



***Okaloosa***

***RoBotics***

***Invitational***

***Tournament***

**2018 Rulebook**

## What is ORBIT?

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It is the Okaloosa RoBotics Invitational Tournament. The annual ORBIT competition tests competitors' progression of programming skills and understanding of engineering concepts over the course of 5 events

Drag Race  
Maze  
Step Climber  
Balance Beam  
CyberPath

The first 4 events will be run during the morning. The fifth event, CyberPath, will be run in the afternoon to determine the final ORBIT standings. The Sumo Wrestling event will also be run during the afternoon parallel with CyberPath

Each team will be scheduled for 3 runs at each event with the best score used to determine placement. At each run, teams will be given 3 attempts to complete the task (within time limits)

### **Scoring**

Scoring for each event will be a points-based system based on time of successful completion of task

1st place- 5 points  
2nd place- 4 points  
3rd place- 3 points

Any team after third place that successfully completes the event will be awarded 1 point. Also, when a team successfully completes a challenge they will receive a token that may be used for hints in completing the CyberPath. Team must successfully complete the CyberPath to be eligible for the ORBIT trophy.

The team with the highest overall score will be the Overall ORBIT Competition winner. In case of a tie, shortest time to complete the CyberPath will be tiebreaker. Awards will be also be given to best performing robot for each event

## Events

### Dragster

The Dragster tests your ability to build a fast, line-following robot and your understanding of gear ratios. The object of this event is to complete the track as quickly as possible while staying on the track. It is required that the dragster be built only from EV3 education kit and use gears to increase drive speed. The scoring of this game will be based on the shortest amount of time.

The track is a 50" long straight lane 18" wide with a 3/4" black line (black electrical tape) down the middle. Vehicle's length cannot exceed 16 in. If your dragster leaves the lane during the run, that run is disqualified.

When your dragster is placed on the starting line, there will be a blind placed in front of it. When the blind is removed, that will signal the dragster to start. The end of the run will be marked with a 6" red stripe running the width of the lane. The dragster does not need to stop on the stripe, but the dragster must use the red stripe to signal deceleration.

### Balance Beam

The robot must drive upon a beam and center the combined weight of the robot and beam until the beam is horizontal. The beam is 4 feet long and 16 inches wide with the fulcrum in the center plus or minus 1 foot. Weights will be used to balance the beam when at rest. The fulcrum is 6 inches high.

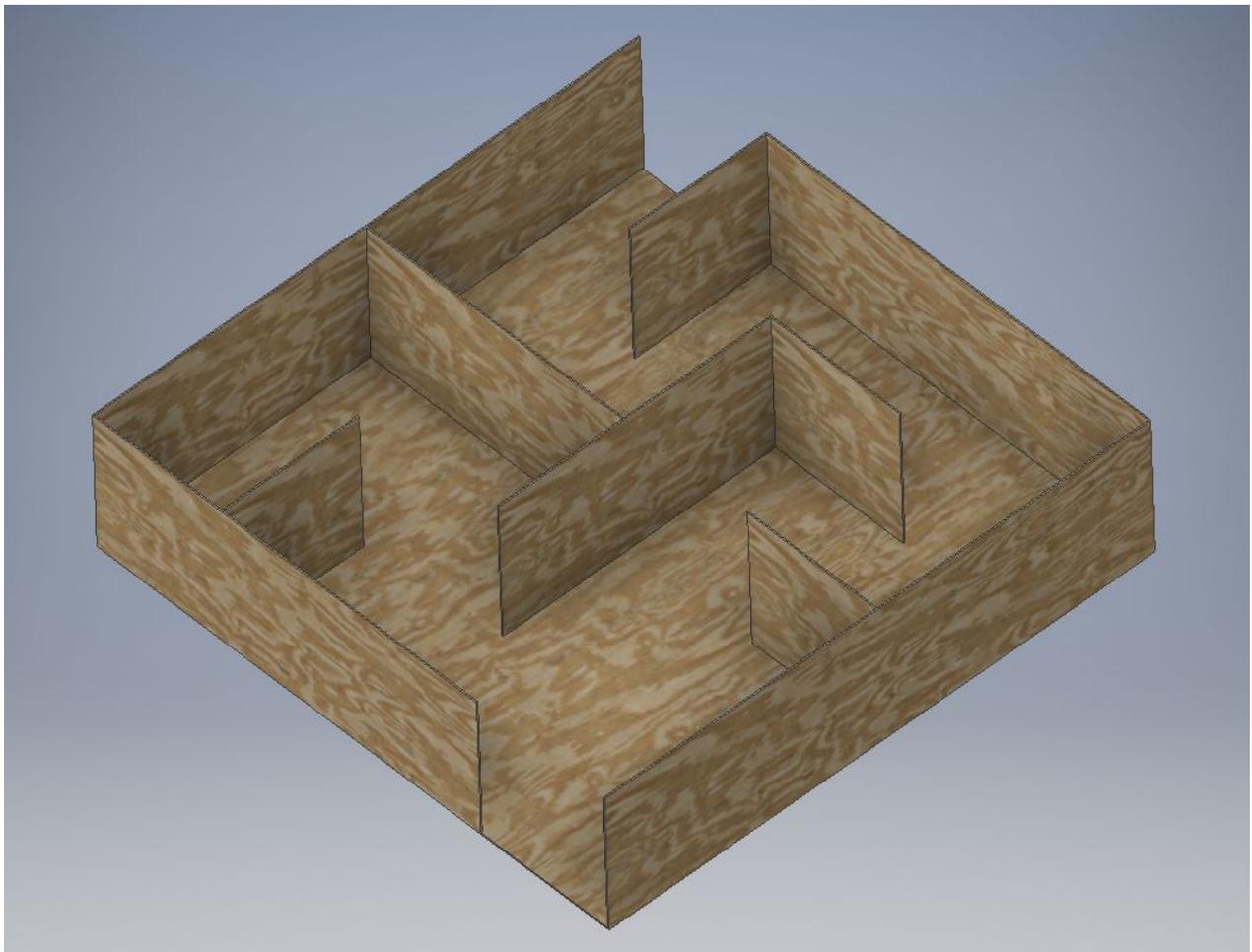
Maximum dimensions of robot is 12" x 12" x 12". Robot will be placed facing the beam some random distance between 6 inches and 2 feet. Scoring is based on shortest time of completion

## Maze

The Maze tests your robot's ability to detect obstacles and navigation through them. The Maze board is 4' x 4', and the paths inside are 1' wide. There are three possible configurations of the Maze, which are randomized throughout the competition. The robot must be able to enter the maze and find its way out.

During the navigation of the maze, the robot will drive through the paths, and must choose to turn either left or right once a dead-end is reached. Once the robot locates the exit, it must successfully exit the maze. If the robot misses the turn out of the maze, the robot will be disqualified for that run. Each of the three runs will be performed in a different maze that will not be disclosed until the team is ready to place their robot in the entry point. Scoring will be based on the teams that exit the maze in the least amount of time. Each team will be given two minutes to complete this challenge.

\*There are 3 possible configurations for the maze. This is just an example.

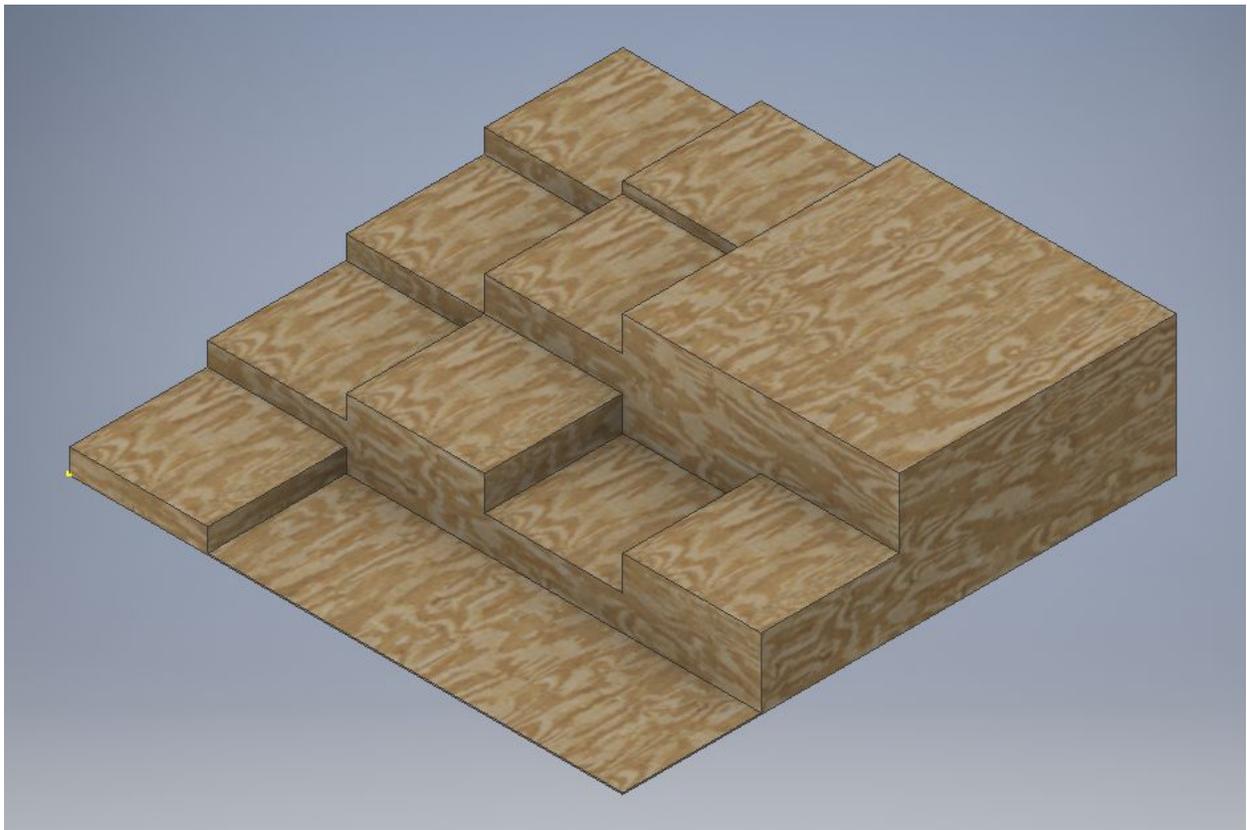


## Step Climber

The Step Climber tests your robot's ability to maneuver over rough terrain. The Step Climber is played on a 4' x 4' board. There is a base on the ground that is 1' x 3'. There will be a series of steps, where each step is a 1' square. There is a path with 6 steps, each increasing by a height of 2". There is a second path with 4 steps that each increase by a height of 3". The third option is a path of 2 steps, increasing by 6" each step. The highest point of the board will be 1' tall, in a square in the corner that is 2' x 2'. On the 2' x 2' block there will be a loop. Robot's beginning configuration cannot exceed 12" x 12" x 12".

The objective is to climb the series of steps to the top block, collect the loop, and climb back down to the base. The robot may take whatever route the team chooses.

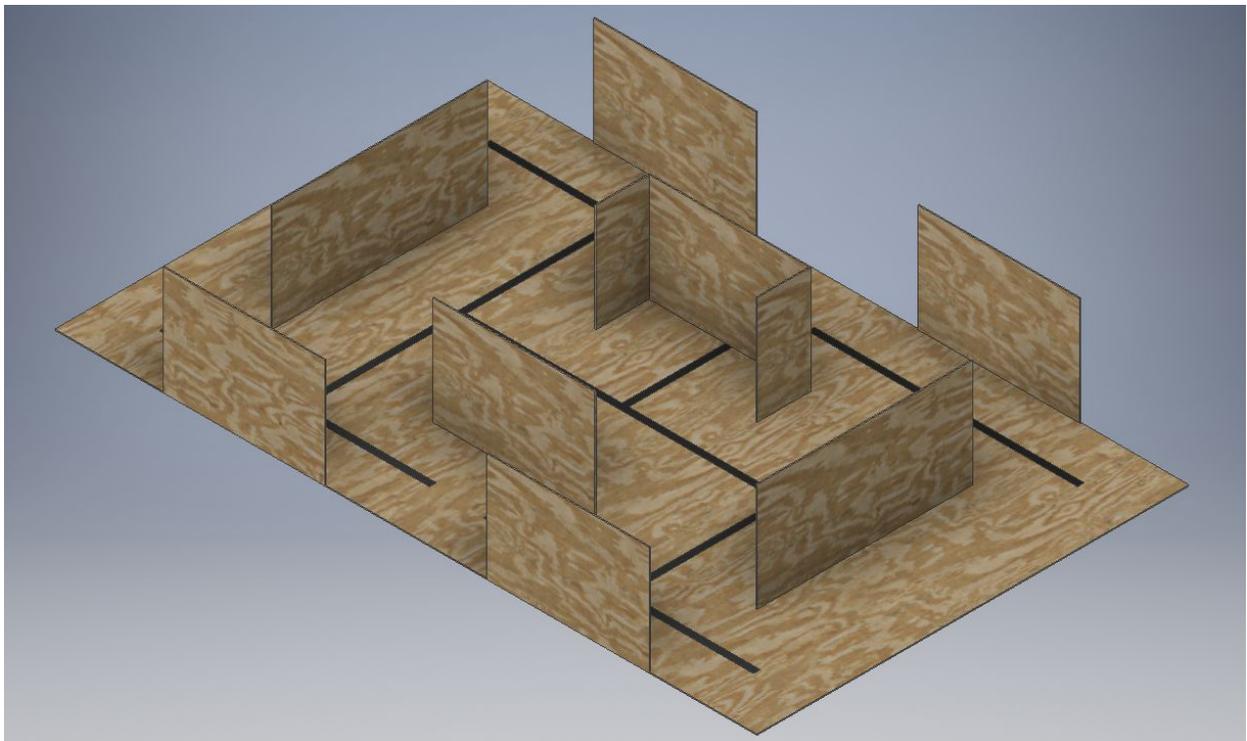
Scoring will be based on teams that successfully climb to the top level, collect the loop, and return the loop back to the base with the fastest time. At the end of the run, the robot must be right side up and the loop must be totally supported by the robot.



## Cypher Path

The robot will traverse through a maze of sorts. At every turn the robot will add a bit to a binary string. After the robot exits the path, it must convert the binary string to its base 10 equivalent. Every wall it encounters will have either a red or green panel. The color of the panel will direct the robot which direction it should turn, right or left. Red is right and green is left. A right turn adds a one to the string and a left adds a zero.

The robot will start in the center of the “maze” and will make three turns. Let’s assume the panels are red, red, and green. That will make a binary string of 110 which is equal to 6 in base 10.



## **Robo Sumo Wrestling**

Back by popular demand. All teams are encouraged to participate but participation is not mandatory. There will be a prize awarded to the winner of this competition, but results will have no impact on overall ORBIT ranking.

Robots will compete on 3' diameter red "wrestling" mat. The mat will be centered on a 4' white 1/2" plywood. The robot must remain on the mat throughout the match. Failure to stay on the mat will result in point awarded to your opponent. First robot to score 3 points is the match winner. Points are also scored by

Pushing your opponent off of the mat

Disabling your opponent (ie tipping, flipping, dismemberment, crushing)

Only parts from EV3 Core Education Set are allowed on robot. Robot starting dimensions cannot exceed 12X12X12, but can expand during match. When play is reset due to stalemate or point scored, robot must return to original dimensions. Robot must move around the mat to seek its opponent (spinning is not moving). If a robot is stationary for more than 3 seconds, point will be awarded to opponent. Battle damage repair will not be allowed during match play. Any components lost during match play will be removed from mat and returned to team at end of match.

Only wheels, treads, and castor are allowed to be in contact with the mat surface. "Cleats" or other friction devices are not allowed. If your robot uses an articulator designed to get under your opponent, it MUST have rollers/wheels to prevent it from being considered a friction device. Bottom line: Only wheel type devices intended for locomotion or conveyance is allowed to be in contact with the mat surface. Do not attempt to circumvent this restriction. Violation of this rule is up to judges' discretion and their decision is final.

Matches will be 3 minutes in duration. At the end of regulation play, if no robot has scored 3 points, robot with the most points wins. If match is tied at end of regulation, play will be considered to be in "sudden death" and will continue until a point is scored. Tournament will be in double elimination format.