



MOUSETRAP VEHICLE

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Read the General Rules in the manuals and on www.soinc.org as they apply to every event.

1. **DESCRIPTION:** Teams design, build, and test one vehicle using one mousetrap as its sole means of propulsion to reach a target as quickly, accurately and close to their predicted time as possible.

A TEAM OF UP TO: 2 **IMPOUND: Yes** **EYE PROTECTION: #5** **APPROX. TIME: 10 minutes**

2. **SAFETY PARAMETERS:** Competitors must bring and correctly wear eye protection, ANSI Z87+ spectacles with side shields, while preparing and running their vehicle. Teams without proper eye protection must be immediately informed of that and given a chance to obtain eye protection if time allows, otherwise not be allowed to compete and scored as a no-show.

3. **CONSTRUCTION PARAMETERS:**

- a. Vehicles must be designed to travel a specified distance, come to a complete stop without straying from the center of the track, and be as close as possible to their predicted time. The exact distance for Regional is 10.00 m; for State between 8.00 and 12.00 m (1.00 m intervals); and for Nationals between 8.00 and 12.00 m (0.50 m intervals). At State and Nationals, the distance is chosen by the Event Supervisor and not announced until all vehicles have been impounded.
- b. Only one unmodified snap mousetrap (with a base less than 6.0 cm x 12.0 cm) must be used as an energy source. An unmodified mousetrap is one that still retains all of its original parts and structural integrity to function as intended. Altering the structural integrity of the mousetrap includes, but is not limited to, welding, bending, and cutting. Items, other than an extension bar attached to the snap portion, may not be added to the mousetrap. Soldering, taping, tying, gluing, and/or clamping the extension bar to the snap portion is allowed. Up to four (4) holes may be drilled in the mousetrap for attachment to the chassis only.
- c. All of the vehicle's kinetic energy must originate from the unmodified mousetrap (spring). Items must not be added to the mousetrap to increase the potential energy of the unmodified mousetrap. Conversion of the mechanical energy of the mousetrap spring is permissible, but any additional sources of kinetic energy must be at their lowest states at the beginning of the run.
- d. The vehicle must have the point of a bent paper clip that serves as a 'Measurement point' attached to the front of its chassis, that extends down to within 1.0 cm of the track's surface. The point of the paper clip nearest the track surface is used as the reference point for distance measurements and must be easily accessible to the Event Supervisor.
- e. In the ready-to-start mode, the vehicle must be no more than 1.00 m long and 0.35 m wide. The width dimension must be parallel to the Starting Line. After it starts its run, it does not have to remain within these dimensions. There is no restriction on the height of the vehicle.
- f. Competitors must start the vehicle by actuating a trigger using an unsharpened #2 pencil, with an unused eraser (supplied by the Event Supervisor). The trigger must be designed so that its actuation is perpendicular (vertical) to the floor. A non-vertically activated trigger is a construction violation.
- g. The wheels and drive string(s) are the only vehicle parts permitted to contact the floor at any time.
- h. Stopping mechanisms must work automatically. The vehicle must not be tethered or remotely controlled.
- i. Electrical components must not be used on the vehicle or its alignment devices.

4. **THE TRACK:**

- a. The competition must be on a straight and level lane with a relatively smooth, hard, low-friction surface. Space is needed on each side of the track's center and beyond the finish line to allow for error in the vehicle's path.
- b. One-inch tape must be used to define the track's center (Center Line Bonus), the Starting Line, and Target Line (finish line). The inside edge of the tape must define the Starting Line and the Target Line. The Starting Line must be 1.0 m in length. The Finish Line must be a minimum of 1.0 m in length but may be extended to facilitate measurement.
- c. The track centerline must connect the center points of the start and finish lines. The center of the start and finish line must be marked.
- d. At the Event Supervisor's discretion, more than one track may be used. Teams must be given the option to choose which track they will use. All runs by a team must be made on the same track.

5. **THE COMPETITION:**

- a. The vehicle must be impounded before the start of the competition. Tools, data, and calculating devices need not be impounded.
- b. For States and Nationals, the Target Distance must not be announced until all vehicles have been impounded.
- c. Only competitors being judged are allowed in the vehicle impound and track areas while teams are competing.

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- d. Teams may not verify the distance by rolling the vehicle on the track surface (floor) between the start and finish line at any time prior to or during the competition.
 - e. All parts of the vehicle must move as a whole; no anchors, tie downs, launching ramps, or other separate pieces are allowed. The competitors must not hold, constrain, or give a push to the vehicle. If any piece falls off during the run, it is considered a construction violation. The vehicle must be able to remain at the starting position without being touched until triggered.
 - f. **Before the first run, the competitors must predict their vehicle's Run Time. They are not allowed to change the prediction for the second run, but they may adjust the vehicle.**
 - g. Teams have 10 minutes of Event Time to set up, make any adjustments (including adjusting the Measurement point), take measurements, and start two runs. If the second run has started before the 10-minute period has elapsed, it must be allowed to run to completion. Time used by the Event Supervisor for run measurements must not count toward the 10 minute Event Time.
 - h. **Teams must place the tip of the vehicle's Measurement point anywhere directly above the Starting Line and align the vehicle prior to the run.**
 - i. **Sighting and/or aiming devices placed on the track are permitted but must be removed before the vehicle runs. Aligning and sighting devices mounted on the vehicle may be removed at the team's discretion prior to each run.**
 - j. Run Time starts when the vehicle begins forward motion and ends when the vehicle comes to a complete stop. If a vehicle does not move upon actuation of the switch it does not count as a run and the team may request to set up for another a run, but must not receive extra time.
 - k. **If the vehicle moves any distance after actuation of the switch, it must be considered a run.**
 - l. Once the vehicle starts a run the competitors must move outside the lane, not follow their vehicle, and wait until called by the Event Supervisor to retrieve their vehicle following measurement.
 - m. Run Time is in seconds, recorded to 0.01 seconds.
 - n. **Event supervisors are strongly encouraged to utilize 3 independent timers on all runs. The middle value of the 3 timers must be the officially recorded time.**
 - o. **If the time and/or distance cannot be measured for a vehicle (e.g., the vehicle starts before the Event Supervisor is ready or the competitors picks up the vehicle before it is measured), or the vehicle travels in the wrong direction, it is a failed run, which counts as a run with no score.**
 - p. Teams who wish to file an appeal must leave their vehicle with the Event Supervisor.
6. **SCORING:** Low score wins.
- a. The Run Score = Distance Score + Time Score + Center Line Bonus + Predicted Time Score.
 - b. **The Distance Score is the distance from the Measurement point to the Target Line in millimeters. This is a point to line measurement.**
 - c. **The Time Score = 10 * (Run Time).**
 - d. **A Center Line Bonus of -20.0 points is awarded if the center tape remains completely within the vehicle's track, i.e. the Center Tape is not visible outside of either wheel of the vehicle's widest axle, while the vehicle travels between the start and finish line as determined by the Measurement point.**
 - e. **The Predicted Time Score = 10 * |(Predicted Time - Travel Time)|.**
 - f. **The Final Score for the event is the run, which gives the team the better rank.**
 - g. **Tiers:** Teams are ranked using the single run that gives them the best overall rank.
 - i. 1st Tier: A run with no violations.
 - ii. 2nd Tier: A run with competition violations.
 - iii. 3rd Tier: A run with construction violations or both competition and construction violations.
 - iv. 4th Tier: **A vehicle that cannot complete any runs. (Participation points only)**
 - h. **Ties must be broken by this sequence 1. Better non-scored run; 2. Better Predicted Time Score of better run; 3. Better distance score on better run.**

SCORING EXAMPLE: At a competition, a team's vehicle stopped 103 mm from the Target Line. It made the run in 7.86 seconds, kept the Center Line within the vehicle's track, and their predicted time was 6.79 sec.

Distance Score	103.0 points	
Time Score	78.6 points	(10* 7.86 s)
Center Line Bonus	-20.0 points	
Predicted Time Score	10.7 points	(10 * (6.79 s - 7.86 s))
Run Score	172.3 points	

Recommended Resources: All reference and training resources including the **Mousetrap Vehicle DVD** are available on the Official Science Olympiad Store or Website at <http://www.soinc.org>

