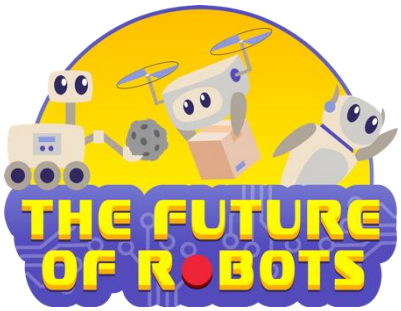
WORLD ROBOT OLYMPIAD ™

RoboMission

Elementary Game Rules
Season 2025



The Future of Robots
Satellites at Work

Official Game Rules for the WRO International Final. Version: December 1st 2024
(Note: Rules for local WRO events may vary!)

WRO International Premium Partner

aramco

WRO International Gold Partners

Table of Contents

Important information for reading this document:

- The general rules have changed drastically for 2025. Make sure to read them entirely.
- These game rules are made for local and national competitions.
- National Organizers in WRO countries are allowed to simplify the missions.
- For the International Final, one extra mission will be released on October 8th 2025. The extra challenge will work with the same game mat and brick set. It is not mandatory to do this extra mission to participate in the event.
- Because of possible surprise rules and the extra mission for the International Final, the game field may contain areas and markings that are not used at local or national events.
- For greater clarity, the robot missions are explained in multiple sections. But the teams can decide which missions they will do and which order.
- The game missions have easy and more complicated tasks. This makes the competition suitable for beginning and more experience teams. It is not necessary to solve all missions to enjoy a WRO participation.
- General information on game table setup and fixing of game objects on the field you find in the WRO RoboMission General Rules, chapter 7.

We wish everyone much success and a lot of fun with our WRO 2025 challenges!

Your team of World Robot Olympiad Association

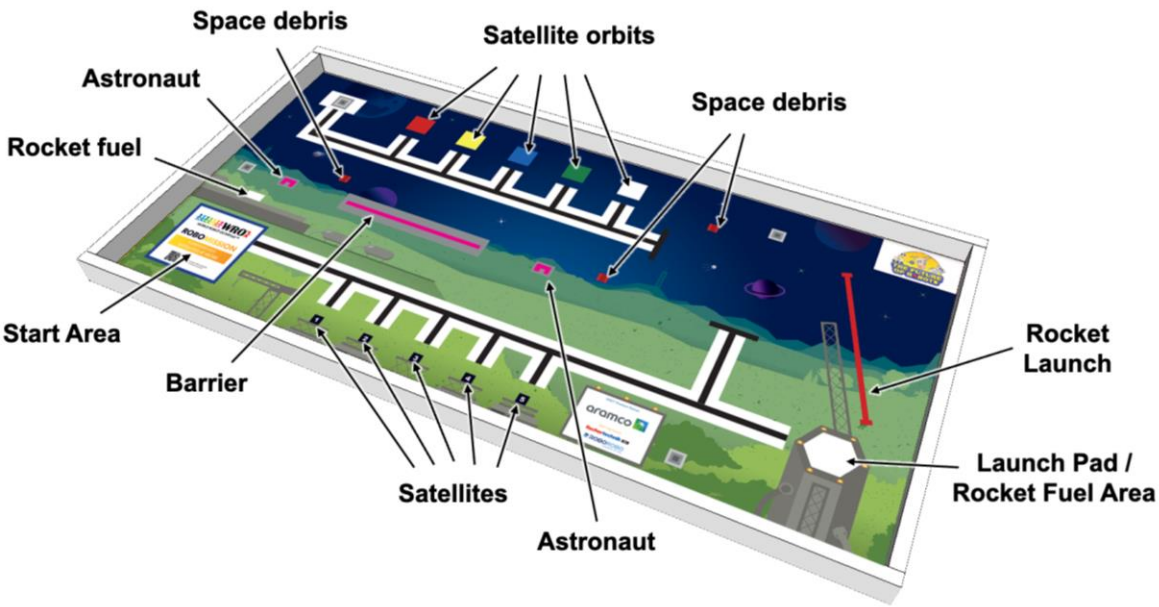
1. Introduction

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.



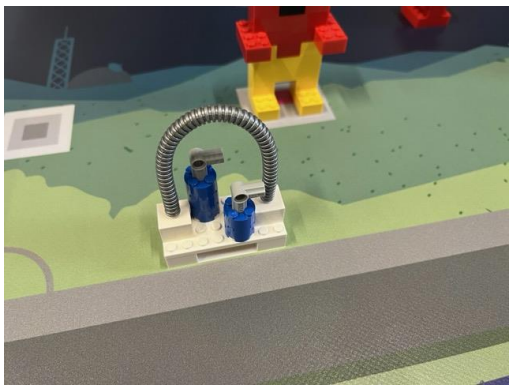
If the table is larger than the game mat, place the mat against the wall with the two sides closer to the start area (in the picture: left and bottom side).

3. Game Objects, Positioning, Randomization

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.

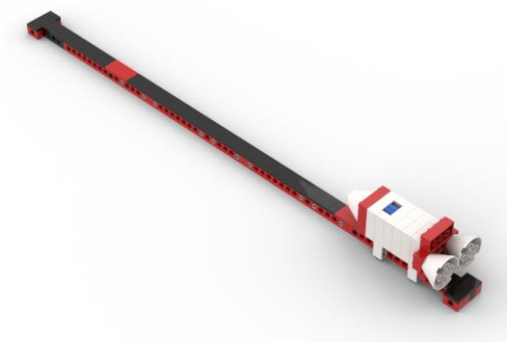
Rocket fuel



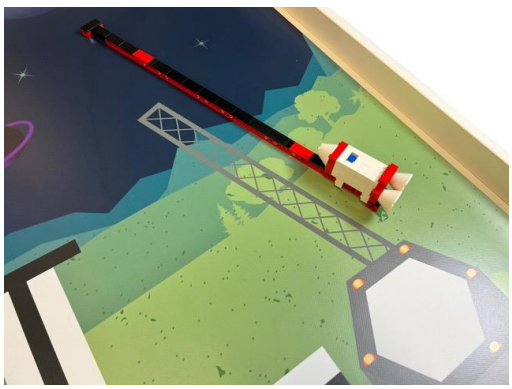
Position on the field

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



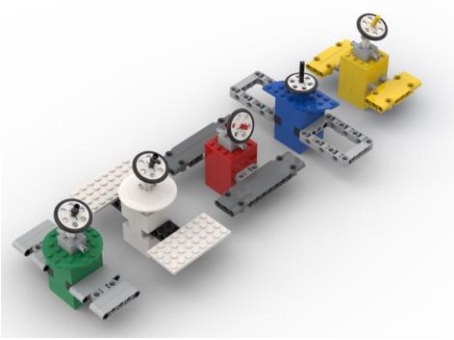
Start position of the rocket is always at the bottom.

Recommended positions of double-sided adhesive tape.

Satellites in 5 different colours

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

- 4 satellites are randomly placed on the positions 1 – 5.
- 1 random position stays free / unoccupied.
- 1 satellite is unused in every round.

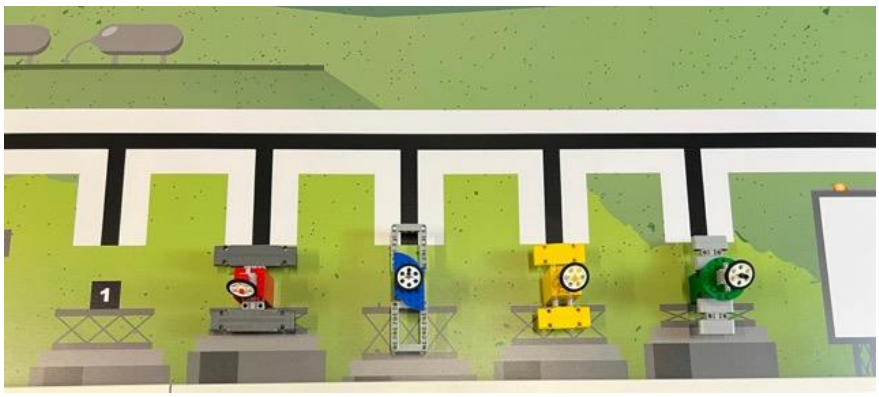


5 satellites (in different colours)

Please note:
The following examples are just two of many options.

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

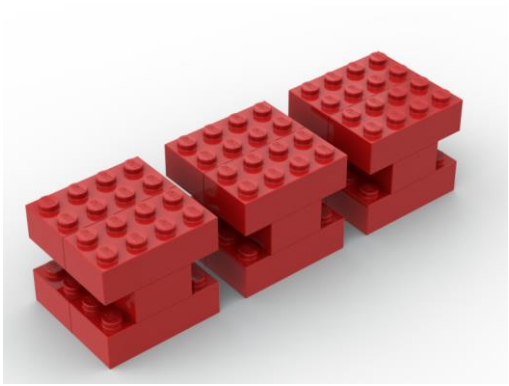
One possible position for the satellites



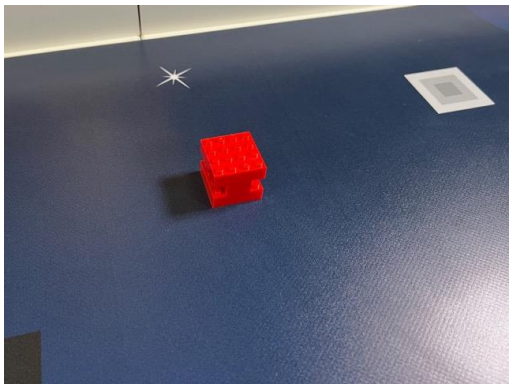
Another possible position for the satellites

Space debris

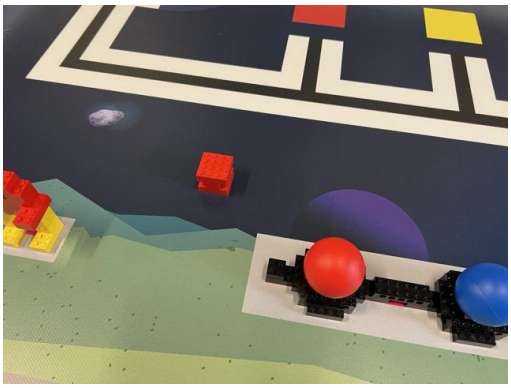
There are **3 pieces of space debris** on the field. They are always placed on the same positions on the game field. The orientation is shown in the last picture. The marking on the field shows the orientation.



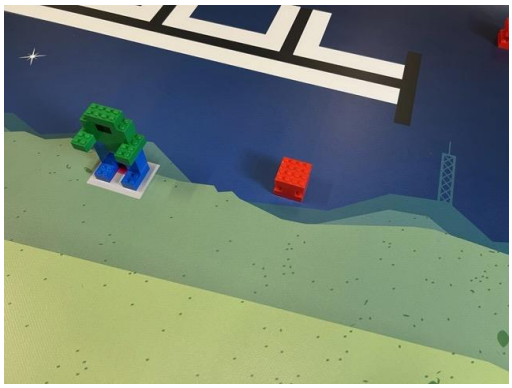
3 space debris



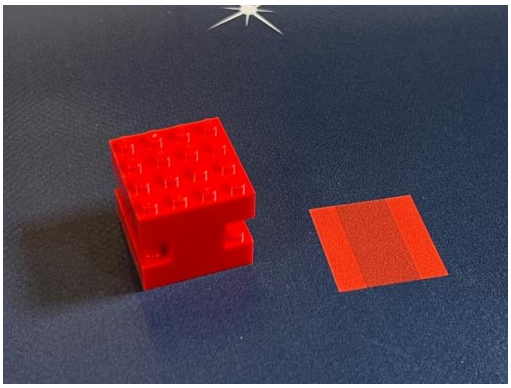
Position top right



Position middle left



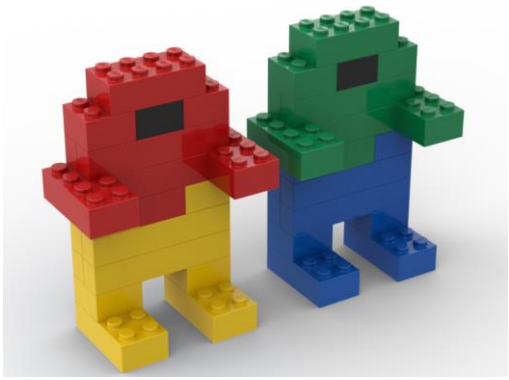
Position middle right



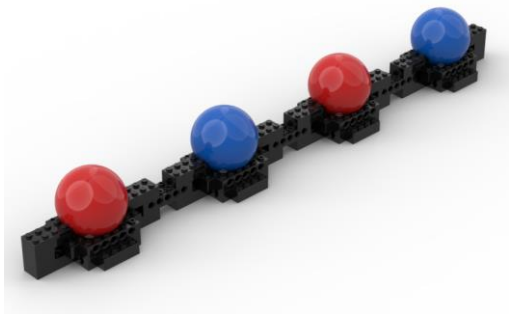
Orientation

Barrier and astronauts

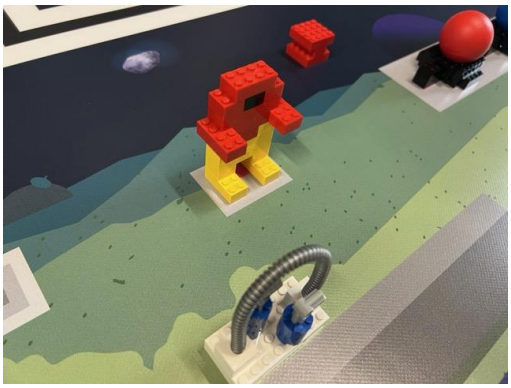
There are **2 astronauts and 1 barrier** on the field.
They are always placed on the same positions on the game field and are not allowed to be moved or damaged.



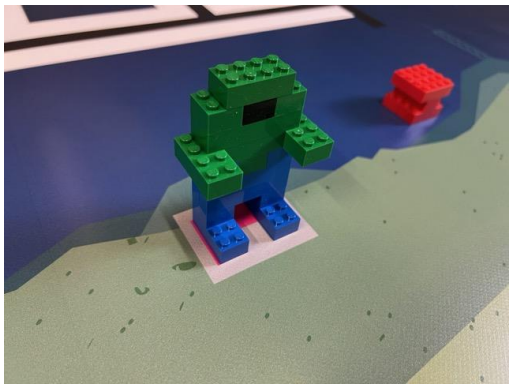
2 astronauts



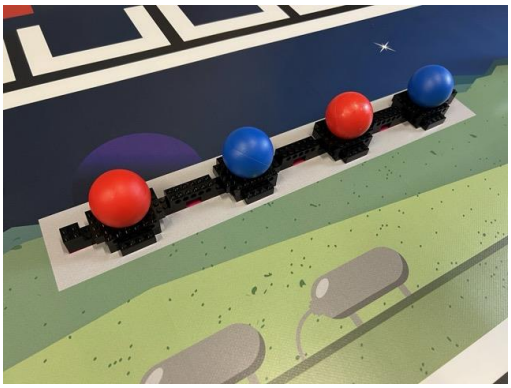
Barrier



Position of astronaut on the left



Position of astronaut on the right



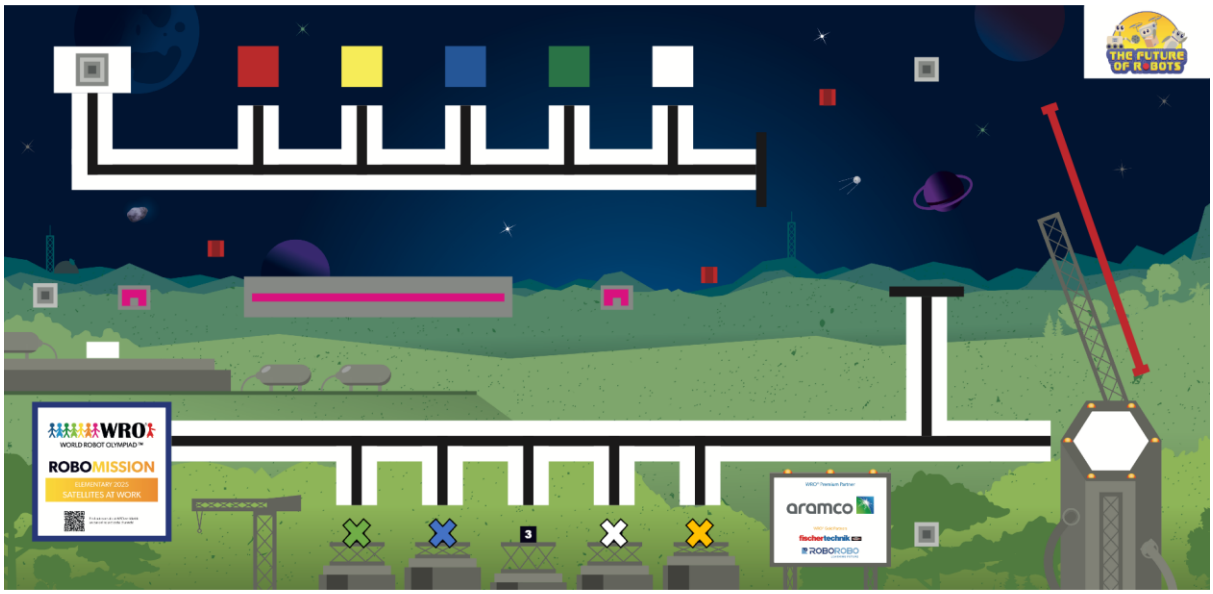
Position of barrier

Summary randomization

On this field, the following objects are **randomly placed in <u>each round</u>**:

- 4 of the 5 satellites (one satellite is left out each round!)

You can see one possible randomization here (only randomized objects are marked):



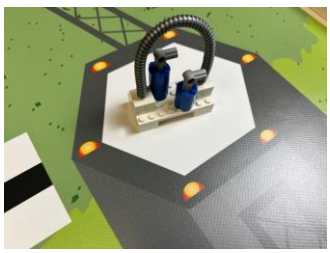
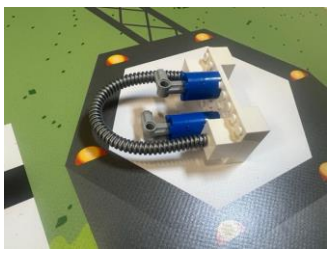
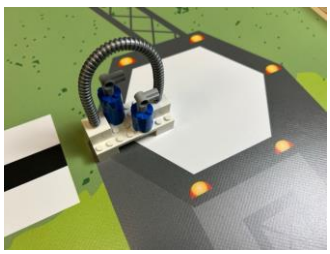
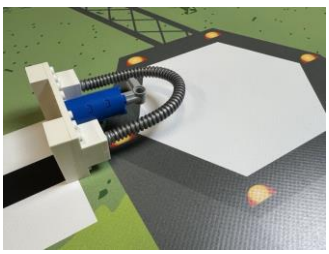
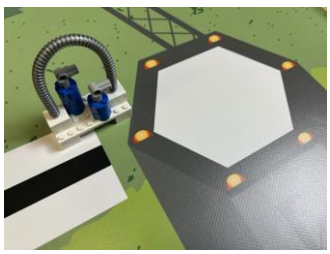
Robot Missions

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.

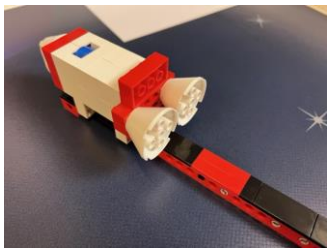
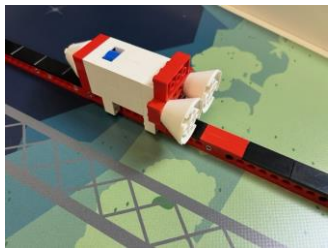
	Each	Max.
Fuel is completely in the rocket fuel area (white hexagon area) (no matter if standing or lying)	**10**	**10**
Fuel is touching the rocket fuel area	5	

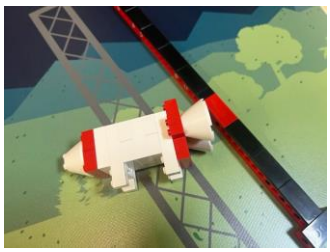
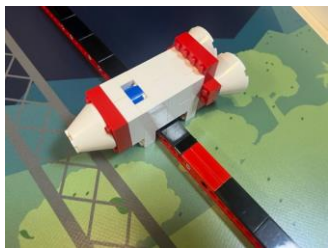
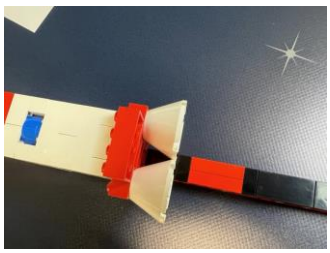
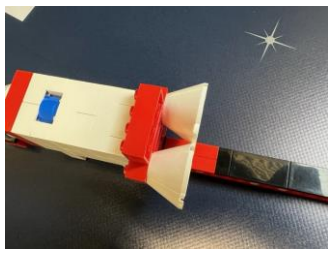
 10 points (completely inside)	 10 points (ok if lying)	 10 points (fully in and not touching outside)
 5 points (partly inside)	 0 points (object is only touching outside)	 0 points (object is only touching outside)

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.

<table>
<tr><th></th><th>Each</th><th>Max.</th></tr>
<tr><td>Rocket reached the orbit
(Rocket is beyond 2nd red marker)</td><td>15</td><td>15</td></tr>
<tr><td>Rocket is in flight
(Rocket is beyond 1st red marker, but not beyond 2nd red marker)</td><td>5</td><td></td></tr>
<tr><td colspan="3">

15 points
(beyond 2nd marker)

5 points
(beyond 1st marker,
but not 2nd marker)

0 points
(not beyond any marker)
</td></tr>
<tr><td colspan="3">

0 points
(not on the rail anymore)

0 points
(not correctly on the rail)
The rocket has to stay correctly on the rail.
</td></tr>
<tr><td colspan="3">

Top-down view: Rocket beyond marker

Top-down view: Rocket not beyond marker
The relevant factor for scoring points is the top-down view.
</td></tr>
</table>

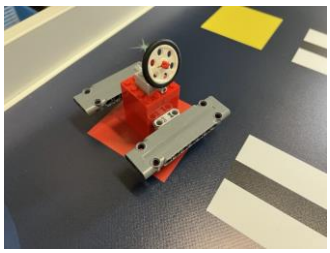
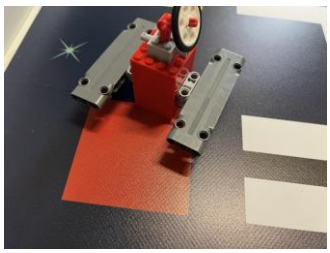
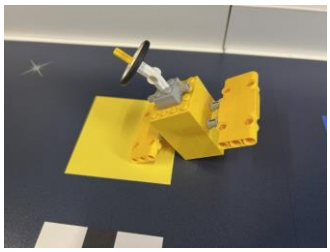
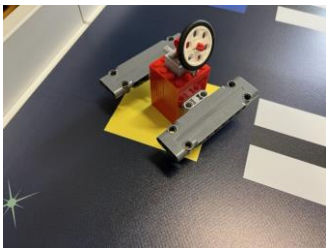
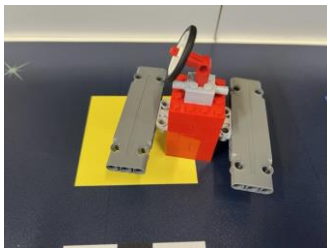
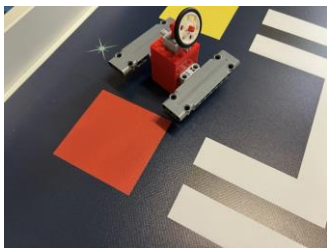
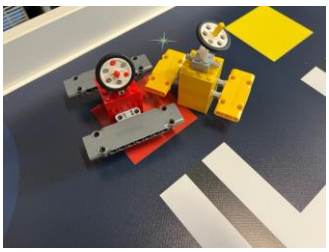
3.3 Collect the satellites and bring them into space

4 different satellites are randomly placed on the positions 1 – 5 on the game and the robot should identify the satellites and 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	**20**	**80**
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

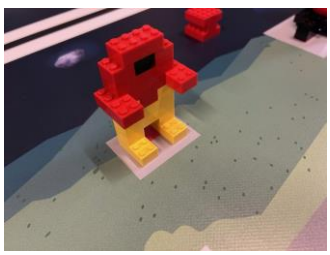
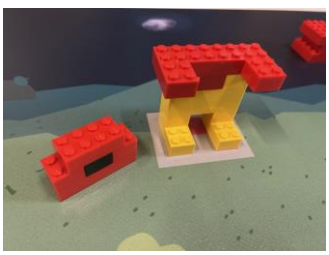
It is not allowed to move or damage the astronauts or the barrier.

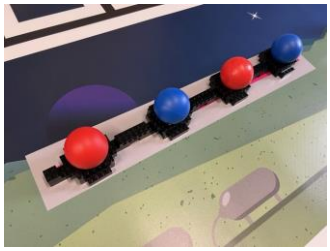
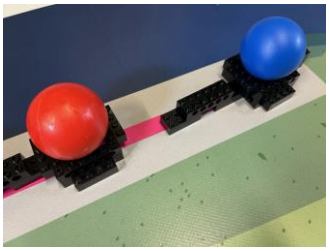
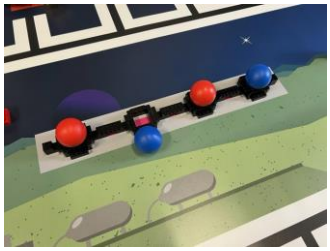
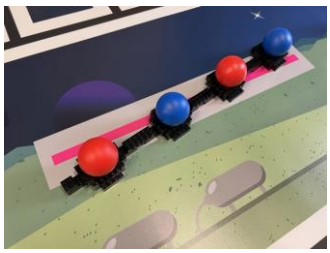
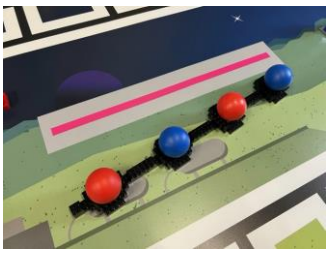
If those objects are not damaged and not moved, you will <u>always</u> get bonus points.

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**
Barrier is not damaged or moved	**10**	**10**

		
5 points (touching grey area only)	0 points (damaged)	0 points (touching outside)

 10 points (touching grey area only)	 0 points (damaged)	 0 points (counts as damaged)
 0 points (touching outside)	 0 points (touching outside)	

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	**20**	**80**		
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**		
Bonus for astronauts & barrier				
Astronaut is not damaged or moved	**5**	**10**		
Barrier is not damaged or moved	**10**	**10**		
Maximum Score		**155**		
			Total Score in this run	
			Time in full seconds	