



| Logistic Robot | Level           | Team       | Building |
|----------------|-----------------|------------|----------|
|                | Junior / Senior | 1-2 person | Pre-Made |

### Robot Specifications

1. The robot must not exceed 300 mm in length, 300 mm in width, and must weigh no more than 2 kilograms, including the battery and control equipment.
2. The robot used in the competition must move using wheels only.
3. A maximum of 6 motor/gearbox units may be used.
4. Servo motors are not allowed.
5. The robot must use TT gear motors only (yellow/blue or any color, as long as it is a TT gear motor). Gear ratio is not limited.
6. The robot must be controlled via a wired remote control (either self-built or pre-made). The remote control cable must be suspended at least 240 mm above the ground and must not touch the ground during the competition.
7. The battery used must not exceed 12 volts, and Li-Po batteries are not allowed.
8. Robots may be pre-assembled before the competition.
9. There is no restriction on the materials used to construct the robot.

### Competition Field and Equipment Specifications

1. The competition field is 2400 mm long and 1200 mm wide, elevated no more than 15 cm above the ground, and has no border walls.
2. The START and FINISH zones each measure 300 x 300 mm.
3. The sugar packaging is represented by a 3x3 Rubik's Cube measuring 60 x 60 x 60 mm and weighing no more than 80 grams.



Figure 1: A cube-shaped Rubik's cube with dimensions 60 x 60 x 60 mm.



\* These rules are not final and may be updated up until the day before the competition.

1. There are 24 Rubik's cubes in total, divided into 4 colors with 6 pieces of each color. The colors are red, blue, yellow, and pink, and they are placed at the delivery zone.
2. The delivery zone is the area where the cubes are placed, outlined with a red border.
3. The delivery area consists of a 6x4 grid, totaling 24 cells.

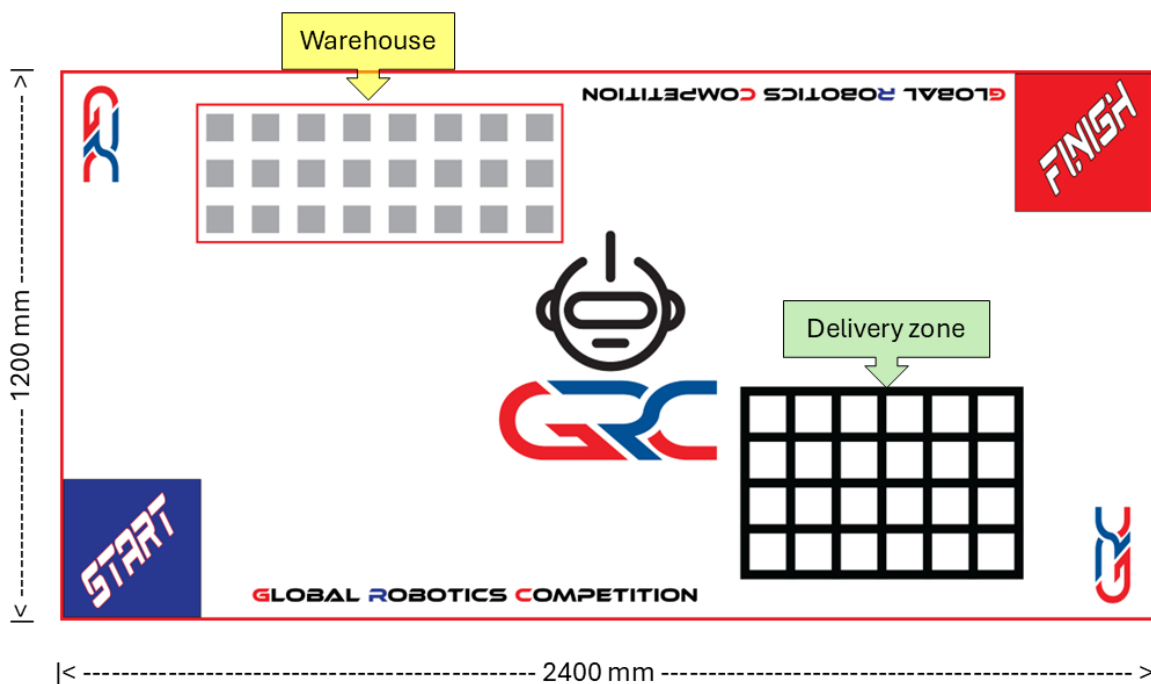


Figure 2 shows the dimensions of the competition field.

### Competition Rules

1. Before the competition begins, referees will distribute a Mission Card to each team. This card details the arrangement of the Rubik's cubes and specifies the target delivery positions. It indicates the placement of milk bottles in the delivery zone and the correct color positions in the delivery area.
2. Each match lasts 180 seconds (3 minutes). Each team has two attempts, and the best score will be used to determine the ranking.
3. The robot may carry no more than 2 Rubik's cubes at a time by gripping and lifting them. Dragging, pushing, or sweeping is not allowed.
4. The robot may lift, grip, place, drag, or push Rubik's cubes only within the red-bordered delivery zone and the delivery area. The Rubik's cube must remain within these designated areas; the robot itself may be outside as long as the cube is within the correct zone.
5. While transporting, the Rubik's cubes must not touch the ground under any circumstances. If the cube is dropped or falls and touches the ground, points will be deducted, and the robot will be forced to retire. The dropped cube will remain in place and cannot be reused.
6. Any Rubik's cube that falls or topples, whether inside or outside the delivery zone or delivery area, will not be removed by referees. These cubes are considered obstacles until the round ends.

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7. Rubik's cubes must be delivered to the exact positions specified on the Mission Card. Misplaced cubes will result in point deductions.
8. Delivered cubes must be fully within the grid square in the delivery area. Cubes touching the black lines will not be counted for points.
9. Unlimited retirements are allowed, but the number of retirements will be recorded and used for tie-breaking.
10. After each retirement, competitors must return the robot to the START position.
11. If the robot becomes damaged or malfunctions during the match, the team may request a retirement for repairs, but time will not be paused.
12. If a team decides to end their match early, only the points scored up to that point will be recorded. Time will not be recorded, and such teams will be ranked lower than teams that use the full 180 seconds.
13. If a robot breaks down and cannot resume within the time limit, only the points scored before the incident will be recorded. No time will be logged.
14. Teams may choose to move to the FINISH point at any time, at which point the score and time will be recorded.
15. Any interference with other teams is strictly prohibited. First offense results in a 20-point deduction. Second offense results in disqualification.

### Competition Procedure

1. Before the match begins, competitors place both the robot and the remote control at the START point.
2. When the referee gives the signal to start, the operator must start the timer themselves and begin the task of transporting sugar (Rubik's cubes) to the delivery area. Cubes may be moved in any order.
3. During the match, the remote control cable must not touch the field surface. If it does, the robot will be forced to retire.
4. When the task is complete or the team is satisfied with their performance, the robot must be driven into the FINISH zone, with at least 50% of its body inside. Then, the operator must place the remote down and press the stop timer button themselves. Referees will then check and record the score and time.

### Scoring Rules

1. A Rubik's cube must be placed in the correct target cell as specified in the Mission Card, and must not touch any of the black border lines.
2. Scoring is only calculated at the end of each match round.



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| Mission   | Score |
|---|-------|
| Correct Delivery (per item)                       | 10    |
| Misplaced Delivery                                | -5    |
| Rubik's cube touching the ground during transport | -10   |

### Judging

1. The final ranking will be based on the best round of each team, prioritized as follows:  
**Score achieved > Completion of the mission (reaching the FINISH point) > Time taken to complete the mission > Number of retirements.**
2. If teams have the same score, the results from **Round 1** will be used as a tiebreaker. The team with the better performance in Round 1 will be ranked higher. If there is still a tie, a **Sudden Death Match** will be held between the tied teams.
3. For any situations not covered by these rules, the **judges' decision will be final and binding.**

