

## Out & Back

**Description:** Teams will design, build and test a vehicle that uses one or two single-spring mousetraps as their sole source of energy for propulsion. The vehicle will be designed to travel 7.0 meters in a straight line and then reverse its direction and return to a target at the starting line.

### Competition:

- 1) Only one or two unmodified single-spring mousetraps (not rat traps) may be used as energy sources. (Unmodified for this event means that all the original parts of the mousetrap(s) remain in place. Things may be added to the mousetrap(s), but not removed). All parts of the vehicle must move as a whole (i.e. no anchors or launching ramps).
- 2) All energy available to propel the vehicle must originate from the mousetrap or mousetraps. Conversion of the mechanical energy of the spring(s) is permissible, but the second source must be at its lowest energy state at the beginning.
- 3) A fixed point that extends at least 2 cm in front of the vehicle. This fixed point will be placed over the starting line and will be used as the reference point for all other measurements.
- 4) The vehicle will be started anywhere along the 1.5-meter starting line with the designated measuring point directly above the line. The vehicle must be able to remain at the starting position without being touched until the trigger is released. Students will not be allowed to touch or guide the vehicle in any way after the mousetrap has been triggered.
- 5) The competition is to be held on a smooth tiled floor. There is to be a 1.5-meter wide lane that is marked on the floor. The vehicle is to remain within the 1.5-meter lane during the test run in order to receive bonus points.
- 6) The students may give no push to the vehicle nor will they be allowed to constrain the vehicle during release.
- 7) The vehicle is to cross the 7-meter but not the 8-meter line before reversing direction in order to receive maximum score.
- 8) 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
- 9) The vehicle is to stop in a box at the starting line that is 30 cm X 30 cm with its center being 75 cm from the lane
- 10) Teams will have five minutes in which to get the two runs started. If the second run has started before the five-minute period has elapsed, it will be allowed to run to completion.
- 11) Before students begin their first of their two runs they will be asked to predict the time it will take for the vehicle to come to a stop. This time prediction will be used to break ties.

### Scoring:

- 1) Score = distance from target
- 2) The stopping distance will be measured in a straight line from the point in the center of the target.
- 3) There will be a -30 cm bonus awarded to vehicles that remain inside the 1.5-meter lane while traveling both directions.
- 4) There will be a -30 cm bonus awarded to any vehicle that has the designated measuring point within the 30 cm X 30 cm target. The bonus points will be awarded as follows: 30 cm – (distance from target center)
- 5) Vehicles that cross the 8-meter line will have 100 cm added to their score, those crossing the 8.5 meter line + 150 cm, 9-meter add 200 cm .... 11meters.
- 6) The team with the lowest score in centimeters will be the winner.
- 7) Tiebreaker: ties will be broken by the closest prediction to the amount of time to complete its run.
- 8) Vehicles that do not cross the 7-meter line will be ranked behind all vehicles that do cross the 7-meter line.