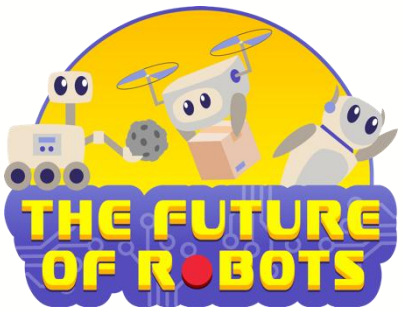
NROC

NATIONAL ROBOTICS OPEN COMPETITION

RoboMission

Junior

Primary School
Game Rules
Season 2025



The Future of Robots
Space Helpers

MINISTRY OF EDUCATION

SASBADI

Table of Contents

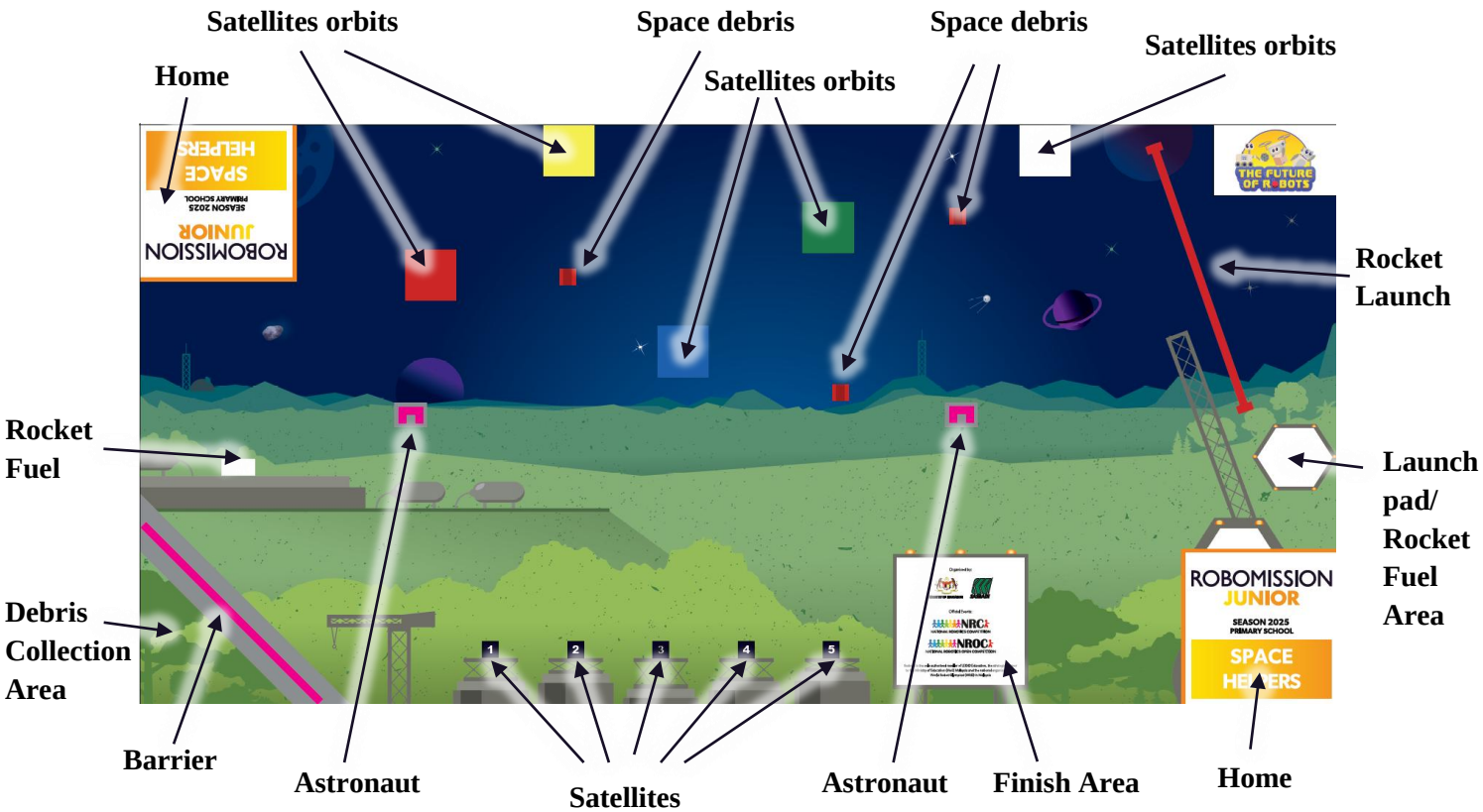
1. Introduction

Satellites are really important for things we use every day, like talking to people far away, predicting the weather, and using GPS. AI, or artificial intelligence, helps satellites work better by quickly analyzing lots of data and making accurate predictions. But there's a big problem: space debris. This is made up of old, broken pieces of satellites and rockets that can crash into working satellites and cause damage. To fix this, scientists are using robots with AI to find and clean up the space junk. AI also helps plan safe paths for new satellites to avoid collisions. This keeps space safe so our satellites can keep doing their important jobs.

Can your robot help bringing satellites into space and clean up some space debris?

2. Game Field

The following graphic shows the game field with the different areas.



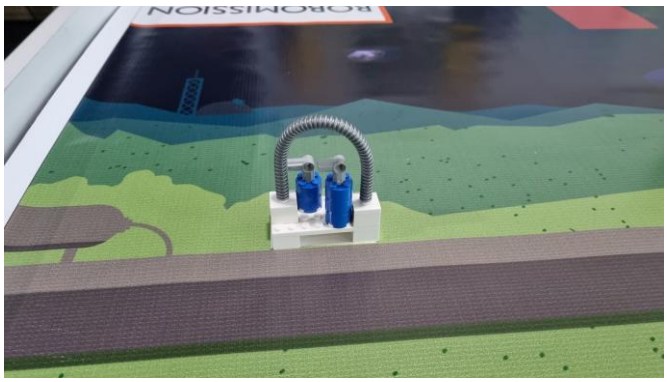
If the table is larger than the game mat, place the mat against the wall with the two sides closer to the start area (in the picture: left and bottom side).

3. Game Objects, Positioning

Rocket fuel

There is **1 rocket fuel** on the field. The position on the game field is above the start area and always stays the same.

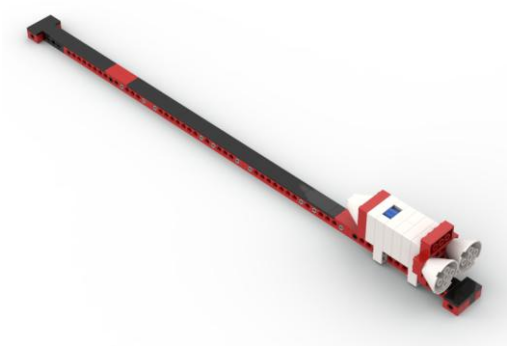
Rocket fuel



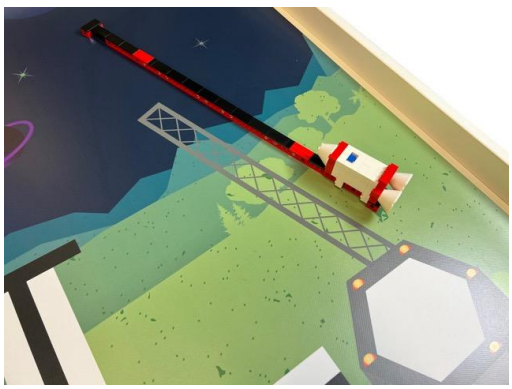
Position on the field

Rocket

There is **1 rocket** on the field. The position on the game field is in the top right area and stays the same. The rail is fixed on playing field with double-sided adhesive tape.



Rocket



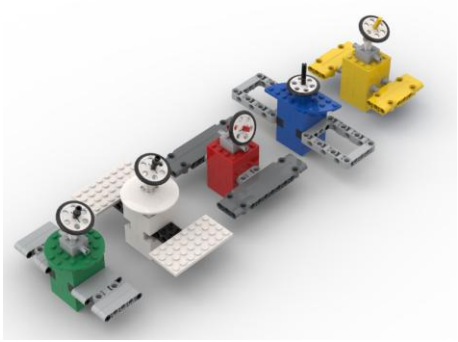
Start position of the rocket is always at the bottom.

Recommended positions of double-sided adhesive tape (or other suitable method).

Satellites in 5 different colours

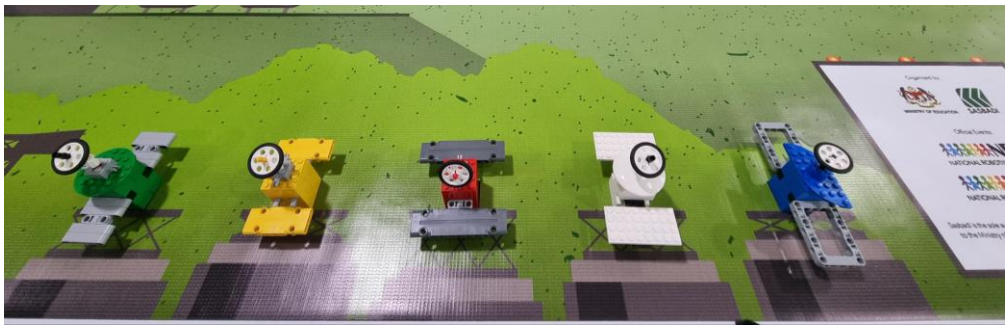
There are **5 satellites (in different colours)** in total:

- 5 satellites are placed on the positions 1 – 5.



5 satellites (in different colours)

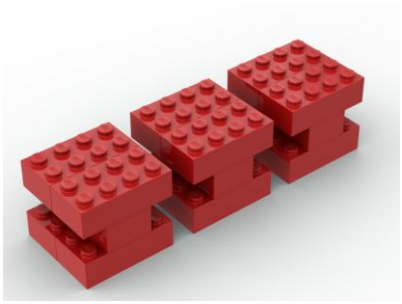
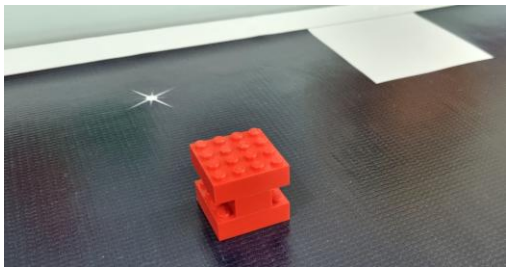
The antannes of the satellites always point in the direction of the wall. The pictures below show the orientation of all satellites.



fixed position for the satellites

Space debris

There are **3 pieces of space debris** on the field. They are always placed on the same positions on the game field. The orientation is shown in the last picture. The marking on the field shows the orientation.

<table>
<tr>
<td> 
3 space debris</td>
<td> 
Position top right</td>
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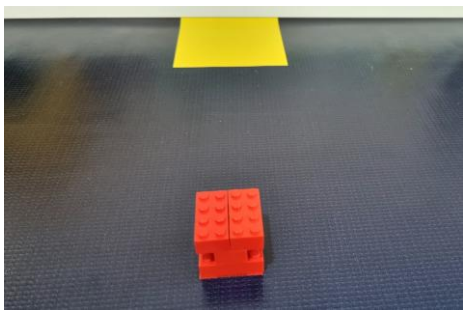
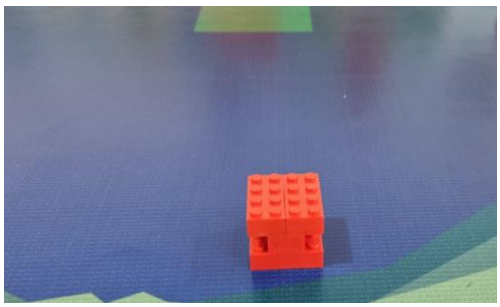
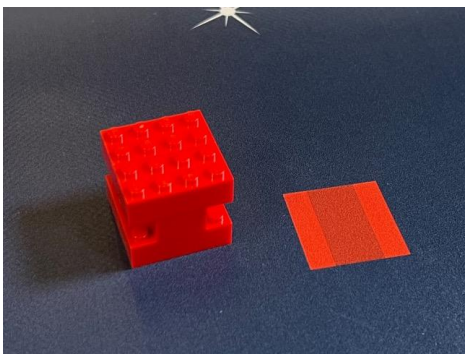
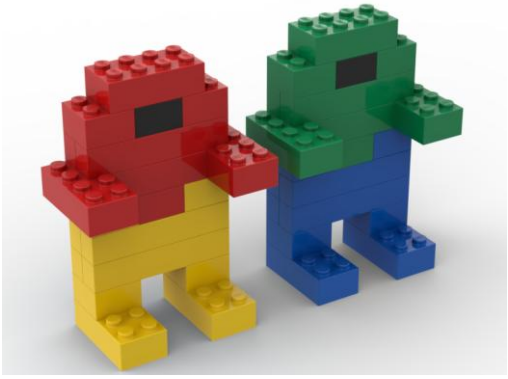
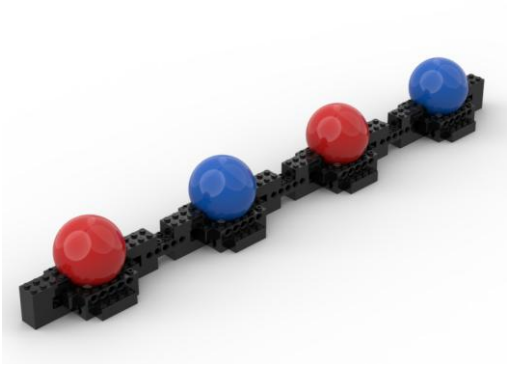
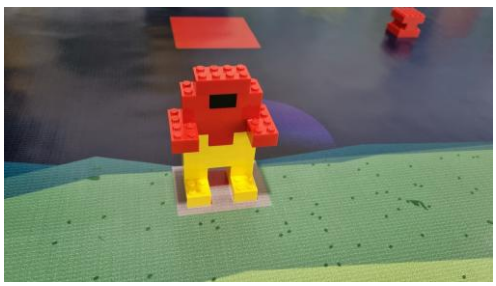
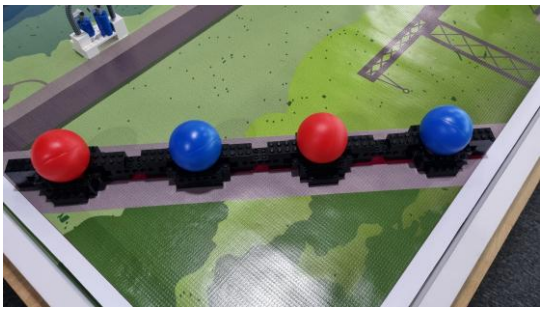
<tr>
<td> 
Position middle left</td>
<td> 
Position middle right</td>
</tr>
<tr>
<td> 
Orientation</td>
<td></td>
</tr>
</table>

Barrier and astronauts

There are **2 astronauts and 1 barrier** on the field.
They are always placed on the same positions on the game field and are not allowed to be moved or damaged.

<table>
<tr>
<td> 
2 astronauts</td>
<td> 
Barrier</td>
</tr>
<tr>
<td> 
Position of astronaut on the left</td>
<td> 
Position of astronaut on the right</td>
</tr>
<tr>
<td> 
Position of barrier</td>
<td></td>
</tr>
</table>

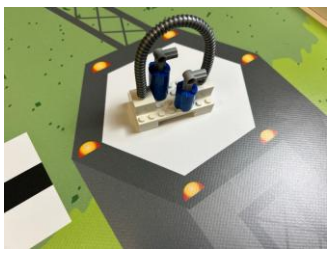
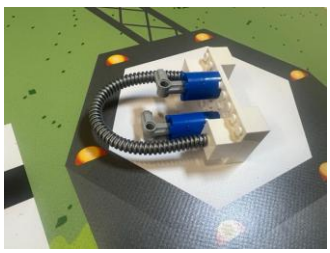
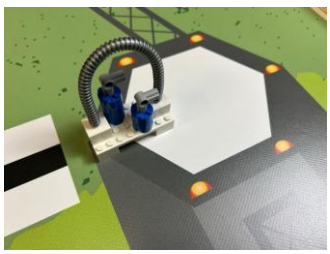
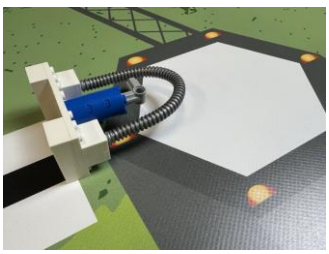
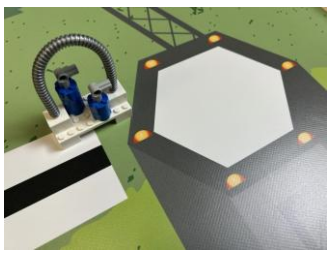
Robot Missions

3.1 Fuel the rocket

A piece of rocket fuel is stored on the field above the starting area. This rocket fuel needs to be transported to the launch pad below the rocket in the bottom right corner of the game field.

- Definition “completely in”: Completely means that the game object is touching the corresponding area only.

	Each	Max.
Fuel is completely in the rocket fuel area (white hexagon area) (no matter if standing or lying)	**10**	**10**
Fuel is touching the rocket fuel area	5	

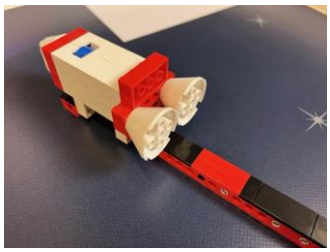
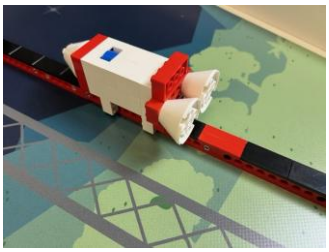
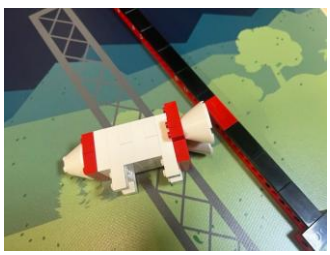
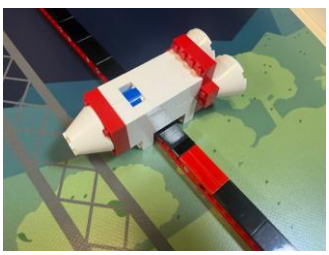
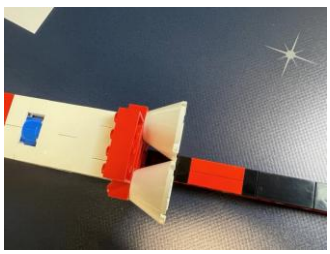
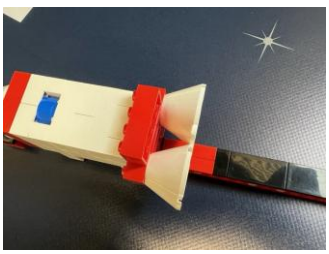
 10 points (completely inside)	 10 points (ok if lying)	 10 points (fully in and not touching outside)
 5 points (partly inside)	 0 points (object is only touching outside)	 0 points (object is only touching outside)

3.2 Launch the rocket

The rocket is placed on the launch pad on the right end of the game field. The rail symbolizes the flight path of the rocket. Launch the rocket into space. Please note for this task:

- To check, if the rocket reached a certain area of the flight path you have to look at the rocket rail from top-down view. The rocket has to fully cross the red marker on the rail in top-down view.

	Each	Max.
Rocket reached the orbit (Rocket is beyond 2nd red marker)	**15**	**15**
Rocket is in flight (Rocket is beyond 1st red marker, but **not** beyond 2nd red marker)	5	

 15 points (beyond 2nd marker)	 5 points (beyond 1st marker, but not 2nd marker)	 0 points (not beyond any marker)
 0 points (not on the rail anymore)	 0 points (not correctly on the rail)	*The rocket has to stay correctly on the rail.*
 Top-down view: Rocket beyond marker	 Top-down view: Rocket **not** beyond marker	*The relevant factor for scoring points is the top-down view.*

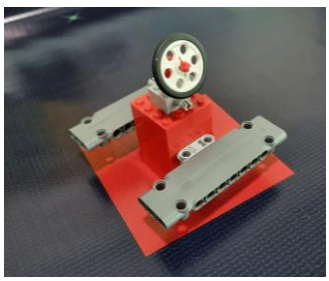
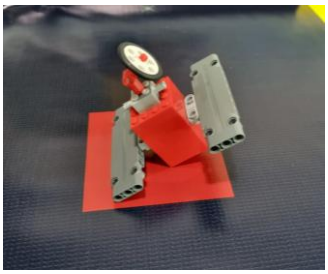
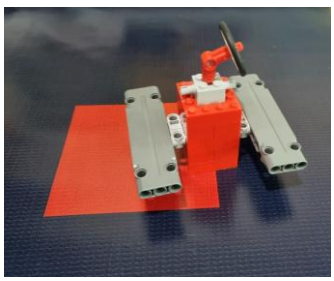
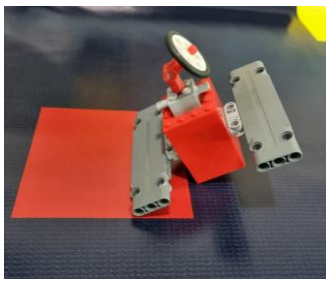
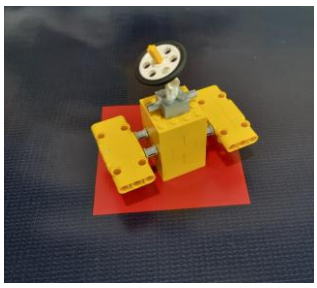
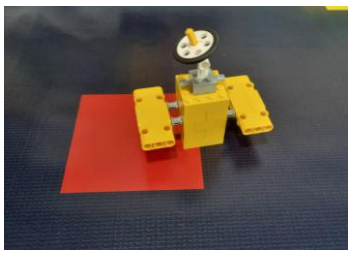
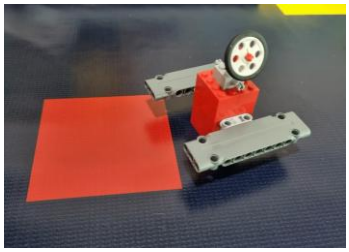
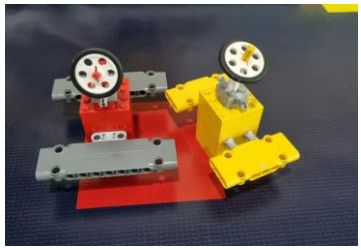
3.3 Collect the satellites and bring them into space

5 different satellites are placed on the positions 1 – 5 on the game and the robot should bring them to the orbit of the same colour.

The following table shows the scoring of this task and the photos show scoring situations that apply for all satellites. Please note for this task:

- Definition "completely in": Completely means that the game object is touching the corresponding area only.
- Per orbit only the satellite scoring the most points will be counted.

	Each	Max.
Satellite is completely in satellite orbit of the correct colour	**15**	**75**
Satellite is partly touching any satellite orbit or completely in an orbit of the wrong colour	5	

 20 points (completely inside)	 20 points (completely inside)	 5 points (partly inside)
 5 points (partly inside)	 5 points (fully in, but wrong colour)	 5 points (partly in, but wrong colour)
 0 points (object is only touching outside, very sad)	 20 points for red one (only the object with higher points counts)	

3.4 Collect space debris and bring it back

The atmosphere contains 3 pieces of space debris. Collect these pieces and bring them into the start area (white area without blue boarder).

	Each	Max.
Space debris is touching the start area	**10**	**30**

10 points
(completely inside)

10 points
(partly inside)

0 points
(not touching the start area)

3.5 Bonus for astronauts & barrier

It is not allowed to move or damage the astronauts or the barrier.

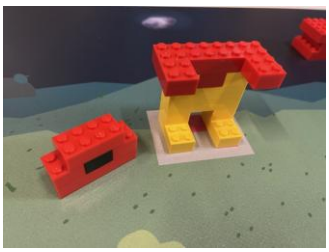
If those objects are not damaged and not moved, you will always get bonus points.

The following table shows the scoring of this task and the photos show scoring. Please note for this task:

- Definition “damaged”: Any situation that means that the game object is not exactly like at the start of the run, e.g. a brick fell off or balls have fallen off the barrier.
- Definition “moved”: The game object is considered as moved if a part of the game object is touching the mat outside of the grey area.

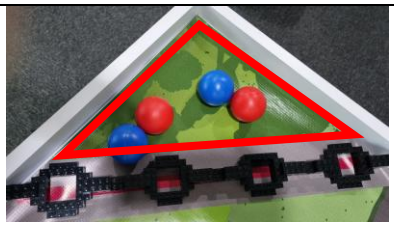
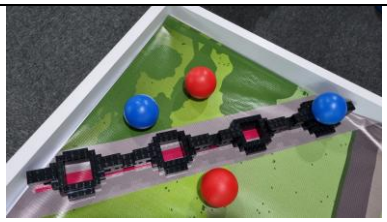
	Each	Max.
Astronaut is not damaged or moved	**5**	**10**
Ball is touching the debris collection area	**5**	**20**

5 points
(touching grey area only)



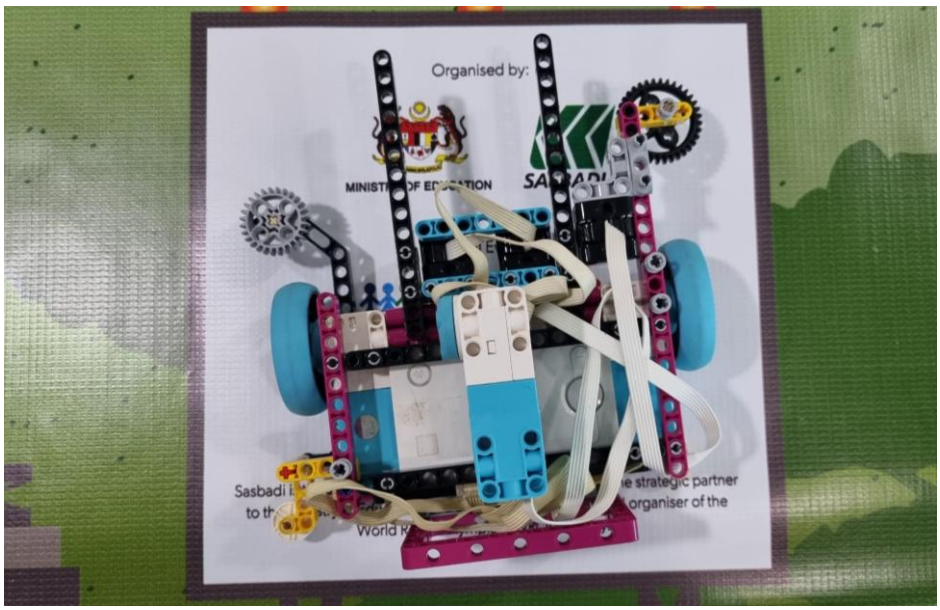
0 points
(damaged)

0 points
(touching outside)

 20 points (all 4 balls touching the area)	 10 points Only 2 balls touching the area	

3.6 Park the robot

The mission is complete when the robot stops in the Finish area, and the projection of the robot is completely (top-view) within the Finish area.



3.7 Penalty Token

Team will have 6 penalty tokens before the match. One penalty token will be deducted if teams touches the robot/ object outside of home area. Refer rules no.5

4. Scoring Sheet

Team name: _____ **Round:** _____

Tasks	Each	Max.	#	Total
Fuel the rocket				
Fuel is completely inside the rocket fuel area (no matter if standing or lying)	**10**	**10**		
Fuel is touching the rocket fuel area	5			
Launch the rocket				
Rocket reached the orbit (Rocket is beyond 2nd red marker)	**15**	**15**		
Rocket is in flight (Rocket is beyond 1st red marker, but not beyond 2nd red marker)	5			
Collect the satellites and bring them into space (only one satellite per orbit, the one with more points, counts)				
Satellite is completely in satellite orbit of the correct colour	**15**	75		
Satellite is partly touching any satellite orbit or completely in an orbit of the wrong colour	5			
Collect space debris and bring it back				
Space debris is touching the start area	**10**	**30**		
Astronauts & barrier				
Astronaut is not damaged or moved	**5**	**10**		
Ball is touching the debris collection area	**5**	**20**		
Park the Robot				
Robot completely in the Finish area		**10**		
Penalty Token				
Remaining penalty token at the end of the match	**5**	**30**		
Maximum Score		**200**		
Total Score in this run				
			Time in full seconds	

5. Special General Rules

For RoboMission Junior game, the normal NROC RoboMission General Rules apply, but there are some special rules as well. These special rules replace the corresponding general rules and are as follows:

1. The controllers, motors and sensors used must be from the LEGO® Education WeDo 2.0 Core set and/ or LEGO® Education SPIKE™ Essential. There are no restrictions on the number or combination of controllers, motors and sensors. Any LEGO® branded non-electronic elements can be used in the construction of the robot.

2. Before starting, the robot's dimension must be maximum 250mm x 250mm x 250mm. After start there is no restriction.

3. The robot must start from one of the Home areas.

4. During the attempt, the robot may be moved/ operated under programmed control autonomously or under remote control, or using a combination of the two methods. The robot can be controlled by any compatible device using WeDo 2.0/ SPIKE™ Essential software, or any compatible software, or with a remote controller built from WeDo 2.0/ SPIKE™ Essential elements.

5. During an attempt, the team may only touch the robot when a part of robot (e.g. a wheel) touches home area.

6. During an attempt, the team may also move the robot from one home area to another home area. **Team may only move the robot and not the game objects.**

7. During an attempt, these rules also apply:

    - The team must not touch elements outside the home area. If the team touches game objects outside the start area, the judge must put the objects back to where they were, and in the state they were in before they were touched. One penalty token will be deducted.

    - The team must not touch the robot unless the robot touches a home area. If the team touches the robot outside the start area, the judge must place the robot into the nearest start area. One point will be deducted from the total score.

    - If the robot does not start within the green line of the start area, one penalty token will be deducted.

8. An attempt is over when:

    - The robot is in the Finish area, stops, and the entire robot is inside the area (viewed from above – cables may stick out), the team gives a sign to the judge that the attempt is over.

    - The team shouts "STOP" and the robot stops moving.

    - 2 minutes have passed.