

## **EVENT 2: TARGET DROP**

(Dated 11/7/2016)

**OBJECTIVE:** To predict the landing point of a ball launched horizontally from a tabletop.

### **RULES:**

- a. The team will design, build and bring to the competition a device that will allow a 1 inch diameter steel ball to roll off a table horizontally (parallel to the floor). The ball cannot have a vertical velocity when it leaves the table, other than that due to small deviations from the horizontal due to the table not being level.
- b. The team may determine if the floor is level and include deviations in their calculations.
- c. The team needs to supply their own tools including measuring devices to determine the table height above the floor.
- d. The type of table to be used by the team will be announced at the time the team competes and will be chosen from among lunchroom tables, student/lab desk or lab counters typical used in High Schools.
- e. During the planning stage, the team may test their device as long as the ball does not leave the table. If the ball leaves the table, the team may be disqualified as per the judges' decision.
- f. The person placing the ball into the device may not impart energy to the ball. (i.e., the ball must gain speed by the force of gravity only).
- g. The team will predict the landing site of the ball by drawing a target on paper placed the predicted distance away from the table. The target drawn must be the same diameter as the ball. The floor may be a hard or carpeted surface.
- h. A target distance between 45.00 and 55.00 centimeters in 2.00 centimeter intervals will be randomly assigned to the team at the time of the event.
- i. The team will have fifteen (15) minutes to assemble their device, prepare the target and launch the ball. Time will be recorded by the judge(s)

### **COMPETITION AND SCORING:**

- a. The team **will** supply all necessary supplies, tools and equipment, including the steel ball. The target, paper and carbon paper will be supplied to the team.
- b. The target will be a 35mm film canister. Team may supply their own canister.
- c. The canister may **not** be altered in any way other than a simple damping device placed inside such as tape, sand or paper.
- d. The team will place carbon paper over a sheet of white paper and mark their predicted landing spot of the projectile on the white paper. The team will then place a film canister at this location.
- e. The canister, as well as the paper, may be secured to the floor.
- f. Each team will be given only one (1) try to have the ball land inside the canister. There are no do-overs.
- g. If the ball lands inside the canister, the team will receive a score of 100. **No** penalty if the ball **bounces** out of the canister. (Refer to rule i below).
- h. If the ball does not land inside the canister but hits the rim of the canister, the team will receive a score of 90.
- i. If the ball falls within a radius of 10 centimeters from the center of the film canister, then the team will receive a score of 80. For every additional 10 centimeters the ball lands from the center of the canister, the team will score 10 points less.
- j. It is the team's responsibility to record the landing of the ball in slow motion for verification of landing spot otherwise, the Judge(s) decision is(are) final.
- k. Additionally, the results will be recorded by carbon paper.
- l. No score less than zero will be recorded.
- m. In case of a tie, the team with the fastest time to perform the launch will win.
- n. If the tie breaking procedure is used, the winning team will have their score increased by 10%. Their adjusted score will then become the new winning (highest) score. For example, a team receiving a winning score of 100 and also having the fastest time will receive a score of 110.

$$\text{SCORE} = \frac{(\text{Your score})}{(\text{Highest score})} \times 100$$

Updates to the rules and frequently asked questions with answers are available by e-mailing the event organizers at [jvalente@ctemc.org](mailto:jvalente@ctemc.org). It is the team's responsibility to periodically inquire about changes and clarifications to the rules.