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# SAM Labs Environmental Protector Mission Primary Category Game Description, Rules and Scoring

Updated: 04/10/2024





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*Mission field*

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### A. Brief

A1. When trash is thrown out of your hands, where does it end up? The United Nations estimated in 1991 that up to 80% of marine garbage comes from land, and 40% of the garbage is recyclable resources. In order to protect our earth and oceans, robots need to sort the garbage so that the resources can be recycled and reduce pollution!

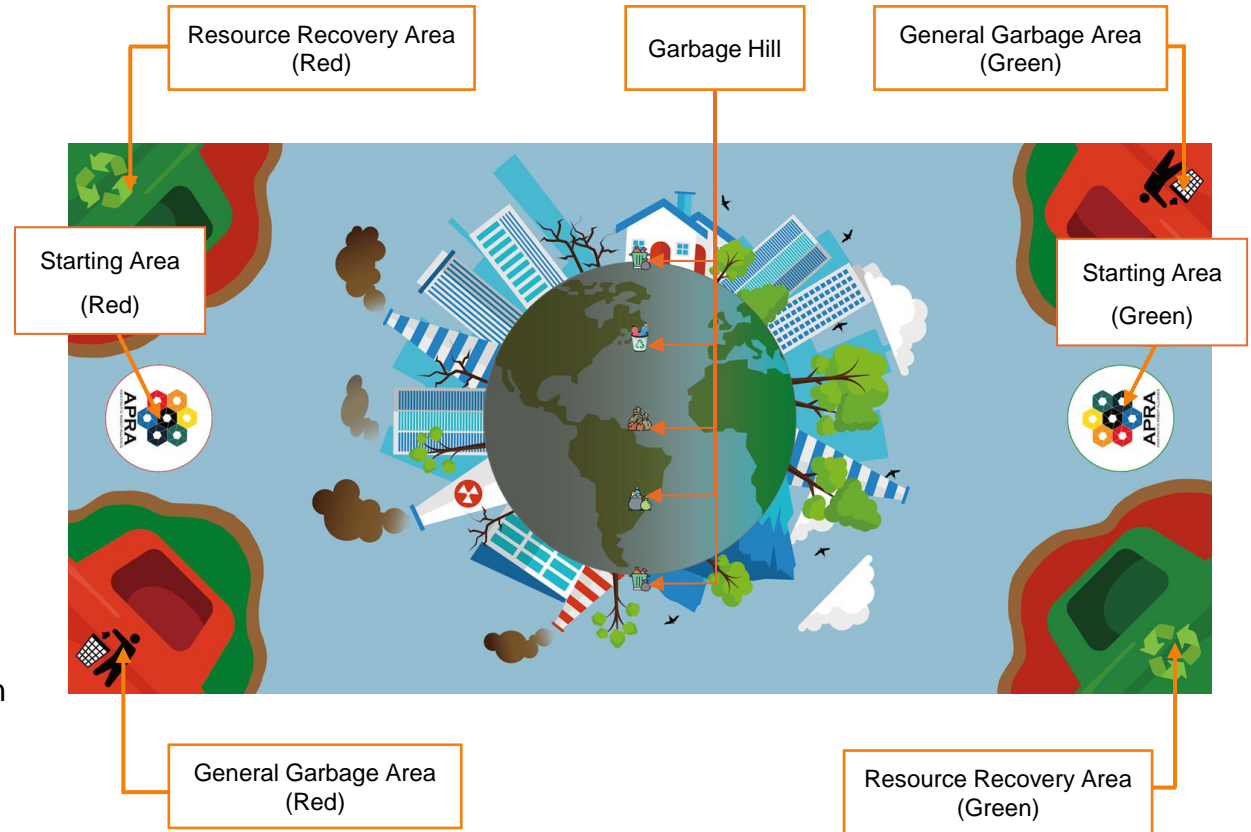
A2. The participating teams consist of one to three members, and each team will use one SAM Labs robot to compete against another team's robot. The team with the higher score within the time limit is the winner.

A3. The quota for each school or organization will be determined according to the actual number of participating teams.

A4. Participating age: Participants must be 6 - 10 years old (birth date in 2024 season is 2014 - 2018).



## B. Field Setup And Specifications



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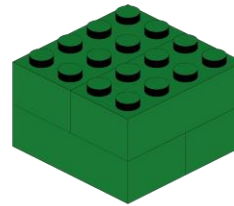


## B. Field Setup And Specifications

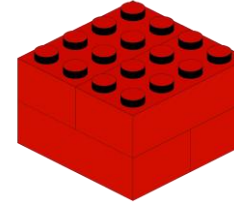
B1. There will be a total of 12 pieces of 'burnable garbage' and 8 pieces of 'recycling garbage' on the field.

B2. A garbage hill consisting of 4 pieces of garbage standing upright will be placed on the garbage hill diagram of the field.

B3. Each garbage hill consists of a random amount of burnable garbage and recycling garbage.



Recycling Garbage  
x 8



Burnable Garbage  
x 12



Garbage Hill

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## C. Game Description

C1. Each round lasts **60** seconds.

C2. The vertical projection of the robot must be **completely** within the starting area before the game starts.

C3. During the game time, robots can move freely on the field. (Except the starting area, resource recovery area and the general garbage area in the opponent's field.)

C4. After the competition begins, participants are not allowed to touch the robot until the end of the round.

C5. On the day of the competition, all teams will first compete in the group stage, and the winning team will advance to the knockout stage.

C6. Each team will compete with different teams for several rounds in the group stage. The team will get 3 points for winning while 0 points for losing the round. If there is a draw, both teams will get 1 point for the round.

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C7. The team with the higher score from each group in the group stage will advance to the knockout stage until the championship, 1<sup>st</sup> runner-up, 2<sup>nd</sup> runner-up and 3<sup>rd</sup> runner-up are decided. (The number of qualifying teams will be announced by APRA.)

C8. In the event of the same score that affects promotion, there will be a play-off. The winner will be promoted. (The scoring method remains the same, but it will be completed in the absence of opponents and within 30 seconds.)



## D. Scoring

D1. After the game time is over, 20 points each for recycling garbage that has **completely entered** the resource recovery area .

D2. After the game time is over, 10 points each for burnable garbage that has **completely entered** the general garbage area .

D3. After the game time is over, if the robot has **partially entered** its own starting area, 10 points will be scored.

D4. After the game time is over, if garbage has completely entered the wrong area, 10 points will be deducted for each garbage.

D5. If the participant touches the robot during the game time, 10 points will be deducted each time.

D6. If the robot fails to move for any reason during the game time, the referee will hand over the robot to the participant, but 10 points will be deducted each time.

D7. If the robot has **partially entered** the starting area, resource recovery area and the general garbage area in the opponent's field at any time, 100 points will be deducted.

D8. The maximum deduction is 0 point, and there will be no negative points.

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## D. Scoring

D9. The referee will only calculate the score based on the position of each garbage at the end of the round.

D10. During the game, if the garbage goes to the wrong area, the robot can move the garbage back to the correct position.

D11. The definition of completely entered refers to the vertical projections of both the object and the area that are **completely** overlapped.

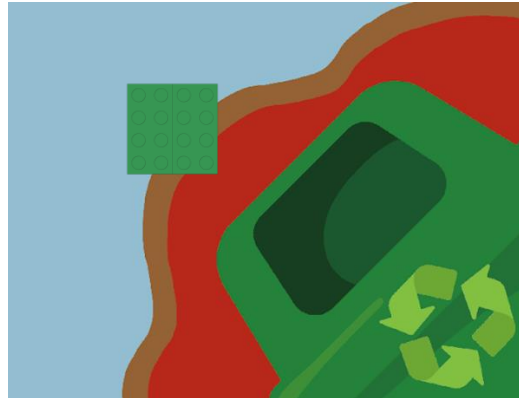
D12. The definition of partially entered refers to the vertical projections of both the object and the area that are **partially** overlapped.

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## D. Scoring



Recycling garbage has **partially entered** the resource recovery area = **0** point

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Recycling garbage has **completely entered** the resource recovery area = **20** points





## D. Scoring



Burnable garbage has **partially entered** the general garbage area = **0** point



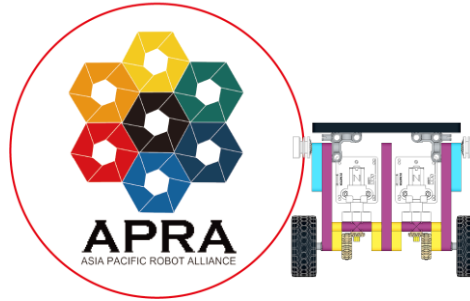
Burnable garbage has **completely entered** the general garbage area = **10** points

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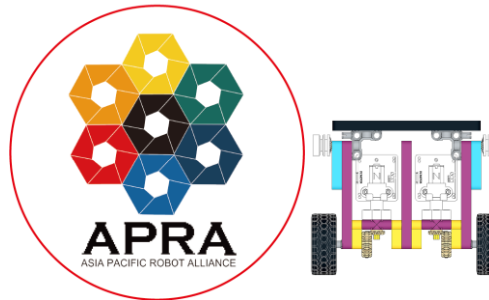
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## D. Scoring



After the game time is over, robot has **partially entered** its own starting area = **10** points



After the game time is over, robot has **not partially entered** its own starting area = **0** point

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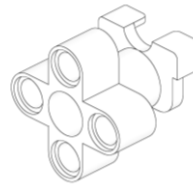
## E. Game Rules

E1. The electronic components (including motors and sensors) used to build the robot must be from SAM Labs products. The number of sensors is not limited but **two** motors ( DC MOTOR ) must be used for the robot.

E2. The maximum extension size of the robot (including the attached accessories) cannot exceed a circle with a diameter of 220 mm, and the height cannot exceed 220 mm.

E3. The robot can be designed freely but the parts for building the robot must be strictly LEGO® parts.

E4. Only APRA officially specified 3D motor connection components can be used.



Motor Component A



Motor Component B

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E5. Building materials such as glue, tape, screws, etc. must not be used.

E6. The control program must be official SAM Labs software (SAM Studio or SAM Space).

E7. Participants must bring their own computer or tablet for the tournament.



## F. Other Rules

### Responsibility of the parties

F1. In the tournament, the referee has the final decision.

F2. Any objections to the decision of the referee will be warned. If participants continue to argue, the team will be immediately disqualified from the tournament.

F3. After the game, participants in each team need to sign the score sheet for confirmation.

F4. When confirming the score sheet, a protest can only be lodged if the score is incorrect or if there is a problem with the result of the game. Once the score sheet has been signed, no protest may be made by either party.

F5. The referee may interpret the rules.

F6. In special circumstances, such as unforeseen problems or the ability of robots that everyone agrees in the tournament, the rules can only be changed with the consent of the chief referee.

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## F. Other Rules

### Robot maintenance

F7. If the referee finds a robot that does not comply with the rules during the inspection time, the team must modify the offending parts within 1 minute. If teams do not meet the requirement within the time limit, they will not be allowed to participate in the existing round.

F8. The preparation time before the game is 1 minute. Up to two players can enter the game area, and the team can adjust the robot.

F9. After the start of each game, if any part of the robot accidentally flies off, it is no longer part of the robot, and the referee can remove it and give it to the competitor.

F10. After the start of each game, all components of the robot shall not be re-assembled or modified, batteries shall not be replaced, nor shall the game be requested to be suspended.

F11. Only one robot (one microcontroller) may be used per match. It is illegal to use multiple robots in a single round of game. Teams can use different robots in the next match of game. However, it is strictly prohibited to exchange robots or parts between different teams. Once the violation is found, the relevant team will be disqualified.

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## F. Other Rules

### Fair Play

F12. Except for the participants and staff, no one is allowed in the game area.

F13. No one other than the participants is allowed to modify the robot or the program.

F14. Participants are not to be prompted or assisted in any way during the tournament.

F15. If the above situations are found during the game, the team may be disqualified from the tournament.

F16. When the team registers for the tournament, it is also necessary to clearly read the relevant registration terms and competition rules.

F17. When the content of different files conflicts, the order of precedence of the rules is:

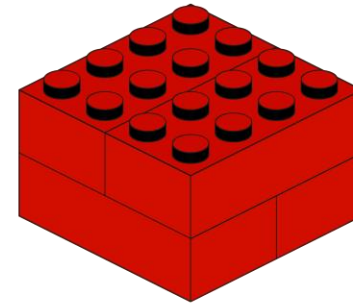
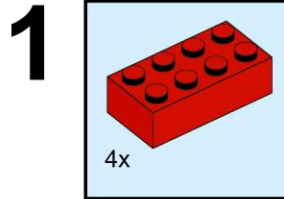
Final Decision of Organizer > Rules Update > SAM Labs Environmental Protector Mission.

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## G. Assembly Of Game Objects

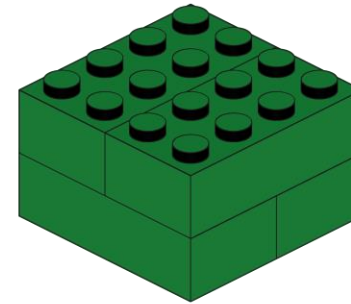
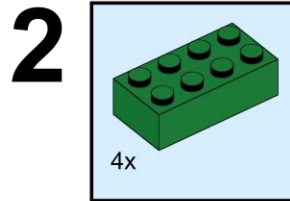


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## G. Assembly Of Game Objects



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