DESCRIPCIÓN DEL RETO REGULAR - SENIOR

"RISING WATER"

WORLD ROBOT OLYMPIAD SPAIN 2020

Versión 26/01/2020

1. INTRODUCTION

Rising water is dangerously increasing pressure on the dikes that protect an area below sea level. The warning system just alerted you that water is leaking from two dikes that threaten to collapse. Your robot is parachuted into the area to fix the issues.

This year, it is the Senior mission to design a robot that will need to locate the dikes' weaknesses, find material to build reinforcement walls, install sandbags to protect houses, and notify their occupants that they have to evacuate.

2. GAME FIELD

The following graphic shows the game field with the different areas.
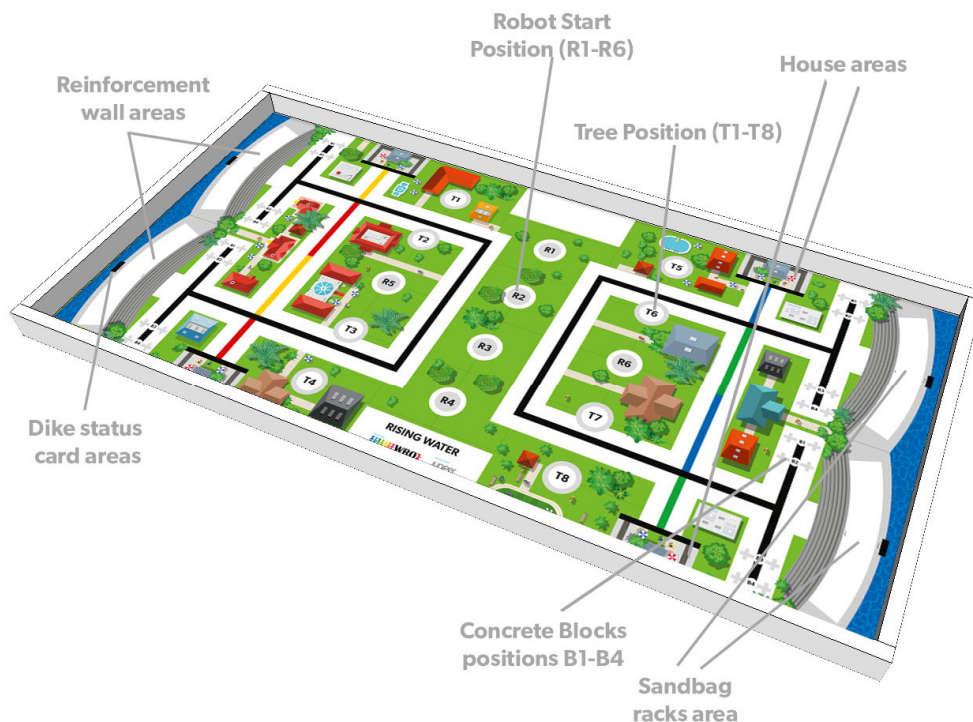
If the table is larger than the game mat, the mat will be centered in all dimensions. Possible space between the mat and the wall will be counted towards the area on the mat.

Information about the start position

This year, the Senior field does not have a typical start area. The robot starting position will be randomly selected as one of the grey circles. The robot shall be placed so that the grey circle is fully covered by the projection of the robot (top view). The team is allowed to place the robot facing in any direction.

As this starting circle is smaller than the allowed robot size, the size of the robot will be measured based on the General Rules before the run.

3. GAME OBJECTS

Concrete blocks

Six concrete blocks (3 yellow and 3 red) are available and can be used to build reinforcement walls. The blocks can be stacked in an intertwined way.

Yellow block

Red block

All blocks

Concrete blocks placed on the field

Blocks stacked in an intertwined way
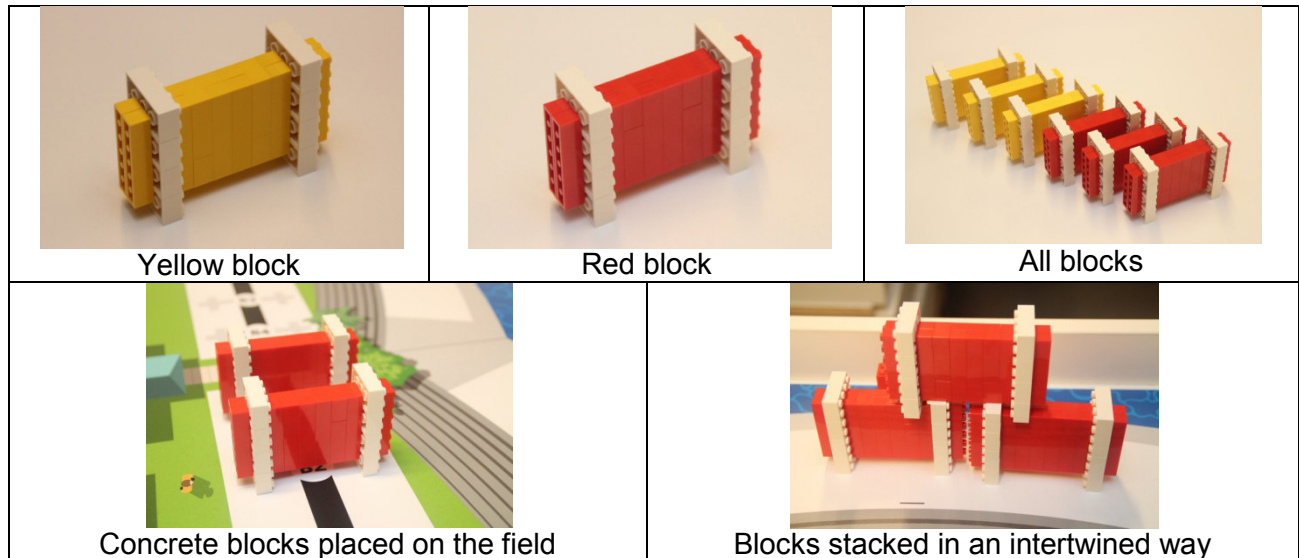
Sandbags

Four sandbags (2 green and 2 blue) are available and can be used to protect houses against water coming from the leaking dikes.
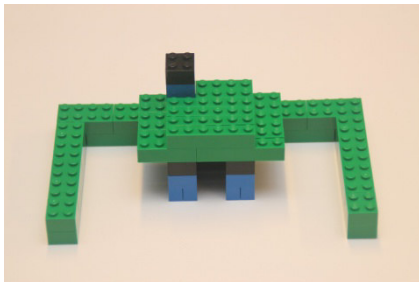

Green sandbags

Blue sandbags

Sandbag racks

Two sandbag racks are used to store sandbags (2 per rack).

Sandbag racks

Sandbags are placed centered
on the sandbag racks

Houses

Two houses (green and blue) with surrounding walls are installed on the playing field. Houses have no wall on the front, so they are vulnerable to rising water.
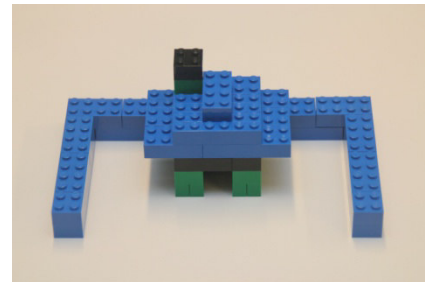

| Green house | Blue house |

Evacuation notice

Two notices of evacuation shall be used to force the house occupants to evacuate. The robot can carry them at the start. One notice shall be delivered to each house.
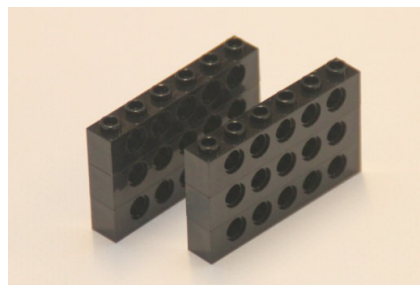
Evacuation notice

Dike status cards

A red dike status card means that a red reinforcement wall shall be built at this location, a yellow dike status card means a yellow reinforcement wall.
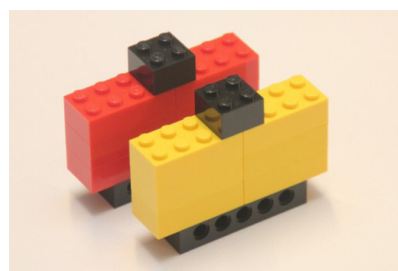
Dike status cards

Trees

Three trees have grown in the center of the playing field since the dikes were built.

Trees are not made of LEGO parts. Cylinders of any material, color and weight can be used (cartons, soda can, toilet roll, kitchen roll, wood, metal) can be used as trees. Diameter shall be between 4 and 7 cm, height shall be at least 10 cm, weight not more than 100 gr each.

4. POSITIONING OF GAME OBJECTS

For a better understanding, the game field is divided into four areas: A (top-left), B (bottom-left), C (top-right) and D (bottom-right) – See the following graphic:

The game objects will be positioned and randomized as followed:

Before to start the competition

1. The position of the houses will be randomly selected. The two houses are placed in two of the four areas (one each) and will stay there for the competition day.
2. Sandbag racks are installed in the other areas, those without a house (S areas).

Before every round (same for all teams in one round)

1. Two sandbags are placed in each sandbag rack without mixing colors.
2. One red or one yellow dike status card is placed in each of the areas with a house.
3. Three concrete blocks are randomly placed on 3 of the 4 possible locations (B1, B2, B3, or B4) in the each of the other areas without a house, but always all three concrete blocks of one color in one area (no mix of colors).
4. Three trees are randomly placed on the white circles (T1 to T8), at least one per column.
5. The start positions of the robot (the grey circles, R1 to R6) will be randomly selected.

One possible example:
• Houses are placed in A and C areas
• Sandbag racks in S-positions in B and D areas
• Blue sandbags are placed in sandbag rack in area B, green in area C
• Red dike status card is placed in area A, yellow card in area C.
• Red concrete blocks are placed on B1, B2, B3 in area B, yellow concrete blocks on B2, B3, B4 in area D.
• Trees are placed on T3, T4, T6.
• The robot should start on R3.

See the photos on the next page as an example for the setup of the field.

A (top-left) & B (bottom-left) AREA	• Blue House in area A • Red Dike card in area A • Yellow concrete blocks in area B • Blue sandbags area B • Trees on position T3, T4 • Robot on R3 with evacuation notice lying on top
C (top-right) & D (bottom-right) AREA	• Green house in area C • Yellow dike card in area C • Red concrete blocks in area D • Green sandbags in area D • Tree on T6

Please note: This is one possible setup based on the randomization explained on the page before. Please take a close look at the explanation of the randomization!

5. ROBOT MISIONS

For a better understanding, the missions will be explained in multiple sections. The team can decide in which order they will do the missions.

In order to execute its missions, the robot will need to navigate in a complex environment without knowing its initial starting position and without damaging or moving any trees.

5.1. Deliver notices of evacuation

The robot must deliver a notice of evacuation to each house occupant. Notice is considered delivered if it is within the property defined by the walls surrounding the house.

5.2. Protect the houses

The robot needs to install two sandbags to close the open area in front of the houses. Each sandbag touching the black line in front of the house will earn points.

Extra points are awarded if the house is fully protected against rising water and if the sandbags of the same color as the house are used. The house is fully protected if there is no remaining opening large enough to fit the width of a 1x6 LEGO brick.

5.3. Build reinforcement walls

The robot needs to build reinforcement walls in front of the leaking dikes. Each wall should be made of concrete blocks of the same color as the dike status card.

To earn points, a concrete block must touch the target area. Extra points are awarded if building blocks of the same color as the dike status card are used and if the concrete blocks are built as a stacked construction.

5.4. Park the robot

The mission is complete when the robot returns to its starting position and stops by itself. The starting position grey circle must be at least partly covered by the projection of the robot.

5.5. Penalties

Penalties will be awarded for houses out of its original position. Penalties will be awarded for trees that are moved (no longer touching the light grey square). Penalties will never result in a negative score (see General Rules).

6. SCORING

Definitions for the scoring:

- "Completely" means that the game object is only touching the corresponding area (not including the black lines).
- "Partly" means that the game object is at least touching the area with one part.

| Tasks	Each	Total
Deliver the notices of evacuation		
Completely within the property (max. 1 per house)	**9**	**18**
Partly within the property (max. 1 per house)	6	12
Protect the houses		
Sandbag touches the black line (2 max. per house)	**12**	**48**
• Bonus if both sandbags are the same color as the house	**8**	**16**
• Bonus for house fully protected (no gap)	**10**	**20**
Build reinforcement walls		
Concrete blocks completely inside the white target area or stacked on blocks completely inside the white target area (3 max per target area)	**4**	**24**
• Bonus for concrete block standing and correctly stacked in an intertwined way on two blocks	**8**	**16**
• Bonus for each block of the right color per target area	**7**	**42**
Return to starting position		
Returns to its starting position and stops by itself (partly or completely hiding the grey circle from top view) (only if scored other points)	**6**	**6**

Penalties		
House moved (out of light grey / black area) or damaged	-5	-10
Tree moved (no longer touching the light grey square) or damaged.	-7	-21
Maximum Score		**190**

Scoring Interpretation

Completely within the property (max. 1 per house) ➔ 9 points
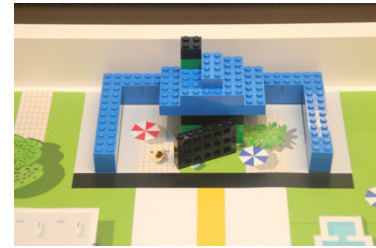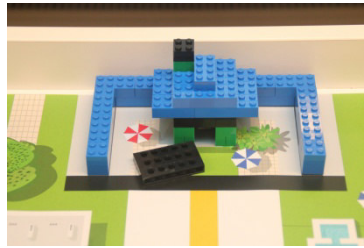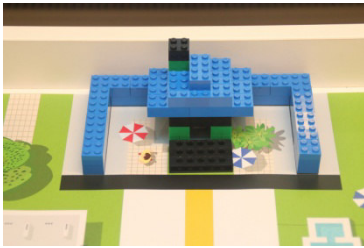
Black line belongs to the property, this is OK.

Standing is OK as well.
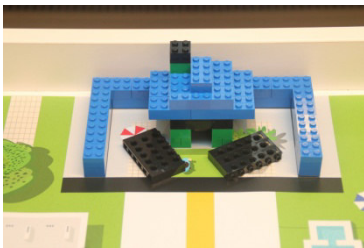
9 points, only one counts.

Partly within the property (max. 1 per house) ➔ 6 points
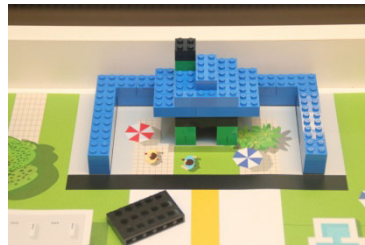
0 points, out

Sandbag touches the black line (2 max. per house) ➔ 12 points

24 points, 2 touching.
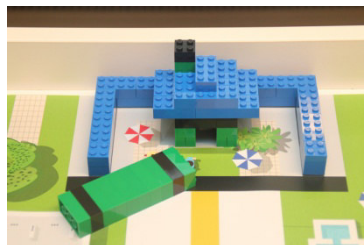
12 points, 1 touching.
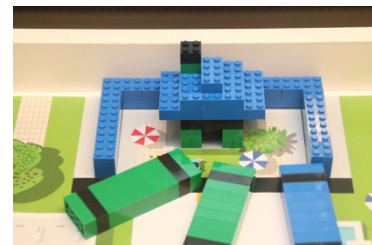
24 points, only 2 count.

Bonus if both sandbags have the same color as the house ➔ 8 points
Bonus for house fully protected (no gap) ➔ 10 points
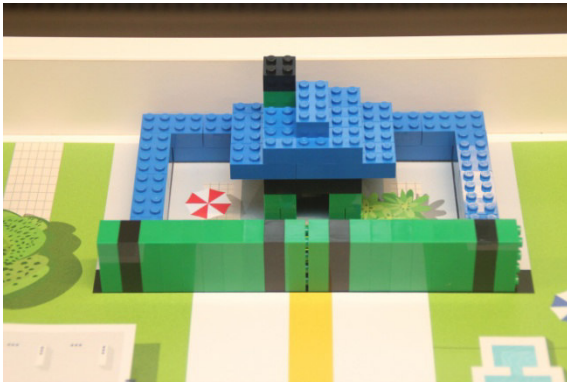
2 x 12 points: Sandbags touching
+ 10 points: House fully protected
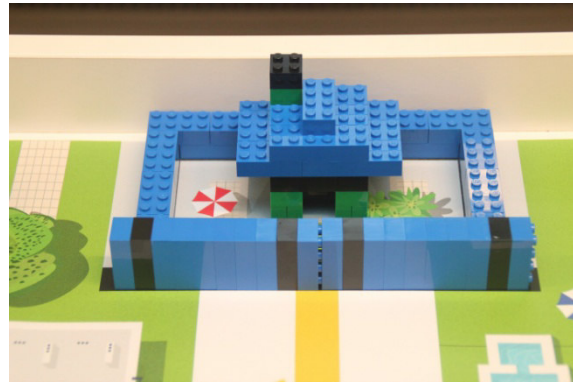
2 x 12 points: Sandbags touching
+ 10 points: House fully protected
+ 8 points bonus for correct color
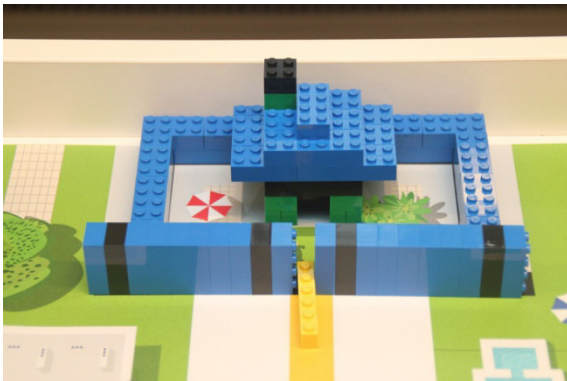
The house is not fully protected because a 1x6 LEGO piece could be stacked between the sandbags:
2 x 12 points: Sandbags touching
+ 8 points bonus for correct color
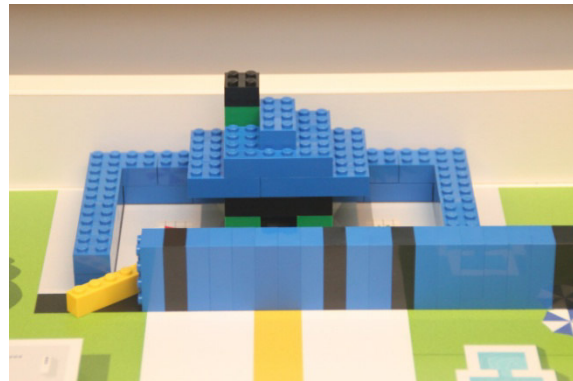
Concrete blocks completely inside the white target area or stacked on blocks completely inside the white target area (3 max per target area) ➔ 4 points
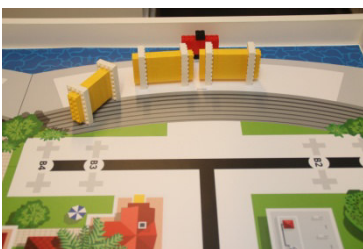
2 x 4 points = 8 points
(two completely inside)
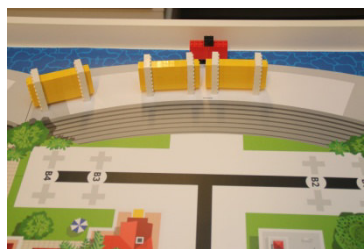
2 x 4 points = 8 points
(two completely inside)
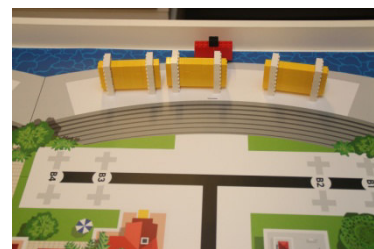
3 x 4 points = 12 points
(three completely inside)
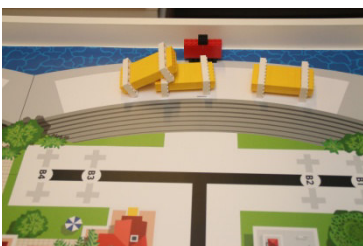
3 x 4 points = 12 points
(three completely inside)

Bonus for concrete block standing and correctly stacked in an intertwined way on two blocks
➔ 8 points
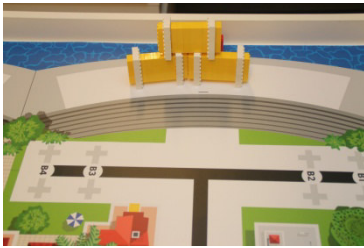
3 x 4 = 12 points.
+ 8 bonus points.

Bonus for each block of the right color per target area ➔ 7 points
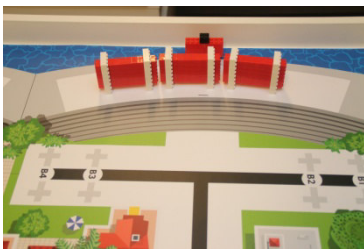
3 x 4 = 12 points
+ 3 x 7 = 21 bonus points
for correct color.
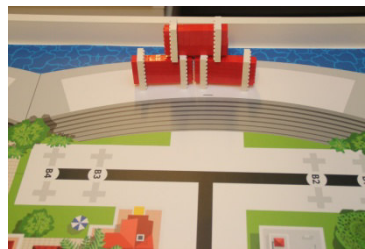
3 x 4 = 12 points
+ 8 bonus points for stacked
in an intertwined way
+ 3 x 7 = 21 bonus points
for correct color.

3 x 4 = 12 points
Blocks are inside but not
stacked in an intertwined way
+ 3 x 7 = 21 bonus points
for correct color.

Returns to its starting position and stops by itself (partly or completely hiding the grey circle from top view) ➔ 6 points
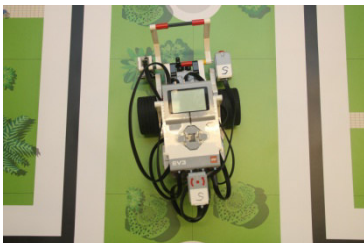
Covers start position
completely. 6 points.
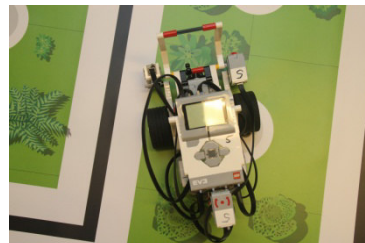
Covers start position partly.
6 points.

Returning to a wrong R1 –
R6 area (that was not the
start position) is worth 0
points.

House still in its original position and not damaged ➔ no penalty
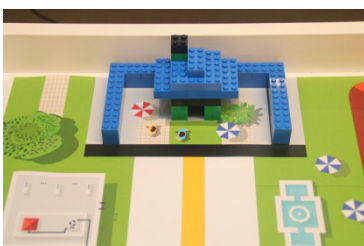
OK, no penalty.
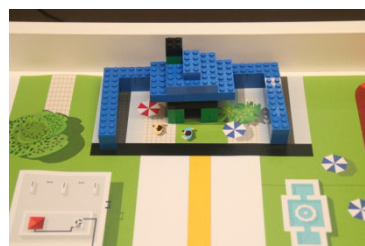
OK, not out of light grey /
black area. No penalty.

OK, pushed to the wall (if
table larger than mat). No
penalty.

Not ok, -5 points.

Tree moved (no longer touching the light grey square) or damaged. ➔ -7 points

Still ok, Tree inside white area and light grey border.

Not ok, moved outside of the circle. -7 points.

Tree damaged, -7 points.

Note: Please be aware that the tree can look differently in your country / at your competition.

7. ASSEMBLY OF GAME OBJECTS

1

2

3

4

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x2

1

2

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4

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x2

1

2
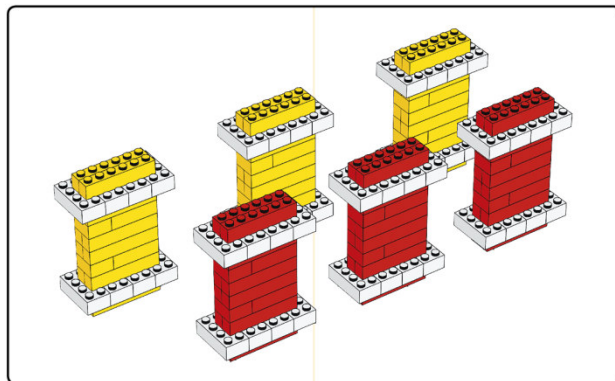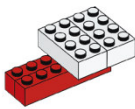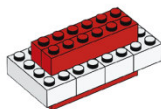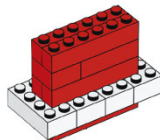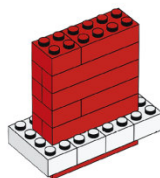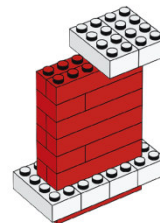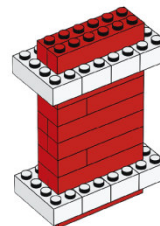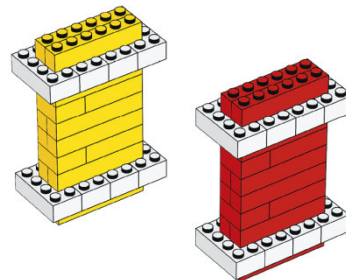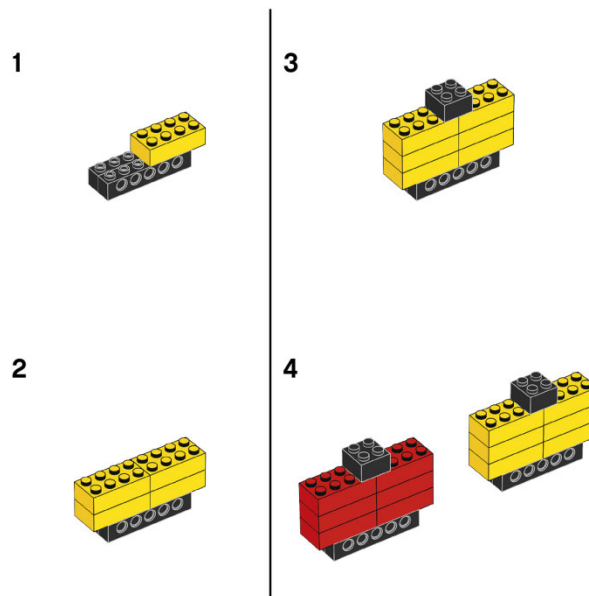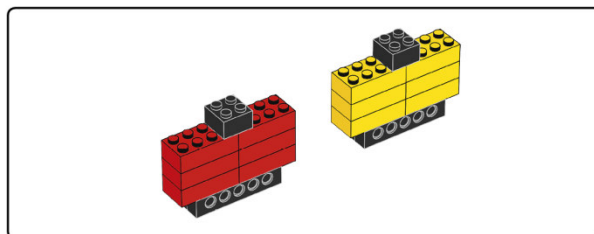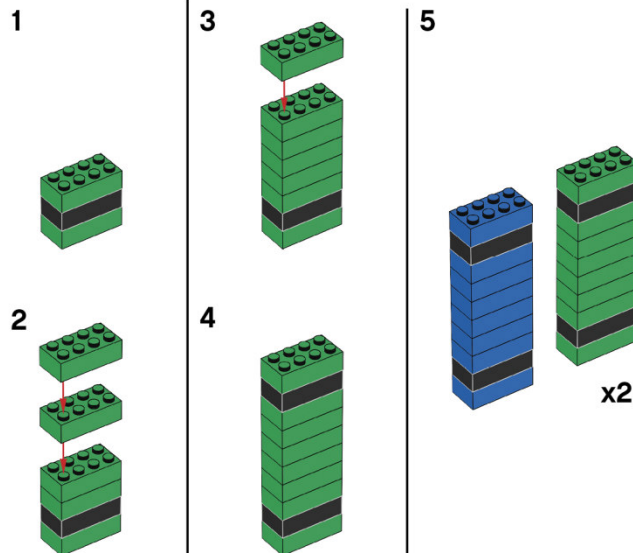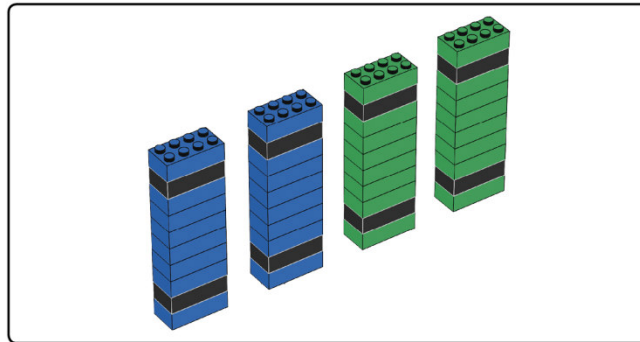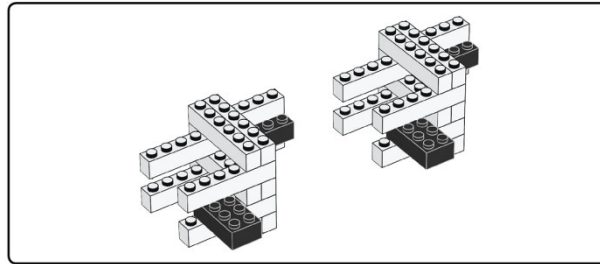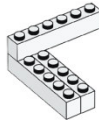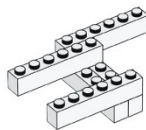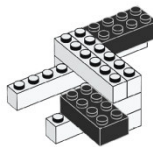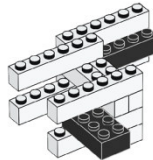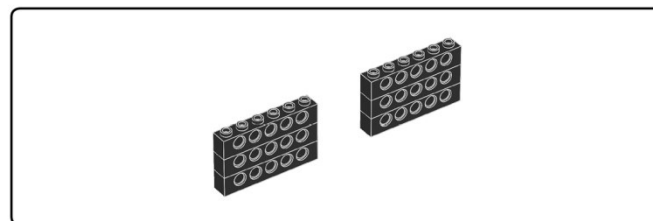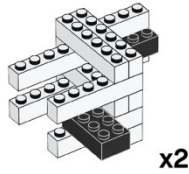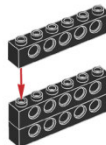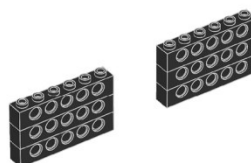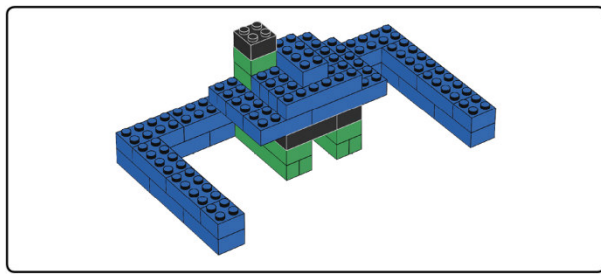
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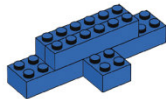
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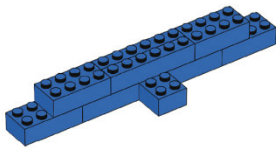
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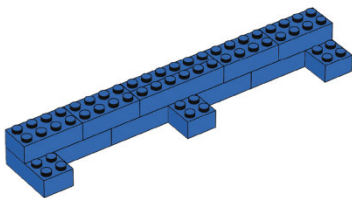
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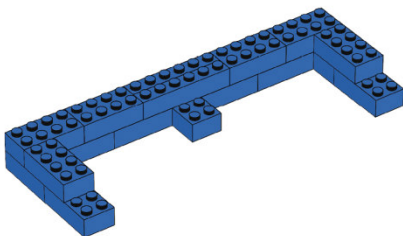
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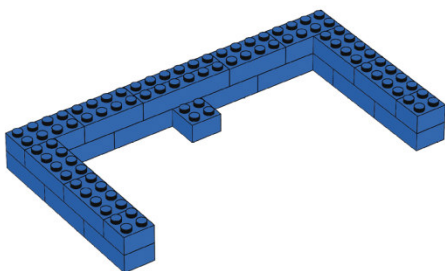
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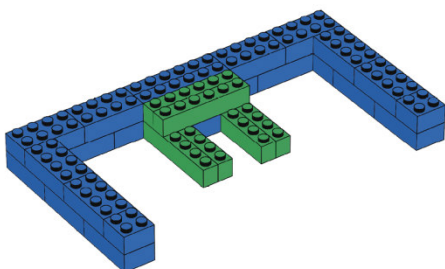
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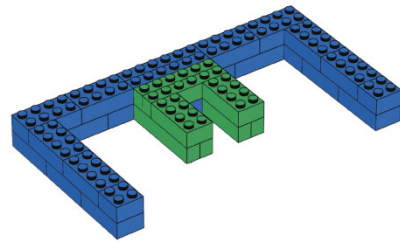
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