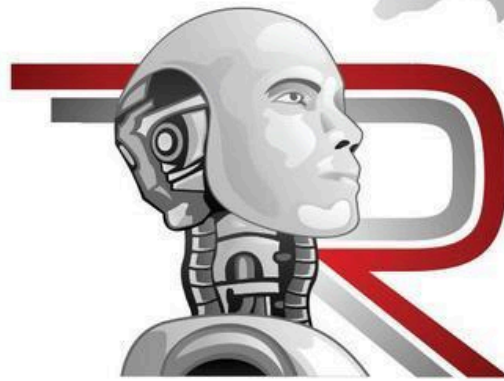


RoboRAVE
Australia



a-MAZE-ing

Revision 3 - Updated 17/04/2024.

2024 Official Game Manual
RoboRAVE Australia

Our motto: *"Today's Play, Tomorrow's Pay."*



Revision History		
Revision	Date	Description/Changes
1	27/01/2024	2024 Challenges Released
2	04/02/2024	Graphics updated. Added a scoring rubric.
3	17/04/2024	Team limited increased to 5.

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1.0 Overview

1.1 What is a-MAZE-ing?

a-MAZE-ing is a fantastic introduction to the world of robotics competitions, designed to spark the imagination of our youngest participants. This challenge involves programming robots to navigate a one-way track with a series of straights and turns, without any sensory input. This unique constraint encourages young minds to think creatively and strategically, finding innovative solutions to guide their robots through the course.

The challenge lies in the need for precision and accuracy in programming, as the robots are required to complete the course without falling off the edge. Each track offers a different layout, ensuring a fresh experience and the need for adaptability with every attempt. The simplicity of the design, combined with the necessity for careful planning, makes a-MAZE-ing an ideal stepping stone into the world of robotics.

For enthusiasts seeking more complex challenges, the Line Follow - SPRINT and Mouse Labyrinth competitions are the perfect next steps. These contests elevate the experience with more intricate tracks and tougher navigation requirements. They offer a thrilling progression for those ready to advance or who are too old for a-MAZE-ing.

1.2 Who can compete in a team?

a-MAZE-ing is offered to students in the following divisions:

- 1) Elementary School (ES) – Ages 8-10
- 2) Middle School (MS) – Ages 11-13

The division a team enters is dependent on the oldest team member in that team at the time of registration. Teams can choose to enter a higher age division but cannot enter a lower one.

Teams should consist of 1-5 competitors. Teams with more than 5 members will not be allowed to compete in the competition or will be forced to register additional teams to compete.

1.3 What are the requirements for the robot?

Robots must fit all of the following criteria to be eligible to compete:

- 1) The total cost of the robot does not exceed \$1,500 USD.
- 2) Robots can be made from any platform and material.
- 3) Multiple motors and processing segments can be used. No sensors are permitted.
 - a. Motor encoders used to measure wheel rotations are permitted.
- 4) The robot is completely autonomous and does not use any remote-control features.
 - a. Devices such as remotes or tethers cannot be used to control the robot.
 - b. Programs can be run from an external device (e.g., laptop) at Home as long the device isn't operated while the robot is not at Home.
- 5) The robot cannot exceed the size limit of 18 cm x 25 cm, with no limit to height.

2.0 Operating the Game

2.1 How does an official game run?

Travelling down the Track:

- 1) Teams program their robot for the specific track at the event before proceeding to an official game.
- 2) Robots will start at the Home Line and can leave once the timer starts. The robot can only be interacted with while it is at Home or on the Home Line.
- 3) The robot will receive points as it follows the track, with points awarded to each successful segment it passes until it reaches the Finish Line.
- 4) If the robot falls over the edge, it will be required to go back to the start.
- 5) If the robot is unsuccessful, it can attempt another run. However, the timer will continue until the game finishes.

2.2 What are the rules in an official game?

The following rules are enforced during official competition games by the referee:

- 1) The referee will ensure the team and robot are compliant with the rules in 2.1 and 2.2. If the referee believes any of the eligibility criteria are not met, the Head Referee will be brought in to determine further actions.
 - a. A team or robot that does not meet the eligibility criteria will usually not be allowed to compete and be required to make changes based on the Head Referee's decision.
- 2) The game lasts for up to 2 minutes timed by the referee and is the only time the robot can score points. It is played on a predetermined field that complies with the rules in 4.0. The field is revealed on the day of the competition.
- 3) Robots are placed with the front of the robot overhanging or touching the Home Line at the start of the game or for any additional runs.
- 4) A segment is defined as completed if the robot passes completely through it without falling over the edge. The robot must touch the surface the track is on.
- 5) There are several reasons a robot may be returned to the Home.
 - a. If a competitor touches the robot or the field outside of Home or the Start Segment.
 - i. Referees can choose to end the match if the field interference has a significant benefit to the robot's performance.
 - b. With the referee's permission, competitors can return the robot Home for any reason.
- 6) Only competitors can operate and manipulate the robot during the game. Remember, "Players Play, Coaches Coach, Parents Cheer".

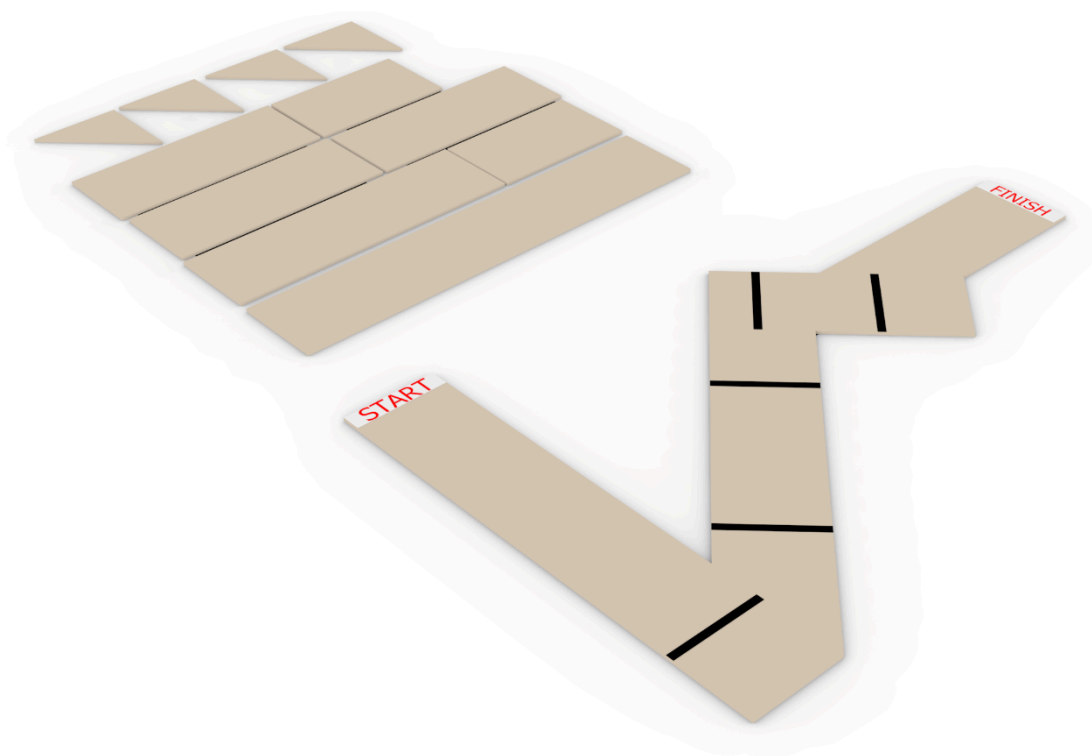
3.0 Competition Field

3.1 How is the field constructed?

All official a-MAZE-ing fields will fit the following description:

- 1) The track consists of multiple-sized MDF rectangle and triangle pieces, cut from a single 1200x1200x9mm MDF panel.
- 2) The panel is cut into the following pieces that can be used to construct the track.
Measurements for each piece may vary by $\pm 10\text{mm}$:
 - a. 1x 1200 x 240mm
 - b. 1x 800 x 240mm
 - c. 4x 600 x 240mm
 - d. 2x 400 x 240mm
 - e. 3x 240 x 240mm cut diagonally into 6x triangles.
- 3) The pieces are used to construct straight segments and turns of 45° , 90° , and 135° .
- 4) A black line of electrical tape is marked 200mm from the end of each straight segment and 100mm after an angled turn. These are used to mark when a robot completes a segment.
- 5) Tracks are joined together using gaffer tape on the underside of each joint. Every effort is made to ensure the tracks are smooth with no gaps or bumps.
- 6) ES Division has 4 straights and 3 angled turns.
- 7) MS Division has 6 straights and 5 angled turns.

Standard field construction for ES and example a-MAZE-ing field setup.



4.0 Points and Scoring

Challenge:	Maximum Points per Mission	
	ES	MS
4.1.1 Straights	20p (4x)	30p (6x)
4.1.2 Angles	30p (3x)	50p (5x)
4.1.3 Final Stretch	10p	10p
4.1.4 Time	1p per second left	1p per second left
Total Maximum Points	60p + time	90p + time

4.1 What points are earned on the track?

Points are only awarded the first time a specific task is completed.

- 1) **Straights (5p/segment)** – For every straight segment the robot completes it earns 5 points.
 - a. Points are only awarded when the robot touches or overhangs the associated segment line.
 - b. Falling off the segment does not award points.
- 2) **Angles (10p/segment)** – For every angled segment the robot completes it earns 10 points.
 - a. Points are only awarded when the robot touches or overhangs the associated segment line.
 - b. Falling off the segment does not award points.
 - c. Points awarded do not correspond to the angle of the segment.
- 3) **Final Stretch (10p)** – If the robot passes the Finish Line it earns 10 points.
 - a. The robot must have achieved a run with no fails within the time limit to be awarded the points.
 - b. Points are only awarded when the robot touches or overhangs the Final Line.
- 4) **Time (1p/sec)** – Every second left on the timer at the end of the game is worth 1 point.
 - a. Time points only apply to robots who have achieved the points for the Final Stretch.

5.0 Finals

5.1 How are the top teams selected?

The finals are used at the official competition to determine the top teams in a division. They put the best of the best live against each other to find the best team and robot. The teams for the a-MAZE-ing Finals are determined as follows:

- 1) Teams will complete official timed games on the day. The number of games on the day is determined by the Event Director but will be a minimum of three.
 - a. An official game is any game operated by a referee with a recorded score.
- 2) The best game from the day for each team will be the only one considered for the finals.
- 3) The teams with the top 8 or 16 best games in each division will be brought forward to the finals.
 - a. If there is a draw between two teams, then both teams will progress.
- 4) If the divisions were collapsed due to low team numbers, each division should run its finals as if they weren't collapsed.
 - a. Teams from different divisions should not compete against each other in the finals.
 - b. Depending on the size of the division, they may result in an automatic victory.

5.2 How do the finals work?

The finals for a-MAZE-ing are operated under the following rules:

- 1) The top teams in each division compete against each other in an additional set of games. Each team will have one opportunity to do their best run to get into the Grand Final.
- 2) The score achieved in the finals determines the team's final ranking, excluding the top 3 teams, who instead progress to the Grand Final.
- 3) The top 3 teams will compete in one last set of matches to determine 1st, 2nd, and 3rd place, awarded in order of highest points scored in the Grand Final.
- 4) All three positions will receive awards for recognition of their achievements.