying parts or excessive movement outside of the launch area.
- c. The launch device must be constructed to accommodate the supervisor provided counterweights and projectiles. Teams may not modify the counterweights or projectiles.
- d. The launch force must be entirely supplied by the gravitational potential energy from the supervisor provided falling counterweights. The device, without the counterweight and projectile, must not contribute energy to the launch. This includes any part of the device whose potential energy decreases, with the exception of items of nominal mass, such as strings and thin rods. Devices will be inspected to ensure that there are no other energy sources. At the supervisor's discretion, teams must disassemble devices after competing in order to verify this.
- e. The launch device must be designed and operated in such a way to not damage or alter the floor.
- f. Devices built out of metal are not allowed.

Storm the Castle (Cont.)

THE COMPETITION:

- a. Each team will have 8 minutes to set up, adjust and calibrate their device, and to launch a max of 2 shots with each counterweight. Measurement time required by the supervisor is not included in the allotted time. Devices that do not meet the construction specs will not be allowed to launch until brought into spec.
- b. When instructed by the event supervisor(s), teams must place their device at a location they select in the launch area. Competitors must not be within 75 cm of the launch area or in front of the front edge of the launch area during a launch. They may touch only the part of the triggering device that extends at least 75cm outside of the launch area.
- c. Teams may move devices within the launch area and/or adjust them in any way between and before shots.
- d. No part of the launch device may extend outside of the launch area before or after a shot. If part of the launching device extends beyond the launch area during the launching action, it must return to and remain in the launch area immediately after the launch without assistance of the competitors.
- e. Before the first launch with each counterweight, the team must notify the supervisor of the desired position of the target (only 0.5 m increments allowed).
- f. Before each launch, teams must notify the event supervisor. Any launch, even if unintended or not announced, will count as one of the four launches allowed to a team.
- g. If the team tries to trigger the device and it does not go through a launch motion, it does not count as one of the team's four launches and the team must be allowed to adjust/reset the device if time allows.
- h. After each launch the event supervisor will indicate to the team when they may approach the target to make measurements to calibrate their device.
- i. If a team hits the target, they may request the target be moved to a new location (in 0.5 m increments).
- j. Supervisors must be responsible for retrieving projectiles and returning them to the team between each launch if less than 2 projectiles of each type are initially provided to the team.

COMPETITION AREA:

- a. The launch area is a rectangular area 1.0m wide by 1.0m long (parallel to the launch direction), designated by tape on the floor. Tape must also be placed 75 cm away from the sides and back of the launch area.
- b. The target will be an open-topped container with a minimum dimension of 20 cm x 20 cm x 20 cm.
- c. The supervisor will set the target at a distance selected by the team so that two sides of the target are parallel with a straight line from the center of the Launch Area to the center of the target.
- d. The 2 separate counterweights must consist of a 0.5-1.5 kg (light) or 1.5-2.5 kg (heavy) mass with a standard 1" open hook bolt on top.
- e. Projectiles must have a mass of 20.0-40.0 g (for the light counterweight) and 40.0-60.0 g (for the heavy counterweight) and must be approximately spherical with a diameter not exceeding 6.0 cm.

SCORING: [Link to scoring sheet](#)