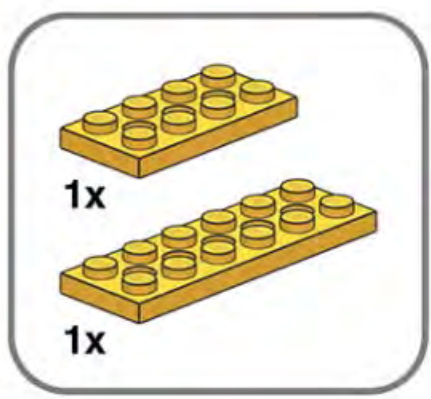




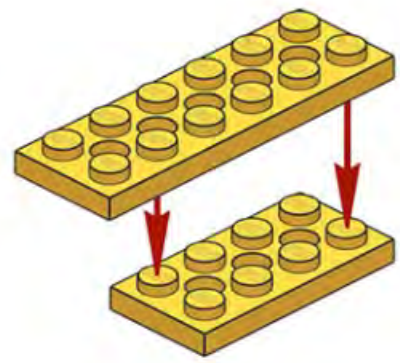
Build the robot!

ROBORISE-IT!
ROBOTIC EDUCATION





1

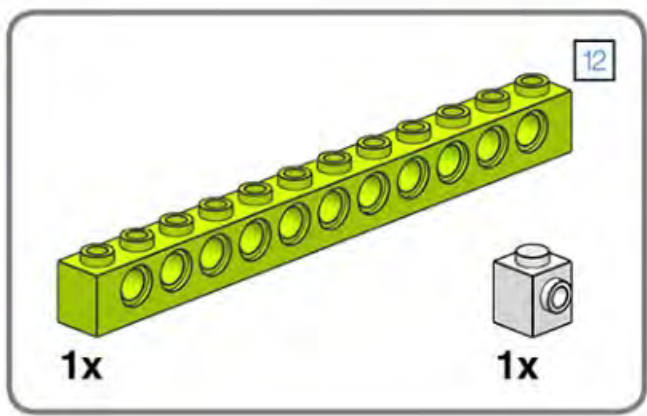


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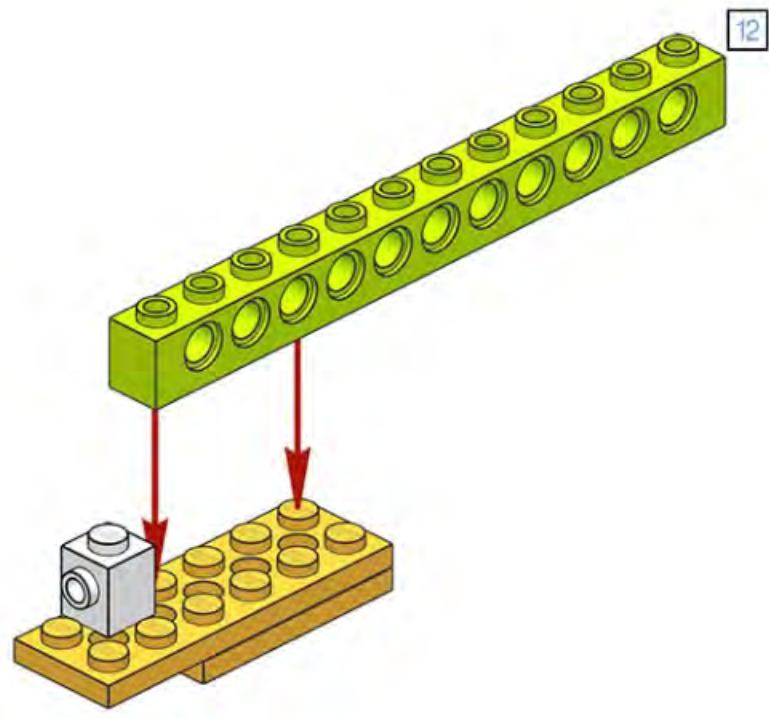
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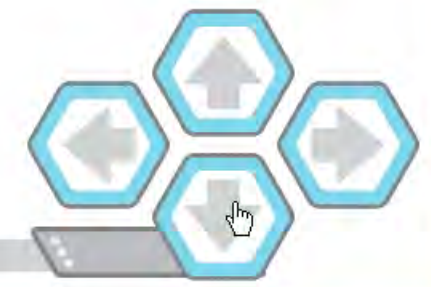
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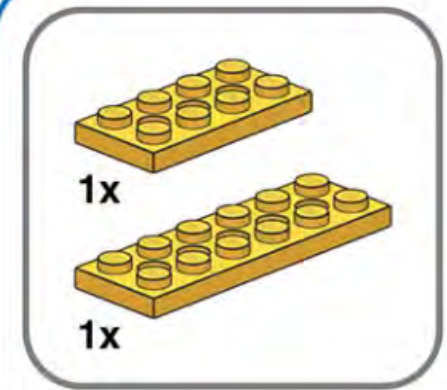


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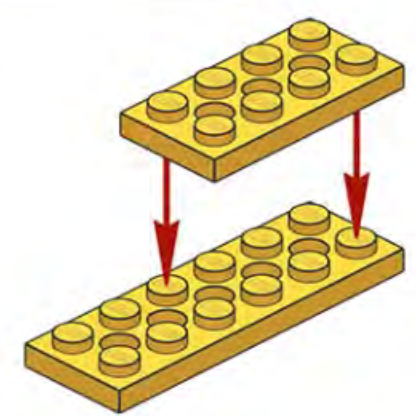
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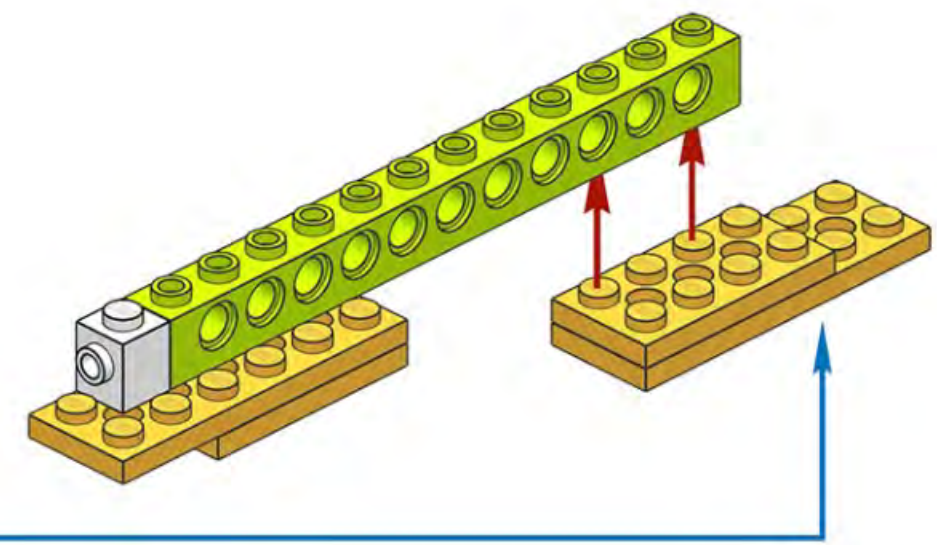
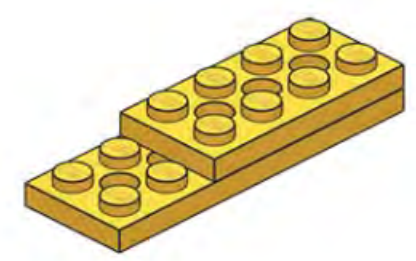


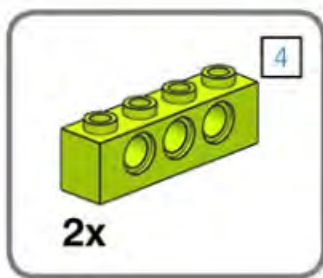


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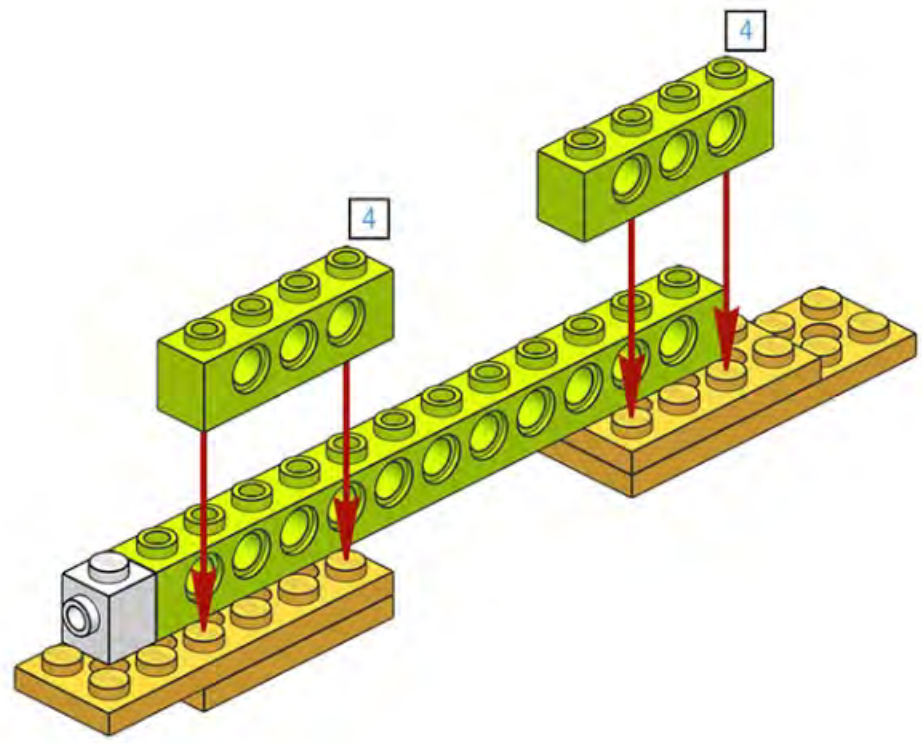


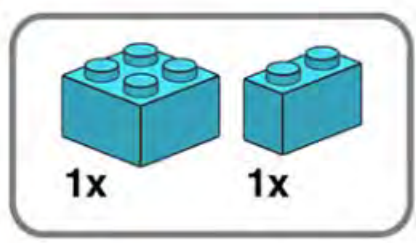
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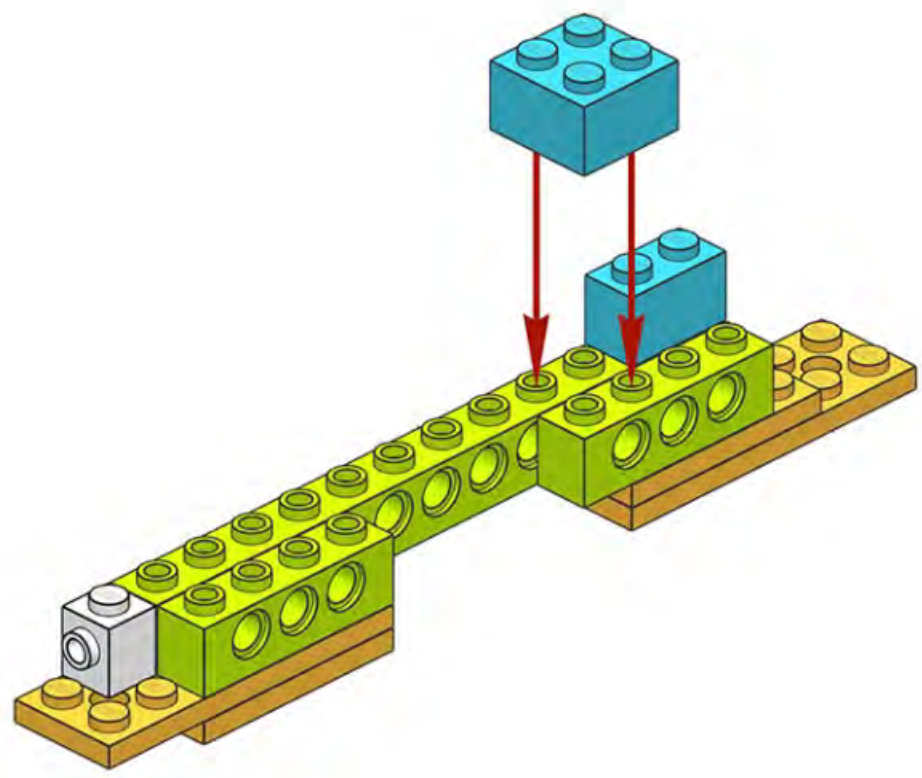


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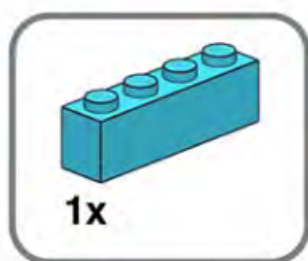


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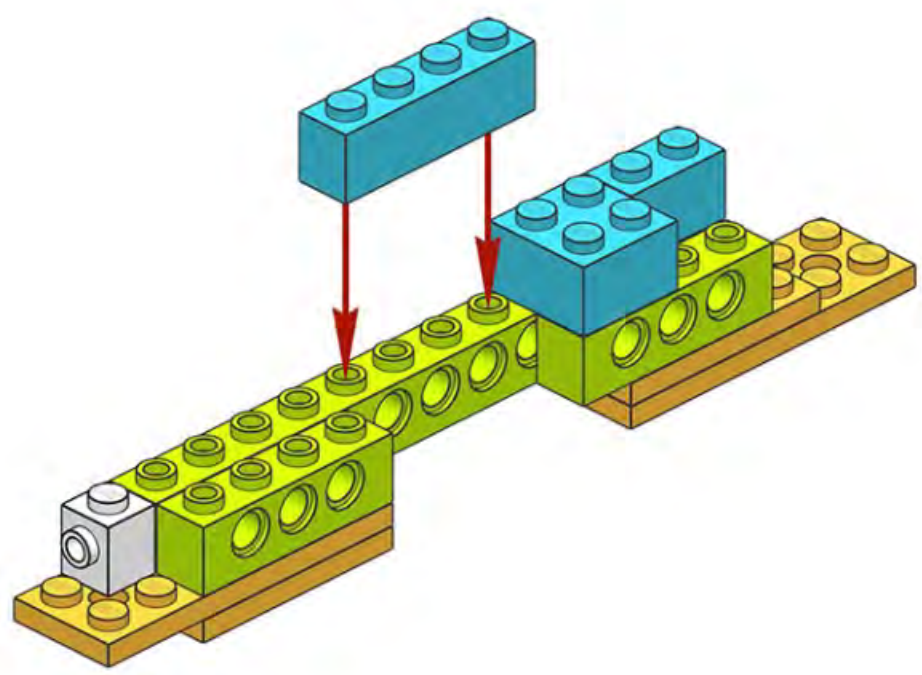
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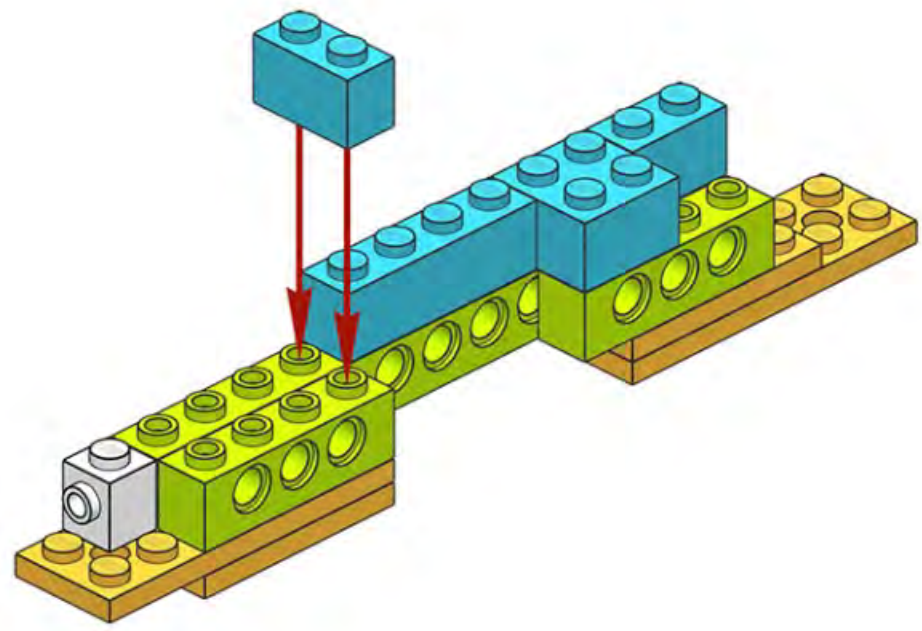


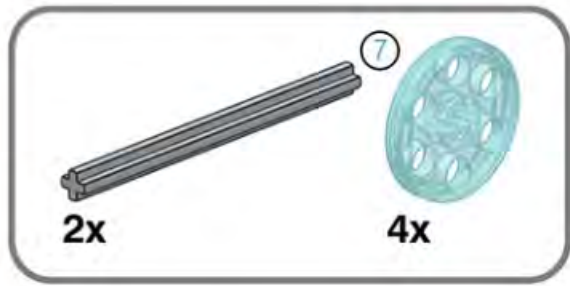
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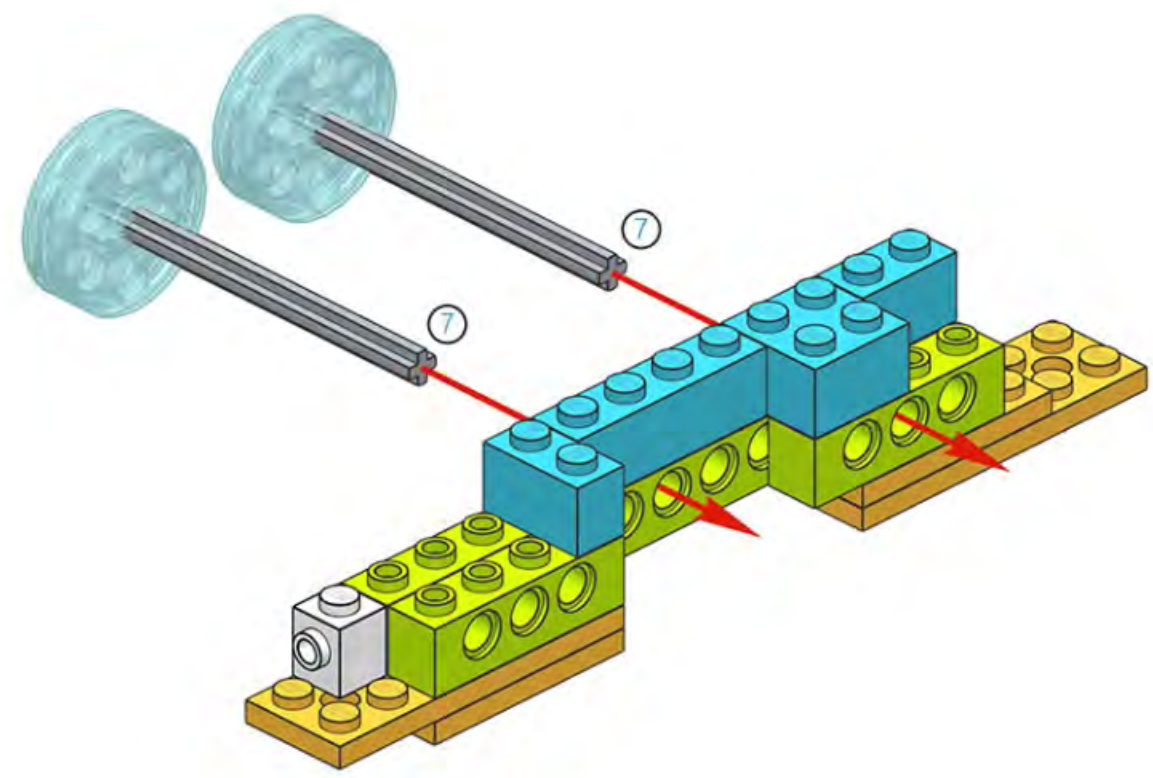


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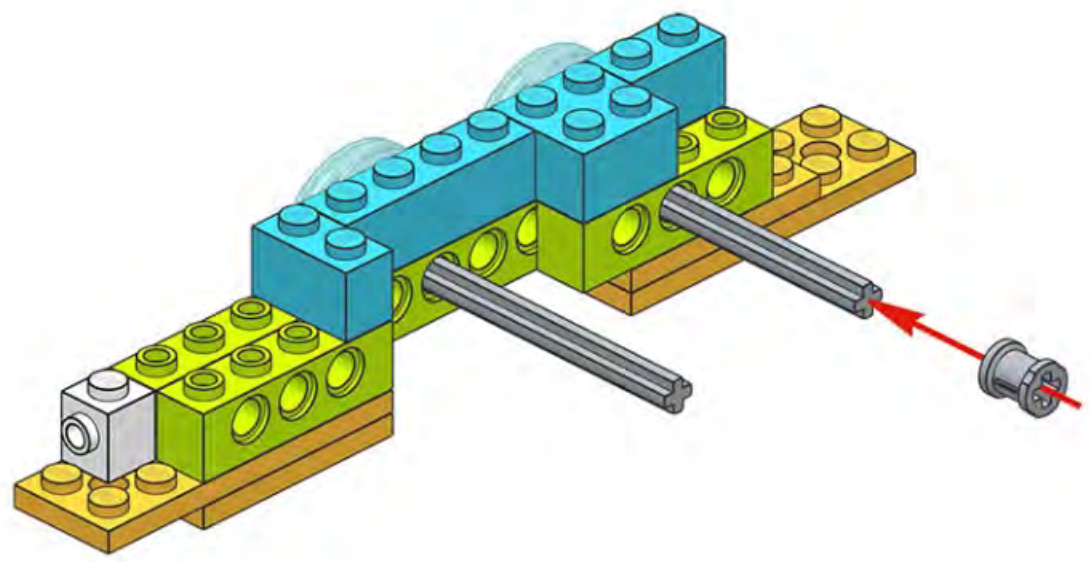
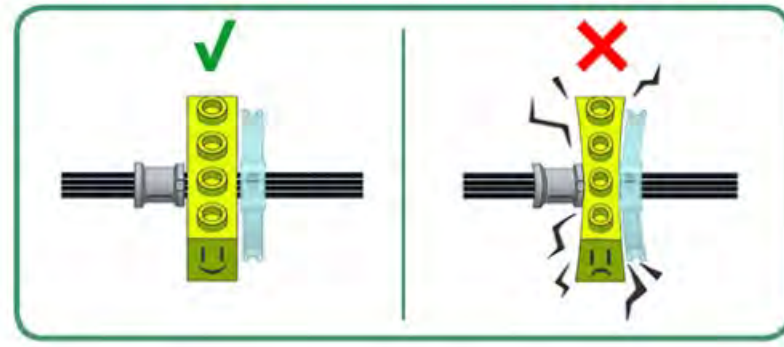
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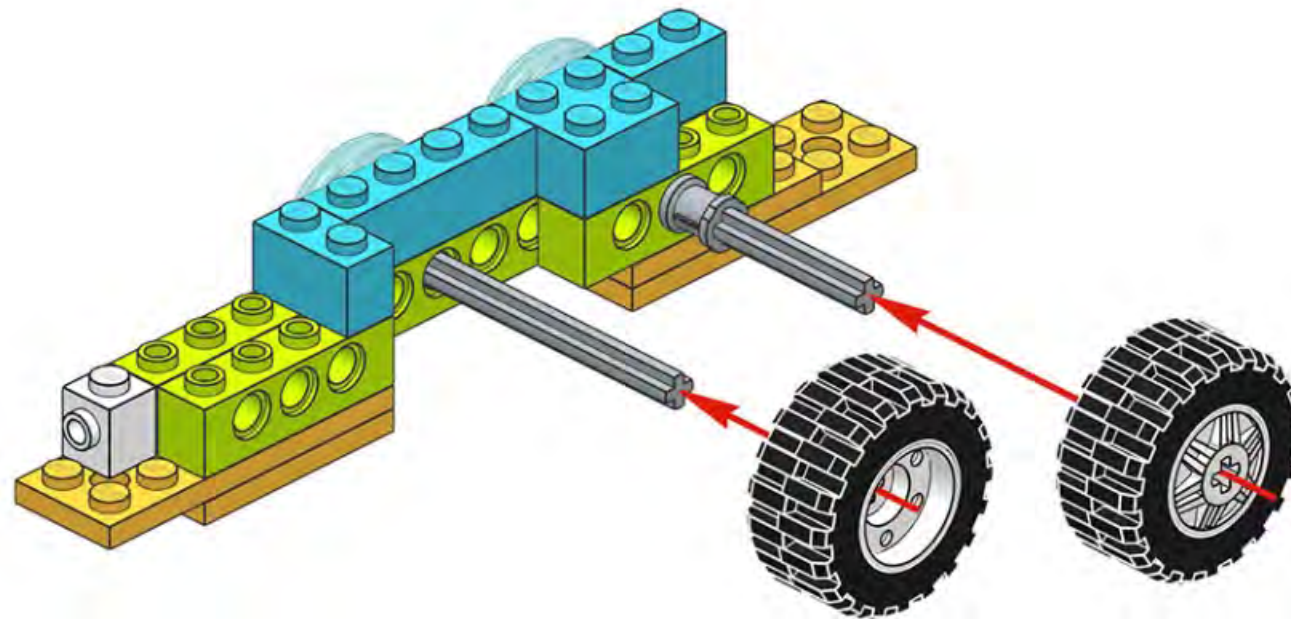

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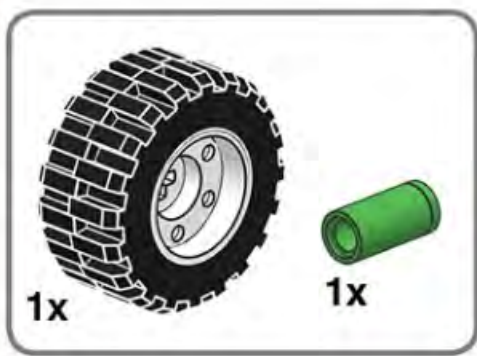

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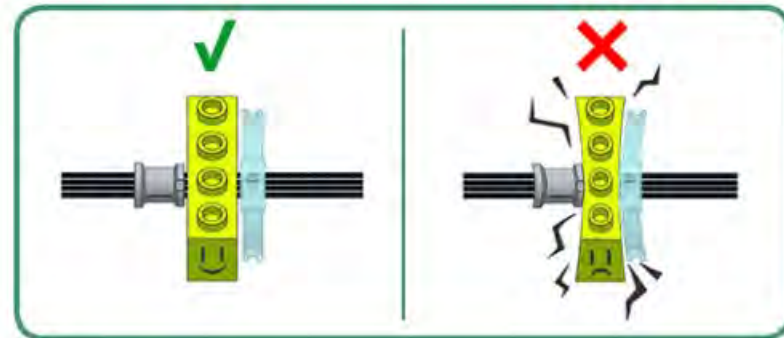
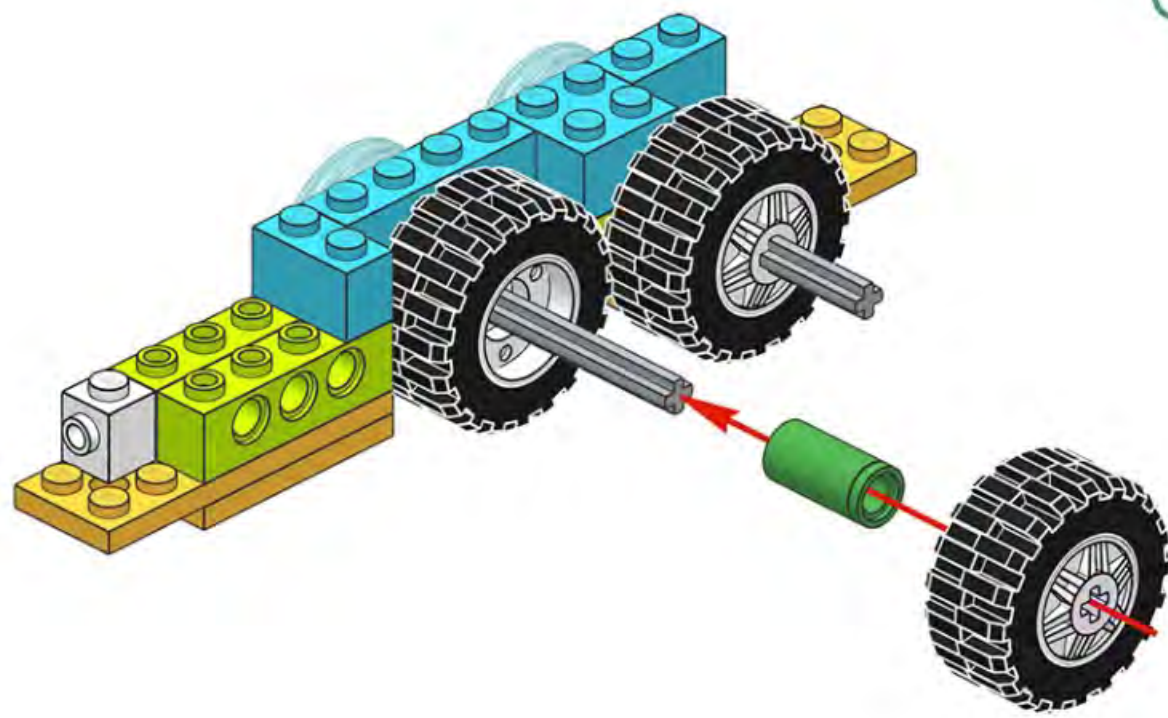


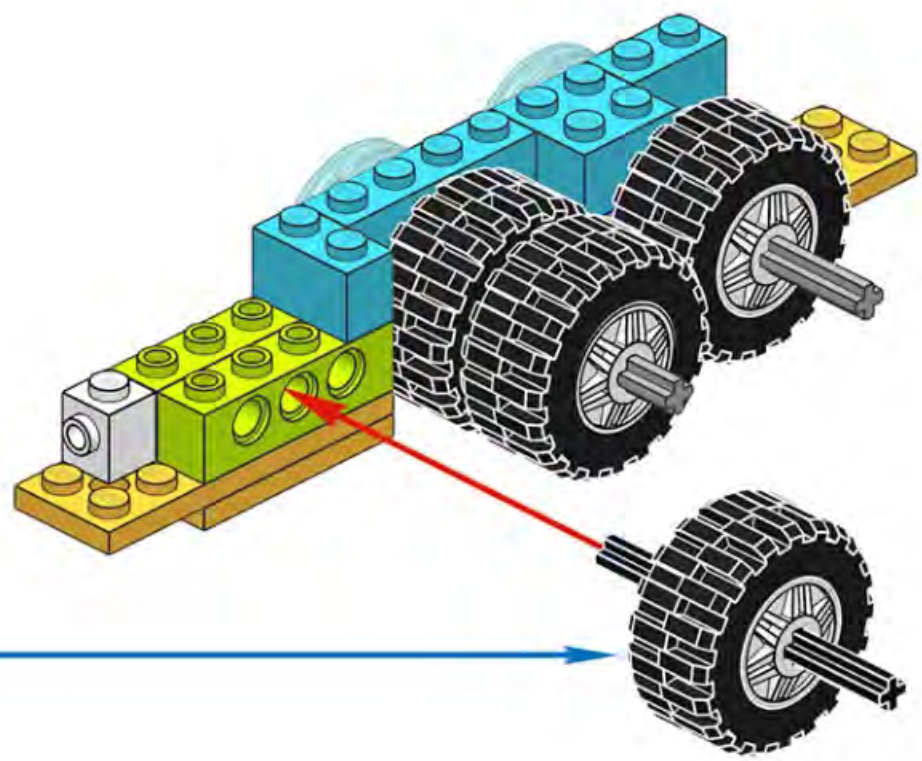
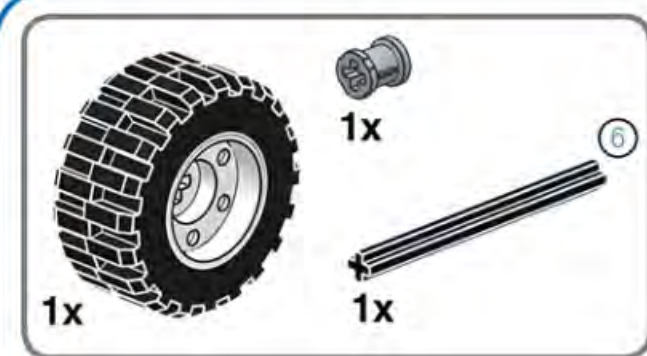
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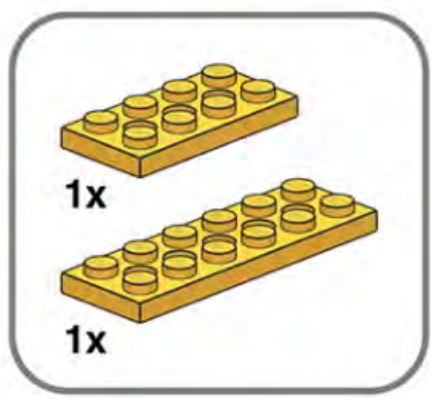




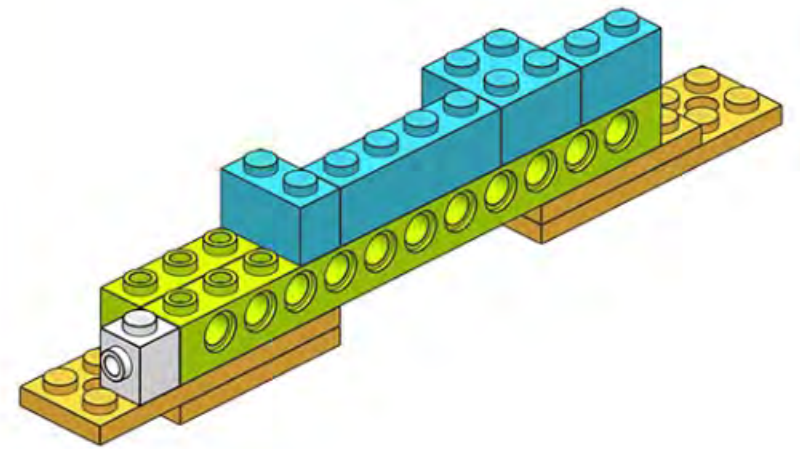
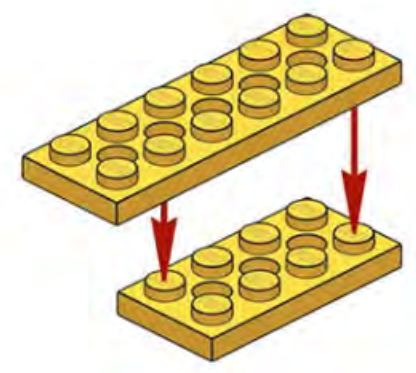


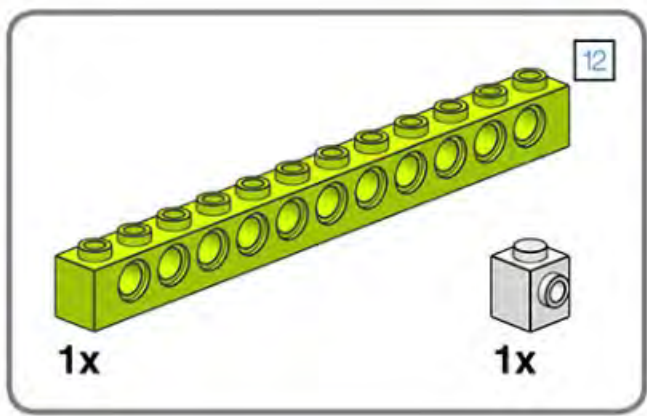
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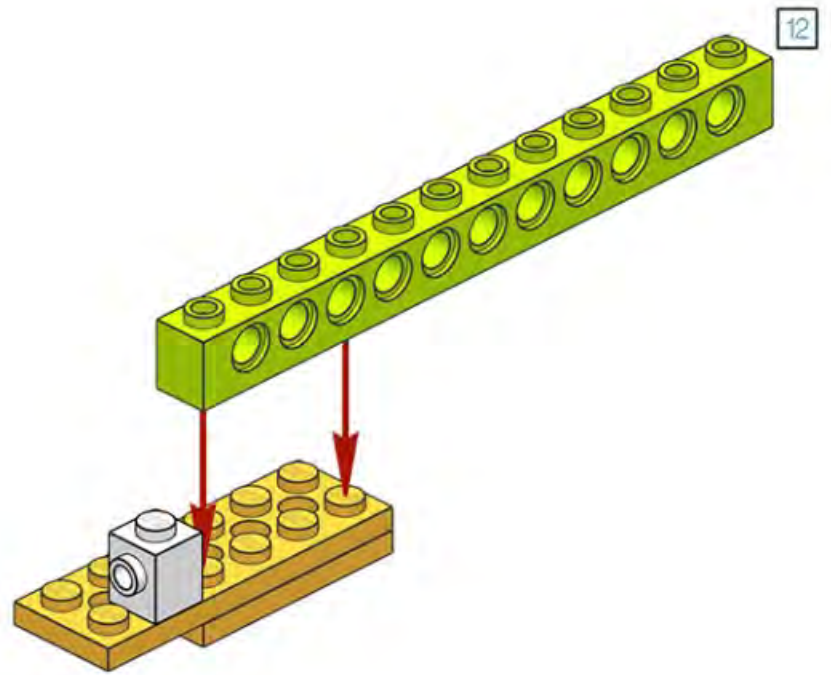


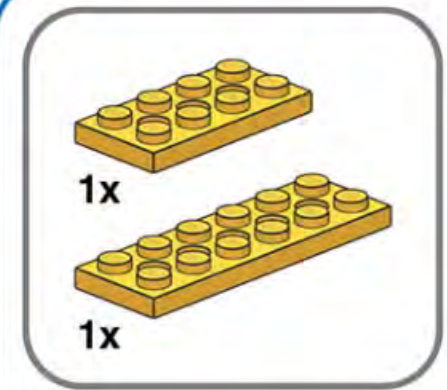
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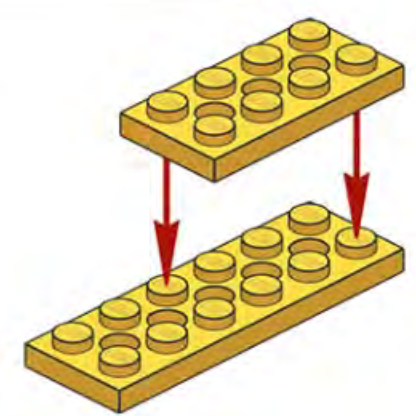


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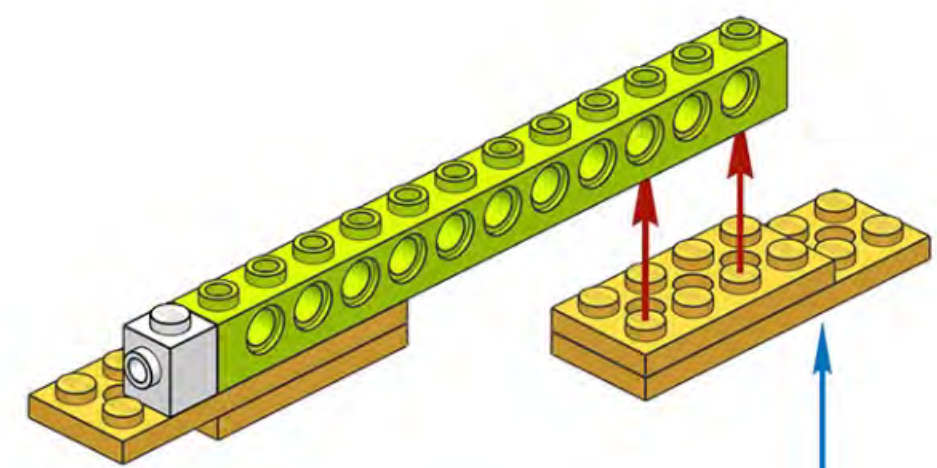
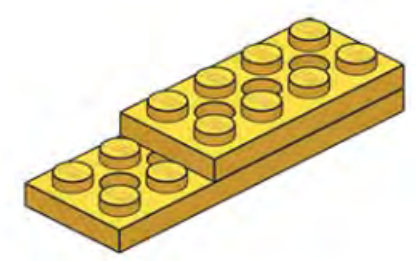


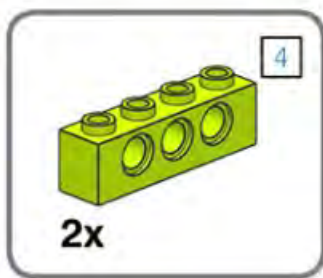


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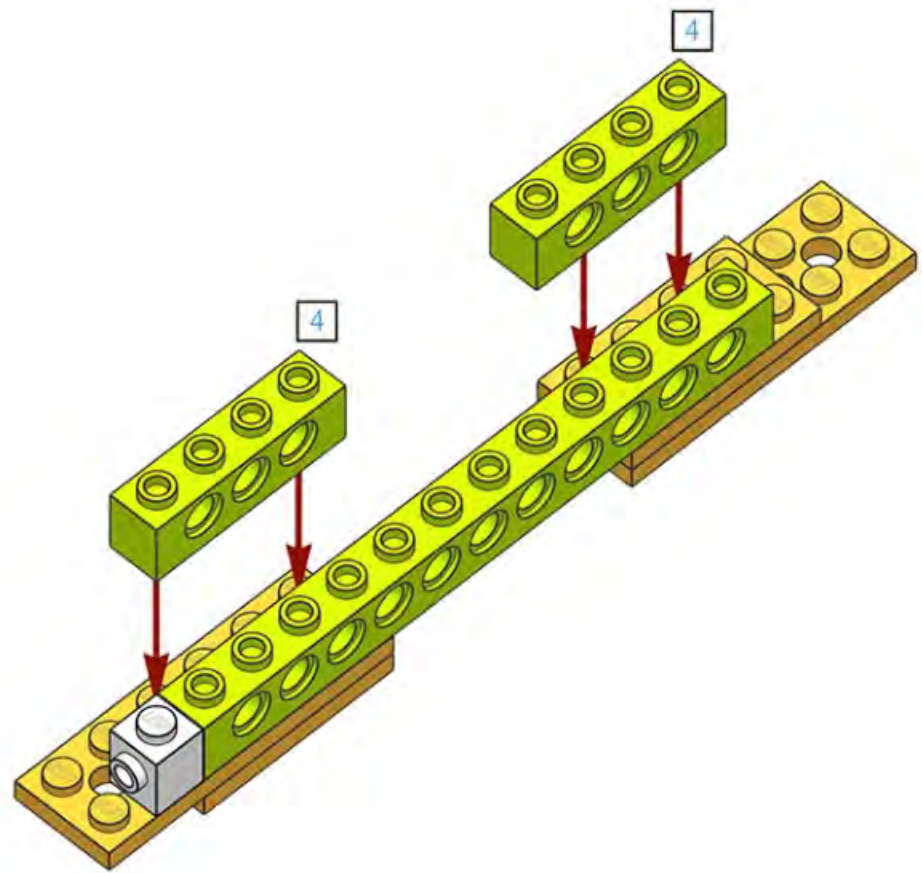


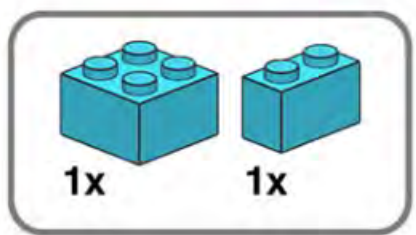
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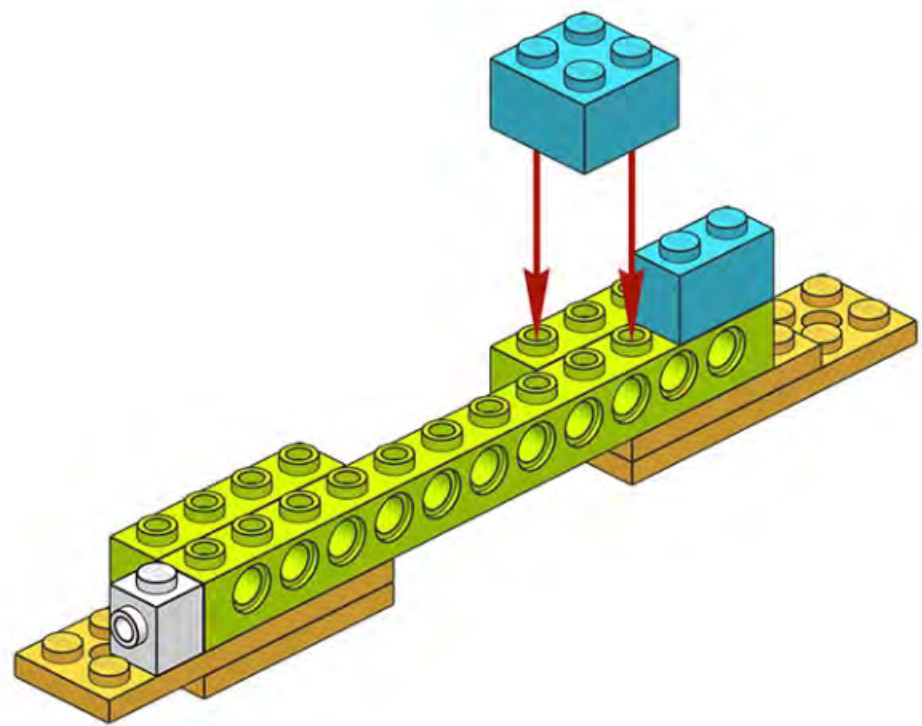


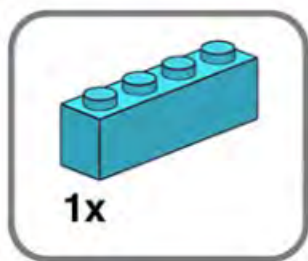
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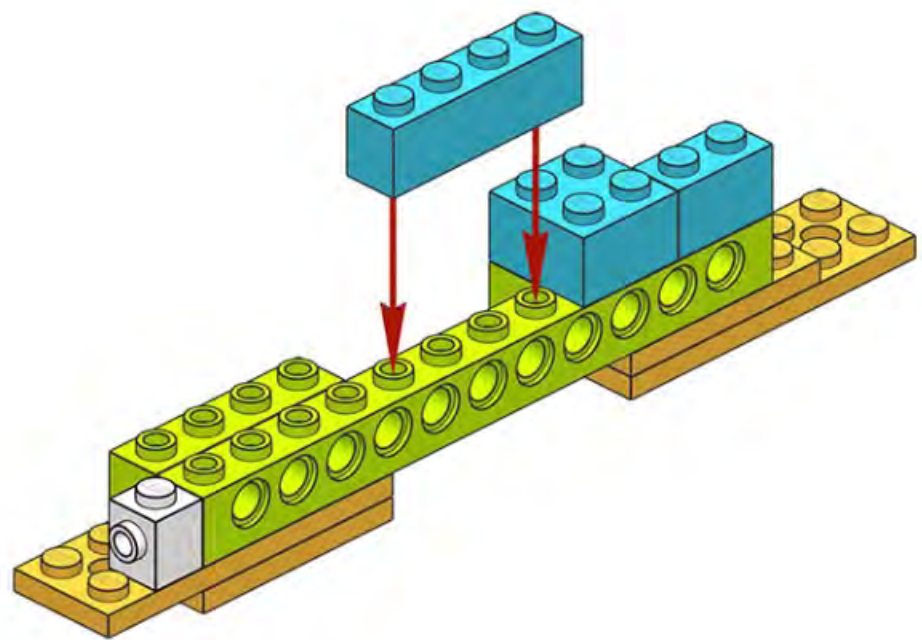


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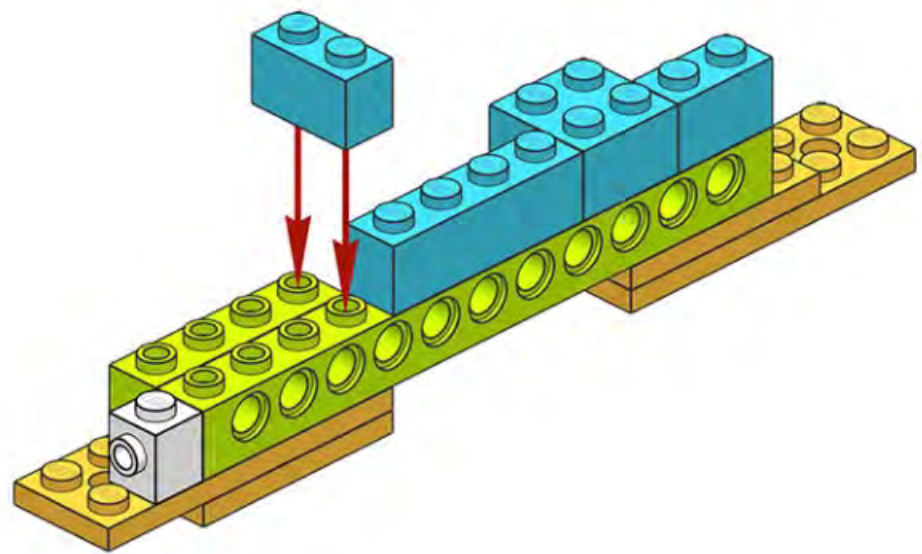


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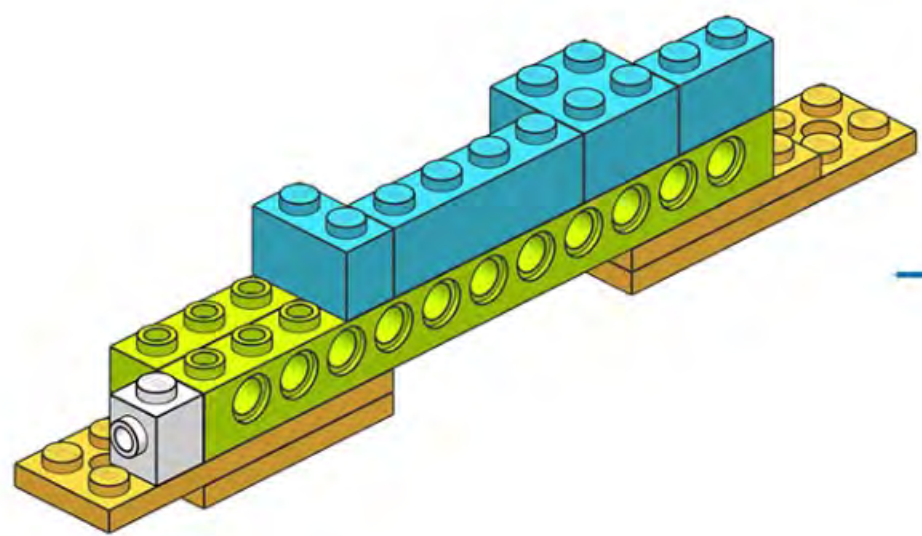


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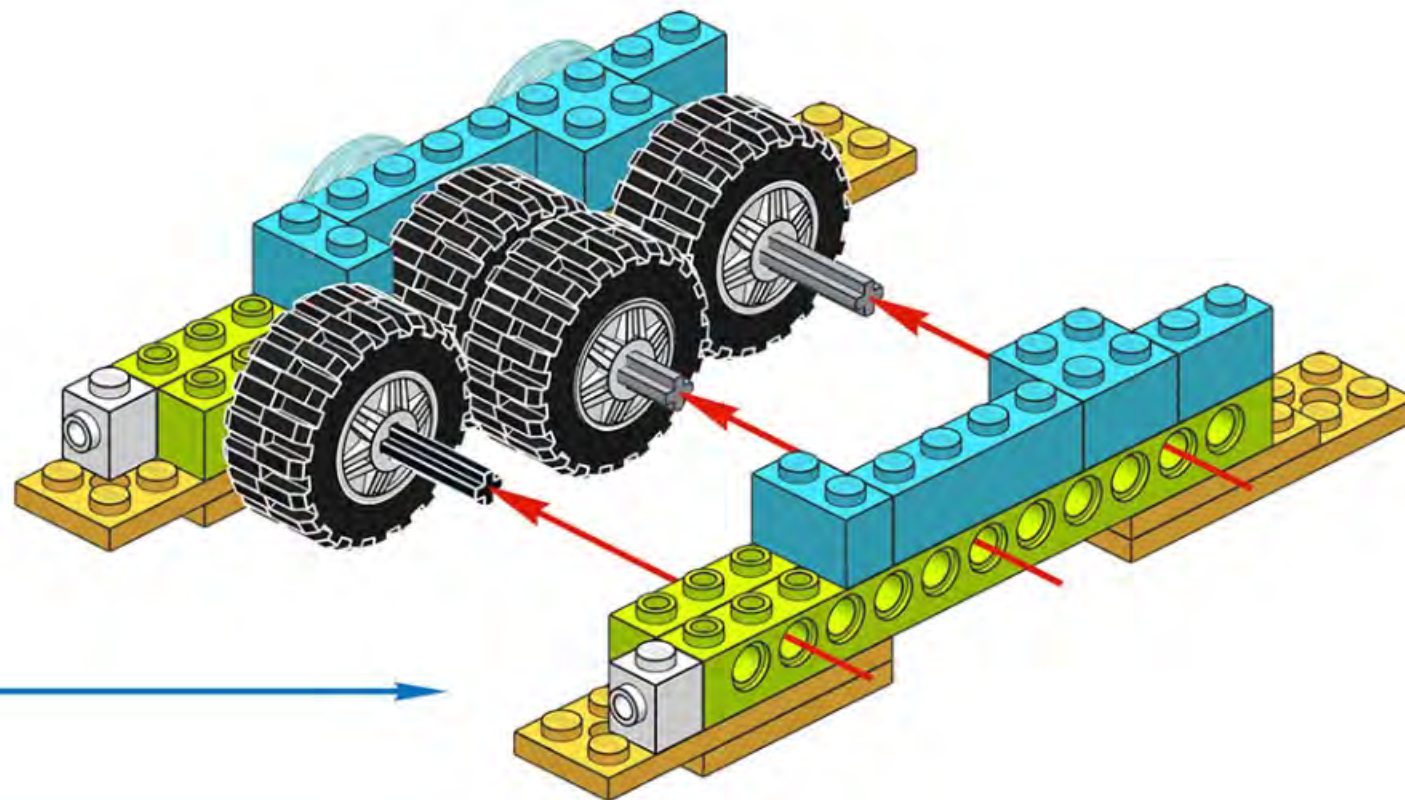
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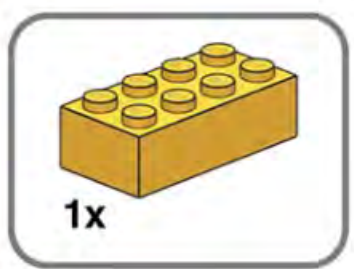
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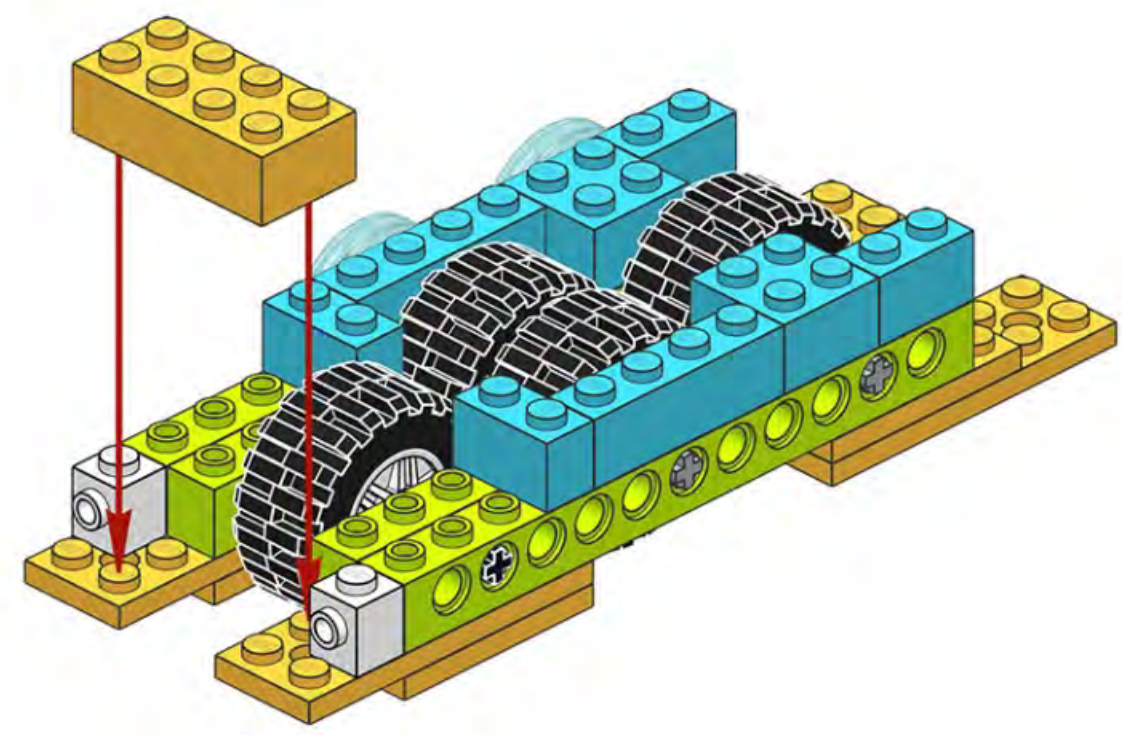
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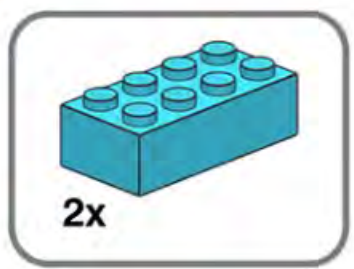
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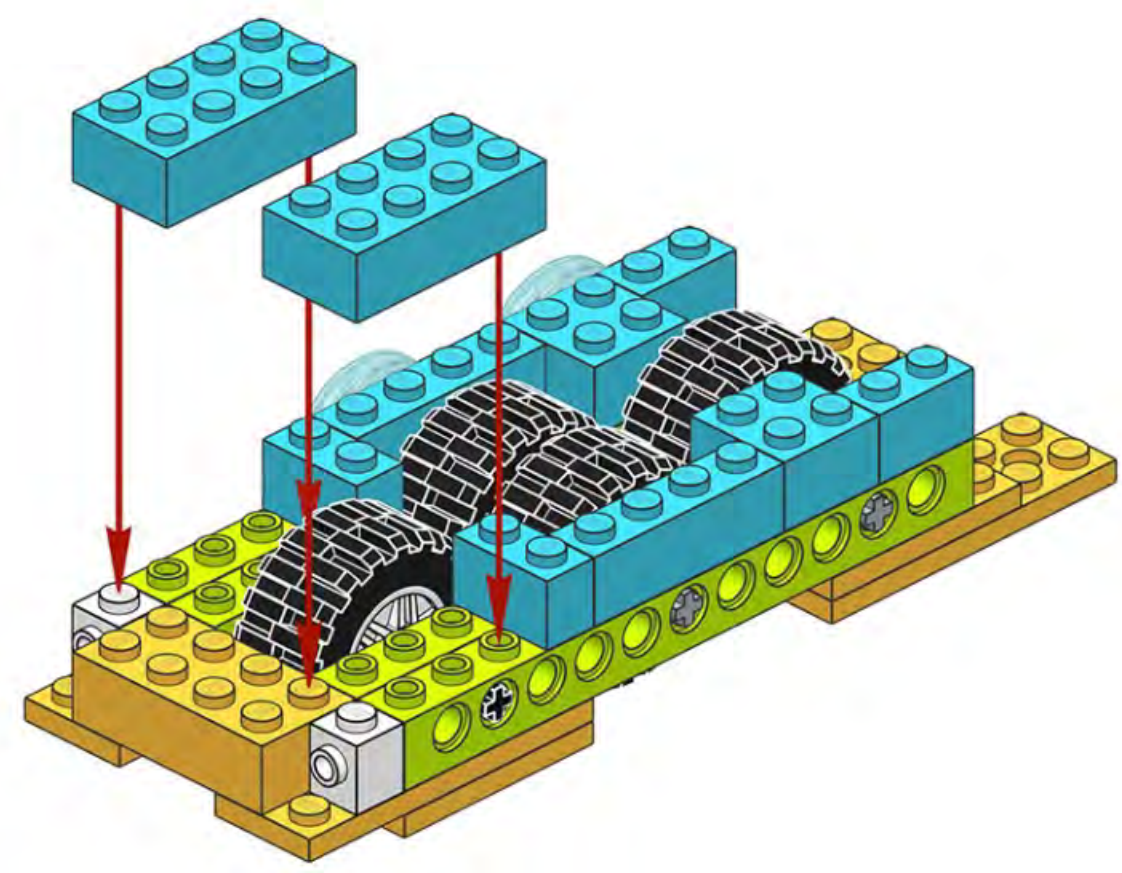


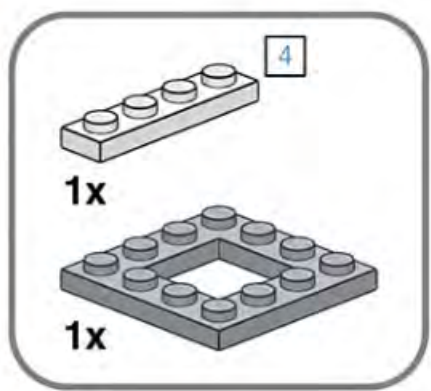
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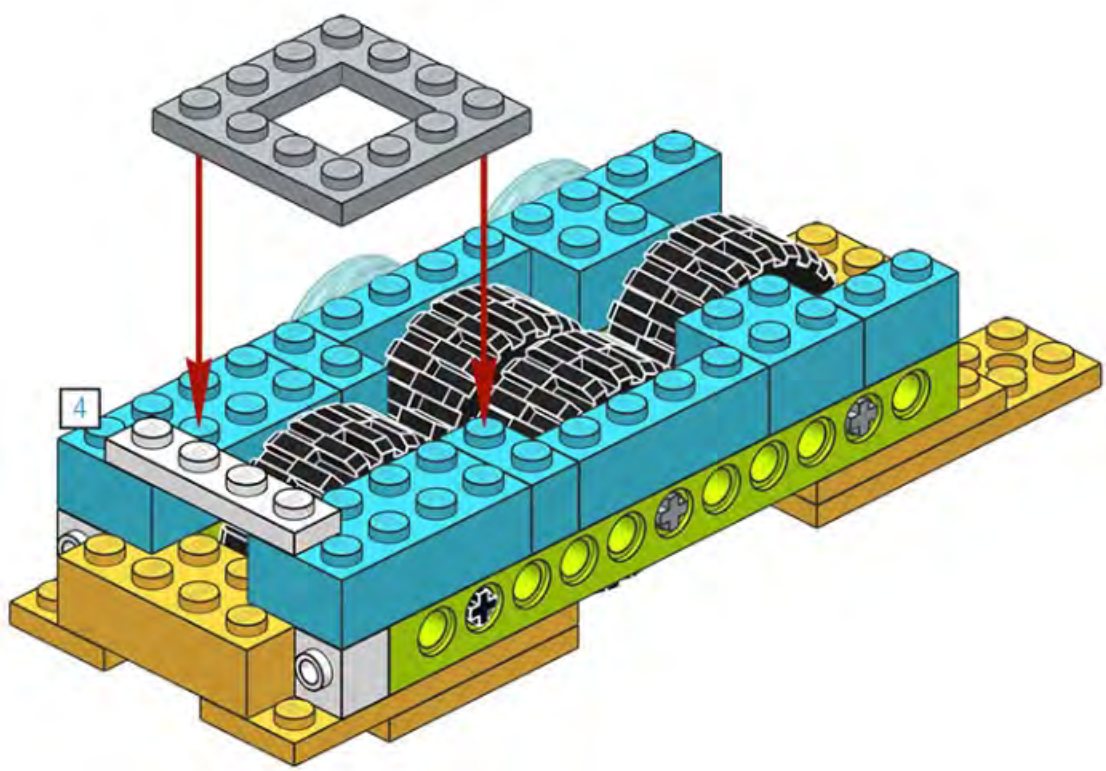


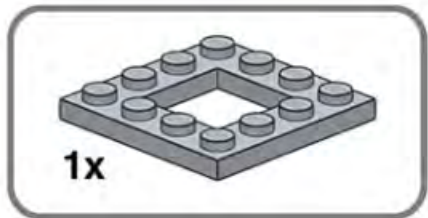
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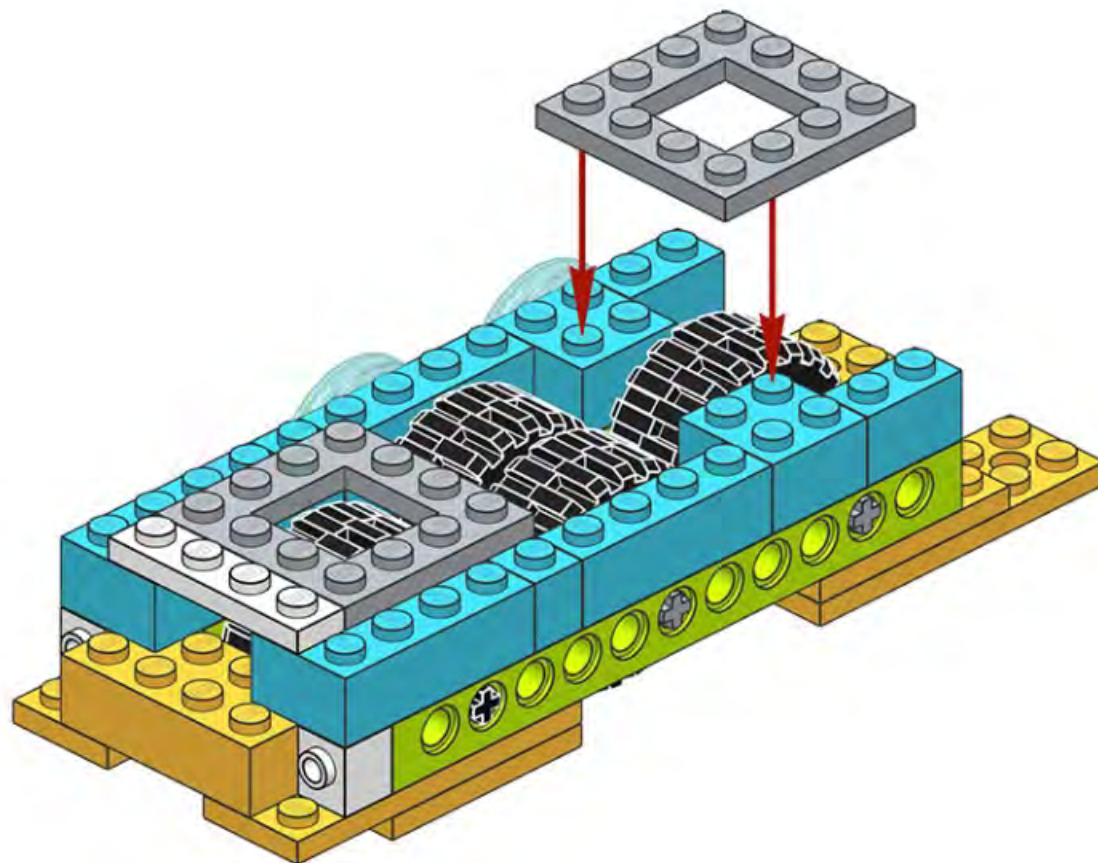


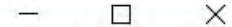
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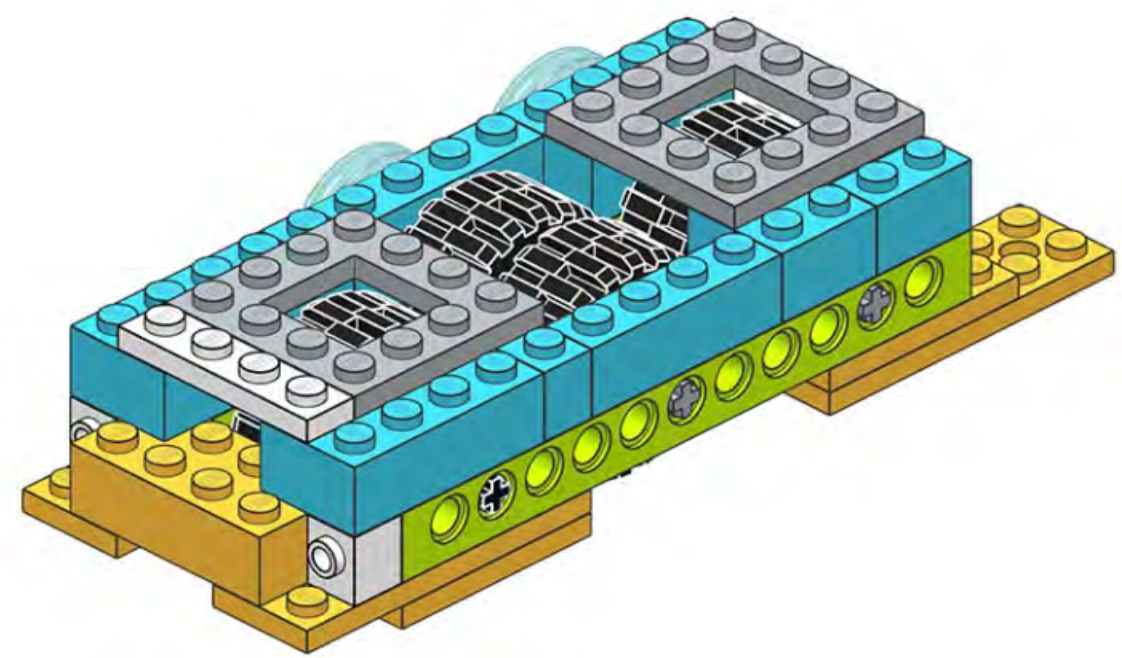


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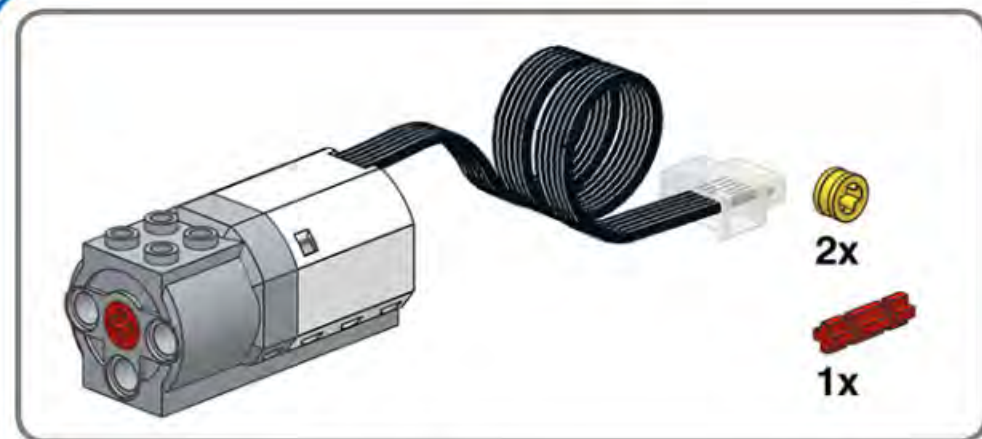


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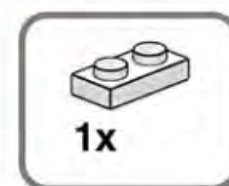
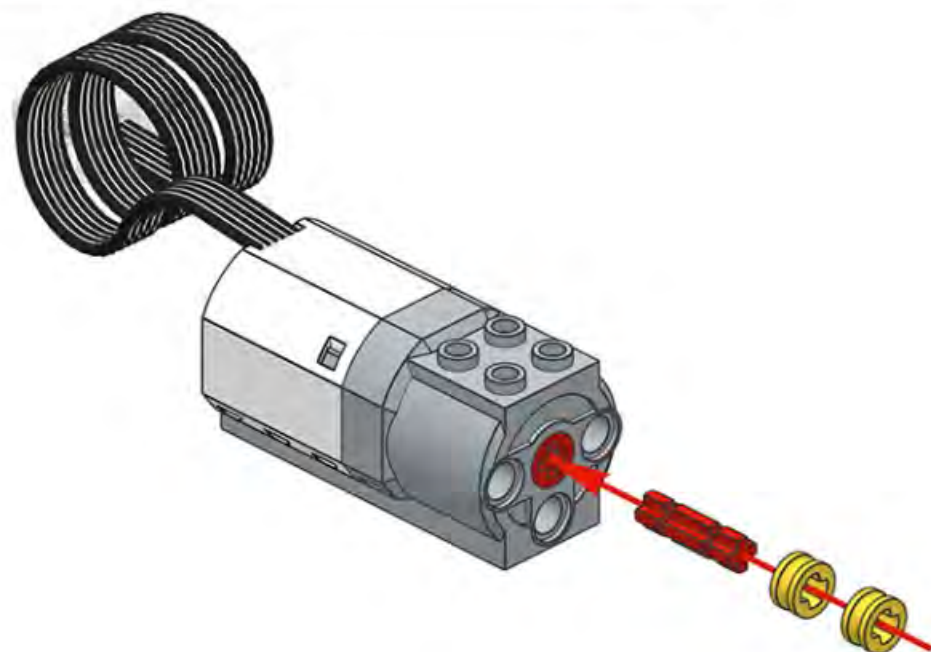
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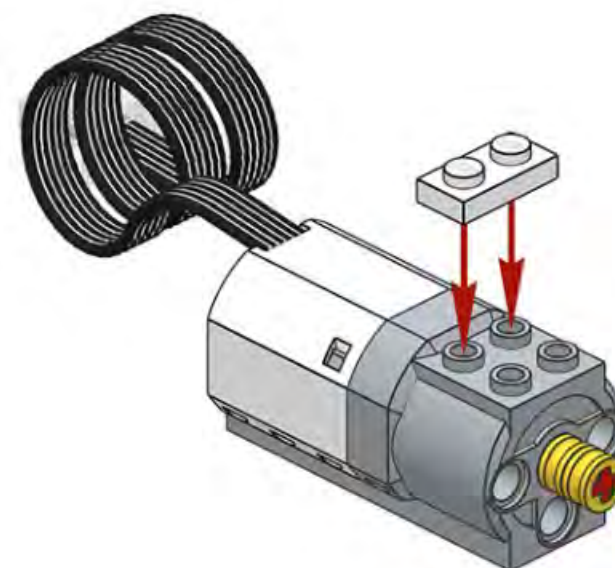




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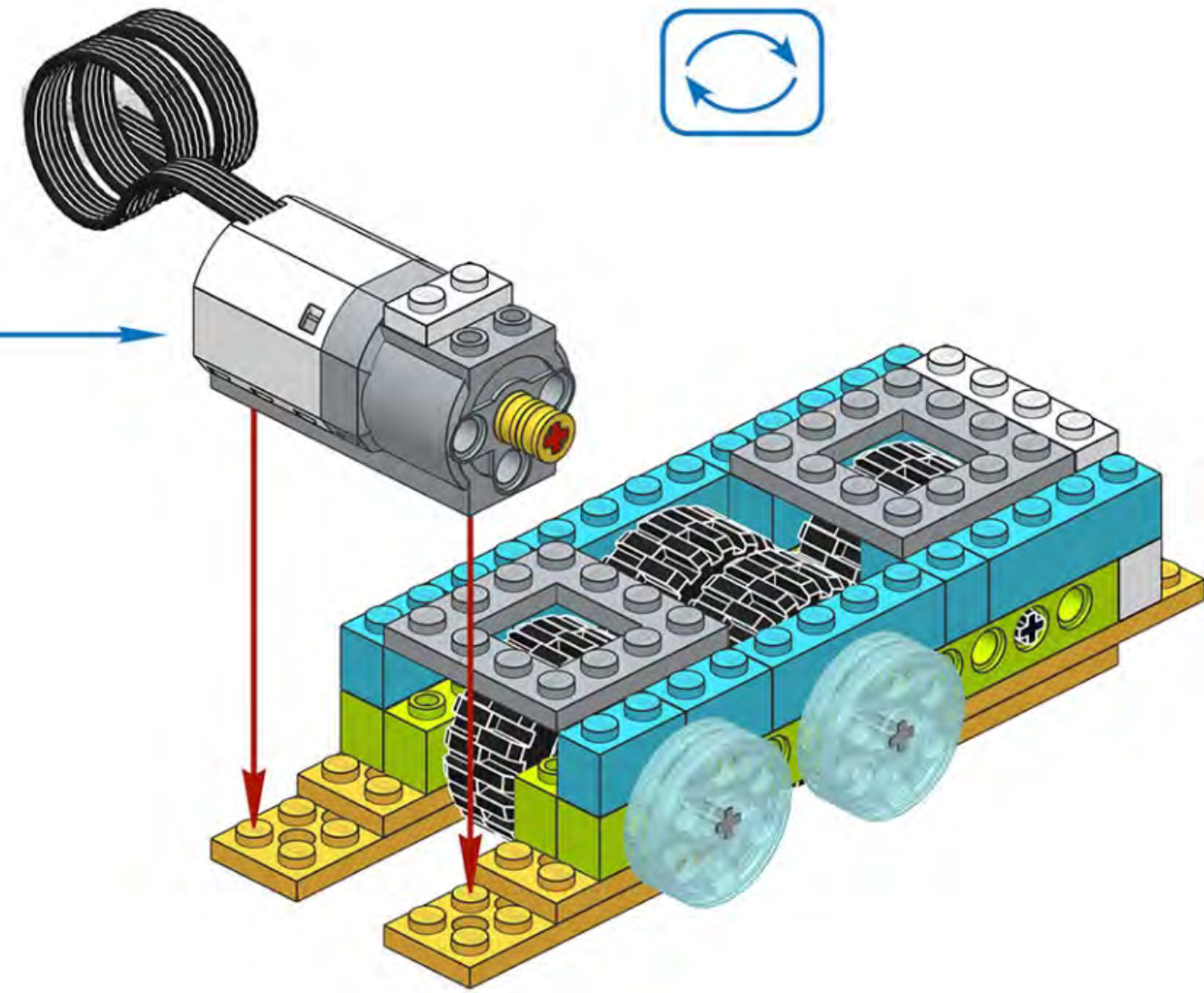


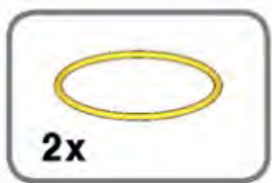
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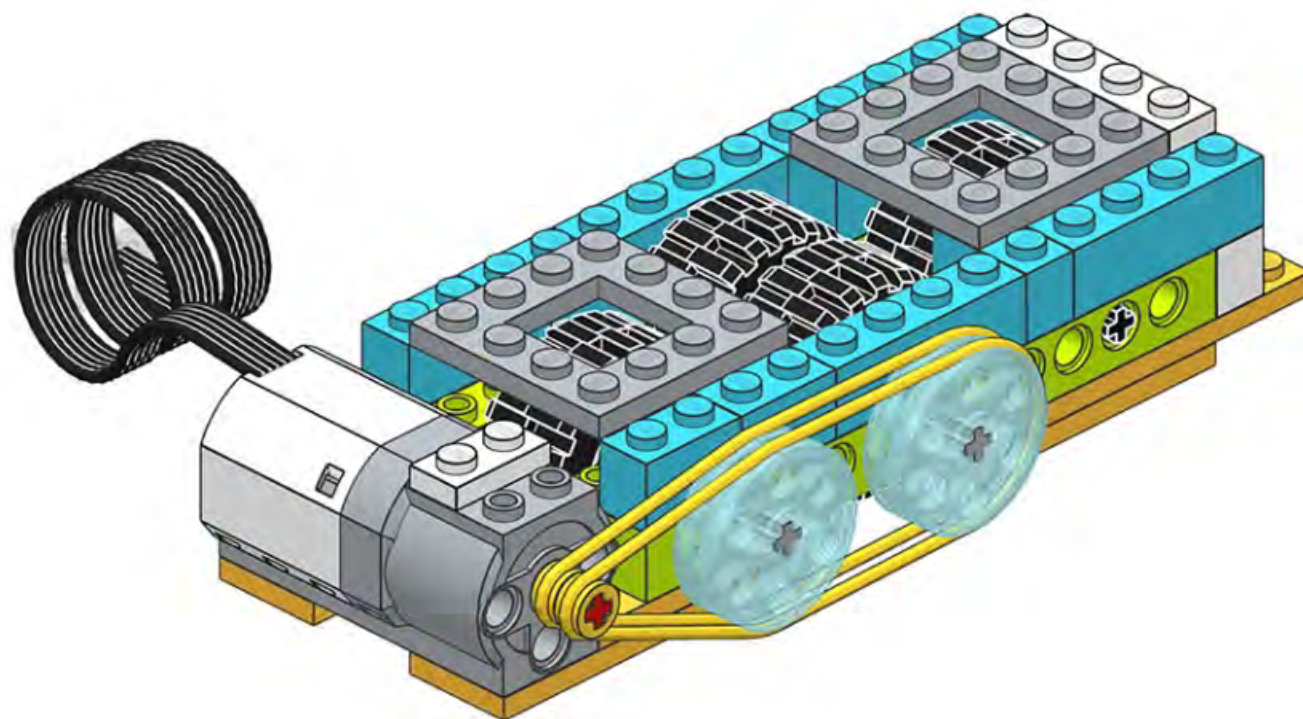


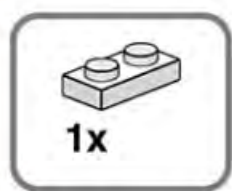
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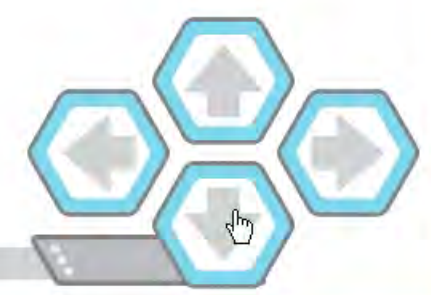
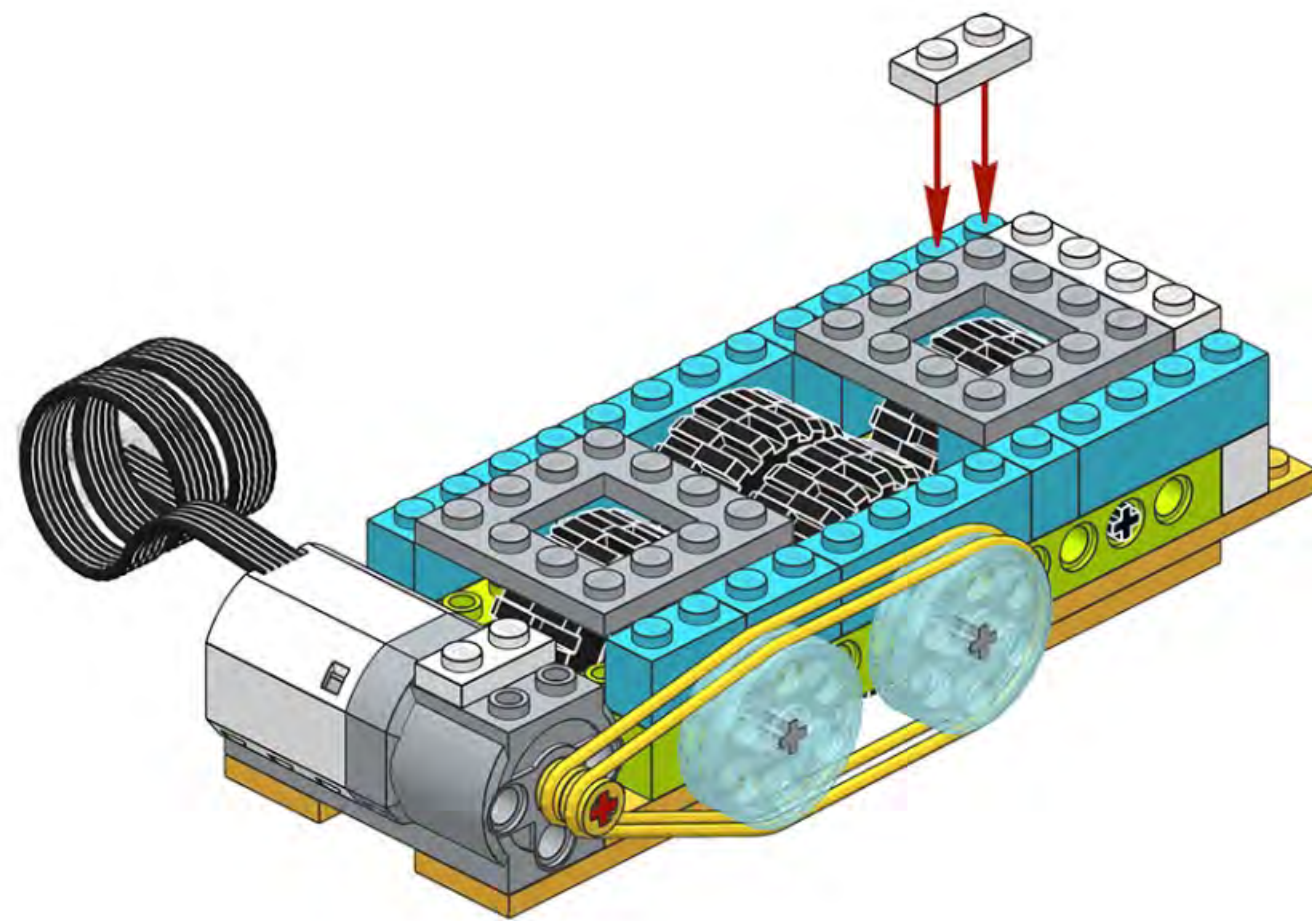


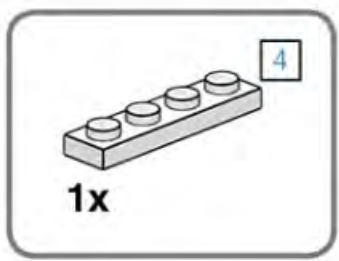
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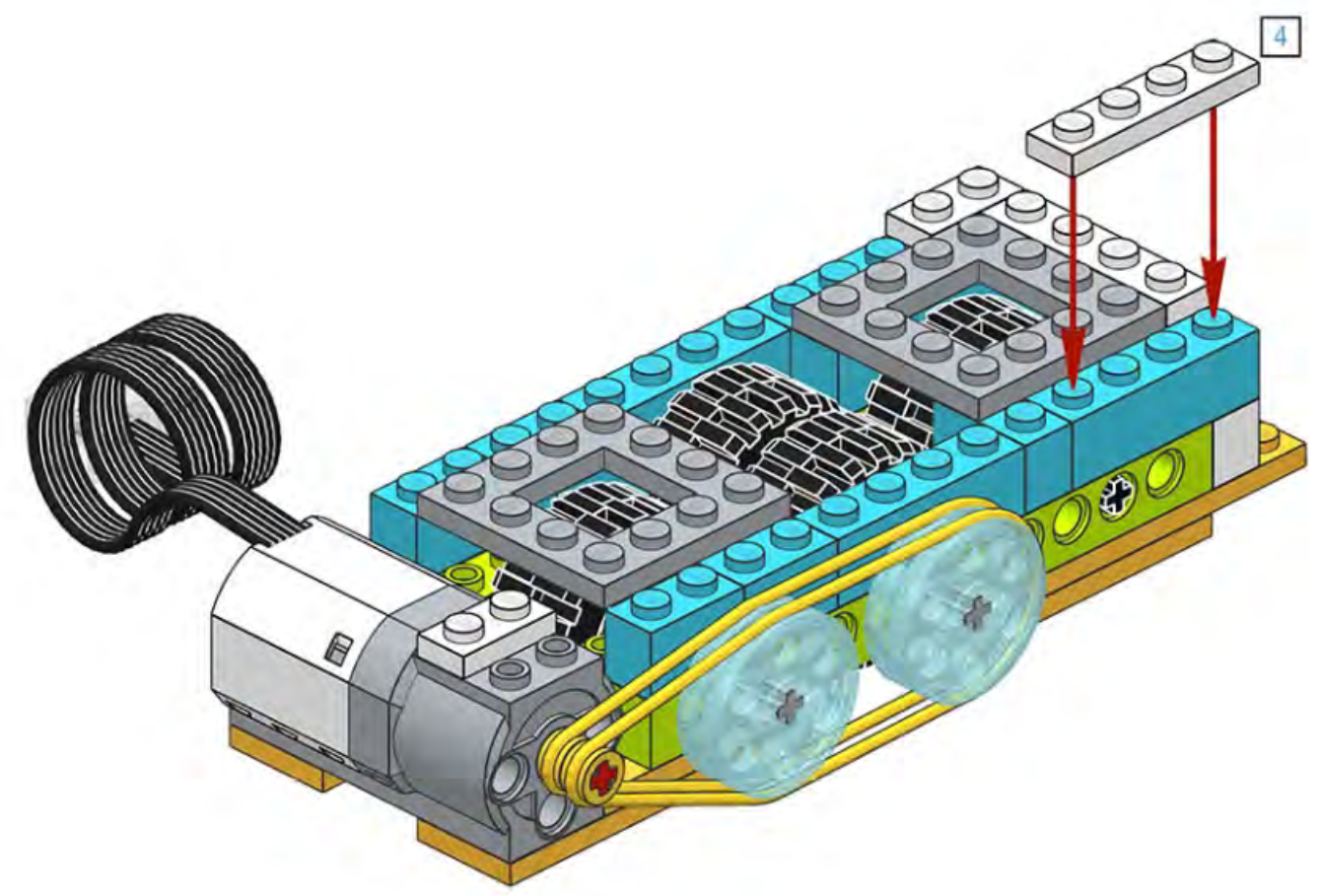


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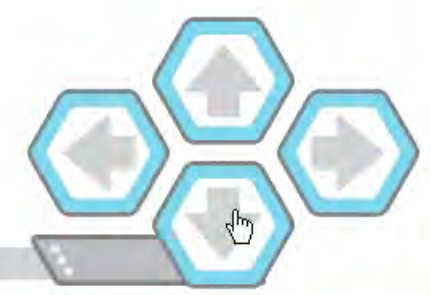
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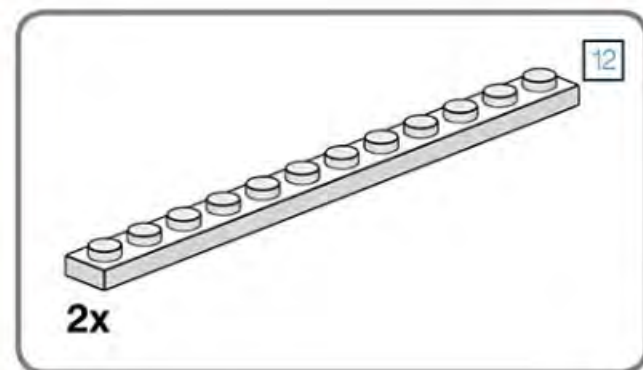


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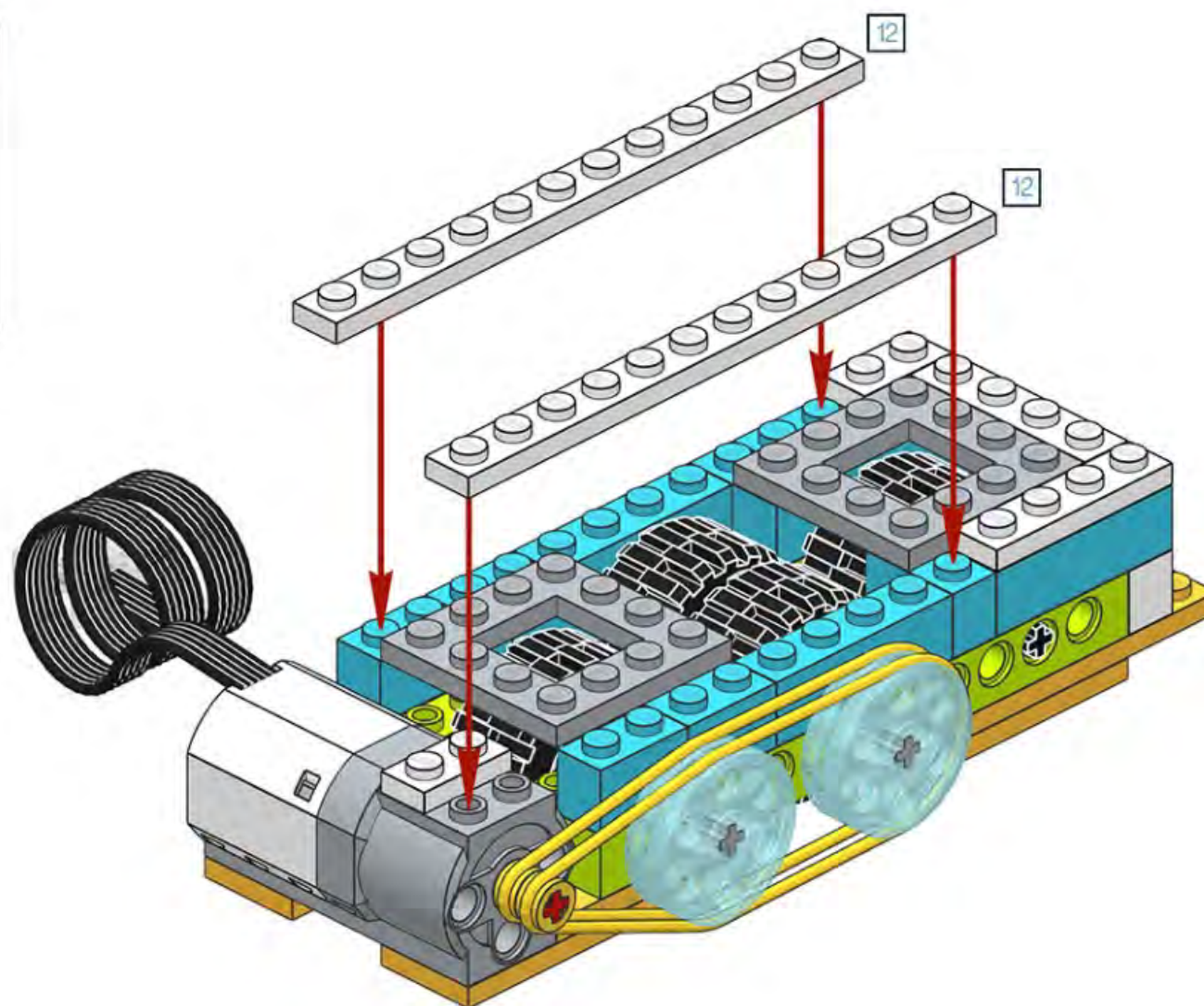
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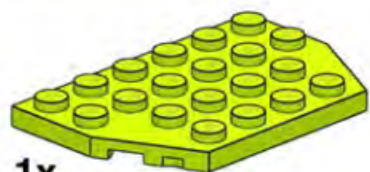
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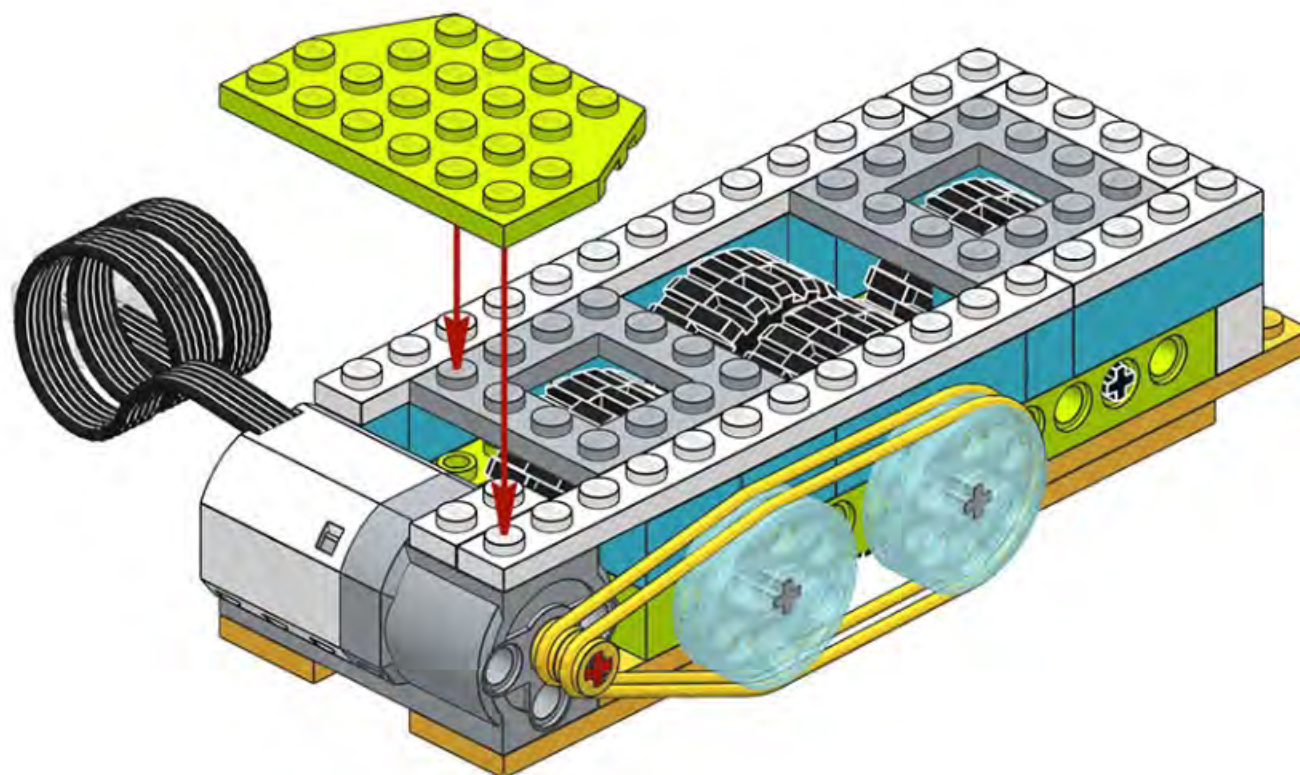
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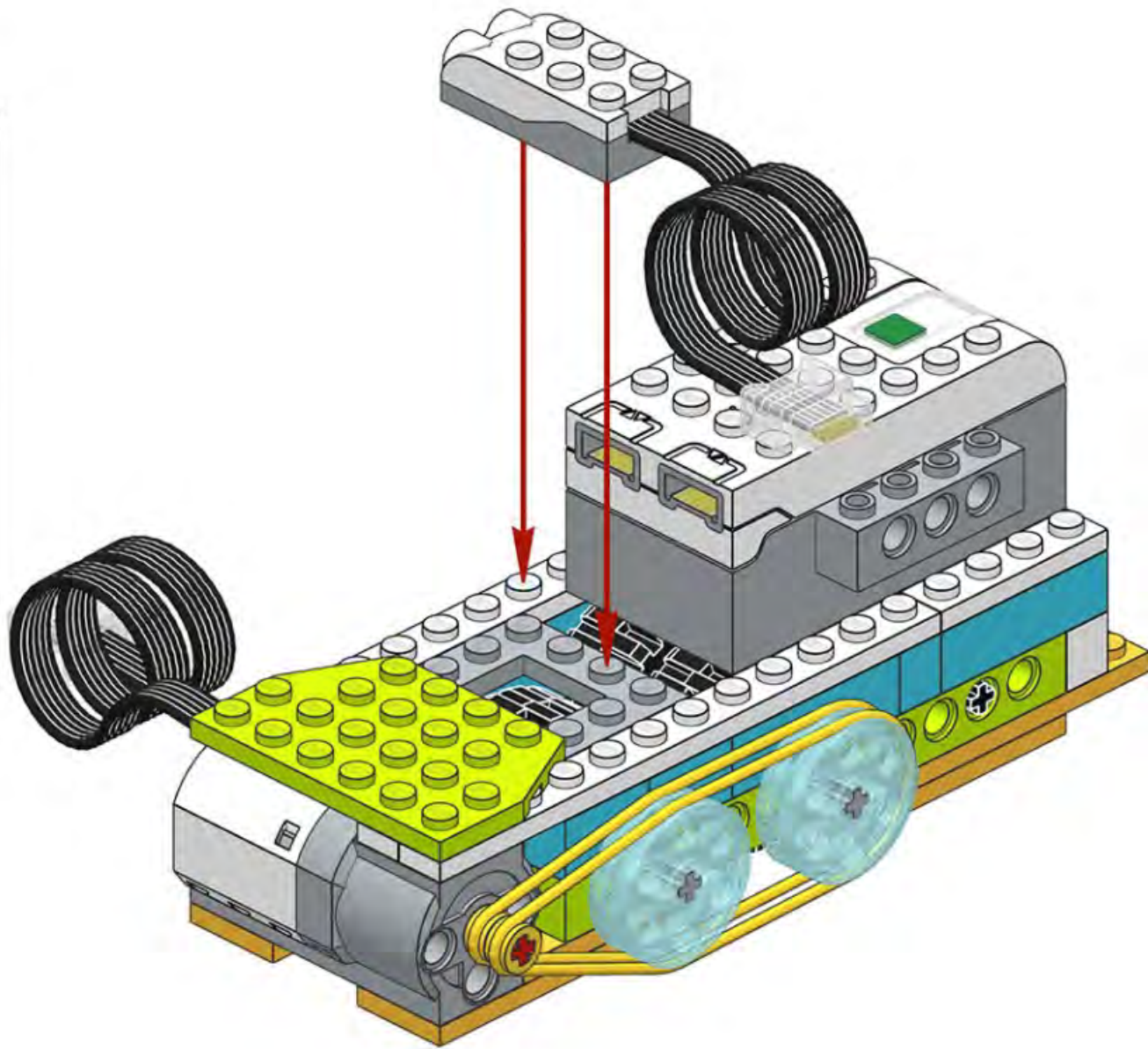




1x

34





35

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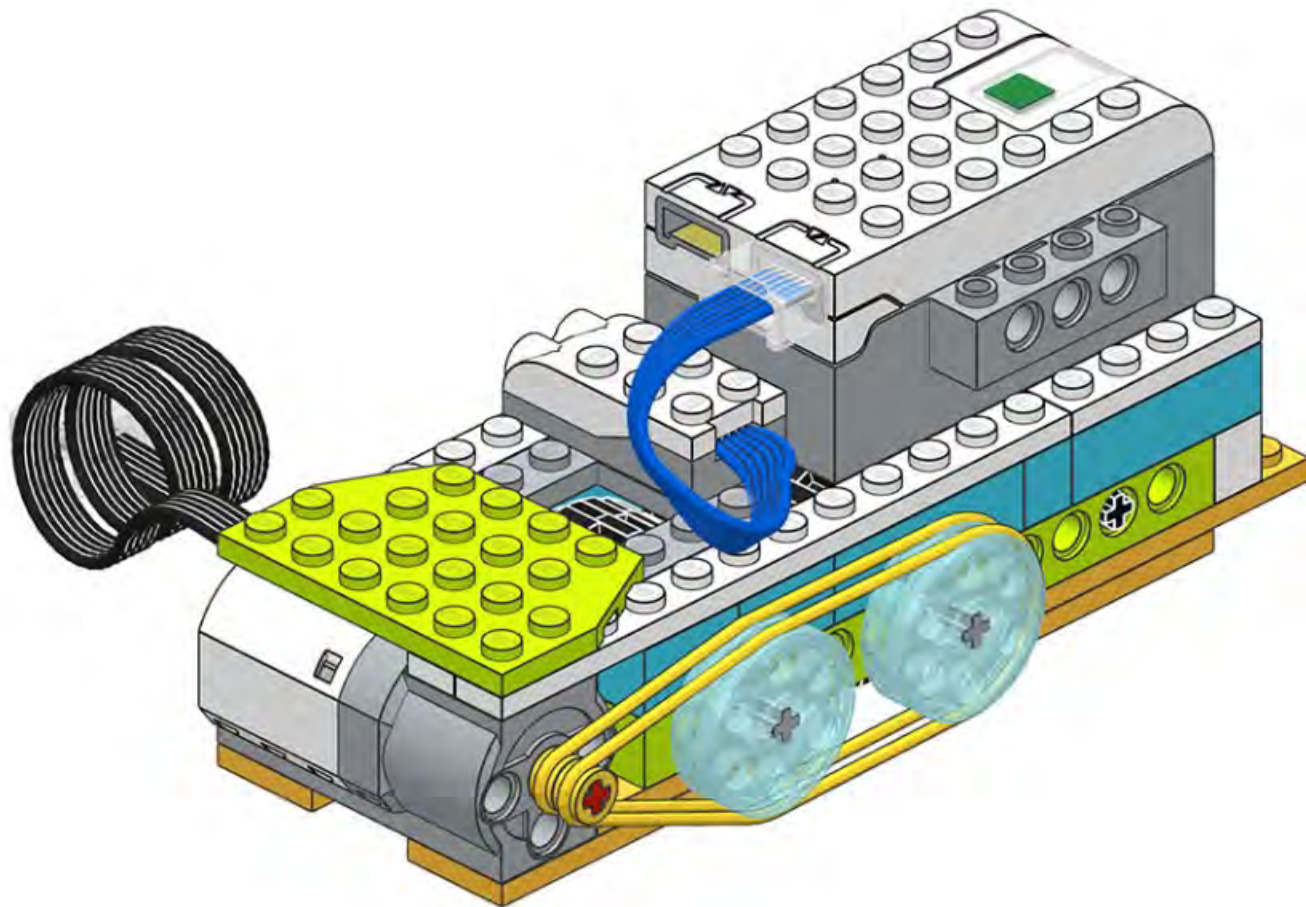
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63





36



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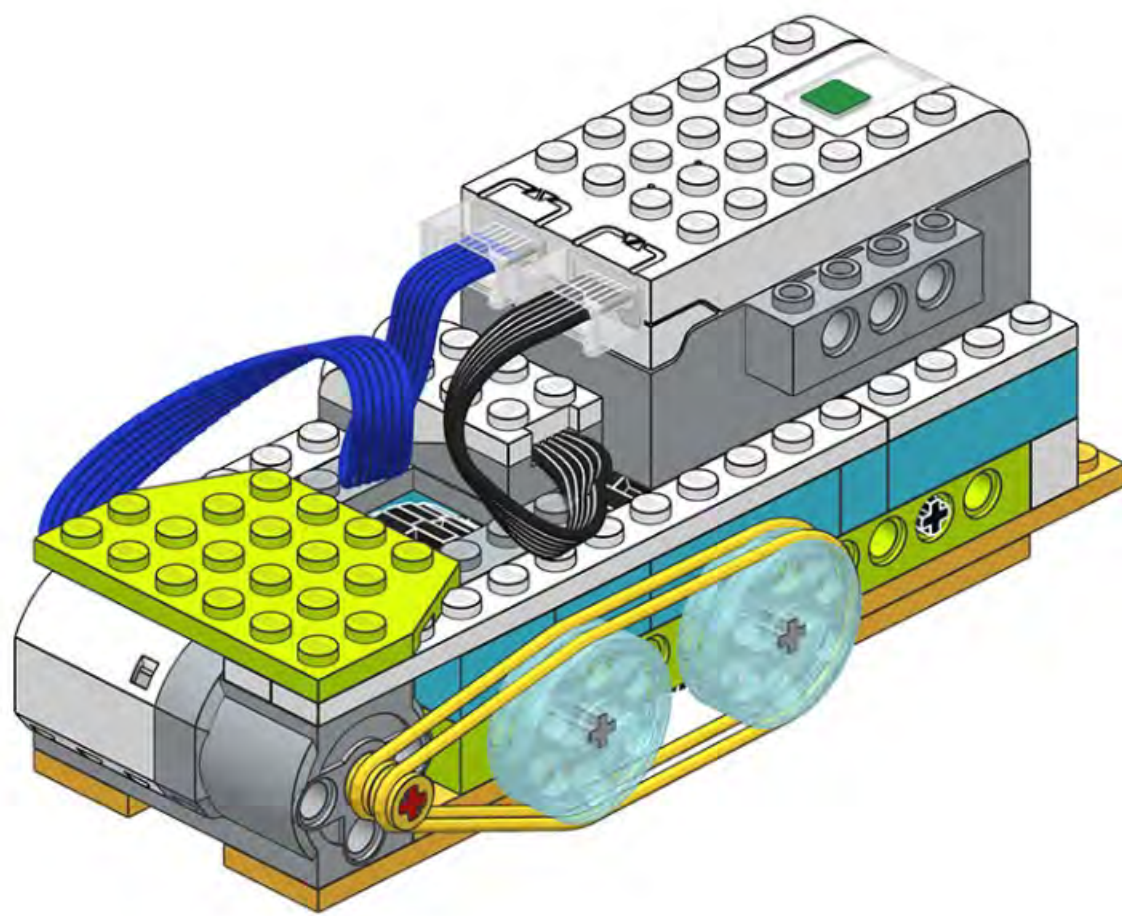
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37



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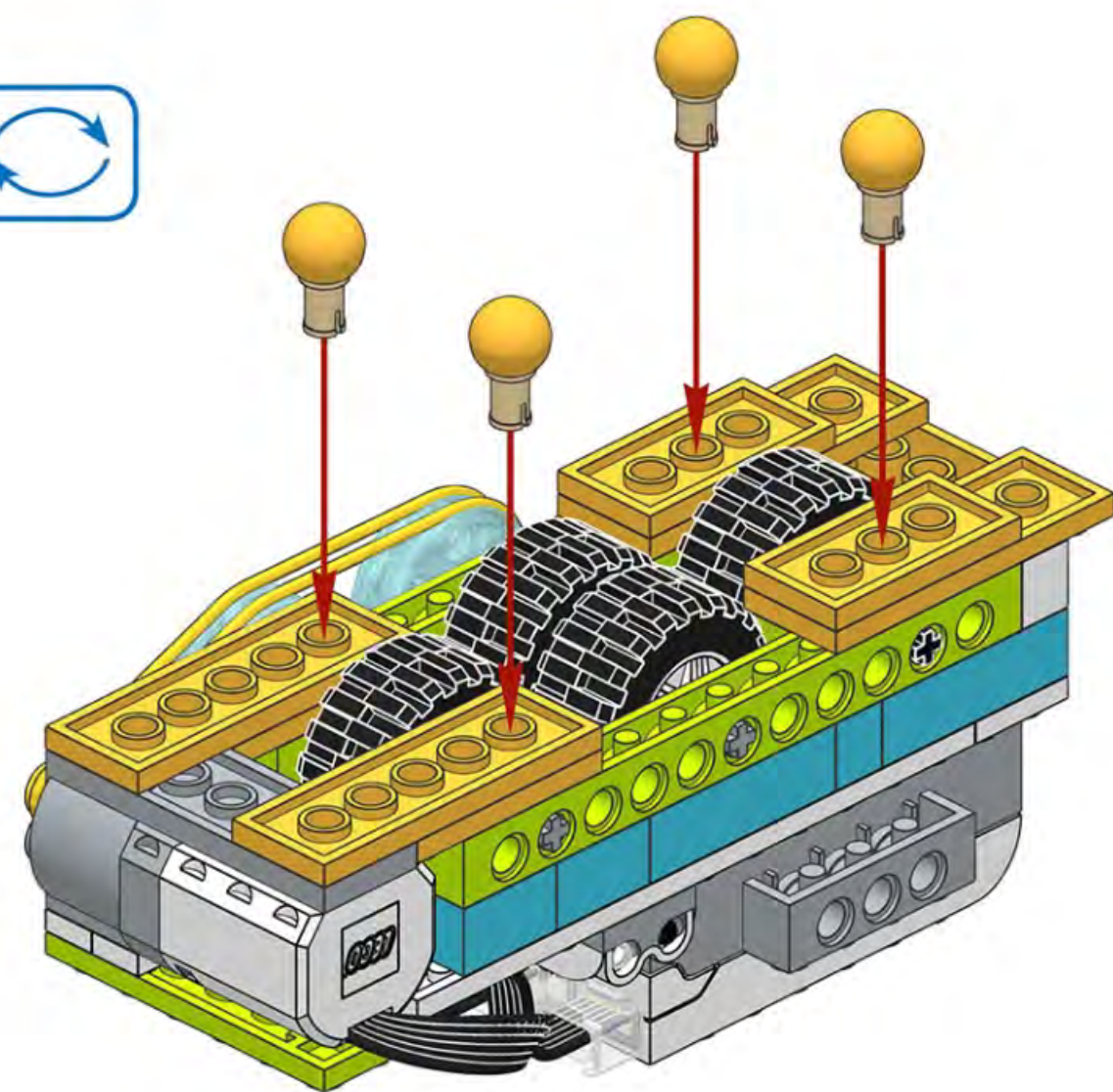



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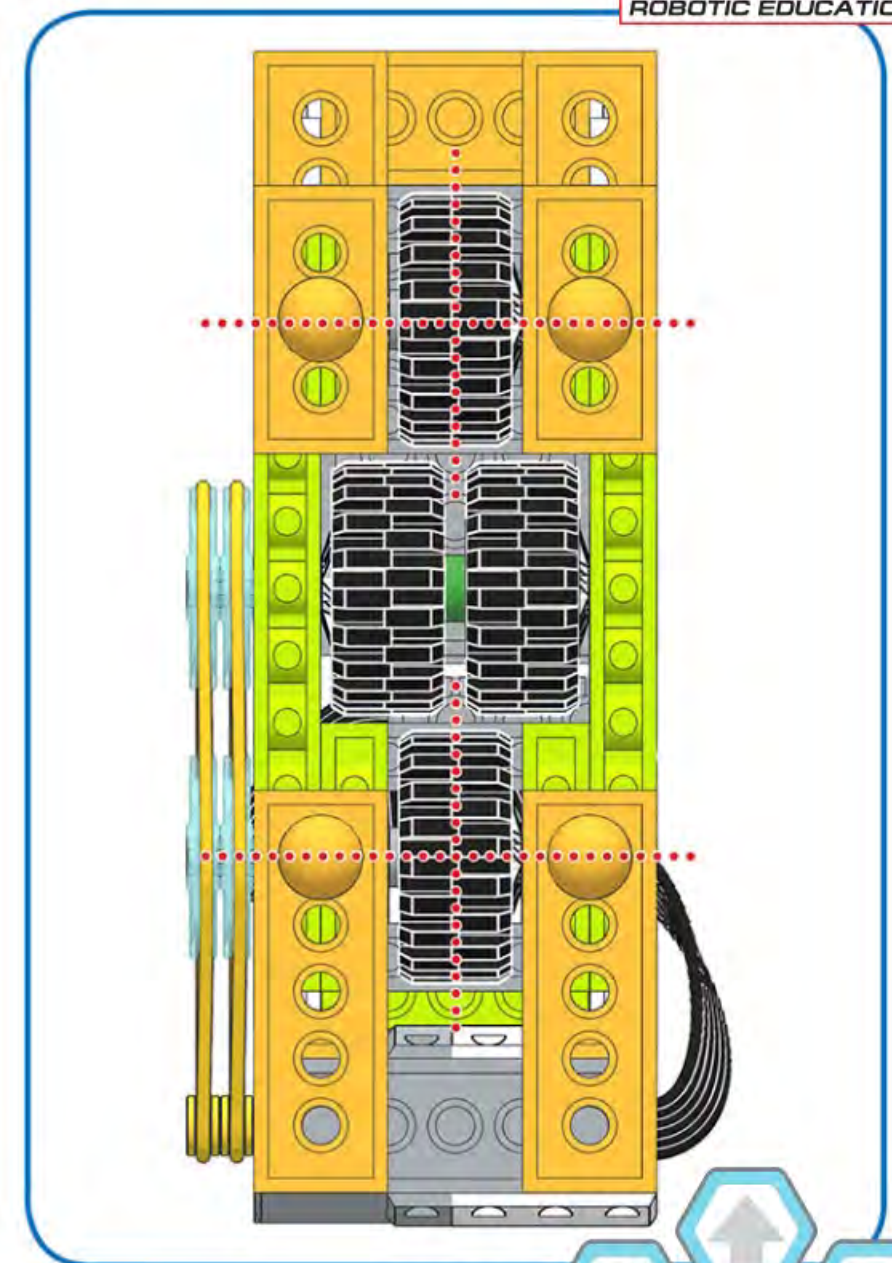

4x



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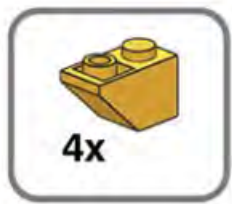



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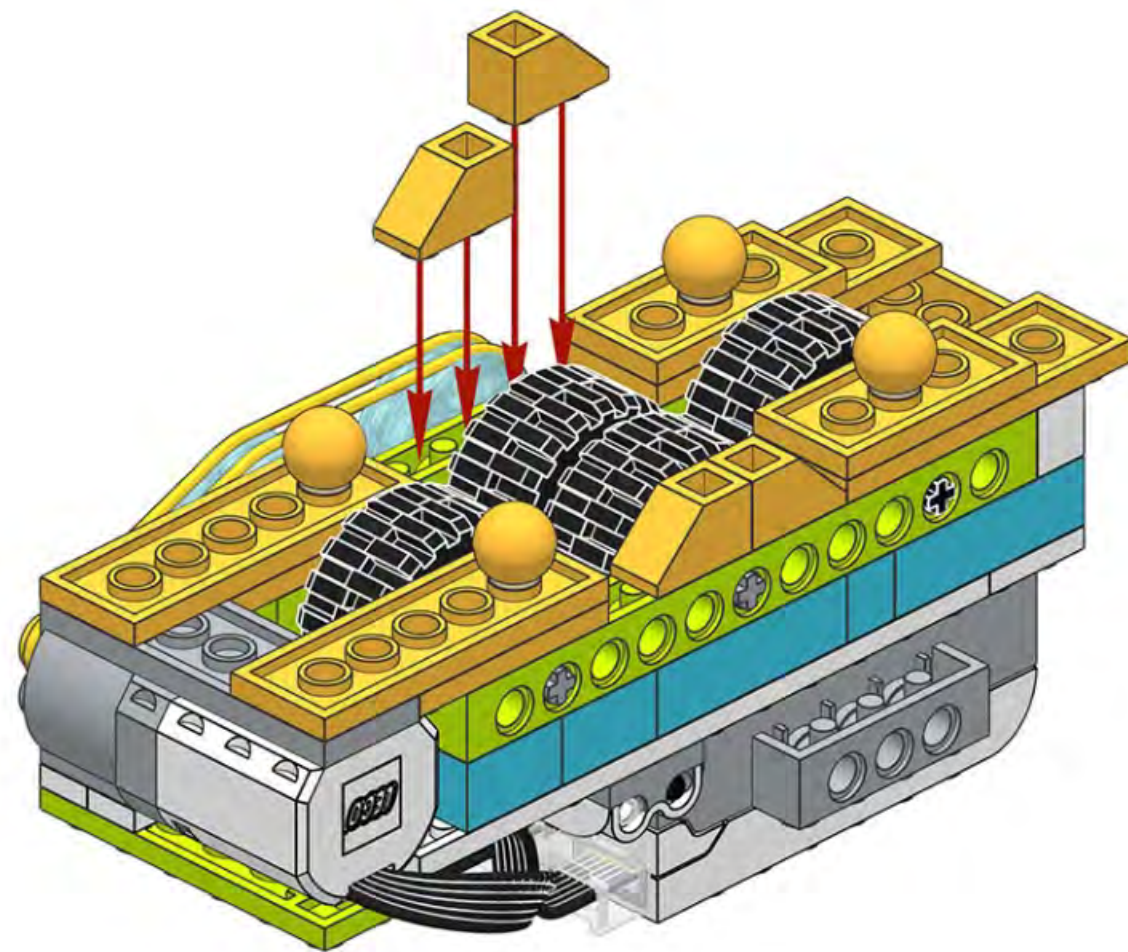

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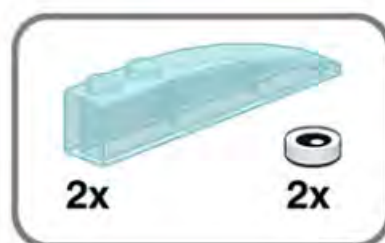

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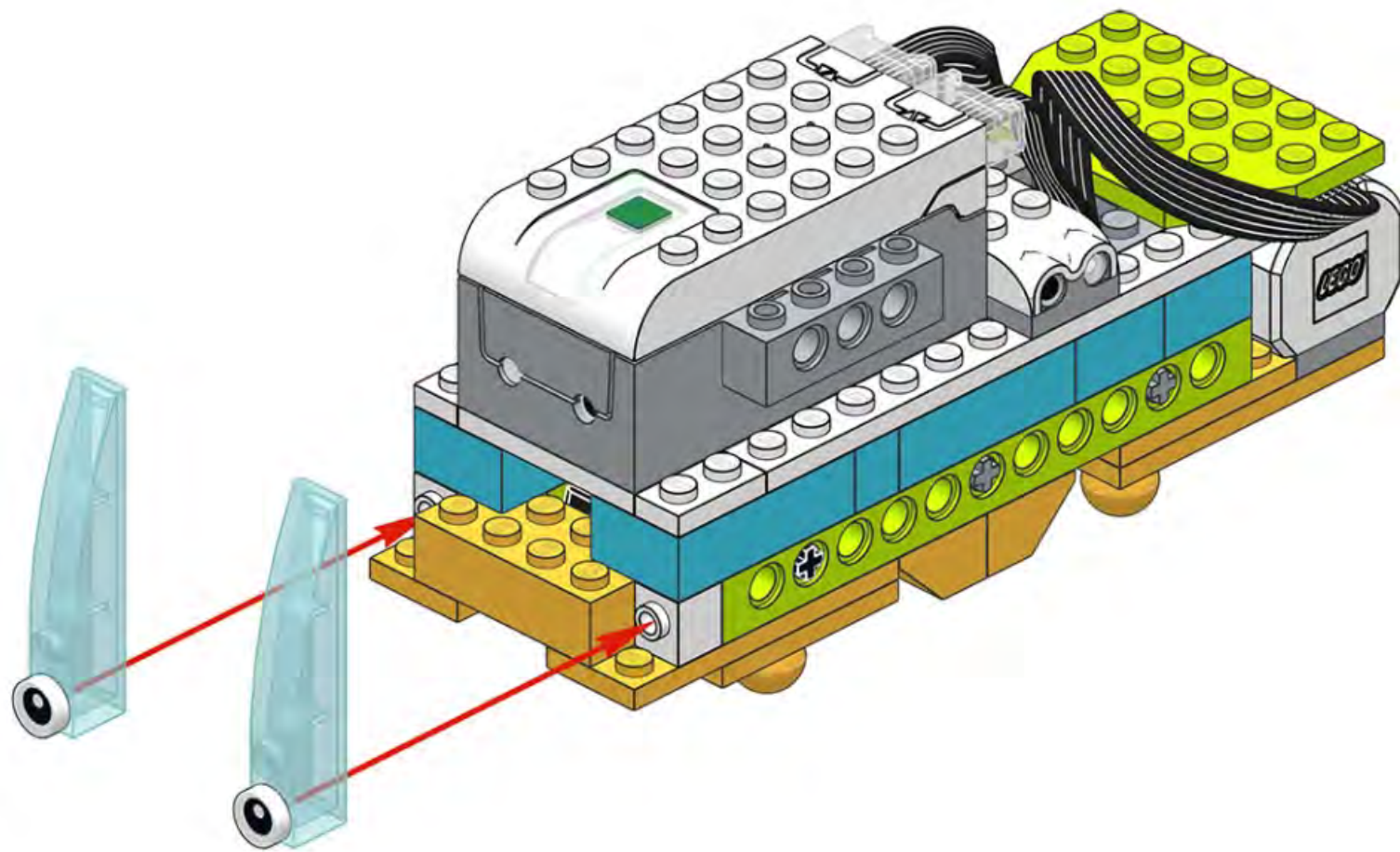


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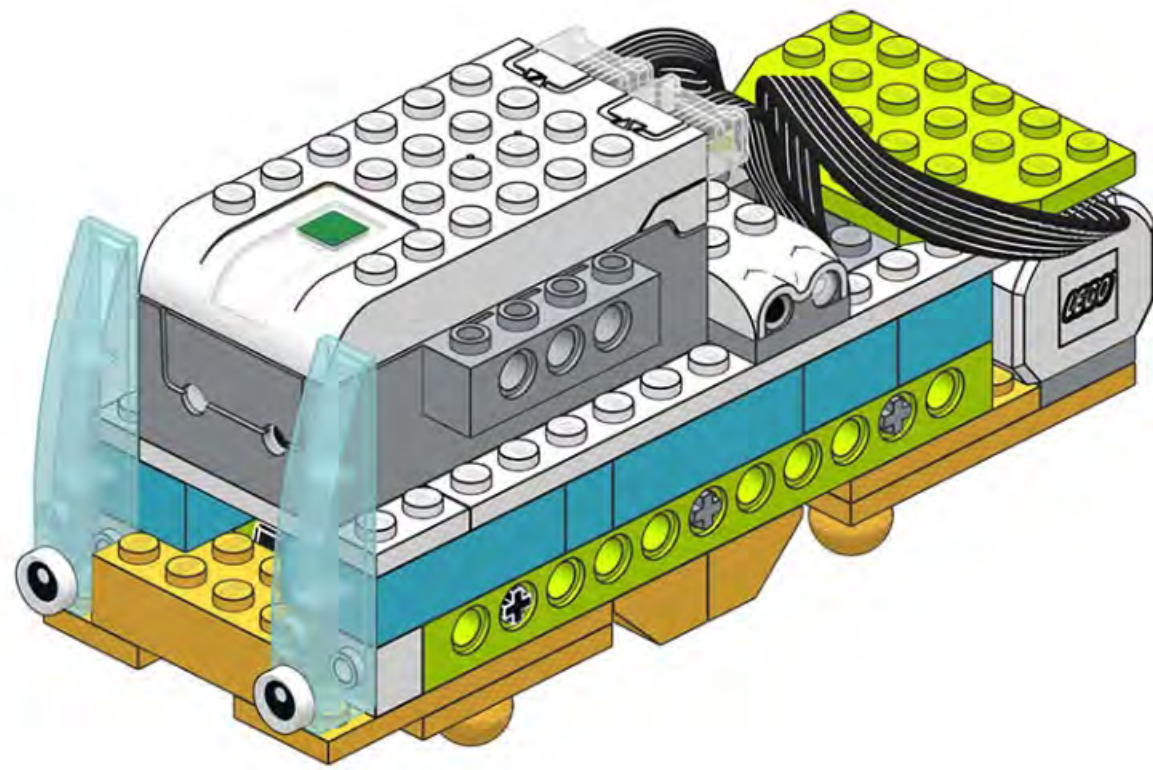
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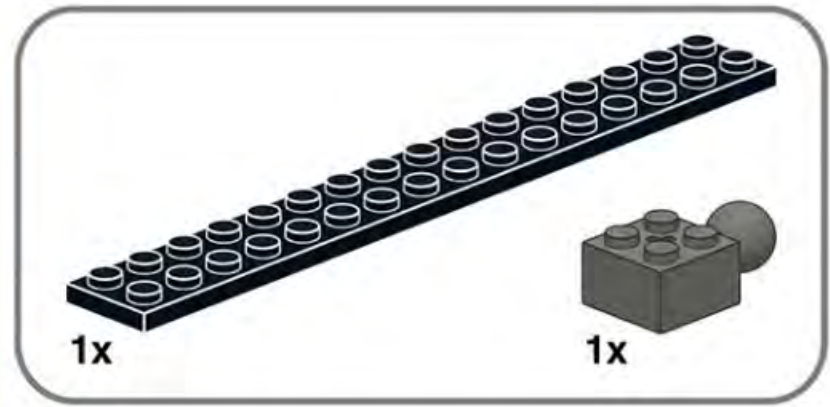
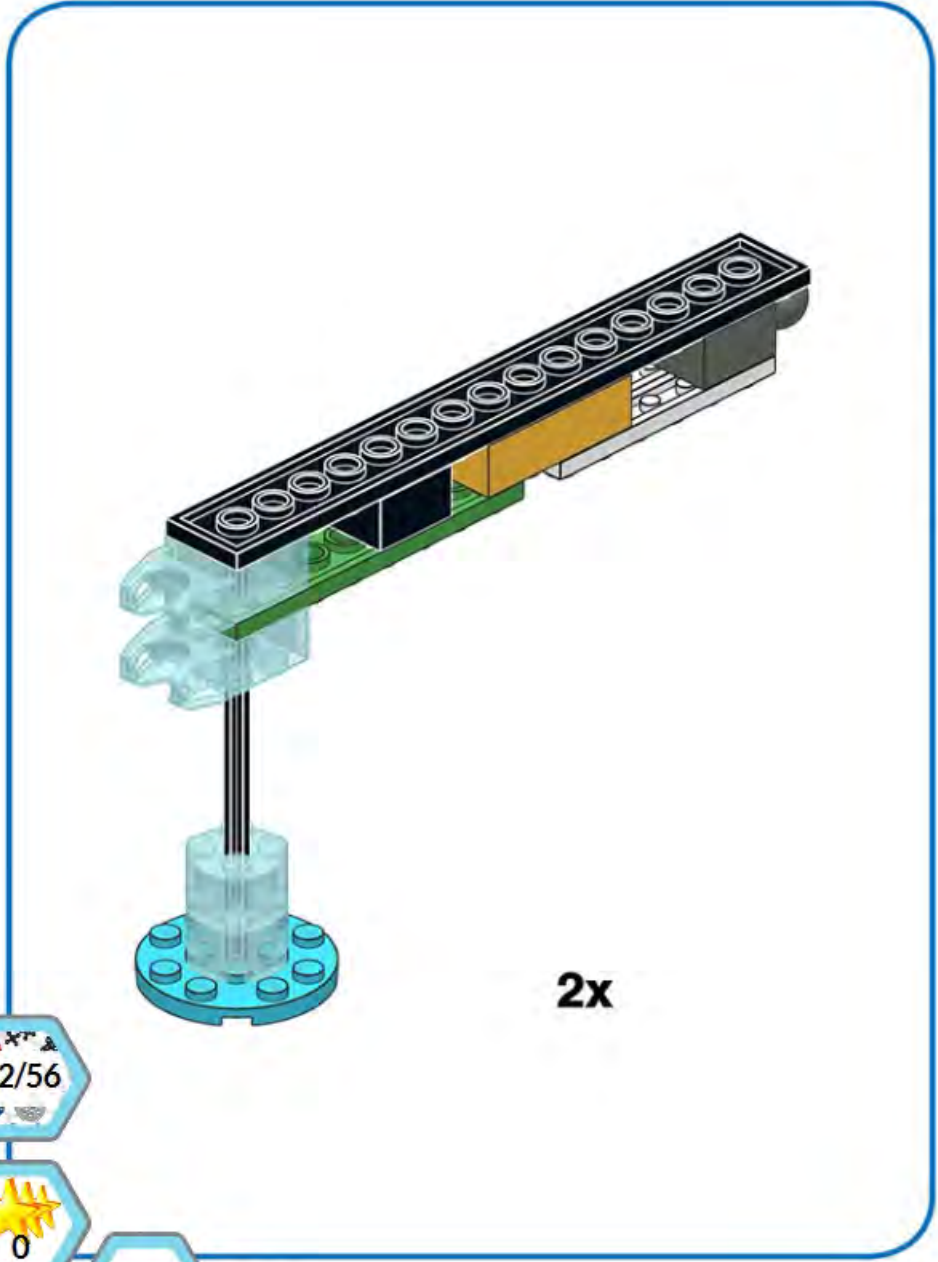
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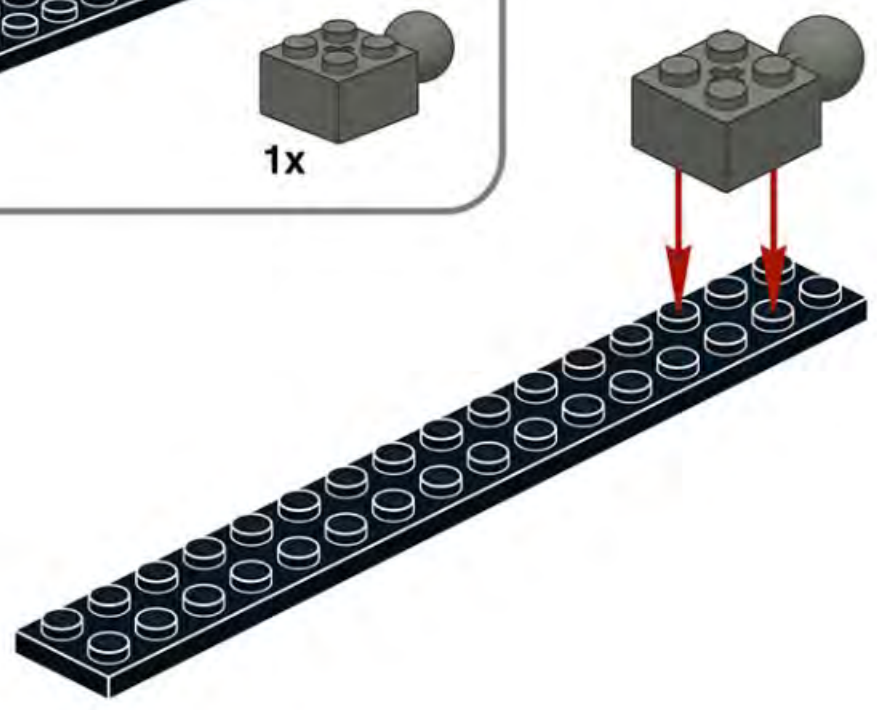
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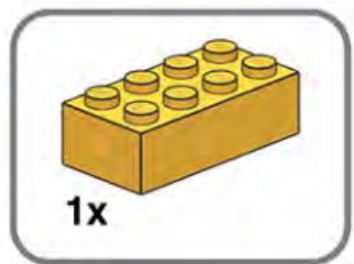
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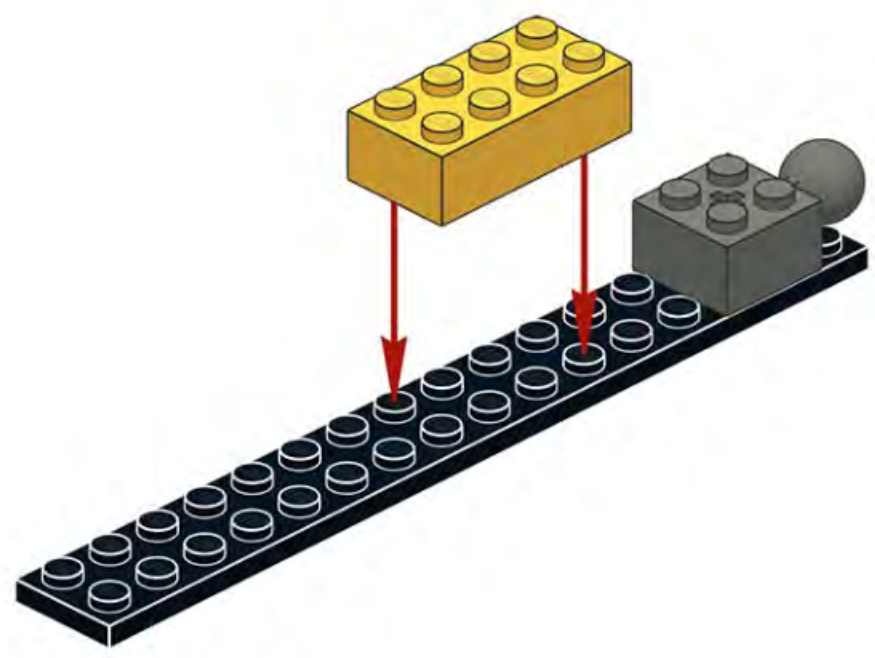


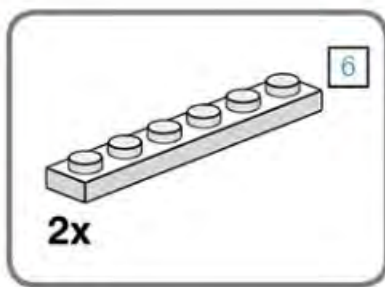
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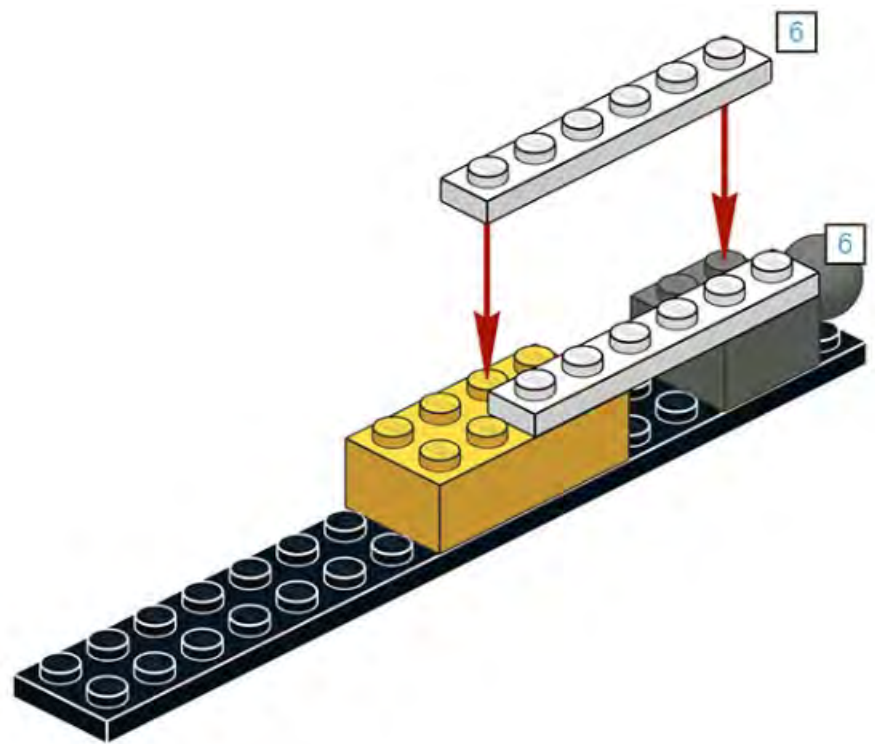


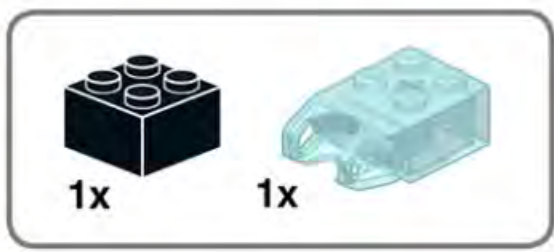
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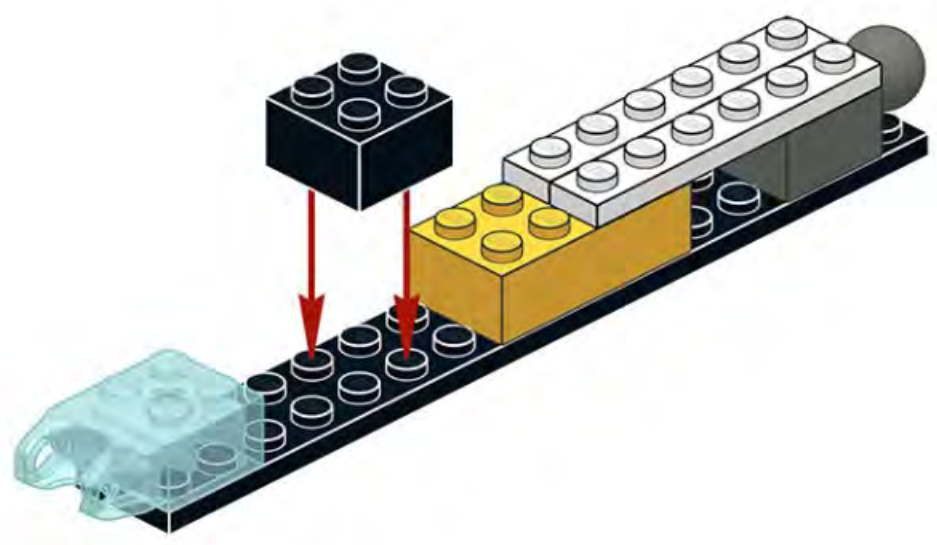


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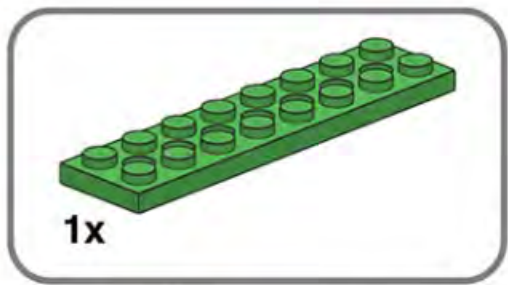


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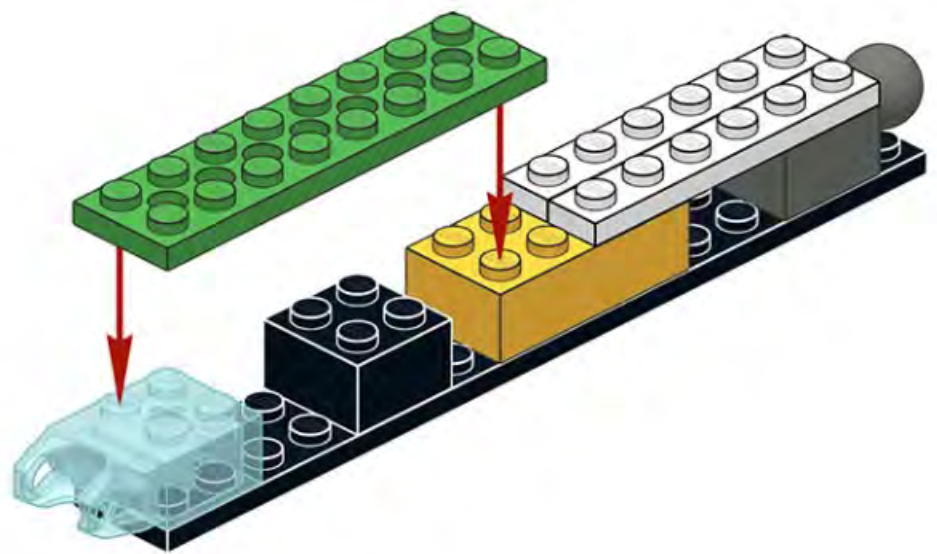
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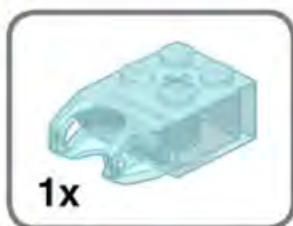
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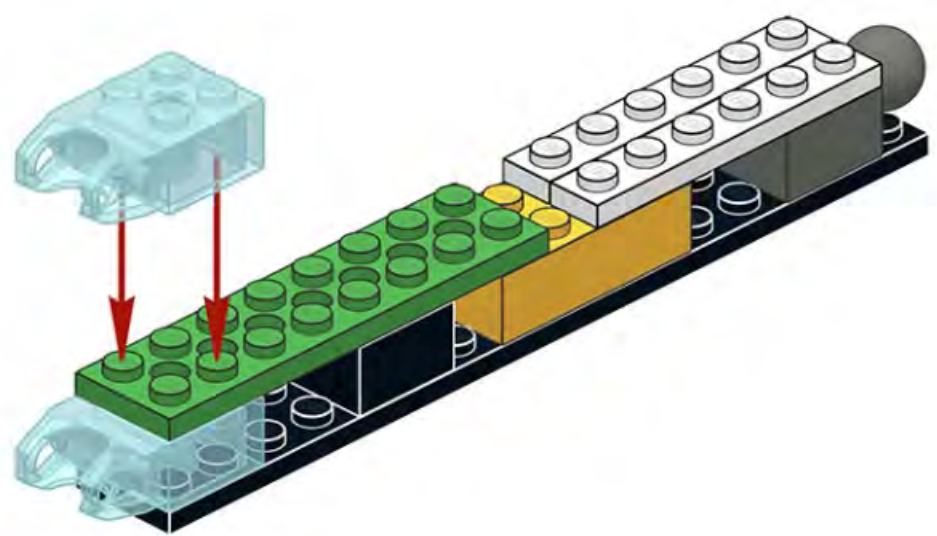


46





47

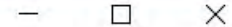


47/56

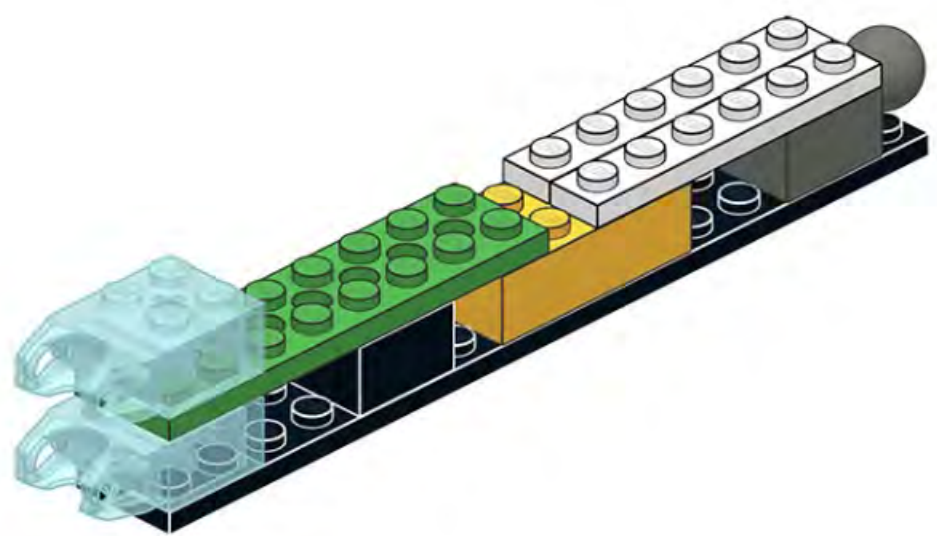
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48

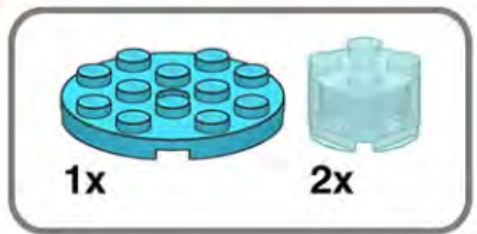


48/56

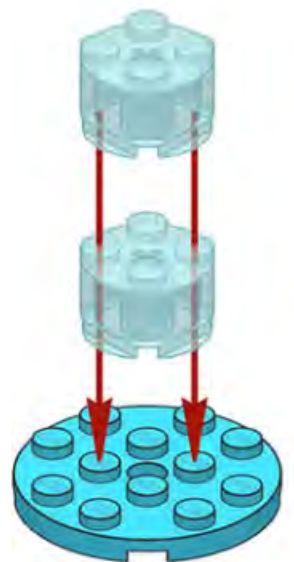
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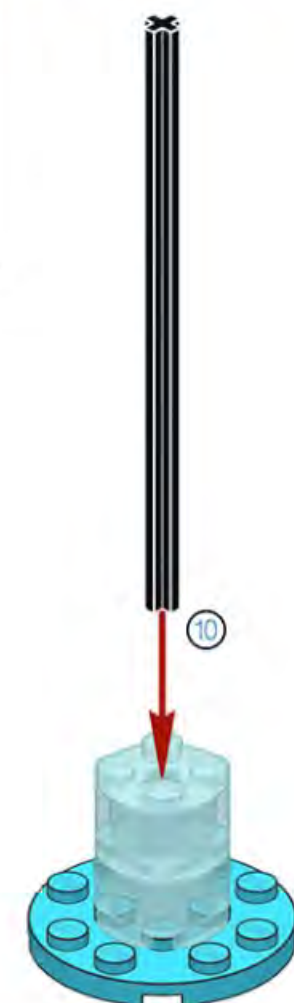




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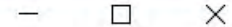


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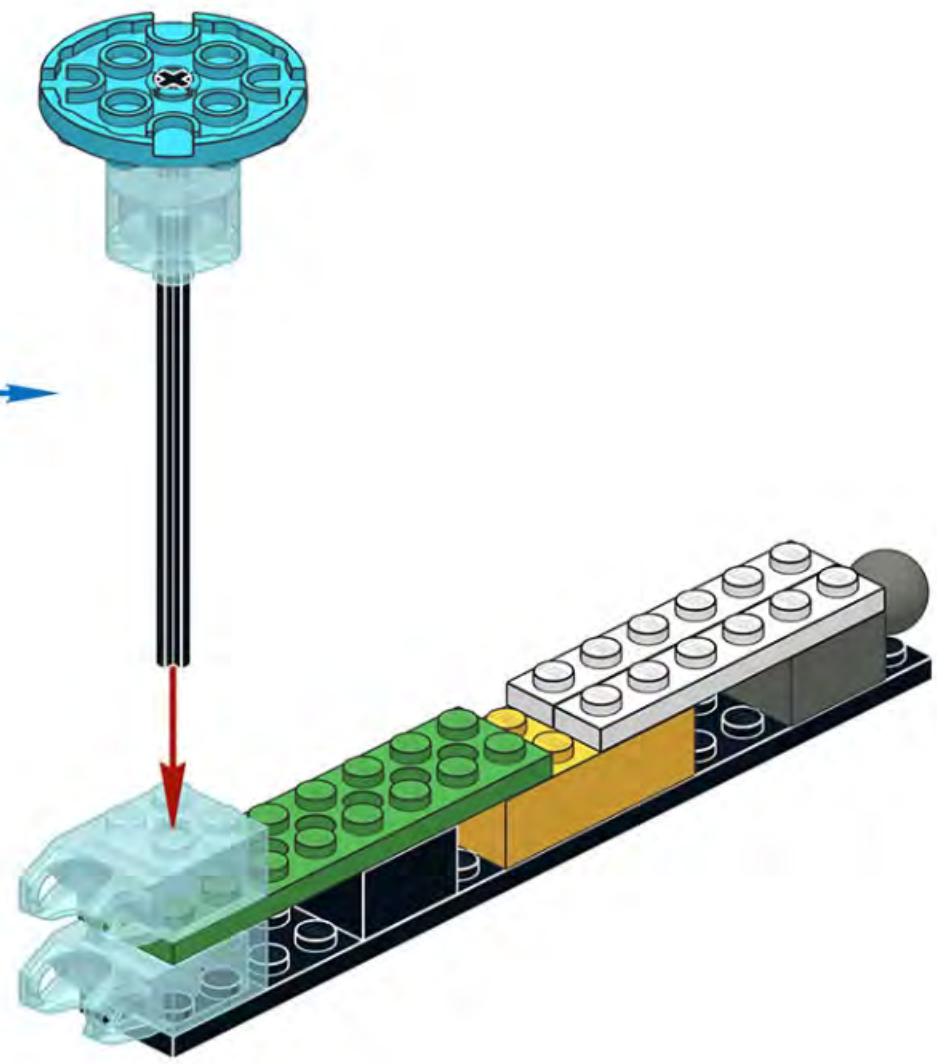


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50/56



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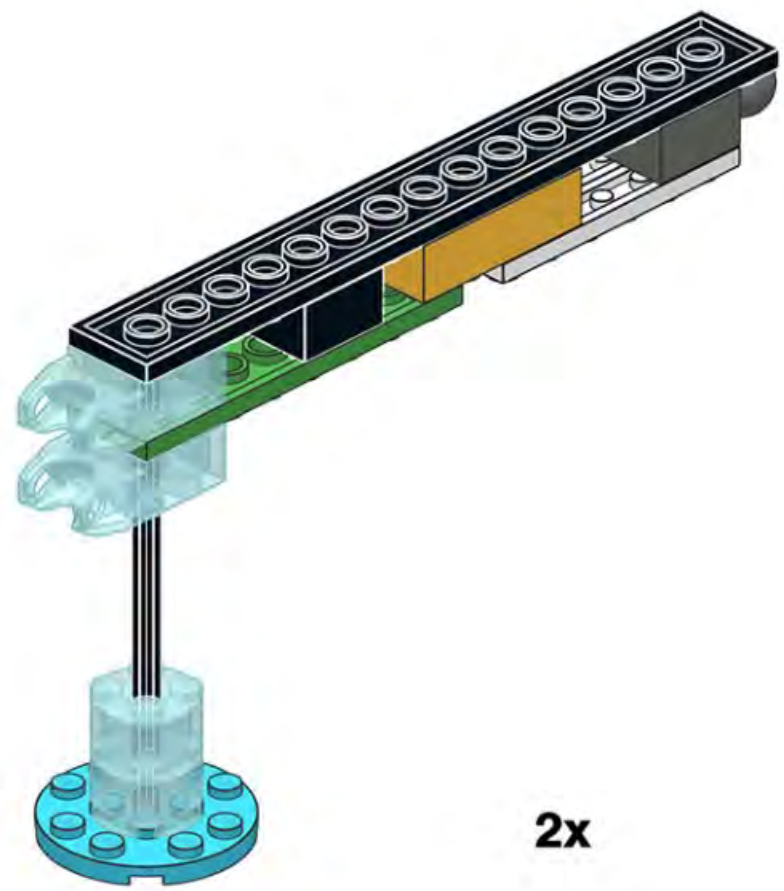


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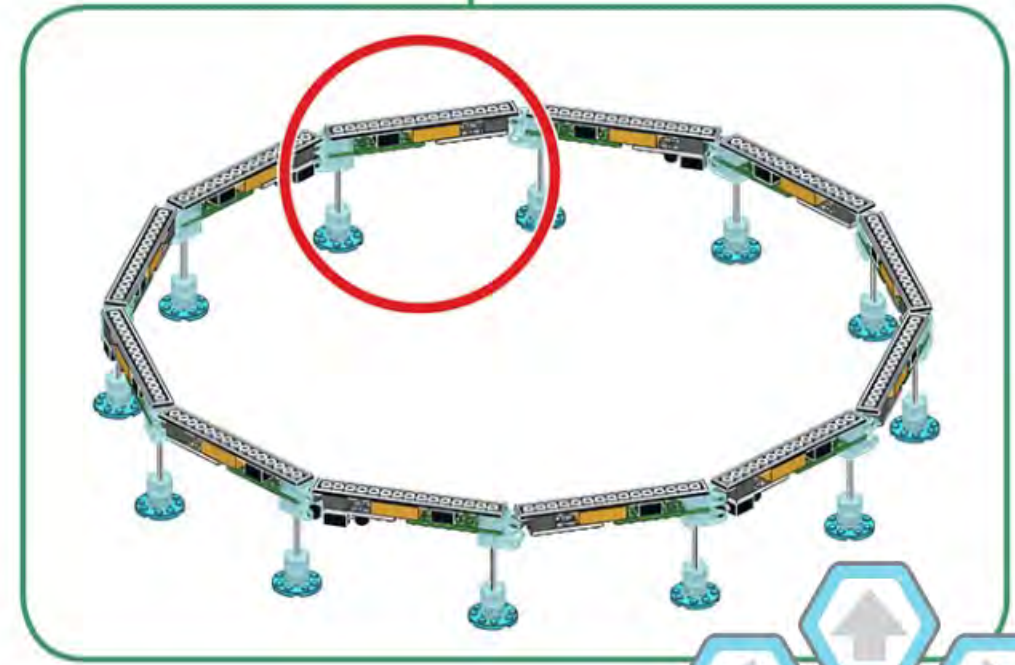




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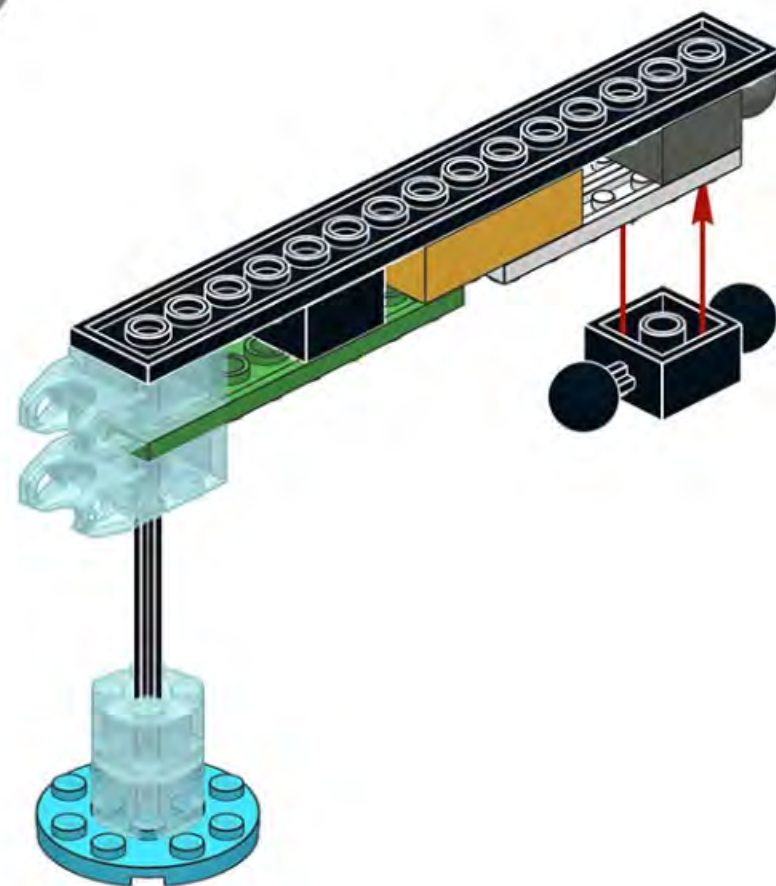
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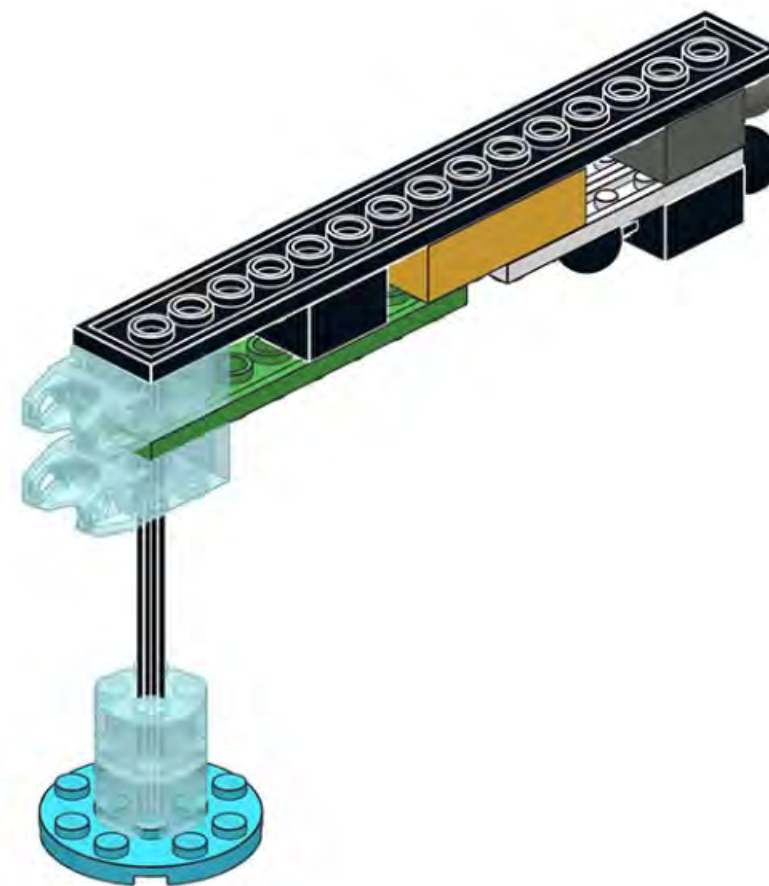


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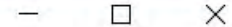


52/56

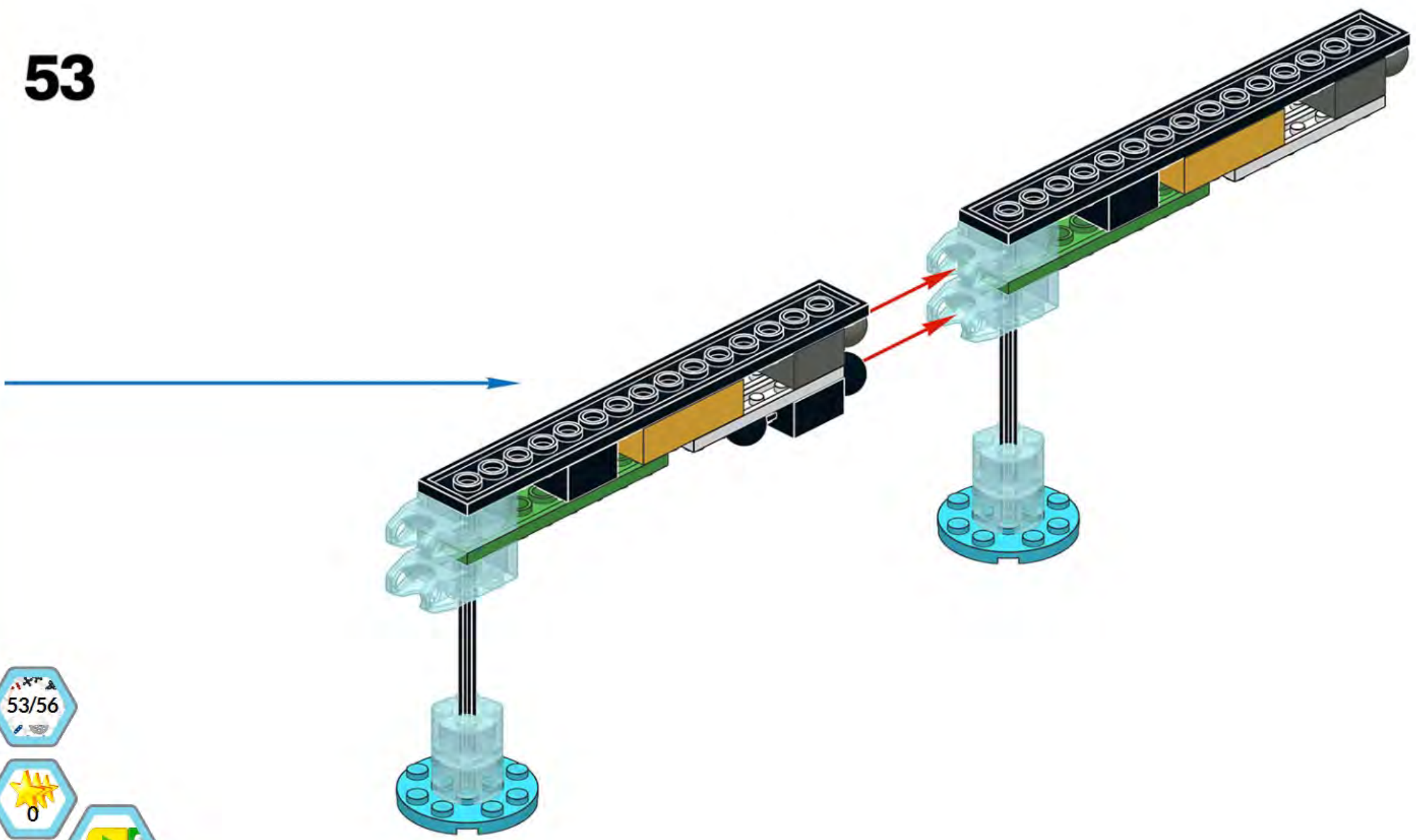


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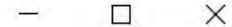
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53/56

0

81



54

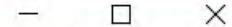


54/56

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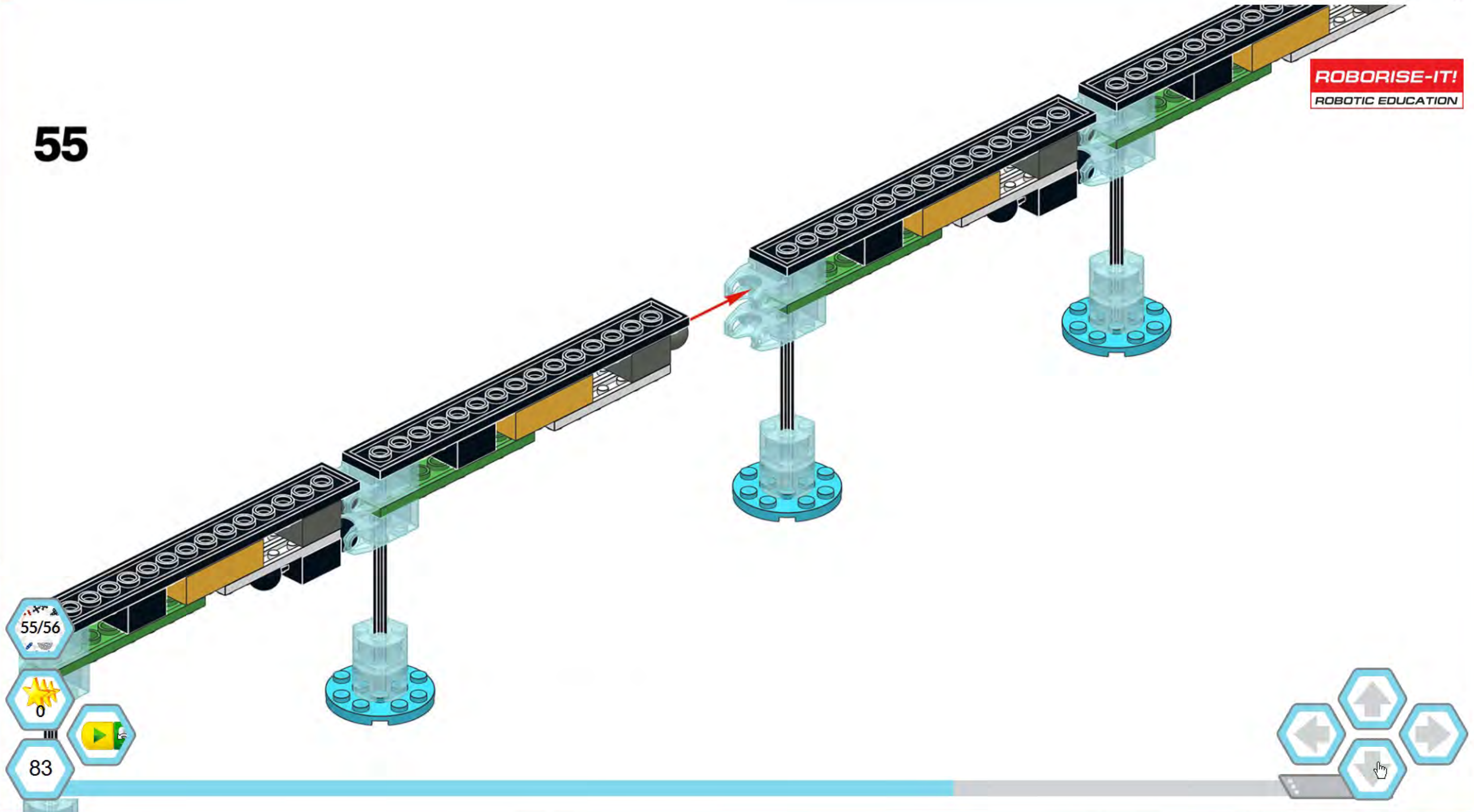
82





55

ROBORISE-IT!
ROBOTIC EDUCATION



55/56


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83



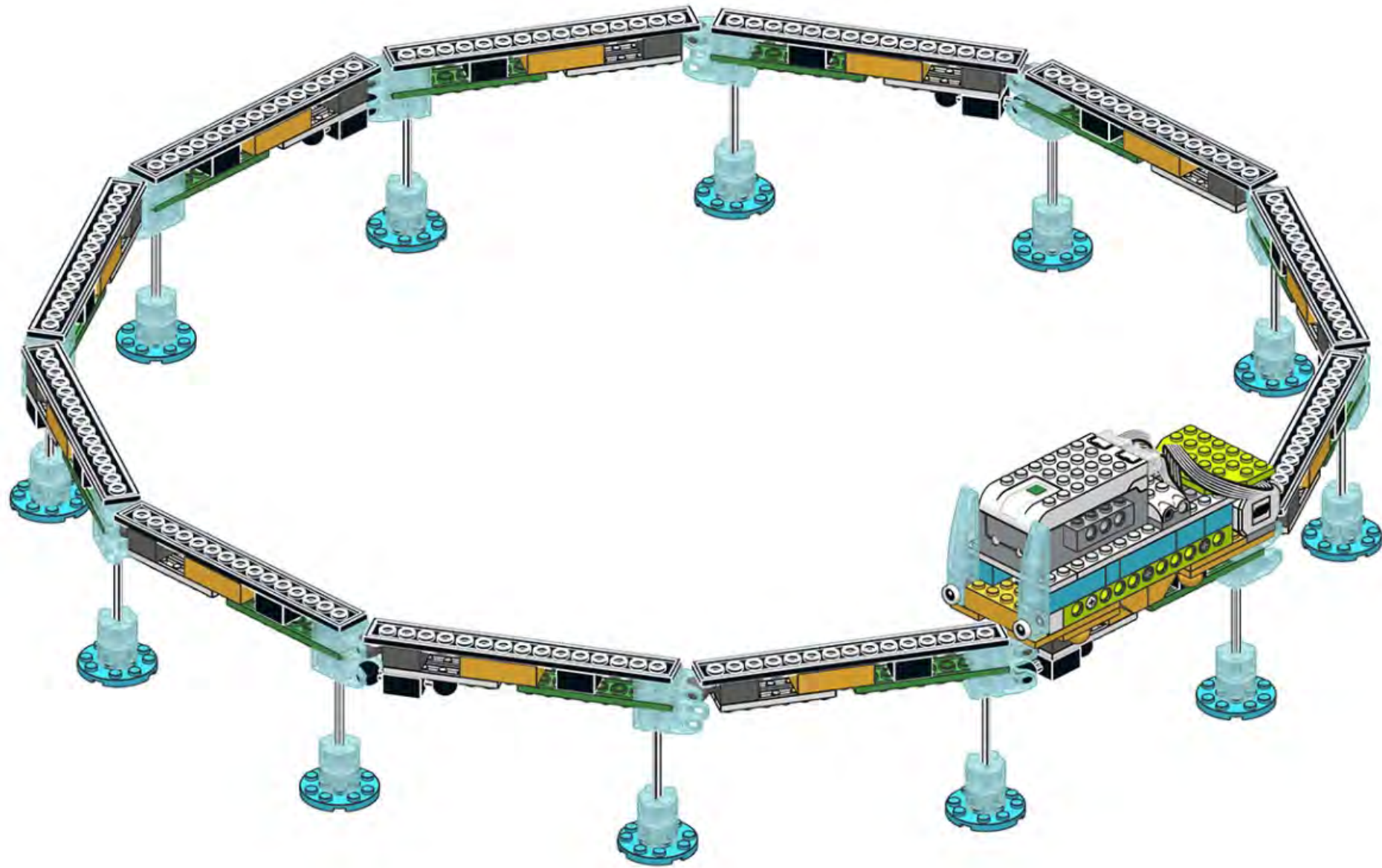








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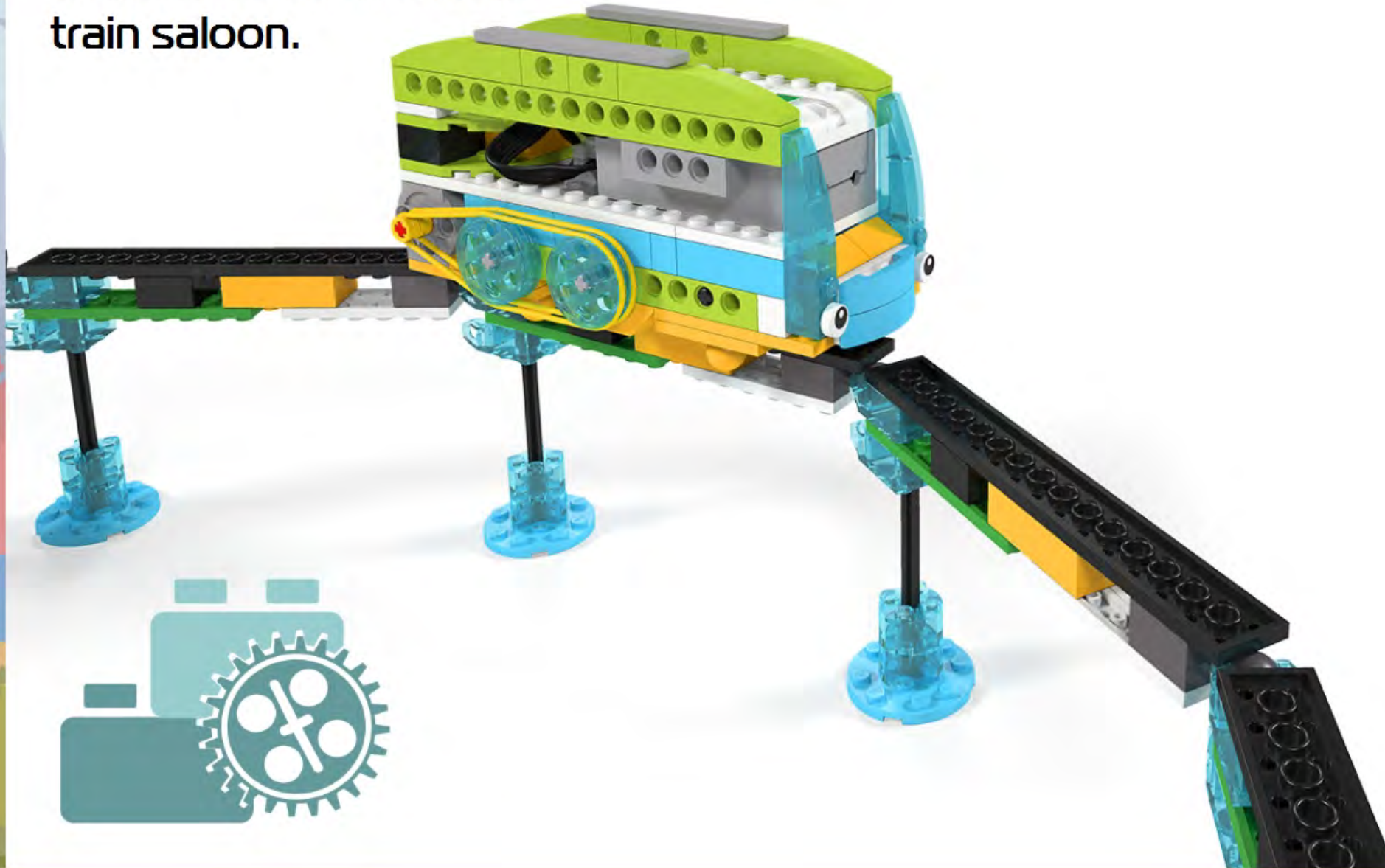


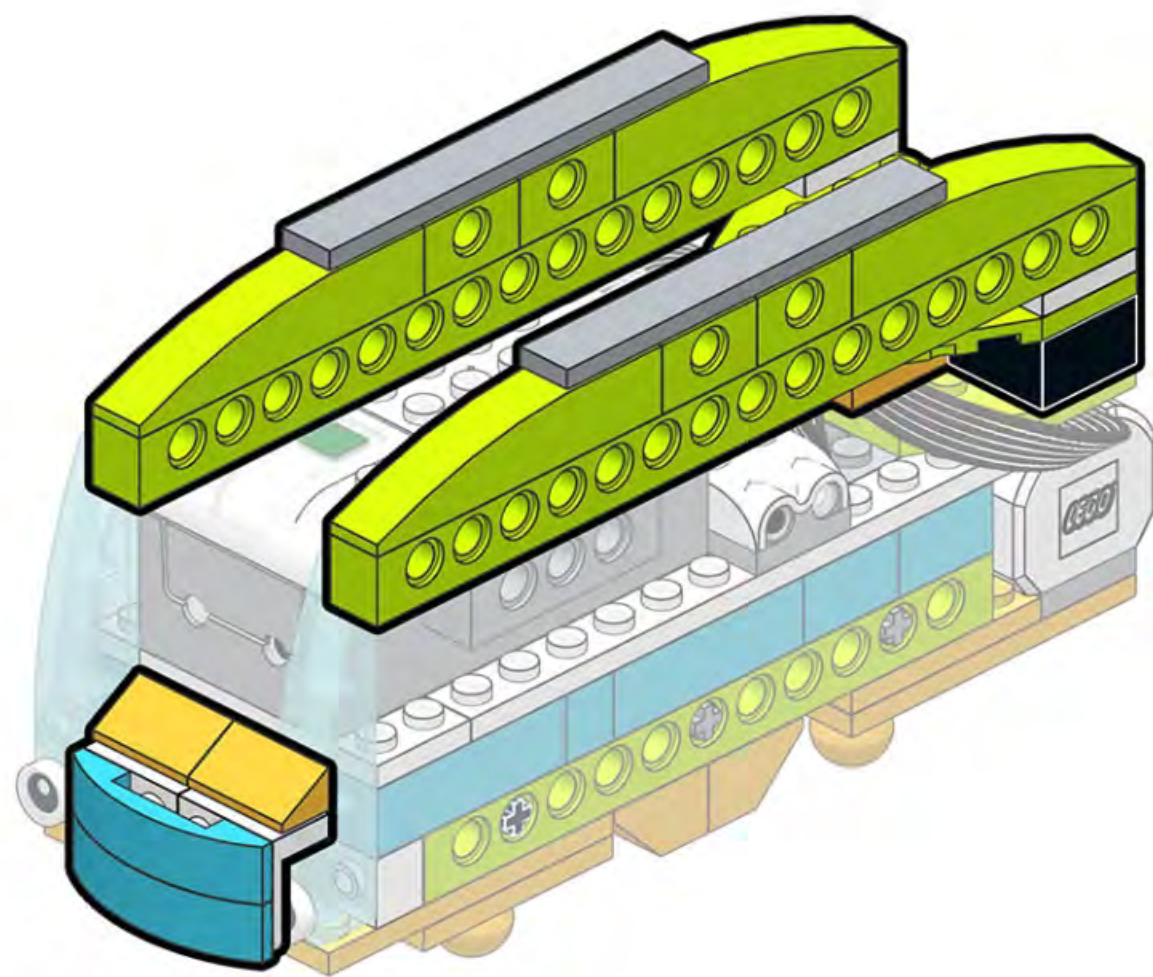


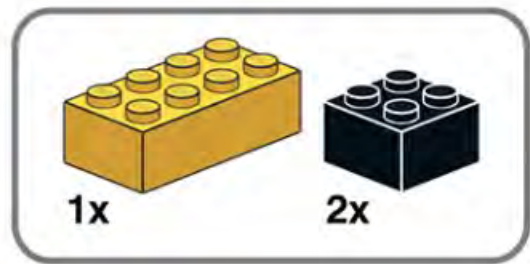
Enhanced version

ROBORISE-IT!
ROBOTIC EDUCATION

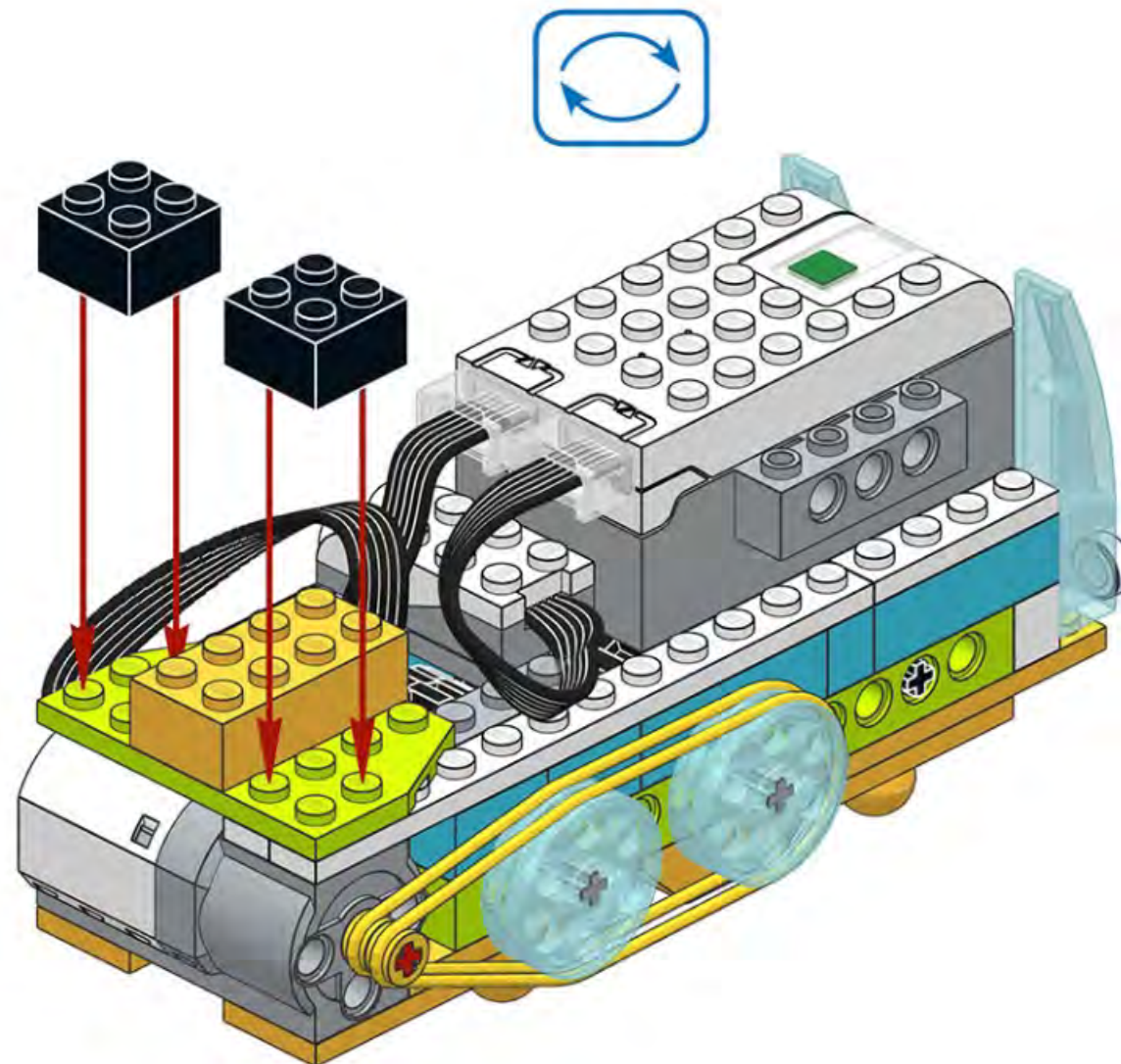
Build more comfortable
train saloon.

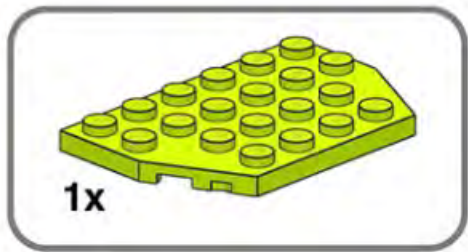




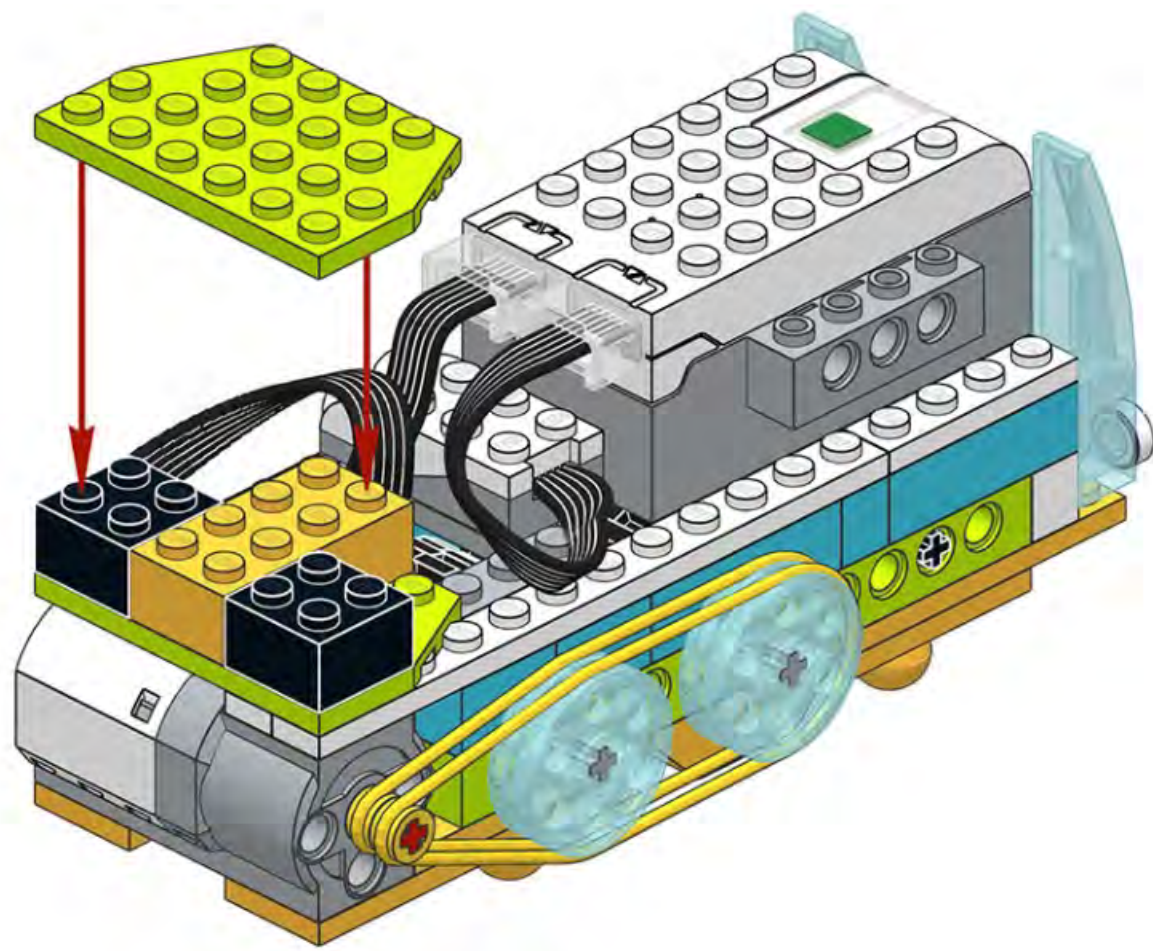


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58



3/12



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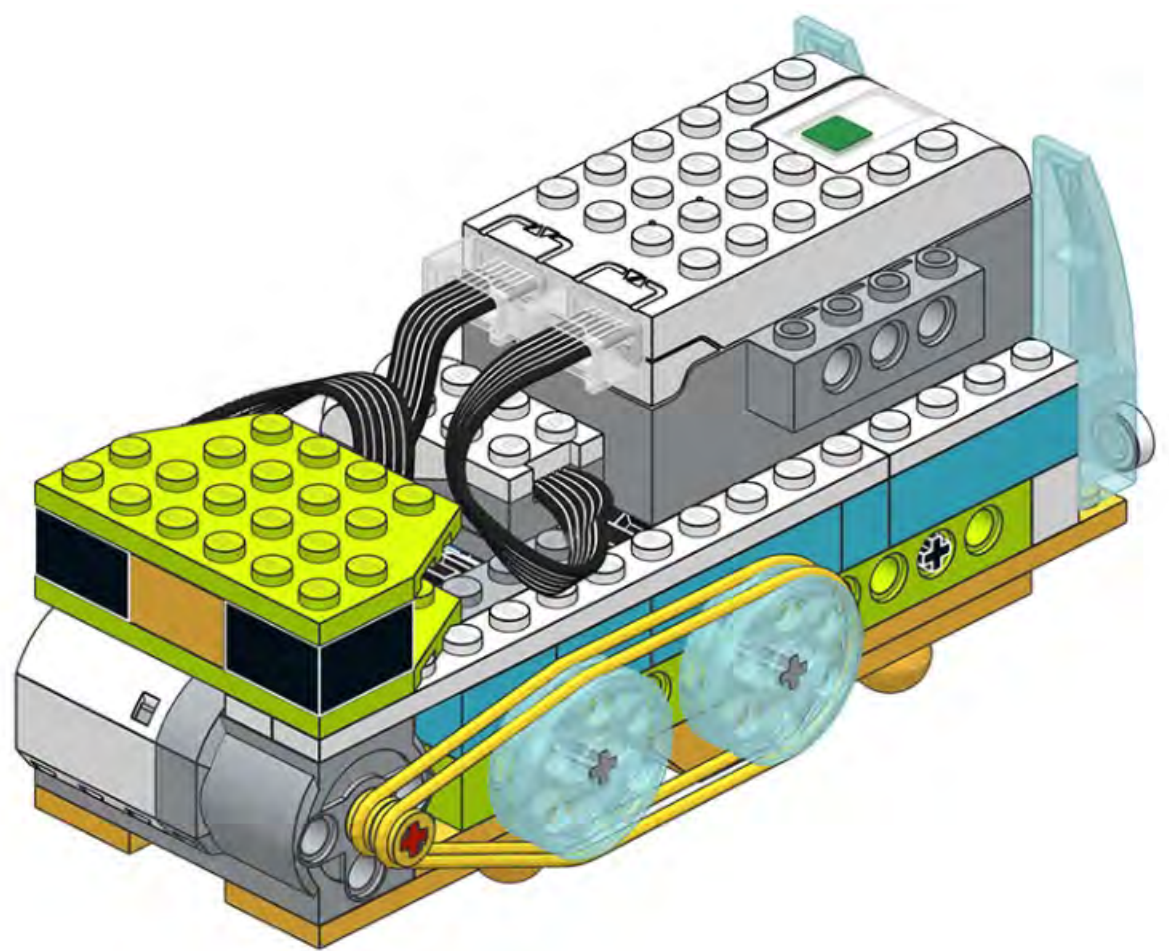


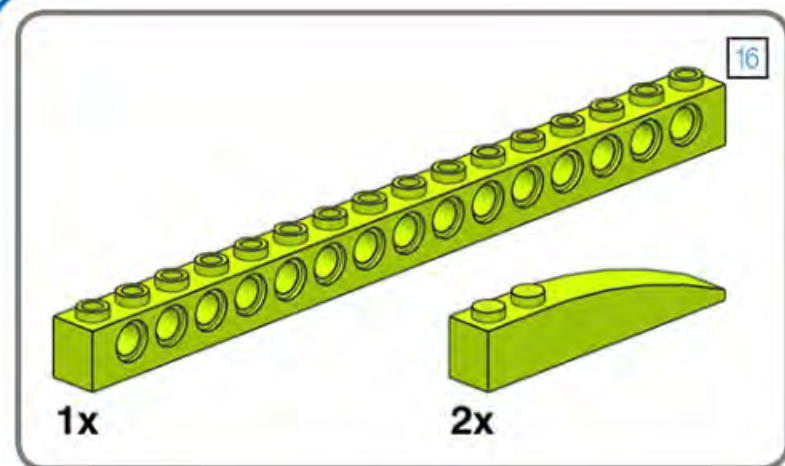
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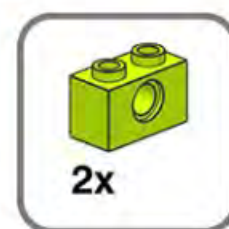
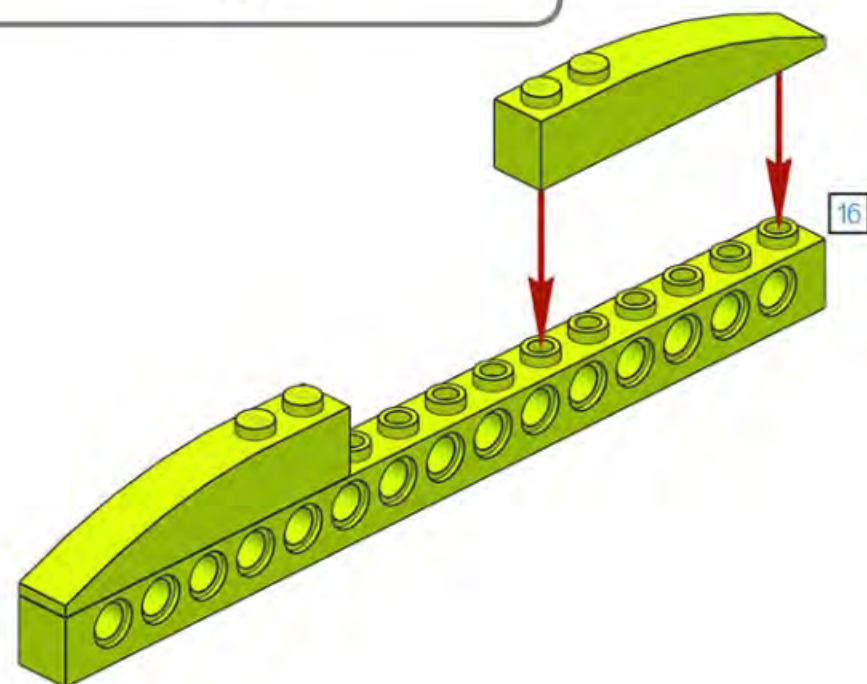


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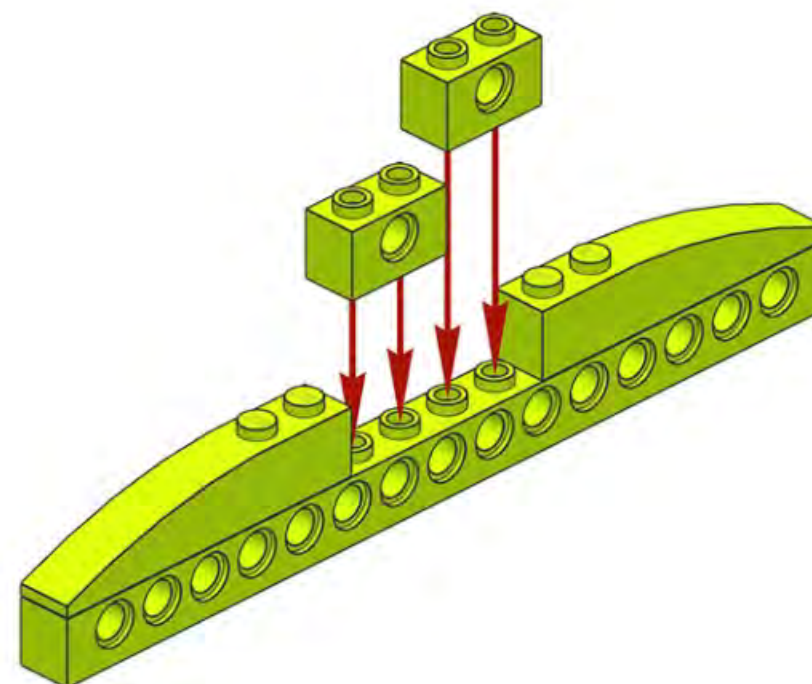


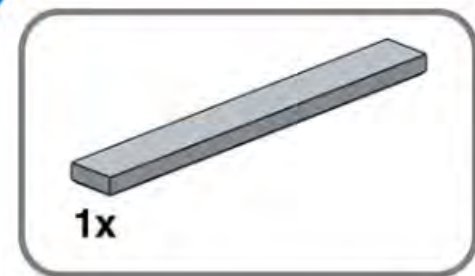


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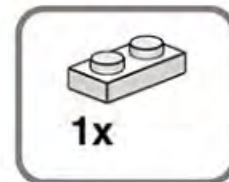
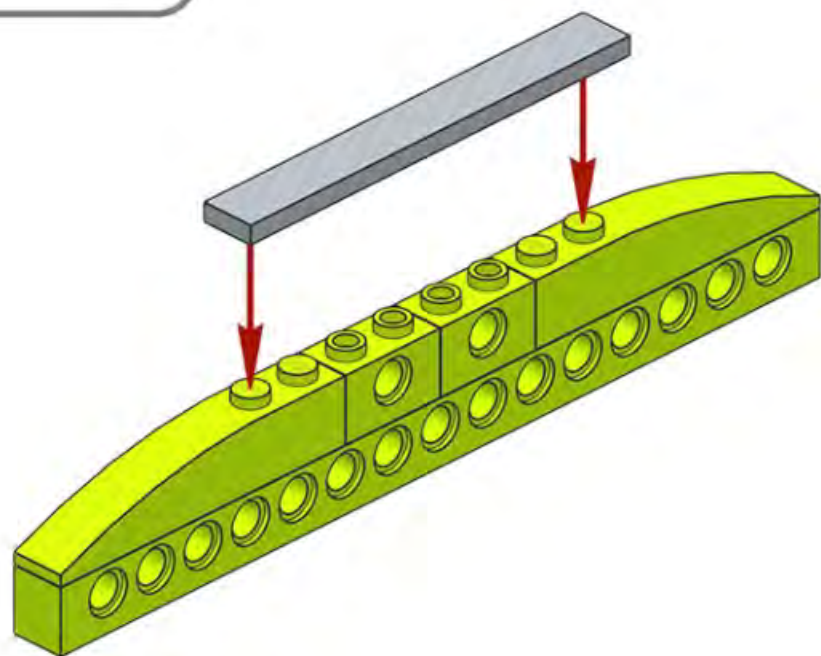


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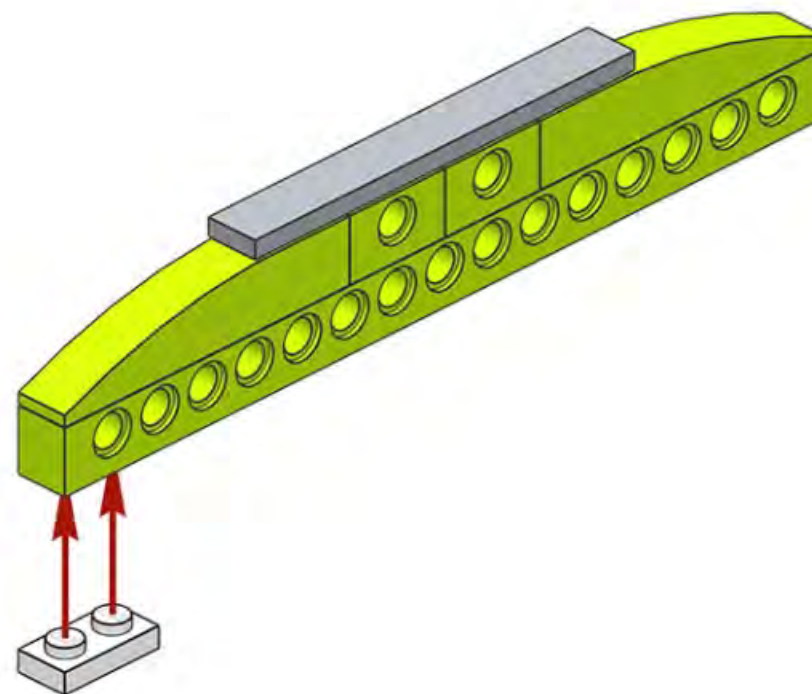




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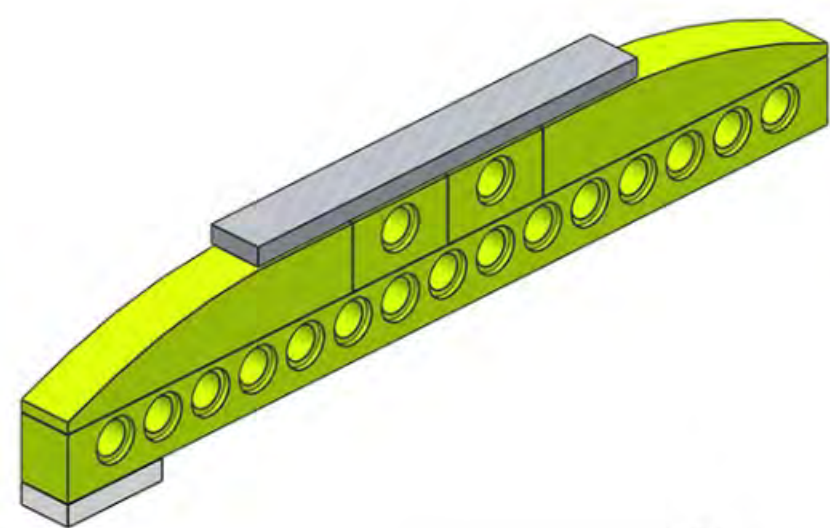


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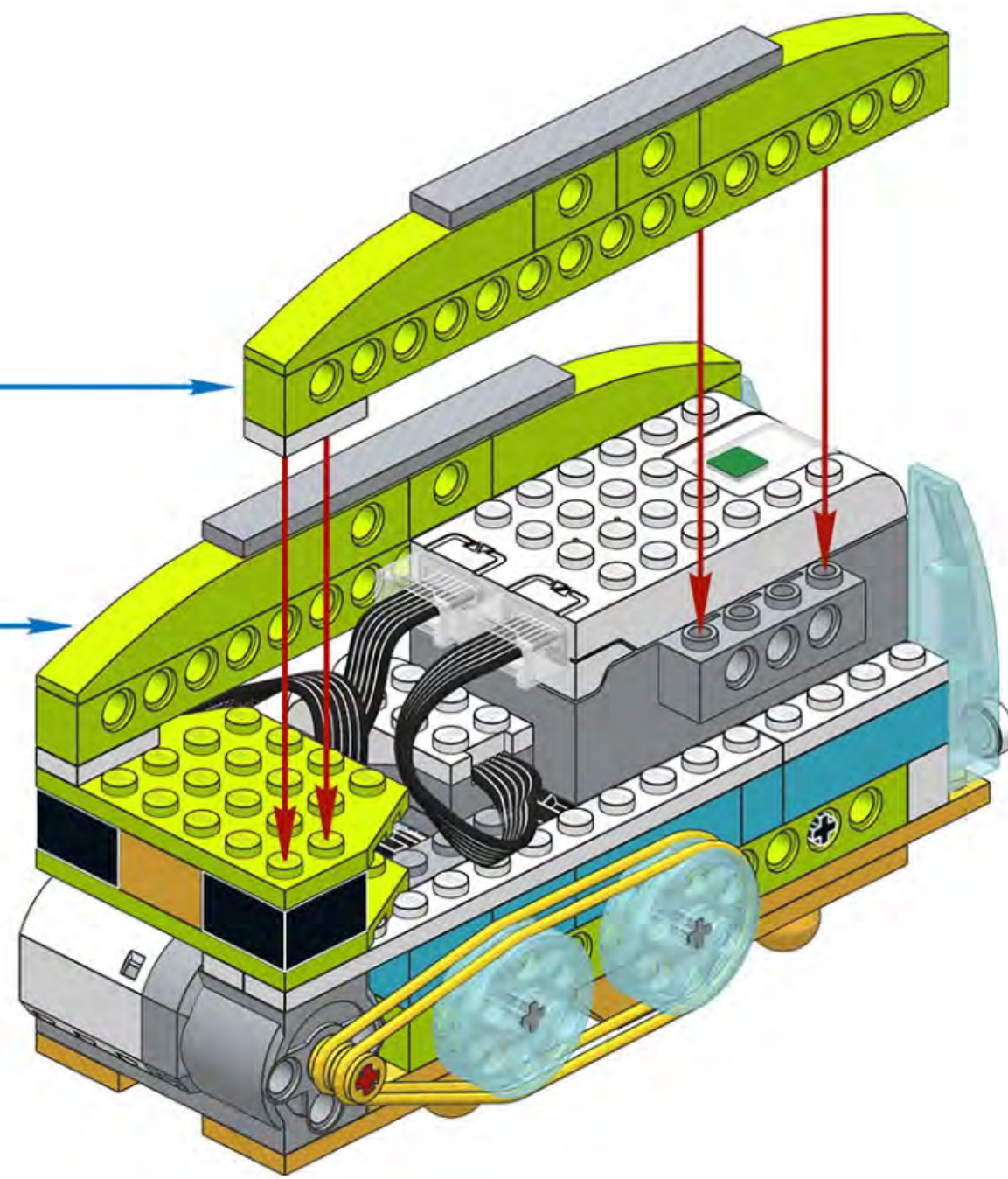




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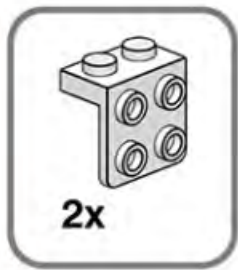


7/12

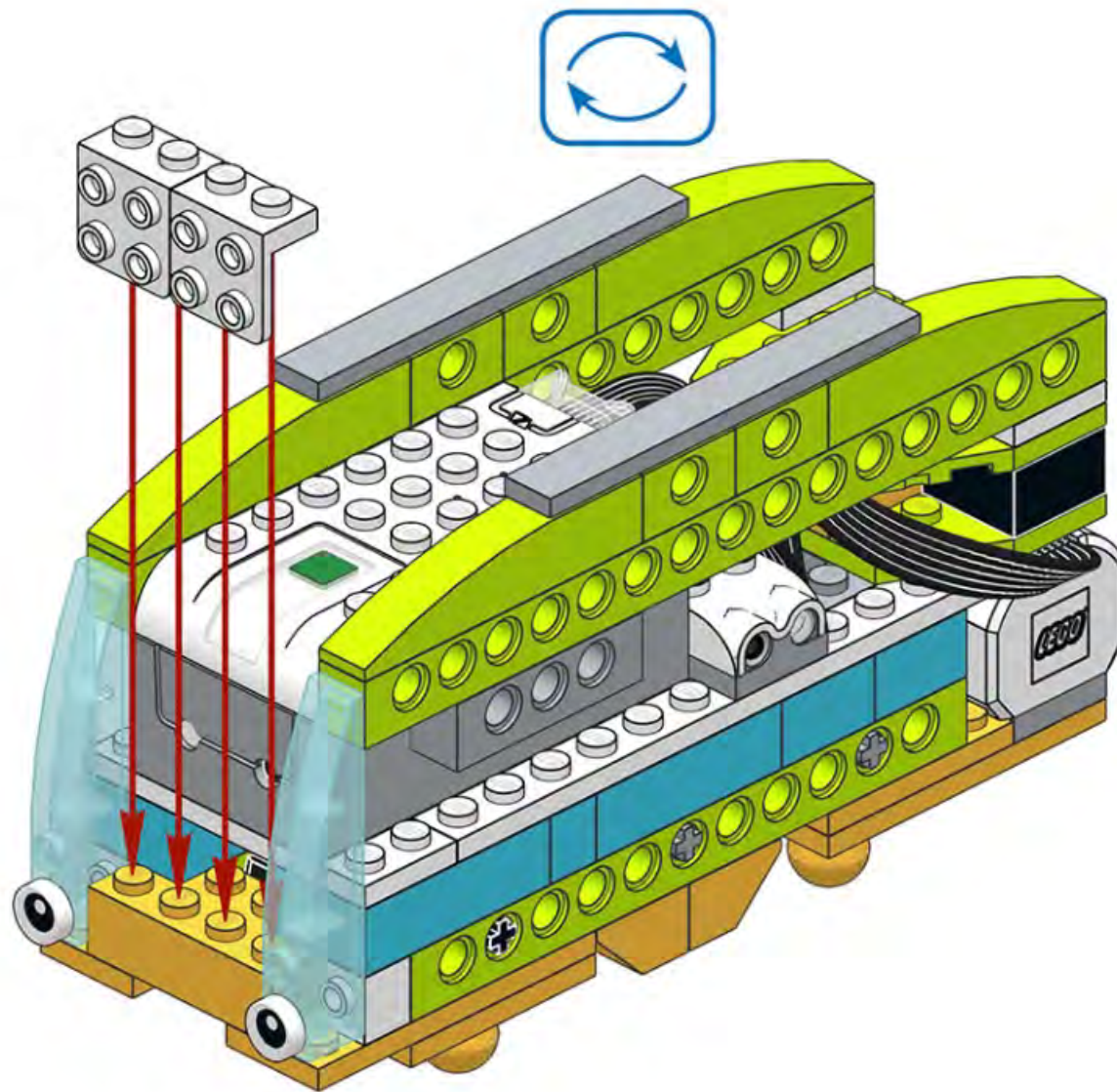
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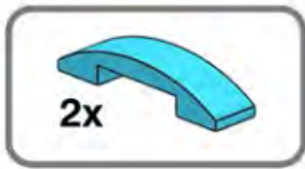
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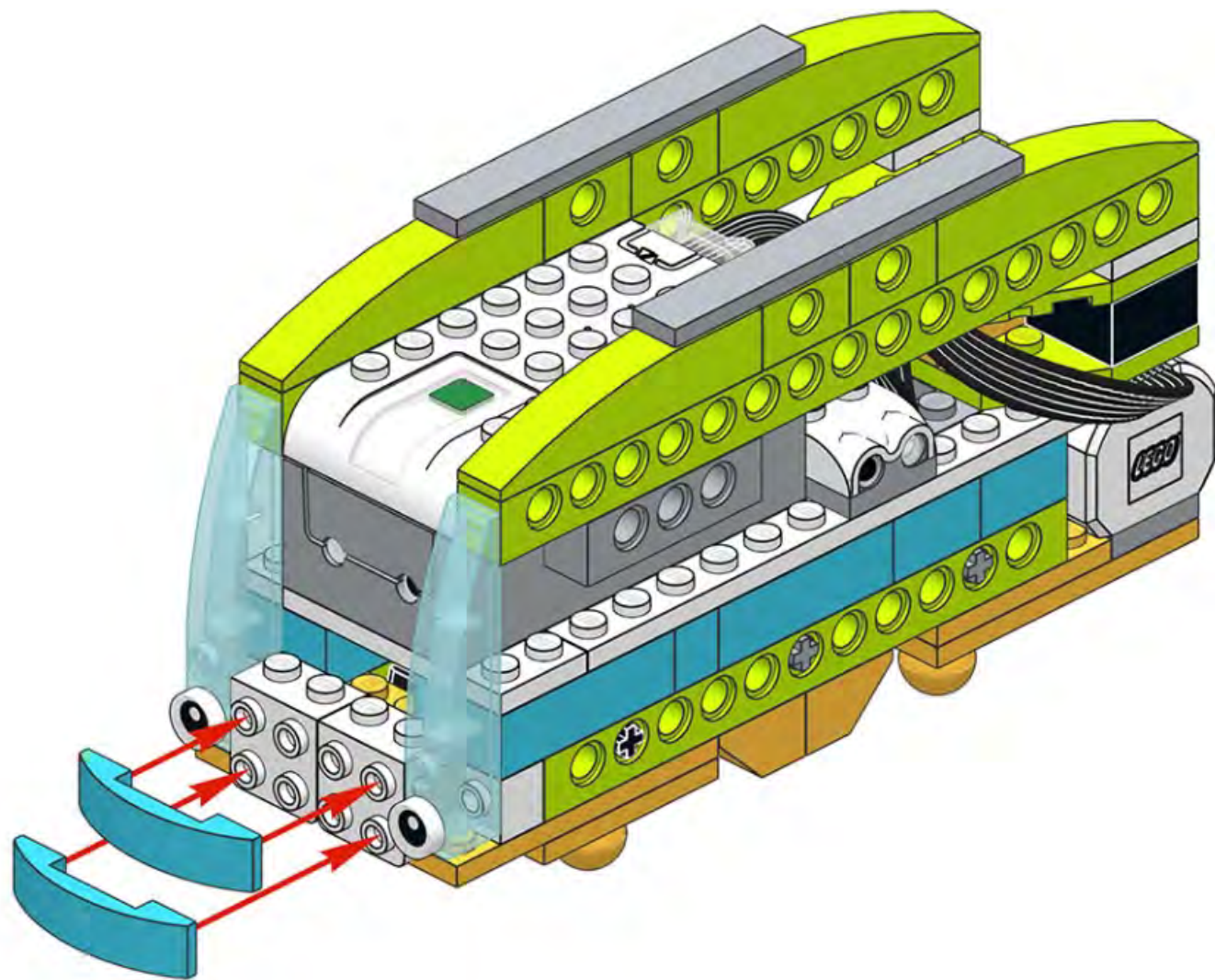


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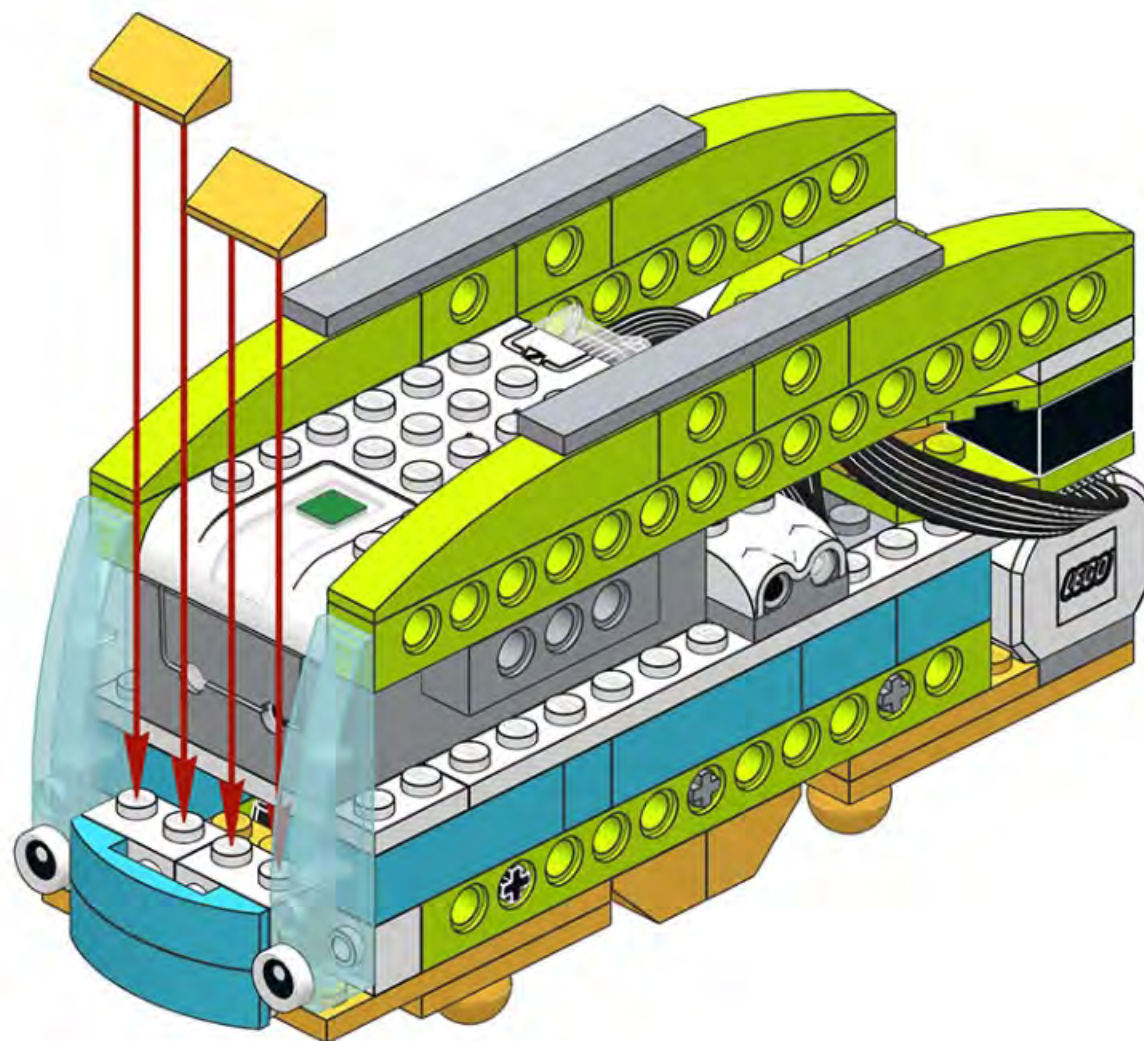


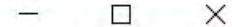
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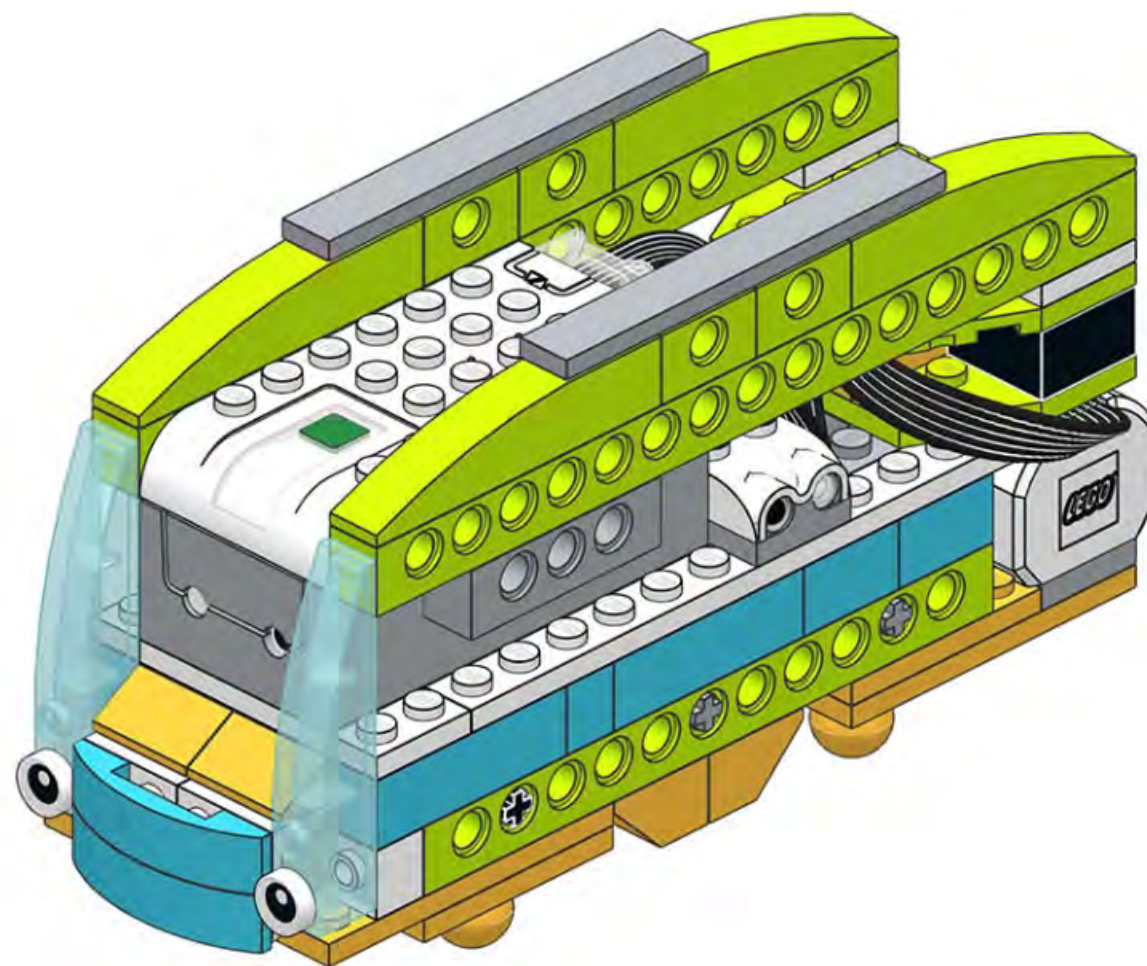


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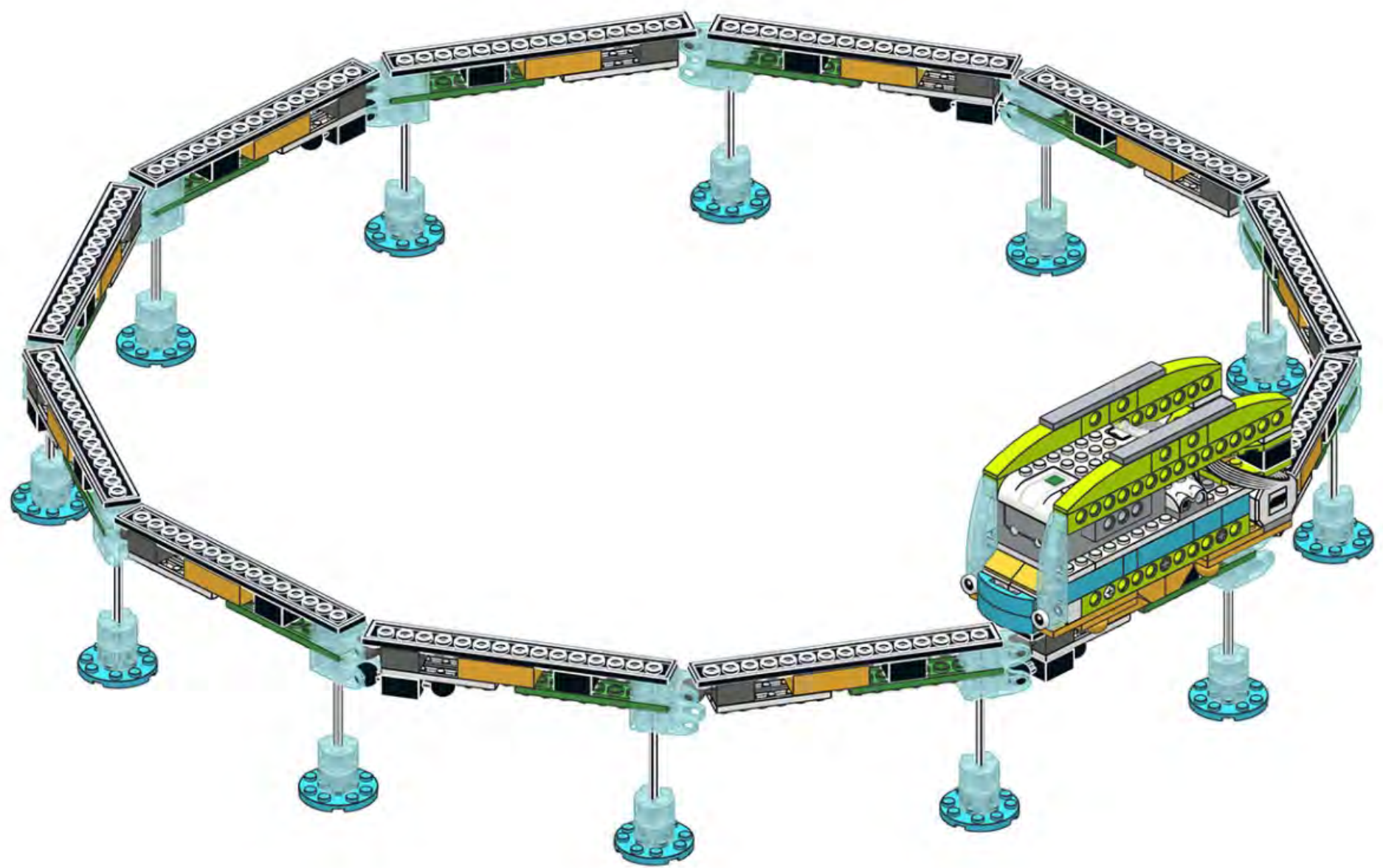


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67



12/12

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97





MonoRail

ROBORISE-IT!
ROBOTIC EDUCATION



MonoRail



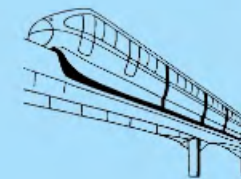


New day at the robots` factory

ROBORISE-IT!
ROBOTIC EDUCATION



Hello!
Our next task is to solve the problems of public transport system. A large number of tourists are expected. The city must be ready to provide the free movement of people.





TASK

ROBORISE-IT!
ROBOTIC EDUCATION



TASK

- to find the solution of the public transport system problems



Steps

- to know more about the types of public transport
- to define the main advantages and disadvantages of the each transport
- to make the choice of the transport to build





Discussion of the task

ROBORISE-IT!
ROBOTIC EDUCATION



What do you know about the public transport? What types of it do you know?

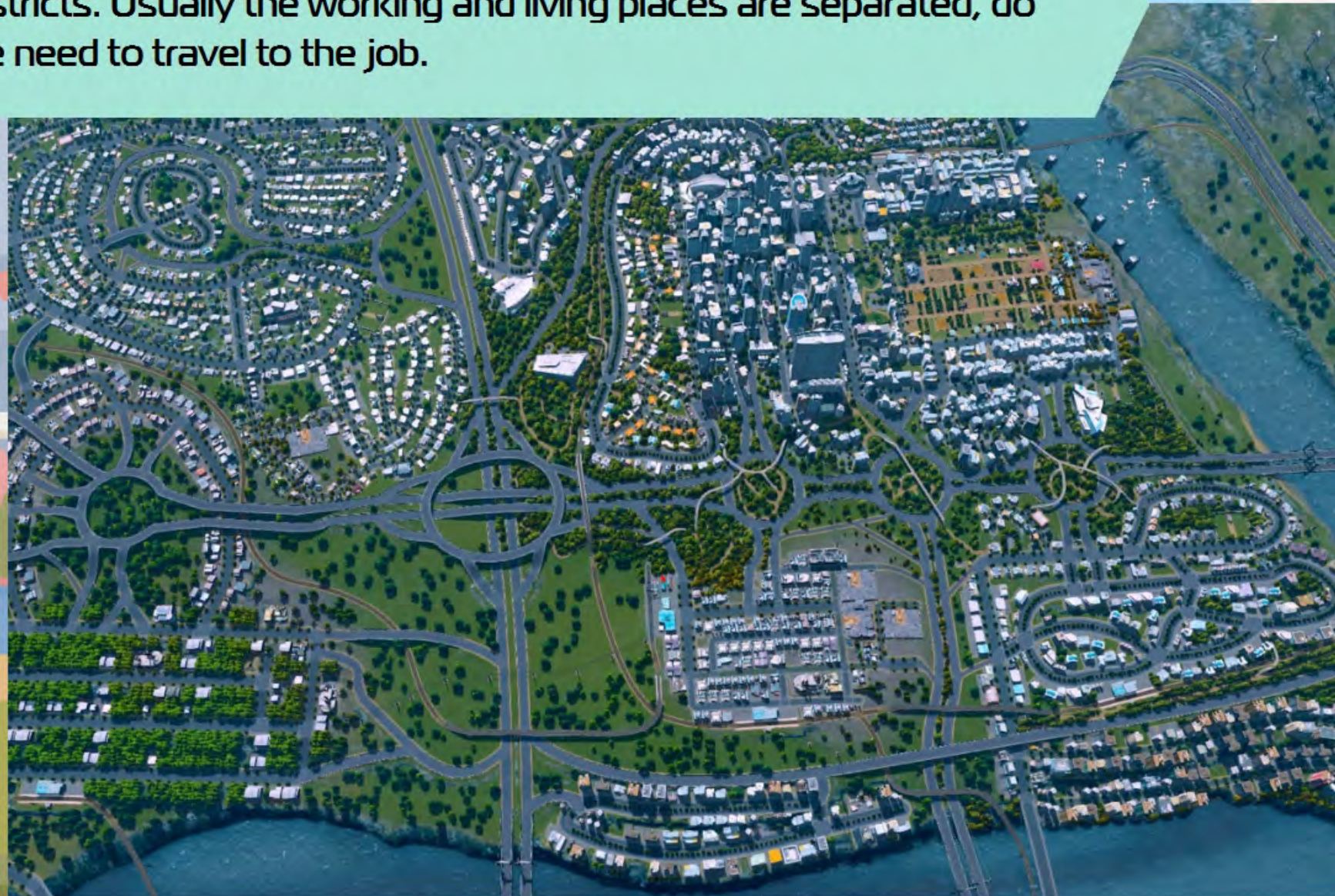




Public transport

ROBORISE-IT!
ROBOTIC EDUCATION

Public transport helps to make the free movement of people between city districts. Usually the working and living places are separated, so people need to travel to the job.





Public transport

ROBORISE-IT!
ROBOTIC EDUCATION

The good functioning of the public transport system decrease the number of the cars on the roads and allows to travel faster.

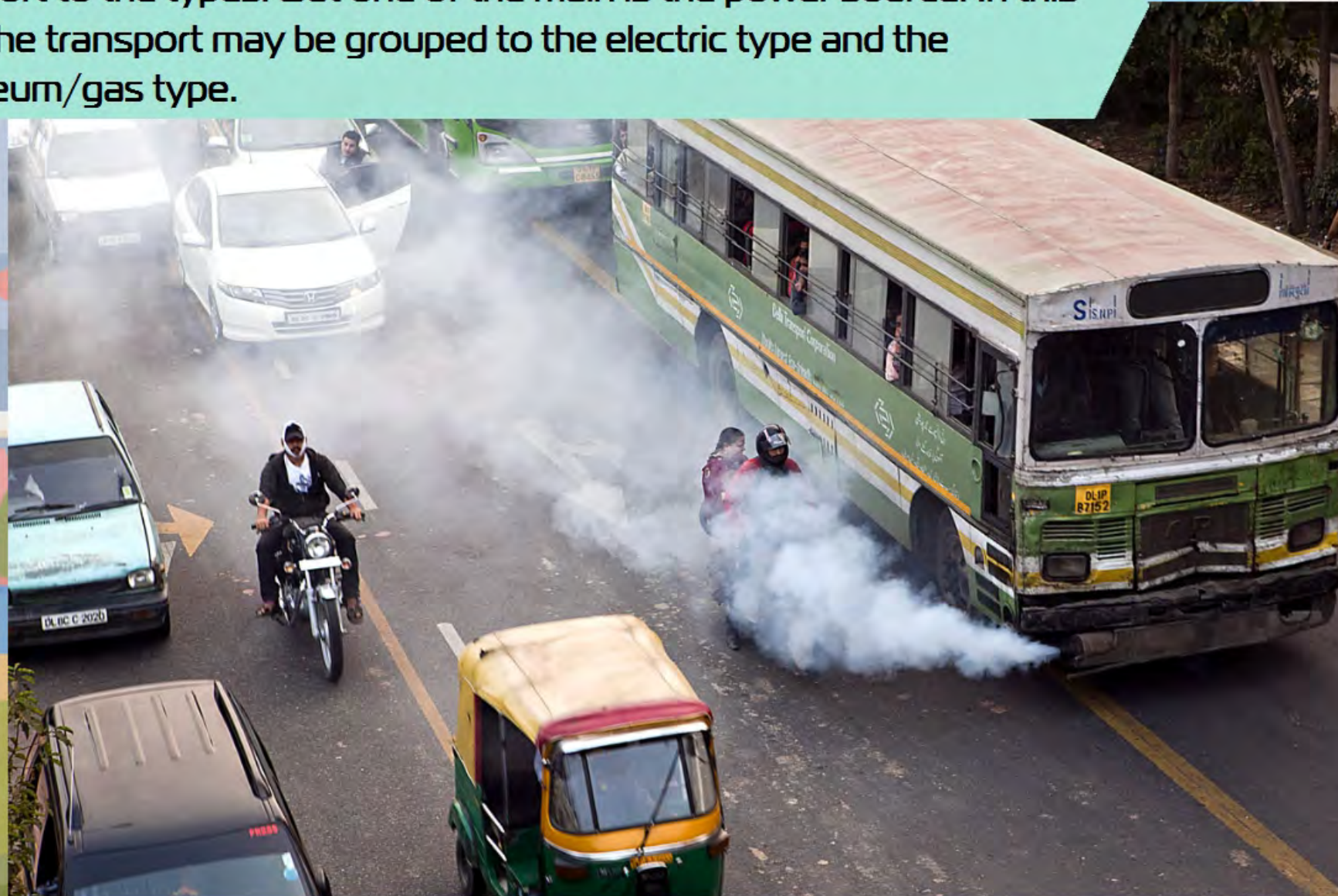




Public transport types

ROBORISE-IT!
ROBOTIC EDUCATION

There are a lot of the factors that may be used for the grouping the transport to the types. But one of the main is the power source. In this layer the transport may be grouped to the electric type and the petroleum/gas type.





Discuss!

ROBORISE-IT!
ROBOTIC EDUCATION



How do you think, what advantages of the electric public transport has?





Electric public transport

ROBORISE-IT!
ROBOTIC EDUCATION

The following machines is electric: trolleybus, tram, metro, monorail.
Also the electric-powered buses appears on the roads of many countries.





Electric transport advantages

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ROBOTIC EDUCATION

Electric public transport decreases the air pollution emissions in cities. Also it produce minimal noise pollution and may be use in the enclosed space (in tunnels or underground).





Trolleybus

ROBORISE-IT!
ROBOTIC EDUCATION

This is an electric bus that draws power from overhead wires. The disadvantages is: aesthetic (wires is unsightly in city), dewirements (sometimes it come off of the wire), difficulties when re-routing.





Tram

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ROBOTIC EDUCATION

This is a rail vehicle which runs on tramway tracks along public urban streets. Usually tramways powered by electricity. They produce a high sound pollution, but very effective. Also often the trams must to stop at the Traffic lights as usual cars.





Metro

ROBORISE-IT!
ROBOTIC EDUCATION

Also known as heavy rail, subway, MRT, tube, U-Bahn or underground, is a type of high-capacity public transport. It is very expensive due to the costs for building of the tunnels, but allows to create very effective transport system.





Monorail

ROBORISE-IT!
ROBOTIC EDUCATION

This is a railway in which the track consists of a single rail. In most cases rail is elevated, but monorails can also run at ground, below ground or in subway tunnels.





Monorail

ROBORISE-IT!
ROBOTIC EDUCATION

Unlike some trams and light rail systems, modern monorails are always separated from other traffic and pedestrians. It allows to make the very fast and safely transport system.





Monorail

ROBORISE-IT!
ROBOTIC EDUCATION

Often monorails is only one available transport that may be added to the existing city infrastructure. Other transport has a lower capacity (as trams) or is very expensive (as metro) or is influenced by other traffic (as trolleybuses).





Let's summaries

ROBORISE-IT!
ROBOTIC EDUCATION

We must to create the public transport system that:

- Has a great capacity.
- Has zero emission of air pollution.
- May be integrated into the existing city infrastructure.
- Not very expensive.





Discussion of the task

ROBORISE-IT!
ROBOTIC EDUCATION



What do you think, which type of the electric public transport is better for our needs?





Meet MonoRail!

ROBORISE-IT!
ROBOTIC EDUCATION

This is a robotised
autonomous monorail.



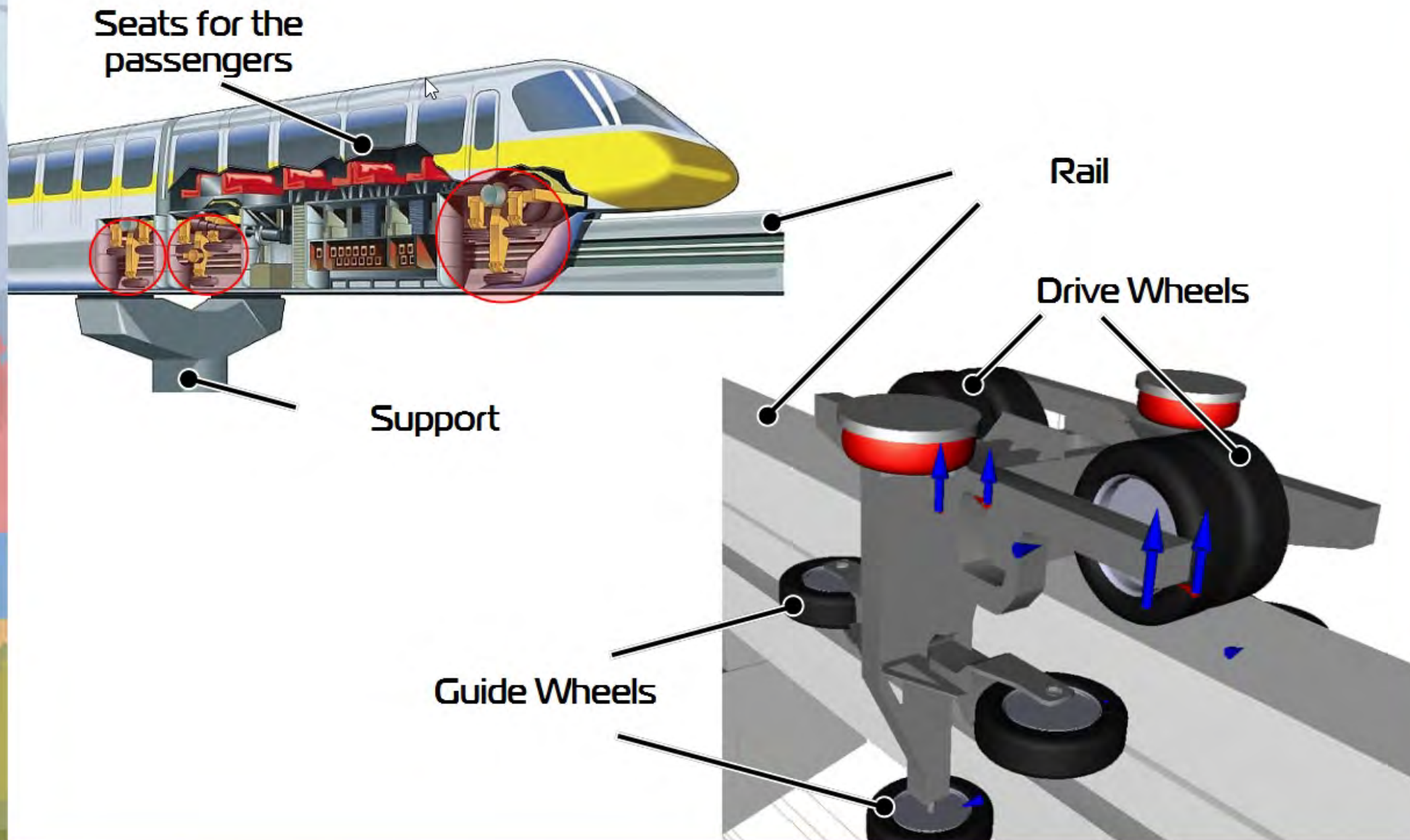
MonoRail





Monorail's elements

ROBORISE-IT!
ROBOTIC EDUCATION

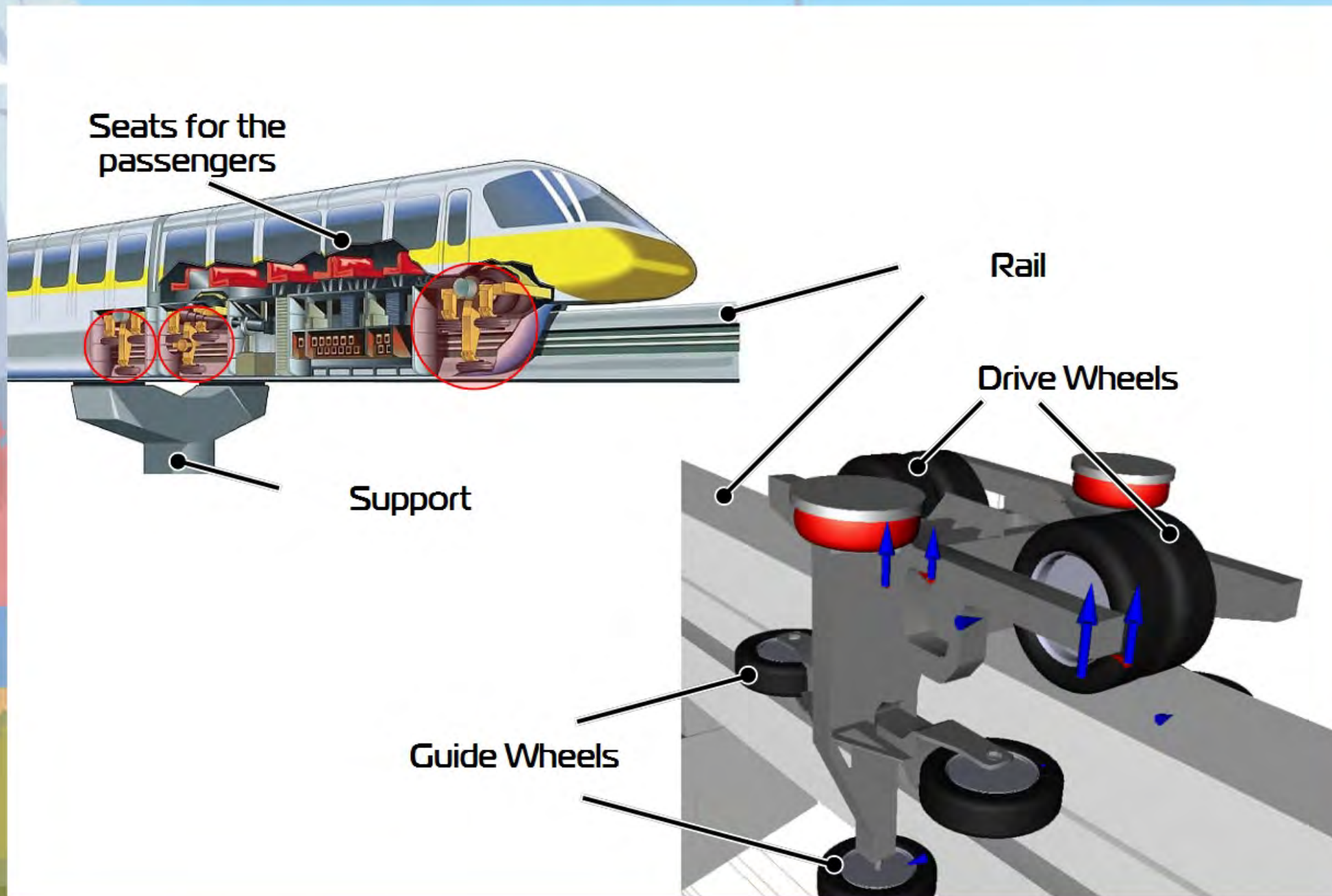


21





Monorail's elements

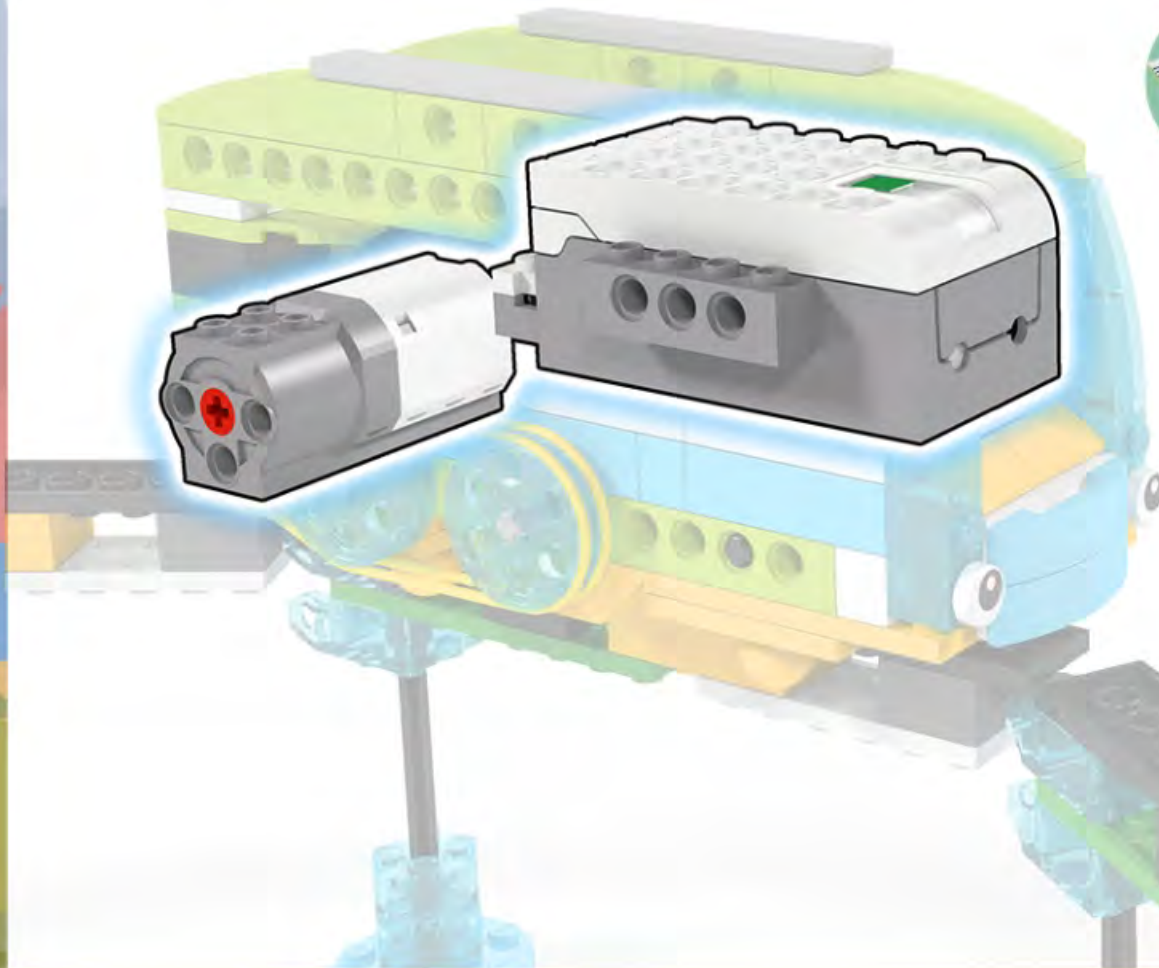




Features

ROBORISE-IT!
ROBOTIC EDUCATION

The motor is used for movement of the MonoRail. The motion sensor can be used to station detection.



Find:

- smarthub
- motor
- sensor



0



22





Features

ROBORISE-IT!
ROBOTIC EDUCATION

The separate parts of the rails can be connected together to achieve a Circular route.

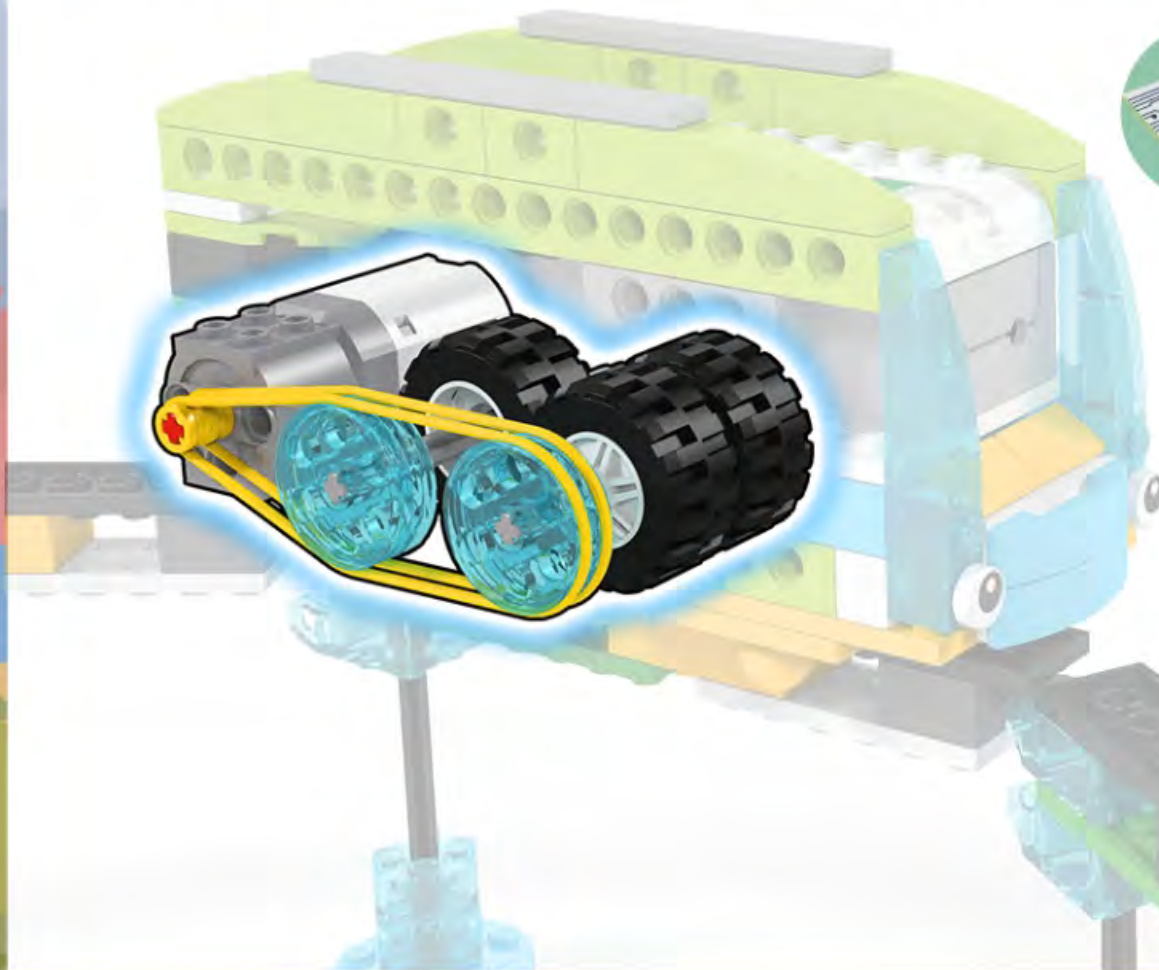




Features

ROBORISE-IT!
ROBOTIC EDUCATION

The rotation is transmitted from the motor to the Drive wheels due to the Belt drive. Compare the size of the contact of the belt with first and second pulley. How do you think, what will this lead to?



Find:

- Motor
- Belt drive
- Drive Wheels



24





Features

ROBORISE-IT!
ROBOTIC EDUCATION

How do you think, why robot needs two Drive axles?



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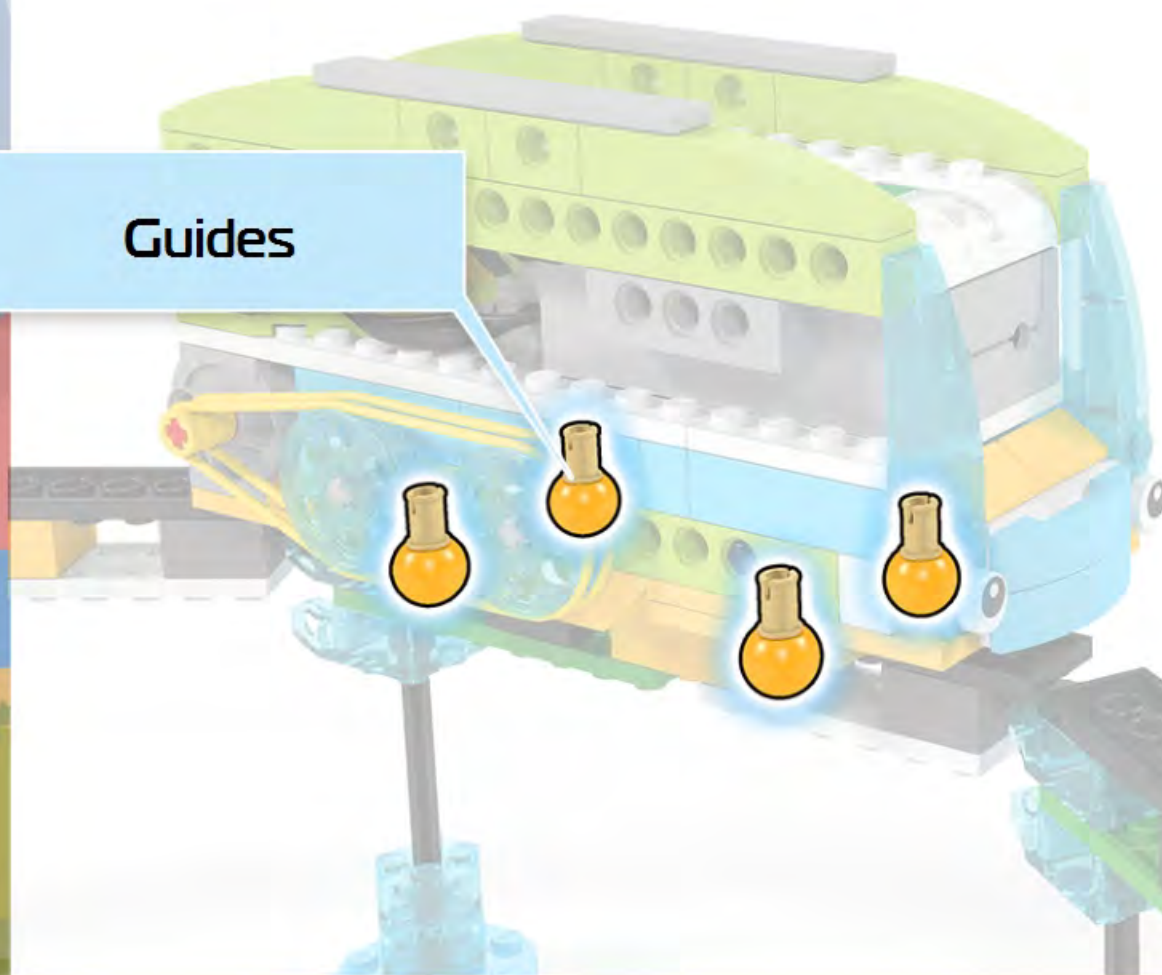


Features

ROBORISE-IT!
ROBOTIC EDUCATION

MonoRail has the guides for run through the curves of the rail.
They fix the robot on the rail.

Guides





Features

ROBORISE-IT!
ROBOTIC EDUCATION

Guides



Note, that Guides not touches the rail on the straight sections. But they works on the curves.

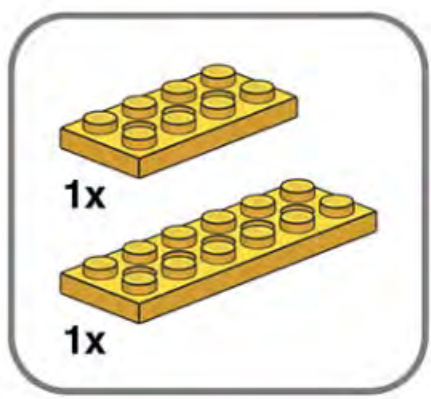




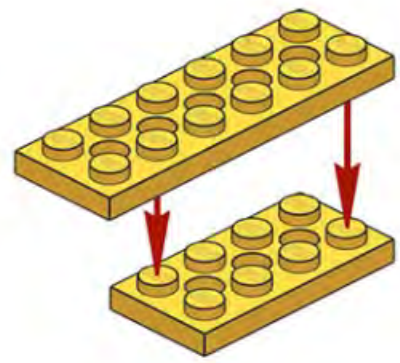
Build the robot!

ROBORISE-IT!
ROBOTIC EDUCATION





1



1/56

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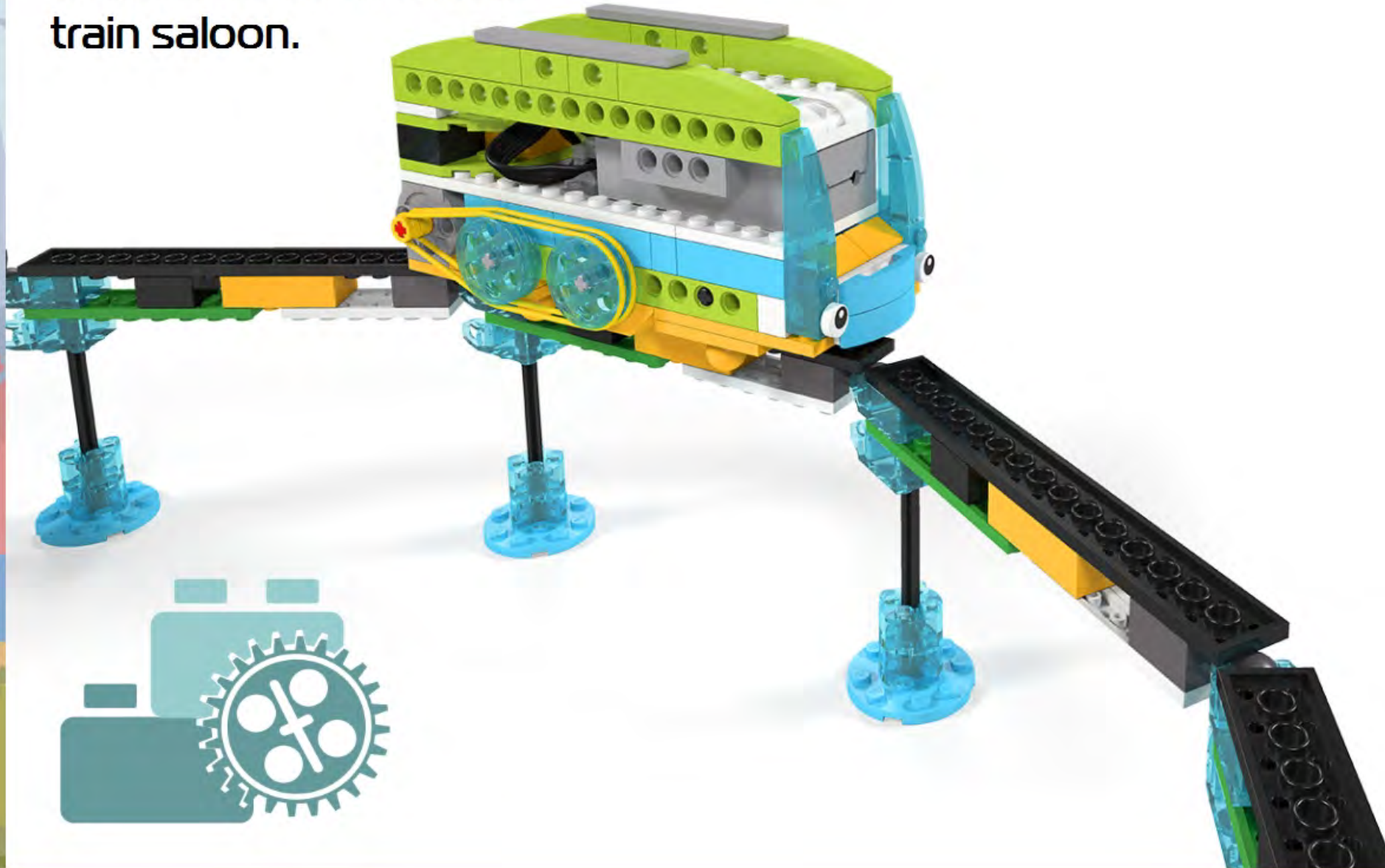
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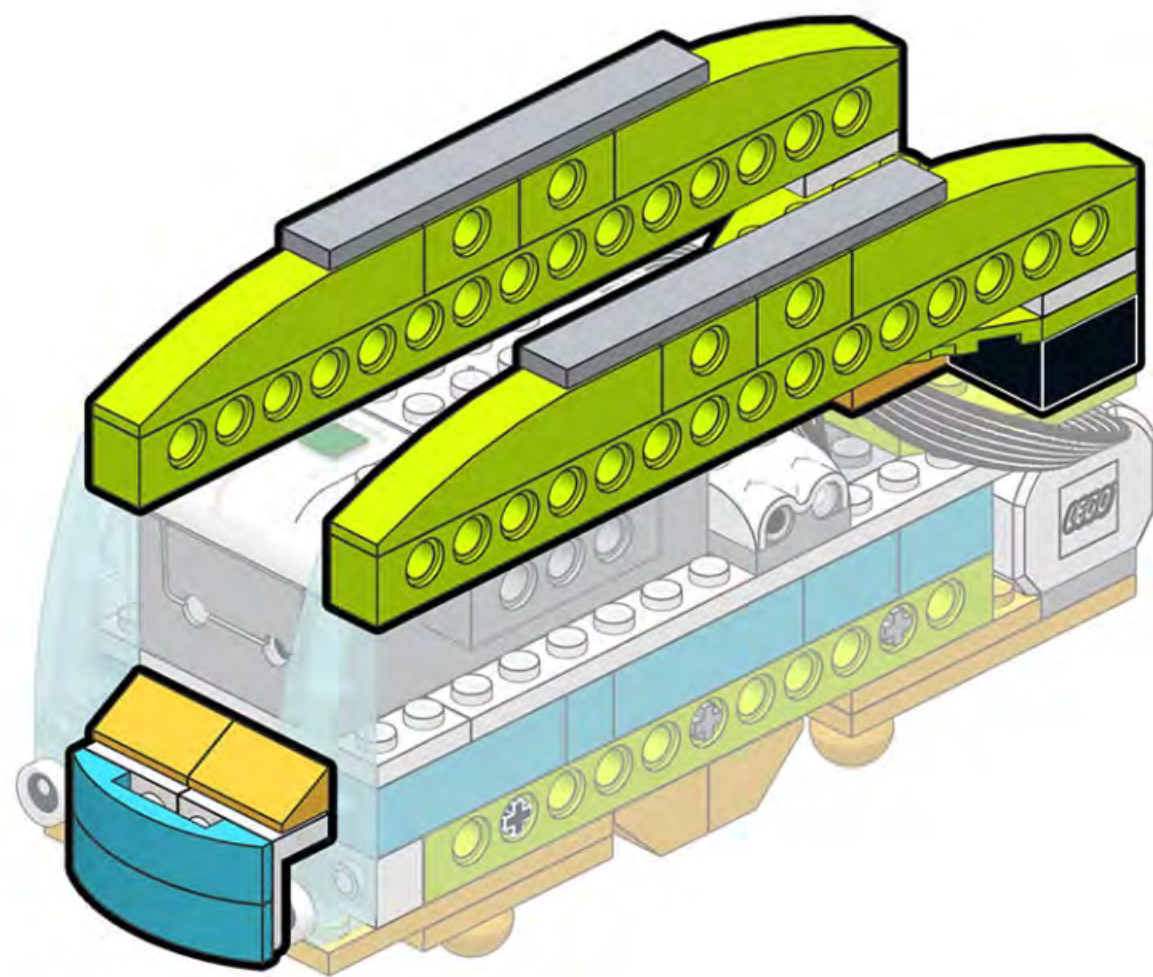


Enhanced version

ROBORISE-IT!
ROBOTIC EDUCATION

Build more comfortable
train saloon.





1/12

0

86



Check it out!

ROBORISE-IT!
ROBOTIC EDUCATION

Avoid any friction
between the cables
while robot is moving.

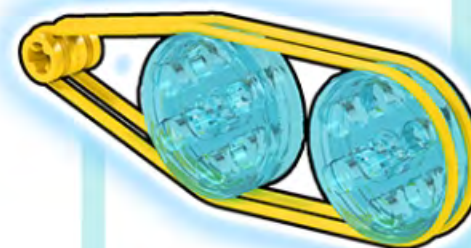
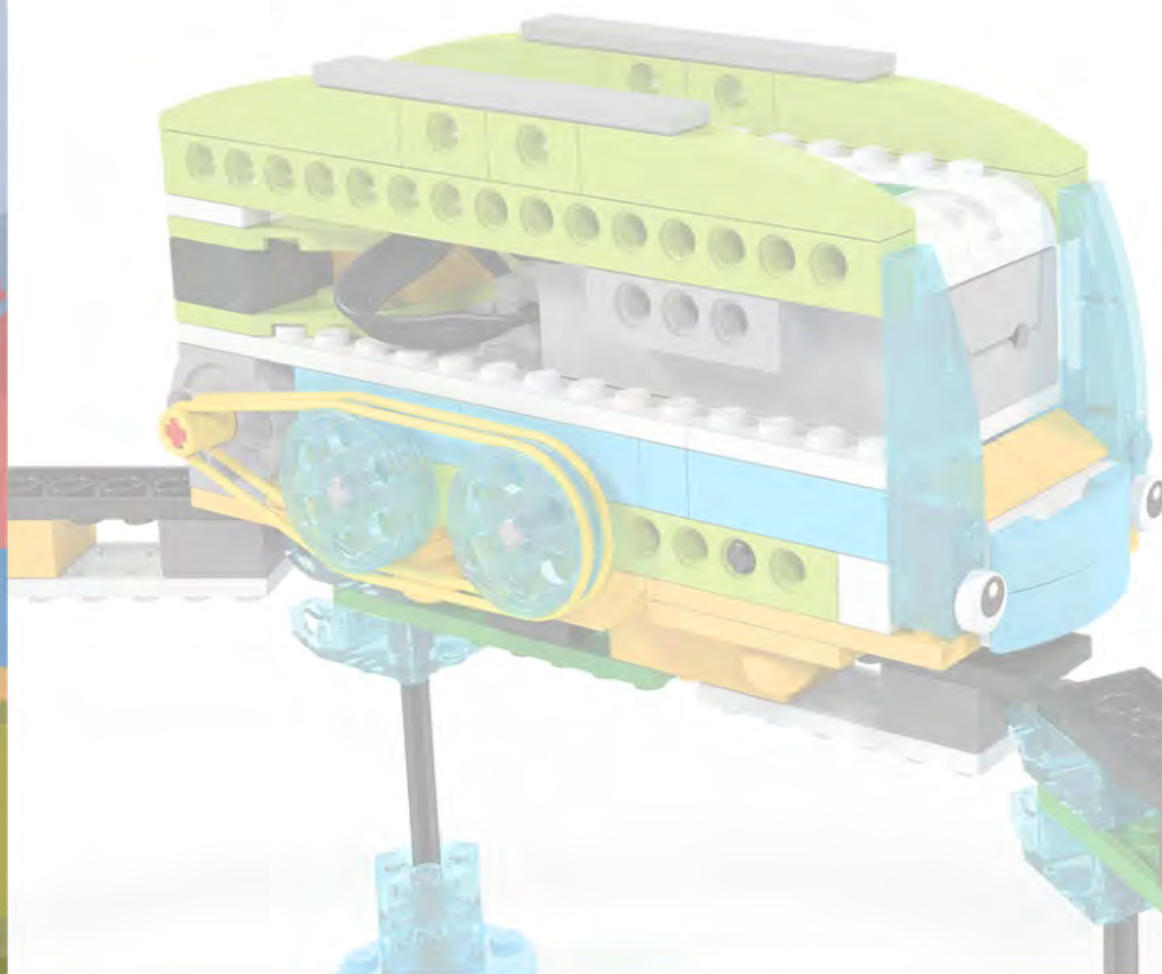




TASK

ROBORISE-IT!
ROBOTIC EDUCATION

Place parts of the robot in the right places.





Task 1

ROBORISE-IT!
ROBOTIC EDUCATION

Check the mechanism. The MonoRail must smoothly run via each joint of the road.





Task 2

ROBORISE-IT!
ROBOTIC EDUCATION

Program the stop of the monorail near the station. Note, that robot must to stop at the center of the station.



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00:03

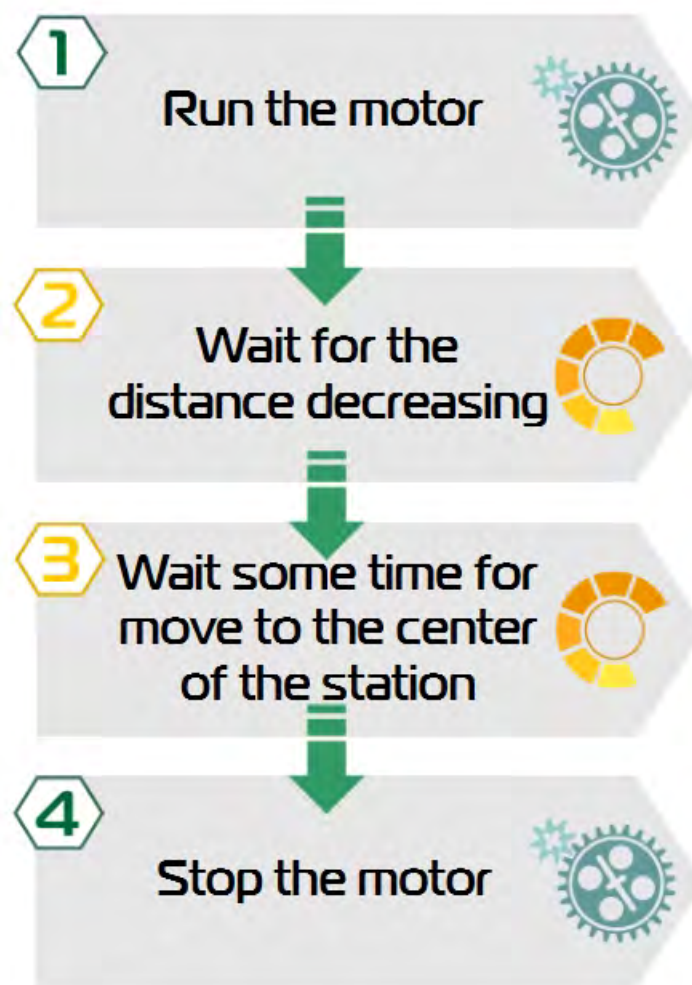




Task 2. Algorithm

ROBORISE-IT!
ROBOTIC EDUCATION

The program should run by the following algorithm:





Task 3. Program

ROBORISE-IT!
ROBOTIC EDUCATION

1

Run the motor



Step:





Task 3. Program

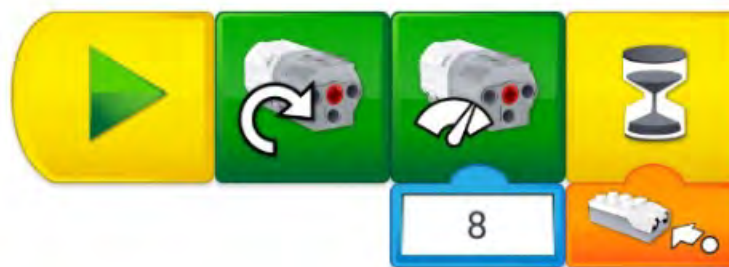
ROBORISE-IT!
ROBOTIC EDUCATION

1

Run the

2

Wait for the
distance decreasing



Step:

1

2

3

4



0



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Task 3. Program

ROBORISE-IT!
ROBOTIC EDUCATION

1

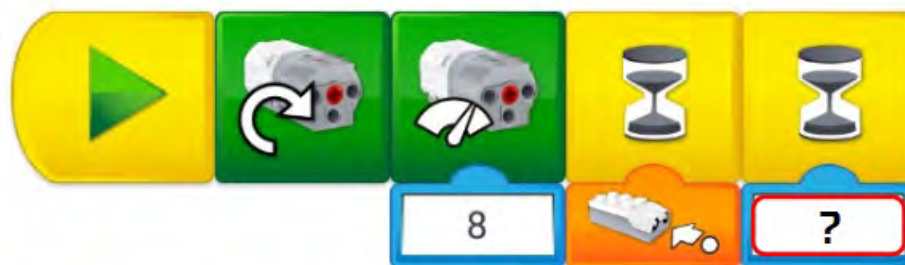
Run the

2

Wait for
distance d

3

Wait some time for
move to the center
of the station



Adjust the duration
of the waiting

Step:



0



103





Task 3. Program

ROBORISE-IT!
ROBOTIC EDUCATION

1

Run the

2

Wait for
distance d

3

Wait some
move to t
of the s

4

Stop the motor



Adjust the duration
of the waiting

Step:





Task 3

ROBORISE-IT!
ROBOTIC EDUCATION

Program the continuous transfers between the stations.

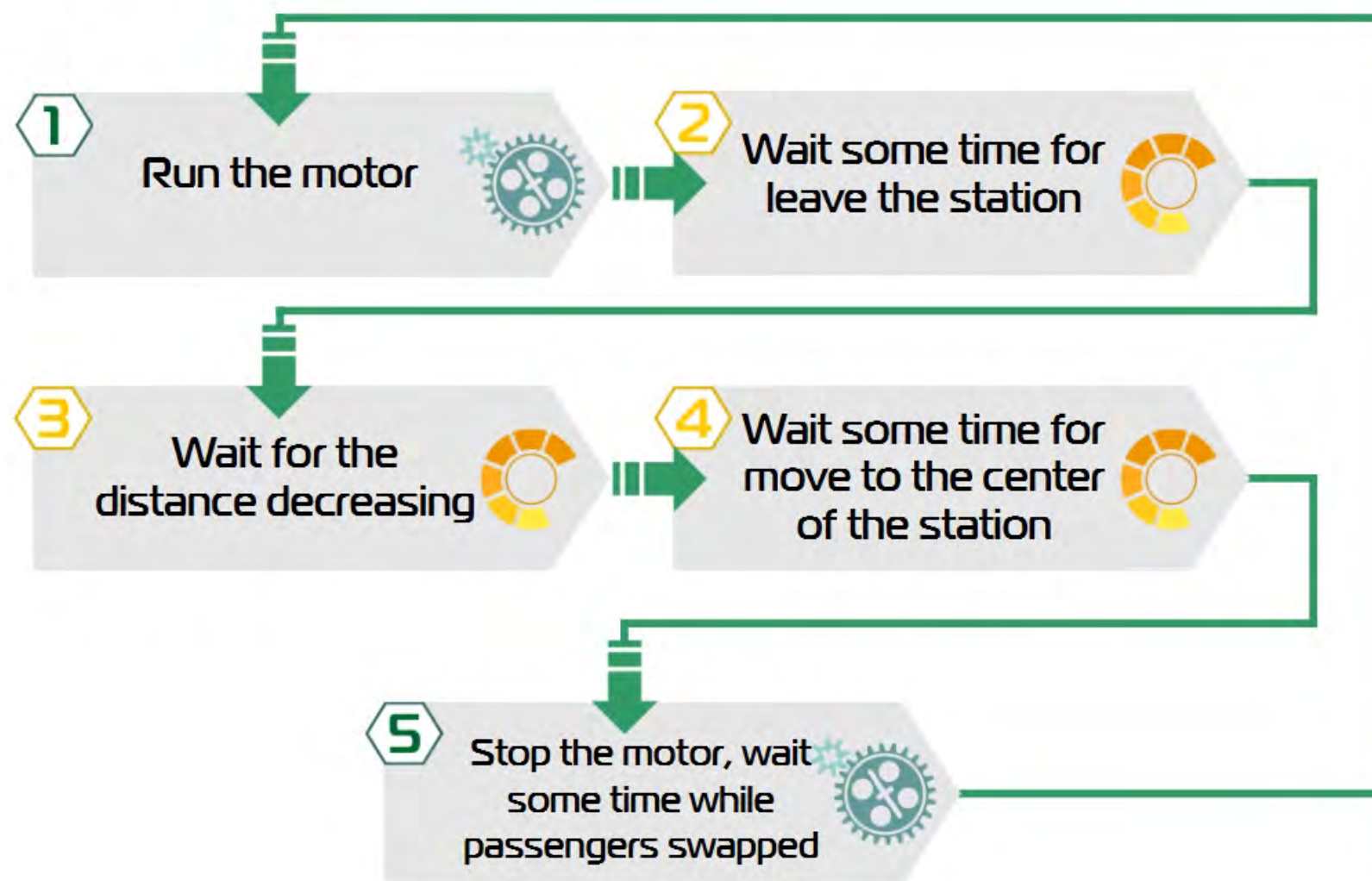




Task 3. Algorithm

ROBORISE-IT!
ROBOTIC EDUCATION

The program should run by the following algorithm:



105





Task 4

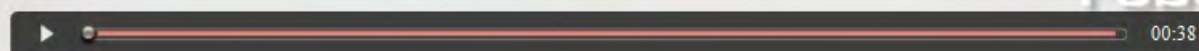
ROBORISE-IT!
ROBOTIC EDUCATION

Build and place near the rail few stations and display on the screen the number of the stops on the stations.

0



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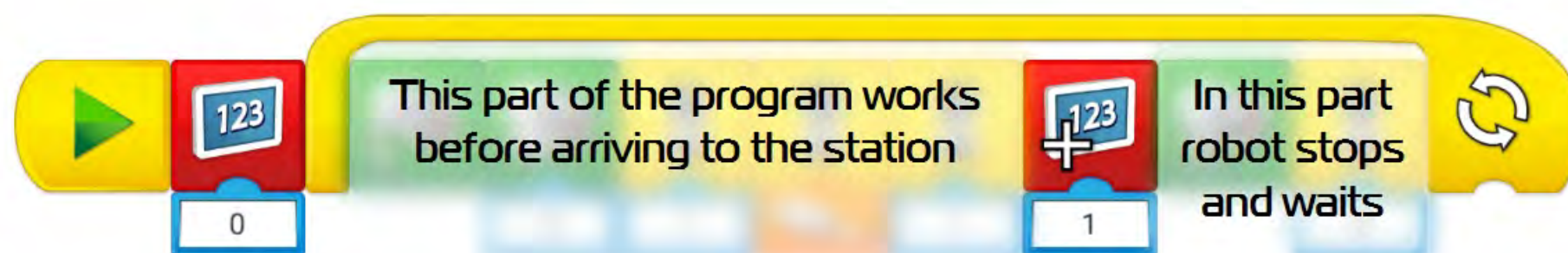




Task 4. Program

ROBORISE-IT!
ROBOTIC EDUCATION

For modify your program you need only a few blocks. First of all at the program begin you must to set the number of the passed stations to the "0". Then at the each loop iteration the value of the variable must be increased on the "1".



Note! Your program may be differ. The above screenshot is for reference only.





Task 5*

ROBORISE-IT!
ROBOTIC EDUCATION

Let's calculate how many full circles will finish the robot in a two minutes. To do this you may divide the number of passed station on the number of station on the route. The number of the full circles is the integer part of the result.

$$N = \frac{\text{\# passed station}}{\text{\# station on the route}}$$





Task 6

ROBORISE-IT!
ROBOTIC EDUCATION

Re-built the rails to make the straight section and place two stations on the ends.





Task 7

ROBORISE-IT!
ROBOTIC EDUCATION

Program the work of the robot on such route. Note, that for stop at the center of the stations robot will need different Wait block settings.





TASK

ROBORISE-IT!
ROBOTIC EDUCATION

Sort the transport by the cost of the construction. Drag and drop corresponding icons.

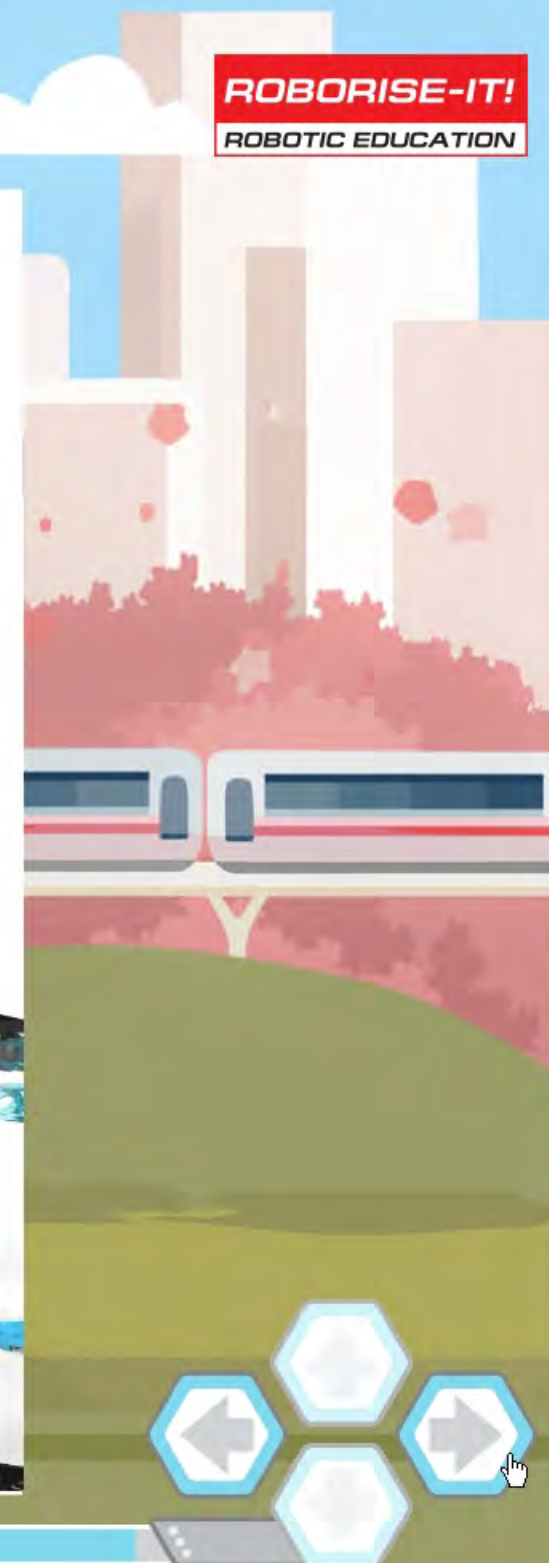




Discuss!

ROBORISE-IT!
ROBOTIC EDUCATION

- What advantages the monorail has?
- Why the electric public transport is better for using in a large cities?
- What types of public transport presented in our city?





Your achievements

ROBORISE-IT!
ROBOTIC EDUCATION

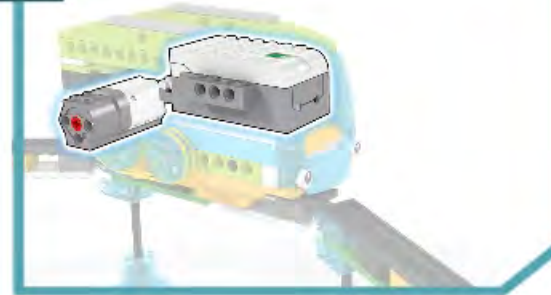
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Mission complete!

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