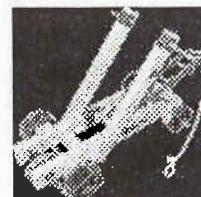


MOUSETRAP VEHICLE

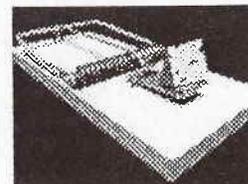
1. **DESCRIPTION:** Teams will design, build, and test a vehicle that uses one or two snap mousetraps as the sole propulsion energy source to travel a distance and return to the starting line center as quickly as possible.
A TEAM OF UP TO: 2 **IMPOUND:** Yes **EYE PROTECTION:** #5 **APPROX. TIME:** 15 mins.
2. **EVENT PARAMETERS:** Students must bring and correctly wear ANSI Z87+ High Impact Goggles (Eye Protection #5 on www.soinc.org) while preparing and running their vehicle.
3. **CONSTRUCTION PARAMETERS:**
 - a. Only one or two unmodified snap mousetraps (with bases less than 6.0 cm x 12.0 cm) may be used as energy sources. Unmodified means that all the original parts of the mousetrap remain in place. Things may be added to the mousetrap, but not removed. Holes may be drilled in the mousetrap base.
 - b. All parts of the vehicle must move as a whole, i.e. no anchors, tie downs, launching ramps, or other separate pieces are allowed. If any piece falls off during the run, it is considered a run violation.
 - c. All of the vehicle's kinetic energy must originate from the mousetrap(s). Conversion of the mechanical energy of the mousetrap spring(s) is permissible, but any additional energy sources must be at their lowest states at the beginning of the run.
 - d. Reversing and stopping mechanisms must work automatically. The vehicle may not be tethered or remotely controlled in any way to guide it, reverse it, or make it stop. Recoil is NOT considered reversing.
 - e. The vehicle must have a fixed, pointed object (i.e. pin or toothpick) somewhere on the perimeter of the chassis of the vehicle that extends down to within 1.0 cm of the track's surface. The fixed point must be easily accessible to the Event Supervisor without lifting or moving the vehicle. The tip of the fixed point nearest the track surface will be used as the reference point on the vehicle for all distance measurements.
 - f. The vehicle's wheel base must be between 30.0 cm and 34.0 cm. The wheel base is the distance measured parallel to the direction of travel between the center of rotation of the front and rear axles.
 - g. The vehicle's maximum wheel width may not exceed 25.0 cm. The wheel width is the distance measured perpendicular to the direction of travel between the outermost sides of the left and right wheels.
 - h. Sighting devices which do not use electricity are permitted. Sighting devices do not have to be permanently attached and can be removed before the vehicle runs.
 - i. No part of the vehicle, other than the wheels, may contact the floor or tape defining the track at any time.
4. **THE TRACK:**
 - a. The competition will be on a straight and level lane with a relatively smooth, hard, low-friction surface.
 - b. The inside edge of three quarter or one inch tape will be used to define:
 - i. The starting line
 - ii. A parallel line 3.50 m from the starting line (the "3.5 m line")
 - iii. A parallel line 7.00 m from the starting line (the "7 m line")
 - iv. A parallel line 8.00 m from the starting line (the "8 m line")
 - v. The 1.50 m lane side boundaries from the starting line to the 8 m line
 - c. The center of the start line will be indicated with an arrow pointing toward the inside edge of the tape. The center of the 7 m line will also be marked with an arrow pointing toward the inside tape edge.
 - d. Additional space must be provided in all 4 directions of the lane to allow for vehicle over-running the track. At Nationals, there will be 0.50 m of space outside the lane side boundary and 2.00 m of space beyond both the starting line and the 8 m line. Every 0.5 m of additional space beyond the 8 m line will be marked with tape. The additional space for Regionals and States will depend on the venue.
5. **THE COMPETITION:**
 - a. The vehicles, any replacement mousetraps, and any other setup materials must be impounded. Tools, data sheets, and eye protection do not have to be impounded. Corded power tools are not allowed.
 - b. Teams can choose to start their vehicle anywhere along the starting line with the fixed point directly above it. A target may be placed at the 7 m line to aid in alignment, but must be removed before each run. The vehicle must be able to remain at the starting position without being touched until the trigger is released using a pencil, pen, dowel, or similar device (which is not a part of and does not travel with the vehicle). It is considered a run if the vehicle moves any distance after the trigger has been released.
 - c. The students cannot set up their vehicle by rolling it down or along the side of the track.



- d. The students may not push nor constrain the vehicle during release or touch their vehicle during a run.
 - e. If the vehicle starts moving in the wrong direction, it will be considered a failed run. If the vehicle is inadvertently started before the Event Supervisor is ready, it will be considered a failed run.
 - f. Teams will have 10 minutes of Event Time to set up and start two runs. If the second run has started before the 10 minute period has elapsed, it will be allowed to run to completion. Time used by the Event Supervisor for assessment and measuring will not be included in the Event Time.
 - g. Teams may not follow their vehicle down the track. They must wait until called by the Event Supervisor to observe their finish distance and pick up their vehicle. At this point, the Event Time will resume during which teams may take any measurements or make any adjustments to their vehicle.
 - h. Teams who wish to file an appeal must leave their vehicle with the Event Supervisor.
6. **SCORING:**
- a. **The Run Score** shall be the sum of the Distance Score plus Lane Bonus plus Overrun Penalty plus Time Score. Negative scores are possible. **LOW SCORE** shall determine the winner.
 - b. **Distance Score:**
 - i. The Distance Score for vehicles that reach the 7 m line and reverse their travel is the distance measured in cm (to 0.1 cm) from the center of the starting line to the fixed point. For vehicles that travel past the 3.5 m line but not the 7 m line and then reverse, a penalty of 1000 points is added to this distance. For vehicles that reverse but do not reach the 3.5 m line, a penalty of 2000 points is added.
 - ii. The Distance Score for vehicles that do NOT reverse their direction of travel will be the absolute value of 700.0 minus the distance measured in centimeters (to 0.1 cm) from the center of the starting line to the tip of the fixed point. All these vehicles will be placed in Tier 2.
 - c. **A Lane Bonus** of -20 points is awarded to any vehicle whose fixed point remains inside the tape defining the 1.50 meter lane between the starting line and the 8 meter line while traveling in both directions.
 - d. **An Overrun Penalty** shall be assessed if the fixed point crosses the 8 meter line as follows: 50 points is added for crossing the line, and an additional 50 points is added for each additional 0.5 m of travel.
 - e. **The Time Score** shall be the time of each run in seconds, measured in 0.01 seconds. The time of a run starts when the vehicle begins movement.
 - i. If the vehicle does not reverse within three seconds after coming to a stop, the total run time will be the time of motion plus the three seconds.
 - ii. If the vehicle reverses direction, the run time will stop once all motion ceases.
 - iii. At Regionals, the Time Score is 1 point for every second. At States, it is 2 points for every second. At Nationals, it is 4 points for every second.
 - f. **Competition Violations:** As defined in Section 5 (The Competition) will be ranked in Tier 3.
 - g. **Construction Violations:** Teams with violations of Construction Parameters will be placed in Tier 4.
 - h. **Tiers:** Teams will be ranked in four (4) Tiers using the single run that will give them the best overall rank. Rankings in Tier 3 and 4 should follow the same method that ranked vehicles in Tiers 1 and 2.
 - i. 1st Tier: A run with no violations and reverses its direction of travel.
 - ii. 2nd Tier: A run with no violations but does not reverse its direction of travel.
 - iii. 3rd Tier: A run with Competition Violations.
 - iv. 4th Tier: A run with Construction Violations or both Competition and Construction Violations.
 - i. **Tiebreakers:** 1st: Distance score of the counted run. 2nd: The vehicle's other run score.
 - j. If the device cannot start at least one run, or has two failed runs, the team will receive participation points.

SCORING EXAMPLE: At States, the run took 15.80 sec. The fixed point crossed the 8.5 m line, but not the 9.0 m line, reversed, ended up 18.6 cm from the center of the starting line, and stayed within the lane the entire run. There are no violations; the run is ranked in Tier 1 with a Run Score of:

| | |
|-----------------|--|
| Distance Score | 18.6 points |
| Lane Bonus | -20 points |
| Overrun Penalty | 100 points |
| Time Score | 31.6 points (15.8 seconds x 2 points/1 second) |
| Run Score | 130.2 points (18.6 - 20 + 100 + 31.6) |



RECOMMENDED RESOURCE: *NEW!* Mousetrap Vehicle (Out & Back) DVD - see store at: www.soinc.org