

IDE SERIES

2020 SINGAPORE

IDE ROBOTICS 2020

(Secondary Schools)
Competition Manual

Event Organiser:



Official Hardware Sponsor:



Education Partner:



PREFACE

Global warming has resulted in a rapid rise in temperature due to industrialization. Humans have been starting to see the effects of global warming - melting ice caps, shrinking ice sheets, glacial retreat, rising sea levels, random heat waves, climate change including intense rainfall and drought at different locations.

Deep in the Safarawan desert, the village of Doki-doki has been facing severe water shortages. The Oasis which once kept them well-supplied with water has been drying up, amid the new erratic weather patterns. A group of young robotics engineers from the Well Diggers movement decided to help save the dying village. They brought the case to the local authorities for permission to survey the desert land for groundwater so that they can start digging wells.

After weeks of groundwater survey, the young robotics engineers found an excellent spot for well-digging just 1km away from the small village. However, the terrain proved too dangerous for construction workers to transport building materials (donut-shaped blocks). The robotics engineers decided to build a robot to transport the building materials to the well construction site.

As the robot moves through the path marked by the black line, it will automatically clear the path and make it safe for humans to travel. After clearing a path, the robot will map the path and needs to deliver the map to the village elders (yellow/blue/green cubes). After doing so, the robot needs to bring the village elders back into their houses (yellow/blue/green boxes on the map).

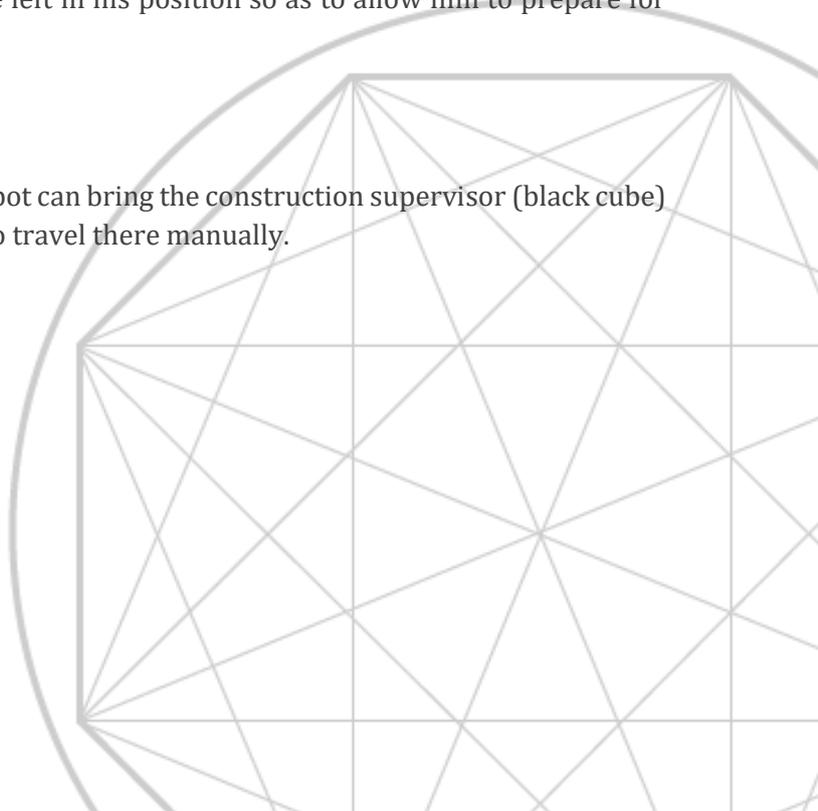
Note: the battery of the robot is unable to last long enough to finish all the tasks. Hence, halfway through the mission, the robot must enter the recharging area (red zone) to recharge its battery.

(ONLY FOR SECONDARY SCHOOL)

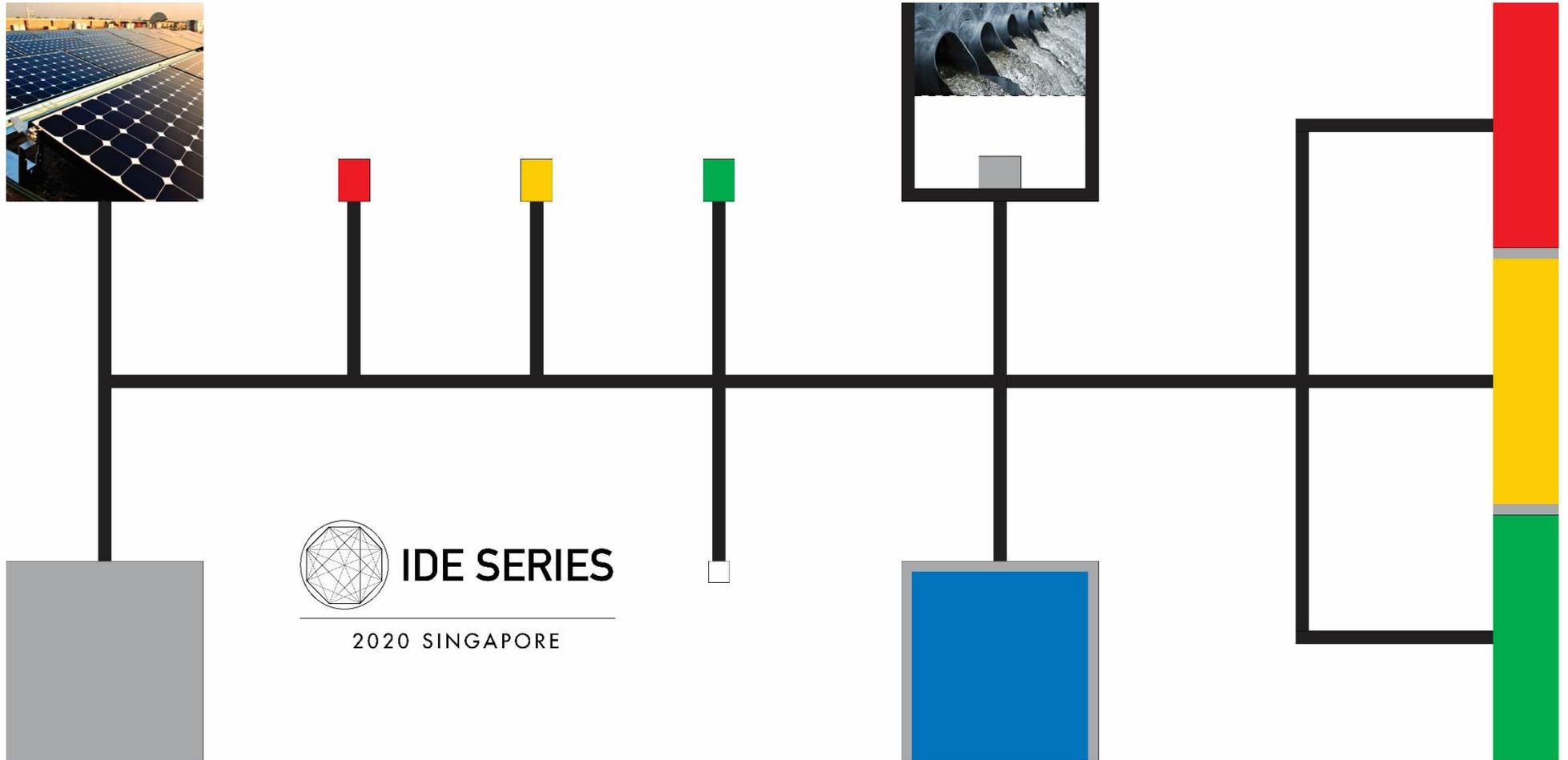
To further improve the situation, the robotics engineers have secured funding to employ some of the villagers as construction workers of the new well. One of the village elders has volunteered to be the construction supervisor (black cube). This village elder/construction supervisor (black cube) should not be brought back into his house and should be left in his position so as to allow him to prepare for the construction work.

BONUS

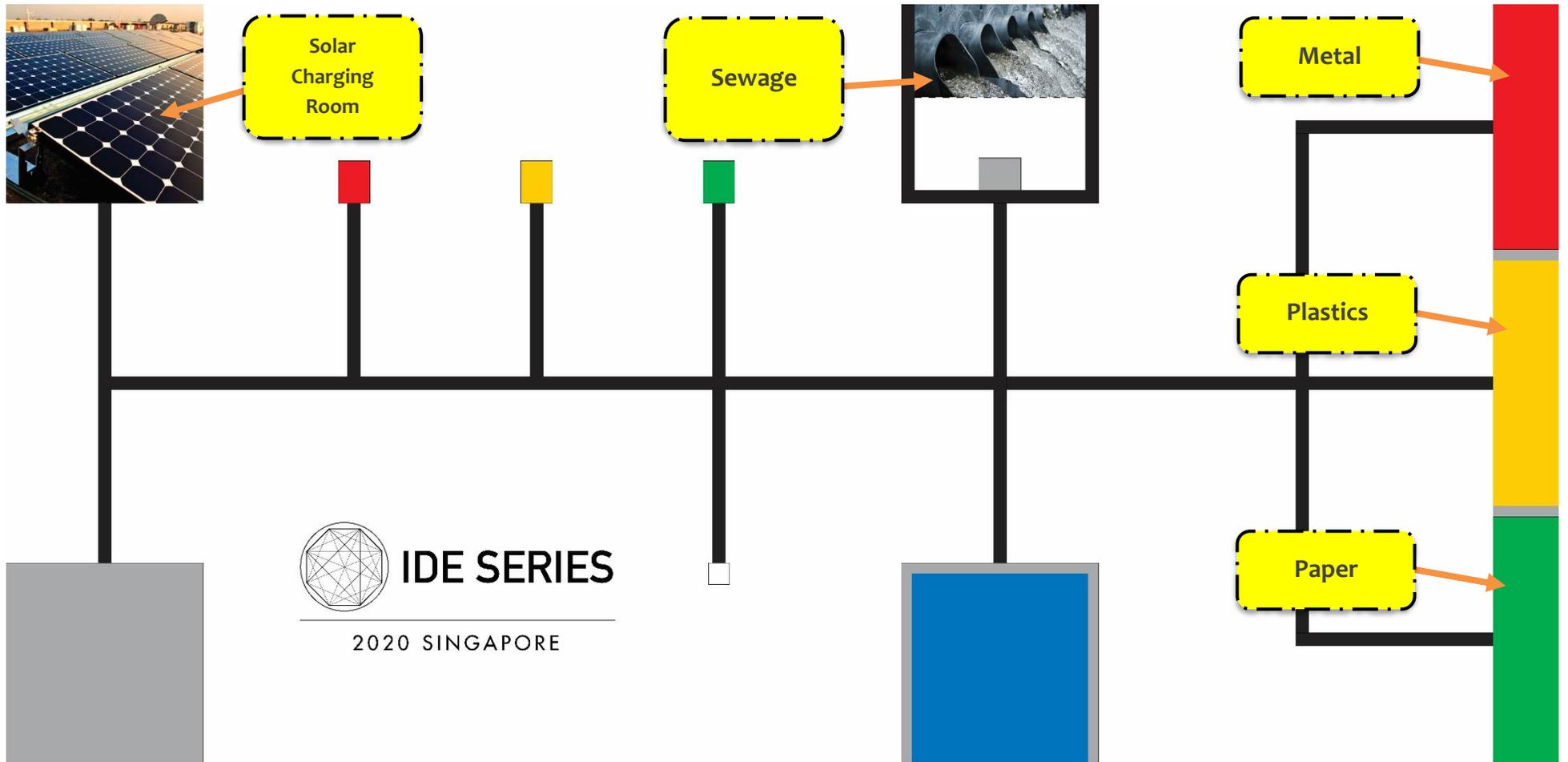
For bonus points, to speed up construction, the robot can bring the construction supervisor (black cube) to the construction site so that he does not have to travel there manually.



IDE ROBOTICS 2020 PLAYFIELD

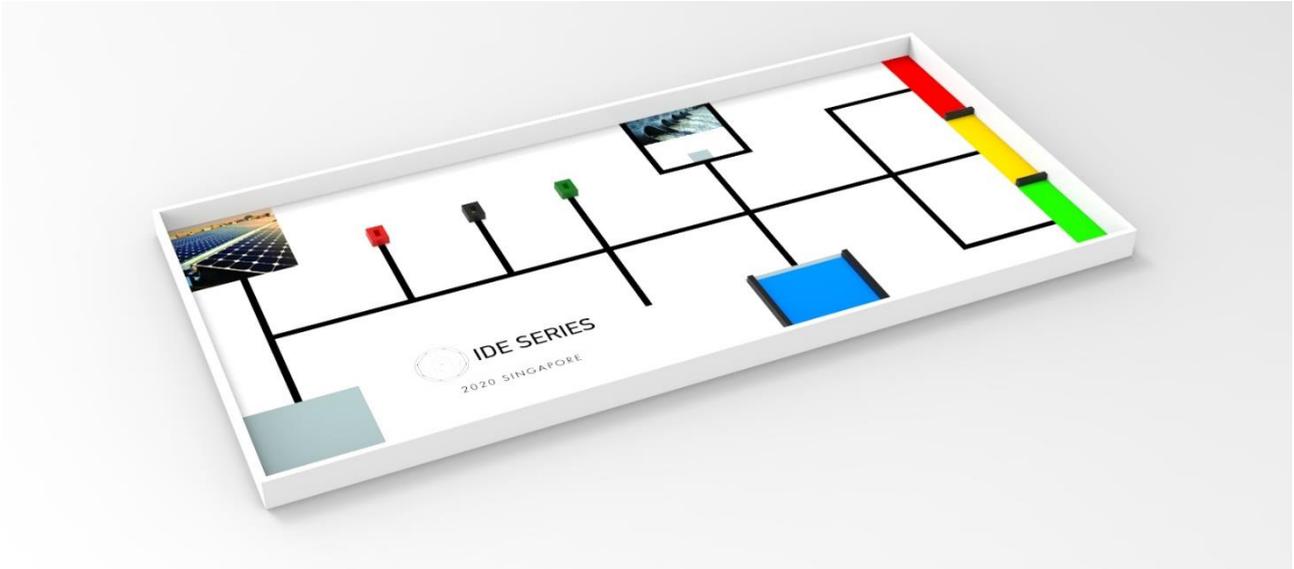


IDE ROBOTICS 2020 PLAYFIELD (ANNOTATED)



GAME PLAY

Scoring Elements



For Secondary category, coloured LEGO bricks (Red, Yellow, Green and Black) will be used. The position where the black brick is placed will be random. Each coloured brick is 2 bricks high, measuring 8 studs in length and 6 studs in width. The solar charging room and start/end grey zone are **30cm by 30cm**.

Secondary School Category

Total time allowed for each run is 2 minutes. The mission will only begin when the robot is **completely** within the start zone. The robot operator can handle the robot at the start zone only and nowhere else. A change in program and attachments is **NOT allowed** during the mission run. **The robot or any scoring elements is considered to be in the zone when it is entirely inside the demarcated zones.**

Objectives

1. Bring recyclable materials to their respective factories

Coloured Bricks (Green, yellow and/or red bricks, except black) are to be transported into their respective coloured zones. Black brick will be placed randomly in one of the 3 coloured zones, and not to be touched.

2. Proceed to Solar Charging Room

The robot should make its way to the solar charging room anytime during the run and stay there for at least 3 seconds.

3. Return to base

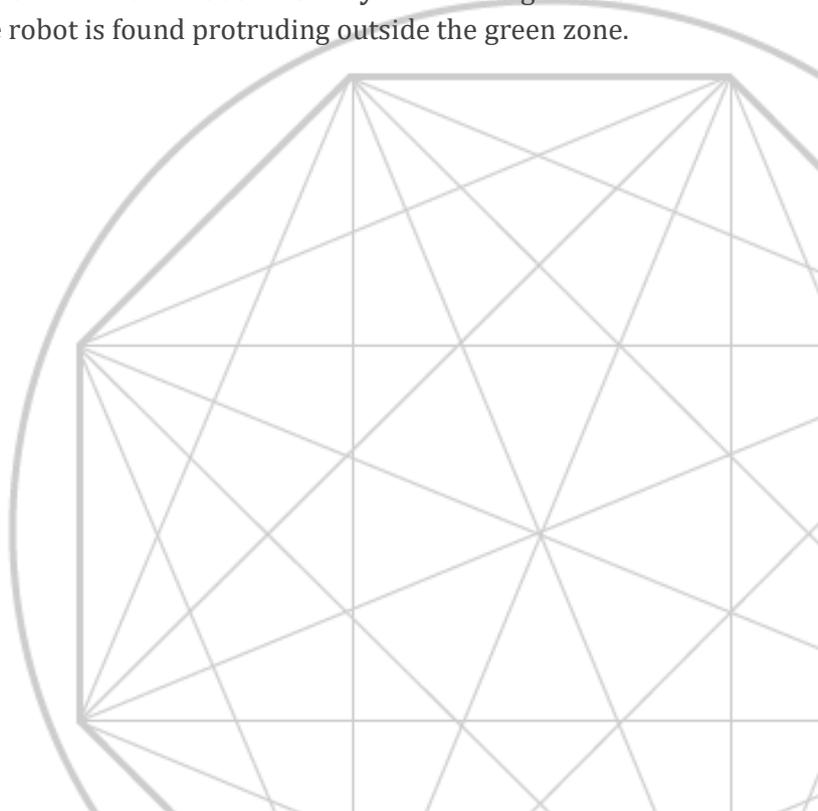
Upon completion of the tasks, the robot should make its way home back to grey zone.

SCORING (SECONDARY CATEGORY)

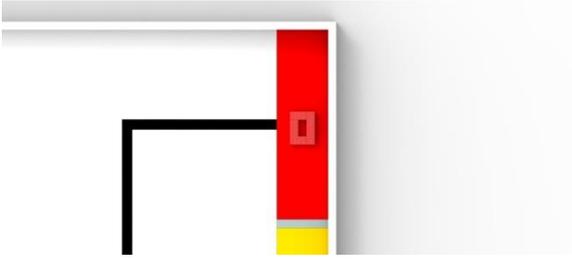
Objectives	Score	Max Score
Green/Yellow/Red bricks fully in respective coloured zones [1]	30 per Cube	60
Green/Yellow/Red bricks partially in respective coloured zones [1]	20 per Cube	
Green/Yellow/Red bricks partially/fully in different coloured zones [1]	10 per Cube	
Black brick shifted from original position [1]	-20 per Cube	
BONUS: All Walls untouched and at least 1 coloured brick fully/partially in coloured zone	10	10
Wall shifted out from original position	-5 per Wall	
Robot fully in solar charging room for at least 3 seconds [2]	20	20
Robot partially in solar charging room for 3 seconds or less [2]	10	
Robot ends mission fully in grey zone [3]	20	20
Maximum possible score:		110

Notes:

- Points will be awarded when a brick is partially/fully within the respective/different coloured zones.
- No points will be awarded for damaged bricks/elements.
- No alterations are to be made to the robot after inspection.
- No restarts allowed.
- Timer begins once the referee signals mission start.
- Points for **return to green zone** will only be awarded if robot fits **fully** within the green zone. No partial score awarded if any part of the robot is found protruding outside the green zone.

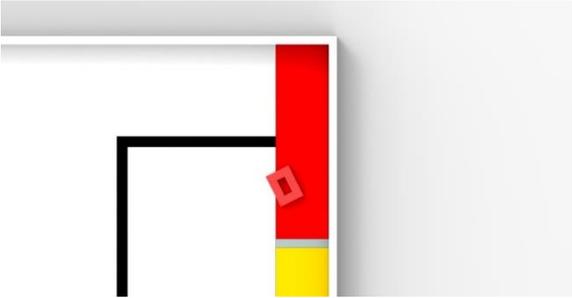


SCORING (CLARIFICATION)



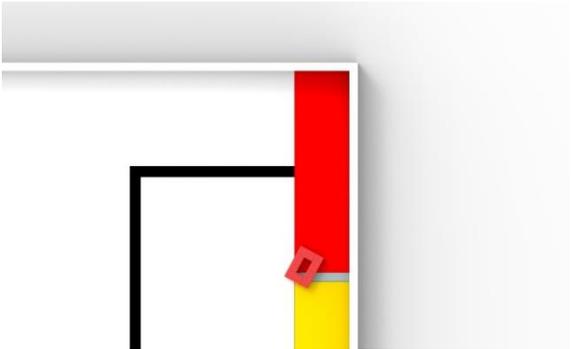
Coloured brick is entirely in respective coloured zone.

30 points awarded.



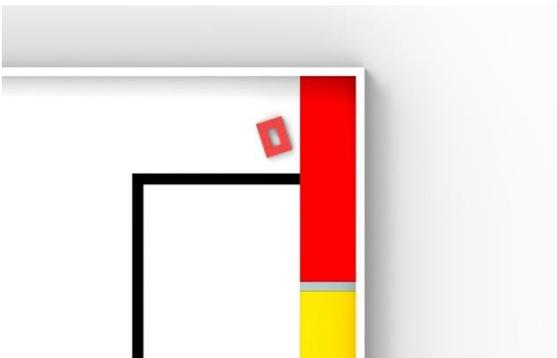
Coloured brick is partially in respective coloured zone.

20 points is awarded.



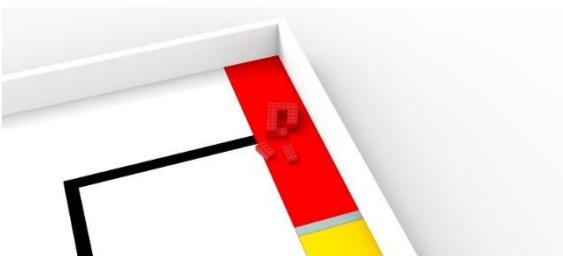
Coloured brick is entirely out.

0 points awarded.

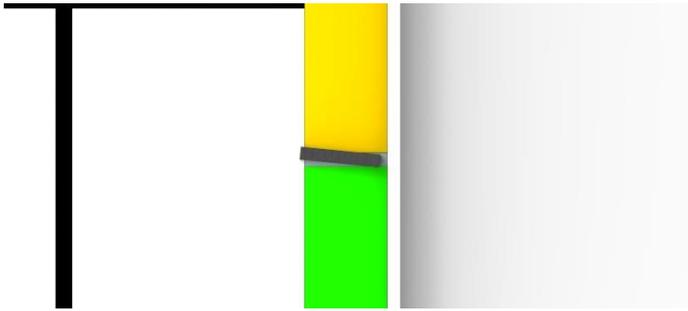


Coloured brick is damaged.

0 points awarded.

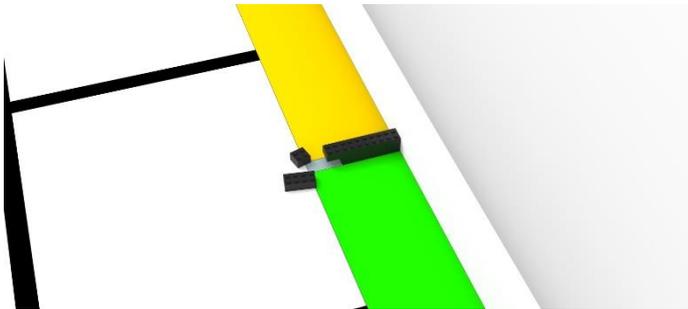


SCORING (CLARIFICATION)



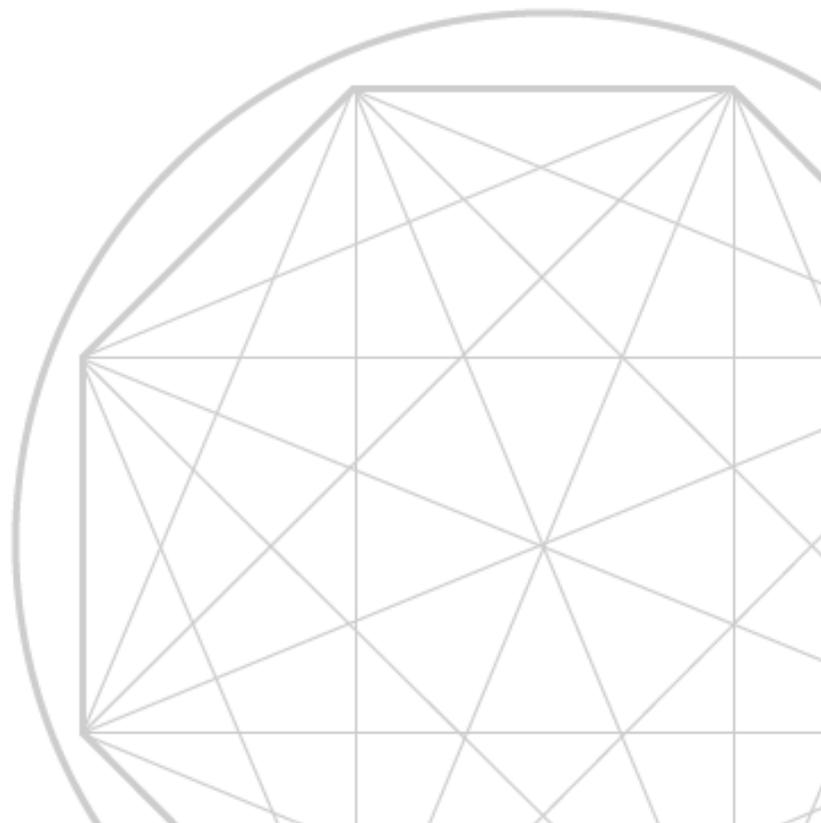
Brick wall is shifted from its original position.

Penalty of 5 points for each brick wall.



Brick wall is damaged.

Penalty of 5 points for each brick wall.



COMPETITION RULES

General:

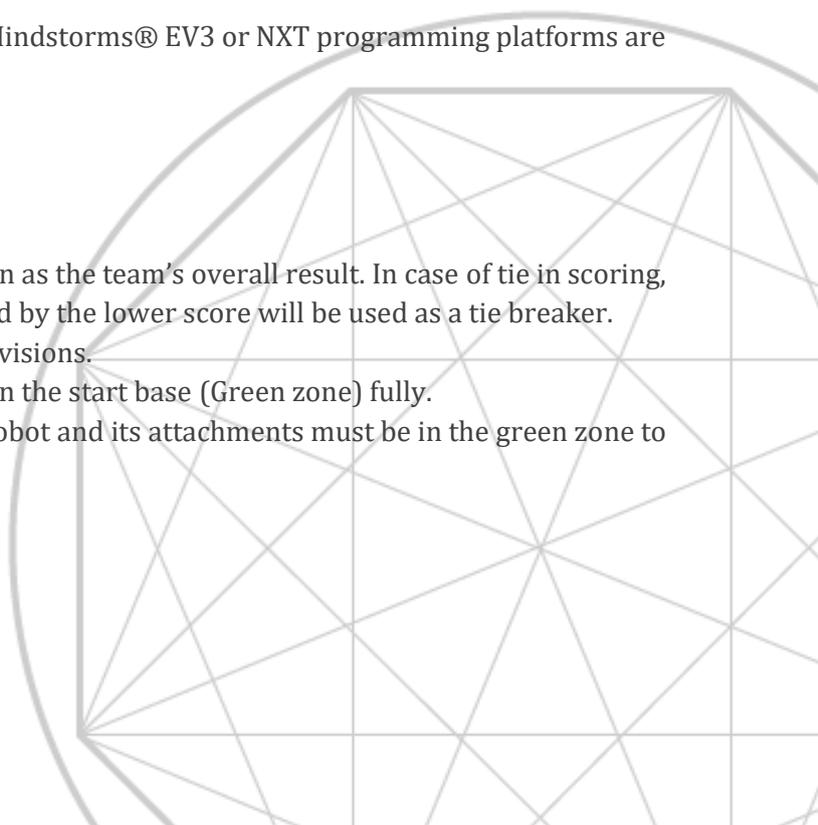
1. During the competition, all teams must look after their own personal property, team construction and materials. Any member(s) of the competition who are caught in the act of sabotage, theft or mischief, whether to cause harm to other participating teams or not, will be dealt with by the competition organisers and may subject their team to disqualification.
2. No external help is to be rendered in this competition. This includes receiving direction, contribution, construction of any kind from any party or person not belonging to the team or Mentor. Failure to comply with this rule will be dealt seriously and may result in disqualification.
3. Teams should prepare and bring all the equipment, software and portable computers they need during the tournament.
4. There will be trial fields set up for practice prior to the competition. Students are advised to queue up in an orderly manner and to refrain from hogging the fields as a standard practice of professionalism.
5. All decisions by the competition officials and organising parties are final.

Parts and Size Restrictions

1. Teams are expected to bring their own LEGO® EV3, NXT or RCX sets, batteries and laptops.
2. The robots must use parts solely from LEGO® Sets. Teams are allowed to use only one controller (EV3, NXT or RCX). However, the number of motors and sensors is not restricted. The number of parts is not limited as long as they are LEGO® parts.
3. Mixing of parts from all 3 platforms (RCX / NXT / EV3) is allowed.
4. Before each run, an inspector will check the robots for any non-LEGO® accessories. Team may face possible disqualification or point deduction if the parts cannot be removed.
5. The size of the robot and its extension as a whole will be strictly limited to **25cm x 25cm x 25cm**. If any robot with its extension attached is found to exceed this dimension, the exceeded part of the robot must be removed.
6. No form of remote control or wireless programming is allowed during the course of the run of the robot.
7. Only NI Labview, Robolab™ and LEGO® Mindstorms® EV3 or NXT programming platforms are accepted.

Game Play Rules

1. Each team will get 2 competition runs.
2. The higher score of the 2 runs will be taken as the team's overall result. In case of tie in scoring, the run time of the best run score, followed by the lower score will be used as a tie breaker.
3. Strictly no restarts are allowed for both divisions.
4. The robot and its attachments must start in the start base (Green zone) fully.
5. When a robot returns to base, the entire robot and its attachments must be in the green zone to be considered "in base".



Operational Rules

1. Once the competition preparation time is over, no further work or modifications may be done to the robot.
2. Failure to quarantine the robot by the stated time will result in disqualification.
3. During each run, only a maximum of two members of each team will be allowed in the designated playfield area as designated robot operators.
4. During a run, only the designated robot operators may operate the robot.
5. A re-run may be held if the robot cannot complete the course due to an outside interference, such as a referee accidentally obstructing the path of the robot, or collision with a robot from a neighbouring playing field. A re-run may also be held if a malfunction of the playing field occurs.
6. To request a re-run, the designated robot operator must notify the referee before leaving the playing area. **Battery failure will not be a valid reason for rematch.** Durability of a team's robot will not be a valid reason for a rematch. Teams will be entirely responsible for ensuring that the robot is in full working order before the run.
7. Robot must be activated manually via NXT/EV3 screen options. No form of wireless programming or operation is allowed during the 2 competition runs.
8. The Referee will start the time as the robot is exiting the green zone, and will automatically stop the time when robot is entirely within the green zone. At any time during the mission, robot operator(s) may signal the Referee to stop the time with an upraised hand combined with the verbal signal "Stop". The timer will be stopped and points will be counted up to the moment where the signal to stop was clearly given.

Violations

1. The Referee(s) have the ultimate authority during the competition. Their decisions are final. Referees will not review recorded replays after a match is completed.
2. If a referee disqualifies a team, the robot is turned off for the remainder of the match and will not score any points for the match.
3. A team may not win a match through an advantage gained by breaking a rule, even accidentally.
4. If one team intentionally damages another team's robot they will be disqualified. If the damaged team's robot is considered poorly built due to a decision flaw, the other team may not be disqualified. The ultimate decision lies with the Chief Referee.
5. Deliberately damaging the playing field, robot, or altering the LEGO® pieces is strictly illegal and will result an immediate disqualification.
6. Team members, except for the operator(s), are not allowed in the designated playing area until the referees have completed the scoring procedures.
7. Team members must not interfere or assist the robot in any way during its run. No wireless robot communication is allowed during the 2 competition runs. Teams found in violation will be immediately disqualified.