RoboCup Junior Australia

# Rescue Maze Rules 2025

Version 25.1 | Last Modified: 28 Mar 2025

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# RoboCup Junior Australia Rescue Technical Committee

**National Challenge Coordinator** David Musgrave (Western Australia) – david.musgrave@robocupjunior.org.au

**For State and Territory enquiries, contact information can be found on the RCJA Website:**

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# Preface

**Spirit**

It is expected that all participants, students and mentors, will respect the aims and ideals of RoboCup Junior as set out in our mission statement. In turn, the volunteers, referees and officials will act within the spirit of the event to ensure the event is competitive, fair and most importantly fun. “It is not whether you win or lose, but how much you learn that counts.”

**Sharing**

It is the overall desire of RoboCup Junior events, that any technological and curricular developments will be shared with other participants after the event. Any developments including new technology and software examples may be published on the RoboCup Junior website after the event, furthering the mission of RoboCup Junior as an educational initiative. Participants are strongly encouraged to ask questions of their fellow competitors to foster a culture of curiosity and exploration in the fields of science and technology.

**Local Variations**

These rules will be in use for the Australian National Championships for the titled year. State and Regional events may implement minor variations with respect to age groups, divisions and judging. These variations will be communicated to the participants through email and/or on their relevant website prior to the state or regional event..

# General Rules

General Rules have been introduced. Multiple sections of these Challenge Rules have been relocated to the General Rules to ensure consistency across all Challenges. Please ensure you read the General Rules, which can be downloaded from the Rescue Maze Challenge Page on the RoboCup Junior Australia Website.

# Notes/Advice vs. Rules

This document may include notes/advice to participants and mentors, plus rules that are firm. This has been done to remove ambiguity. There is a notation to indicate whether the content of this document is to be read as a note/advice or as a rule. Advice is noted in green. Rule changes for the new year are noted in red.

# Change Log

| Revision | Change(s) Made |
|---|---|
| 25.0 | Initial release for the season. Key changes from 2024 include:<br>• Complete restructure of rules for ease of use, clarification and to include the new Intermediate Maze division. Please read the entire document.<br>• "Floor Obstacles" have been renamed to "Speed Bumps", "Room Obstacles" is now "Obstacles" (see sections A2.4, B2.4 & C 2.4).<br>• Mighty Maisy Maze: Requirement to find at least 50% of victims before count bonuses can be claimed. Count bonus for Harmed changed to 25 points. Standard round time changed to 180 seconds (see sections A6.6, B6.6 & C6.6).<br>• Mighty Maisy Maze: "Trapped" victims are now "Unharmed" victims and "Critical" victims are now "Harmed" victims (see A3).<br>• Intermediate Maze: New division based on Mighty Maisy Maze with elements added from Open Maze, such as floating walls, debris, speed bumps and rescue kits (see section B).<br>• Open Maze: Victims changed to remove Heated Victims and introduce Unharmed and Harmed victims (see section C3).<br>• All divisions: There is now a minimum of 4 victims in any round, rather than 5 (see sections A3.2.1, B3.3.2 & C3.2.1).<br>• Final placings are now based solely on the results of the Finals Super Rounds, if the Super Rounds are run (see sections A7.4, B7.4 & C7.4).<br>• General Rules have been introduced. Multiple sections of these Challenge Rules have been relocated to the General Rules to ensure consistency across all Challenges. Please ensure you read the General Rules, which can be downloaded from the Rescue Maze Challenge Page on the RoboCup Junior Australia Website. |
| 25.1 | • Fixed references to Obstacles in Mighty Maisy Maze and Intermediate Maze.<br>• Fixed Super Rounds terminology for separate courses for Mighty Maisy Maze and Intermediate Maze.<br>• Fixed wording in introduction sections with regards to exit bonus and count bonuses. |

# Table of Contents

# 1 The Challenge

## 1.1 The Scenario

1.1.1 There has been an accident at a manufacturing plant. There are a number of victims still trapped within the plant, and it is too hazardous to send in human rescue teams. Your autonomous robot must be able to navigate through a treacherous building which may have obstacles, uneven floors and restricted areas to identify victims and leave rescue kits to aid harmed victims. Time and technical skills are essential! Come and prepare to be the most successful Rescue Maze Response Team.

## 1.2 Event Divisions

1.2.1 The Rescue Maze Challenge has three divisions: Mighty Maisy Maze, Intermediate Maze and Open Maze.

Mighty Maisy Maze was developed with the aim to create a very accessible entry point for students who are new to the Challenge.

Intermediate Maze increases the difficulty of the Challenge to be a transition level between Mighty Maisy Maze and Open Maze. This division can also be used by Open Maze teams that are significantly changing hardware and/or software platform.

Open Maze extends the Challenge with more complexity for more experienced students.

Subject to age limitations and other criteria, Open Division teams who perform well in the National Event may qualify for the annual RoboCup Junior International Event. Other international events may have other divisions/qualification requirements.

The rules for each division are separated into their own sections with the chart below highlighting the differences:

| Challenge Aspect | Mighty Maisy Maze | Intermediate Maze | Open Maze |
|---|---|---|---|
| Floor victims | X | X | |
| Wall victims | | | X |
| | | | |
| Rescue Kits for Harmed victims | | X | X |
| | | | |
| Start/Finish using silver reflective tile | X | X | |
| Start/Finish using coloured tiles | | | X |
| | | | |
| Checkpoints at identified victims | X | X | |
| Checkpoints using silver reflective tiles | | | X |
| | | | |
| Maze: Allow use of A4 Reams for walls | X | X | |
| Maze: “No Go” black tiles | X | X | X |
| Maze: Floating Walls | | X | X |
| Maze: Debris | | X | X |
| Maze: ~~Floor Obstacles~~ Speed Bumps | | X | X |
| Maze: ~~Room~~ Obstacles | | | X |
| Maze: Stairs | | | X |
| Maze: Ramps | | | X |
| Maze: Multiple Levels | | | X |
| Maze: Tunnels | | | X |
| | | | |
| Exit Bonus | X | X | X |
| Count Bonus | X | X | |

# A Mighty Maisy Maze

## A1 Introduction

A1.1 The robot needs to search through a maze for colour-identifiable victims. i.e. the robot ~~should~~ need not find the fastest path through the maze, instead it should explore as much as possible of the maze. The robot will score points for each victim found. The robot should avoid areas with a black floor.

A1.2 If the robot is stuck in the maze, it can be restarted at ~~the last correctly identified victim~~ any previous correctly identified victim.

A1.3 If the robot can find its way back to the start tile after exploring ~~a large proportion of~~ the maze it will receive an exit bonus (as defined in A6.5).

A1.4 Additional count bonuses will be awarded upon exit if the robot can report the number and type of victims that it has identified in the maze (victims might be identified more than once) once at least half the victims have been identified (as defined in A6.6).

## A2 Playing Field

All measurements in the rules have a tolerance of 5%.

### A2.1 Maze Description

A2.1.1 The maze will be on a single level and may consist of multiple distinct areas. Areas will have a horizontal floor and a perimeter wall. Walls can be constructed either using reams of A4 Paper laid on their long side or using the Open Maze walls.

A2.1.2 Areas may be joined together by doorways.

A2.1.3 Walls will be located approximately 290 mm (tolerance ±15 mm) apart. There may be a 5mm gap between wall sections.

A2.1.4 Doorways are approximately 290 mm (tolerance ±15 mm) wide.

A2.1.5 Walls that make up the maze are at least 150 mm to a maximum of 300 mm high.

A2.1.6 The walls can be any colour.

### A2.2 Floor

A2.2.1 Floors should be smooth (e.g. vinyl) and may have up to 3 mm height difference at joints. There may be holes in the floor (about 5 mm diameter) for fastening walls. There may also be 5mm gaps between floor tiles. Floors will be a light colour and must not be a similar colour to silver reflective tiles, black tiles or victims.

A2.2.2 The Start/Exit Tile will be marked by a silver reflective tile against an external wall. The silver reflective tile will be fixed to the floor. The entry will be enclosed with a wall.

A2.2.3 Throughout the arena, there may exist black tiles that represent “no go” spaces. The black tile will be fixed to the floor.

### A2.3 Path

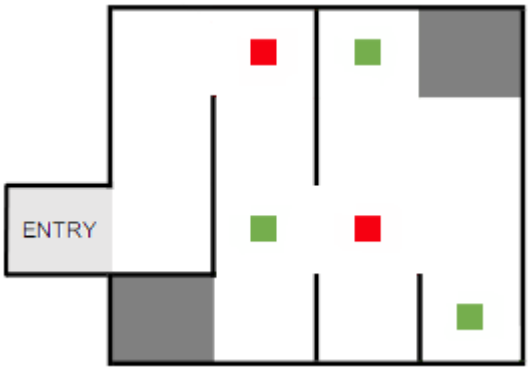
A2.3.1 Walls will lead to the entrance/exit. Walls that lead to the entrance/exit are called linear walls. The walls that do NOT lead to the entrance/exit are called "Floating Walls" and are not included in the Mighty Maisy Maze division.

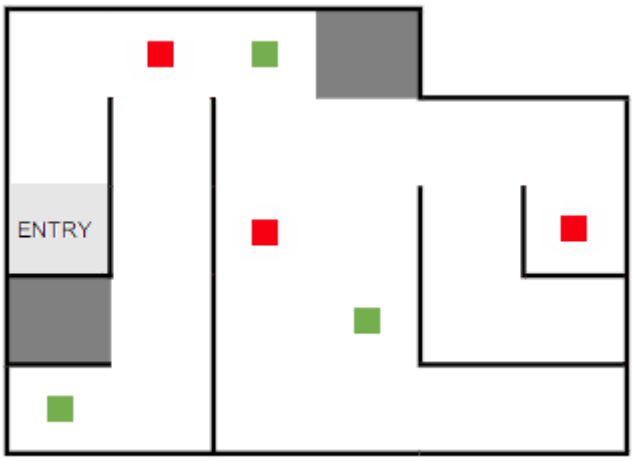
A2.3.2 Paths will be approximately 290 mm (tolerance ±15 mm) wide but may open into foyers wider than the path.

## A2.4 Debris, Speed Bumps, Obstacles and Stairs

A2.4.1 There are no Debris, ~~Floor or Room~~ Speed Bumps, Obstacles, Stairs or Ramps in the Mighty Maisy Maze division.

Example Courses:




## A2.5 Environmental Conditions

A2.5.1 This event simulates a disaster area. There may be gaps and misalignments between wall panels, differences in flooring materials and heights. Teams should expect the environmental conditions at a tournament to be different from the conditions at their home practice field.

A2.5.2 Teams must come prepared to adjust their robots to the conditions at the venue.

A2.5.3 Lighting and magnetic conditions may vary along the course in the rescue arena.

A2.5.4 The arena may be affected by magnetic fields (e.g. generated by under floor wiring and metallic objects).

A2.5.5 Teams should prepare their robots to handle unexpected lighting interference. While the organizers and referees will try their best to minimize external lighting interference, it is not possible for them to foresee all unexpected interferences such as camera flash from spectators.

A2.5.6 The Organising Committee will try their best to fasten the walls onto the field floor so that the impact from regular robot's contact should not affect the robot. All measurements in the rules have a tolerance of 5%.

A2.5.7 Objects to be detected by the robot will be distinguishable from the environment by their colour ~~and/or heat signature~~.

# A3 Victims

## A3.1 Definition

A3.1.1 Victims are represented by red or green coloured 50 mm squares ~~laid on~~ fixed to the floor approximately 150 mm from the nearest wall (as measured to the centre of the square).

A3.1.2 ~~The trapped~~ Unharmed victims are depicted as green squares while ~~the critically injured~~ Harmed victims are red squares.

## A3.2 Locations

A3.2.1 There will be a minimum of ~~five (5)~~ four (4) victims in any round.

A3.2.2 Victims can be located anywhere within the maze except for on black tiles and Start/End tiles.

A3.2.3 Victims will be placed more than 100 mm apart as measured from the edge of each square.

# A4 Rescue Kits

A4.1 There are no Rescue Kits in the Mighty Maisy Maze division.

# A5 Game Play

## A5.1 Pre-round Practice

A5.1.1 Where possible, competitors will have access to practice arenas for calibration, testing and tuning throughout the event.

A5.1.2 Whenever there are dedicated independent arenas for event and practice, it is at the organizers' discretion if testing is allowed on the event arena.

## A5.2 Humans

A5.2.1 Teams should designate one of its own team members as Robot Handler. Only this team member will be allowed access to the practice/event arenas, unless otherwise directed by a referee. Only the robot handler will be allowed to interact with the robot during a scoring run.

A5.2.2 The robot handler can move the robot only when told to do so by the referee.

A5.2.3 Other team members (and any spectators) within the vicinity of the rescue arena have to stand at least 1500 mm away from the arena while their robot is active, unless otherwise directed by the referee.

A5.2.4 No one is allowed to touch the arenas intentionally during a scoring run.

## A5.3 Start of Play

A5.3.1 A run begins at the scheduled starting time whether or not the team is present/ready.

A5.3.2 Once the scoring run has begun, the playing robot is not permitted to be taken from the event area for any reason.

A5.3.3 Each run lasts a maximum of ~~240~~ 180 seconds and includes time for calibration. Time Limits for a round may be varied at the discretion of the Challenge Coordinator at the event.

A5.3.4 Calibration is defined as the taking of sensor readings and if necessary, modifying a robot's program to accommodate such sensor readings. Once the clock has started, a team may calibrate their robot at as many locations as desired on the arena, but the clock will continue to count down.

A5.3.5 Calibration time is not for pre-mapping the arena and/or the locations of the victims. Pre-mapping activities will result in immediate robot disqualification for the round.

A5.3.6 The maze will have one silver reflective start tile.

~~A5.3.7 Once initial calibration has been completed, no more calibration is permitted (this includes changing of code/code selection) without penalty as per section A5.5.3.~~

## A5.4 Scoring Run

A5.4.1 Modifying a robot during a run is prohibited, which includes remounting parts that have fallen off, unless a Restart is declared.

(A5.4.2 All parts that the robot loses (intentionally or unintentionally) will be left in the arena until the run is over, unless a Restart is declared. Neither the team nor the judge are allowed to remove parts from the arena during a run.

A5.4.3 A "visited tile" means that more than half of the robot is inside the tile when looking down from above and shall be determined by the referee.

A5.4.4 The scoring run ends when:

A5.4.4.1 The time expires.

A5.4.4.2 The Robot Handler declares an end of their scoring run. The team will be awarded all points achieved up to the call for end of round.

A5.4.4.3 The robot returns to the start tile and gets the exit bonus. To collect points, the robot must stop on the start/exit tile and indicate in some way that it has completed the round. Exit indication should be distinct from the victim indication as detailed in section A6.2. The operator should be prepared to demonstrate the exit indication to the referee if required.

A5.4.4.4 A team member touches the arena or their robot without permission from a referee. If a team member is in breach of this rule the referee can declare a Restart where the robot is returned to the Start tile as per A5.6.1.

## A5.5 Lack of Progress

A5.5.1 A Lack of Progress occurs when:

A5.5.1.1 The Robot Handler requests a Lack of Progress from the referee provided that the robot can genuinely not continue through either a stoppage or recursive (looping) behaviour.

A5.5.1.2 A robot fails to retreat from a "visited" black tile. A robot is deemed to have entered the tile when more than half the robot is within the tile as determined by the referee. For a successful retreat, it needs to back up without turning inside the black tile (it has to move straight backwards inside of a black tile). (See definition of visited tile on rule A5.4.3.) If a robot is deemed to have visited the black tile, a Lack of Progress will be called as per rule A5.5.2.

A5.5.1.3 A robot or a team member damages the arena.

A5.5.2 If a Lack of Progress occurs the robot must be returned to any previously visited checkpoint (or the Start tile if the robot has not reached a checkpoint). The robot can be placed in any direction but must be wholly within the tile. The program can be paused but not reset or changed. All points scored to that stage are still valid~~, but debris and obstacles will not be reset~~.

## A5.6 Restart

A5.6.1 After a Lack of Progress or when Rule A5.4.4.4 is breached, the Robot Handler may declare a **Restart**. After a Restart, the team can reset the power supply (turn the robot off and on), change programs, remount parts that have fallen off, and the maze will be returned to original condition by the referee.
**Note:** All points earned prior to a call of restart are invalid and will be reset.
**Note:** The round timer remains running.

# A6 Scoring

A6.1 **Successful Victim Identification:** Robots are rewarded points for each Successful Victim Identification in the arena:

- 10 points per ~~Trapped~~ Unharmed victim.
- 25 points per ~~Critical~~ Harmed victim.

A6.2 A robot can carry out the following action to successfully identify a victim by stopping for at least 1 second over the victim and clearly indicating by either visual indicator or sound.

Hint: Sounds can be hard to hear in a loud venue, so a visual indicator is recommended.

A6.3 **No duplicate rewards.** Each victim can only be identified and scored once.

A6.4 Once correctly identified, a victim can be used as a checkpoint for lack of progress.

A6.5 **Exit Bonus.** A successful exit bonus of 25 points will be awarded if the robot reaches and stops on the Start/Exit Tile.

A6.6 **Count Bonus.** Once at least 50% of the total victims in the maze (rounding down) have been identified, the robot will be awarded a further bonus of 25 points if it stops on the Start/Exit tile and clearly indicates the number of ~~trapped~~ Unharmed victims the robot has found. A bonus of 25 points will be awarded if the number of ~~critical~~ Harmed victims the robot has found is clearly indicated. There is no penalty if victims are identified more than once.

For example, if there are 2 Harmed victims, but the robot has successfully identified 3 (i.e. it has counted one victim twice) then the Harmed victim count should be 3.

A6.7 **Scoring Summary:**

| State | Indicator | Points |
|---|---|---|
| ~~Trapped (green)~~ Unharmed victim found | Stop for at least 1 second and give clear indication of victim identification | 10 points per victim |
| ~~Critical (red)~~ Harmed victim found | Stop for at least 1 second and give clear indication of victim identification | 25 points per victim |
| Exit Bonus | The robot will be awarded 25 points for reaching and stopping on the Start/Exit tile within Time Limit | 25 points |
| ~~Trapped (green)~~ Unharmed Victim Count Bonus | The robot will be awarded 25 points for a count of Unharmed victims the robot found | 25 points |
| ~~Critical (red)~~ Harmed Victim Count Bonus | The robot will be awarded 25 points for a count of Harmed victims the robot found | 25 points |

# A7 Event Structure

A7.1 The regular event will consist of as many preliminary rounds as possible with the team scores cumulative over the rounds. Placings at the end of the ~~event~~ preliminary rounds will be awarded on the basis of the cumulative scores. In the event of a tied position the placings will be awarded based on the number of victims identified over the preliminary rounds. If still tied, the placings will be decided based on the lowest cumulative time over the preliminary rounds.

A7.2 The organisers may include Super Rounds for the final rounds of the event.

A7.3 The top 4 scoring teams in the preliminary rounds will be eligible to compete in the Super Rounds.

A7.4 Placings at the end of the event will be awarded based solely on the cumulative scores of the Super Rounds. In the event of a tied position the placings will be awarded based on the number of victims identified over the Super Rounds. If still tied, the placings will be decided based on the lowest cumulative time over the Super Rounds. If still tied, the placings will then refer to the preliminary rounds results.

A7.5 In the Super Rounds all teams compete at the same time, on separate independent courses.

A7.6 The teams will select their initial ~~starting tile~~ course in the order that they have finished in the preliminary rounds.

A7.7 After each Super Round, the competing teams will start the next round from the next ~~start tile~~ course moving clockwise.

A7.8 Courses for the Super Rounds must be independent but can have missing walls as long as there is a black tile to prevent robots from crossing into another course.

# B Intermediate Maze

Intermediate Rescue Maze is a new division as of 2025, the following marked red changes in Section B represent the differences between 2025 Intermediate Rescue Maze and 2025 Mighty Maisy Rescue Maze.

## B1 Introduction

B1.1 The robot needs to search through a maze for colour-identifiable victims. i.e. the robot need not find the fastest path through the maze, instead it should explore as much as possible of the maze. The robot will score points for each victim found. The robot should avoid areas with a black floor.

B1.2 If the robot is stuck in the maze, it can be restarted at any previous correctly identified victim.

B1.3 If the robot can find its way back to the start tile after exploring ~~a large proportion of~~ the maze it will receive an exit bonus (as defined in B6.5).

B1.4 Additional count bonuses will be awarded upon exit if the robot can report the number and type of victims that it has identified in the maze (victims might be identified more than once) once at least half the victims have been identified (as defined in B6.6).

B1.5 If the robot can also deliver a Rescue Kit close to Harmed victims, it will earn additional points.

## B2 Playing Field

All measurements in the rules have a tolerance of 5%.

### B2.1 Maze Description

B2.1.1 The maze will be on a single level and may consist of multiple distinct areas. Areas will have a horizontal floor and a perimeter wall. Walls can be constructed either using reams of A4 Paper laid on their long side or using the Open Maze walls.

B2.1.2 Areas may be joined together by doorways.

B2.1.3 Walls will be located approximately 29 mm (tolerance ±15 mm) apart. There may be a 5mm gap between wall sections.

B2.1.4 Doorways are approximately 290 mm (tolerance ±15 mm) wide.

B2.1.5 Walls that make up the maze are at least 150 mm to a maximum of 300 mm high. There may be a 5 mm gap between wall sections.

B2.1.6 The walls can be any colour.

## B2.2 Floor

B2.2.1 Floors should be smooth (e.g. vinyl) and may have up to 3 mm height difference at joints. There may be holes in the floor (about 5 mm diameter) for fastening walls. There may also be 5mm gaps between floor tiles. Floors will be a light colour and must not be a similar colour to silver reflective tiles, black tiles or victims.

B2.2.2 The Start/Exit Tile will be marked by a silver reflective tile against an external wall. The silver reflective tile will be fixed to the floor. The entry will be enclosed with a wall.

B2.2.3 Throughout the arena, there may exist black tiles that represent “no go” spaces. The black tile will be fixed to the floor.

## B2.3 Path

B2.3.1 Walls will lead to the entrance/exit. Walls that lead to the entrance/exit are called linear walls. The walls that do NOT lead to the entrance/exit are called "Floating Walls".

B2.3.2 Paths will be approximately 290 mm (tolerance ±15 mm) wide but may open into foyers wider than the path.

## B2.4 Debris, Speed Bumps, Obstacles and Stairs

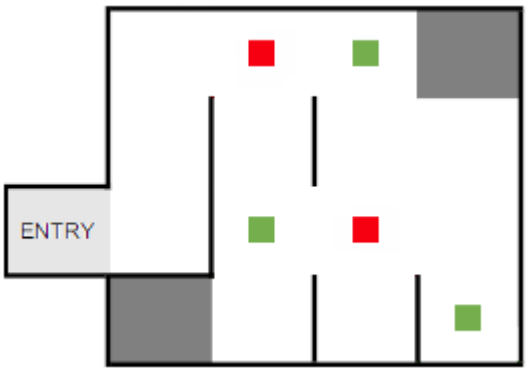
B2.4.1 **Speed Bumps** are fixed to the floor, have a maximum height of 5 mm and will be no closer than 50 mm apart.

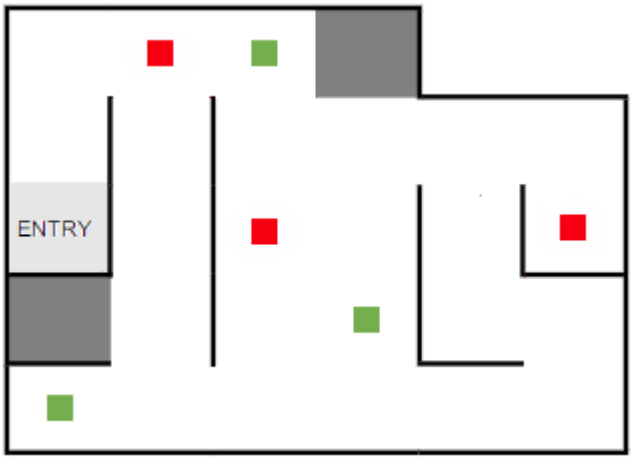
B2.4.2 **Debris** will not be fixed on the floor and will have a maximum height of 5 mm. Debris can be placed anywhere on the tile and must be a contrasting colour to the victims, the start tiles, black tiles.

Hint: Make sure that your robot can negotiate speed bumps and has sufficient ground clearance.

B2.4.3 There are no Obstacles, Stairs or Ramps in the Intermediate Maze division.

Example Courses:




## B2.5 Environmental Conditions

B2.5.1 This event simulates a disaster area. There may be gaps and misalignments between wall panels, differences in flooring materials and heights. Teams should expect the environmental conditions at a tournament to be different from the conditions at their home practice field.

B2.5.2 Teams must come prepared to adjust their robots to the conditions at the venue.

B2.5.3 Lighting and magnetic conditions may vary along the course in the rescue arena.

B2.5.4 The arena may be affected by magnetic fields (e.g. generated by under floor wiring and metallic objects).

B2.5.5 Teams should prepare their robots to handle unexpected lighting interference. While the organizers and referees will try their best to minimize external lighting interference, it is not possible for them to foresee all unexpected interferences such as camera flash from spectators.

B2.5.6 The Organizing Committee will try their best to fasten the walls onto the field floor so that the impact from regular robot's contact should not affect the robot. All measurements in the rules have a tolerance of 5%.

B2.5.7 Objects to be detected by the robot will be distinguishable from the environment by their colour.

# B3 Victims

## B3.1 Definition

B3.1.1 Victims are represented by red or green coloured 50 mm squares fixed to the floor approximately 150 mm from the nearest wall (as measured to the centre of the square).

B3.1.2 Unharmed victims are depicted as green squares while Harmed victims are red squares.

## B3.2 Locations

B3.2.1 There will be a minimum of four (4) victims in any round.

B3.2.2 Victims can be located anywhere within the maze except for on black tiles and Start/End tiles.

B3.2.3 Victims will be placed more than 100 mm apart as measured from the edge of each square.

# B.4 Rescue Kits

B4.1 A Rescue Kit represents a basic health package distributed to a harmed victim caught in a natural disaster. It symbolises tools or devices used in the rescue process, such as GPS Transponders or even something as simple as food, water or light source providers.

B4.2 Each Rescue Kit must have a minimum volume of 500 $mm^3$ (e.g. 8 mm x 8 mm x 8 mm).

B4.3 Each team can only carry a maximum number of 12 of those kits.

B4.4 Each team is responsible for the whole Rescue Kit system (the maximum of 12 kits), including bringing the rescue kits to the event. The Robot Handler is responsible for loading their own Rescue Kits on their robots and cleaning the field with the referee's/judges' authorization after the game is called to end.

# B.5 Game Play

## B5.1 Pre-round Practice

B5.1.1 Where possible, competitors will have access to practice arenas for calibration, testing and tuning throughout the event.

B5.1.2 Whenever there are dedicated independent arenas for event and practice, it is at the organizers' discretion if testing is allowed on the event arena.

## B5.2 Humans

B5.2.1 Teams should designate one of its own team members as Robot Handler. Only this team member will be allowed access to the practice/event arenas, unless otherwise directed by a referee. Only the robot handler will be allowed to interact with the robot during a scoring run.

B5.2.2 The robot handler can move the robot only when told to do so by the referee.

B5.2.3 Other team members (and any spectators) within the vicinity of the rescue arena have to stand at least 1500 mm away from the arena while their robot is active, unless otherwise directed by the referee.

B5.2.4 No one is allowed to touch the arenas intentionally during a scoring run.

## B5.3 Start of Play

B5.3.1 A run begins at the scheduled starting time whether or not the team is present/ready.

B5.3.2 Once the scoring run has begun, the playing robot is not permitted to be taken from the event area for any reason.

B5.3.3 Each run lasts a maximum of 240 seconds and includes time for calibration. Time Limits for a round may be varied at the discretion of the Challenge Coordinator at the event.

B5.3.4 Calibration is defined as the taking of sensor readings and if necessary, modifying a robot's program to accommodate such sensor readings. Once the clock has started, a team may calibrate their robot at as many locations as desired on the arena, but the clock will continue to count down.

B5.3.5 Calibration time is not for pre-mapping the arena and/or the locations of the victims. Pre-mapping activities will result in immediate robot disqualification for the round.

B5.3.6 The maze will have one silver reflective start tile.

## B5.4 Scoring Run

B5.4.1 Modifying a robot during a run is prohibited, which includes remounting parts that have fallen off, unless a Restart is declared.

B5.4.2 All parts that the robot loses intentionally or unintentionally will be left in the arena until the run is over, unless a Restart is declared. Neither the team nor the judge are allowed to remove parts from the arena during a run.

B5.4.3 A "visited tile" means that more than half of the robot is inside the tile when looking down from above and shall be determined by the referee.

B5.4.4 The scoring run ends when:

B5.4.4.1 The time expires.

B5.4.4.2 The Robot Handler declares an end of their scoring run. The team will be awarded all points achieved up to the call for end of round.

B5.4.4.3 The robot returns to the start tile and gets the exit bonus. To collect points, the robot must stop on the start/exit tile and indicate in some way that it has completed the round. Exit indication should be distinct from the victim indication as detailed in section B6.2. The operator should be prepared to demonstrate the exit indication to the referee if required.

B5.4.4.4 A team member touches the arena or their robot without permission from a referee. If a team member is in breach of this rule the referee can declare a Restart where the robot is returned to the Start tile as per B5.6.1.

## B5.5 Lack of Progress

B5.5.1 A Lack of Progress occurs when:

B5.5.1.1 The Robot Handler requests a Lack of Progress from the referee provided that the robot can genuinely not continue through either a stoppage or recursive (looping) behaviour.

B5.5.1.2 A robot fails to retreat from a "visited" black tile. A robot is deemed to have entered the tile when more than half the robot is within the tile as determined by the referee. For a successful retreat, it needs to back up without turning inside the black tile (it has to move straight backwards inside of a black tile). (See definition of visited tile

on rule B5.4.3.) If a robot is deemed to have visited the black tile, a Lack of Progress will be called as per rule B5.5.2.

B5.5.1.3 A robot or a team member damages the arena.

B5.5.2 If a Lack of Progress occurs the robot must be returned to any previously visited checkpoint (or the Start tile if the robot has not reached a checkpoint). The robot can be placed in any direction but must be wholly within the tile. The program can be paused but not reset or changed. All points scored to that stage are still valid, but debris ~~and obstacles~~ will not be reset.

### B5.6 Restart

B5.6.1 After a Lack of Progress or when Rule B5.4.4.4 is breached, the Robot Handler may declare a **Restart**. After a Restart, the team can reset the power supply (turn the robot off and on), change programs, remount parts that have fallen off, and the maze will be returned to original condition by the referee.
**Note:** All points earned prior to a call of restart are invalid and will be reset.
**Note:** The round timer remains running.

## B.6 Scoring

B6.1 **Successful Victim Identification:** Robots are rewarded points for each Successful Victim Identification in the arena:

- 10 points per Unharmed victim.
- 25 points per Harmed victim, with an additional 10 points for a successful rescue kit deployment.

B6.2 A robot can carry out the following action to successfully identify a victim by stopping for at least 1 second over the victim and clearly indicating by either visual indicator or sound.

Hint: Sounds can be hard to hear in a loud venue, so a visual indicator is recommended.

B6.3 **No duplicate rewards.** Each victim can only be identified and scored once. Points for a successful rescue kit deployment can only be scored once.

B6.4 Once correctly identified a victim can be used as a checkpoint for lack of progress.

B6.5 **Exit Bonus.** A successful exit bonus of 25 points will be awarded if the robot reaches and stops on the Start/Exit Tile.

B6.6 **Count Bonus.** Once at least half of the total victims in the maze (rounding down) have been identified, the robot will be awarded a further bonus of 25 points if it stops on the Start/Exit tile and clearly indicates the number of Unharmed victims the robot has found. A bonus of 25 points will be awarded if the number of Harmed victims the robot has found is clearly indicated. There is no penalty if victims are identified more than once.

For example, if there are 2 Harmed victims, but the robot has successfully identified 3 (i.e. it has counted one victim twice) then the Harmed victim count should be 3.

B6.7 **Scoring Summary:**

| State | Indicator | Points |
|---|---|---|
| Unharmed victim found | Stop for at least 1 second and give clear indication of victim identification | 10 points per victim |
| Harmed victim found | Stop for at least 1 second and give clear indication of victim identification | 25 points per victim |
| Exit Bonus | The robot will be awarded 25 points for reaching and stopping on the Start/Exit tile within Time Limit | 25 points |

| | | |
|---|---|---|
| Unharmed Victim Count Bonus | The robot will be awarded 25 points for a count of Unharmed victims the robot found | 25 points |
| Harmed Victim Count Bonus | The robot will be awarded 25 points for a count of Harmed victims the robot found | 25 points |
| Rescue Kit deployed for Harmed victims | Drop one rescue kit on the tile of an identified Harmed victim | 10 points per victim |

B6.8 **Successful rescue kit deployment.** Robot should drop a rescue kit on the tile where an identified Harmed victim is. The deployment point and the rescue kit need to be wholly on the tile of the victim. The robot is awarded points (see table) per successful rescue kit deployment.

## B.7 Event Structure

B7.1 The regular event will consist of as many preliminary rounds as possible with the team scores cumulative over the rounds. Placings at the end of the preliminary rounds will be awarded on the basis of the cumulative scores. In the event of a tied position the placings will be awarded based on the number of victims identified over the preliminary rounds. If still tied, the placings will be decided based on the lowest cumulative time over the preliminary rounds.

B7.2 The organisers may include Super Rounds for the final rounds of the event.

B7.3 The top 4 scoring teams in the preliminary rounds will be eligible to compete in the Super Rounds.

B7.4 Placings at the end of the event will be awarded based solely on the cumulative scores of the Super Rounds. In the event of a tied position the placings will be awarded based on the number of victims identified over the Super Rounds. If still tied, the placings will be decided based on the lowest cumulative time over the Super Rounds. If still tied, the placings will then refer to the preliminary rounds results.

B7.5 In the Super Rounds all teams compete at the same time, on separate independent courses.

B7.6 The teams will select their initial ~~starting tile~~ course in the order that they have finished in the preliminary rounds.

B7.7 After each Super Round, the competing teams will start the next round from the next ~~start tile~~ course moving clockwise.

B7.8 Courses for the Super Rounds must be independent but can have missing walls as long as there is a black tile to prevent robots from crossing into another course.

# C Open Maze

## C1 Introduction

C1.1 The robot needs to search through a maze for colour and/or ~~heated~~ visually identifiable victims. i.e. the robot ~~should~~ need not find the fastest path through the maze, instead it should explore as much of the maze as possible. The robot will ~~get between 10 to 25 points~~ score points for each victim found. The robot should avoid areas with a black floor.

C1.2 If the robot is stuck in the maze, it can be restarted at the last visited checkpoint. The checkpoints are indicated with silver reflective tile so the robot can save its map (if it uses a map) to a non-volatile medium and restore it in case of a restart, optimising the robot's search.

C1.3 If the robot can find its way back to its start tile after exploring a large proportion of the maze it will receive an exit bonus (as defined in C6.7).

C1.4 If the robot can also deliver a Rescue Kit ~~(designed by the team themselves)~~ close to alive victims, it will earn additional points.

## C2 Playing Field

All measurements in the rules have a tolerance of 5%.

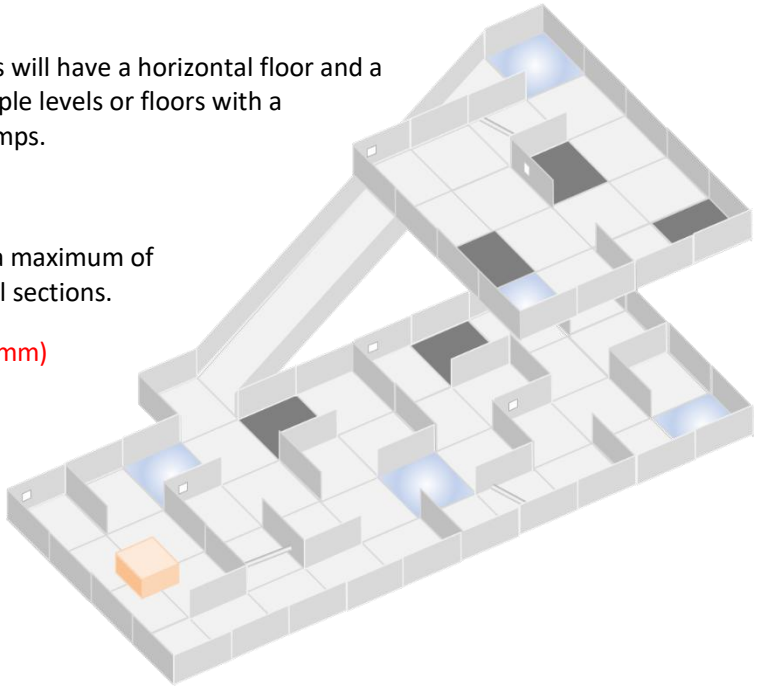
### C2.1 Maze Description

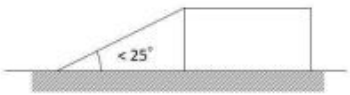
C2.1.1 The maze may consist of multiple distinct areas. Areas will have a horizontal floor and a perimeter wall. Mazes may be constructed with multiple levels or floors with a height of 400-600 mm Which will be accessible via ramps.

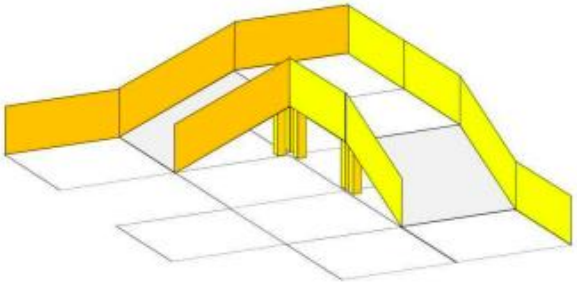
C2.1.2 Areas may be joined together by doorways or ramps.

C2.1.3 Walls that make up the maze are at least 150 mm to a maximum of 300 mm high. There may be a 5 mm gap between wall sections.

C2.1.4 Doorways are approximately 290 mm (tolerance ±15 mm) wide.





C2.1.5 Ramps will be at least 290 mm (tolerance ±15 mm) wide and have an incline with a maximum of 25 degrees from horizontal surface. The ramp is always straight.

C2.1.6 The walls can be any colour.

## C2.2 Floor

C2.2.1 Floors may be either smooth or textured (like linoleum or carpet) and may have up to 3 mm height difference at joints. There may be holes in the floor (about 5 mm diameter) for fastening walls. There may also be 5mm gaps between floor tiles. Floors must not be a similar colour to start tiles, silver reflective tiles or black tiles.

C2.2.3 There may also exist silver reflective tiles that represent Checkpoints. Silver reflective tiles may not be completely fixed on the floor.

C2.2.4 Throughout the arena, there may exist black tiles that represent “no go” spaces. Black tiles may not be completely fixed on the floor.

C2.2.5 The floors for start tiles can be coloured red, green, blue or yellow and will be against an external wall. The entry will be enclosed with a wall.

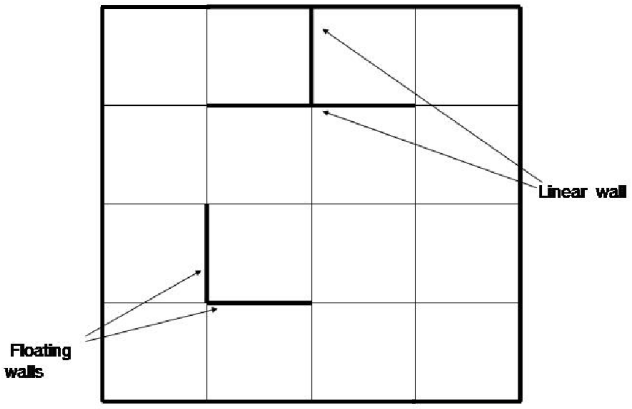
## C2.3 Path

C2.3.1 Walls may or may not lead to the entrance/exit. Walls that lead to the entrance/exit are called linear walls. The walls that do NOT lead to the entrance/exit are called "Floating Walls".

C2.3.2 Paths will be at least 290 mm (tolerance ±15 mm) wide but may open into foyers wider than the path.

C2.3.3 There may be multiple entries with coloured floors that are randomly selected prior to the start of the run.

C2.3.4 Paths may form passages/tunnels passing under upper floors.




## C2.4 Debris, Speed Bumps, Obstacles and Stairs

C2.4.1 ~~**Floor Obstacles**~~ **Speed Bumps** are fixed to the floor, have a maximum height of 20 mm and will be no closer than 50 mm apart.

C2.4.2 **Debris** will not be fixed on the floor, and will have a maximum height of 10 mm. Debris can be placed anywhere on the tile and must be a contrasting colour to the start tiles, black or silver reflective tiles.

Hint: Make sure that your robot can negotiate obstacles and has sufficient ground clearance.

C2.4.3 ~~**Room obstacles**~~ **Obstacles** have a minimum height of 150 mm, may consist of any large, heavy items and can be any shape, including rectangular, pyramidal, spherical or cylindrical. Obstacles can be coloured or clear. Obstacles are not fixed to the floor so may be moved by the robot during play.

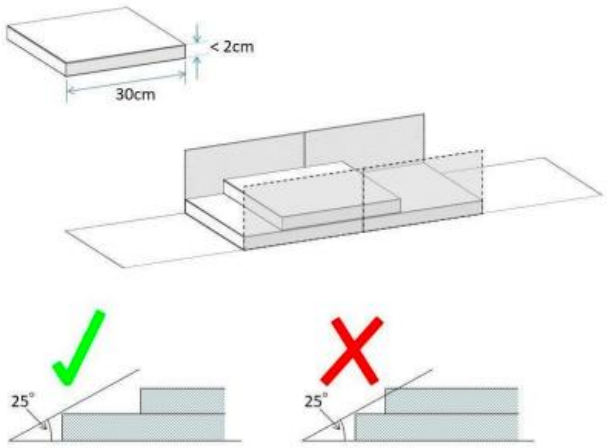
C2.4.4 Obstacles will not prevent a robot from discovering routes in the maze. An Obstacle may be placed in any location where at least 200 mm is left between the obstacle and a wall.

C2.4.5 ~~Floor Obstacles & Room~~ Obstacles that are moved or knocked over will remain where they are moved to/fall and will not be reset during the scoring run.

C2.4.6 Stairs will be the full width of the passageway (300 mm less thickness of walls) and the individual maximum height is 20 mm.

C2.4.7 The incline of stairs (i.e.: the incline of a plate to the horizontal when placed on the stairs) will be less than 25 degrees.

C2.4.8 Stairs will be placed between walls.




## C2.5 Environmental Conditions

C2.5.1 This event simulates a disaster area. There may be gaps and misalignments between wall panels, differences in flooring materials and heights. Teams should expect the environmental conditions at a tournament to be different from the conditions at their home practice field.

C2.5.2 Teams must come prepared to adjust their robots to the conditions at the venue.

C2.5.3 Lighting and magnetic conditions may vary along the course in the rescue arena.

C2.5.4 The arena may be affected by magnetic fields (e.g. generated by under floor wiring and metallic objects).

C2.5.5 Teams should prepare their robots to handle unexpected lighting interference. While the organizers and referees will try their best to minimize external lighting interference, it is not possible for them to foresee all unexpected interferences such as camera flash from spectators.

C2.5.6 The Organizing Committee will try their best to fasten the walls onto the field floor so that the impact from regular robot's contact should not affect the robot. All measurements in the rules have a tolerance of 5%.

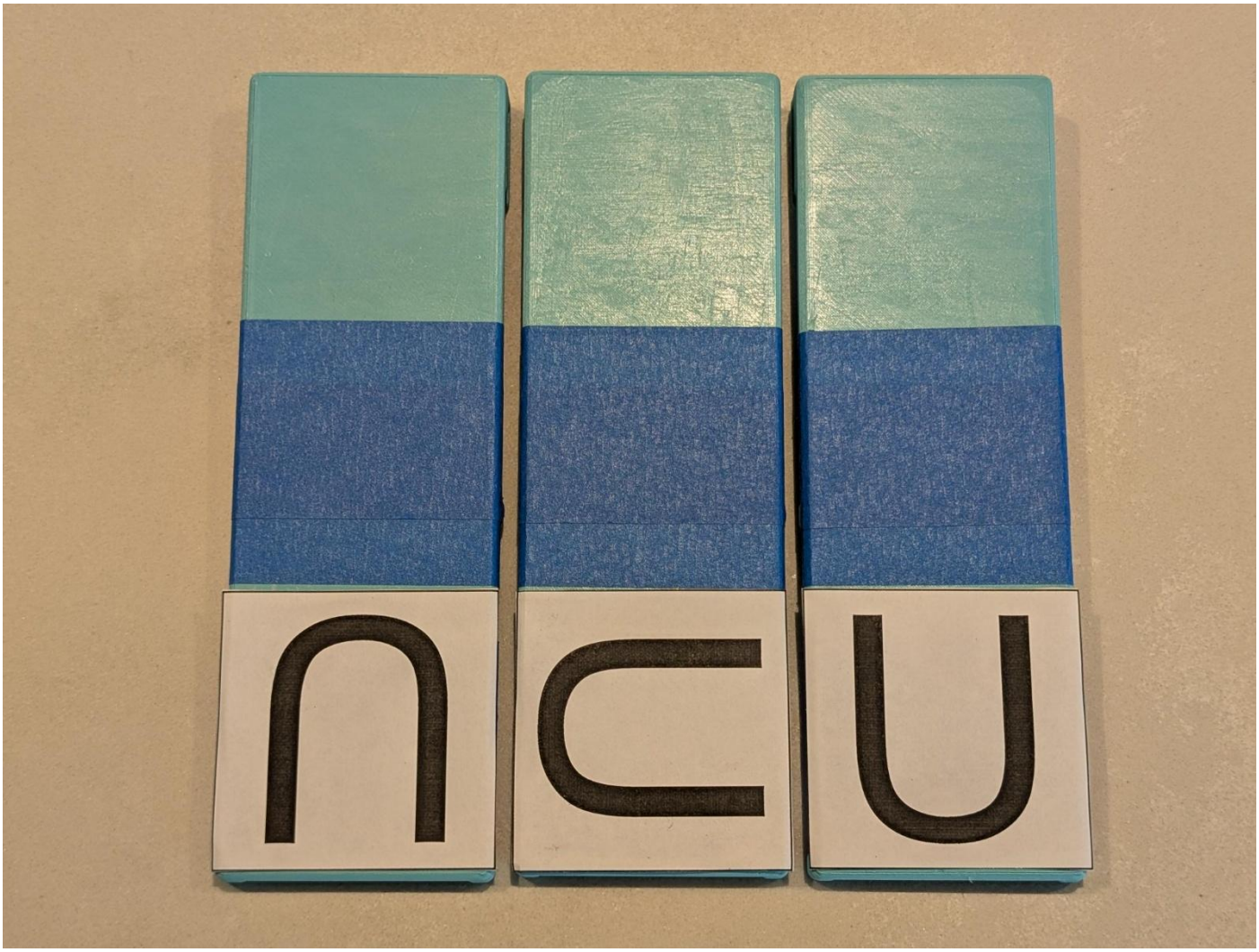
C2.5.7 Objects to be detected by the robot will be distinguishable from the environment by their colour and/or ~~heat signature~~ symbol.

# C3 Victims

## C3.1 Definition

C3.1.1 There are two types of victims that may be used: Unharmed and Harmed. Victims can be identified by looking for coloured or reflective tape, or by looking for letter symbols. The inclusion of letter symbols helps prepare teams and robots for the International Rescue Maze rules.

C3.1.2 Unharmed Victims will be located on walls, near the floor of the arena (centred approximately 70 mm above the floor). The victim will be an uppercase letter “U” (for Unharmed) on a white background. It will be printed in black using a sans serif typeface (such as ‘Arial’ 160 point) with a height of 40 mm. The letter can be rotated. They will also be wearing work clothing simulated by blue coloured tape (e.g. 3M painter’s blue masking tape) fixed to them. The tape will be centred approximately 130 mm above the floor and have an area of approximately 2500 $mm^2$ (for example: 50 mm x 50 mm).



C3.1.3 Harmed Victims will be located on walls, near the floor of the arena (centred approximately 70 mm above the floor). The victim will be an uppercase letter "H" (for Harmed) on a white background. It will be printed in black using a sans serif typeface (such as 'Arial' 160 point) with a height of 40 mm. The letter can be rotated. They will also have "locator beacons" simulated by reflective tape (e.g. Aluminium foil tape) fixed to them. The tape will be centred approximately 130 mm above the floor and have an area of approximately 2500 $mm^2$ (for example: 50 mm x 50 mm).


C3.1.4 Victims identified as Harmed need medical assistance and require a Rescue Kit dropped.

C3.1.5 Victims identified as Unharmed do not need a Rescue Kit. There will be no points awarded for dropping a Rescue Kit.

Advice: It is recommended that teams using Lego robots be aware that if they are using the standard Lego software they may be restricted in their choice of sensors and that the standard Lego sensors, while usable, may not be very effective. We would recommend that the teams consider using some of the text-based programming alternatives in combination with robot vision to identify victims.

## C3.2 Locations

C3.2.1 There will be a minimum of ~~five (5)~~ four (4) victims in any round.

C3.2.2 Victims can be located anywhere within the maze except for on black tiles, Start/End tiles or on tiles with obstacles. Victims may be located on ramps and stairs.

# C4 Rescue Kits

C4.1 A Rescue Kit represents a basic health package distributed to a Harmed Victim ~~an alive victim~~ caught in a natural disaster. It symbolizes tools or devices used in the rescue process, such as GPS Transponders or even something as simple as food, water or light source providers.

C4.2 Each Rescue Kit must have a minimum volume of 500 $mm^3$ (e.g. 8 mm x 8 mm x 8 mm).

C4.3 Each team can only carry a maximum number of 12 of those kits.

C4.4 Each team is responsible for the whole Rescue Kit system (the maximum of 12 kits), including bringing the rescue kits to the event. The Robot Handler is responsible for loading their own Rescue Kits on their robots and cleaning the field with the referee's/judges' authorization after the game is called to end.

# C5 Game Play

## C5.1 Pre-round Practice

C5.1.1 Where possible, competitors will have access to practice arenas for calibration, testing and tuning throughout the event.

C5.1.2 Whenever there are dedicated independent arenas for event and practice, it is at the organizers' discretion if testing is allowed on the event arena.

## C5.2 Humans

C5.2.1 Teams should designate one of its own team members as Robot Handler. Only this team member will be allowed access to the practice/event arenas, unless otherwise directed by a referee. Only the robot handler will be allowed to interact with the robot during a scoring run.

C5.2.2 The robot handler can move the robot only when told to do so by the referee.

C5.2.3 Other team members (and any spectators) within the vicinity of the rescue arena have to stand at least 1500 mm away from the arena while their robot is active, unless otherwise directed by the referee.

C5.2.4 No one is allowed to touch the arenas intentionally during a scoring run.

## C5.3 Start of Play

C5.3.1 A run begins at the scheduled starting time whether or not the team is present/ready.

C5.3.2 Once the scoring run has begun, the playing robot is not permitted to be taken from the event area for any reason.

C5.3.3 Each run lasts a maximum of 240 seconds and includes time for calibration. Time Limits for a round may be varied at the discretion of the Challenge Coordinator at the event.

C5.3.4 Calibration is defined as the taking of sensor readings and if necessary, modifying a robot's program to accommodate such sensor readings. Once the clock has started, a team may calibrate their robot at as many locations as desired on the arena, but the clock will continue to count down.

C5.3.5 Calibration time is not for pre-mapping the arena and/or the locations of the victims. Pre-mapping activities will result in immediate robot disqualification for the round.

C5.3.6 The maze will have a minimum of 2, and up to 4 possible entries. ~~These entries will be a hallway style (that is walls on either side) and will have a floor that is uniformly coloured with the exception of a black strip of 50mm width at the open end.~~ Calibration for the colour of the entry tile will be included within the Run Time. Entries may be on either the ground or upper levels and will be against an external wall. The entry will be enclosed with a wall.

C5.3.7 The start tile for each run will be randomly determined just prior to the commencement of the timed period. Black tiles and Checkpoints may also be relocated at this time.

C5.3.8 Once initial calibration has been completed, no more calibration is permitted (this includes changing of code/code selection) without penalty as per section C5.6.1.

## C5.4 Scoring Run

C5.4.1 Modifying a robot during a run is prohibited, which includes remounting parts that have fallen off, unless a Restart is declared.

C5.4.2 All parts that the robot loses intentionally or unintentionally will be left in the arena until the run is over, unless a Restart is declared. Neither the team nor the judge are allowed to remove parts from the arena during a run.

C5.4.3 A "visited tile" means that more than half of the robot is inside the tile when looking down from above and shall be determined by the referee.

C5.4.4 The scoring run ends when:

C5.4.4.1 The time expires.

C5.4.4.2 The Robot Handler declares an end of their scoring run. The team will be awarded all points achieved up to the call for end of round.

C5.4.4.3 The robot returns to the start tile and gets the exit bonus. To collect points, the robot must stop on the start/exit tile and indicate in some way that it has completed the round. Exit indication should be distinct from the victim indication as detailed in section C6.2. The operator should be prepared to demonstrate the exit indication to the referee if required.

C5.4.4.4 A team member touches the arena or their robot without permission from a referee. If a team member is in breach of this rule the referee can declare a Restart where the robot is returned to the Start tile as per C5.6.1.

## C5.5 Lack of Progress

C5.5.1 A Lack of Progress occurs when:

C5.5.1.1 The Robot Handler requests a Lack of Progress from the referee provided that the robot can genuinely not continue through either a stoppage or recursive (looping) behaviour.

C5.5.1.2 A robot fails to retreat from a "visited" black tile. A robot is deemed to have entered the tile when more than half the robot is within the tile as determined by the referee. For a successful retreat, it needs to back up without turning inside the black tile (it has to move straight backwards inside of a black tile). (See definition of visited tile on rule C5.4.3.) If a robot is deemed to have visited the black tile it must return to the last visited checkpoint (or the start tile if never reached a checkpoint). All points scored to that stage are still valid, but obstacles and debris will not be reset.

C5.5.1.3 A robot or a team member damages the arena.

C5.5.2 If a Lack of Progress occurs the robot must be returned to the last visited checkpoint (or the Start tile if the robot has not reached a checkpoint). The robot can be placed in any direction but must be wholly within the tile. The program can be paused but not reset or changed.

## C5.6 Restart

C5.6.1 After a Lack of Progress or when Rule C5.4.4.4 is breached, the Robot Handler may declare a **Restart**. After a Restart, the team can reset the power supply (turn the robot off and on), change programs, remount parts that have fallen off, and the maze will be returned to original condition by the referee.
**Note:** All points earned prior to a call of restart are invalid and will be reset.
**Note:** The round timer remains running.

# C6 Scoring

C6.1 **Successful Victim Identification.** Robots are rewarded points for each Successful Victim Identification in the arena:

- 10 points per "victim" located at a tile adjacent to a linear wall (even diagonally), i.e. all victims at the 6 tiles around a linear wall.
- 25 points per "victim" at floating walls, i.e. all the victims at the 4 floating wall tiles.

C6.2 The method used to indicate the discovery of the victim must be clearly observable in the course of play. The indicator method used must be conveyed to the referee before commencing the course. The robot must carry out one or more of the following actions to successfully identify a victim:

C6.2.1 Stop for 5 seconds wholly on the same tile as the victim and clearly indicate for the full 5 seconds, or

C6.2.2 Stop wholly on the same tile and play a Sound, or

Hint: Sounds can be hard to hear in a loud venue, so a visual indicator is recommended.

C6.2.3 Stop wholly on the same tile and provide a visual notification, such as a flashing light or colour change.

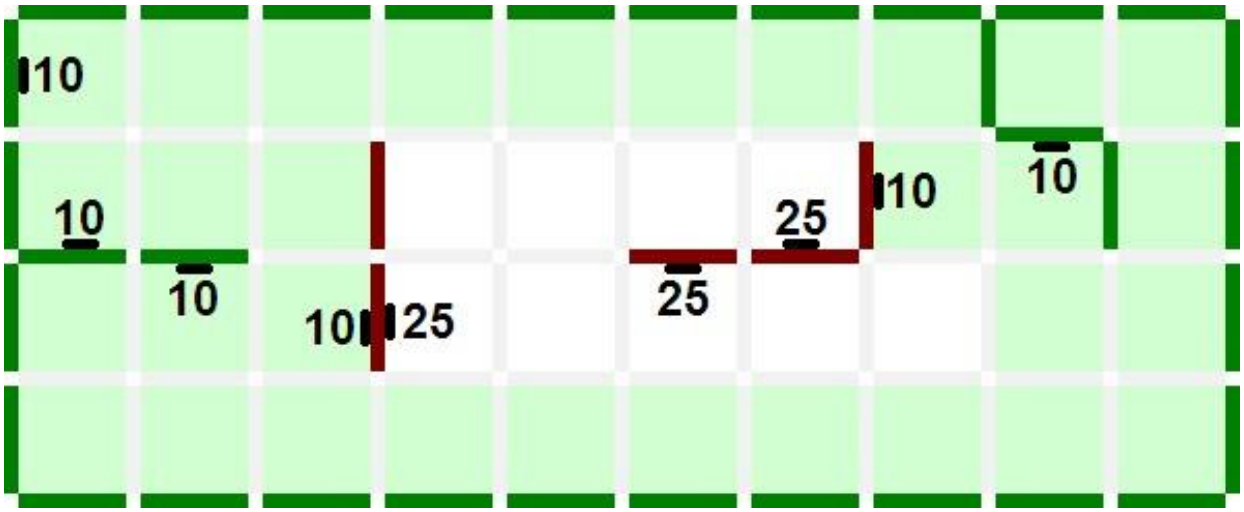
Note: Visual indicators must be placed in a clearly observable area.

C6.3 **Successful rescue kit deployment.** Robot should drop a rescue kit on the tile where an identified Harmed victim is. The deployment point and the rescue kit need to be wholly on the tile of the victim. The robot is awarded points (see table) per successful rescue kit deployment.

C6.4 **No duplicate rewards.** For example, if a robot successfully crosses a tile with a checkpoint multiple times, only one successful checkpoint bonus will be rewarded per tile. The same result applies to all other scoring rules.

C6.5 **Scoring Table for Victim Identification:**

| State | Indicator | Points Linear Wall | Points Floating Wall | Each Rescue Kit deployed for Harmed victims |
|---|---|---|---|---|
| Victim Found | Clear indication of victim identification | 10 points | 25 points | 10 points |




Note: In the above diagram, red/brown lines mean floating walls while the green ones represent linear walls. Some of the victims on the floating walls are worth 10p, because the 10p victims are located in a tile near a linear wall. The colours on the diagram are just for illustrative purposes.

C6.6 **Successful Checkpoint Negotiation.** A robot is awarded 10 points for each visited checkpoint. Refer to C5.4.3 for definition of visited tile.

C6.7 **Successful Exit Bonus**. A successful exit bonus is awarded when a robot successfully finishes a round on the start tile (see rule C5.4.4.3) and has visited at least 50% (round down) of the checkpoints. The points awarded will be 10 points per victim successfully identified.

C6.8 Table for Checkpoint and Exit Bonus:

| Action Completed | Score |
|---|---|
| Checkpoint | 10 |
| Exit Bonus | 10 x n (identified victims) |

# C7 Event Structure

C7.1 The regular event will consist of as many preliminary rounds as possible with the team scores cumulative over the rounds. Placings at the end of the preliminary rounds will be awarded on the basis of the cumulative scores. In the event of a tied position the placings will be awarded based on the number of victims identified over the preliminary rounds. If still tied, the placings will be decided based on the lowest cumulative time over the preliminary rounds.

C7.2 The organisers may include Super Rounds for the final rounds of the event.

C7.3 The top 4 scoring teams in the preliminary rounds will be eligible to compete in the Super Rounds.

C7.4 Placings at the end of the event will be awarded based solely on the cumulative scores of the Super Rounds. In the event of a tied position the placings will be awarded based on the number of victims identified over the Super Rounds. If still tied, the placings will be decided based on the lowest cumulative time over the Super Rounds. If still tied, the placings will then refer to the preliminary rounds results.

~~C7.4 The Super Round will be scored as a regular individual round and the points added to the regular rounds cumulative total.~~

C7.5 In the Super Rounds all teams compete at the same time.

C7.6 The teams will select their initial starting tile in the order that they have finished in the preliminary rounds.

C7.7 After each Super Round, the competing teams will start the next round from the next start tile moving clockwise.

C7.8 Scoring in the Super Rounds is identical to the preliminary round with the exception that if a team is the first to correctly identify and leave a rescue kit for a particular victim, they “claim” that victim and no other team can score points for that victim. Claimed victims will be identified by coloured tags or stickers.

# 2 Robot

## 2.1 Robot Configuration

2.1.1 The height of a robot must not exceed 300 mm.

Care should be taken in robot design to ensure that it is of a manageable size to negotiate its way successfully through the maze and past obstacles.

2.1.2 Robots may not have any sensor or devices that enable it to 'see' over the walls.

2.1.3 Any robot kit or building blocks, either available on the market or built from raw hardware and materials, may be used, as long as the design and construction are primarily and substantially the original work of the students.

2.1.4 Any commercially produced robot kits or sensors components that are specifically marketed to complete any single major task of RoboCup Junior Australia Rescue Maze will be disqualified. If there is any doubt, teams should consult the Technical Committee (TC).

2.1.5 Robots should be well engineered and constructed. The robot should not fall apart during the game. If the robot has substantially failed mechanically, fallen apart or is unable to complete the challenge, the robot will be deemed damaged, and the Robot Handler will be asked to remove the robot from the field. The Robot Handler may choose to restart according to sections A5.6.1, B5.6.1, C5.6.1, otherwise the round is deemed to have ended.

2.1.6 A team will not be able to compete with a robot substantially the same as another team's robot.

2.1.7 A team will not be able to compete with a robot that is identical to another team's robot from previous years.

2.1.8 For the safety of participants and spectators, only lasers of class 1 and 2 are allowed. This will be checked during inspection.

## 2.2 Robot Control

2.2.1 Robots cannot be started from a secondary device, such as a laptop, tablet, or mobile phone. Robots must have their program downloaded to them and be able to be started/restarted manually by the Robot Handler.

2.2.2 Robots must be autonomous in operation. If the robot has the capability for remote or any other wireless control (such as by Bluetooth, Wi-Fi or another form of wireless communication), the team must prove that they have disabled the capability for third party operation in some way. This could be by software, hardware or degree of human interaction. Robots that do not comply may face immediate disqualification from the event. Distributed control is allowed but must operate without human interaction after the robot has started the round.

2.2.3 Pre-mapping and/or any type of dead reckoning (i.e., configuring the robot's program based on predefined locations, tiles, obstacles, location of victim, number of victims etc. before game play) is prohibited.

2.2.4 The use of remote control of any kind is forbidden.

## 2.3 Inspection

2.3.1 Teams may be scrutinised to establish the ownership of robot design and programming.

2.3.2 The robot will be inspected by a panel of referees before/during or after the event to ensure that the robot adheres to all relevant rules.

2.3.3 It is the responsibility of teams to have their robot re-inspected if their robot is modified at any time during the event.

## 2.4 Violations

2.4.1 Any violations of the inspection rules will prevent the robot from competing in a round until modifications have been made to the robot to ensure compliance.

2.4.2 Modifications must be made within the time schedule of the events. Rounds will not be delayed due to late teams.

2.4.3 If a robot fails to meet all specifications (including modifications) the robot will be disqualified from that round (but not the event).

2.4.4 If it is determined that the work on the robot is not substantially the original work of the team members or the construction or programming of the robot be deemed not that of the team, the team will be referred to officials. Should the Rescue Coordinator (or other relevant person) on the advice of the officials then uphold the view of the scrutiniser, the team may be disqualified from the event.

# 3 Validation of Work

## 3.1 Electronic Submission

3.1.1 Before registration closes, prior to the event, each team must electronically submit their journal, logbook or technical description paper and program or source code to the event organisers via the event web site or as otherwise directed. Teams can continue to work on their robot, programs and this document after submission.

## 3.2 Interviews

3.2.1 Teams may be required to attend a technical interview to explain the operation of their robot in order to verify that the design, construction and programming of the robot is the students' work. There are no set questions. If interviews are being conducted, either a schedule will be released, or teams will be advised to go for an interview throughout the event prior to the finals.

3.2.2 Teams must bring their journals, logbooks or technical description papers and a running laptop to their interview with their program open and be able to talk through the logic of the program with the interviewer. Screenshots of the program or source code are not sufficient.

3.2.3 Interviews are not scored and do not contribute to the overall score.

3.2.4 Team member(s) will be asked questions about their preparation efforts, and they may be requested to answer surveys and participate in videotaped interviews for research purposes.

## 3.3 Journal/Log Book/Technical Description Paper

3.3.1 For the RCJA National Event all teams must maintain a design journal/logbook/technical description paper detailing the design, development and construction of the robot and its programs as part of the learning experience. The journal can be in the form of a written document, PowerPoint presentation, website or blog, etc. Journals/Logbooks/Technical Description Paper are not scored and do not contribute to the team's overall score but will be used to determine ownership of designs. Journals/Logbooks/Technical Description Paper may be used to determine the awarding of special honours. State and regional events may elect to use other methods to determine originality of students work.

3.3.2 Construction of components (not freely or commercially available to all competitors) must be accompanied by full documentary proof that the developments were wholly the work of the students. This should be in the form of technical documentation showing all stages of design, development, testing and construction.

3.3.3 Failure to produce documentary proof of students' work may result in the robot or bespoke component not being allowed to compete in the tournament.

3.3.4 Teams who fail to submit a journal, logbook or technical description paper may not be eligible for special awards.

## 3.4 Journal/Logbook/Technical Description Paper Criteria

3.4.1 The following headings are a guide in the development of student logbooks/journals. These criteria are mapped to the Australian National Technologies Curriculum. A Technical Description Paper template is available to download from the RCJA Rescue Maze Challenge Web Page.

| | |
|---|---|
| **Team Name** | |
| **Team Members** | List each member's role |
| **School or Organisation** | |
| **Problem Definition** | Define and decompose the problem |
| **Planning** | Identify a number of possible solutions to meet the requirements and constraints |
| | Identify the roles of the team and the order of tasks |
| **Solution Design** | Design the user experience of a digital system |
| | Design Algorithms and validate them. |
| **Implementation** | Implement modular programs, applying selected algorithms and data structures |
| **Evaluation** | Critically evaluate the developed solution. |
| **Student Collaboration** | Create innovative solutions for sharing your ideas and information. |
| | Plan and manage projects using an interactive and collaborative approach |
| **Robot** | Construction Photos |
| | Code |

# 4 Teams

In 2025 the General Rules have been introduced. Parts of this section of these Challenge Rules has been relocated to the General Rules to ensure consistency across all Challenges. Please ensure you read the General Rules, which can be downloaded from the Rescue Maze Challenge Page on the RoboCup Junior Australia Website.

## 4.1 Definition

~~4.1.1 A team should have a minimum of 2 members and a maximum of 4 members.~~

~~An individual participant is allowed to compete in a RoboCup Junior Australia National Rescue Maze Challenge as an individual only once. To do so the individual must seek approval from the Challenge Committee. If a team can only afford, or due to extenuating circumstances, cannot send more than one member to an event, then this is allowed as the Journal/Logbook/Technical Description Paper will show that they have been part of a team.~~

4.1.2 The eligibility requirements for each Rescue Maze Challenge Division are (Students should be guided to a higher division by their mentor as capability increases):

4.1.2.1 **Mighty Maisy Maze:** ~~Open to students at an age that would typically be studying at a recognised primary or secondary provider.~~ This is open to students who are new to Rescue Maze ~~or attempting a new challenge such as creating a robot based on an Arduino or Raspberry Pi controller programmed with a text-based coding language~~. Teams will only be allowed to enter this division where all students have less than two years' experience participating in Rescue Maze (if all Team Members are in Year 8 or below), or have not participated in Rescue Maze in a prior year (if any Team Member is in Year 9 or above). ~~Additionally, if the team significantly changes hardware and/or software e.g. changing from a LEGO robot to a custom Arduino Robot, it is deemed the years of participation resets to zero.~~

4.1.2.2 **Intermediate Maze:** Open to students at an age that would typically be studying at a recognised primary or secondary provider. This is open to all students with less than two years' experience in Intermediate Maze or students attempting a new challenge such as creating a robot based on an Arduino or Raspberry Pi controller programmed with a text-based coding language.

4.1.2.3 **Open Maze:** Open to all students at an age that would typically be studying at a recognised primary or secondary provider.

4.1.3 For each round, one team member is to be nominated as the Robot Handler. Only the Robot Handler is permitted to enter the Game Zone and handle the robot during the round. All other team members must remain outside the Game Zone unless authorised by the Referee, Official or other relevant person.

4.1.4 The Robot Handler is the only team member permitted to communicate directly with the Referees, and Officials.

## 5 Conflict Resolution

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## 6 Code of Conduct

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