

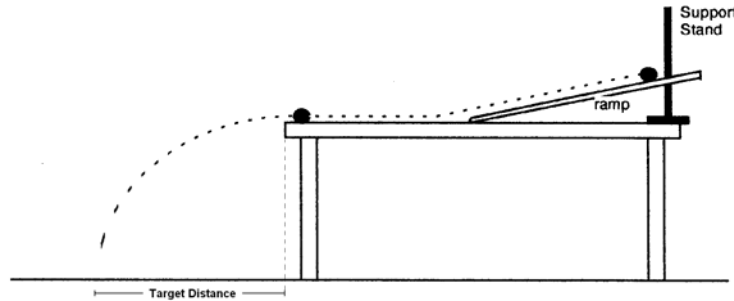
BULL'S EYE

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Spirit of the Event: The objective of this event is to do a no-tech projectiles lab. The only intended variables for this challenge are preparation and meticulous lab work.

Purpose: In this challenge teams will need to configure a ramp so that a ball lands an exact distance from the tabletop. Teams will have only one chance to see the accuracy of their work. There are no practice shots!

General Setup:



Materials:

- Teams may use a ball (1.0 – 5.0 cm steel ball - ask your Physics teacher to loan you one), ramp, paper, pencil, support stand, stop watch, meter stick, thread, washer, masking tape.
- Teams are required to bring all of their own materials. No materials will be provided.
- You may not use calculators, formula sheets, photogates, cell phones, etc.

The Rules:

- At the beginning of the event teams will be informed of the 'Target Distance'. The 'Target Distance' will be between 0.25 and 0.75 meters, measured horizontally from the edge of the tabletop. Left and right aim will not be included in the 'Target Distance'.
- Teams will have 20 minutes in which they may make calculations, adjustments and measurements so that their ball lands at the 'Target Distance' when asked. During this time their ball may roll down the ramp and across a tabletop.
 - The ball may not leave the table top/ramp system.
 - Teams may not do any testing of their landing spot during this time! This includes having your ball fall and land on the floor, near the floor, or any other location that can be even remotely seen as being a practice shot. Doing so will result in a team's disqualification, as described in the NSSL Constitution. Please, follow the spirit of the event.
- It is recommended that teams bring a second meter stick or other object to act as a barrier preventing their ball from leaving the tabletop.
- Two important points to remember in performing this experiment:
 1. The experiment must be repeatable. Teams may be asked to run an additional trial at the discretion of the judges. In the event that the judges deem additional trials necessary, the judges will determine which of landing distances will be recorded.
 2. The ball must not be allowed to leave the table until you are ready for the final run. The judges must be present for your final run.
- At the end of the 20 minutes, judges will ask teams to release their ball from rest along the incline so that the landing spots can be measured.
- Carbon paper (provided by event runner) will be placed over a target sheet of paper (also provided by event runner) so that the landing spot can be recorded.

Scoring:

- A team's score will be determined using the a general percent difference formula:

$$Score = \frac{|Target Distance - Landing Spot|}{Target Distance} \times 100\%$$

- Teams will be ranked by their scores, from least to greatest.