Explorer Prime

Game Rules

2024

WORLD ROBOT OLYMPIAD™

WRO®

SOUTH AFRICA

Date: 19 January 2024

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PART ONE – GAME DESCRIPTION

1. Introduction

The Explorer Prime competition is for children from the ages of 11 years to 16 years in the year of the competition and not the child's age at the time of the competition. The Explorer Competition is developed in South Africa and has no international component. In some years depending on national organiser decisions, there will be official provincial and national events.

For the 2024 Explorer season, provincial organisers have been given the choice to run a physical WRO Explorer event depending on demand from registrations in the province. The WRO National Organising Committee will later in the year make a decision as to the likelihood of a physical Explorer National Event.

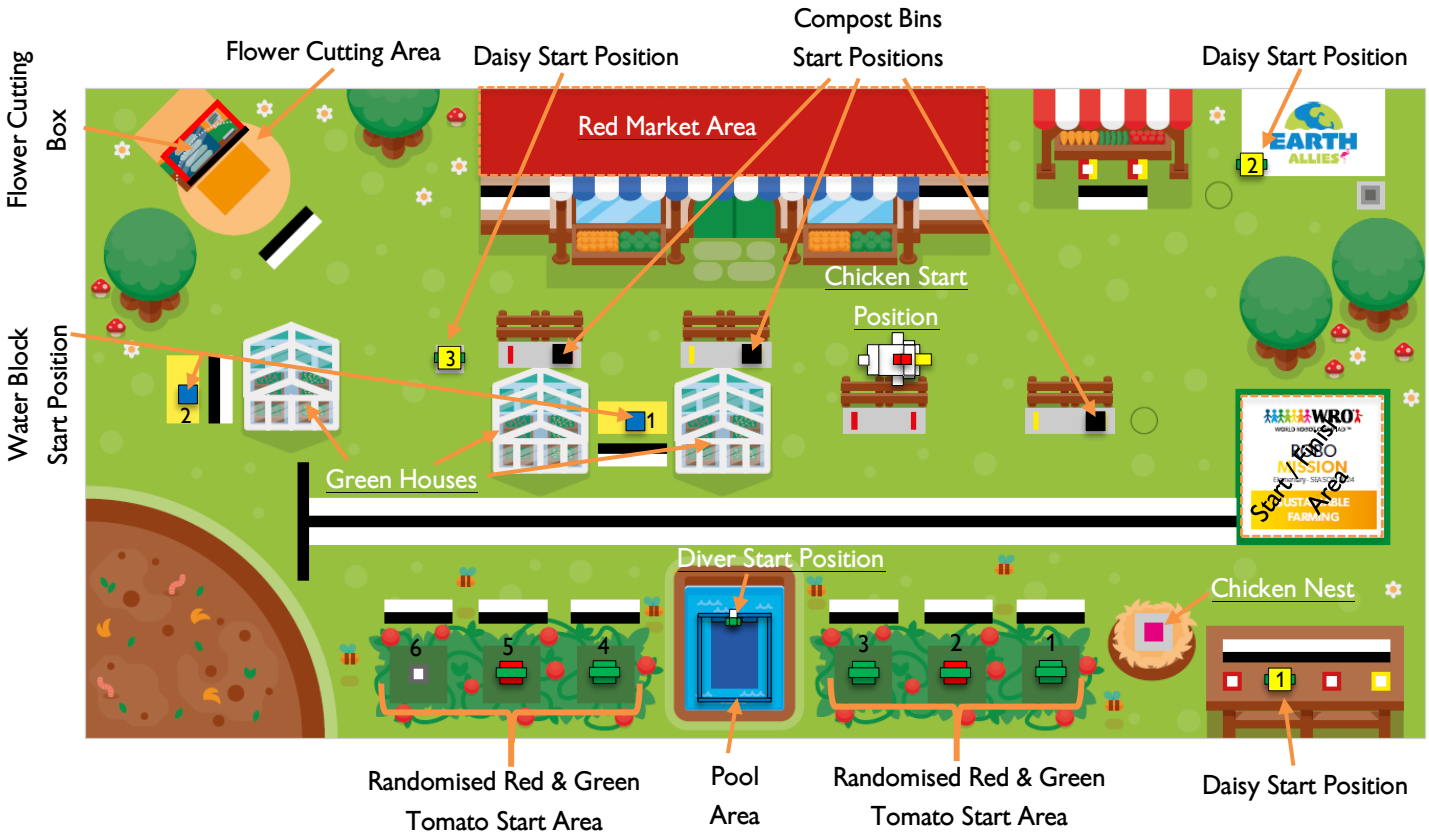
Please check the website www.wrosa.co.za for the latest event updates.

This year WRO SA has introduced a randomisation to the explorer category element positions. At the start of the competition the head judge will conduct the randomisation. Once the elements have been randomised, they will remain in this position for the entire competition and will not be randomised again. This is exclusive to the Explorer category and differs from the Robo Mission randomisation.

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 on the wall with the start area side touching the table wall.



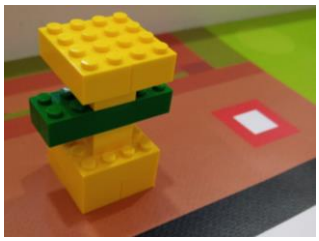
1. Use the Ultrasonic Sensor to start the robot moving.
2. Use the light sensor to follow a line.
3. Move the yellow daisies so that the base is completely on the green grass.
4. Move the red tomatoes **completely** into the red market area.
5. Move the water blocks **completely** into the greenhouses (1 block per green house).
6. Push the diver off the diving board and into the swimming pool. The pool must not have been moved outside of the pool area or damaged.
7. Move the chicken so it's touching its nest area.
8. Move one yellow daisy into the flower cutting area.
9. Robot finishes projecting into the start/finish area.
10. **Bonus:** Do not move or damage the green tomatoes.
11. **Bonus:** Do not move or damage the black compost bins.

3. Game Objects, Positioning, Randomization

Yellow Daisies (x3)

There are three (3) yellow daisy elements placed on the mat in their starting positions. The green leaves all run parallel with the table facing the start/finish area.

Daisy Elements



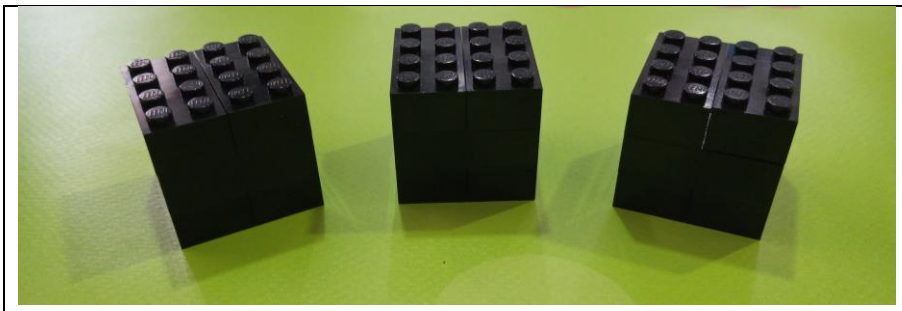
Start position of daisy 1

Start position of daisy 2

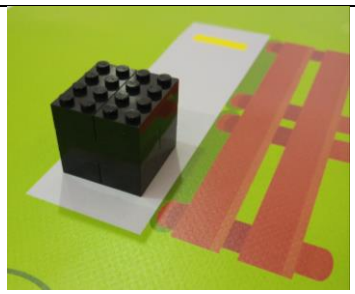
Start position of daisy 3

Compost Bins (x3)

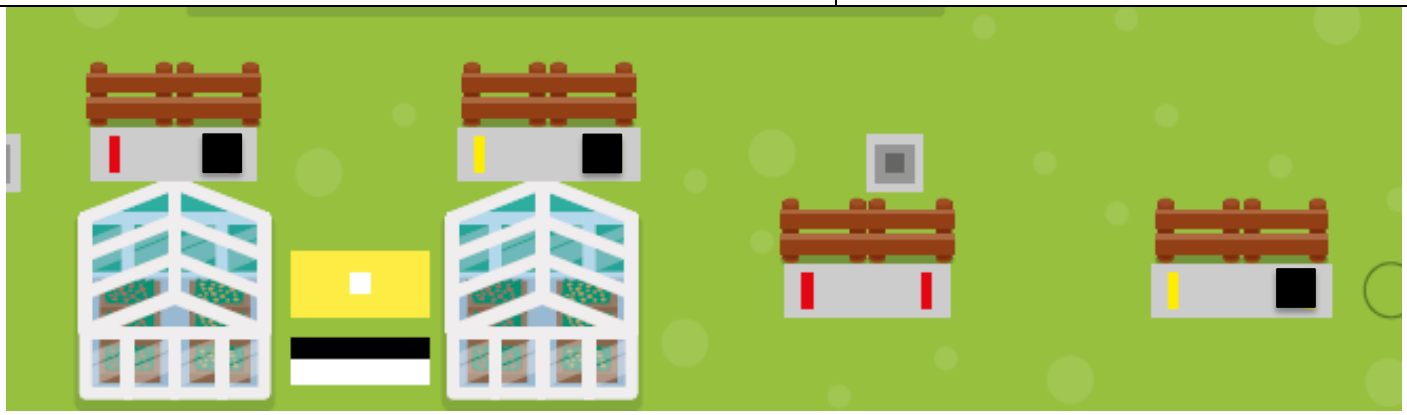
There are three black compost bins placed in the grey fence areas on the game mat. Each compost bin is placed covering the small, coloured rectangle closest to the start area.



Compost bin elements



Placement of compost bins. Covering the small red or yellow rectangle closest to the start area.

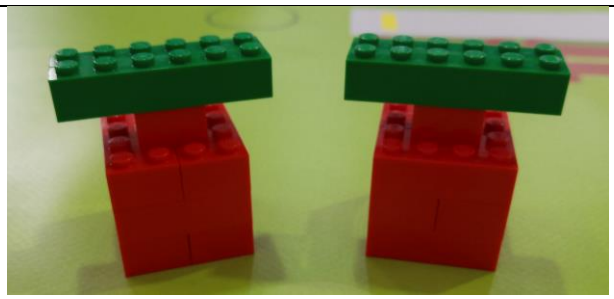


Starting position of the compost bins on the game mat.

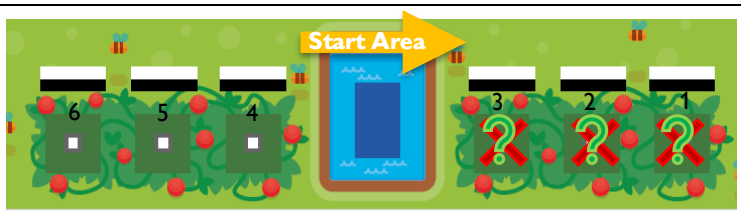
Red Tomatoes (x2) & Green Tomatoes (x 3)

Two red tomato elements are placed on the game mat. One red tomato will be randomly placed in positions 1, 2 or 3 with two green tomatoes in the empty positions 1,2 or 3. One red tomato will be randomly placed in position, 4,5 or 6. One green tomato will be placed in an empty position 4,5 or 6 and the position not used will remain empty.

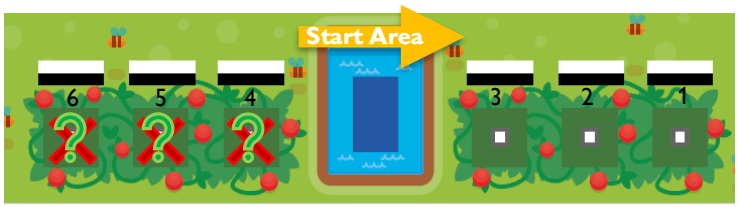
To randomise the tomato elements place a red brick and two green bricks into a back. Starting with position 1 draw out a brick, the colour of the brick represents the element that must be placed in that position. Continue this process with positions 2 and 3. For the second tomato randomisation place a green brick, red brick and white brick into a bag. Starting with position 4 draw out a brick, the colour of the brick represents the element that must be placed in that position (white is blank). Continue this process with positions 5 and 6. Once randomisation is complete the elements must always be placed in the same starting positions for the duration of the competition.



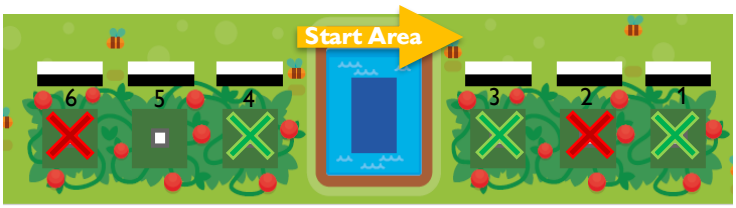
Red Tomato Elements



Starting positions of Red Tomatoes.
Red tomato one starts randomly in position 1, 2 or 3 with two green tomatoes placed in the empty positions once placed the elements remain in that start position for the entire competition.



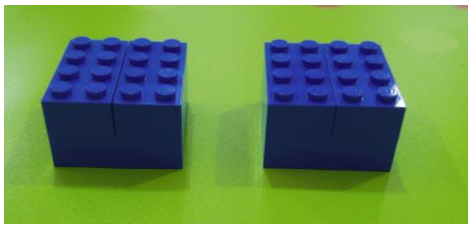
Red tomato two starts randomly in position 4, 5 or 6 with one green tomato placed in one of the empty positions, the remaining position remains empty. Once placed the elements remain in that start position for the entire competition.



One possible randomisation of the tomato area.

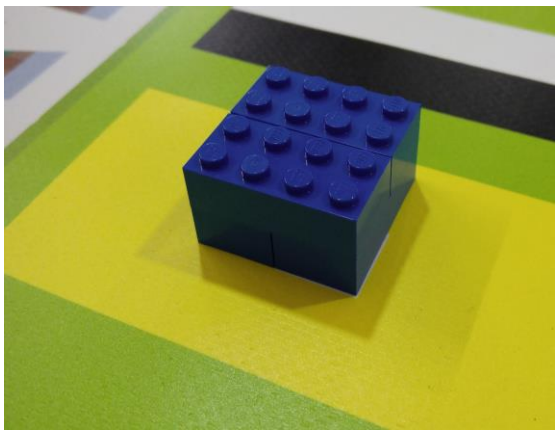
Water Blocks (x2)

There are two (2) water blocks placed on the table in the yellow rectangle areas. The corner of the water block is placed covering the small white square with the majority of the block towards the start/finish area.

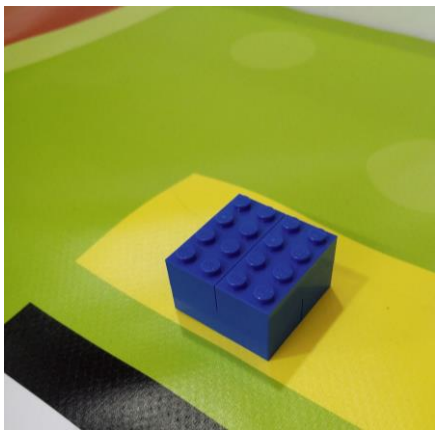


Blue water blocks

Starting position of water blocks



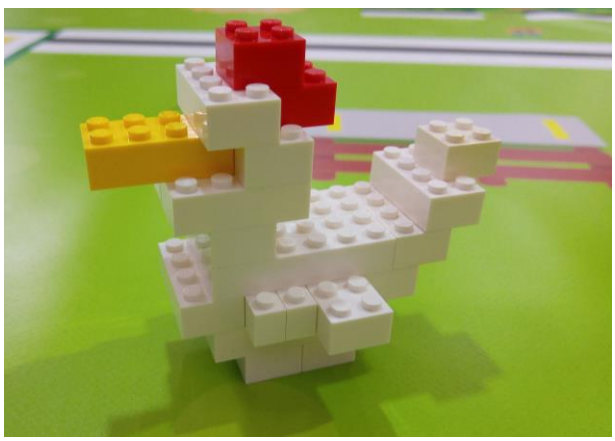
Starting position of water block 1



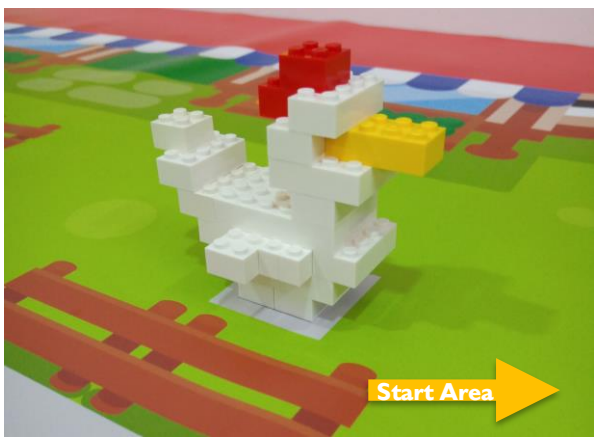
Starting position of water block 2

Chicken (x1)

There is one chicken element placed on the game mat facing the start area. The base of the chicken fits completely inside its dark grey square close to the start area.



Chicken element



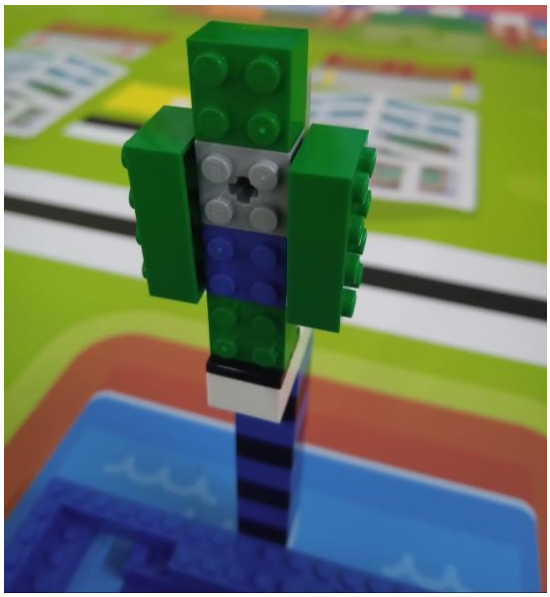
Starting position of chicken element

Pool (x1) & Diver (x1)

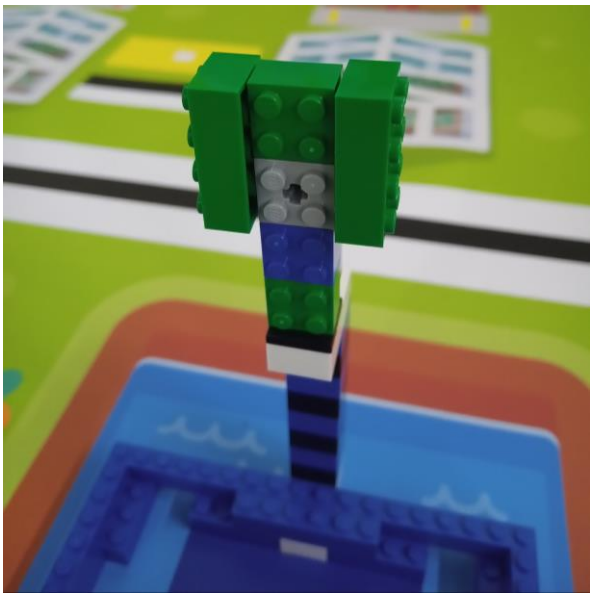
There is one pool element placed in the pool area. The diver is placed on the black plates on the diving board of the pool element facing the pool. The diver may either be placed with arms at the side or arms raised, the team is allowed to choose the divers orientation.

Pool starting position with diver

Position of the pool diving board base.



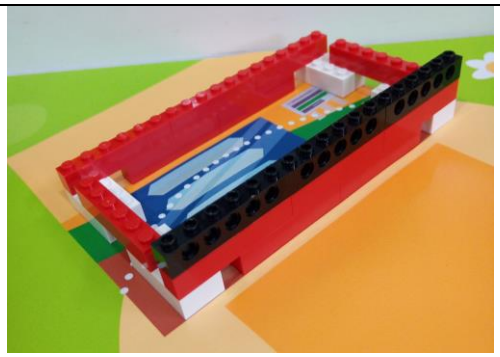
Position of diver on the diving board with arms at the side



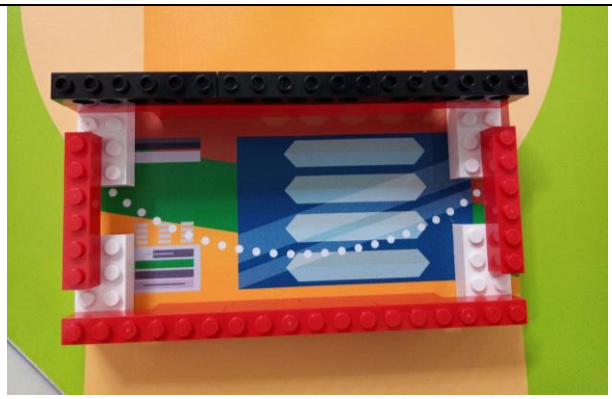
Position of diver on the diving board with arms raised.

Flower Cutting Box (x1)

There is one flower cutting box placed in the flower cutting area. The elements is placed with one side closest to the table wall.



Flower cutting box placed in its start position. The element does not completely fit the area.



Overhead view of the flower cutting box.

4. Robot Missions

4.1 Points for use of sensors

Teams should program the robot so that when a team member or judge breaks the ultrasonic sensors beam the robot waits for 1 second and then begins moving out of the start area before completing any of the missions on the game table. (if a judge can't verify this on the game mat, they must check the team's program)

Teams should program the colour sensor, so the robot follows a line of any colour anywhere on the game mat. (if a judge can't verify this on the game mat, they must check the team's program)

4.2 Move the yellow daisies

There are 3 daisy elements on the game mat. The robot must move the daisy elements from their start position and place them in an area on the mat where the element **only touches green grass**. The daisy elements must be upright for points to be scored.

4.3 Move the Red Tomatoes

The robot must collect and move the two red tomato elements and place them inside of the Red Market area. The element **Completely Inside** the red market area for points to be scored. The element may be in any orientation.

4.4 Move the water blocks

The robot must collect and distribute the two water blocks to two greenhouses. There are a total of three greenhouse images on the game mat. The water blocks can be placed in any of the greenhouses. Water blocks must be placed **completely inside** a greenhouse for points to be scored. Only one water block per green house. If two water blocks are placed in the same greenhouse only 1 will be scored.

4.5 Move the chicken

The robot must collect and move the chicken back to its nest area. The chicken **only needs to touch** the nest area to score points. The chicken can be placed in any orientation.

4.6 Push the diver into the swimming pool

The robot must push the diver off the diving board and into the swimming pool. The diver must be completely inside the swimming pool and the pool element must not have been moved or damaged. The pool element is moved if it is touching or outside of the brown area surrounding the pool image on the game mat.

4.7 Deliver a daisy to the flower cutting area

One daisy must be delivered to the orange rectangle in the flower cutting area. Any of the three daisy elements may be used. The daisy must be placed **completely inside** the flower cutting area for points to be scored. The daisy may be in any orientation and **does not need to be standing upright**.

4.8 Don’t move the green tomatoes.

The robot must not move or damage the green tomato elements. The green tomato element **must remain upright** and standing freely in its original starting location.

4.9 Don’t move the black compost bins

The three black compost bins must not be moved. The bin **must not touch** the outside of their grey starting areas.

4.10 Robot Finish

The robot must finish with parts of the robot projecting into the start/finish area. The robot only **needs to project into** this area for points to be scored. The robot does not need to have attempted all mission tasks for these points to be scored. Some positive points must be scored these do not include the points for the ultra-sonic sensor or the bonus points.

Explorer Prime Scoring

For Explorer Prime game elements are awarded full points if the elements **are completely inside** the correct scoring area, if part of the element is outside of the scoring area and is touching the game mat the team may not be able to score points for the game element, **unless stated otherwise** in the game rules and on the score sheet.

5. Scoresheet

Seat:	**Name of School/Club:**	
	Team Member 1:	
Code:	Team Member 2:	
	Team Member 3:	

Explorer - Prime Team Name:

Task	Each	Points	1st Score	2nd Score	3rd Score	4th Score
Ultrasonic Sensor Used to start the robot.	**Yes / No**	**20**				
Used a light sensor to follow a line.	**Yes / No**	**30**				
Yellow daisy **upright** and the **base is touching nothing but** green grass. (after the robot has finished its run)	**0 1 2**	**10 each** (Max 30)				
Red tomato **completely inside** the red market area.	**0 1 2**	**20 each** (Max 40)				
Water block **completely inside** a greenhouse. (One water block per greenhouse.)	**0 1 2**	**10 each** (Max 20)				
Diver has been pushed into the swimming pool. (Swimming pool not moved or damaged.)	**Yes / No**	**30**				
Chicken is **touching** its nest area.	**Yes / No**	**30**				
One yellow daisy placed inside of the orange flower cutting area. (In a case where two or more daisies are placed in the orange flower cutting area, only the highest scoring daisy will be counted. Points awarded will either be 60 points, 40 points or 20 points, only 1 of the three!)						
Yellow daisy is **touching** the **orange circle** area.	**Yes / No**	**20**				
Yellow daisy is **completely inside** the **orange rectangle**.	**Yes / No**	**40**				
Yellow daisy is **completely inside** the cutting box.	**Yes / No**	**60**				
Robot finished **touching** the start / finish area. (Points other than the Ultrasonic Sensor and Bonus points must have been scored)	**Yes / No**	**20**				
Bonus Points: These points are awarded if the robot moves completely outside of the start area.						
Green tomatoes **standing upright**.	**0 1 2 3**	**5 each** (Max 15)				
Black compost bins **not touching** outside of their grey start area.	**0 1 2 3**	**5 each** (Max 15)				
	Total:	**300 Max:**				
Time is the time the score was recorded. For example 14:37		Time:				

Diamond 300+ points

Gold 200 - 300 points

Silver 120 - 195 points

Bronze 40 - 115 points

Team Member Signature: _____

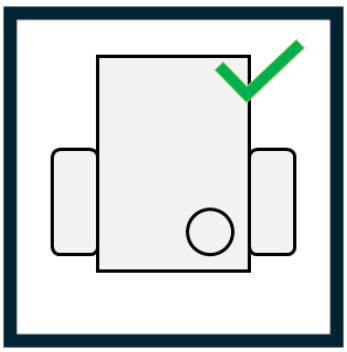
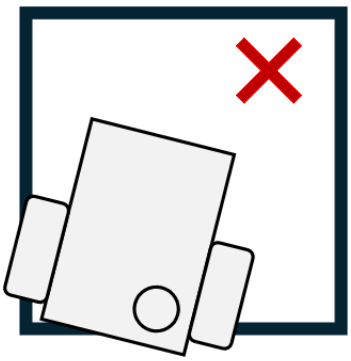
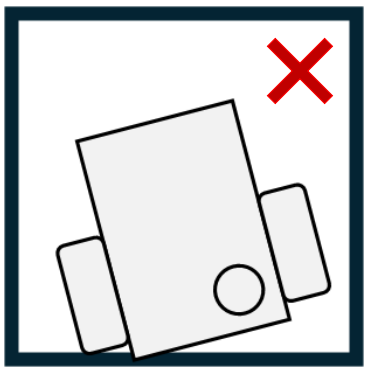
Judge Name: _____

6. Scoring Interpretation

The images in this section will help to explain the scoring options available to teams. In cases where scoring is unsure the judge must bias their decision to the best possible outcome of the team.

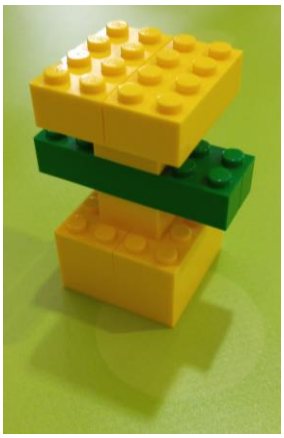
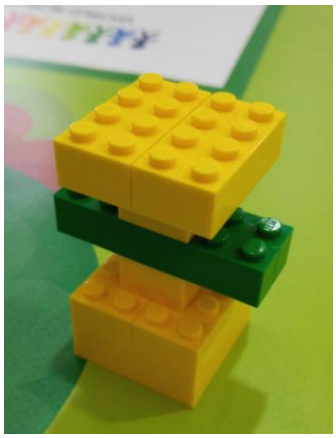
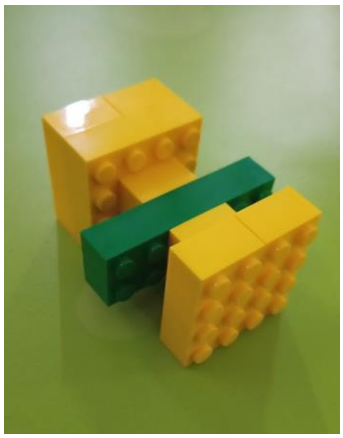
Robot start area

The robot must start completely inside the start/finish area. All parts of the robot must fit into this area **including robot cables**. No part of the robot is allowed to project outside of the start/finish area or into the surrounding line. The start/finish area is defined as the white area only and not the surrounding different colour line/square.

 Robot completely inside the start/finish area. No part overhanging or touching the surrounding line.	 Robot outside of the start/finish area. Robot will not be allowed to start.	 Robot projecting out of the start/finish area. Robot will not be allowed to start

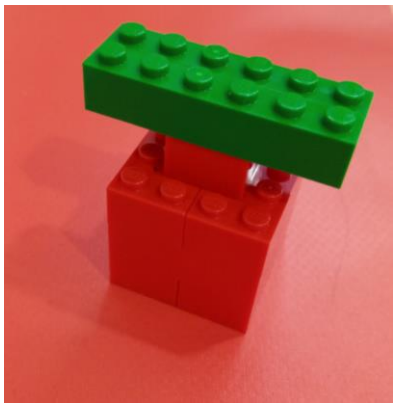
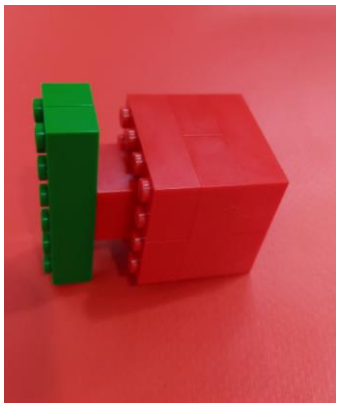
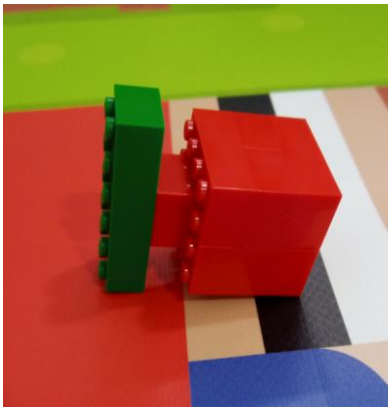
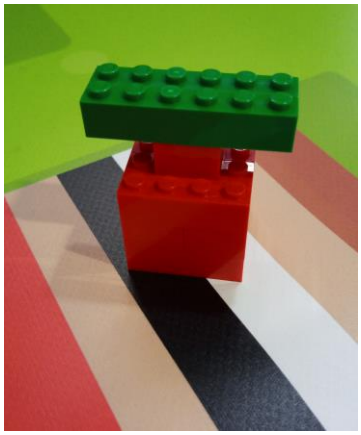
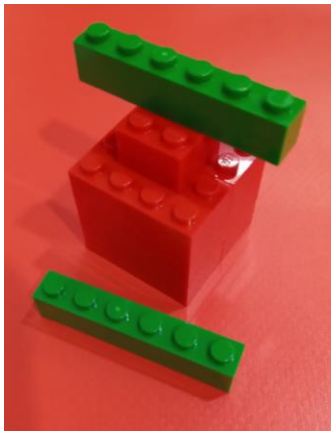
Daisies in the green grass area:

The below images apply for all the daisy elements touching the green grass area.

 Daisy standing upright. Only touching the green grass area. 10 points	 Daisy standing upright. Daisy touching something other than only the green grass. 0 points	 Daisy not standing upright. Only touching the green grass area. 0 points

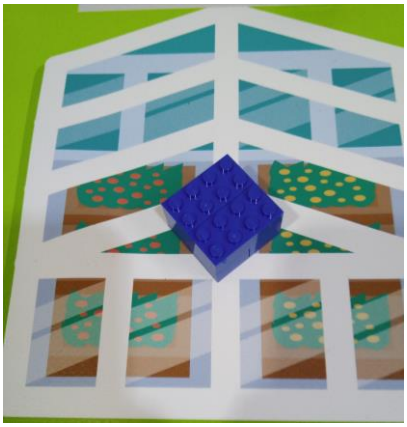
Red Tomato Elements:

The below images apply to the red tomato elements delivered to the red market area.

 Red tomato completely inside red market area. 20 points	 Red tomato fallen over completely inside red market area. 20 points	 Red tomato touching red market area. 0 points
 Red tomato fallen over touching red market area. 0 points	 Red tomato not touching the red market area. 0 points	 Red tomato broken/damaged. 0 points

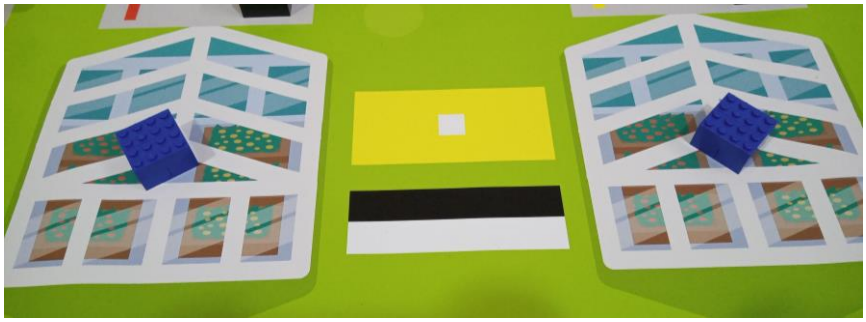
Water Blocks:

The below images apply to the two water blocks to be placed in the greenhouses.



Water block completely inside a greenhouse.

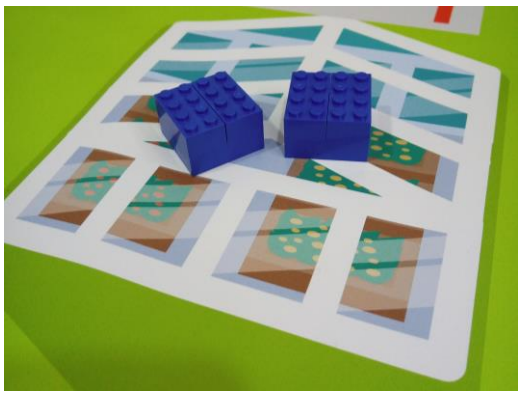
10 points



Water blocks placed in two separate greenhouses.

10 points each

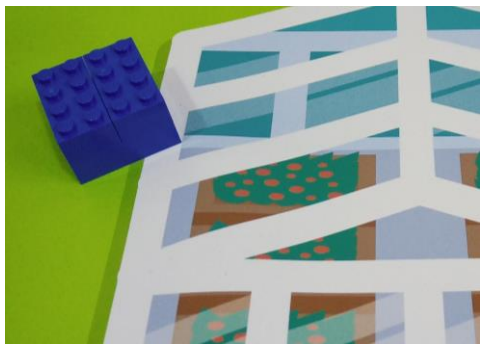
20 points total



Two water blocks completely inside the same greenhouse.

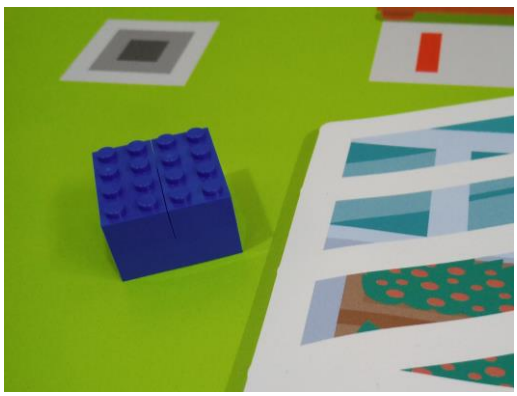
Only 1 water block is scored.

10 points



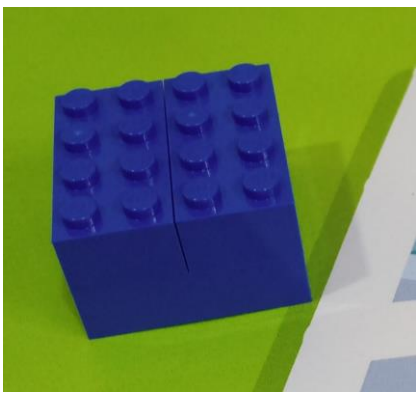
Water block touching a greenhouse.

0 points



Water block not touching a greenhouse.

0 points

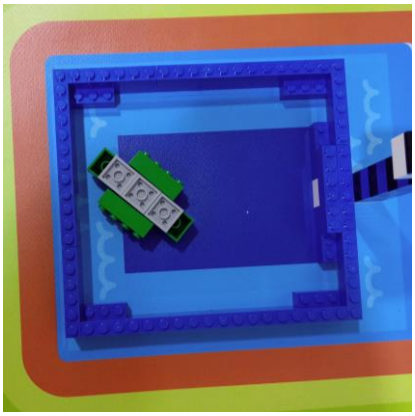


Water block touching the shadow around a greenhouse.

0 points

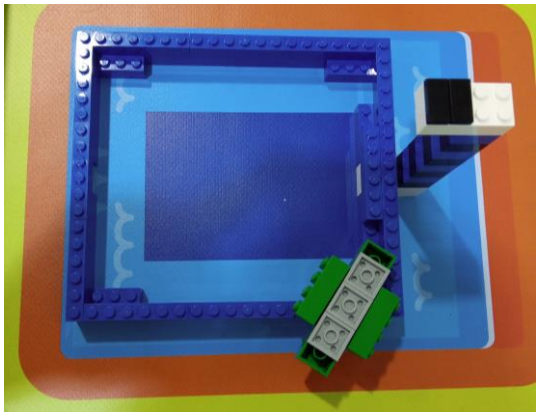
Diver and swimming pool:

The below images apply to the diver and the swimming pool.



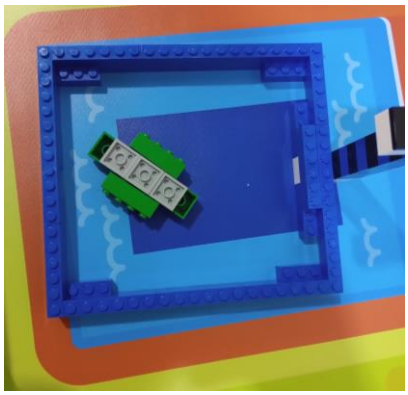
Diver completely inside the swimming pool. Swimming pool not moved/damaged.

30 points



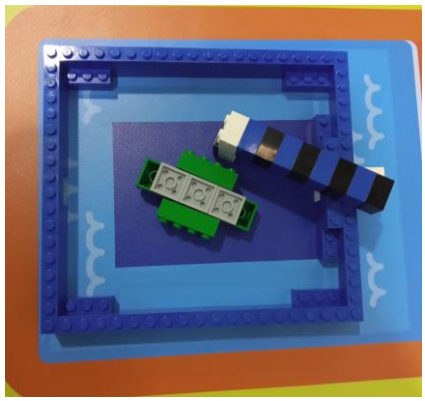
Diver on the edge of the swimming pool, swimming pool not mover or damaged.

0 points



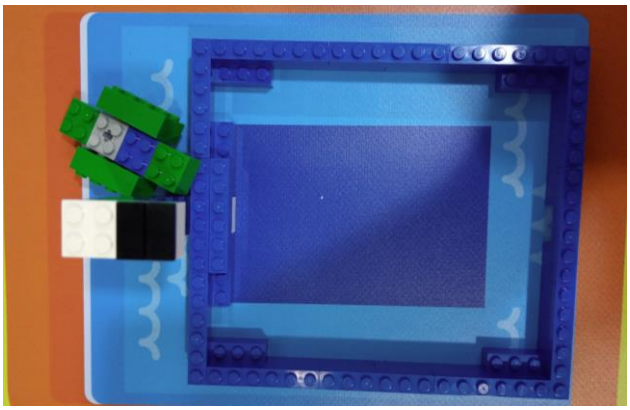
Diver completely inside the swimming pool. Swimming pool touching surrounding brown area.

0 points



Diver completely inside the swimming pool. Swimming pool damged.

0 points

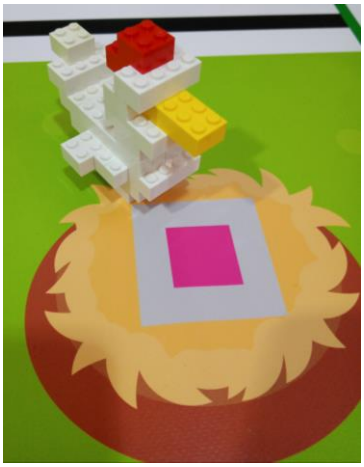
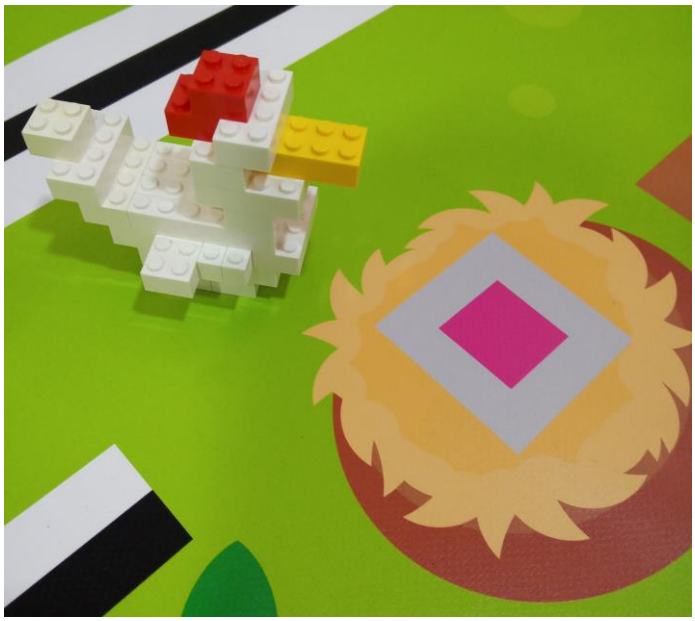


Diver outside of the swimming pool.

0 points

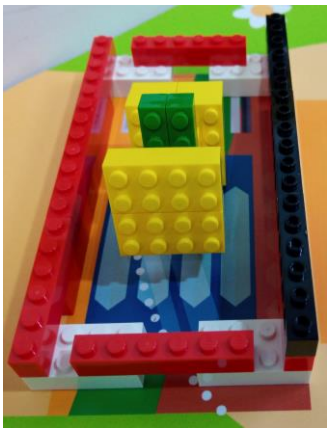
Chicken and nest area

The below images apply to the chicken and the nest area.

<table>
<tr>
<td> 
Chicken completely inside the nest area.
30 points</td>
<td> 
Chicken touching the nest area.
30 points</td>
</tr>
<tr>
<td> 
Chicken fallen over touching the nest area.
30 points</td>
<td> 
Chicken not touching the nest area.
0 points</td>
</tr>
</table>

Daisy in the flower cutting area

The below images apply to the daisy in the flower cutting area. The daisy may be placed in any orientation.

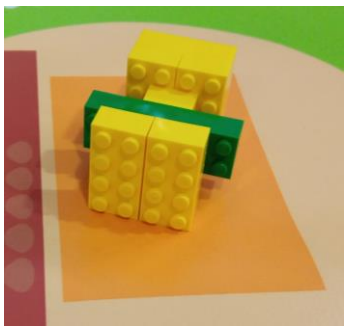



Daisy inside of flower cutting box standing or fallen over.

60 points

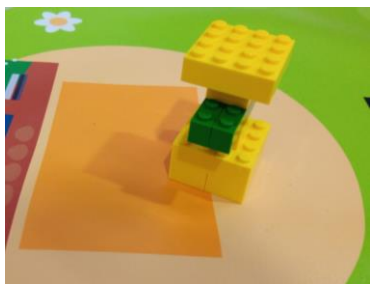
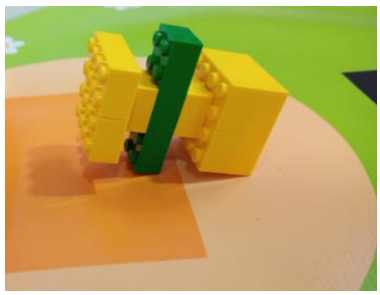
Daisy inside the flower cutting box. Daisy is damaged

0 points

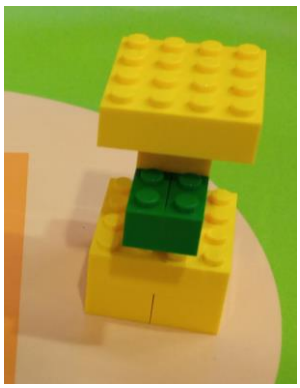
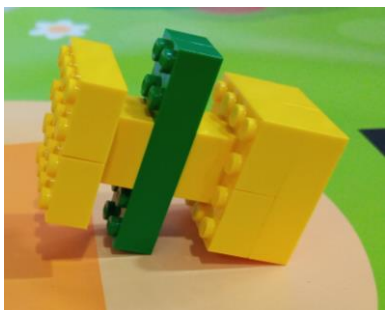
One daisy completely inside the orange rectangle inside the flower cutting area. Standing or fallen over.

40 points

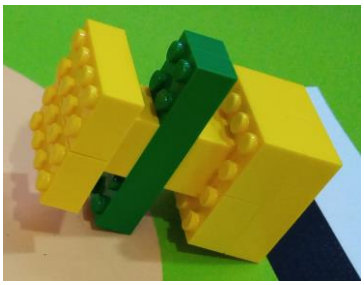
One daisy touching the orange rectangle inside the flower cutting area. Standing or fallen over.

20 points

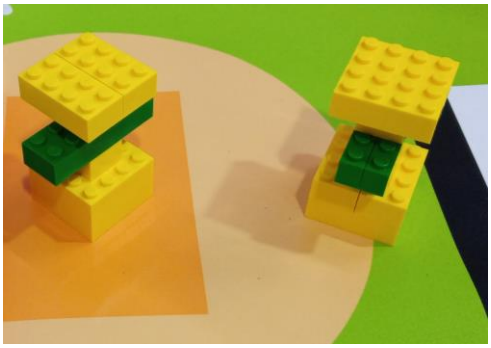
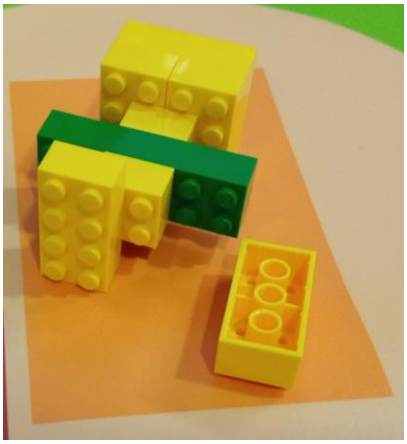
One daisy completley inside the light orange circle in the flower cutting area. Standing or fallen over.

20 points

One daisy touching the light orange circle in the flower cutting area.

20 points

 Two orange daisies completley inside the orange rectange inside the flower cutting area. Only one daisy is awarded points. 40 points 0 points for the second daisy	 One daisy completley inside the orange rectangle inside the flower cuttign area. One daisy touching the orange circle of the flower cutting area. 40 points for the highest scoring daisy 0 points for the second daisy
 Broken Daisy element. 0 points	 Daisy not touching the flower cutting area. 0 points

Green tomato and compost bin elements

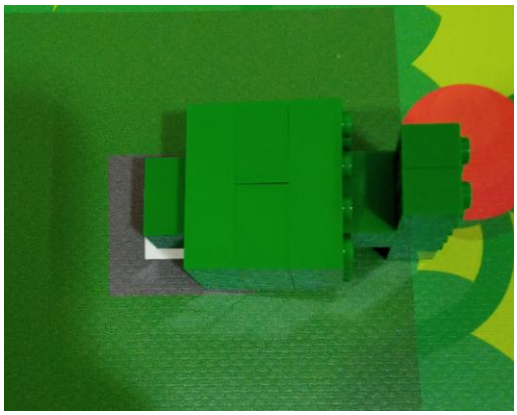
The below images apply to the green tomatoes in the vegetable area and the compost bins in their grey start areas.

Green tomato in original starting position.

5 points

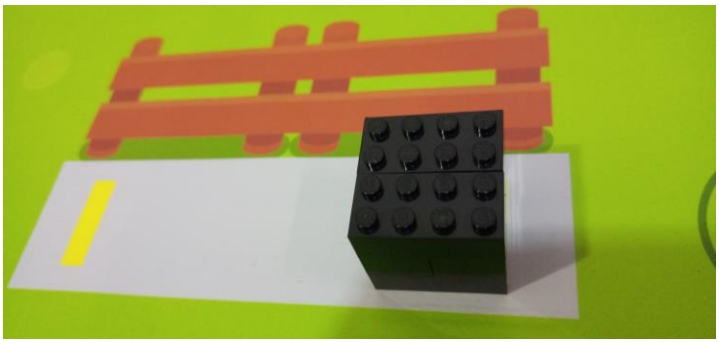
Green tomato moved from its starting position.

0 points



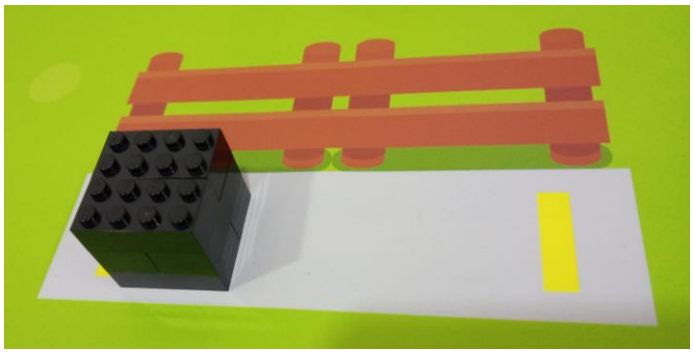
Green tomato fallen over.

0 points



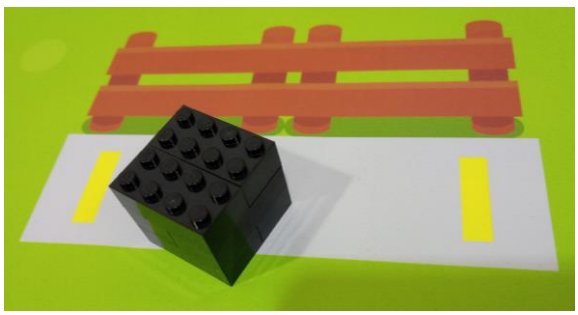
Compost bin not moved, in its original starting position.

5 points



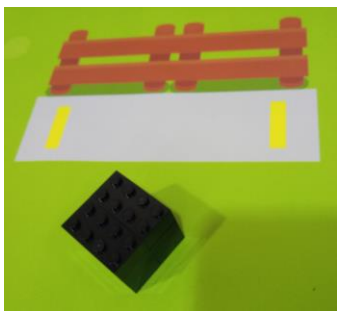
Compost bin moved from its starting position but completely inside the grey area.

5 points



Compost bin moved and touching outside of the grey starting area.

0 points

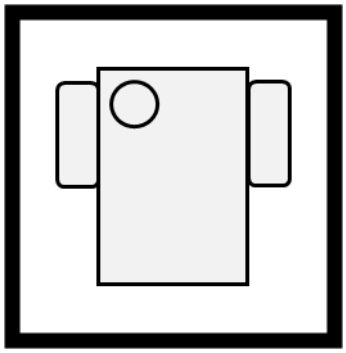


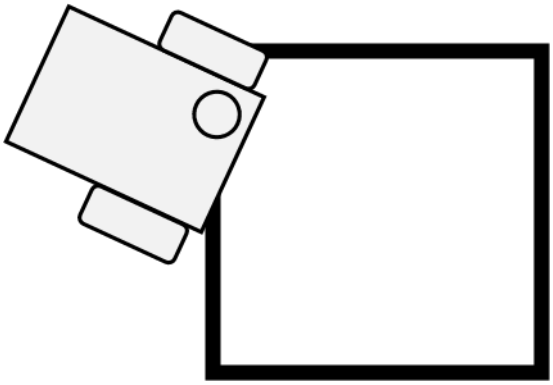
Compost bin moved and completley outside of the grey statring aea.

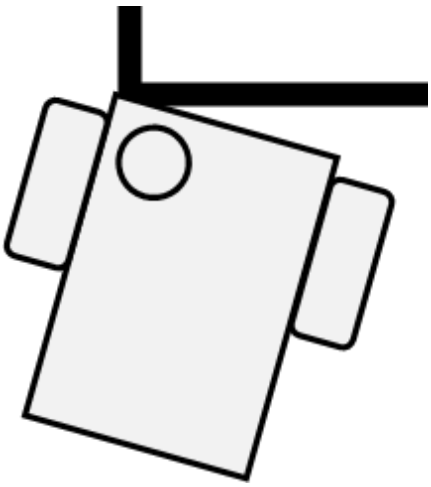
0 points

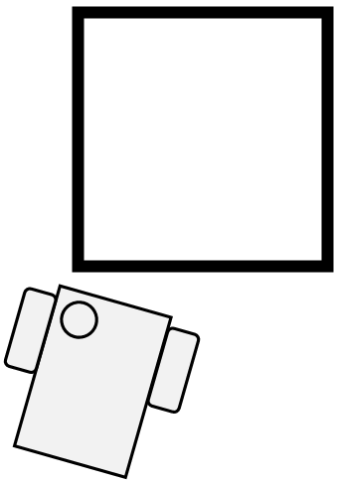
Robot finishing points

The robot must finish with parts of the robot projecting into the start/finish area. The robot only needs to project into this area for points to be scored. The robot does not need to have attempted all mission tasks for these points to be scored. Some positive points must be scored these do not include the points for the ultra-sonic sensor or the bonus points.

<table>
<tr>
<td> 
Robot completely inside the start/finish area.

20 points</td>
<td> 
Robot projecting into the start/finish area

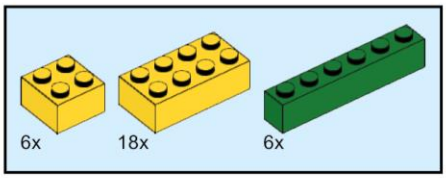
20 points</td>
</tr>
<tr>
<td> 
Robot not projecting into the start/finish area.

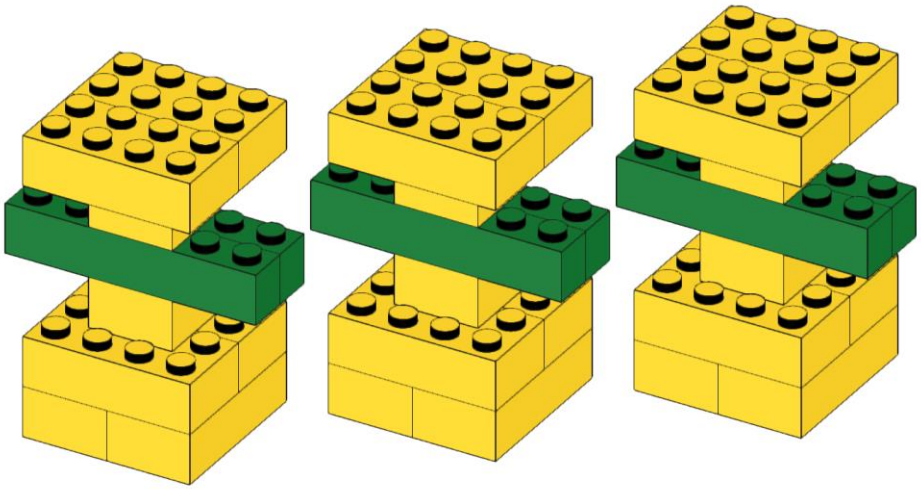
0 points</td>
<td> 
Robot touching the border line around the start/finish area.

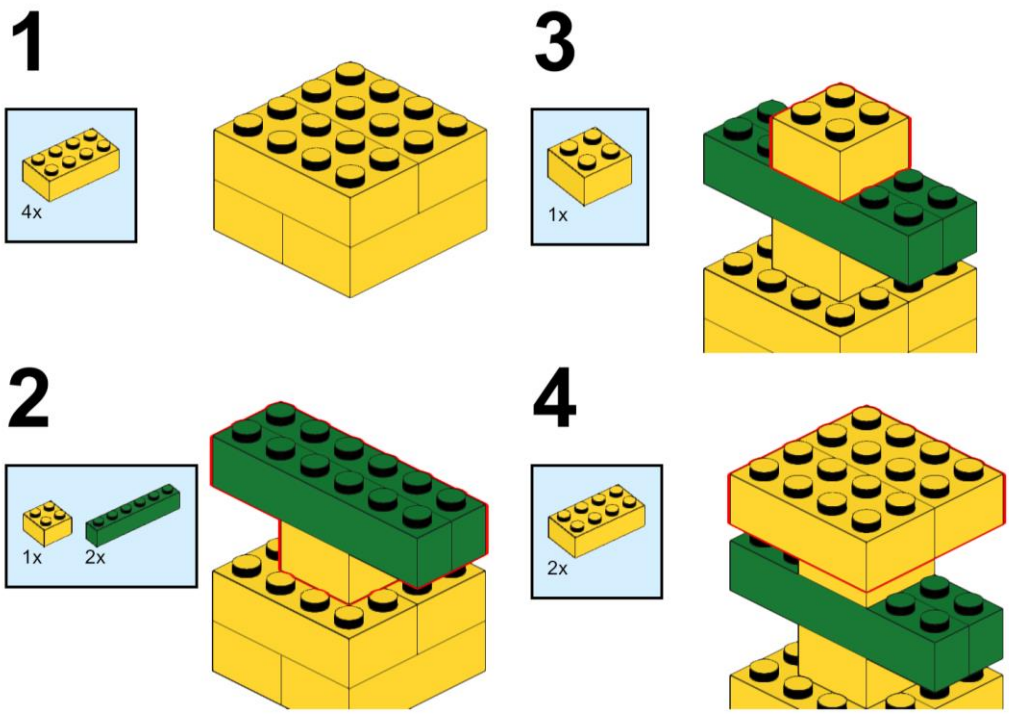
0 points</td>
</tr>
</table>

PART TWO – ASSEMBLY OF GAME OBJECTS

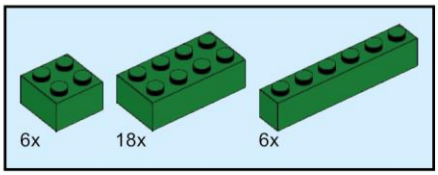
Daisies (x3)

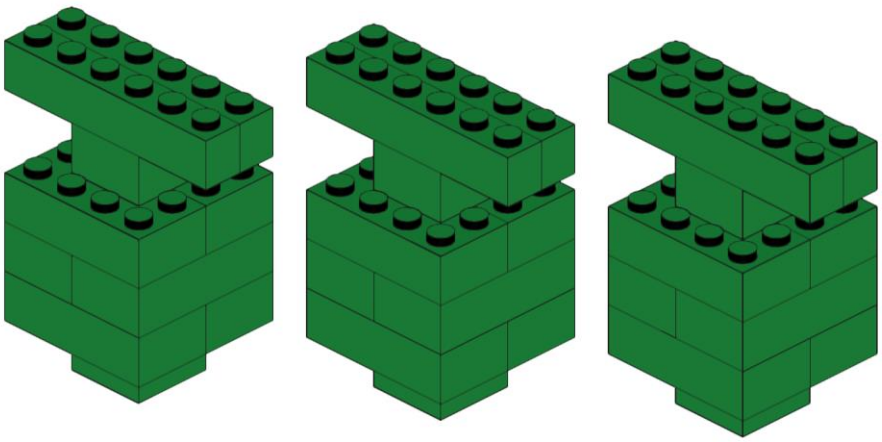


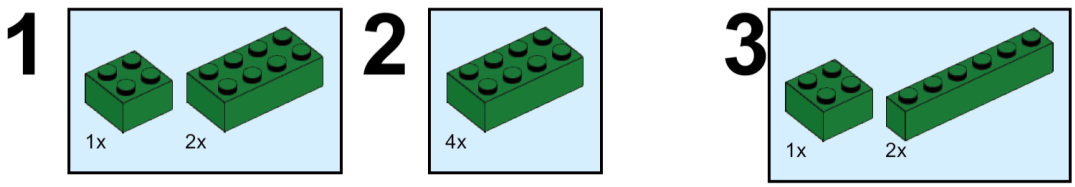


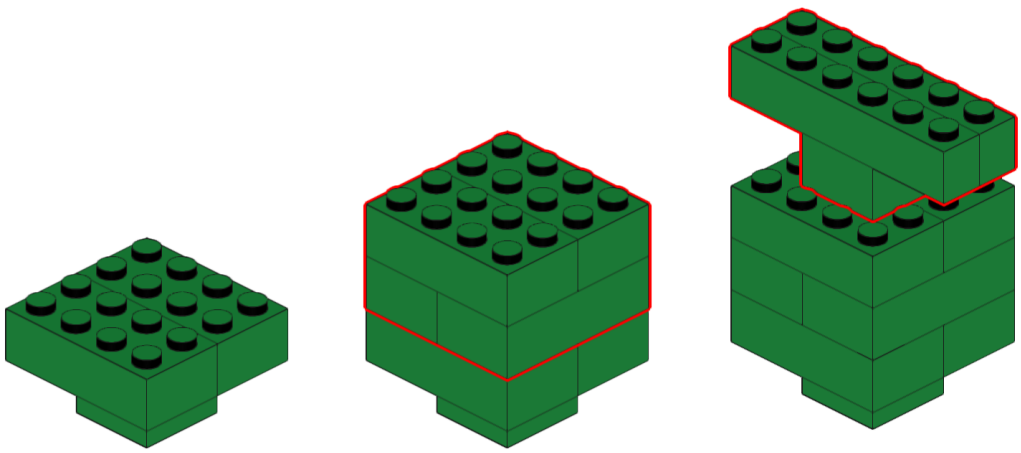


Green Tomato (x3)

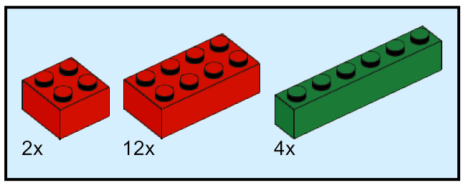


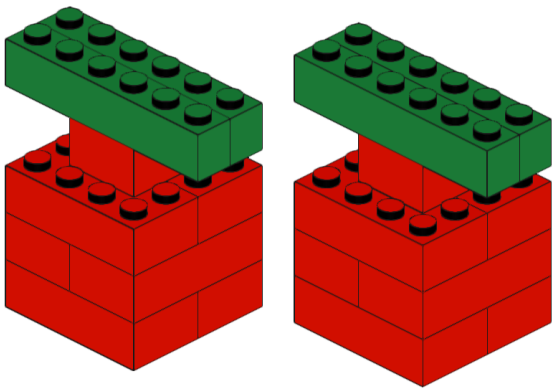




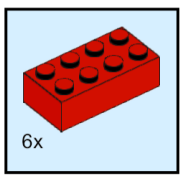


Red Tomato (x2)

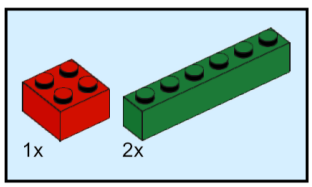


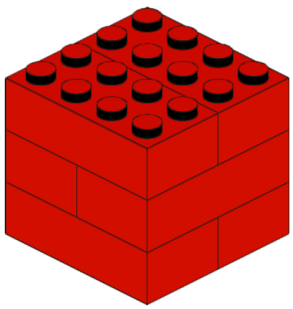


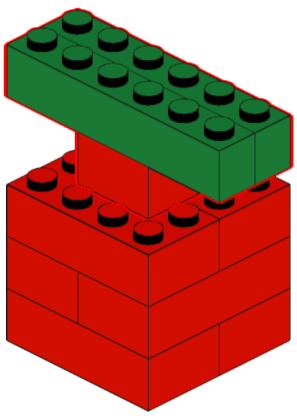
1



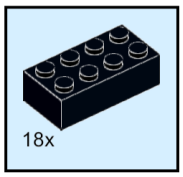
2

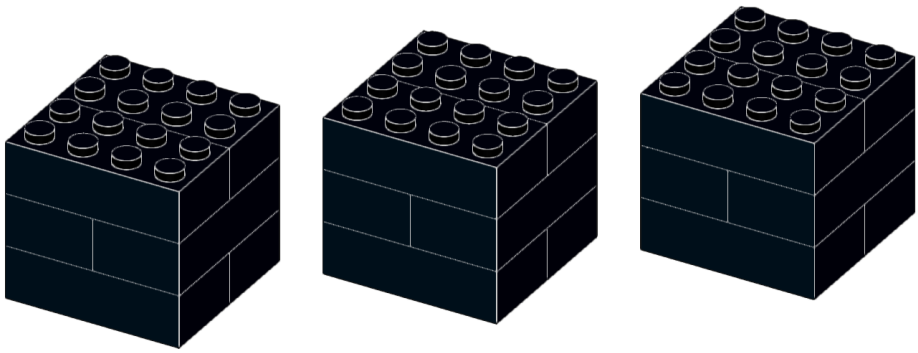




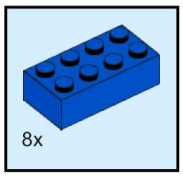


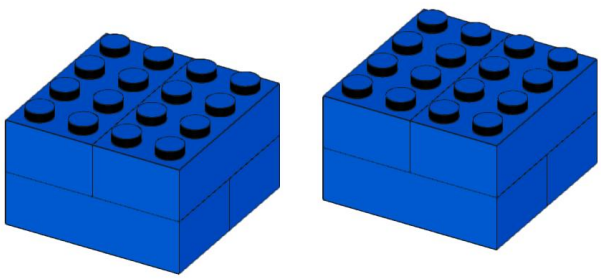
Black Compost Bins (x3)



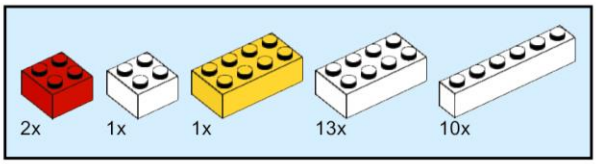


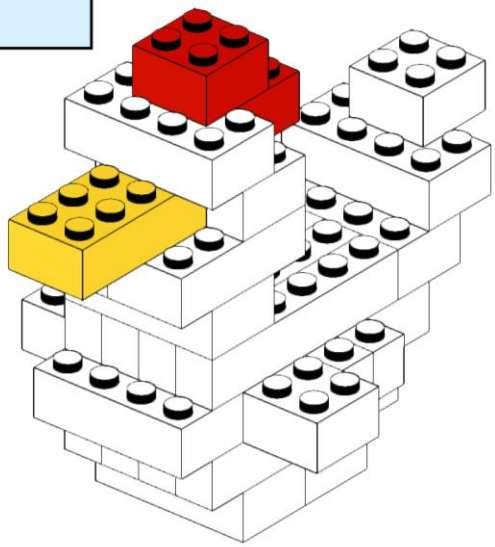
Water Blocks (x2)



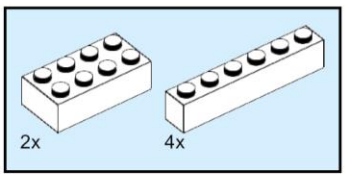


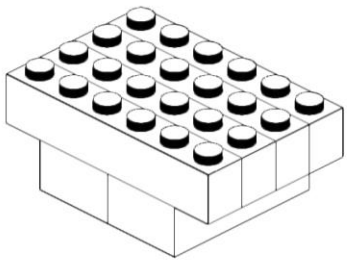
Chicken (x1)



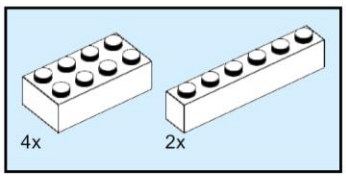


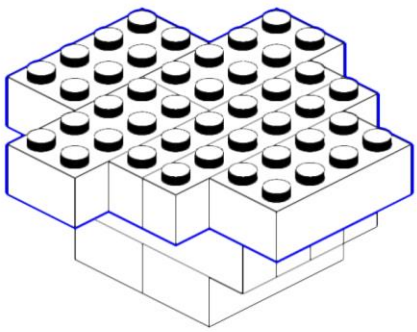
1

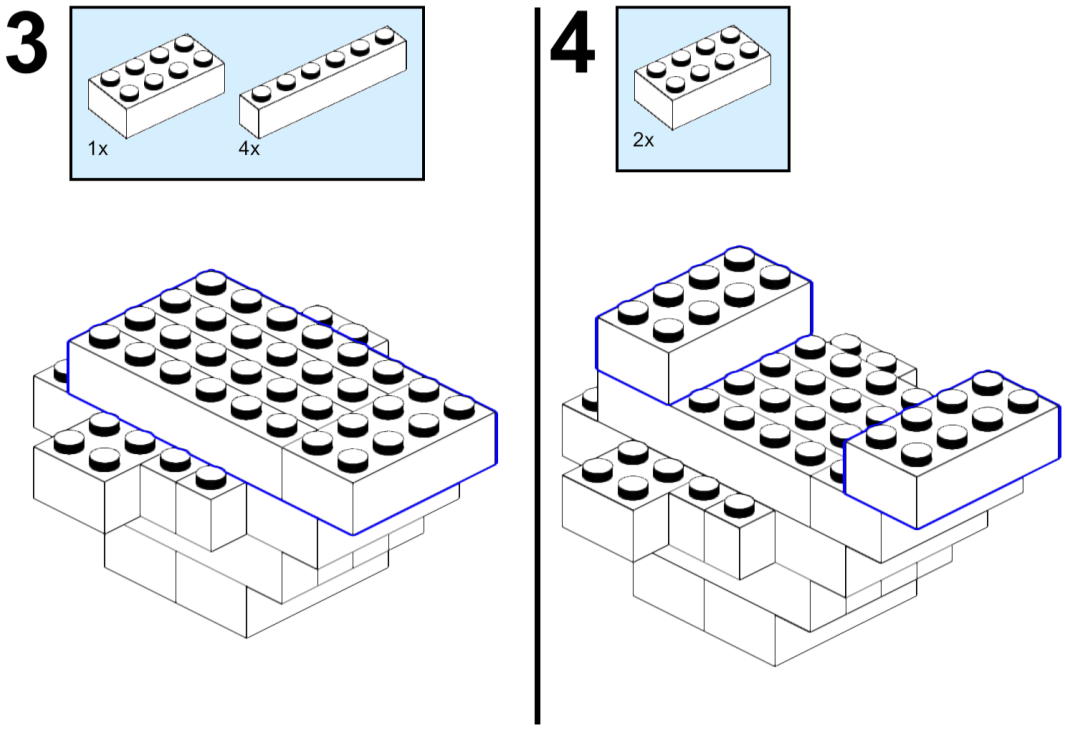


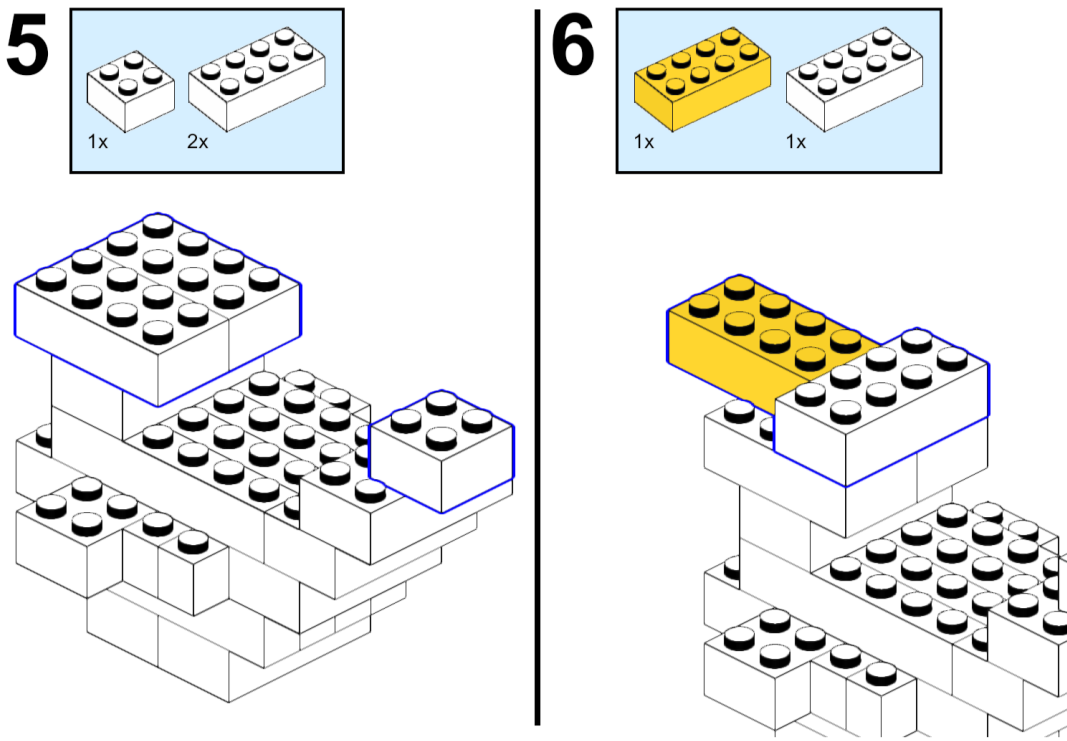


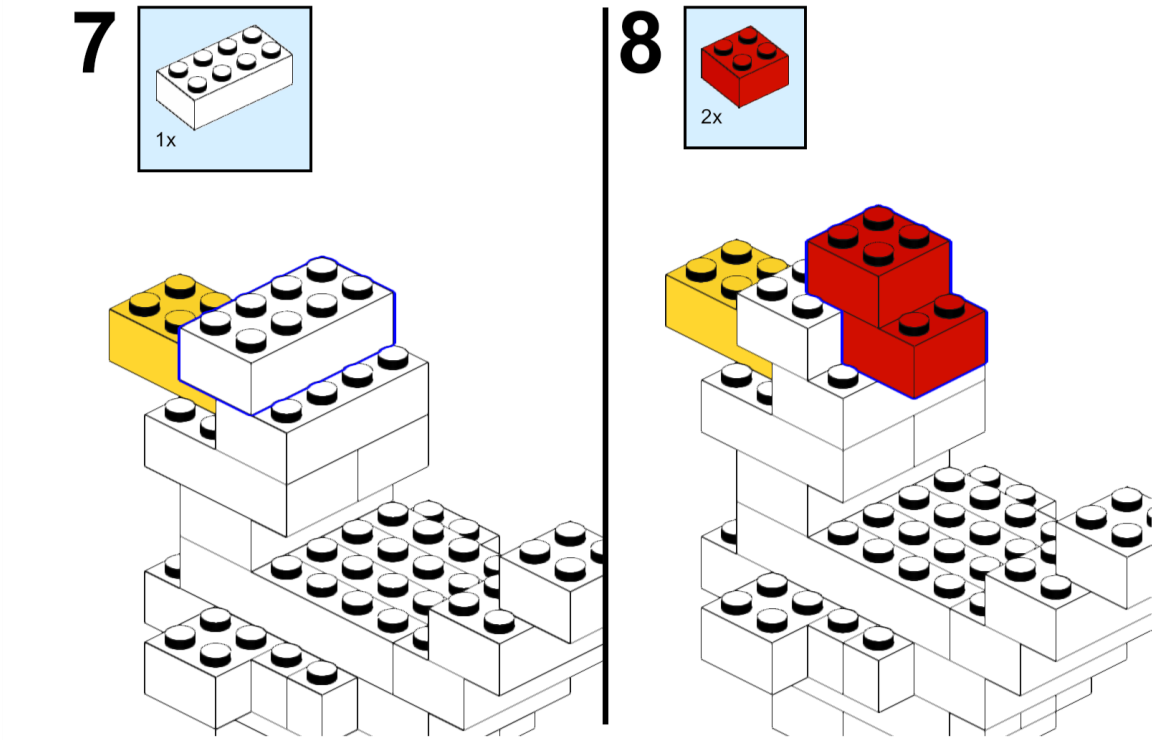
2



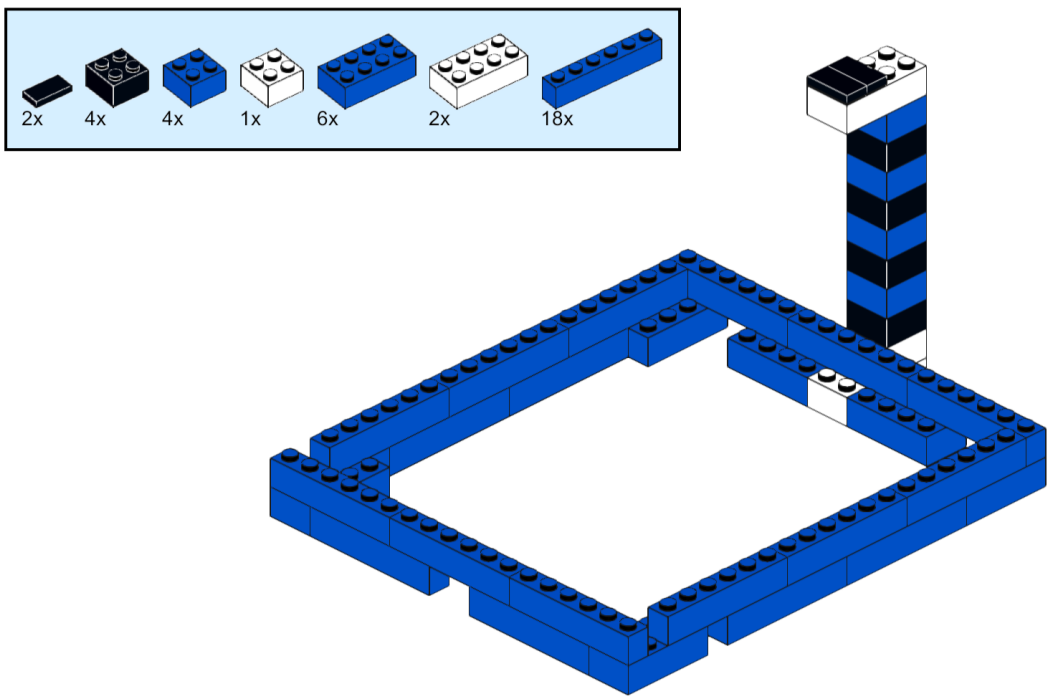


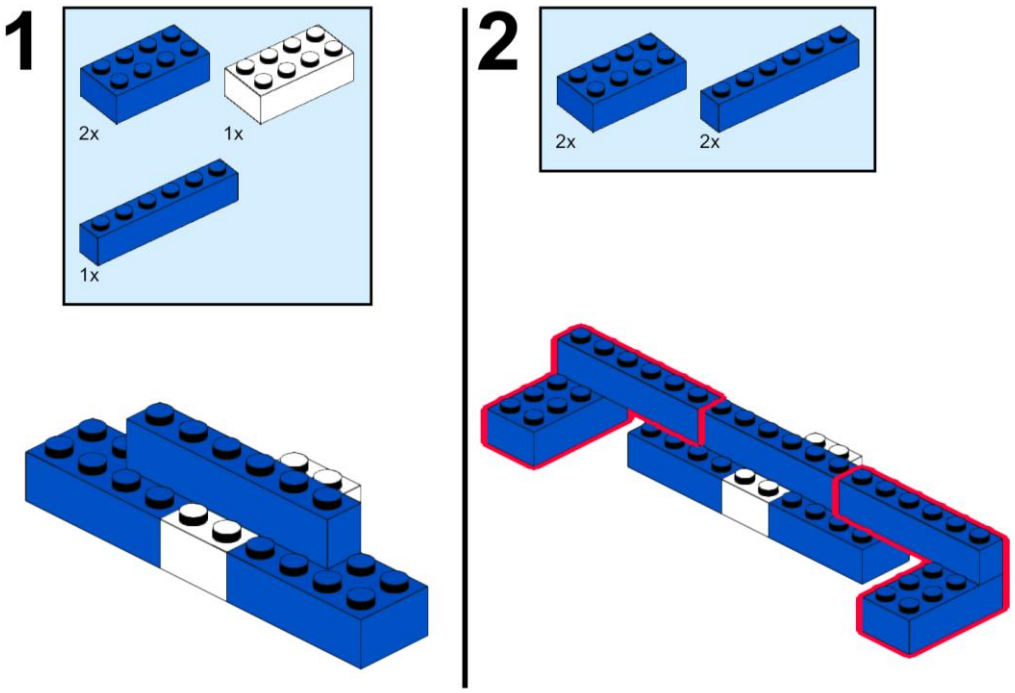

3
1x
4x
4
2x

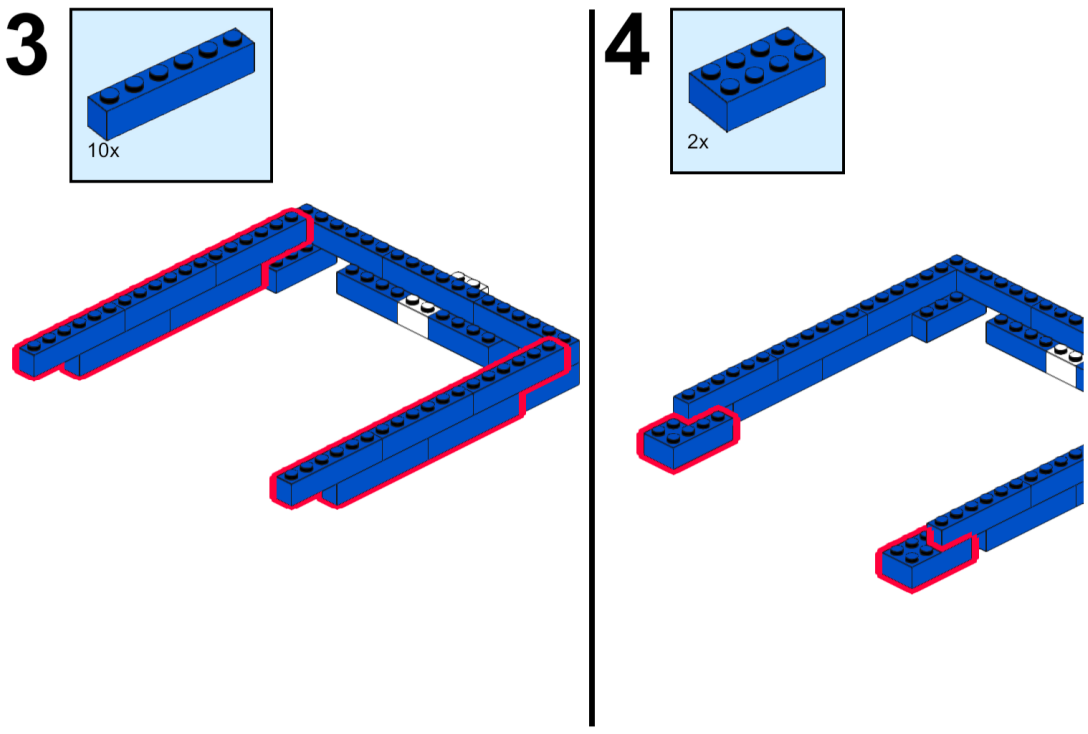

5
1x
2x
6
1x
1x

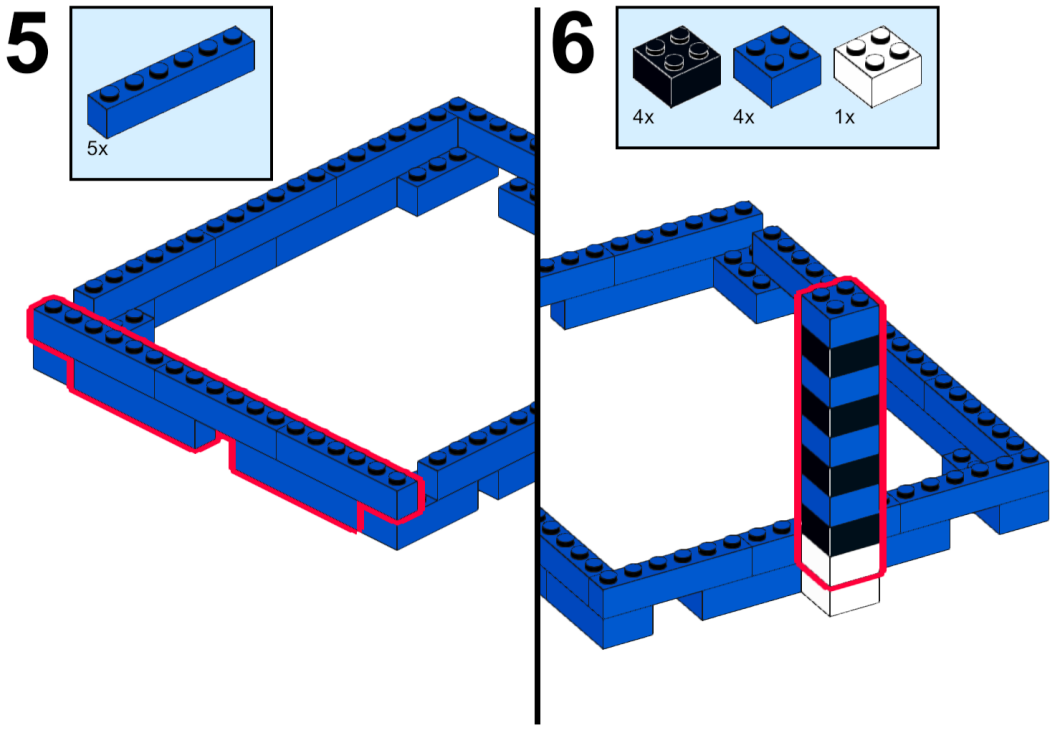


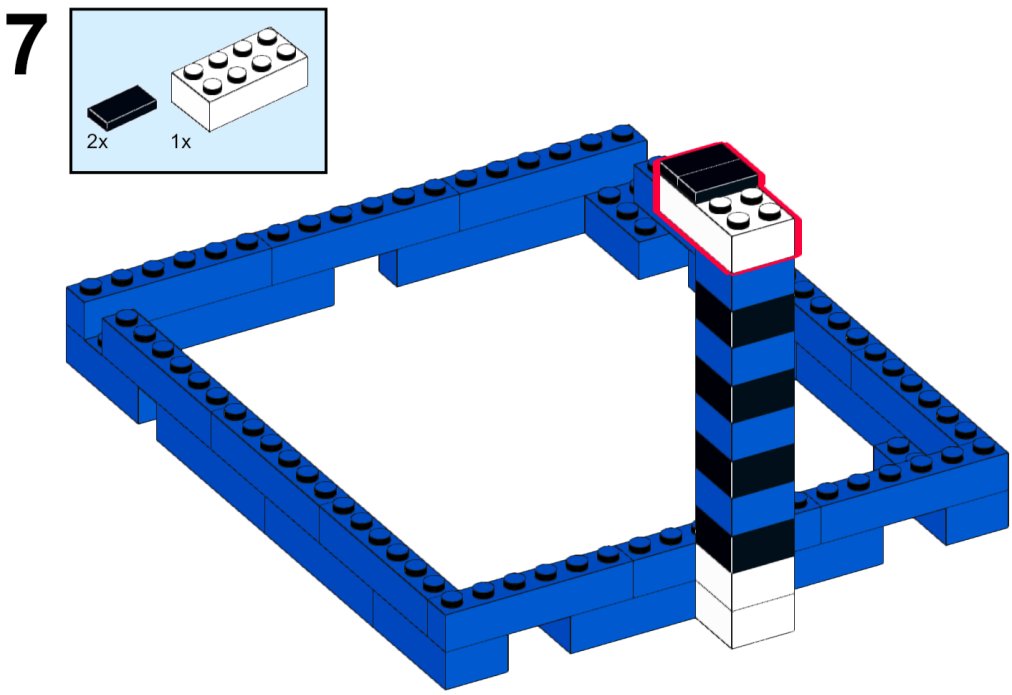
Swimming Pool (x1)



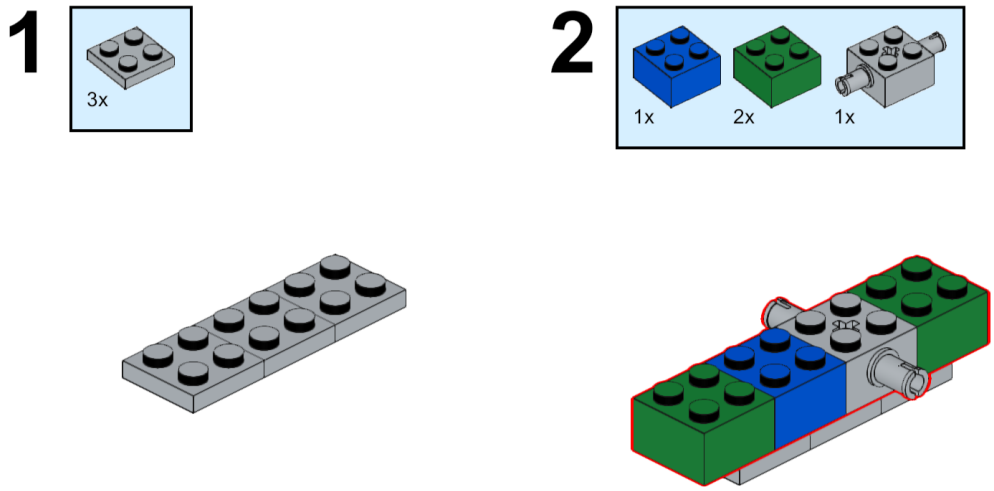

1
2x
1x
1x
2
2x
2x


3
10x
4
2x

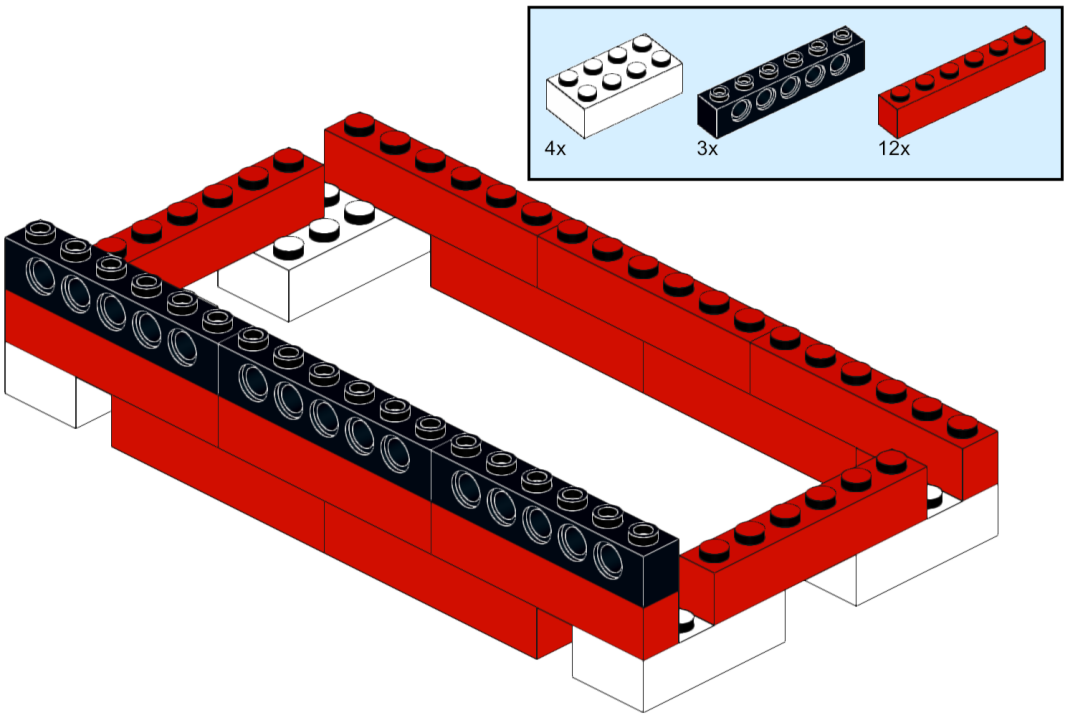

5
5x
6
4x
4x
1x

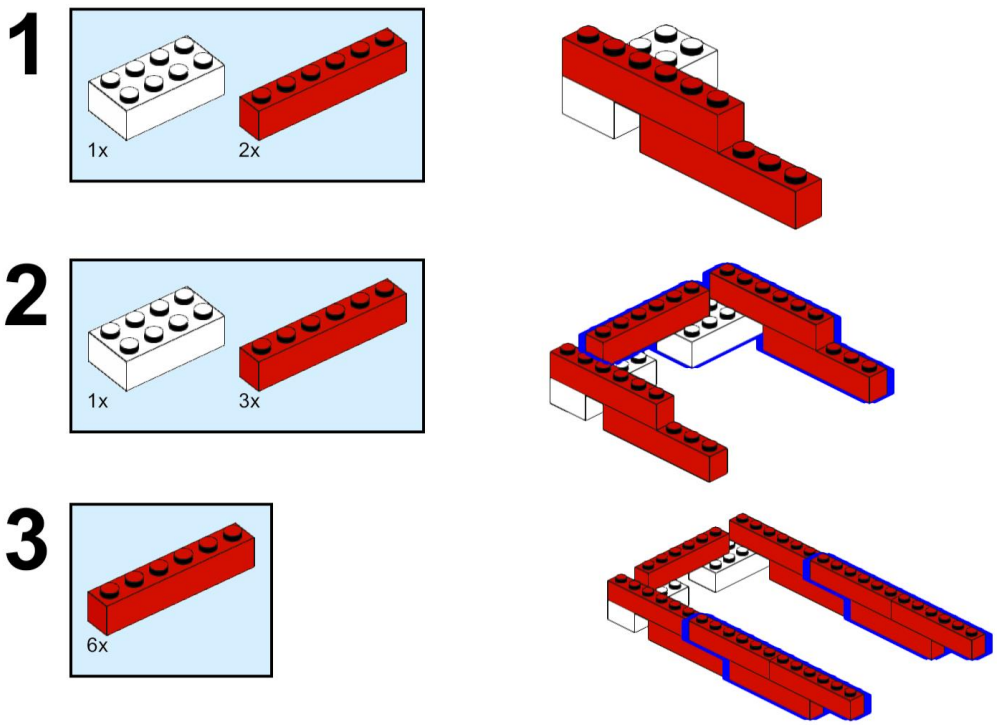

7
2x
1x

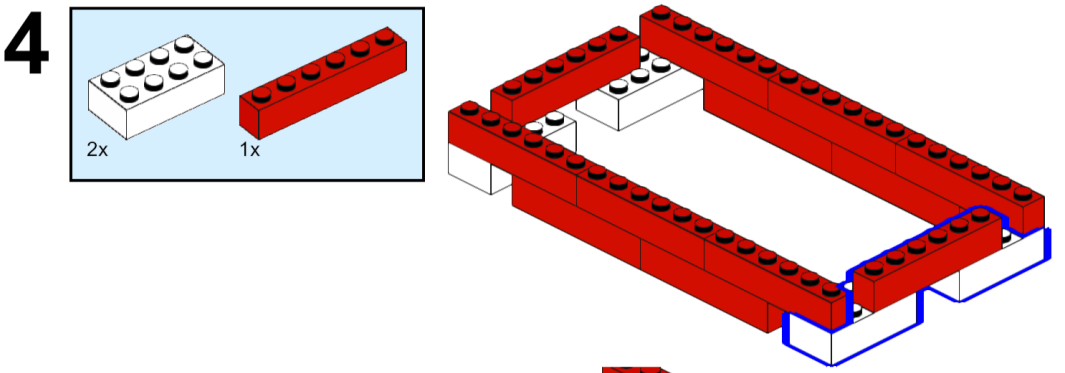
Diver (x1)

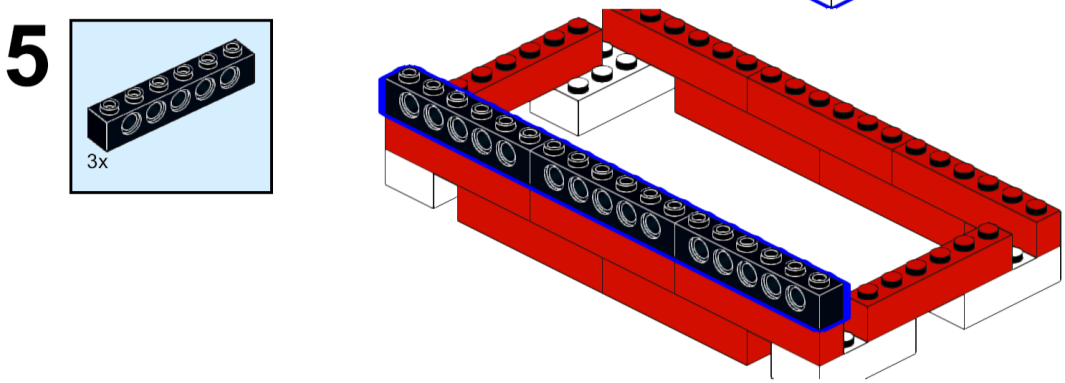


Flower Cutting Box (x1)






4
2x
1x


5
3x