

# MOUSETRAP VEHICLE

See General Rules, Eye Protection & other Policies on [www.soinc.org](http://www.soinc.org) as they apply to every event.

1. **DESCRIPTION:** Teams design, build, and test a vehicle using one or two snap mousetraps as its sole means of propulsion to push a **paper** cup forward, reverse direction, and stop **as close as possible to a Vehicle Target Point**.
- A TEAM OF UP TO: 2    IMPOUND: Yes    EYE PROTECTION: B    EVENT TIME: 8 minutes**
2. **EVENT PARAMETERS:**
  - a. **Each team must bring and impound a single vehicle, a practice log, and any additional/spare parts.**
  - b. **Teams** may bring a **stand-alone** calculator of any type, data, and non-electric tools for their vehicle which do not need to be impounded.
  - c. All participants must properly wear eye protection at all times. Participants without proper eye protection must be immediately informed and given a chance to obtain eye protection if time allows. Participants without eye protection will not be allowed to compete.
3. **CONSTRUCTION PARAMETERS:**
  - a. **Teams** will construct a vehicle where all propulsive energy must come from one or two snap mousetraps of base **6.0 cm x 12.0 cm or smaller**. **No part of the jaw/hammer may extend more than 1.0 cm beyond the base**. Mousetraps must retain all of their original parts and structural integrity. Altering the structural integrity of the mousetrap is prohibited, including welding, bending, and cutting. Items may be added to each mousetrap through methods including, but not limited to: soldering, taping, tying, gluing, and clamping. Added items cannot increase the potential energy of the unmodified mousetrap. Up to 4 holes may be drilled in each mousetrap to attach it to the vehicle.
  - b. Conversion of the mechanical energy of each mousetrap's spring is permissible, but any additional sources of kinetic energy must be at their lowest states in the ready-to-run configuration.
  - c. The vehicle must not be remotely controlled or tethered and must stop and reverse automatically.
  - d. Electric/electronic components and devices are not permitted.
  - e. **An approximately 1/4" diameter round wooden dowel must be attached to the vehicle approximately perpendicular to the floor. The bottom of the dowel must be  $\leq 1.0$  cm from the track's surface and be easily accessible by the Event Supervisor.**
  - f. Wheels/treads in their entirety in the ready-to-run configuration must fit in a **40.0 cm x 40.0 cm** space of any height. Axles, drive arms, and other parts of the vehicle may extend beyond these parameters.
  - g. Only non-electric sighting/aiming devices are permitted. If placed on the track, they must be removed before each run. If placed on the vehicle, they may be removed at the team's discretion.
  - h. All parts of the vehicle must move as a whole. The only parts allowed to contact the floor during the run are wheels/treads, drive string(s), and **any** parts already in contact with the floor in the ready-to-run configuration. Pieces falling from the vehicle are a construction violation. The cup is not considered part of the vehicle.
  - i. Participants must be able to answer questions regarding the design, construction, and operation of the device per the Building Policy found on [www.soinc.org](http://www.soinc.org).
4. **PRACTICE LOG:**
  - a. **Teams must record the vehicle distance, cup distance, and run time of at least 10 practice runs while varying at least one vehicle parameter (e.g., # of string wraps around the axle) for each run.**
  - b. Logs will be impounded and **returned when the team is called to compete.**
5. **THE COMPETITION:**
  - a. Only participants and the event supervisors will be allowed in the impound and track areas. Once participants enter the event area, they must not leave or receive outside assistance, materials, or communication.
  - b. Teams have 8 minutes to set up their vehicle and complete up to 2 runs. Vehicles in the ready-to-run configuration before the end of the 8-minute time period will be allowed to complete a run. Teams may not use AC outlet power during their 8 minutes.
  - c. **The Event Supervisor will provide a 3-oz. paper cup that is at least 5.0 cm tall. Teams must place the cup upside down to cover the Start Point. The Start Point can be anywhere under the cup as long as it is completely covered.**
  - d. In the ready-to-run configuration, the vehicle's dowel must touch the cup, **and the vehicle must remain at the starting position without being touched.**

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- e. Teams may adjust their vehicle (e.g. change mousetraps, distance, directional control) within their 8 minutes, **though the Event Supervisor may re-verify that the vehicle meets specifications prior to each run. Timing is paused during any measurements made by the Event Supervisor.** Timing resumes once the participants pick up their vehicle or begin making their own measurements. Teams may use their own non-electric/electronic measuring devices to verify the track dimensions during their 8 minutes.
  - f. Teams must not roll the vehicle on the floor of the track on the day of the event without tournament permission. If permitted, only participants may be present.
  - g. Substances applied to the vehicle must be approved by the Event Supervisor prior to use, must not damage or leave residue on the floor, track and/or event area. During their 8-minute time, teams may clean the track but it must remain dry.
  - h. Participants must start the vehicle using any part of an unsharpened #2 pencil with an unused eraser, supplied by the Event Supervisor, **in a motion approximately perpendicular to the floor**, to actuate a trigger. They may not touch the vehicle to start it, hold it while actuating the trigger, or “push” the vehicle to get it started. Once the run starts, participants must not follow the vehicle until called by the Event Supervisor.
  - i. A Failed Run occurs **for any run that** does not occur in the 8 minutes or if the time or distance cannot be measured for a vehicle (e.g., the run starts before the event supervisor is ready, the participants pick it up before it is measured, **the vehicle runs backward at the start of its run**). **The vehicle failing to reverse direction does not result in a Failed Run or a violation.**
  - j. If the vehicle does not move upon actuation, it does not count as a run and the team may set up for another run but will not be given additional time.
  - k. A team filing an appeal must leave their vehicle in the competition area.
6. **THE TRACK:**
- a. **A track needs a minimum width of 2.0 m** on a smooth, level, and hard surface. **There is no maximum width.** A diagram of the track can be found on the event page at [www.soinc.org](http://www.soinc.org).
  - b. **The Start Point (SP), Cup Target Point (CTP), and Vehicle Target Point (VTP) will be marked on tape approximately 2.5 cm wide and approximately 5.0 cm long. The CTP will be 8.00 m from the SP.**
  - c. **The VTP will be between the SP and the CTP.**
    - i. **The centerline distance (along the imaginary line connecting the SP and CTP) between the VTP and CTP, will be in intervals of 0.10 m in these ranges: Regional - 1.00 to 2.00 m, State - 2.00 to 4.00 m, National - 4.00 to 6.00 m.** The centerline distance will be chosen by the Event Supervisor and announced after the impound period.
    - ii. **The VTP will be offset to the right side of the imaginary center line when facing the CTP by the following distances: Regional - 0.10 m, State - 0.25 m, National - 0.50 m.**
  - d. The event supervisor is encouraged to use three timers. The middle time of the 3 timers must be the official Run Time. The Run Time must be recorded in seconds to the precision of the timing devices.
  - e. At the event supervisor’s discretion, more than one track may be used. If so, the team may choose which track they use, but must use the same track for both runs.
7. **SCORING:**
- a. The Lowest Final Score wins. The lower of the 2 Run Scores is the Final Score.
  - b. Run Score for each run = Vehicle Distance + 2 x Cup Distance + Run Time (in sec) + Penalties.
  - c. Vehicle Distance = the point-to-point distance, in cm to the nearest 0.1 cm, from the VTP to the **front bottom edge** of the dowel.
  - d. Cup Distance = the **point-to-point distance, in cm to the nearest 0.1 cm, from the CTP to the closest part of the cup. If the cup covers the CTP, the Cup Distance is 0.0 cm.** If the cup tips over during a run, measurement is made from where the cup comes to rest.
  - e. Run Time starts when the vehicle begins to move and ends when the vehicle comes to a complete stop; recoils are considered part of the Run Time. If the vehicle does not move within 3 seconds after coming to a stop, the run is considered to have ended; the 3 seconds are not included in the Run Time. Any action occurring after that time does not count as part of the run.
  - f. Teams with incomplete practice logs will incur a Penalty of 250 points.
  - g. Teams without impounded practice logs will incur a Penalty of 500 points.

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## h. Tiers:

- i. **Tier 1: A run with no violations.**
- ii. **Tier 2: A run with any competition violations.**
- iii. **Tier 3: A run with any construction violations.**
- iv. **Tier 4: A vehicle not impounded during the impound period.**
- i. **Teams who cannot complete a run within 8 minutes or have 2 Failed Runs will be given participation points.**
- j. Ties will be broken by this sequence:
  - i. Lower Cup Distance
  - ii. Lower Vehicle Distance
  - iii. Lower Run Time
  - iv. Lower Run Score of the other run
- k. Scoring Example: The run took 20.21 seconds. The cup came to rest 10.4 cm from the CTP. The dowel was 35.2 cm away from the VTP and the vehicle incurred no Penalties.

Vehicle Distance	35.2 cm =	35.2 pts.
Cup Distance	2 x 10.4 cm =	20.8 pts.
Run Time	20.21 seconds =	20.21 pts.
+ Penalties	0 =	0.0 pts.
Run Score		76.21 pts.

**Recommended Resources:** The Science Olympiad Store ([store.soinc.org](http://store.soinc.org)) carries the Mousetrap Vehicle Video Download and Problem Solving/Technology CD; other resources are on the event page at [soinc.org](http://soinc.org).

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