

# RoboMission

## Elementary Game Rules

### Season 2024



## Earth Allies

### Sustainable Farming

Official Game Rules for WRO RoboMission Elementary.  
Version: January 15th 2024  
*(Note: Rules for local WRO events may vary!)*

WRO International Premium Partner



# Table of Contents

1. Introduction.....	2
2. Game Field .....	2
3. Game Objects, Positioning, Randomization .....	3
4. Robot Missions .....	7
4.1 Collect ripe and rotten vegetables.....	7
4.2 Water thirsty vegetables and prepare farming .....	8
4.3 Bonus for Fences & chicken.....	9
5. Scoring Sheet .....	10

## Important information for reading this document:

- 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 8<sup>th</sup> 2024. 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 6.

We wish everyone much success and a lot of fun with our WRO 2024 challenges!

Your team of World Robot Olympiad Association

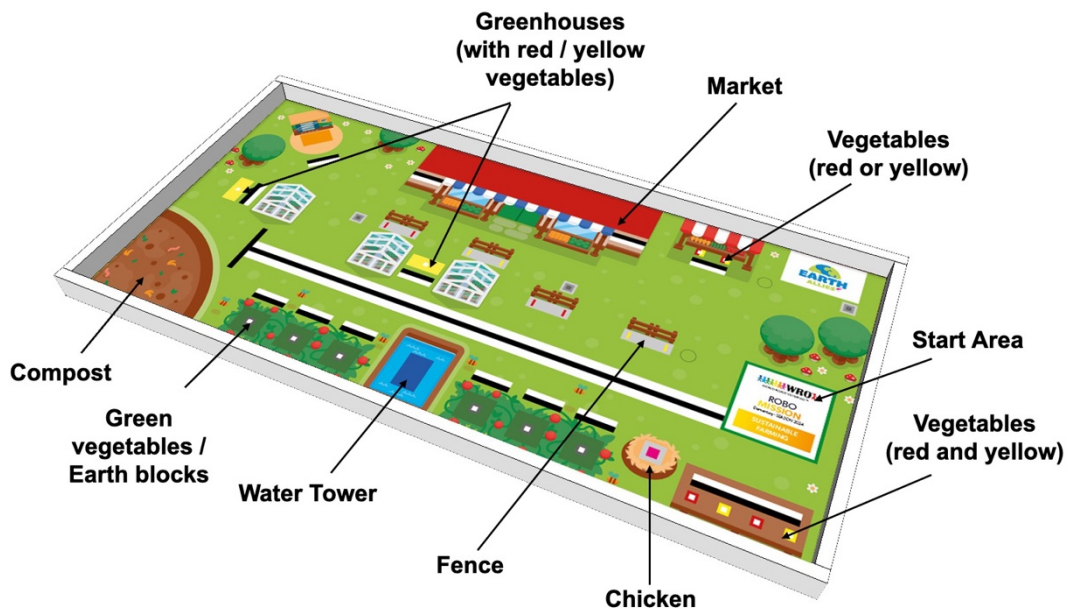
# 1. Introduction

The people in this village have decided that they want to grow their own food. They want to protect the nature and eat vegetables and fruit without pesticides. They have a shared farm in the village so they can all have healthy fruit and vegetables. They also have some chickens at the farm, so they have fresh eggs. The problem is that they all have busy lives. So they decided to find a robot that helps them with the farm.

**Can your robot help the people in the village checking on the vegetables, collecting them and watering the garden?**

# 2. Game Field

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



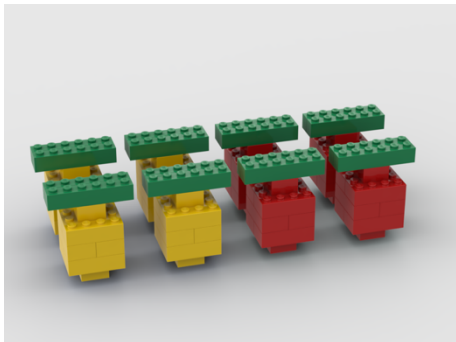
If the table is larger than the game mat, place the mat against the wall with the sides of the garden area (water tower etc.) and the start area section.

### 3. Game Objects, Positioning, Randomization

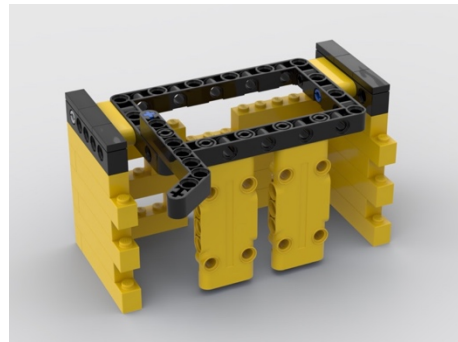
#### Red & Yellow Vegetables and Greenhouses

There are **8 vegetables (4 red, 4 yellow)** and **2 greenhouses** on the field:

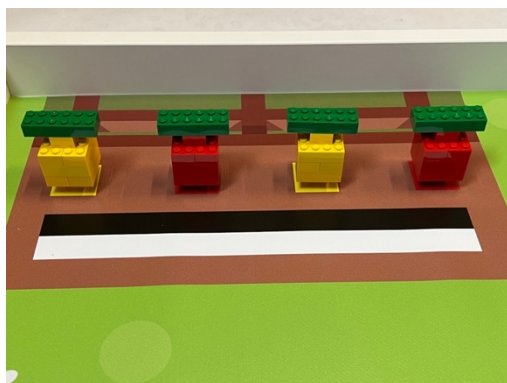
- 2 red and 2 yellow vegetables are always placed on the same positions on the bottom-right corner of the field.
- The other red and yellow vegetables are **randomly placed** on the two positions in the greenhouses and the other two positions on the top-right area of the field.
- The greenhouses are fixed on the field and have one vegetable inside.



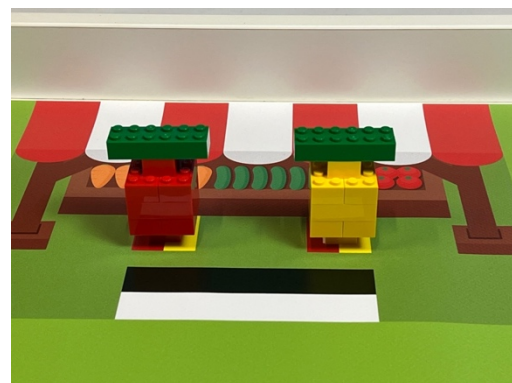
Red and yellow vegetables



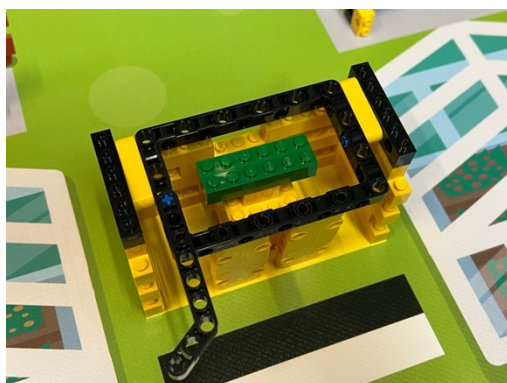
Greenhouse



Fixed positions of vegetables  
(bottom-right corner)



Randomized position of vegetables  
(top-right corner)

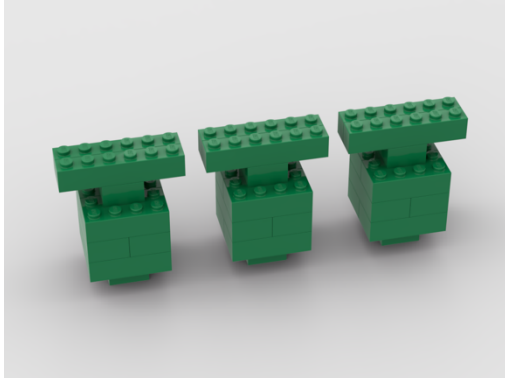


Start position of greenhouse (closed)  
with vegetable inside

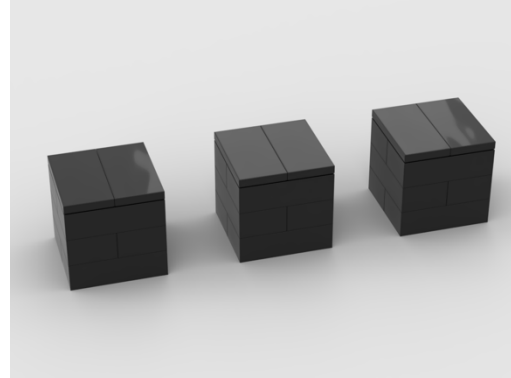
*Please note:  
The vegetables that are not in the greenhouse are always placed in the way that the green bricks on top are parallel to the long border of the game field. The ones inside the greenhouse in line with the greenhouse placement.*

## Green Vegetables and Earth Blocks

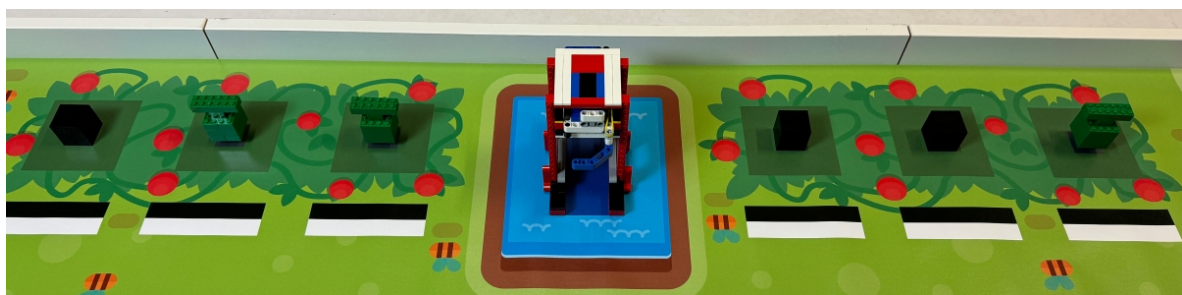
There are **3 green vegetables** and **3 black earth blocks** on the field. These six elements will be **randomly placed** on the six positions in the garden.



Green vegetables



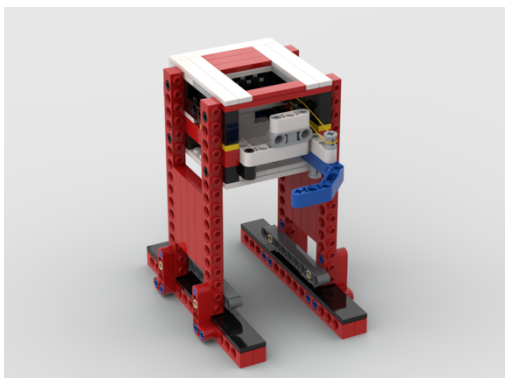
Earth blocks



One possible position of the blocks

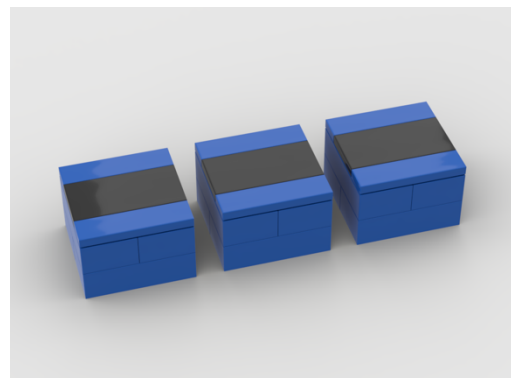
## Water Tower and Water Elements

There are **3 water elements** and **one water tower** on the field. The tower is fixed on the game field. 2 water elements are placed in the water tower, one water element is always placed in the start area.



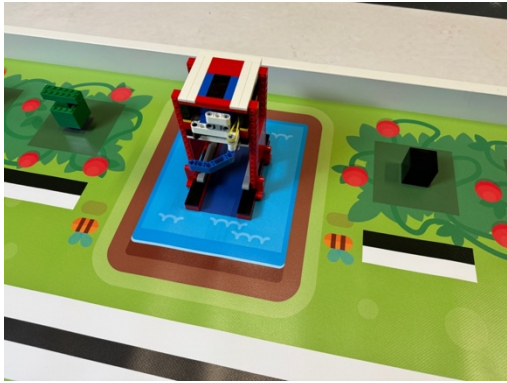
Water tower

*Please note that the water tower will be used without the yellow rubber band.*



Water elements





Placement of water tower



Water Elements in water tower  
*(both water elements are always placed like the top one in this photo)*

## Fences & Chicken

There are **4 fences (2 red, 2 yellow)** and one **chicken** on the field.

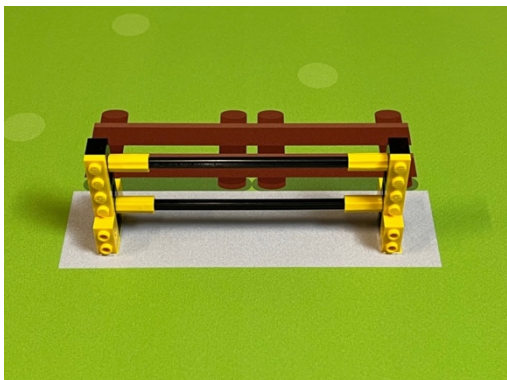
They are always placed on the same positions on the game field and are not allowed to be moved or damaged.



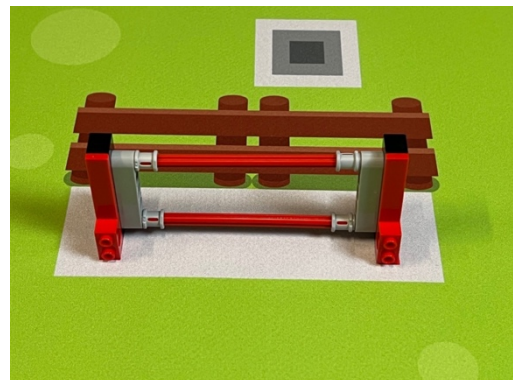
Yellow Fence



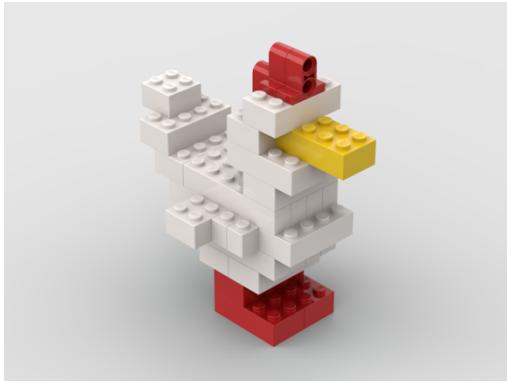
Red Fence



Placement of yellow fence



Placement of red fence



Chicken



Placement of the chicken  
*(always placed in this direction)*

### Summary randomization

On this field, the following objects are **randomly placed in each round**:

- 2 red and 2 yellow vegetables in greenhouses and top-right corner
- 3 green vegetables and 3 black earth blocks

One possible situation with all randomized objects you can see here:



## 4. Robot Missions

### 4.1 Collect ripe and rotten vegetables

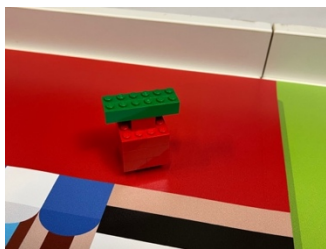
Vegetables are at different places on the game field (top-right corner, bottom-right corner and in the greenhouses) and the robot should identify the different statuses of the vegetable. It is the task of the robot to bring:

- The red (ripe) vegetables to the market area (red).
- The yellow (rotten) vegetables to the compost area (brown).

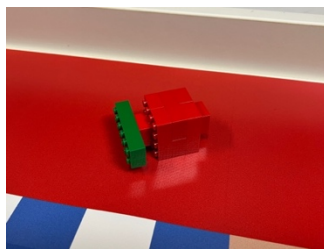
The following table shows the scoring of this task and the photos show scoring situations that apply for both the red and the yellow vegetable. Please note for this task:

- The market area is the red area on the top-middle of the game field (without any other lines or design elements around).
- The compost area is the brown area in the bottom-left of the game field including the brown circle line (not including the bright circle line before).
- Definition “completely in”: Completely means that the game object is touching the corresponding area only.

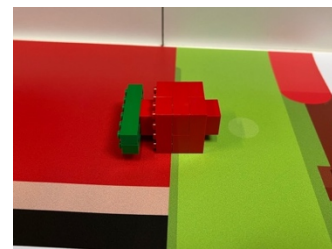
	Each	Max.
Red vegetable completely in market area	11	44
Red vegetable partly in the market area	4	
Yellow vegetable completely in the compost area	11	44
Yellow vegetable partly in the compost area	4	



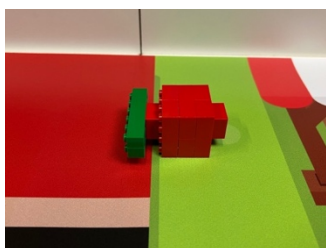
11 points (completely inside)



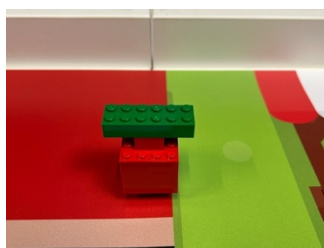
11 points (ok if lying)



4 points (partly inside)



0 points (object is only touching outside)



11 points (object is only touching inside)



0 points (no points for the yellow object in the market)



## 4.2 Water thirsty vegetables and prepare farming

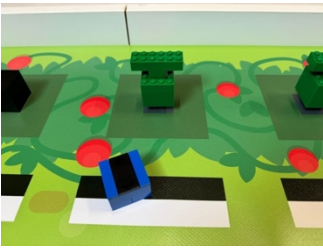

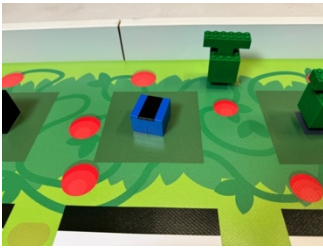
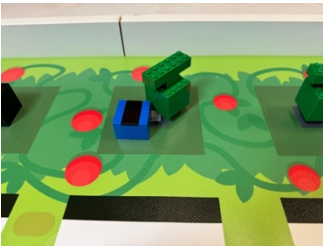
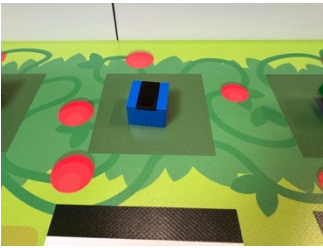
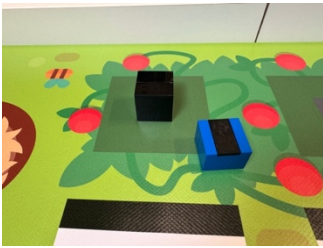
There are areas on the field (bottom) that have vegetables that need water or areas that need to be prepared for farming and the robot should identify what to do. It is the task of the robot:

- To bring a water element to each green area around a green vegetable. Two water elements can be released from the water tower, one water element is always in the start area. Full points are awarded if the water elements are in the correct areas.
- To push the earth blocks outside of the green areas to prepare this area for farming soon. Points are awarded if the earth blocks are completely outside and not touching any green area.

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

- The green area is the dark green square, not including any other design elements around that are green as well.

	Each	Max.
Water element is touching the green square around a green vegetable and the green vegetable is still touching the green square as well (max. one water element per green square counts)	10	30
Earth block is no longer touching any green square area	3	9

 <p>0 points (water element not touching green square)</p>	 <p>10 points (touching)</p>	 <p>0 points (green vegetable is not inside the square area)</p>
 <p>10 points (all correct)</p>	 <p>0 points (no green vegetable)</p>	 <p>0 points (no green vegetable)</p>

<p>10 points (all correct, green vegetable still touching)</p>	<p>0 points (still touching the green square area)</p>	<p>3 points (no longer touching any green square area)</p>

### 4.3 Bonus for Fences & chicken

It is not allowed to move or damage the fences or the chicken.

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 situations that apply for both the fences and the chicken. 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.
- 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.
Chicken is not damaged or moved		3
Fence is not damaged or moved	3	12

<p>3 points (only touching grey area)</p>	<p>0 points (damaged)</p>	<p>0 points (moved outside)</p>

## 5. Scoring Sheet

Team name: \_\_\_\_\_

Round: \_\_\_\_\_

Tasks	Each	Max.	#	Total
<b>Collect ripe and rotten vegetables</b>				
Red vegetable completely in market area	11	44		
Red vegetable partly in the market area	4			
Yellow vegetable completely in the compost area	11	44		
Yellow vegetable partly in the compost area	4			
<b>Water thirsty vegetables and prepare farming</b>				
Water element is touching the green square around a green vegetable and the green vegetable is still touching the green square as well (max. one water element per green square counts)	10	30		
Earth block is no longer touching any green square area	3	9		
<b>Bonus for Fences &amp; Chicken</b>				
Chicken is not damaged or moved		3		
Fence is not damaged or moved	3	12		
<b>Maximum Score</b>		<b>142</b>		
<b>Surprise Rule</b>				
<b>Total Score in this run</b>				
<b>Time in full seconds</b>				