South Africa 2021

Explorer Category - Lite

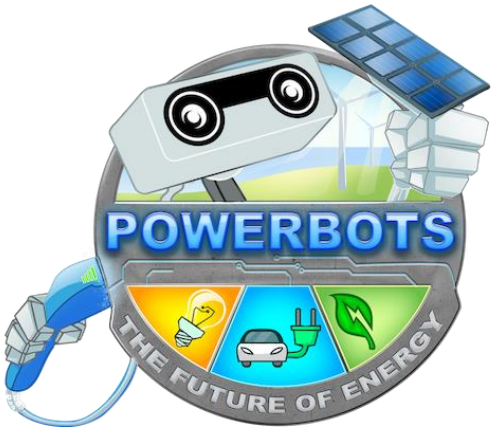
(6-12 years)

Game Rules

POWERBOTS

Energy at Home

Version: March 10th



WRO International Premium Partners

LEGO education

JUNIPER NETWORKS

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1. Introduction

Using our energy resources responsibly is very important for our future. This is important for our whole society, but also for our own houses.

On the playing field of the Elementary age group, the robot helps to modernize a house. The robot will replace old lamps with new energy saving lamps. The robot also needs to mount solar cells on the roof and needs to install intelligent smart home devices.

This work will help to reduce the energy demand of the house and to make the best use of renewable energy.

1.1 Explorer Description

- “EXPLORER” is based on the WRO Elementary table challenge with simplified tasks and a platform for multiple attempts to keep improving your score.
- This challenge has been designed for beginners or learners new to the WRO who would like to participate in robotics challenges but are not yet ready for the Regular WRO.
- The Provincial Explorer Competitions may happen on the Friday afternoon before WRO Provincials on Saturdays due to the number of entries and may be held in the same venue.
- Explorer challenge is run on the PVC roll up printed mats and game elements are built from the 45811 WRO elements box.
- There will be an “Explorer” category at all the Provincial competitions and participants may qualify to participate at the National Competition based on their highest score and time taken to register the score.
- The challenge has been designed on the WRO 2021 Regular Elementary competition mat – Energy at Home.
- Both age groups, Explorer Lite 6-12 years old and Explorer Prime 13-15 years old will participate on the same “Energy at Home” challenge mat but the level of difficulty for Explorer Prime will change (see Explorer Prime rules)
- There is no Senior Explorer challenge, learners older than 15 years of age will need to participate the in the Regular Category Senior challenge.
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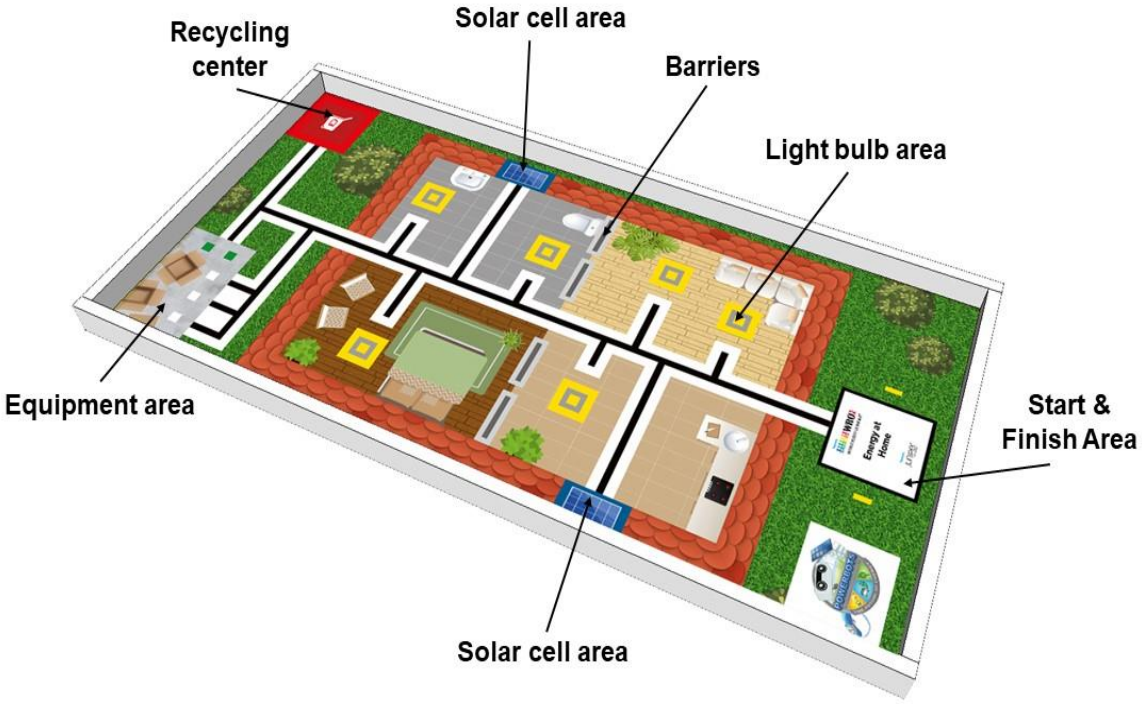
1.2 Explorer General Rule

- Please see the Explorer general rules pack for all rules pertaining to robot restrictions, field regulations, competition ethics etc. This can be found on the WROSA website www.wrosa.co.za

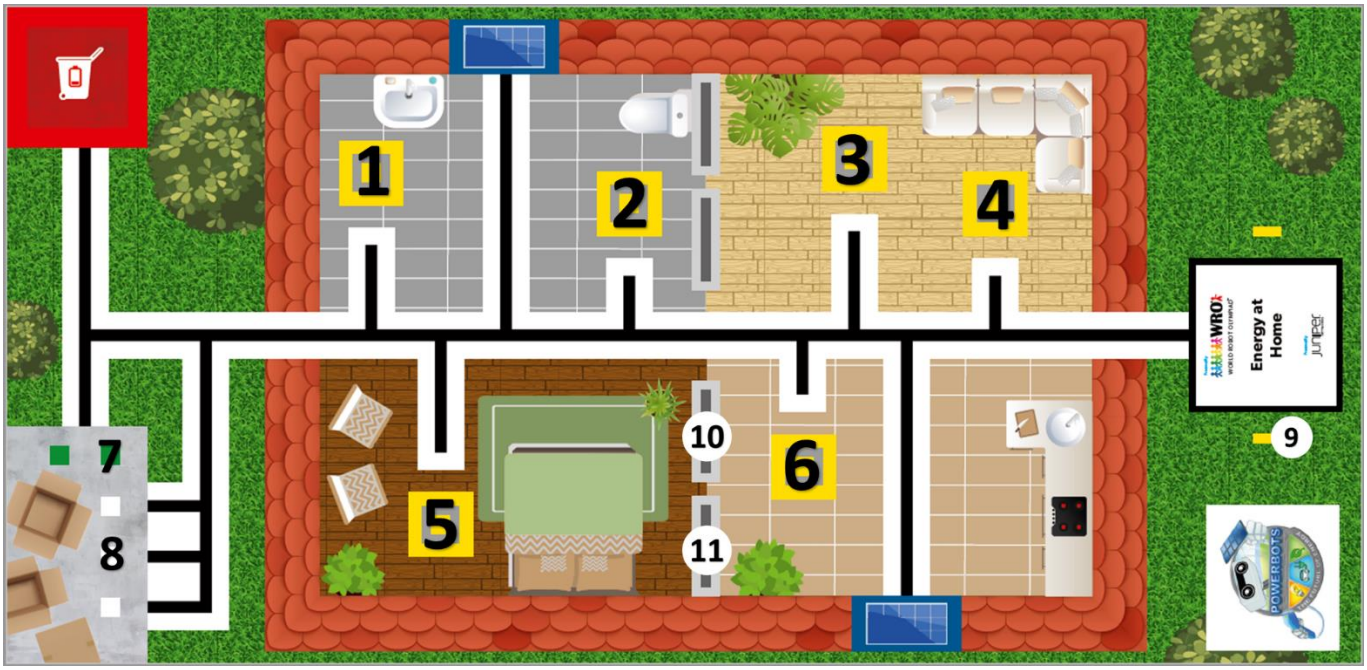
2. Game Field

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 long side with the two start areas on the wall and align them centred between the short walls.

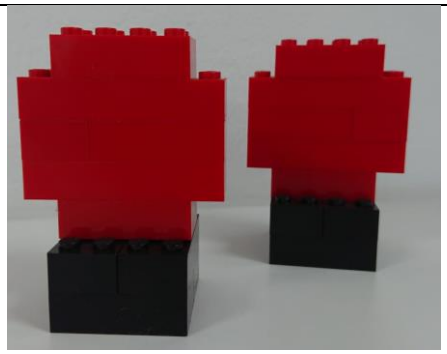


3. Game Objects, Positioning

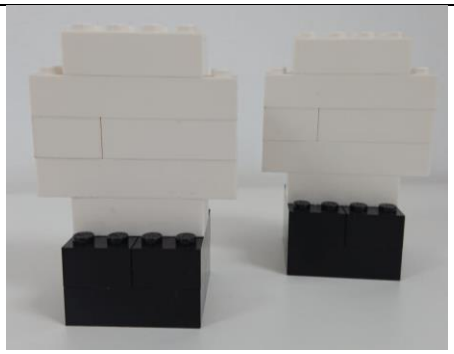


Light Bulbs

There are 2 red light bulbs, 2 white light bulbs, and 1 yellow light bulb.



2 x Red Bulbs



2 x White Bulbs

1 x Yellow Bulb

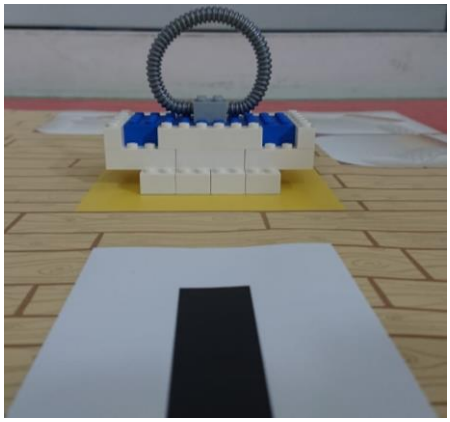
Positioning of lightbulbs on the game mat

All light bulbs are to be placed on the small yellow square inside their designated starting light bulb area.

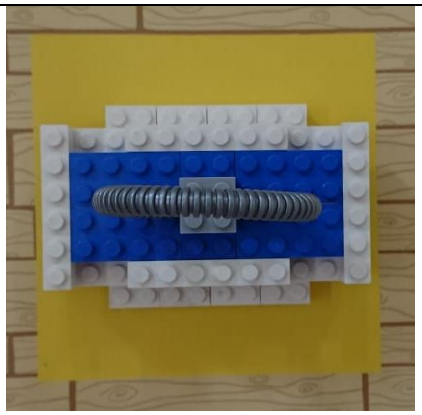
1. **Red lightbulbs:** placed in lightbulb areas 1 and 2
2. **White lightbulbs**: placed in light bulb areas 5 and 6
3. **Yellow lightbulb**: placed in light bulb area 3.

Solar Cell

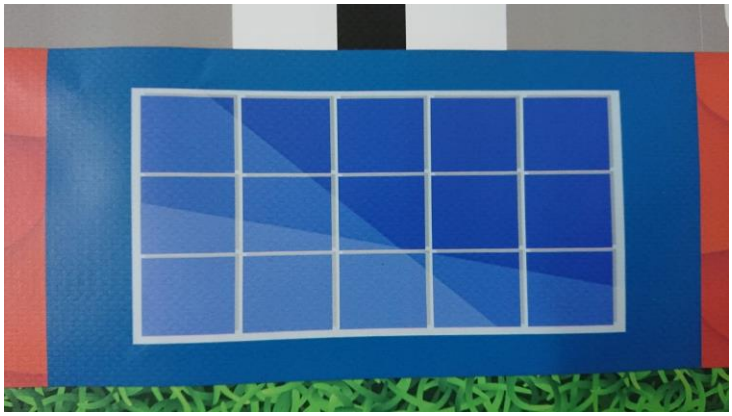
There is one solar cell, starting in position 4 on the game mat. The long edge of the solar cell must face the black line on the mat and be placed completely covering the grey area of its start position. The solar cell must be moved to a blue solar cell area (solar panels)



Solar Panel



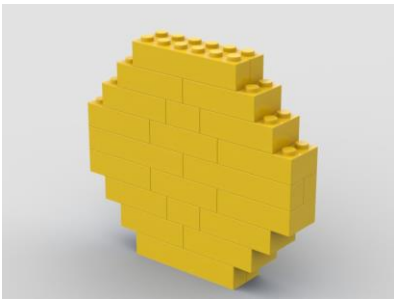
Solar cell placed in starting position



Solar Cell Area

The Yellow Sun

There is one yellow Sun, that starts on the little yellow rectangle in position 9 underneath the start area.



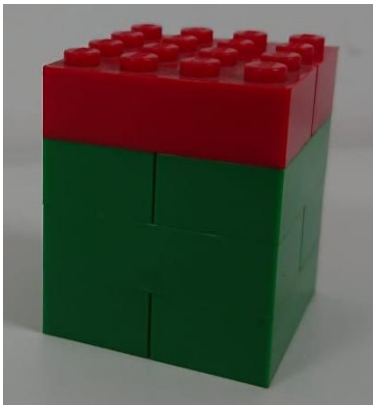
Yellow Sun

Sun in position 9, underneath the start area

Smart Devices

There are 2 kinds of smart devices on the game mat. 1 x green smart device in position 8, 1 x red and green smart device (broken smart device) in position 7

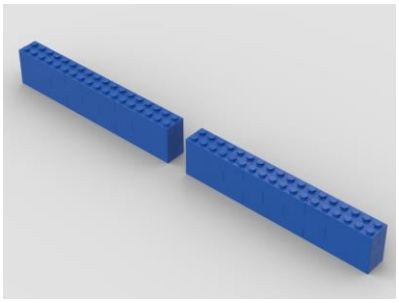
Green smart device



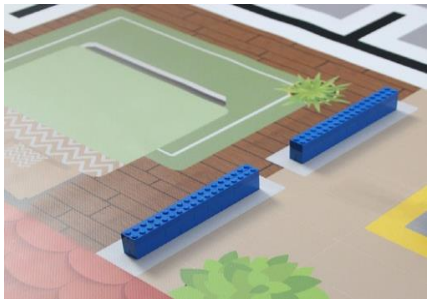
Red and green smart device (broken smart device)

Blue barrier walls

There are two barriers on the field. Both barriers are placed on the grey rectangles in positions 10 and 11.



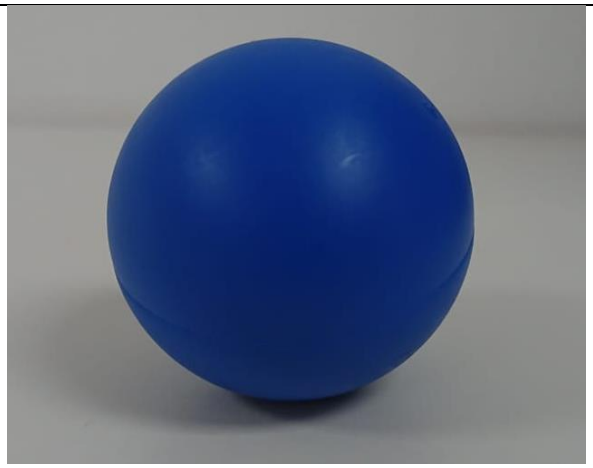
Placed in between the grey markings in positions 10 and 11



Placed in the furthest home area from the start.

WRO Ball

There is one Blue or Red WRO ball that must be placed on the robot in the start and finish area before the robot begins its run.



Official blue or red ball found inside of the WRO elements box (45811)

Robot Start and Finish Areas

The Start/Finish area is the White Energy at home square. The robot must fit completely inside of this area before it can start. To finish the robot must finish with both driving wheels inside of the white area.

Team Interview

Teams will be expected to explain to the judge how they designed their robot, what their strategy for completing the challenge is and parts of their program.

4. Robot Missions

The team can decide in which order they will do the missions

Start the robot, with all wheels completely inside the Start/Finish area

- Use a touch sensor to start the program and wait for 1 second to go
- Use a light sensor to follow a black line for approximately 20cm anywhere on the mat
- Move the 2 RED light bulbs into the recycling centre (bonus points if both red bulbs are in the recycling area)
- Move the 2 WHITE light bulbs into the open RED lightbulb spaces (large YELLOW square in position 1 or 2)
- Move the White/Blue solar cell onto a BLUE solar cell area
- Move the Red and Green broken smart device into a cardboard box in the Equipment area
- Move the GREEN smart device into an open WHITE lightbulb space (large YELLOW square in position 5 or 6)
- Knock over the YELLOW sun
- Do not move any of the BLUE walls outside of their grey starting areas
- Do not move the YELLOW lightbulb off its start position

Use a light/colour sensor to see/read a BLUE solar cell area and immediately use a 3rd motor mechanism to throw a WRO LEGO ball off the table
Can a team member catch the ball (best catch could win a prize)

- Use a light/colour sensor to see/read a BLUE solar cell area and immediately
- Use a 3rd motor mechanism to throw a WRO LEGO ball off the table

- Use the ultrasonic sensor to measure a BLUE barrier wall and stop the robot before hitting the blue barrier wall
- Finish with the 2 drive wheels of the robot completely inside the start/finish area (only awarded after scoring positive points on the mat)

NB!!

In the Explorer Lite Category objects can be partially in or out of the target areas for teams to be awarded points

For example, if a team moves the solar cell to the solar cell area and part of the solar cell is outside of its area, the object is considered inside, and the team will be awarded points for this positioning. In Explorer Lite the judge will bias their decision to the best possible outcome.

Note:

There may be an addition of a surprise rule at the National Competition for more bonus points

5. Explorer Lite Score Sheet

WRO WORLD ROBOT OLYMPIAD

Judge Name:

Explorer Lite Category

Team Name:

Tasks	Points:	1st Score	2nd Score	3rd Score	4th Score
Touch sensor used to start the robot and robot waited 1 second before moving:	10				
Used a light sensor to follow a line for approximatley 20cm	30				
Moved first red light bulb to recycle area	10				
Moved second red light bulb to recycle area	10				
Both red bulbs are in the recycling area	20				
Moved first white light bulb to red light bulb starting position	20				
Moved second white light bulb to red light bulb starting position	20				
Moved solar cell into a solar cell area	10				
Moved red and green (broken smart device) into cardboard box in equipment area	10				
Moved green smart device onto white light bulb start position	10				
Knocked over the yellow sun	20				
Colour/light sensor detected/sensed blue in the solar cell area	20				
Used a 3rd motor to throw the LEGO ball off of the game table (only awarded if colour sensor used to detect solar cell area)	20				
Ultrasonic sensor used to detect a blue barrier wall and stopped the robot	30				
Robot finished with 2 drive wheels in the start/finish area (positive points must have been scored)	20				
Moved either blue barrier wall out off its grey area	-10				
moved the yellow light bulb off of its starting position	-10				
Total:	260				
The time the score was recorded: (e.g. 14:15)	Time:	hh:mm	hh:mm	hh:mm	hh:mm
Did a team member catch the ball thrown by the robot?	Yes / No				

Time of Score ..

Highest Score

Gold 200-260

Silver 140-190

Bronze 80-130

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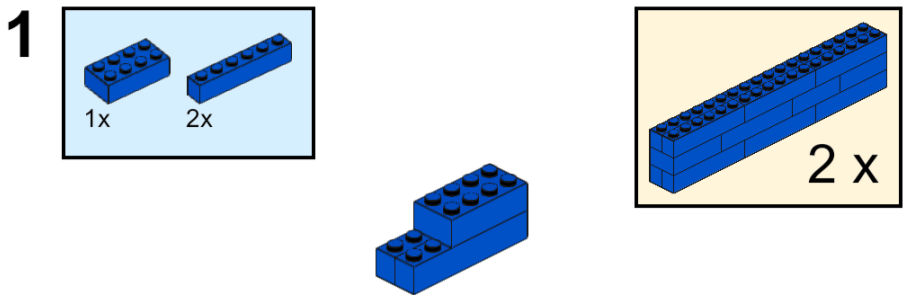
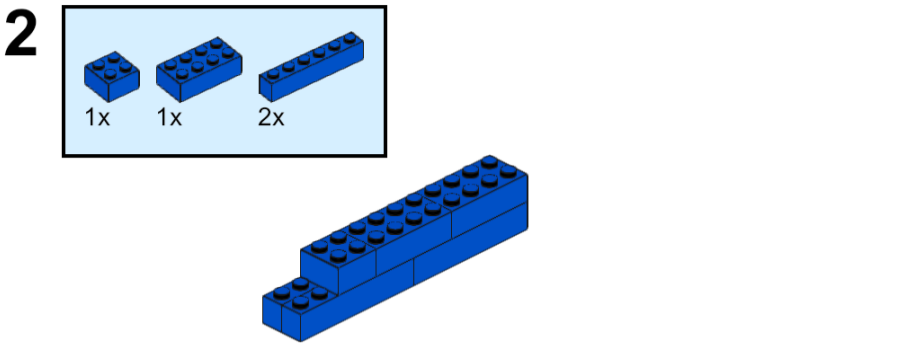
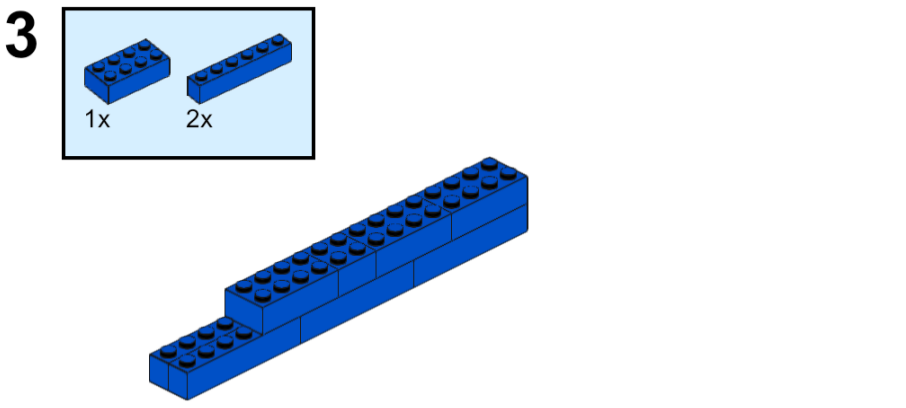
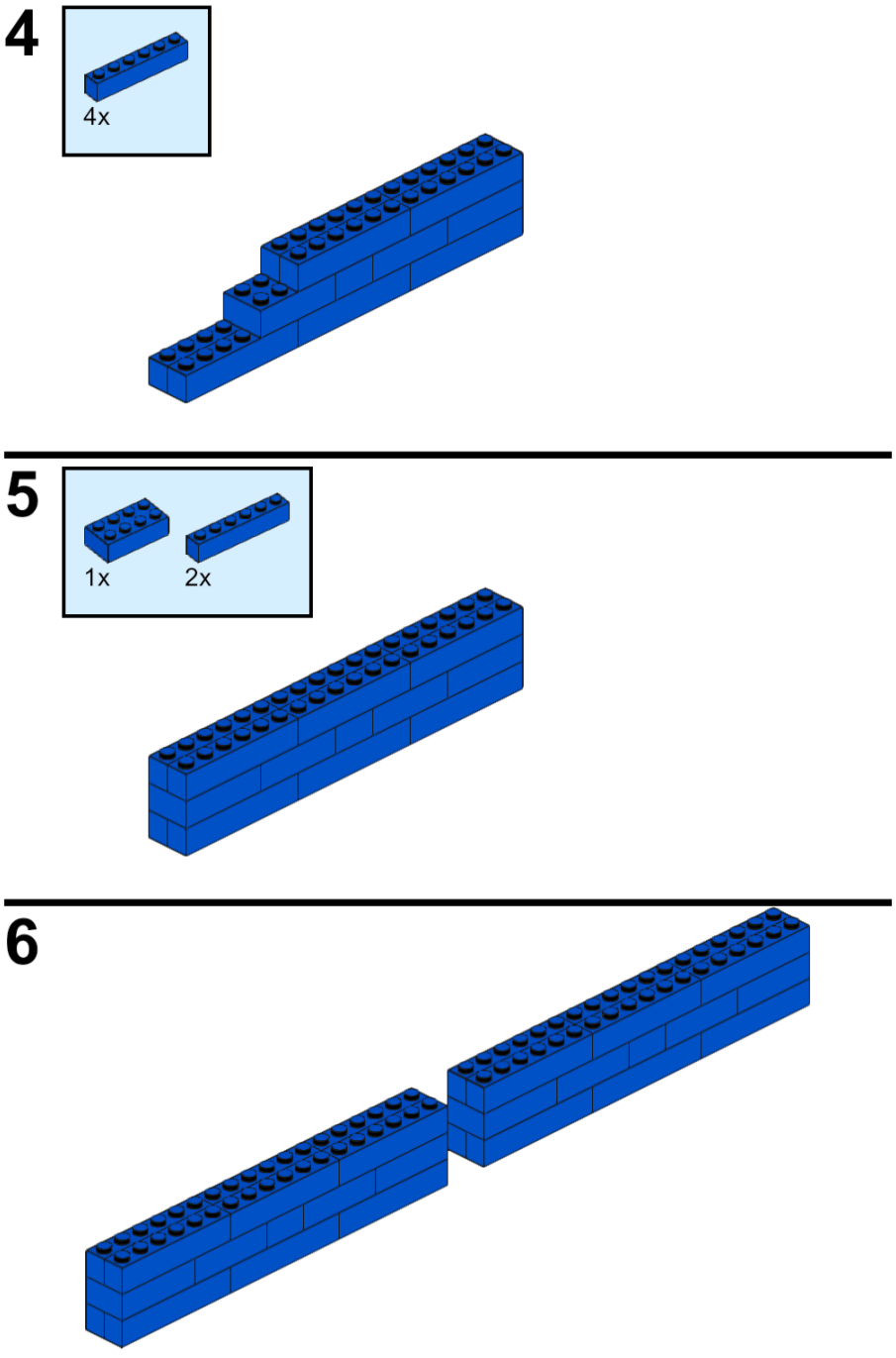
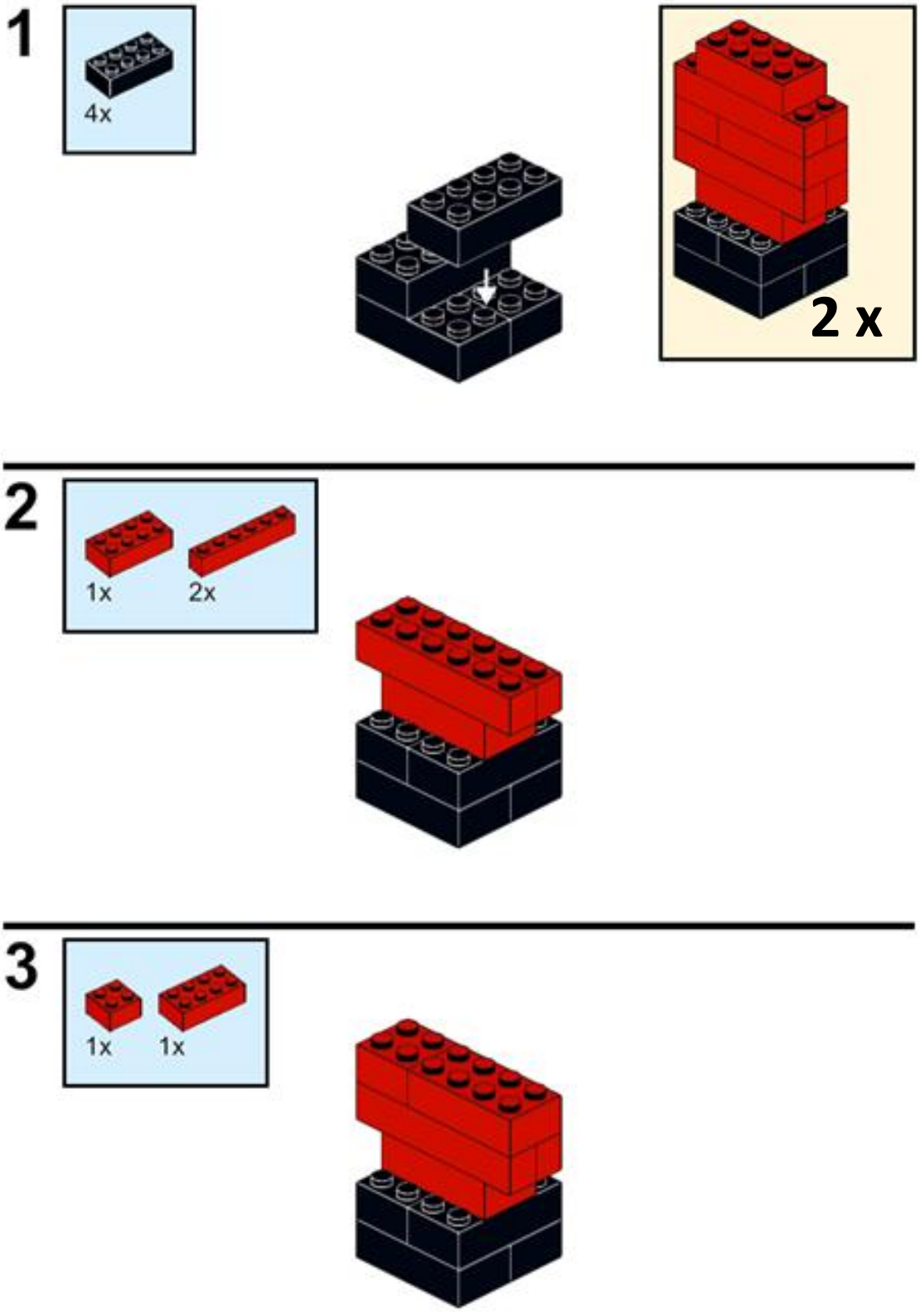
6. Assembly of Game Objects

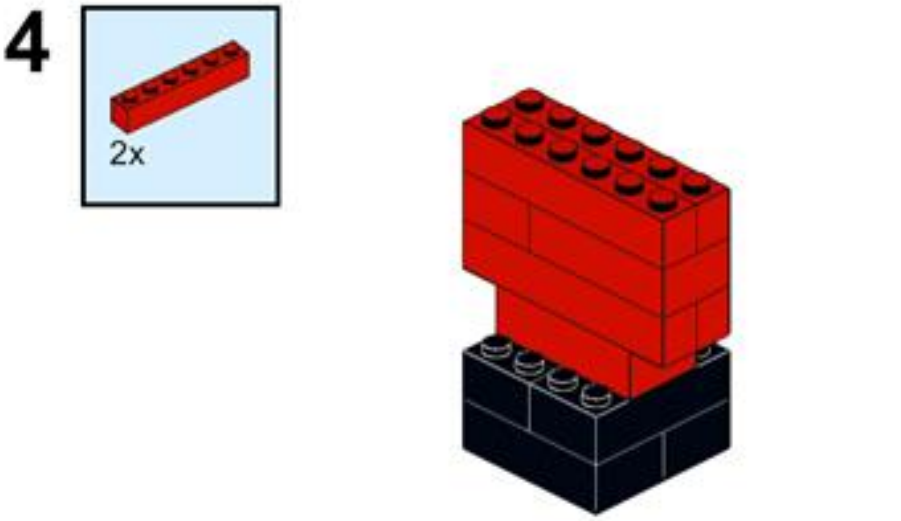


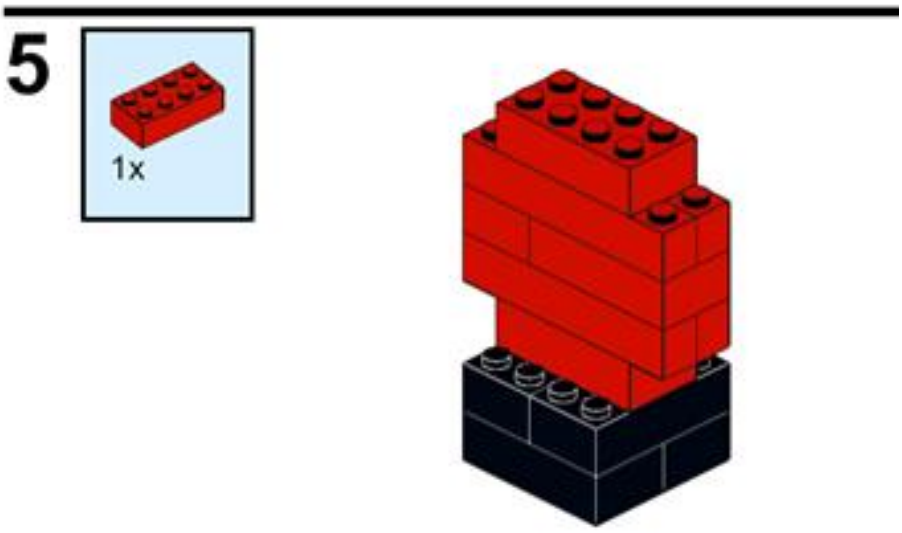


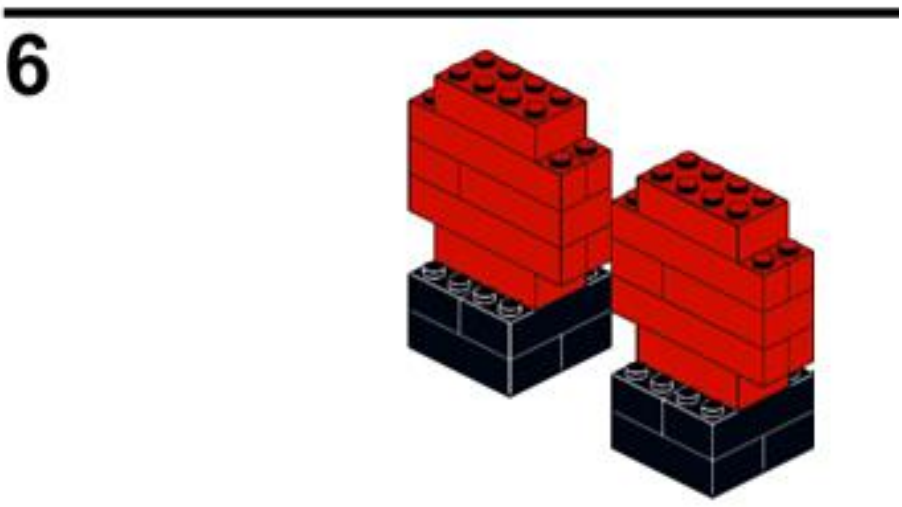


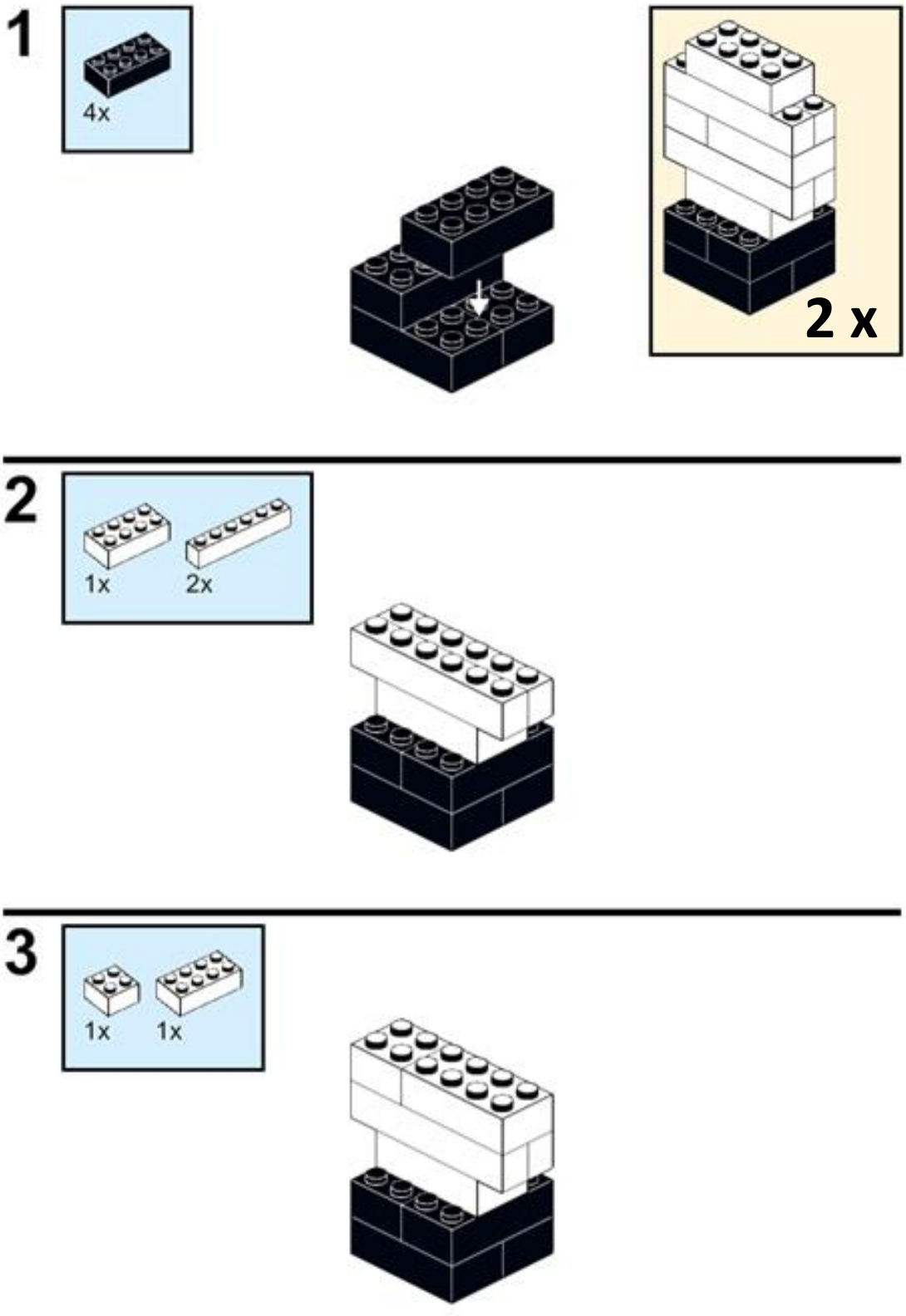


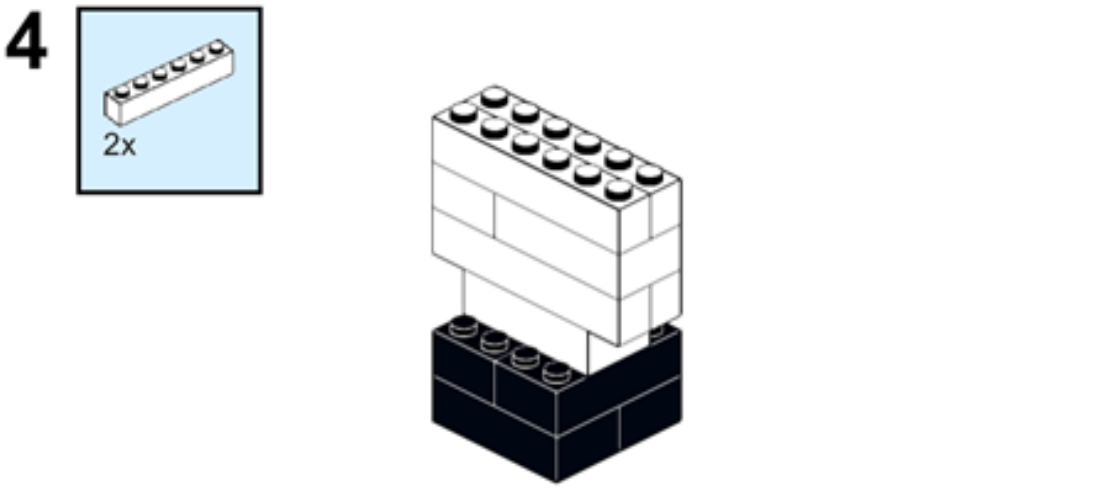


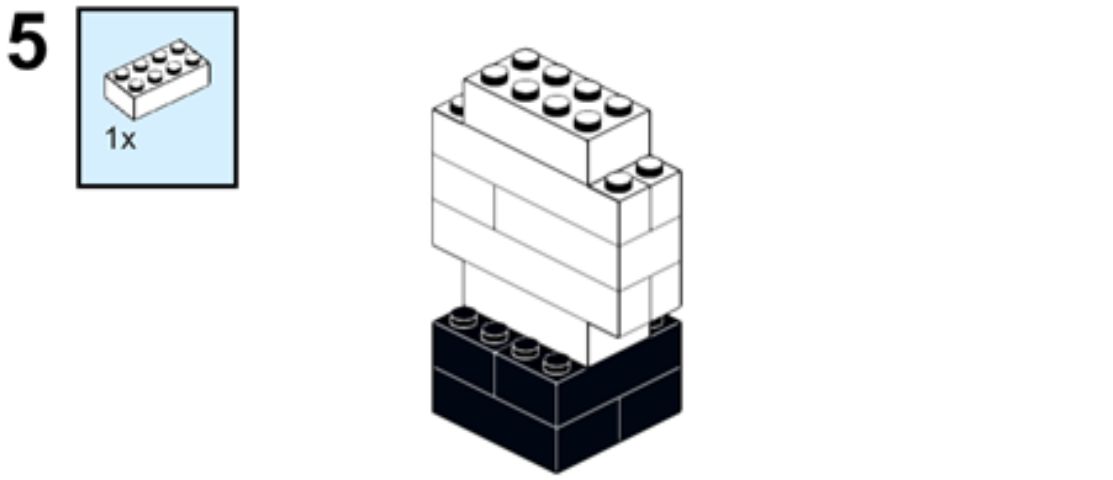


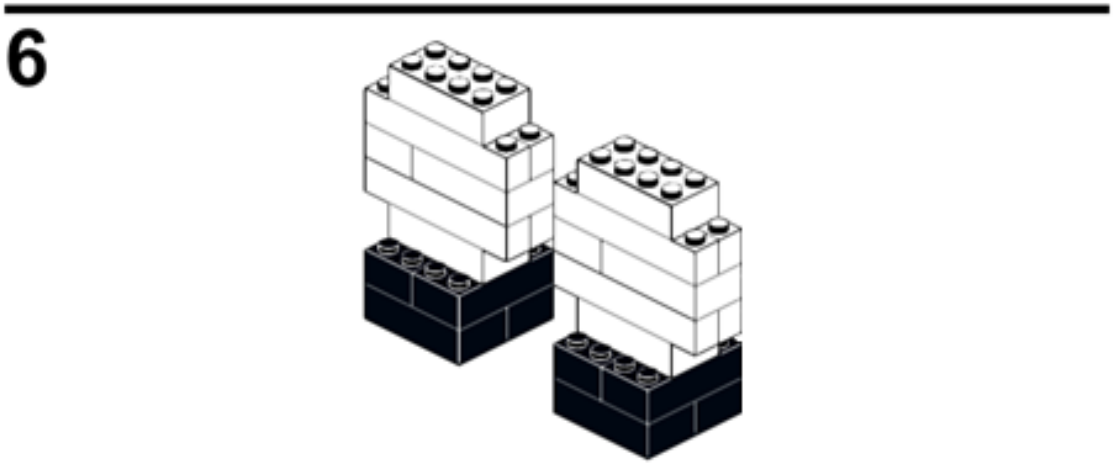


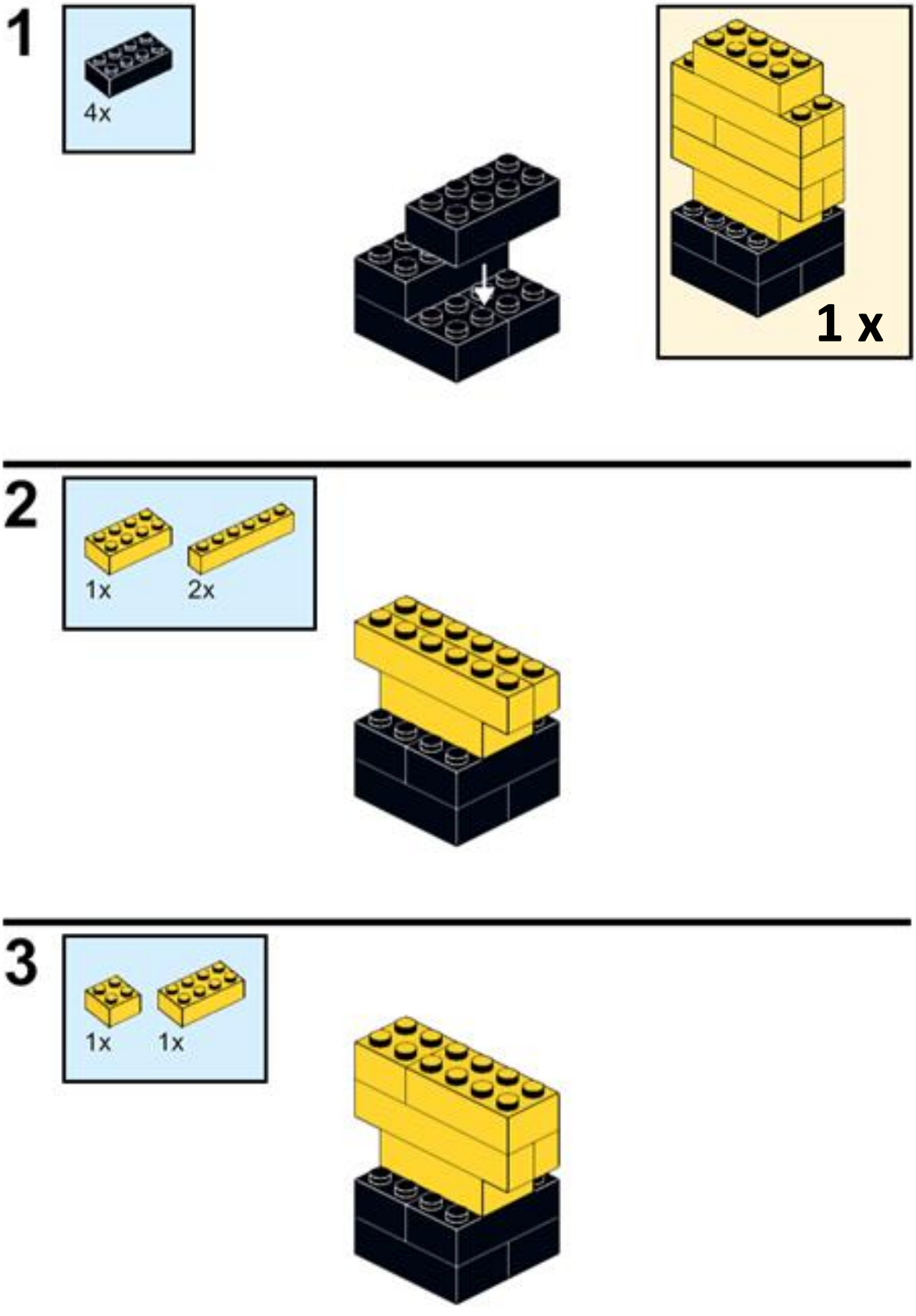


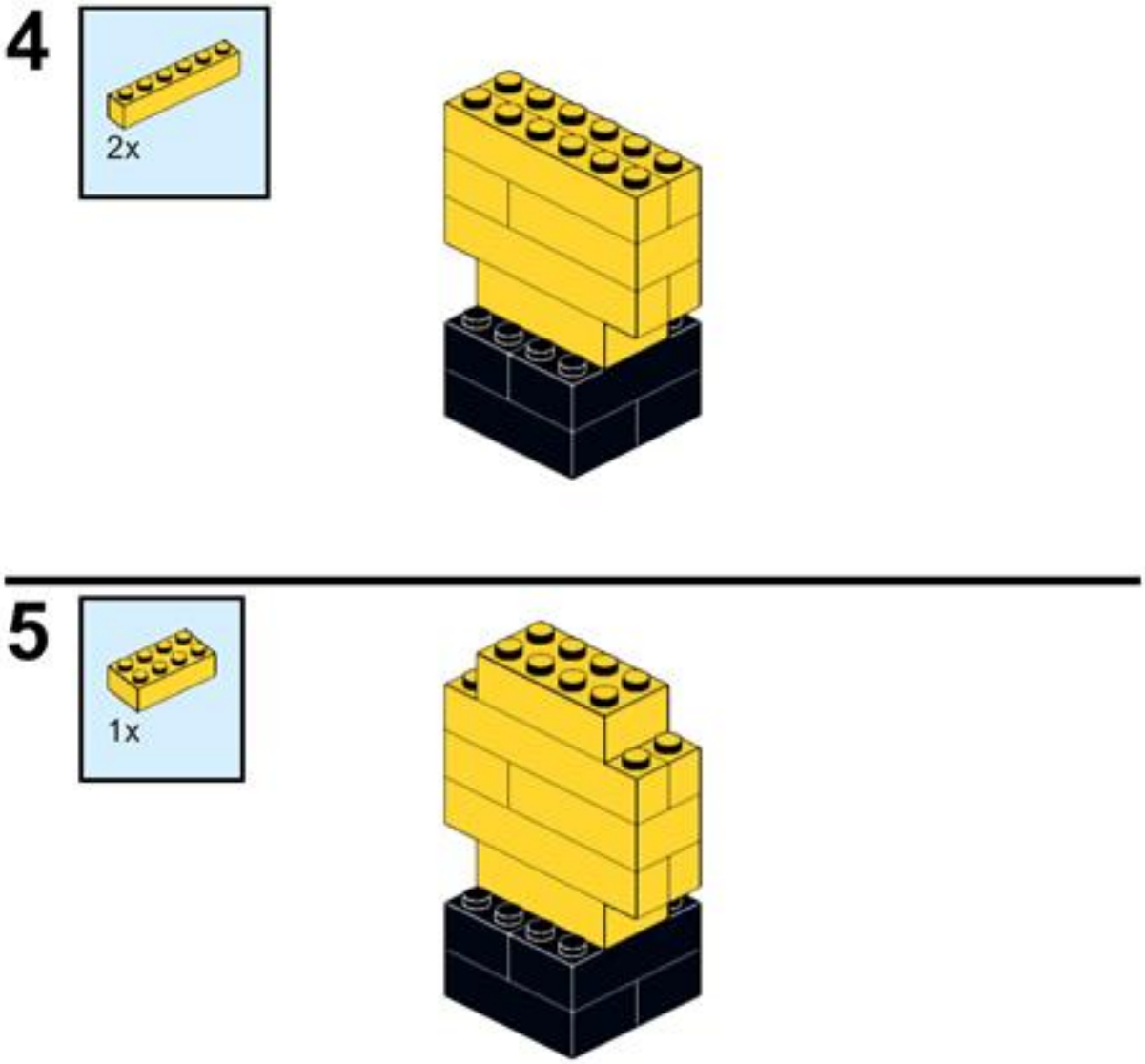


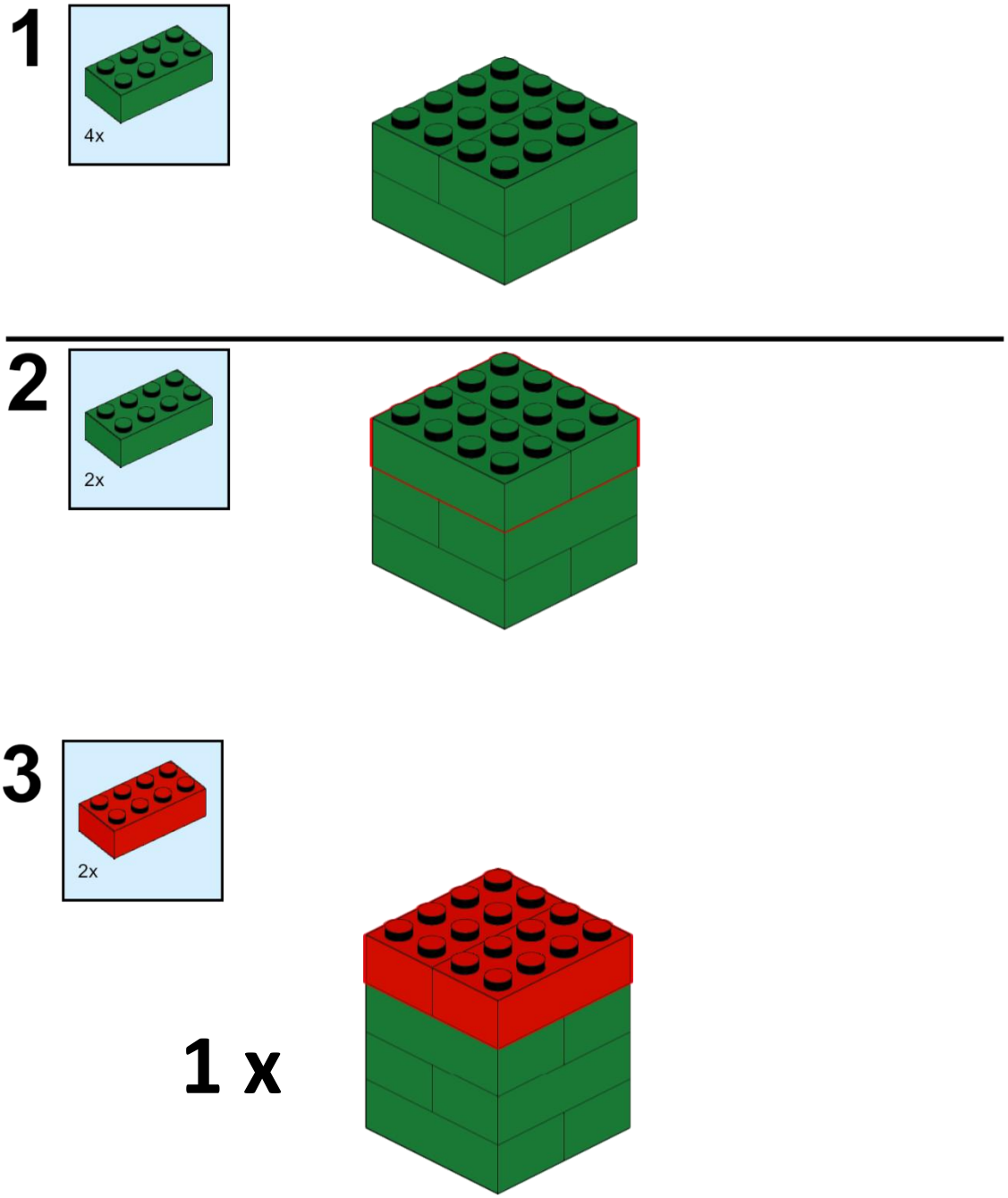


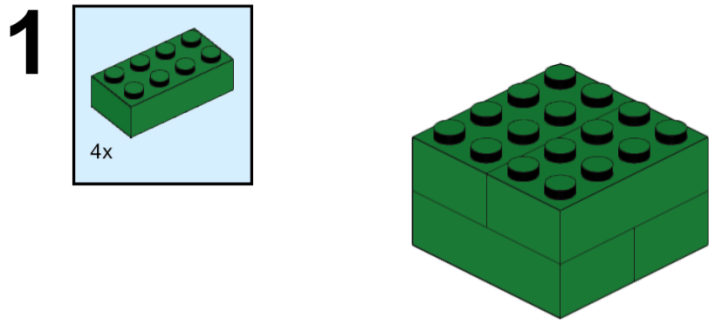


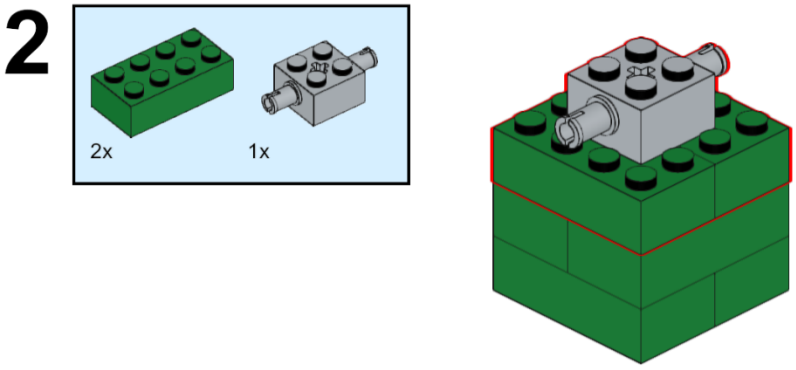


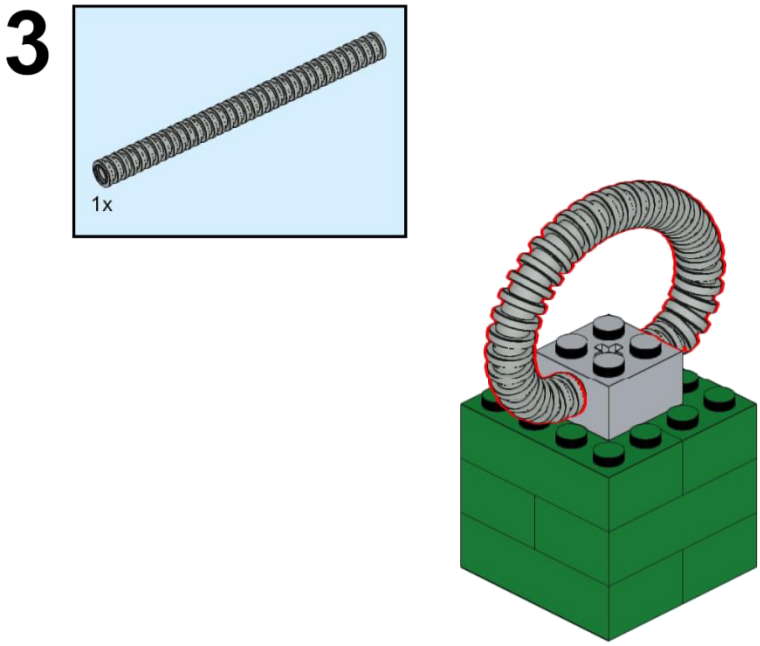












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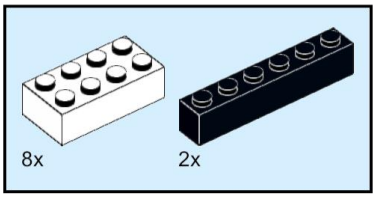

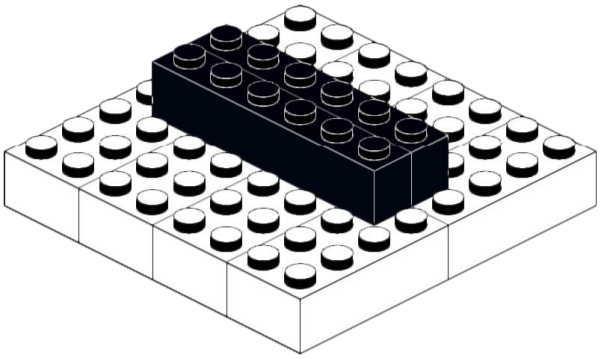

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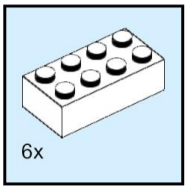

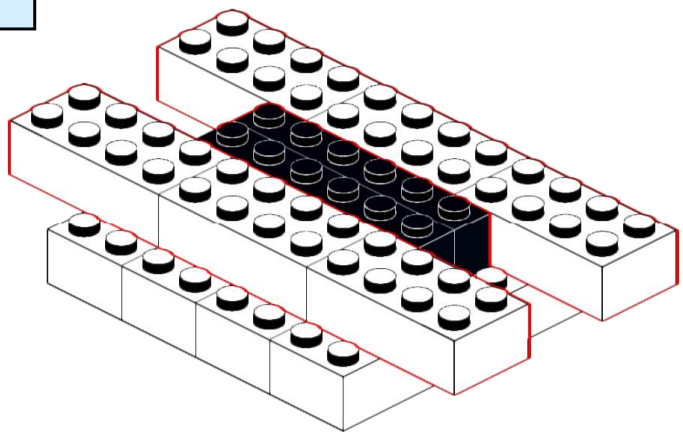

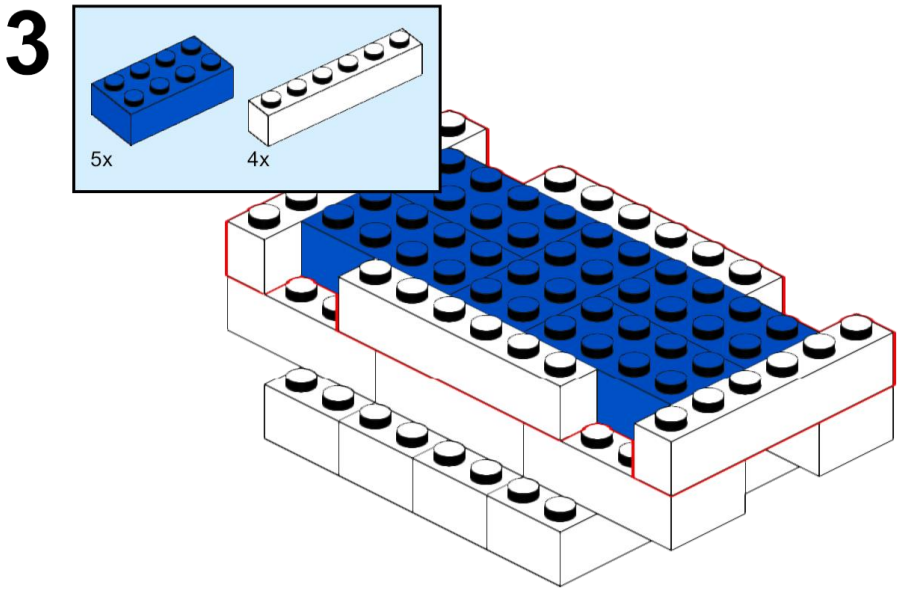

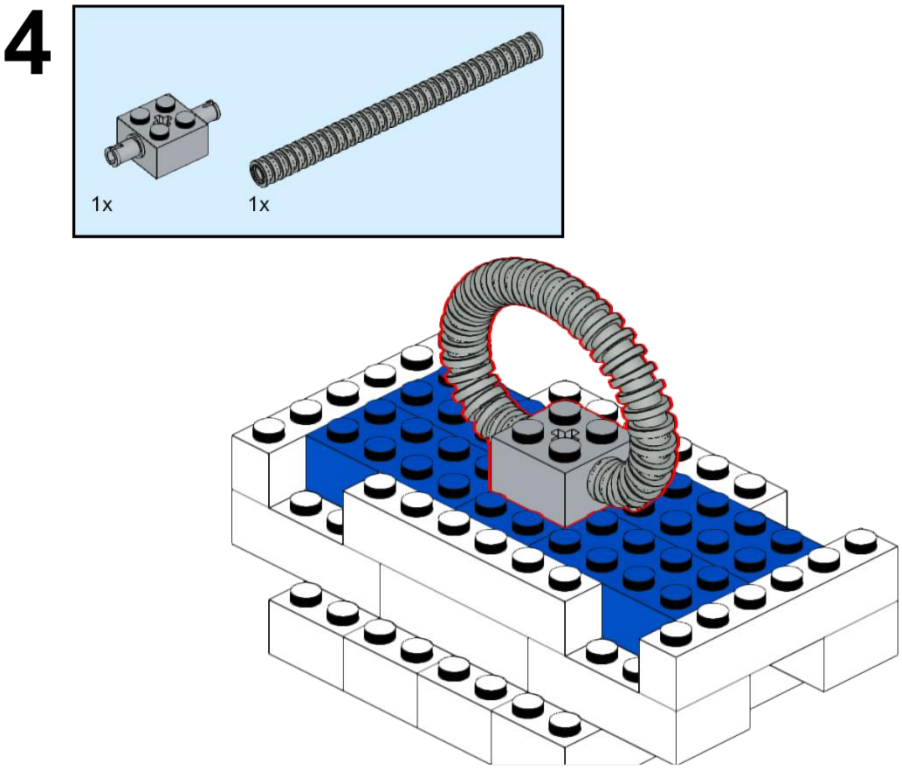

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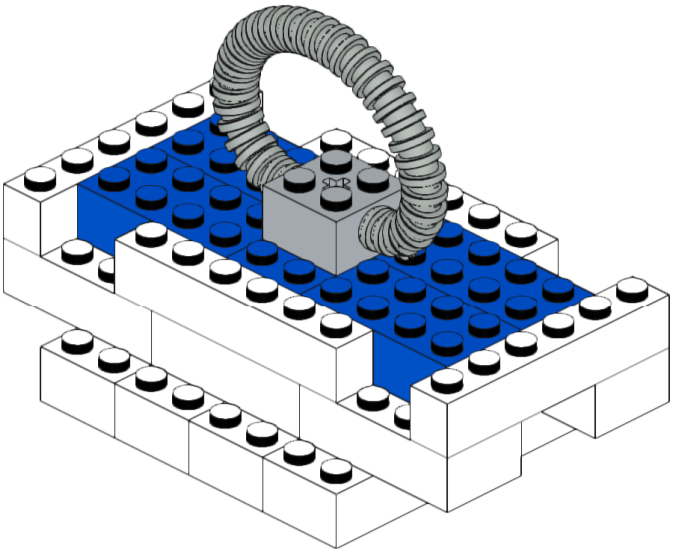
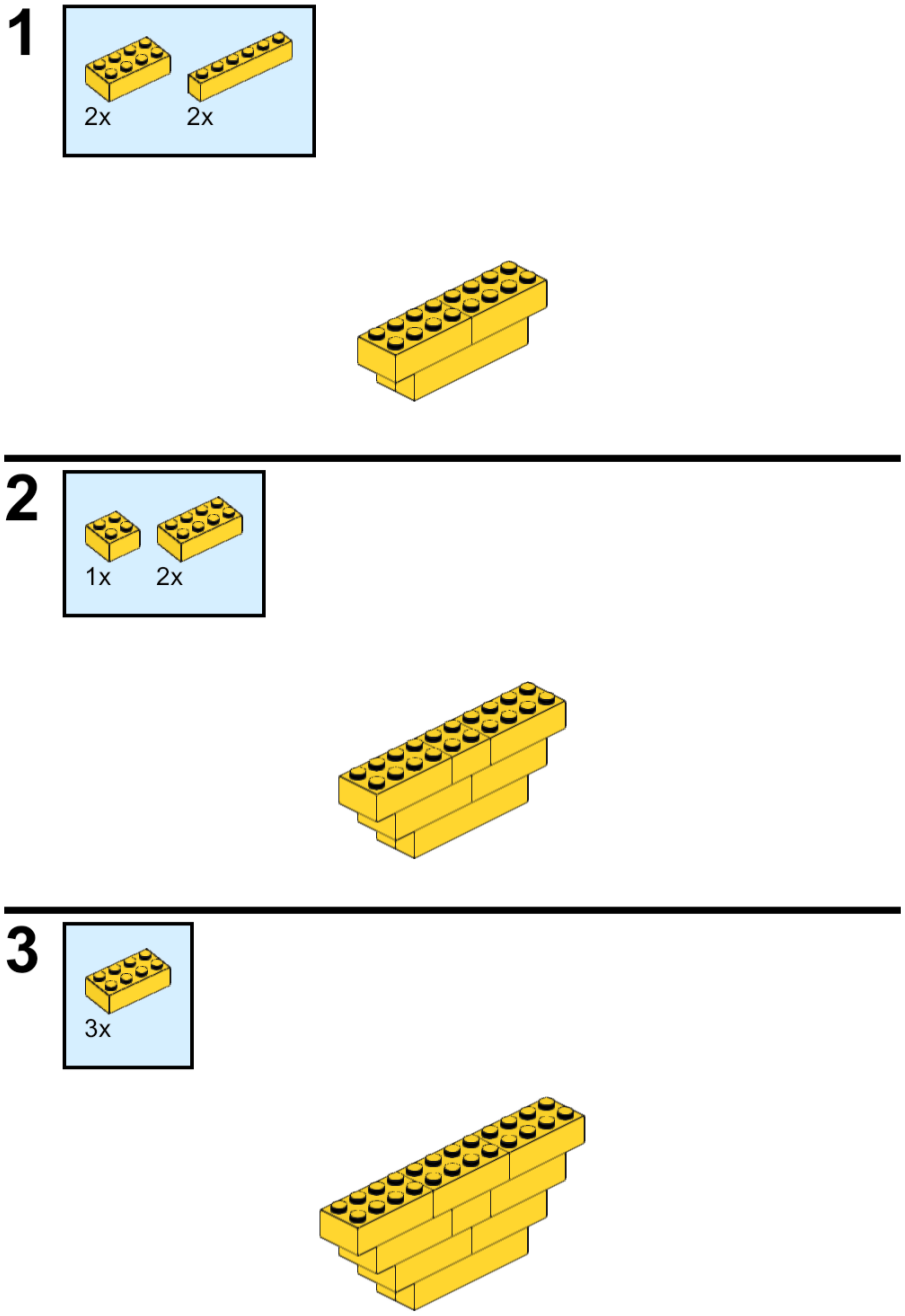
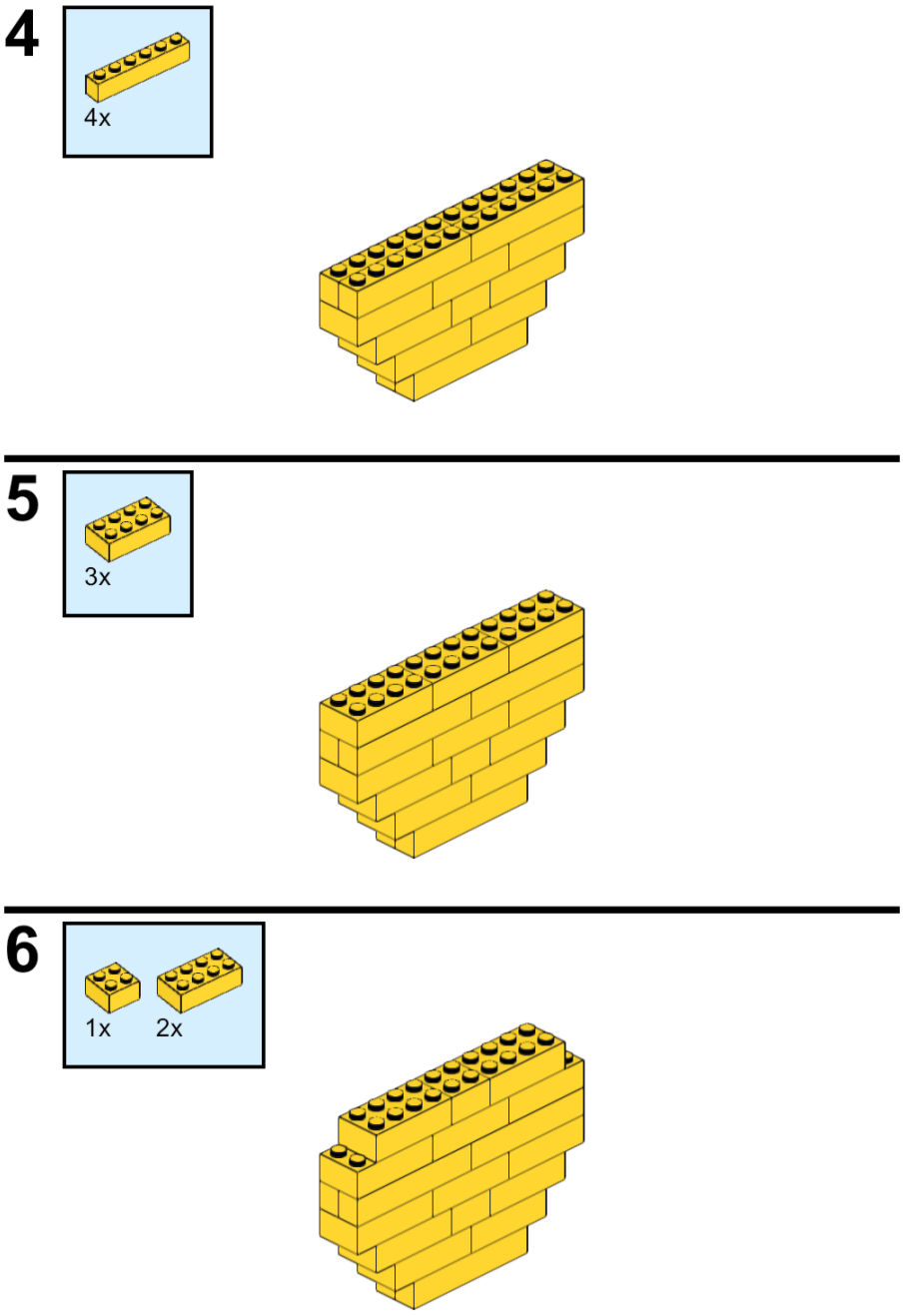
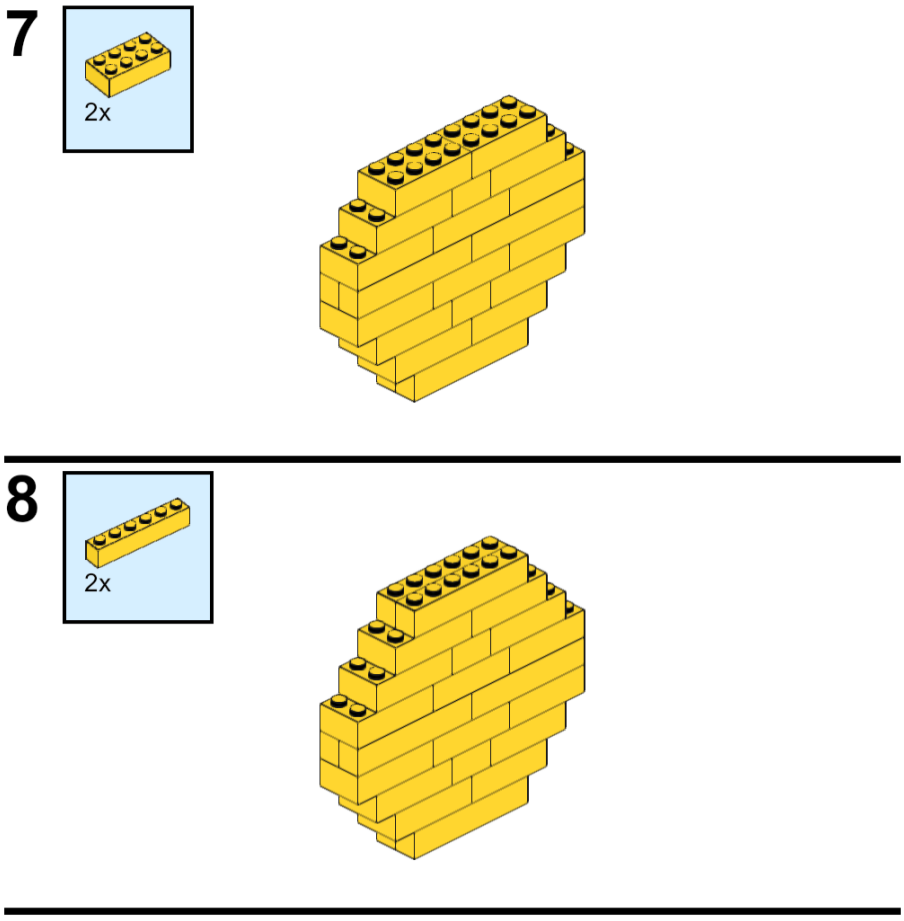
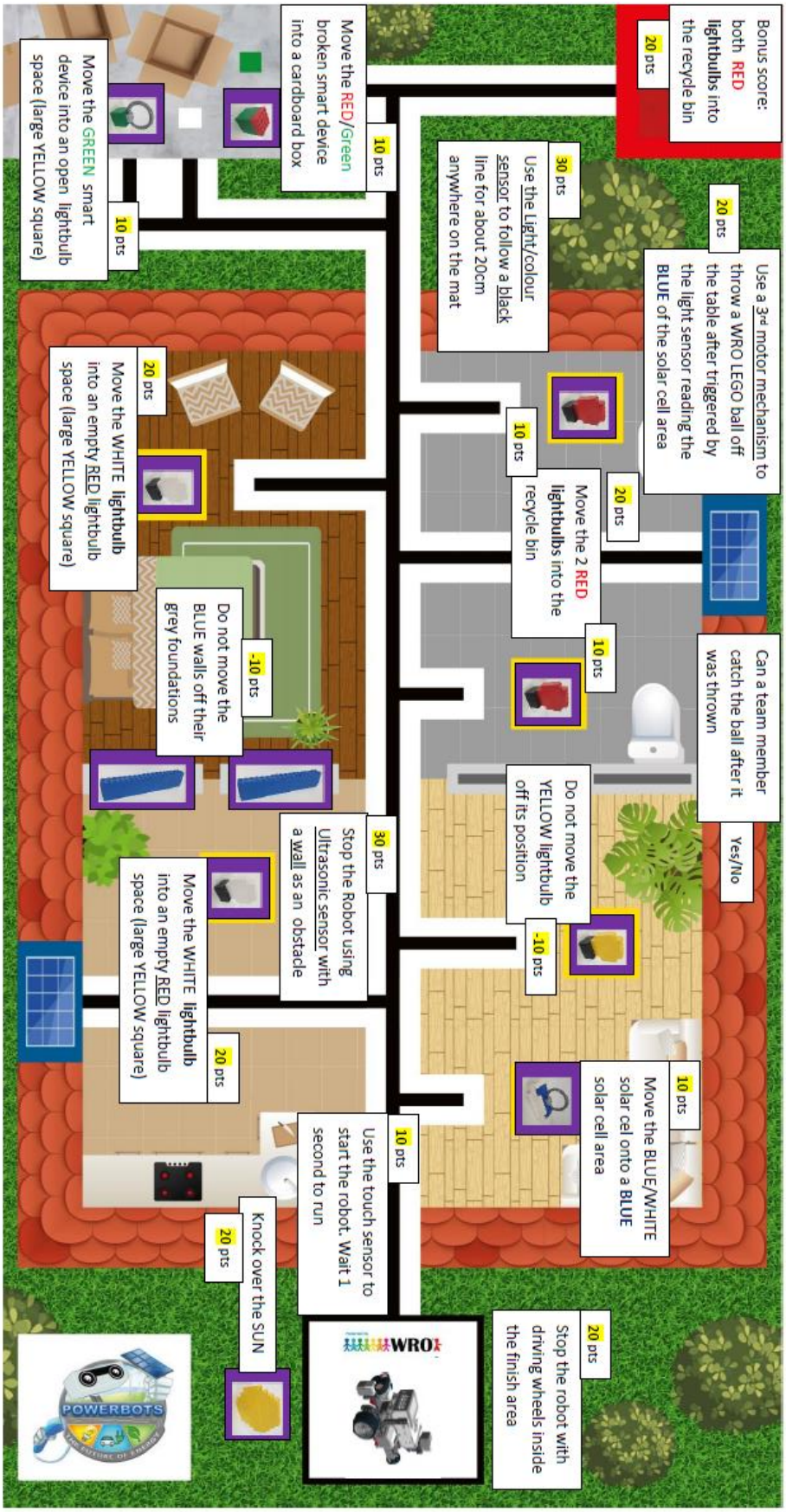








7. Explorer Lite Simplified Game Mat



Simplified Rules – Explorer Lite

THEME: Energy at Home - The robot needs to start and finish inside the start/finish box

SCORING OPTIONS: ***Points may be scored in any order!*** *(It is not compulsory to follow the order below except for the start and finish scores)*

NB!! *For Explorer Lite, ages 6 -12 yrs – if an element is in or partially in the score counts – if an element is out or partially out the score counts!*

- Start the robot, with all wheels completely inside the Start/Finish area

- Use a touch sensor to start the program and wait for 1 second to go ..... 10 pts
- Use a light sensor to follow a black line for approximately 20cm anywhere on the mat ..... 30 pts

- Move the 2 RED lightbulbs into the recycle area ..... 10 pts (each)
- Bonus score if both RED lightbulbs are in the recycle area ..... 20 pts
- Move the 2 WHITE lightbulbs into the open RED lightbulb spaces (large YELLOW square) ..... 20 pts (each)
- Move the White/Blue solar cell onto a BLUE solar cell area ..... 10 pts
- Move the RED/Green broken smart device into a cardboard box ..... 10 pts

- Move the GREEN smart device into an open WHITE lightbulb space (large YELLOW square) ..... 10 pts

- Knock over the YELLOW sun ..... 20 pts
- Do not move any of the BLUE walls off their grey foundations ..... -10 pts
- Do not move the YELLOW lightbulb off its position ..... -10 pts

Use a light/colour sensor to see/read a BLUE solar cell area and use a 3rd motor mechanism to throw a WRO LEGO ball off the table
Can a team member catch the ball (best catch could win a prize) ..... Yes/No

Use a light/colour sensor to see/read a BLUE solar cell area ..... 20 pts
- Use a 3rd motor mechanism to throw a WRO LEGO ball off the table ..... 20 pts
- Use the ultrasonic sensor to measure a BLUE wall to stop the robot before hitting it ..... 30 pts

- Finish with the 2 drive wheels of the robot completely inside the finish box ..... 20 pts

There may be an addition of a surprise rule at the National Competition for more bonus points Maximum possible score – Lite 260 pts