

MOUSETRAP VEHICLE

1. **DESCRIPTION:** Teams design, build, and test one vehicle using one **or two** mousetraps as its sole means of propulsion to travel a distance as **quickly** and **accurately** as possible from a Start Point to a Target Point.
A TEAM OF UP TO: 2 IMPOUND: Yes EYE PROTECTION: #5 APPROX. TIME: 8 min
2. **SAFETY PARAMETERS:** Competitors must bring and correctly wear eye protection, ANSI Z87+ spectacles with side shields, while preparing and running their vehicle.
3. **CONSTRUCTION PARAMETERS:**
 - a. Vehicles must be designed to travel a **minimum of 8.50 m, stay within a 0.75 m track width for the first 8.50 m, and** come to a complete stop as close as possible to a **Target Point**. The exact distance **will be chosen by the Event Supervisor from between 9.00 m and 12.00 m. At Regional competition the interval will be 1.00 m, for State 0.50 m and for Nationals 0.10 m.**
 - b. **The distance must not be announced** until all vehicles have been impounded.
 - c. **Up to 2** unmodified snap mousetraps (with a base less than 6.0 cm x 12.0 cm) may be used as **the sole** 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, or clamping the extension bar to the snap portion is allowed. Up to 4 holes may be drilled in the mousetrap for attachment to the chassis only.
 - d. All of the vehicle's kinetic energy must originate from the unmodified mousetraps. Items must not be added to the mousetrap to increase the potential energy of the unmodified mousetraps. Conversion of the mechanical energy of the mousetrap spring **to any other type of energy except kinetic energy to drive the vehicle is not permitted.**
 - e. The vehicle must have a paper clip attached to its front. **The end point** of the paper clip is used as the **Measurement Point** for distance measurements, it must be easily accessible to the Event Supervisor, **must extend out** beyond any other part of the vehicle (with the exception of the extension bar attached to the snap part), **and it must be bent so** that it extends down to within 1.0 cm of the track's surface.
 - f. In ready to start mode, the **entire** vehicle must be no more than **0.80 m** long and **0.30 m** wide. After it starts its run, **all dimensions except the width may change but at no time may any part of the vehicle extend higher than 0.90 m above the floor.**
 - g. **The vehicle must have a built-in fixed receptacle anywhere on the vehicle to hold a ¼" x 1.0 m Event Supervisor provided wood dowel (mass between 10.0 and 25.0 g) vertical to the floor. If needed, students must provide their own materials to secure the dowel but they must not modify the dowel in any way. The dowel must be used to facilitate timing. Vehicles unable to accommodate the dowel will be allowed to run with the backup timers, but will be placed in Tier 3.**
 - h. 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.
 - i. The wheels and drive string(s) are the only vehicle parts permitted to contact the floor at any time.
 - j. Stopping mechanisms must work automatically. The vehicle must not be tethered or remotely controlled.
 - k. Electrical components must not be used on the vehicle or its alignment devices.
4. **THE TRACK:**
 - a. The track must be on a smooth, level, and hard surface. Space is needed on each side of the track and beyond the **Target Point** to allow for error in the vehicle's path.
 - b. **The inside edge of the one-inch tape closest to the Start Point** must be used to define the track's Start Line, the **0.50m Line, the 8.50m Line, and Side Lines up to the 8.50m Line.**
 - c. **The Start Point will be centered on the Start Line and marked on the inside edge.**
 - d. **The Target Point must be marked on an approximately 5 cm long x 1 inch wide piece of tape. The distance between the Start and Target Points must be measured to within 1 mm of the designated target distance.**
 - e. **If used, a photogate timing system must be installed at the 0.50 m Line and the 8.50 m Line at a height of approximately 0.95 m all tracks. See rule 5.n.**
 - f. 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. Only competitors being judged are allowed in the vehicle impound and track areas while teams are competing.

- c. Teams may not verify the distance by rolling the vehicle on the track surface between the start and finish line at any time prior to or during the competition.
 - d. 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.
 - e. **The competitors may adjust the vehicle between runs but the Measurement Point must remain within 1.00 cm of the floor and be the foremost point with the exception of the extension bar.**
 - f. Teams have **8** minutes of Event Time to set up, **attach the supplied dowel**, make any adjustments (including adjusting the Measurement point), take measurements, and start two runs. If the second run has started before the **8**-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 **8**-minute Event Time.
 - g. Teams must place the tip of the vehicle's Measurement Point on the **Start Point** and align the vehicle.
 - h. 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.
 - i. **Run Time will be the time it takes for the vehicle to travel between 0.50 m and 8.50 m. It starts when the dowel of the vehicle reaches 0.50 m and ends when it passes the 8.50 m mark. The Run Time is measured to the nearest 0.01 s.** 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 run, but must not receive extra time.
 - j. If the vehicle moves any distance after actuation of the switch, it must be considered a run.
 - k. Once the vehicle starts a run the competitors must not follow it down the track and must wait until called by the Event Supervisor to retrieve it. The **8**-minute time resumes once they pick up their vehicle.
 - l. **If any part of the vehicle leaves the 0.75m track before it crosses the 8.50 m Line the run will be placed in Tier 2. After the measurement point passes the 8.50 m Line this penalty will not be implemented.**
 - m. If the vehicle **passes the 0.50 m Line but stops before the 8.50 m Line, the hand held timers record the stop time, measurement is taken, and it is scored as a Tier 2 run.**
 - n. Event supervisors must use **hand held timers** on all runs and are encouraged to also utilize a **photogate timing system for the primary time.**
 - o. If the time and/or distance cannot be measured for a vehicle (e.g., it starts before the Event Supervisor is ready, **if it moves but does not go at least 0.50 m**, the competitors pick up it before it is measured, or it travels in the wrong direction), the run **is ranked in Tier 2 with a score of 5000.**
 - p. Teams who wish to file an appeal must leave their vehicle with the Event Supervisor.
6. **SCORING:** Best low score wins.
- a. The Run Score = Distance Score + Time Score.
 - b. The Distance Score is the distance from the Measurement point to the Target **Point** in **centimeters measured to the nearest 0.1 cm.** This is a point-to-point measurement.
 - c. The Time Score = **Run Time x 5.**
 - d. The Final Score for the event is the run that gives the team the better rank.
 - e. **Tiers:** Teams are ranked using the single run that gives them the best overall rank.
 - i. Tier 1: A run with no violations.
 - ii. Tier 2: A run with competition violations. **Some examples of these would be any run that disrupts the photogate system, doesn't reach 8.50 m, or leaves the confines of the track before its measurement point passes the 8.50 m line.**
 - iii. Tier 3: A run with construction violations or both competition and construction violations.
 - iv. Tier 4: A vehicle that cannot complete any runs. (Participation points only)
 - f. Ties must be broken by this sequence: 1. Better non-scored run; 2. **Faster time on the scored run.**

SCORING EXAMPLE: At a competition, a team's vehicle stopped 155.3 cm from the Target Point with a Run Time of 5.79 s and stayed within the track.

Distance Score	155.3	cm
Time Score	<u>28.95</u>	(5.79 s x 5)
Run Score	184.25	

Recommended Resources: All resources including the **Mousetrap Vehicle DVD** are available on the Official Science Olympiad Store or Website at www.soinc.org

