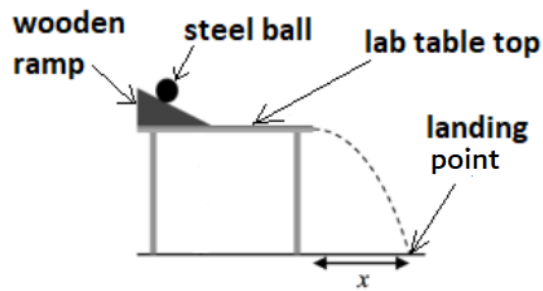


Precisely Predicting Projectiles



Objective:

To predict where a steel ball that is rolled down a ramp, across a lab table, and off the edge will land on the floor.

Rules:

1. Time begins when a team is given their materials. Each team will be given a steel ball, wooden ramp, meter stick, stopwatch, plumb bob, masking tape, and a printed target.
2. The team will decide where on the table to place the ramp, keeping in mind that the ball must roll some distance across the table before becoming a projectile. The ramp may be taped to the table.
3. The team may make measurements of the ball, its motion, the ramp, and the table.
4. Teams may **NOT** allow the ball to roll off the table and hit the floor while they measure. Teams shouldn't be solving this problem through trial and error, and judges have the authority to disqualify a team they deem to be violating the spirit of the event.
5. The meter stick, stopwatch, and plumb bob may only be used for measurement. For instance, the meter stick can not be used to guide the motion of the ball on the table.
6. When teams are done with measurements and calculations, they will tape the printed target on the floor with the bullseye at the location they predict the ball will make first impact.
7. Time stops once the target is taped to the floor.
8. A judge will place a sheet of carbon paper over the target. The team will be given *only one attempt* to roll the ball down the ramp, across the table, and over the edge to hit the target.
9. However, if the team doesn't like "the look" of the ball's path across the table, they can stop the ball **before** it reaches the edge (before it becomes a projectile), and they may release it again. Teams can only stop and re-release the ball twice.
10. The team's final score will be the distance, in millimeters, between the center of the bullseye and the center of the mark left by carbon paper, as measured by the judges. Any teams that fail to hit the printed target will be tied for last place.
11. Teams will be ranked in order of increasing final score.

Tiebreaker: The shortest time will serve as a tiebreaker.

Time limit: 15 minutes.