# Play

## Pre-round Practice

1. When possible, teams will have access to practice fields for calibration and testing throughout the competition.
2. Whenever there are dedicated independent fields for competition and practice, it is at the organizers' discretion if testing is allowed on the competition fields.

## Humans

1. Teams should designate one of their members as "captain" and another one as "co-captain." Only these two team members will be allowed access to the competition fields, unless otherwise directed by a referee. Only the captain will be allowed to interact with the robot during a scoring run.
2. The captain can move the robot only when they are told to do so by a referee.
3. Other team members (and any spectators) within the vicinity of the competition field have to stand at least 150 cm away from the field while their robot is active, unless otherwise directed by a referee.
4. No one is allowed to touch the fields intentionally during a scoring run.

## Start of Play

1. A run begins at the scheduled starting time whether or not the team is present or ready. Start times will be posted around the venue.
2. The checkpoint marker is a marker that indicates for humans which tiles are checkpoints. A disk with 5 mm to 12 mm thickness and up to 70 mm in diameter has been used frequently, but can be different dependent on the organizer. Its purpose is to indicate the checkpoint tiles to humans.
3. The number of checkpoint markers and their locations will be predetermined by the field designers.
4. Checkpoints cannot be placed on tiles with scoring elements.
5. The start tile is a checkpoint, where the robot can restart.
6. Once the run has begun, the robot is not permitted to leave the competition area.
7. Each team will be given a maximum time of 8 minutes to calibrate the sensors and let the robot complete the course. The time for each run will be kept by the referee.
8. Calibration is defined as taking sensor readings and modifying the robot's programming to accommodate such sensor readings. Any and all pre-mapping activities will result in immediate disqualification of the robot for the round.
9. Teams may calibrate their robot in as many locations as desired on the field, but the clock will continue to run. Robots are not permitted to move on their own while calibrating.

10. Once a team is ready to start a scoring run, they must notify the referee. To begin a scoring run, the robot is placed on the start tile of the course as indicated by the referee. Once a scoring run has begun, no more calibration is permitted, including changing of code/code selection.
11. Once a robot begins its scoring run, the referee will roll a standard 6-sided dice to determine in which corner the evacuation point will be located.
12. Obstacles may be removed, added or changed just before a scoring run starts to prevent teams from pre-mapping the layout of the fields.
13. Individual tiles may be changed or switched just before a scoring run starts to prevent teams from pre-mapping the layout of the fields. This may happen on the basis of a die rolled by the referee or with another method of randomization announced by the organizers.
14. The difficulty of the scoring run and the amount of points that can be obtained will be the same for every team in a given round on a particular field.

# Game Play

1. Robots will start behind the joint in between the start tile and the next tile along the course. Correct placement will be checked by the referee.
2. Modifying the robot during a scoring run is prohibited, which includes remounting parts that have fallen off.
3. Any parts that the robot loses intentionally or unintentionally will be left in the field until the run is over. Team members and referees are not allowed to move or remove parts from the field during a scoring run.
4. Teams are not allowed to give their robot any advance information about the field. A robot is supposed to recognize the field elements by itself.
5. The robot must follow the course completely to enter the evacuation zone.
6. The robot has visited a tile when more than half the robot is within that tile when viewed from above.

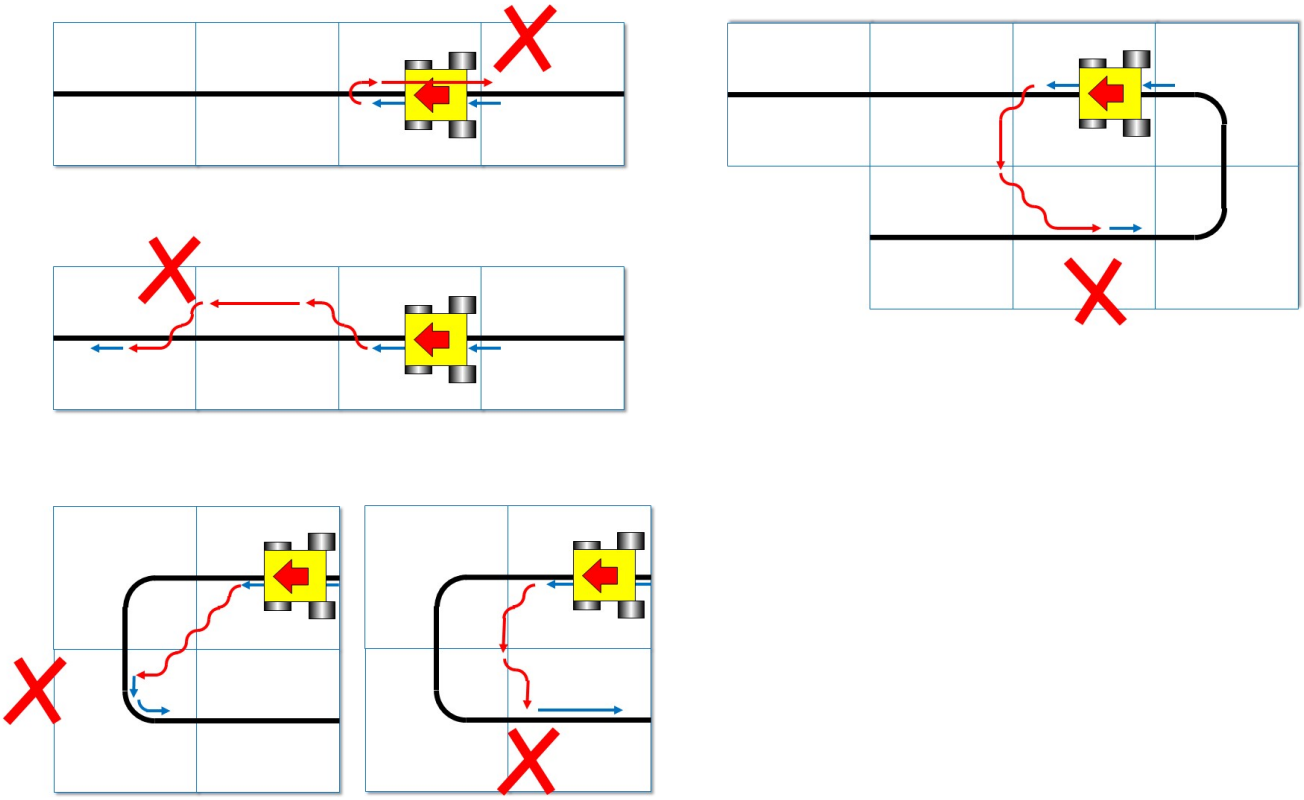
# Lack of Progress

1. A lack of progress occurs when:
    a. a team captain declares a Lack of Progress.
    b. a robot loses the black line without regaining it by the next tile in the sequence (see figures at end of the section).
    c. a robot reaches a line that is not in the intended sequence.

    | **NOTE** | "sequence" is not including diagonal sequence |
    |---|---|

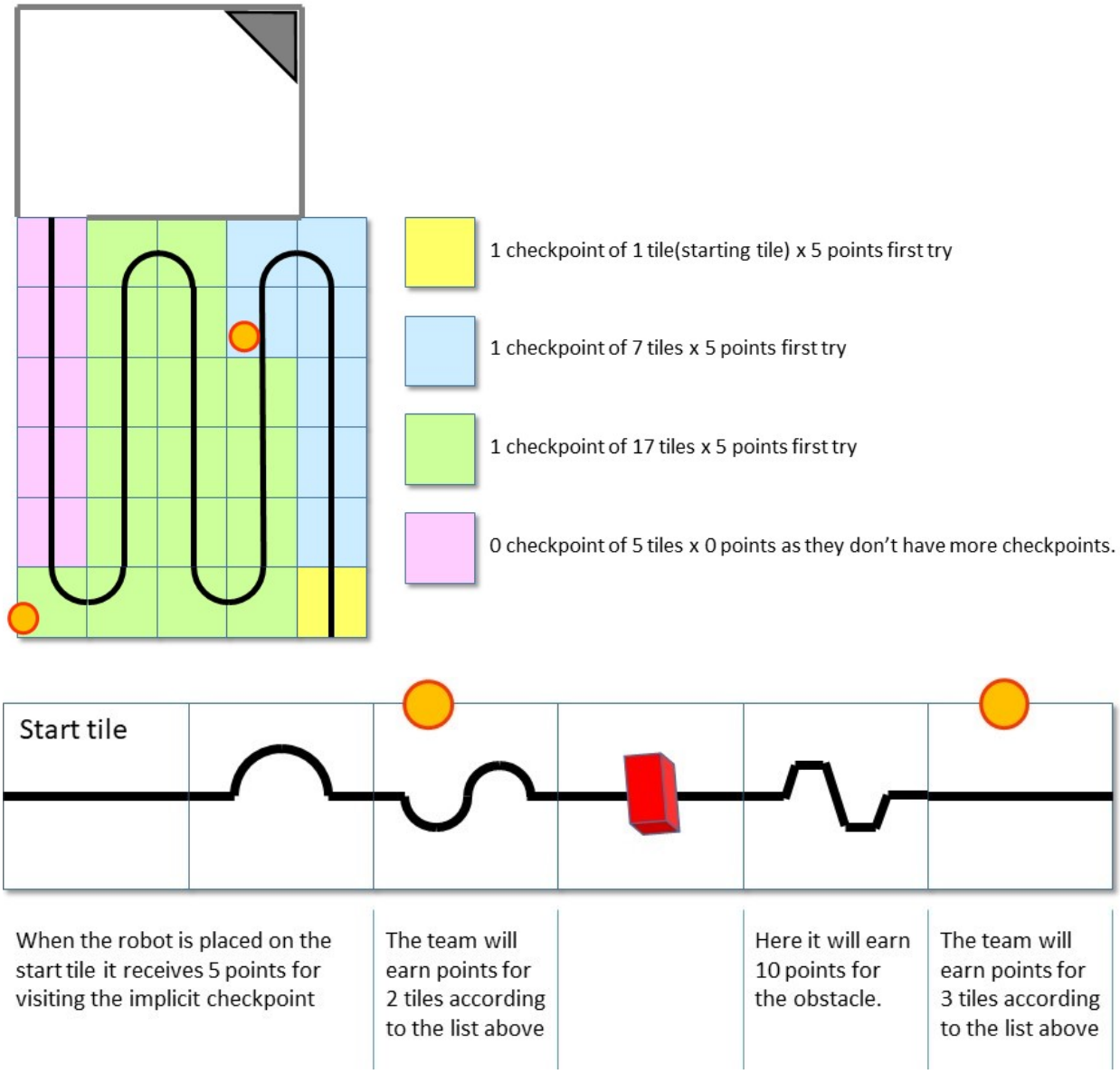
2. If a lack of progress occurs, the robot must be positioned on the previous checkpoint tile facing the path towards the evacuation zone and checked by the referee.
3. After a lack of progress, the team must reset the robot by using a switch/button(s) located in a clearly visible location by the referee (see [3.2.8]).


4. There is no limit to the number of restarts within a round.
5. After three failed attempts to reach a checkpoint, a robot is allowed to proceed to the next checkpoint.
6. The team captain may choose to make further attempts at the course to earn the additional points available from scoring elements that have not already been earned before reaching the checkpoint.
7. If a lack of progress occurs in the evacuation zone, all victims (including ones that have rolled) will remain in their current position. Victims that are held by the robot will be placed roughly on the location of the robot when the lack of progress occurred. If a lack of progress occurs as the robot exits the evacuation zone whilst carrying victims, the victims will be randomly placed in the evacuation zone.
8. Any seesaws ahead of the robots's path can be moved to the favourable direction when a lack of progress is called.



# Scoring

1. A robot is awarded points for successfully navigating each hazard (gaps in the line, speed bumps, intersections, ramps, obstacles, and seesaws). Points are awarded per hazard when the robot has reached the subsequent tile in sequence. A ramp as a hazard accounts for all of the inclined tiles that make up one ramp. Point allocations are, 10 points per gap, 15 points per obstacle, 10 points per intersection, 10 points per ramp, 5 points per speed bump, and 15 points per seesaw.
2. Failed attempts at navigating hazards in the field are defined as a Lack of Progress.
3. When a robot reaches a checkpoint tile it will earn points for each tile it has passed since the previous checkpoint. The points per tile depend on how many attempts the robot has made to reach the checkpoint:
    - 1st attempt = 5 points/tile
    - 2nd attempt = 3 points/tile
    - 3rd attempt = 1 points/tile
    - Beyond the 3rd attempt = 0 points/tile



4. Each gap, speed bump, intersection, dead end, obstacle, ramp, and seesaw can only be scored once per intended direction through the course. Points are not awarded for subsequent attempts through the course.
5. Successful victim rescue: Robots are awarded multipliers for successfully rescuing victims. A successful victim rescue occurs when the victim is moved completely into the evacuation point, and no part of the robot can be in contact with the victim. When the referee determines there has been a successful victim rescue, the victim will be removed from the evacuation point to allow more victims to be evacuated. The multipliers are allocated as such:
    a. x1.4 per successful rescue of a living victim
    b. Dead victims will result in the same multiplier as the live victim if at least one live victim has been successfully evacuated.
    c. x1.2 if only the dead victim is evacuated
6. When a lack of progress occurs inside of the evacuation zone, 0.05 will be deducted from each of the obtained multiplier (however multipliers will not be less than 1).
7. Multiplier values obtained throughout the scoring run will be directly multiplied together to the sum of all the other points gained during the scoring run.
8. The multipliers obtained from evacuations are used to increase the scores obtained from the line tracing course. The scores will be rounded to the nearest integer in each round.
9. Ties in scoring will be resolved based on the time taken by each robot (or team of robots) to complete the course (this includes calibration time).

# End of Play

1. A team may elect to stop the round early at any time. In this case, the team captain must indicate to the referee the team's desire to terminate the run. The team will be awarded all points earned up to the call for the end of the round.
2. The round ends when:
    a. the time expires;
    b. a team captain calls the end of the round; or
    c. the robot has successfully evacuated all victims.