

Worthington Science Day

Engineering Design Challenge 2015

Middle School Level

The Challenge:

Using some or all of the equipment provided, you are to design a machine to transport 10 marbles along the top of the provided table and into the provided receiving target on the floor.

The Specifications:

- 1) The machine may consist only of parts from the provided kit of equipment.
- 2) No part of the machine may be touched by any person from when it passes the tape line on the table until the test is complete.
- 3) The table may not be changed in any way.
- 4) At the beginning of the test, the entire machine and all of the marbles must be behind the tape line.
- 5) The machine must be started by a single action (one push or one pull)
- 6) The team may not conduct any practice runs with the official equipment prior to the official test.
- 7) The team will have one minute from the time they are called to set up their machine, insert the marbles, place the bucket, and perform the start action.
- 8) The team may place the target any distance from the table, but it must be stationary and on the floor once the machine is in motion. It is permissible to ask a judge to hold the target in place.
- 9) The judges may impose any other rules in accordance with the spirit of the contest.
- 10) The decision of the judges is final.

How to Win:

The target consists of two areas. A marble in the center area will receive 1 point, while a marble in the outer area will receive half a point. Therefore, a perfect score will be 10 points. Each team will have 2 attempts. The team that achieves the highest score on either run will be declared the winner.

In the case of a tie, the winner will be determined by the following tie-breakers:

- Total points of the two runs
- Most marbles in center target on best run
- Most marbles in center target on both runs
- Lightest machine

Materials:

Each team will receive a kit containing the following:

- 5 containers with holes drilled in them
- ¼"-diameter dowel rods in a variety of lengths
- 5 feet of string
- 1 roll of scotch tape

Other Rules:

- Teams will have **40 minutes** from when they receive their initial materials to develop a final design. At or before that time, they will deliver their designs to the testing area. If a team is ready before the 40 minutes is up, they may be judged at that time. Each team will have two opportunities to demonstrate their design to the judges. After testing is complete, the judges will announce the winners.
- No outside resources are allowed, including internet access, texting, or consulting with others not participating in the event.