

Harvester

Robot ZONE **[01]**

Educational Challenge

2027

Context

It's harvest time in the village of Merodian, and there aren't enough hands to get everything done before winter.

The villagers depend on their crops for their families' survival. They harvest hay to feed the animals, must sort the ripe fruit into storage, and protect the fields from pest birds.

You're being called on to speed up the work, help build up the stores, and make sure nothing is lost.

You'll also need to pull the cart that's already full of hay. And don't forget to take the bread out of the oven before it burns!

Every minute counts before winter arrives. Your robot will need to carry out different missions to help the villagers. They're counting on you!

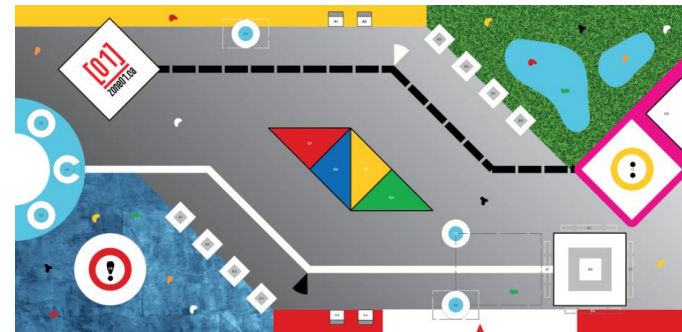
Robot Description

The robots must comply with the following:

1. Maximum robot dimensions: 25 cm x 25 cm. The robot must fit entirely within the starting zone.
2. Only one controller is allowed (Spike Prime, EV3, etc.).
3. The challenge is performed in autonomous mode. The program must be downloaded to the robot BEFORE the round.

Game Surface

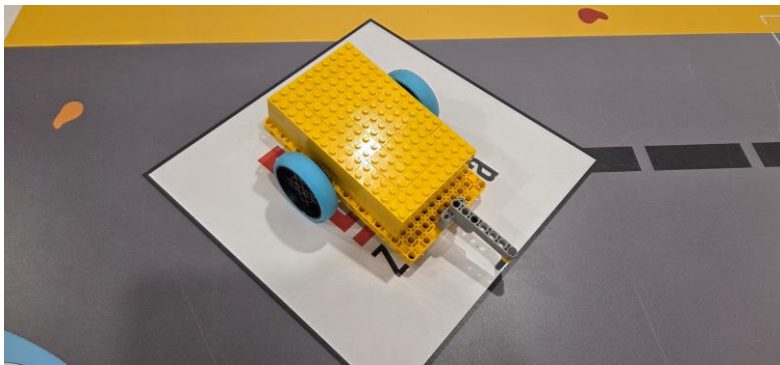
Surface Used: Z01-L



The mat is highly recommended for this challenge and is available at the [Zone01 Shop](#).

There are no walls around the game table.

Description and Position of Accessories



The Cart

The cart is used to transport the hay and the lumis. It's already loaded with hay.

The cart is made from a LEGO plate and Spike wheels, along with 60 LEGO 2x4 bricks. The cart is loaded so that it weighs 230 grams.

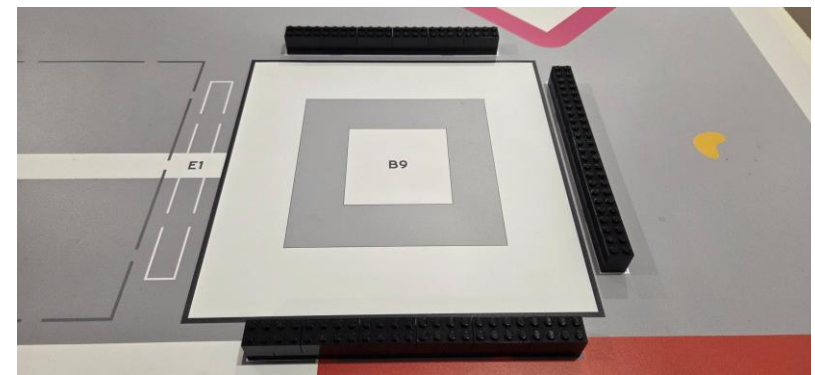
The cart was left behind in the Zone01 square.

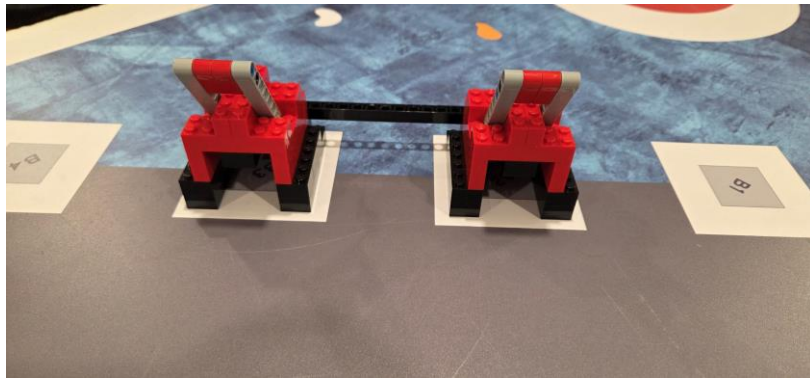
Fences

The fences are used to mark off the enclosure.

There are 3 fences, made of LEGO 2x4 and 2x2 bricks.

They are placed on rectangles E2, E3, and E4, and they must not be moved.



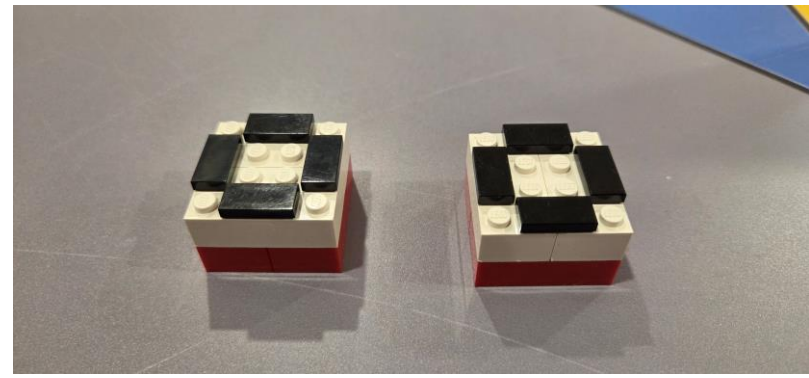


Breadovens

Outdoor ovens are used by the residents to bake bread.

There are 2 ovens connected to each other by a long beam. The ovens are fixed to the playing surface with double-sided tape. A lever on the oven allows the bread to be pushed out once it's ready.

The ovens are installed on squares B2 and B3, and the lever is tilted at the start toward the center of the playing surface.



Bread

Bread is baked every day in the village in outdoor ovens.

There are 2 loaves of bread made from red and white LEGO 2x4 pieces and thin, smooth black 1x2 pieces.

The loaves are placed in the ovens, are baked, and ready to be taken out!

Scarecrows

Scarecrows are used to protect the crops by keeping away the birds that devour the ripe fruit. The scarecrows need to be moved from time to time to remain effective.

There are two scarecrows, built from LEGO Technic pieces. Following a heavy rain, they are located in the puddles of water on the small red and orange shapes, facing the Canadian flag.



Lumis

The lumis are large fruits essential to the survival of the village's inhabitants. Lumis have been left along the edge of the path by the village pickers.

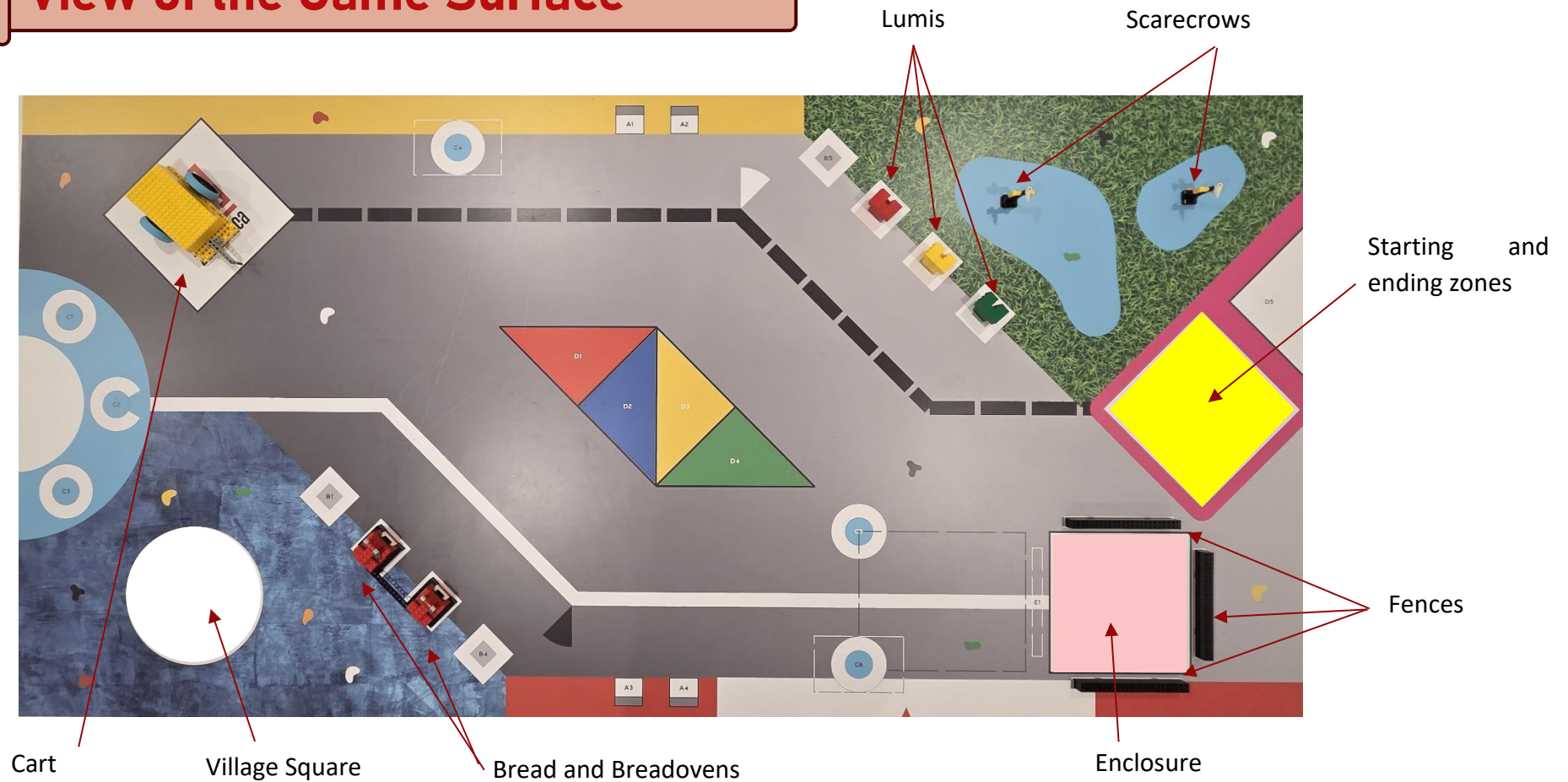
There are 3 lumis, one of each colour (red, yellow, and green), made from 2x4 bricks.

The positioning of the lumis will always be the same (B6 = red, B7 = yellow, B8 = green).

National final only

- The position of the lumis in squares B5 to B8 will be announced the morning of the competition and will remain the same for the day.

View of the Game Surface



Start

The team places the robot entirely within the starting zone and selects the program it wishes to run. The judge then positions the random elements if necessary. The team may not modify the program after randomization or input data in any way whatsoever (buttons, colours, movements).

On the judge's signal, the team activates the robot by pressing the button on the brick or a touch sensor. The robot may complete the tasks in any order.

The challenge ends when a team says "STOP," touches the robot, or when the maximum time of 2 minutes has elapsed.

Points for finishing in the starting zone will only be awarded if the robot completely leaves the starting zone before returning to it and stopping there on its own.

Missions

Mission 1: Move the scarecrows

Move the scarecrows out of the puddles and place them in the field (the section with green foliage) in a standing position.

Mission 2: Sort the lumis

Collect the lumis and sort them into triangles D1 to D4 at the center of the village. Extra points are awarded if a lumis is completely within the zone of the matching colour. Only one lumis per zone counts — the one that gives the most points.

Mission 3: Bring the hay cart back to the enclosure

Hook the hay cart to the robot and bring it back into enclosure B9 without moving the fences.

The cart will be considered completely inside the enclosure if its 2 wheels and its shaft touch only inside the large white square.

Extra points will be awarded if the cart is brought in "backed in" completely into the enclosure. The cart is considered backed in if its shaft is the leftmost piece.

Note: A team member may help hook the cart to the robot, provided the cart's wheels remain in contact with the starting zone during the operation. Careful, do not touch the robot!

Warning: The cart must move by rolling. Its wheels may not be dragged or lifted. If the wheels slide or leave the ground, the judge will not award points for the cart.

Mission 4: Take the bread out and bring it to the village Square

Activate the oven's lever to release the bread. Then bring the loaves completely inside the village Square, represented by a large white circle with an exclamation point (!).

Mission 5: Park the robot completely within the starting zone

Park the robot with all points of contact completely within and touching the starting zone.

The robot must stop on its own for the points to be awarded.

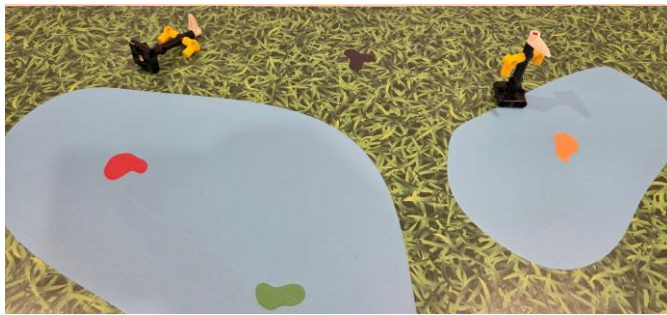
Points

Missions	Each	Points max
Scarecrow standing in the field	8	16
Scarecrow laying in the field	5	10
Lumis sorted completely within the correct colour zone	9	27
Lumis sorted partially within one of the zones D1 to D4, regardless of colour	4	12
Cart backed completely into the enclosure	23	23
Cart completely in the enclosure	16	16
Cart partially in the enclosure	11	11
Cart out of the starting zone	6	6
Bread taken out of the oven and placed completely in the village Square	11	22
Bread taken out of the oven	7	14
Robot stops in the starting zone after having completely left it (all points of contact)	12	12
Robot stops partially within the starting zone (at least one point of contact)	7	7

Solve the surprise rule		20
Total points max		120
Penalties	Each	Points max
Move a fence	-5	-15
Damage an oven	-7	-14

Points Interpretation

Scarecrows

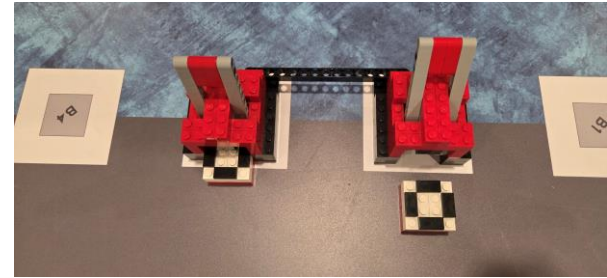


1 scarecrow lying down in the field, the other is still touching the puddle: $5 + 0 = 5$ points



2 scarecrows standing in the field: $8 + 8 = 16$ points

Bread



One bread taken out of the oven: 7 points

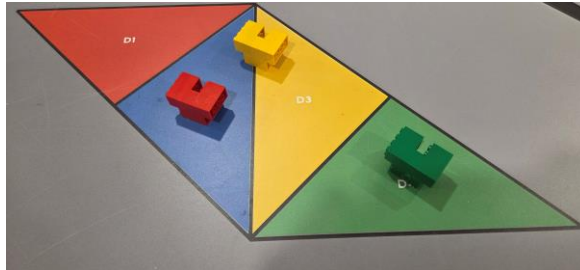


1 loaf of bread in the Square, 1 loaf taken out of the oven:
 $11 + 7 = 18$ points

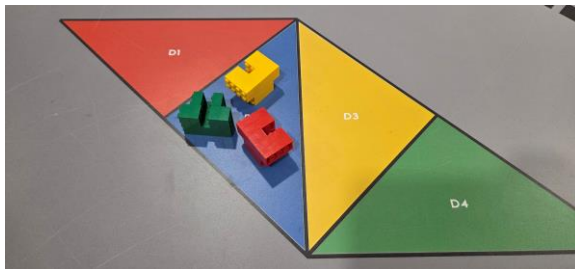


2 loaves of bread in the Square: $11 + 11 = 22$ points

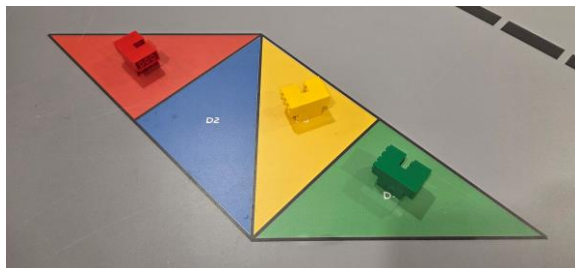
Lumis



1 lumis in the correct zone, 2 Lumis in the wrong zones or partially placed: $9 + 4 + 4 = 17$ points

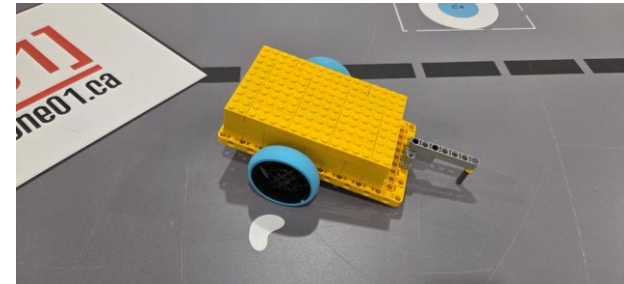


1 lumis in the wrong zone, 2 lumis don't count (in the same zone): 4 points

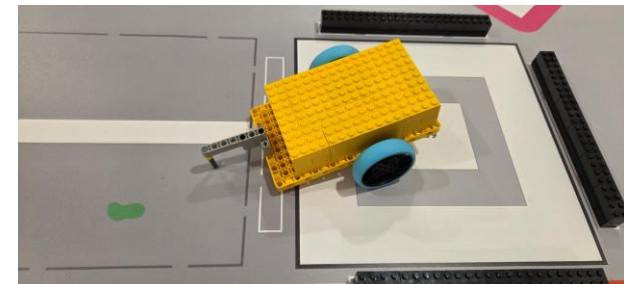


3 lumis in the correct zone: $9 + 9 + 9 = 27$ points

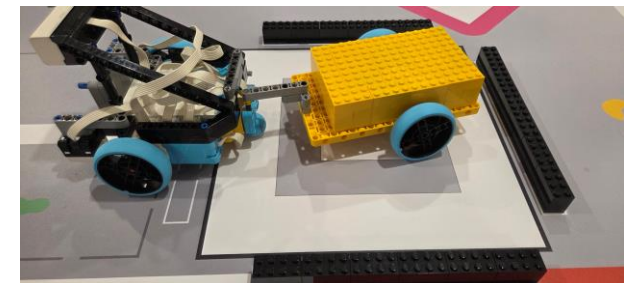
Cart



Cart completely out of its starting zone: 6 points

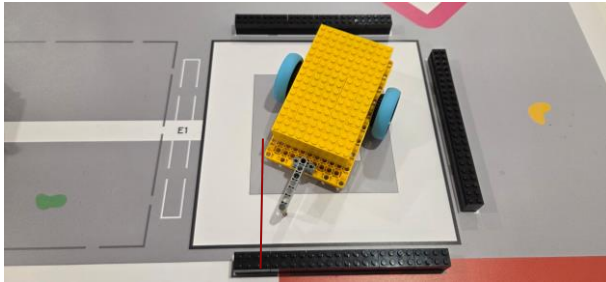


Cart partially in the enclosure: 11 points

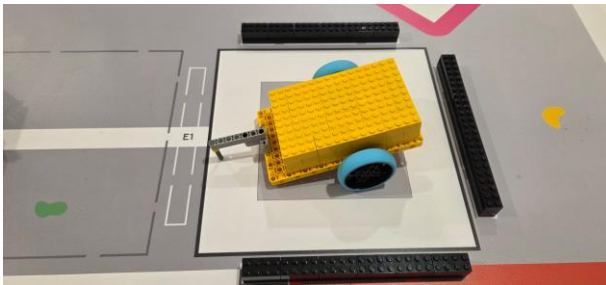


Cart partially in the enclosure (the shaft is not touching the ground): 11 points

Cart



Cart completely in the enclosure but not backed in (the shaft is not the leftmost piece): 16 points

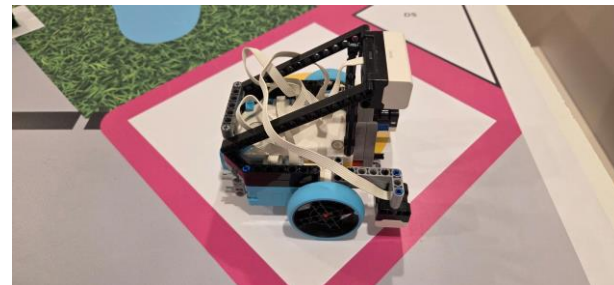


Cart completely in the enclosure, backed in: 23 points

Retour à la zone de départ



One point of contact touching outside the start/end zone: 7 points

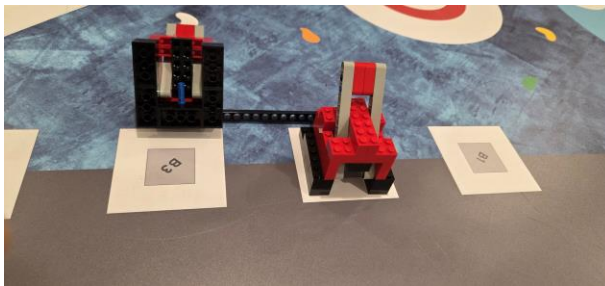


All points of contact are inside the start/end zone: 12 points

Penalties



2 fences moved: $-5 + -5 = -10$ points



1 bread oven damaged: -7 points

Building Instructions

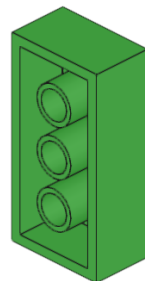
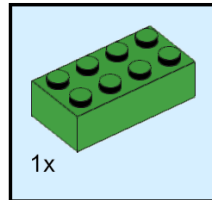
Lumis

1x green

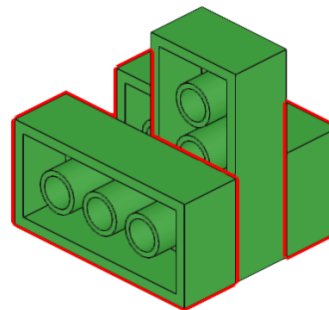
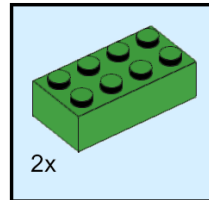
1x red

1x yellow

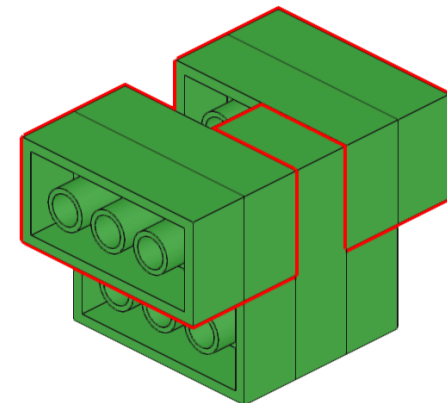
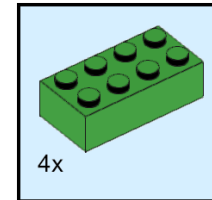
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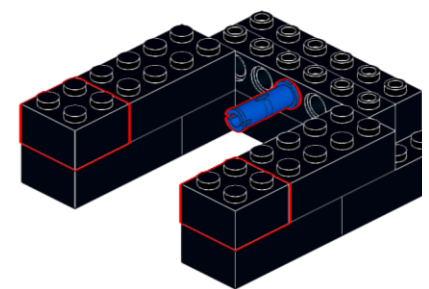
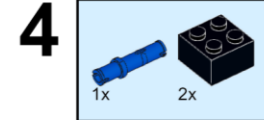
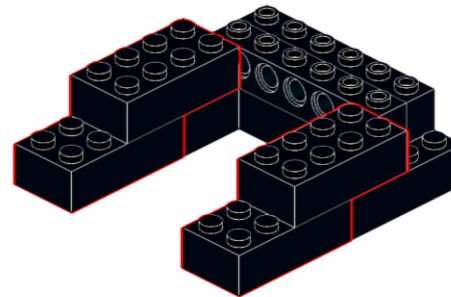
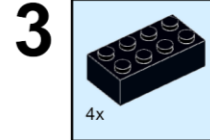
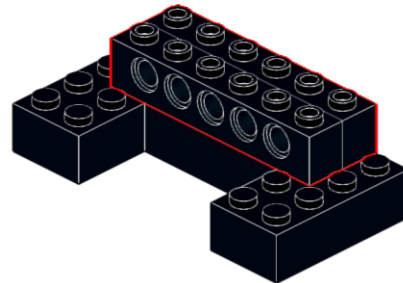
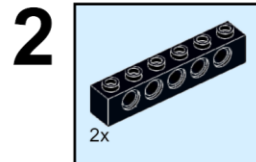
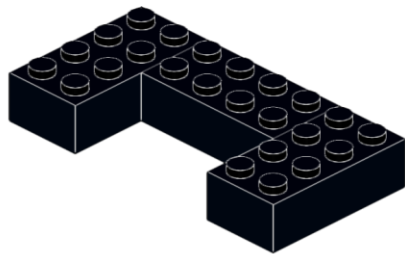
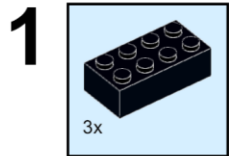
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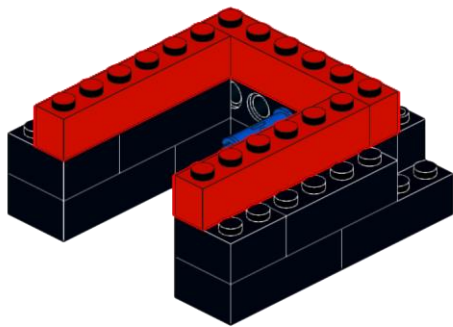
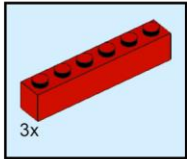
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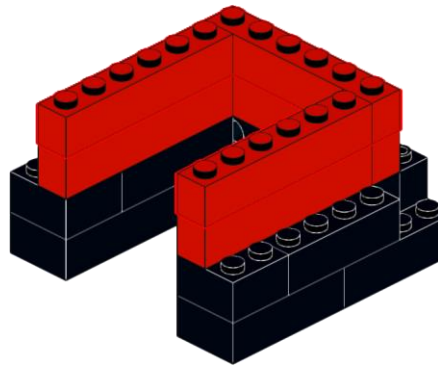
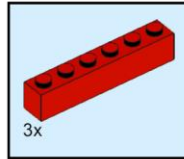
Breadovens



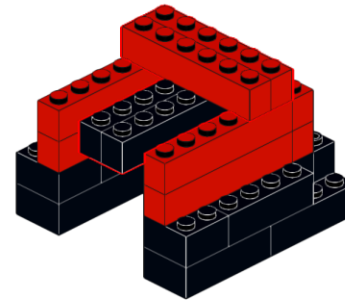
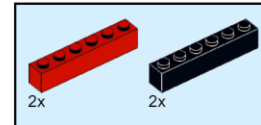
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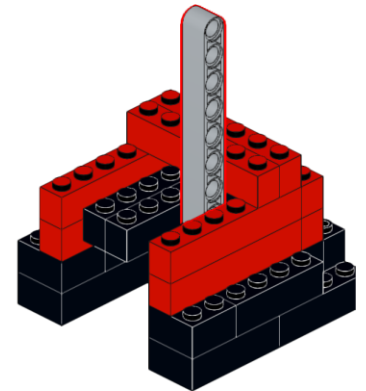
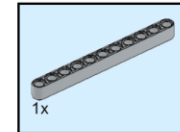
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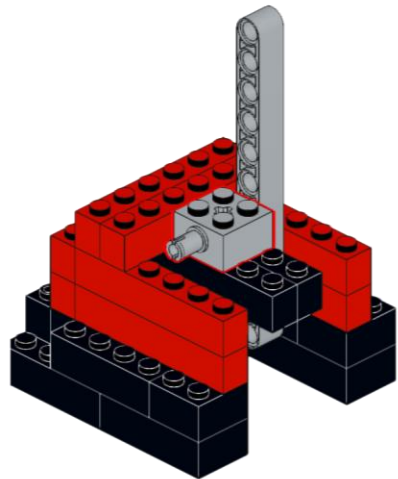
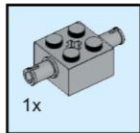
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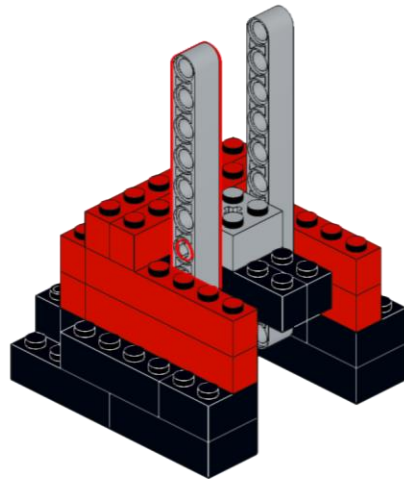
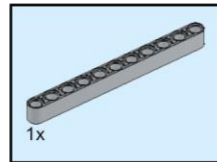
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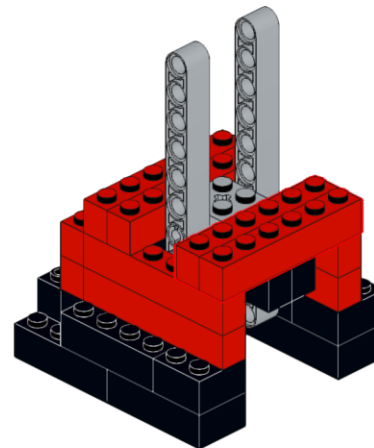
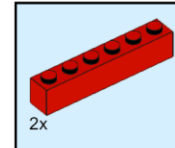
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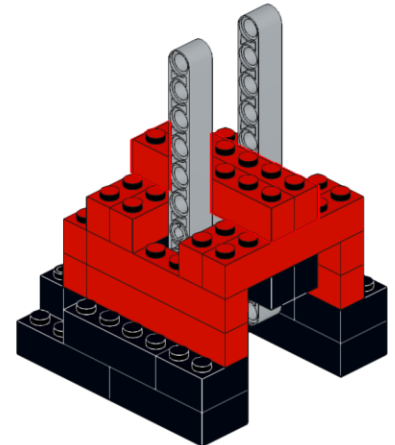
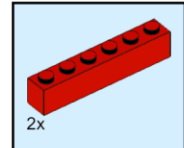
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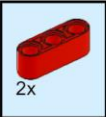


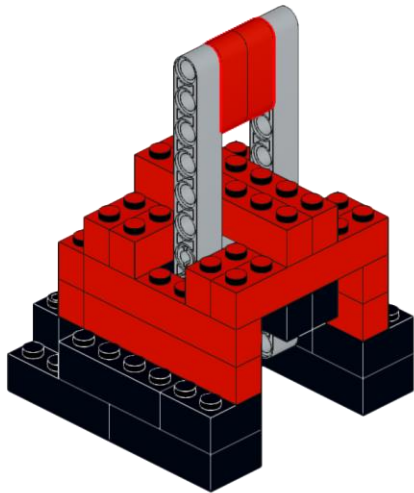
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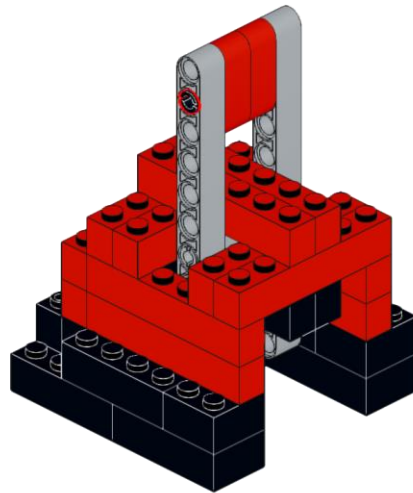
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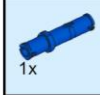


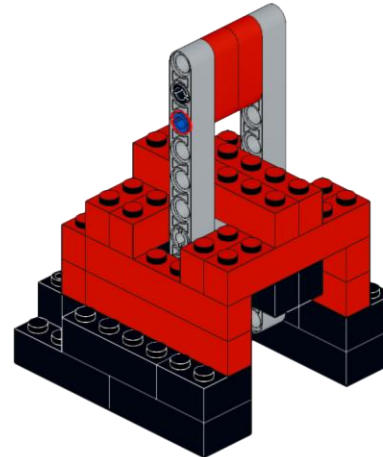
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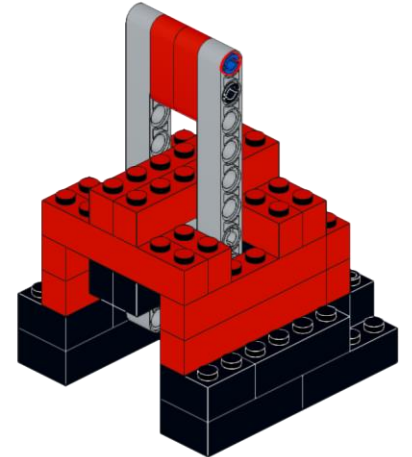
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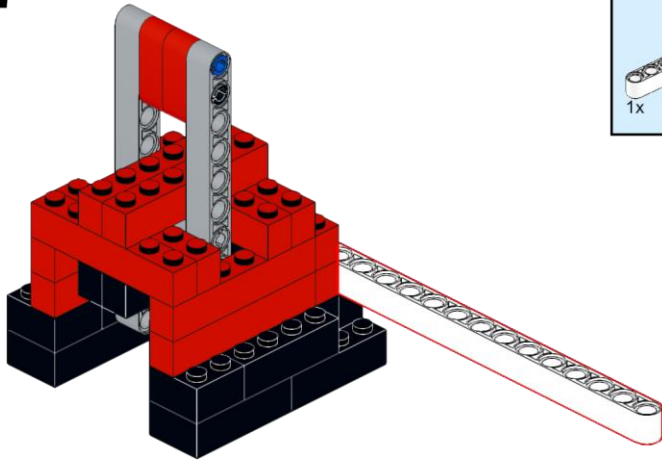
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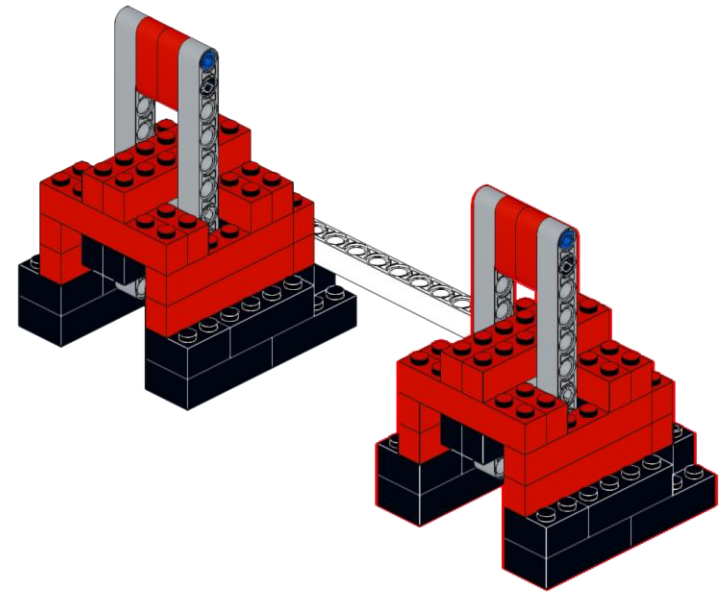
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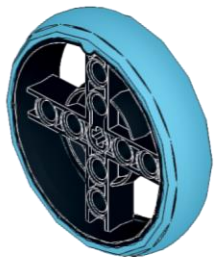


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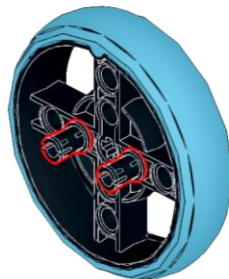


Cart

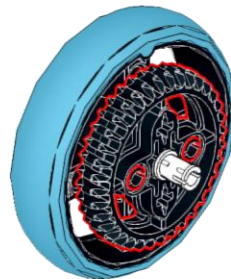
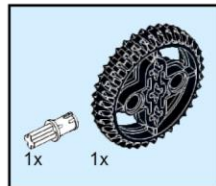
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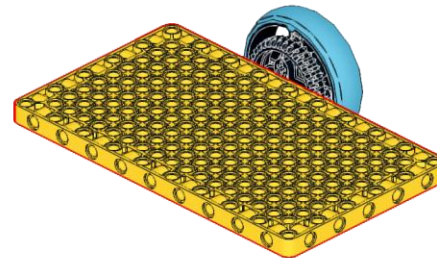
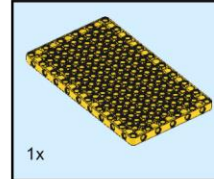
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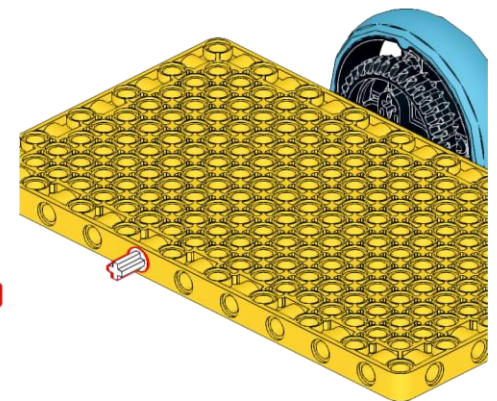
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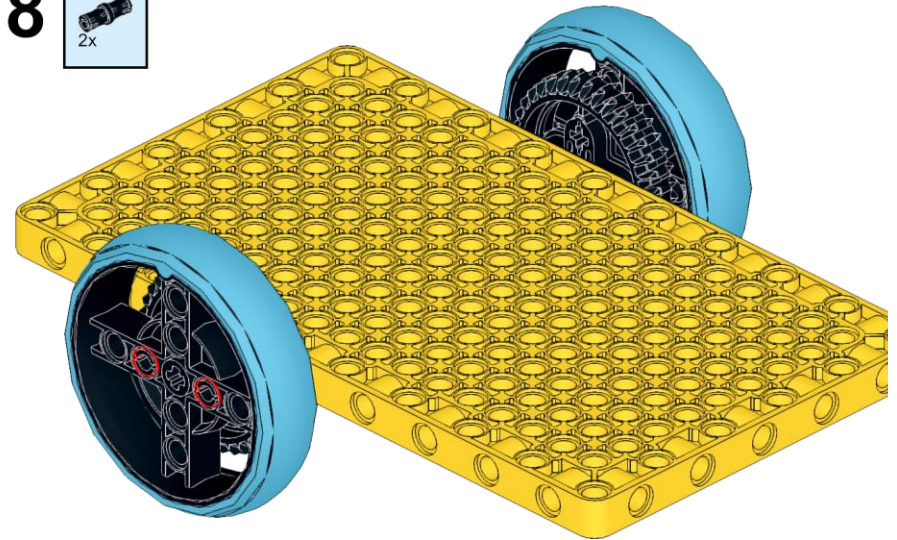
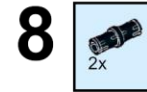
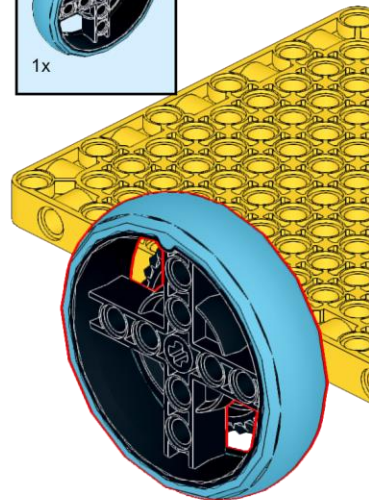
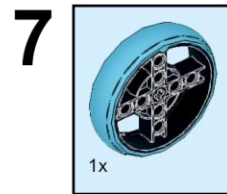
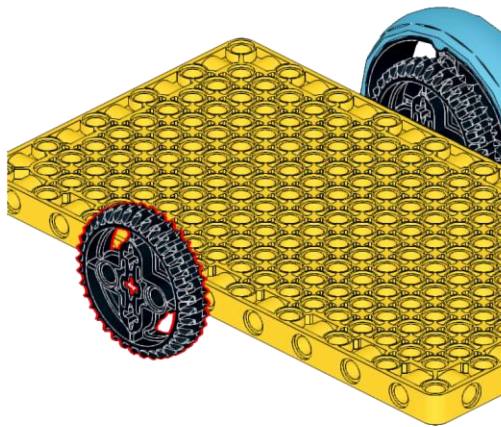
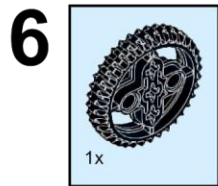


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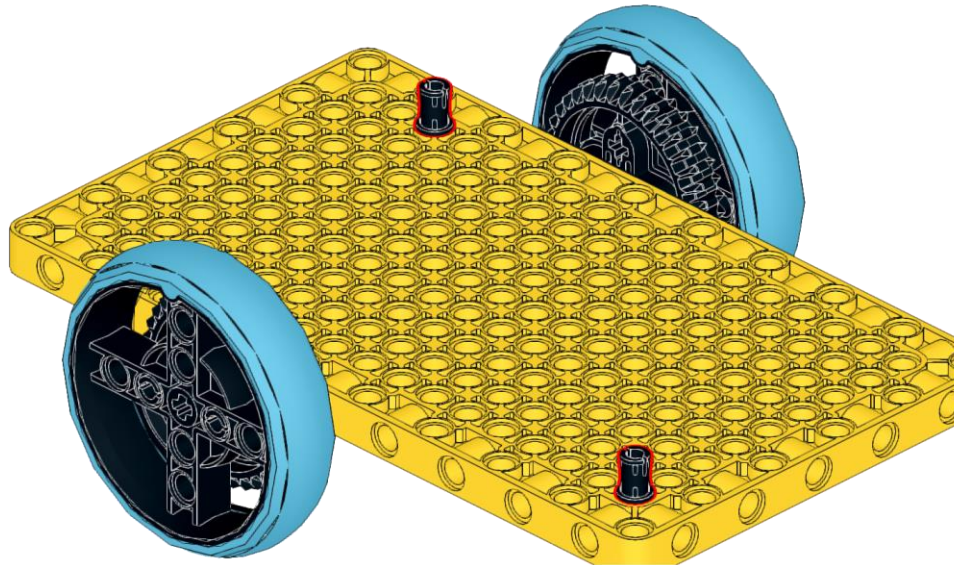


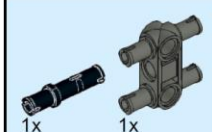
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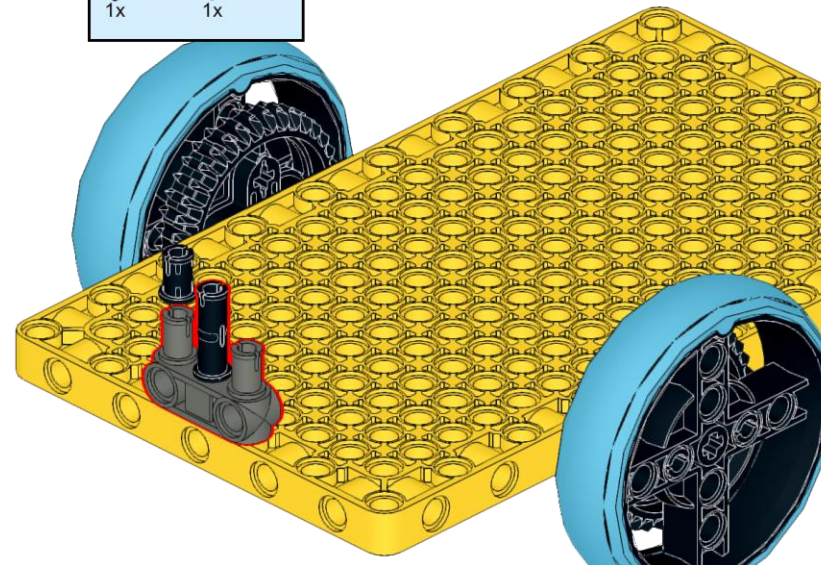




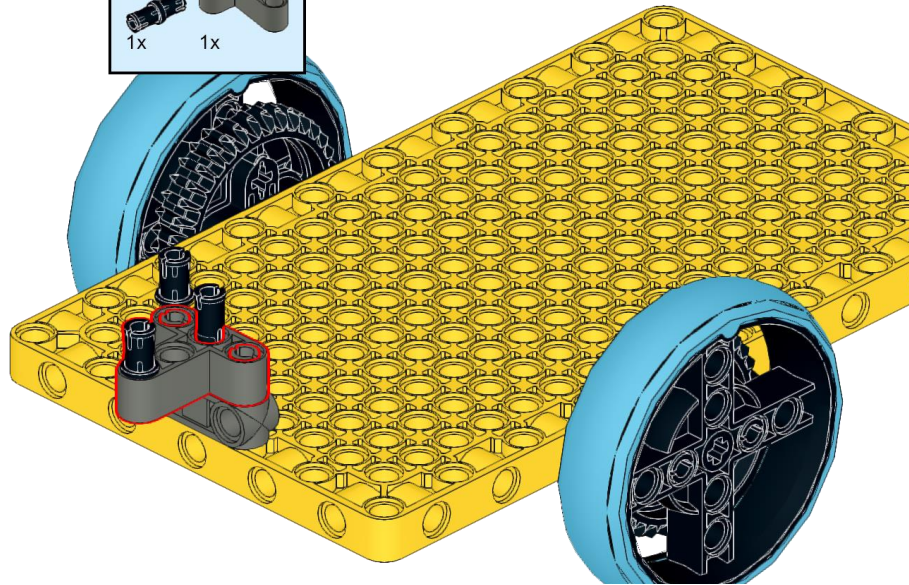
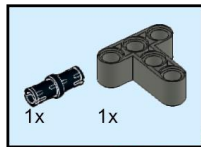
9  2x



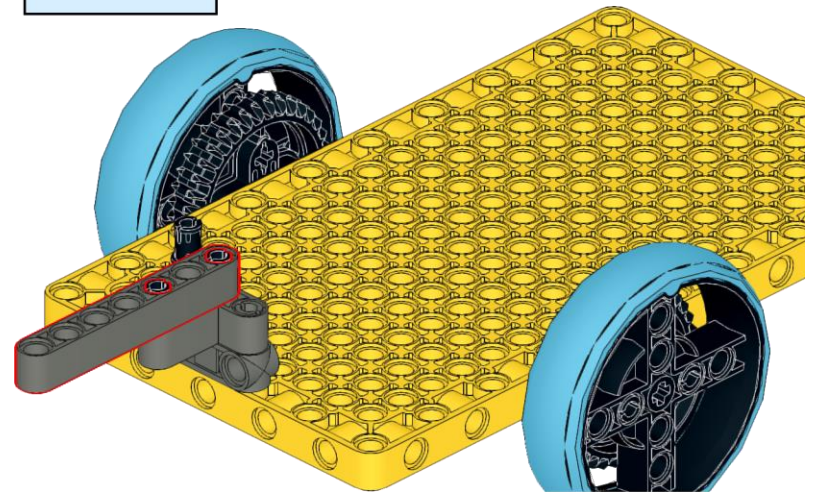
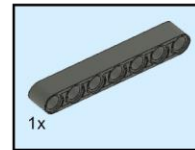
10  1x 1x



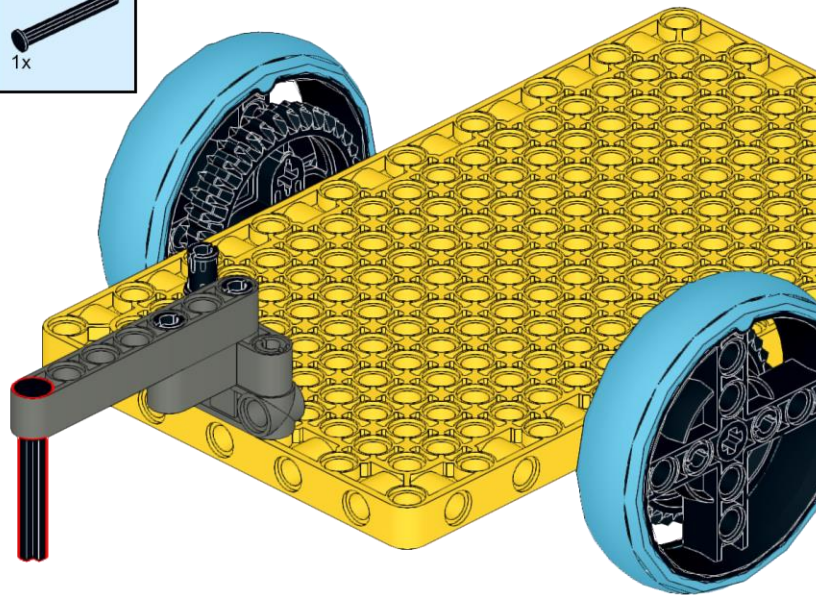
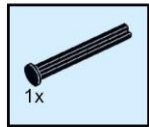
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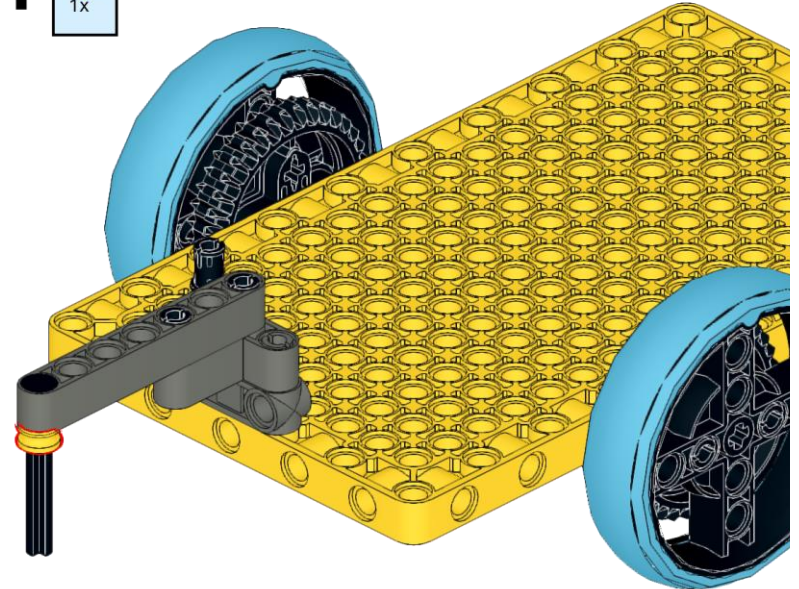
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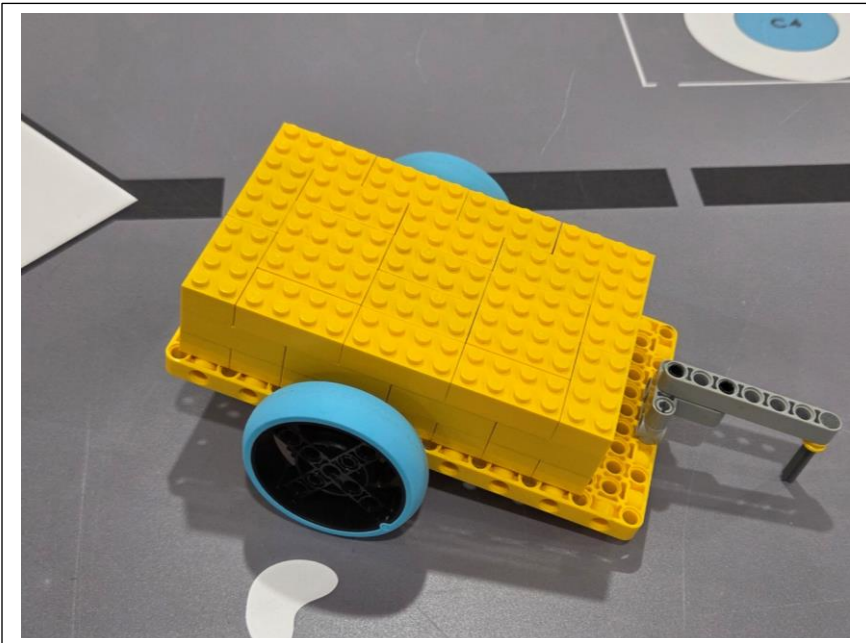


13



14

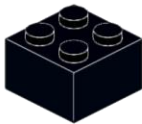
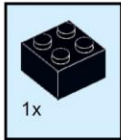




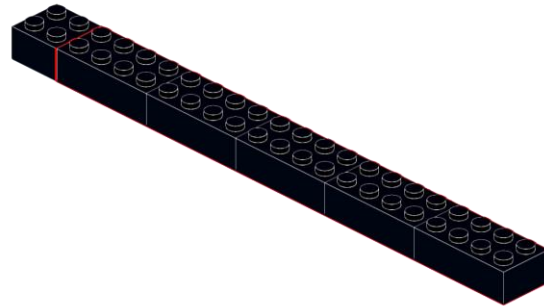
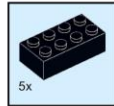
The loaded cart weighs 230g, which is about 60 2x4 bricks worth of hay.

Fences x3

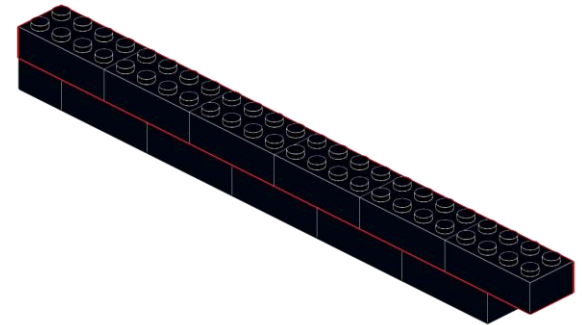
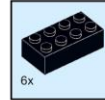
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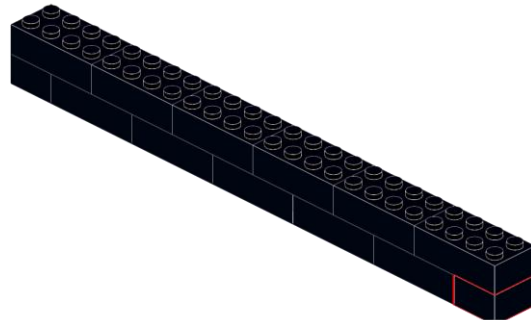
2



3

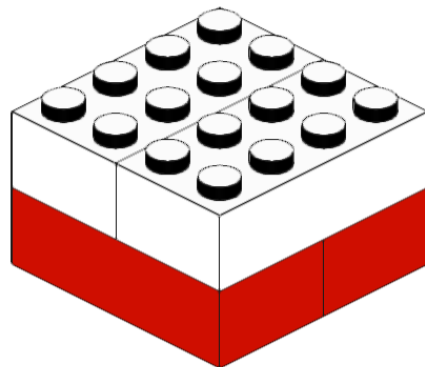
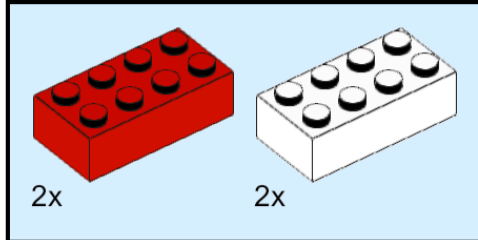


4

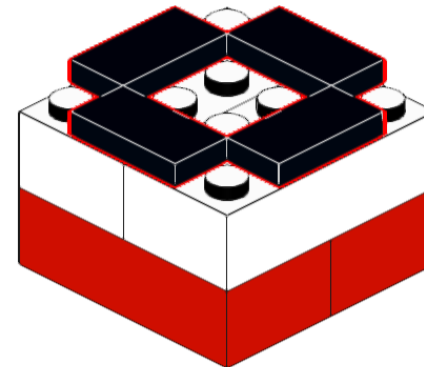
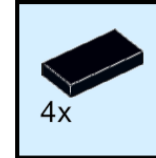


Bread x2

1

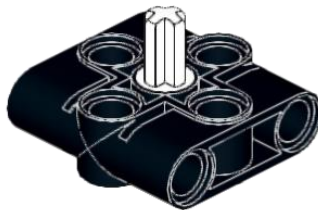
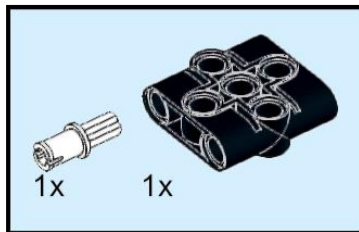


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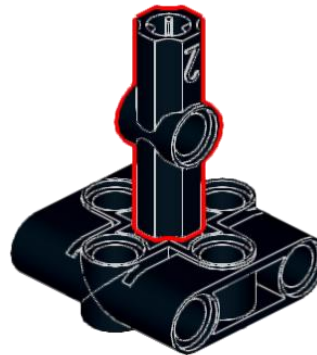


Scarecrows x2

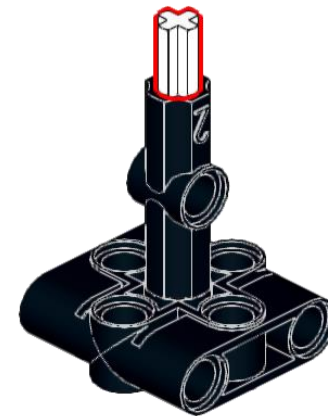
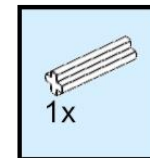
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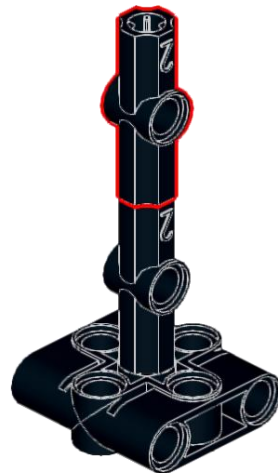
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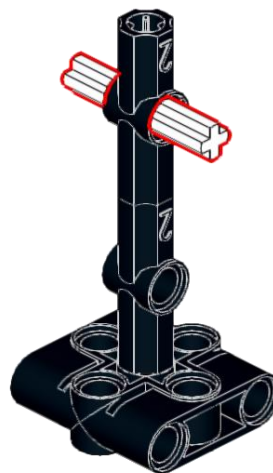
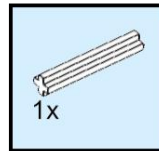
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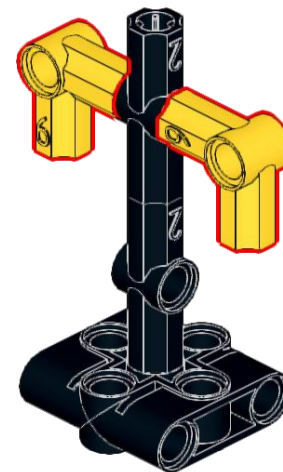
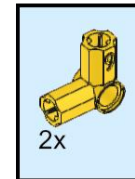
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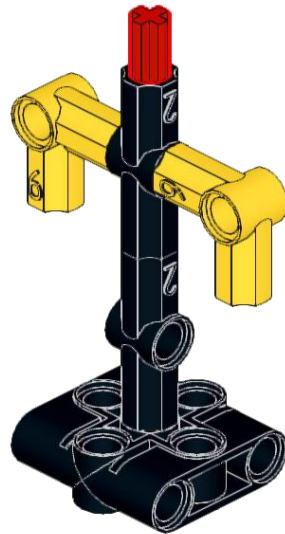
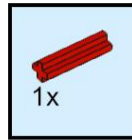
5



6



7



8

