

EVENT 5: THE MARBLE COASTER

(revised 10/01/2023, revisions in blue)

OBJECTIVE: To construct a track along which a marble will be in motion for the longest period of time.

RULES:

1. The marble coaster must be designed, built, and brought to the competition by the team.
2. The entire coaster must be constructed only from cardboard, card stock, construction paper, or similar material, and any type of glue.
3. All glue must be dry at the time of competition. Wet glue on the track or on other parts of the coaster will result in disqualification. **All parts of the track must be viewable for inspection by the judges.**
4. The dimensions of the entire coaster must not exceed a cube that is 60 cm on each edge.
5. The coaster must be pre-constructed and free standing and constructed so that it can easily be placed on a flat tabletop to be tested.
6. The judges will provide the team with a marble, approximately 16 millimeters in diameter.
7. The energy to keep the marble in motion is to come from gravitational potential energy only. No other forms of energy are to be used to increase, decrease, or maintain the speed of the marble.

COMPETITION AND SCORING:

8. The competition will take place in a typical high school lab room or classroom with tables or lab stations approximately between 70 to 92 cm high.
9. The team will position their marble at the start of their coaster course and signal the judge(s) to start timing.
10. Timing begins when the marble is released and ends when the marble exits the coaster.
11. The marble needs to be in motion at all times: if the marble becomes stuck in one place for more than 3 seconds, the clock will be stopped and the team will receive a DQ score for that trial.
12. Each team will be allowed two runs of the marble, and the run with the longest time will be used for scoring.
13. The winning coaster will be the one that keeps the marble in motion for the longest period of time before exiting the coaster.

Scoring:

$$\text{Your Team's Final Score} = \frac{\text{Your Team's Time}}{\text{Winning Team's Time}} \times 100$$

Tiebreaker (1st place tie only) : Teams that are tied for 1st place will re-run a marble on their coaster to break the tie. The original times for each team will be kept, and 5% will be added to the winning team's original time. This adjusted time will become the new "Winning Team's Time" in the scoring formula above.

Disqualification Score: A minimum non-zero score may be applied to participating teams, according to judges' decisions about disqualification.