



PHYSICS DAY AT LAGOON MESA EVENT #2

MESA MOUSE TRAP CAR <https://mesaut.org/physics-day/>

*All MESA students are invited and encouraged
to participate in the Mouse Trap Car Event.*

Event Registration: <http://bit.ly/mesacar>

Description: Students will design and build their own vehicle which must be solely powered by a standard mousetrap and have the fastest elapsed time over a 5-meter track. Kits are not allowed. Project must be the original work of the student(s). Judges may ask questions to verify.

Note: MESA Utah Event #1 will be the MESA Utah Engineering Design Competition “Arduino STEM Solutions.” <https://mesaut.org/resources/nationalcompetition/>

Materials: One standard-sized, single spring “Victor” mousetrap is required; All other materials to build the vehicle are legal and optional.

Team Members: Each team must consist of at least 2 MESA students and not more than 4 MESA students.

Engineering Design Process: In order to compete, each teams must complete and bring an engineering design notebook. Students will need to use the Engineering Design Process and will need to document their steps in a notebook. The design process includes these steps:

1. Ask a question about the goal.
2. Imagine a possible solution.
3. Plan out a design and draw your ideas.
4. Create and construct a working model.
5. Experiment and test that model.
6. Use test results to Improve and revise that model.

Repeat

The following sites may help students understand the Engineering Design Process:

- <https://www.eie.org/overview/engineering-design-process>
- https://www.nasa.gov/pdf/630754main_NASAsBESTActivityGuide6-8.pdf
- <https://youtu.be/fxJWin195kU>

Engineering Design Notebook: Students must use an engineering design notebook and document their progress through each of the six steps of the engineering design process (above). The following design book templates may help students document their progress.

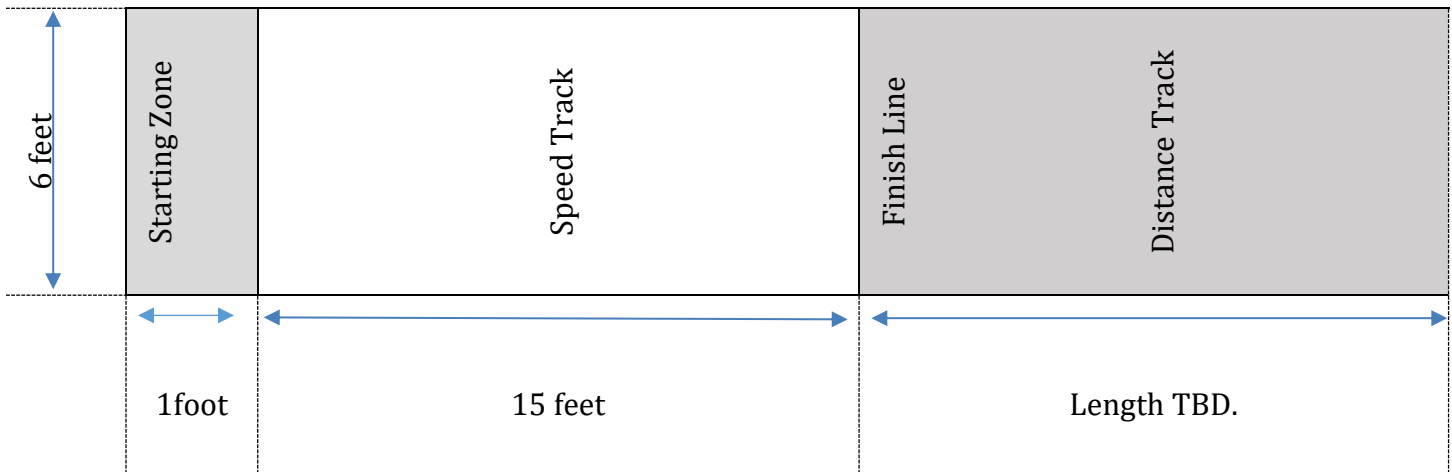
- <http://bit.ly/suutemplate>
- <http://bit.ly/plumesatemplate>
- <http://bit.ly/azmesatemplate>
- <http://bit.ly/gadoetemplate>
- <http://bit.ly/odetemplate>

General Rules:

1. Students must design and build their own vehicle which must be solely powered by the mousetrap and activated by tripping the original mousetrap trip mechanism
2. No other energy source may be added. (e.g.CO2 Cartridge, batteries, elastic strings, rubber bands, etc.)
3. The standard mousetrap must be mounted to the chassis AND must NOT be painted or decorated.
4. Hardware may be added to the mousetrap, but the original hardware and mounting block may ONLY be altered to attach it to the vehicle. The mousetrap may not be disassembled and then reassembled.
5. The springs on the mousetrap may NOT be cut, bent, over-wound, heat-treated or altered in any other manner.
6. No part of the vehicle may be attached to any part of the track. The track may not be altered in any way.
7. Vehicle must roll or coast along the track. All wheels must stay in contact with the surface of the track.
8. Car must be clearly labeled with the students' names and the school name.

Track:

1. The track will be made on the smoothest available non-carpeted area using tape on the floor. At Physics Day, the area will probably be a concrete surface. If a concrete surface is used, the surface joints will be covered with poster board and/or duct tape.
2. The track will follow these specifications:



Judging:

1. Vehicles will be checked for specifications and impounded prior to the performance event.
2. Vehicles must be in testing condition prior to check-in for vehicle performance. If vehicles are disqualified during specification check, design changes will not be allowed.
3. Before the race each vehicle will be weighed. Weight will be used as one of the measures to calculate the overall score. Lighter cars will score higher.
4. Each vehicle will be allowed 2 runs.
5. Each vehicle must be ready for competition when called or forfeit that trial.

6. Each vehicle must be in a “ready, stationary, hands-off” position prior to the start.
Ready Position: Vehicle resting with front wheels within the “start zone”.
7. One team member will be responsible for launch and will indicate to the judge that the vehicle is in the ready position.
8. The team member must wait until the judge gives the “START” order. If the vehicle moves prior to this, a “False Start” will be declared by the judges.
9. Only one “False Start” will be allowed per run. Two “False Starts” during run attempt disqualifies that run.
10. Students may not touch or interfere with the vehicle once the lever has been tripped.
11. Time will begin when judge calls “Start” and will end when the front wheel(s) of the vehicle cross the finish line.
12. It is suggested that timers start at the “start line” of the track and move with the car to ensure watches are stopped when the car crosses the finish line.
13. After the vehicle crosses the finish line it will be allowed to roll until it runs out of energy. At that point distance will be measured from the starting line to the back of the vehicle.
14. Keep in mind, the purpose of this contest is to use creativity to build the best mousetrap car within the framework of the rules. The purpose is not to break the rules and see if you can get away with it.
15. An overall score for each team will be generated using an Excel spreadsheet. Speed will account for 45% of the overall score. Distance will account for 45% of the overall score. Weight will account for 10% of the overall score.

16. Vehicles that cross out of the masking tape track before crossing the finish line will be disqualified from the run. Students should build cars that drive as straight as possible.

17. If a vehicle crosses out of the masking tape track after crossing the finish line, the distance will be calculated by measuring from the starting line to the point where the vehicle crossed out of the track.

2016-2017 Pilot Event:

1. These rules for the MESA Mouse Trap Car were piloted in March, 2017, on a very smooth vinyl tile surface.
2. Top scoring teams had the following scores:

HIGH SCHOOL	Grams	Seconds	Inches
	Weight	Speed	Distance
Car A	76	2.81	221
Car B	84	4.34	212
Car C	125	5.37	461

JUNIOR HIGH	Grams	Seconds	Inches
	Weight	Speed	Distance
Car D	138	6.93	422
Car E	120	3.19	286
Car F	136	5.97	188