

Engineering Olympics 2009

Competition: Mousetrap Vehicle

Design a vehicle, which is powered only by standard Victor mousetraps, that drives a specified distance, and executes two 45° turns and reaches a target area.

Design Constraints

Your team's design must comply with these constraints:

- An unlimited number of standard "Victor" mousetrap springs may be used for energy storage. No other energy storage devices are allowed.
- The vehicle must be automatic. Team members may not touch or interact with the vehicle once released.
- The testing will occur on the concrete floor of the MTU Hockey Arena.
- The pathway will be bordered with electrical tape.
- Vehicle must not damage the floor.

Testing and Scoring

Figure 1 shows a schematic of the test area set up (measurements in feet). The boundary lines shown delineate the interior boundaries of the testing region (i.e., the inside edge of the electrical tape).

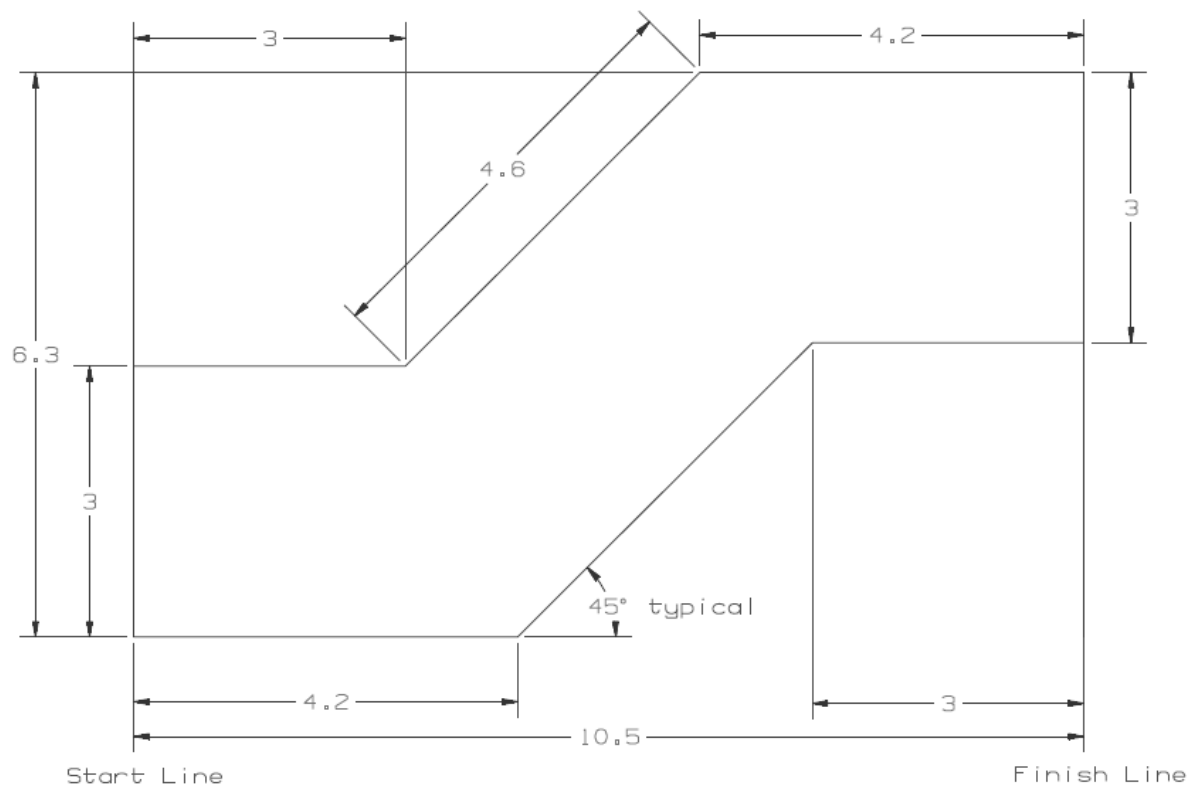


Figure 1. Mousetrap Vehicle Test Area (units = feet)

Your team will be scored using the scale shown in Table 1. If a tie occurs, the vehicles that tie will re-run their vehicles to see which has the “best” performance. Vehicles will be tested using the following criteria:

- The vehicle must be self-contained (i.e., no part of the vehicle may be jettisoned or remain behind the start line).
- The vehicle must start with the front wheels **behind** the start line.
- Team members may not touch or interact with the vehicle once released (nor may they push start the vehicle).
- The vehicle will travel down the pathway, execute two 45° turns and go completely past the finish line.
- Each team will have two runs or six minutes, whichever ends first, to test their vehicle.
- Teams will earn points based on the time required to traverse the testing pathway (**See Table 1**).
- Points will be earned for each successfully completed turn. Leaving the path will result in points being deducted from your total score (5 points each infraction – up to 20 points).
- The final score will be the sum of the team’s two runs. If only one run is completed, your score will be the total for the completed run.

Table 1: Vehicle Test Scoring.

Description	Points Possible
Spreadsheet Analysis of Pre-Test Results	20
Vehicle completely crosses start line (for both runs)	10
Vehicle traverses total pathway distance (for both runs)	10
Vehicle completes turn 1 (for both runs)	20
Vehicle completes turn 2 (for both runs)	20
Time required to completely traverse pathway 0-2 seconds (10 points each run) >2 seconds (5 points each run)	20
Deduction for exiting the pathway (5 points each infraction – up to 20 points each run)	(40)
Total	100

Pre-competition Testing and Performance Prediction

Prior to actual competition testing, a minimum of five test runs needs to be completed, the results recorded in a spreadsheet, along with the calculated vehicle score (**See Table 1**) for each run. The trial data will be presented according to the guidelines listed below. Teams are required to submit a printout of their results prior to testing their mousetrap vehicle. **A team will not be permitted to compete if they do not bring their pre-competition testing and performance data.**

Guidelines for Performance Analysis

The test run data, calculations and graphs must be documented on a spreadsheet and that clearly shows how the prediction was calculated. The interpretation of the results may be a text box within the spreadsheet or a separate document created using a word processor. All sheets must be stapled together with the team member names, school and team number clearly labeled in the upper right hand corner of each sheet submitted.

- 5 pts – Calculations for total vehicle score: Teams should provide documentation with a description of their variables and a sample calculation (These can be hand written.)

- 5 pts – Graphs of distance vs. time: Graphs should have proper labels (i.e., titles, axes, legend (if applicable))
 1. Theoretical – based on your calculations
 2. Experimental – based on trial measurements

- 10 pts – Interpretation of results (calculations and graphs): Teams should explain the significance of their results and predict their team's performance (i.e., critique your design)