



# Triceratops



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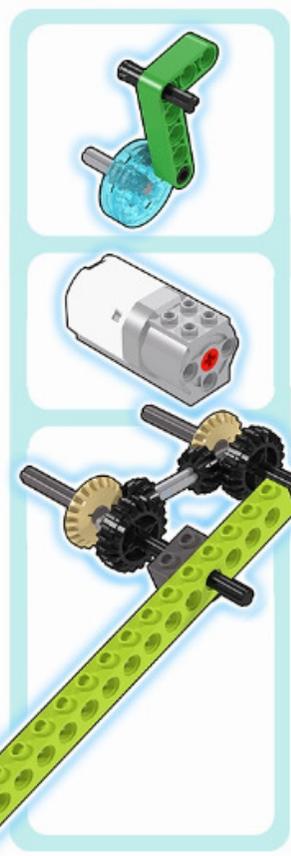
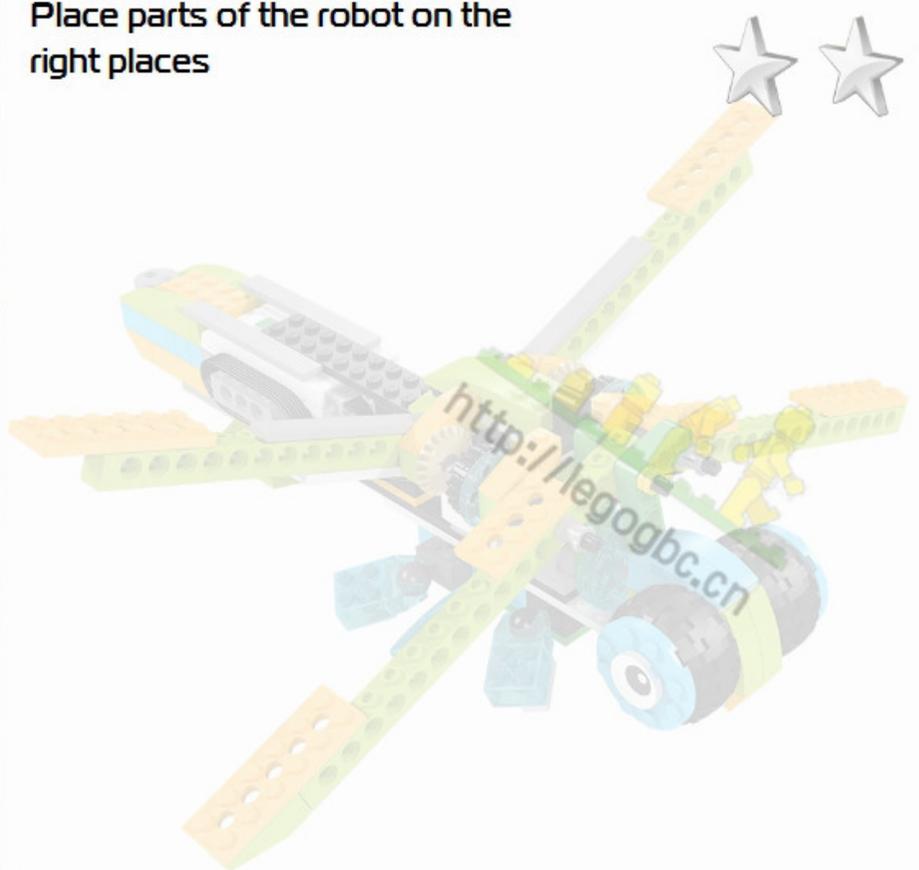
Triceratops



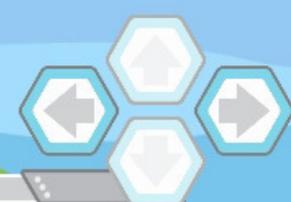


# Let's remind! Meganeura

Place parts of the robot on the right places



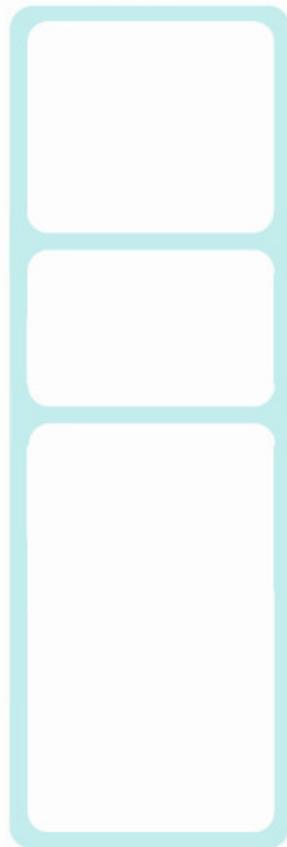
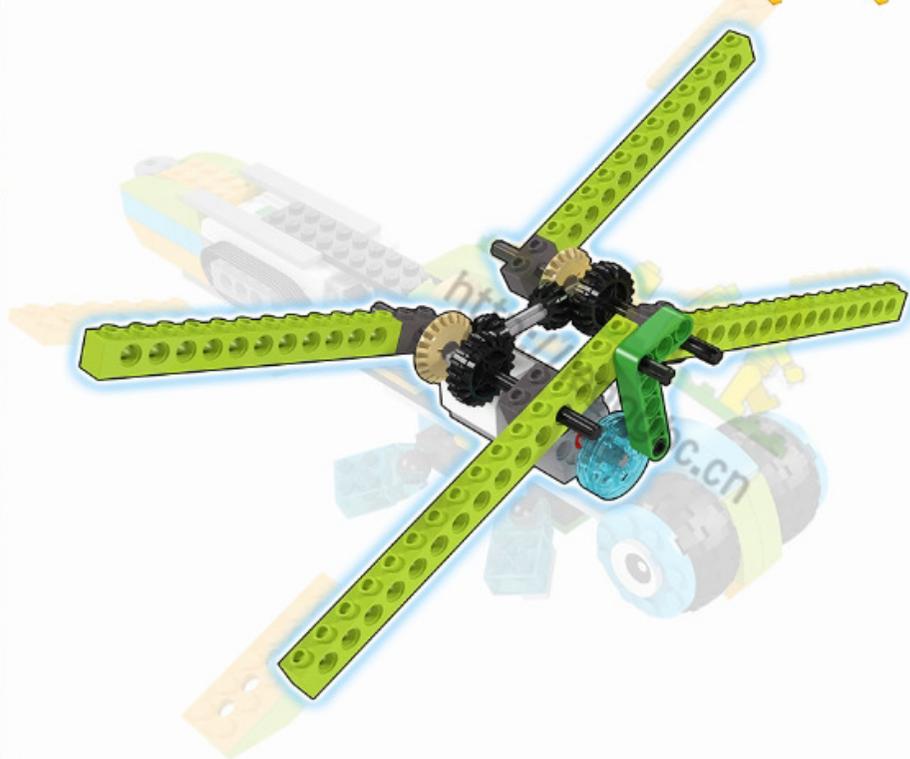
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# Let's remind! Meganeura

Place parts of the robot on the right places



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# Let`s remind! Meganeura



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Who was the most dangerous predators in the air at the time of the Paleozoic?



Birds



Insects



Flying reptiles





# Dino Park

Today we continue to create a modern Dino Park. We must develop a robot for the expositions of the Mesozoic era Cretaceous period.



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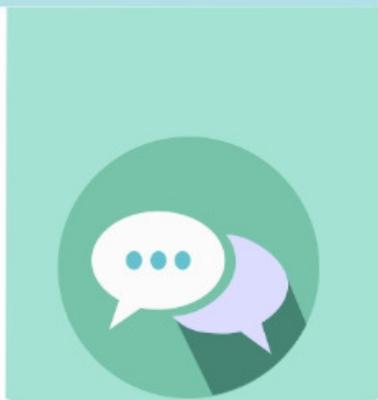




## Let`s remind



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Which five groups do dinosaurs divide into the structure of the skeleton?

<http://www.lesonjoc.com>



4



8





# The structure of the dinosaur skeleton

Scientists have come to the conclusion that most of the found skeletons of the dinosaurs by structure can be attributed to one of

Dinosaur from which group have you already built?



THEROPODS



SAUROPODS

DINOSAURS

STEGOSAURUS



ORNITHOPODS



CERATOPS



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# Ceratopsoideas

This is a group of dinosaurs that has a characteristic beak and horns. Triceratops got their name for three horns on the head. One on the nose and two above the eyes. Their huge skull covered the neck with a wide bone frill. It was with rather fragile bones, however, with it the dinosaur looked bigger and stronger.



Styracosaurus



Pentaceratops



Protoceratops



Triceratops



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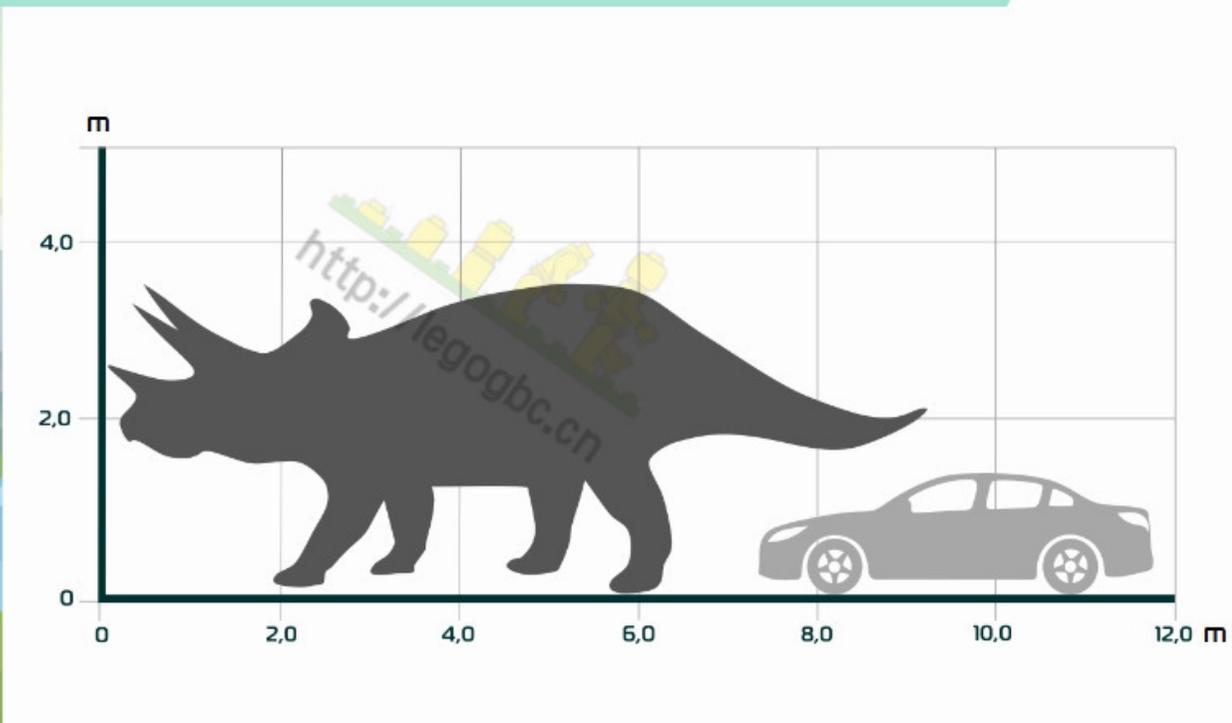


# Ceratopsidae

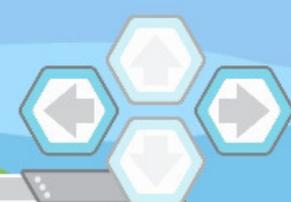


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These herbivorous giants were larger than the modern elephants, and the horns make them somewhat similar to the rhino.



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# Ceratopsidae

Ceratopsidae belong to the group of horned dinosaurs. They were herbivorous animals with sizes ranging from sheep sizes to large modern elephants.



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# Triceratops

Triceratops had a beak, like a beak of modern parrots. It helped them pluck and tear the plants. Then the food was chewed by hundreds of sharp teeth that worked like scissors.



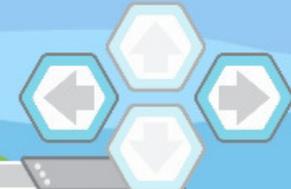
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# Triceratops

In the study of the Triceratops` skulls, the marks left by the teeth of the Tyrannosaurs were found. This makes it possible to assume that between these two species there was a fierce fighting.



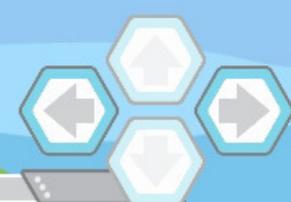
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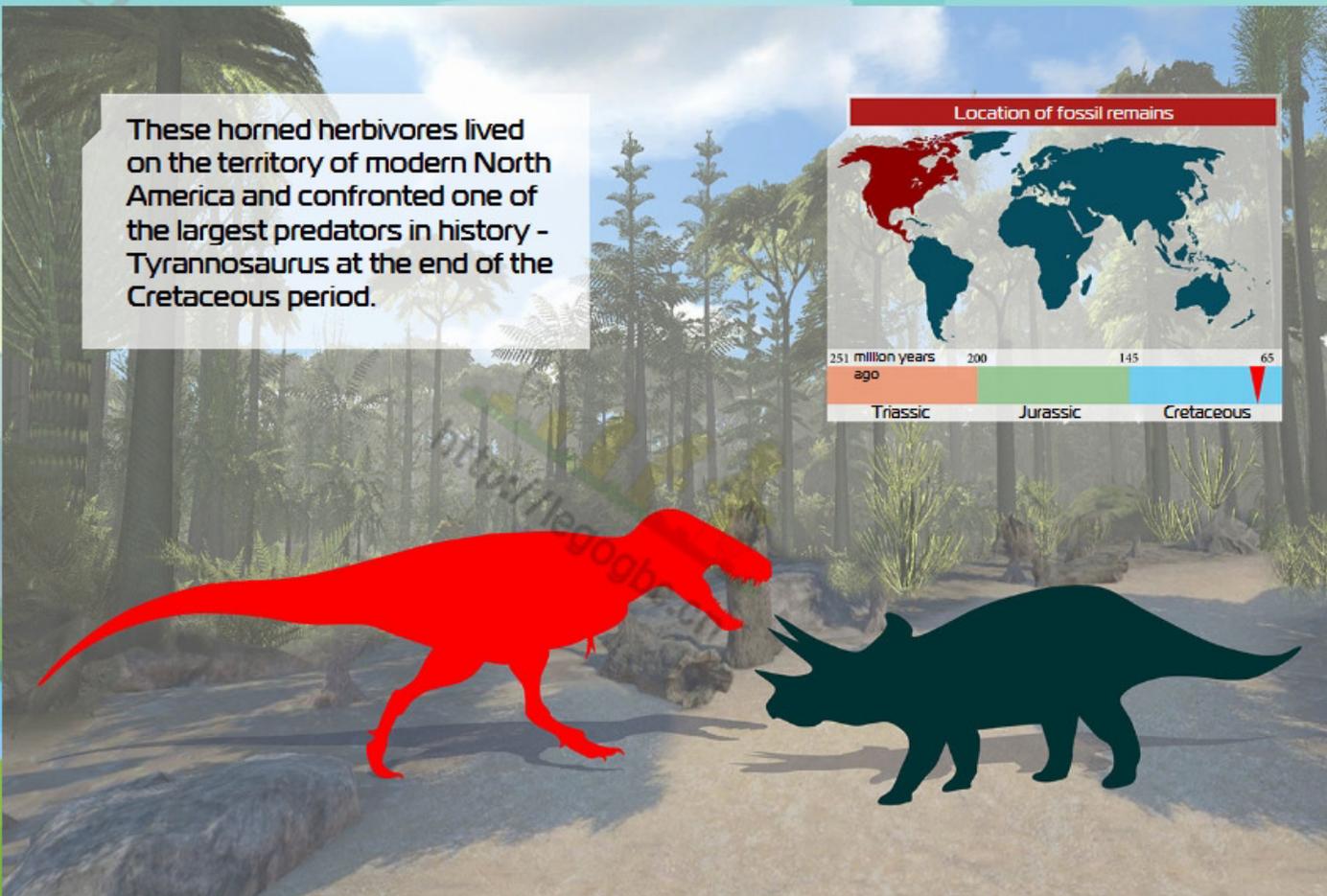
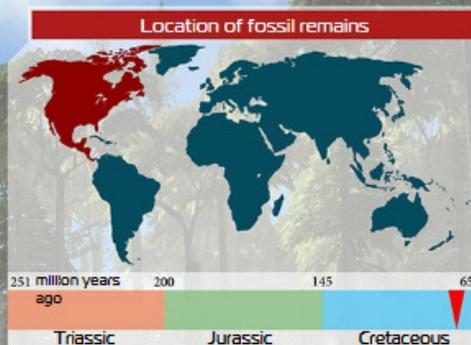


# Triceratops



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These horned herbivores lived on the territory of modern North America and confronted one of the largest predators in history - Tyrannosaurus at the end of the Cretaceous period.





# Chasmosaurus and Daspletosaurus



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# Dino Park



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Triceratops had one horn on their noses and two more over their eyes. Due to the horns, as well as the high bone frill, they can not be confused with other dinosaurs!

What kind of modern animals resemble Triceratops?



<http://lego.com>





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# TASK



Task

- create the robot for the expositions of Cretaceous period

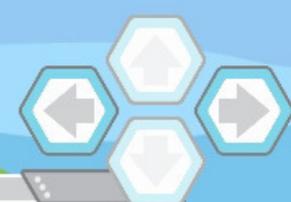


Requirements

- should be Triceratops, have horns on its head and a characteristic "frill"
- must present horned dinosaurs



Triceratop`s appearance





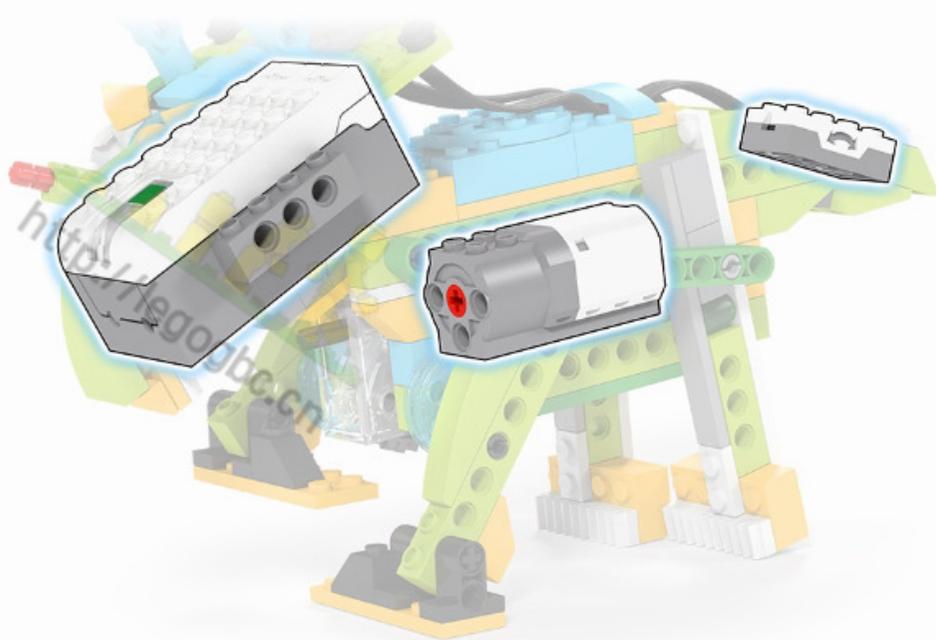
## Design features

Triceratops had very large bone growths on the head. In order for the robot to be as close as possible to them, smarthub is placed in the robot head. The tilt sensor is fixed on the moving tail.



Find:

- smarthub
- motor
- tilt sensor



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# Design features

Robot's head and tail have movable mounts. Placed on the robot's tail tilt sensor allows to control the robot movement.



roboticsais.com



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# Tilt sensor

Tilt sensors are often used in a variety of remote controls. They need to set up the mechanism or direct manual control of the robot.



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# Design features



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Triceratops have front drive legs. The design uses a worm gear that transmits the rotation from the motor to the cranks.



Find:

- motor
- worm gear
- cranks



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# Design features

The drive from the motor is transmitted to the robot's front legs and they make the step.



robotiseis.com



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# Design features



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The robot has a wide feet front and rear legs. Due to this, it is quite stable.



Find:

- front leg
- rear leg



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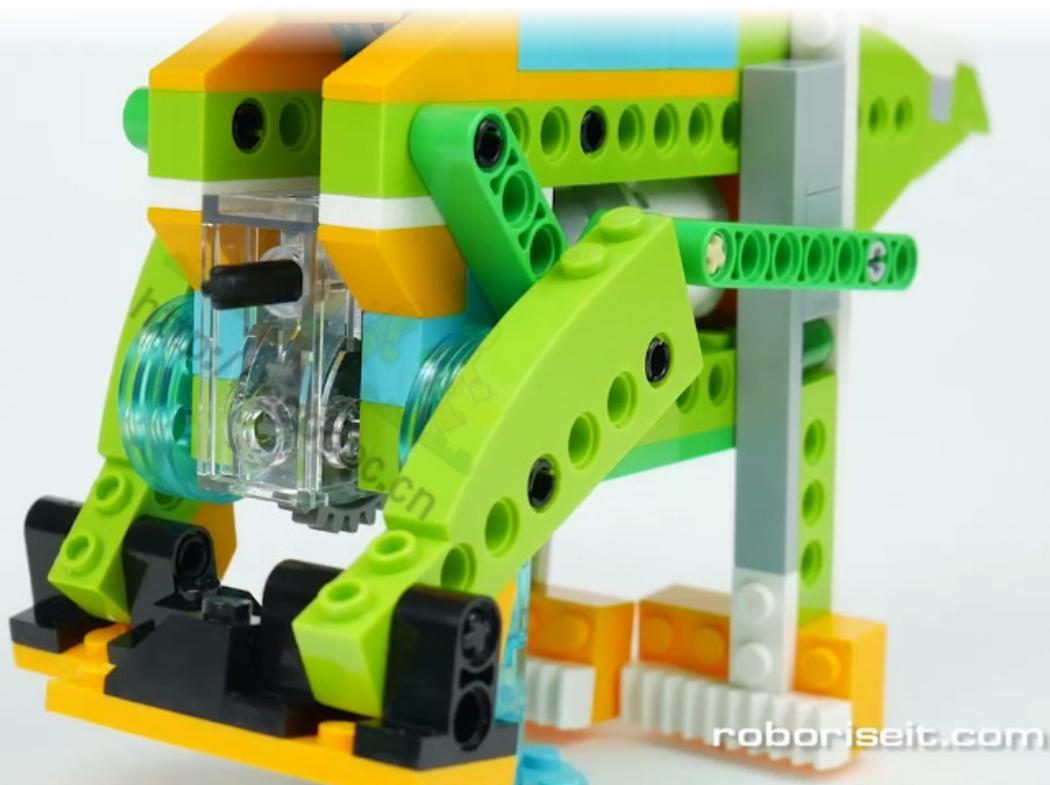
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# Design features

Pay attention! The drive uses a worm gear. Therefore, keep the robot carefully to prevent injuries!



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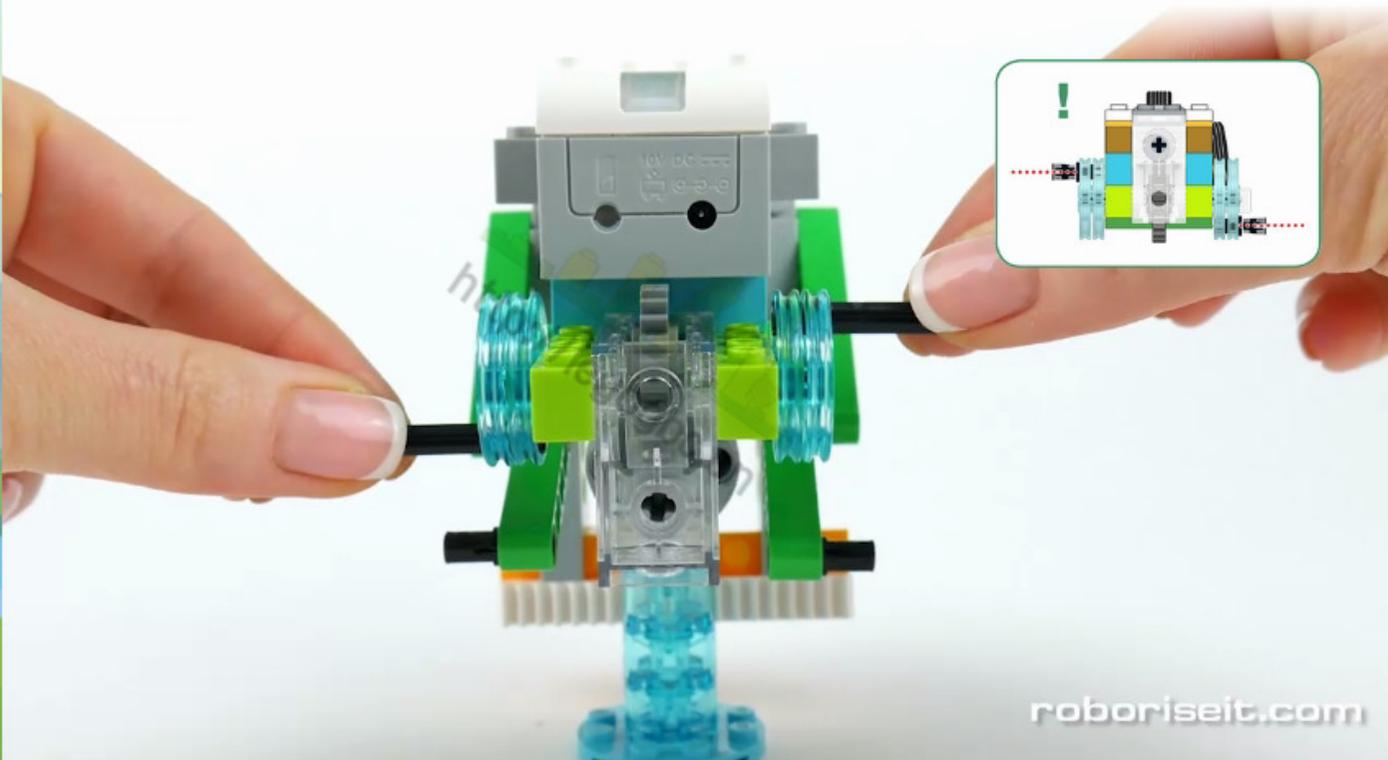


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# Pay attention!

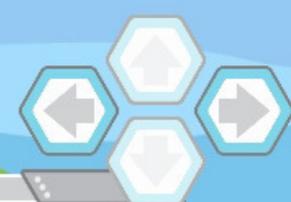
When building the robot correctly fix the crank mechanism. If on the left it is at the top point, on the right it should be in the bottom, and vice versa:



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# Build the robot!



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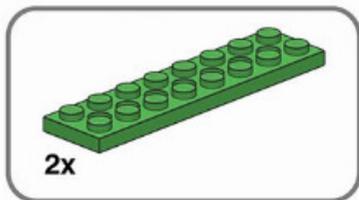


## Triceratops

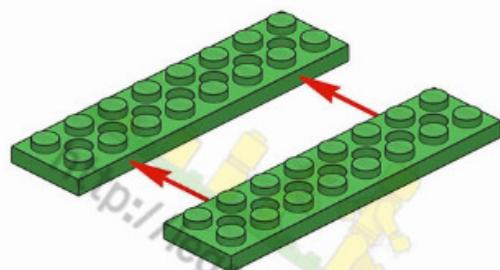




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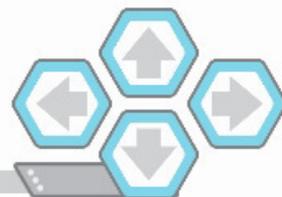
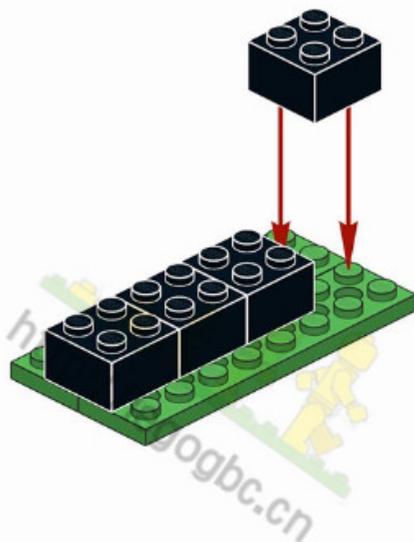




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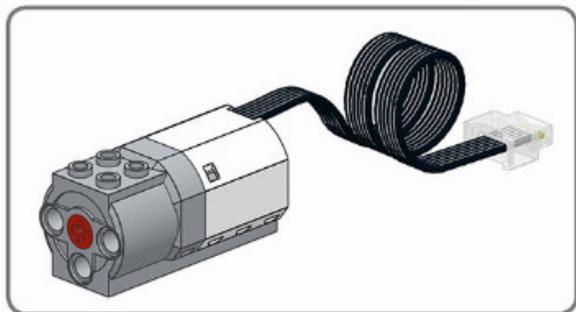


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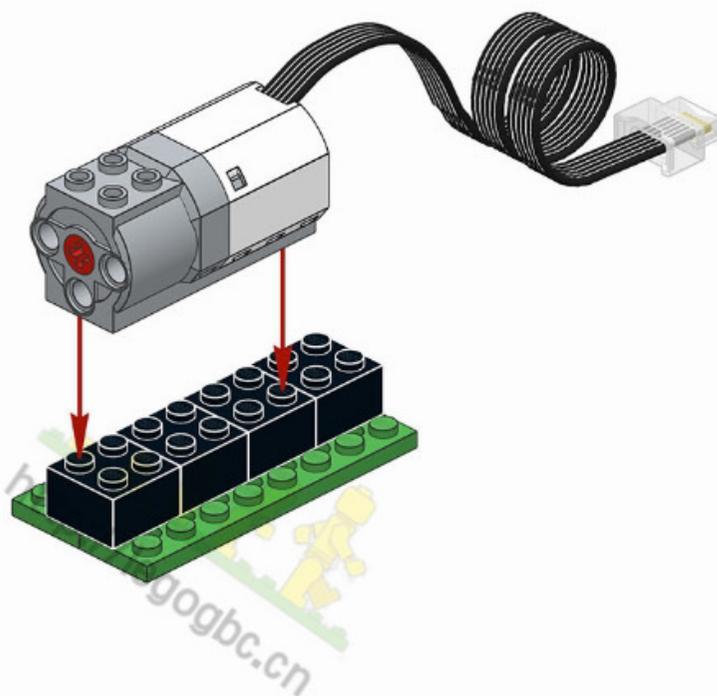




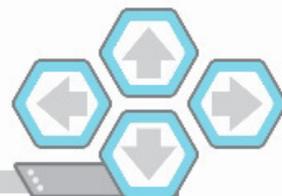
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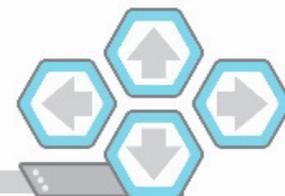
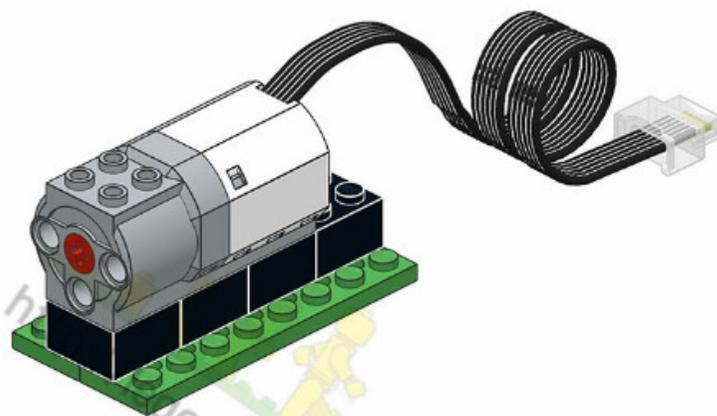
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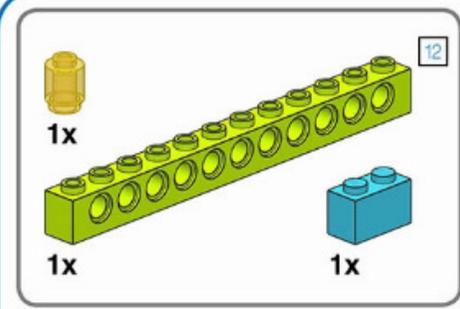


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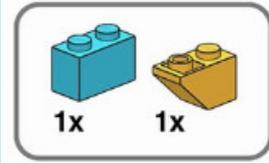
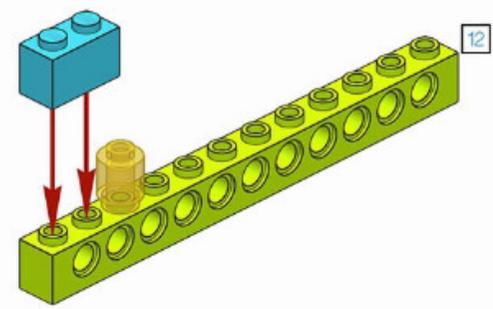




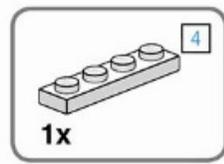
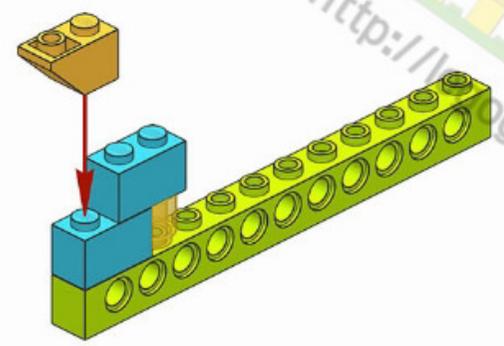
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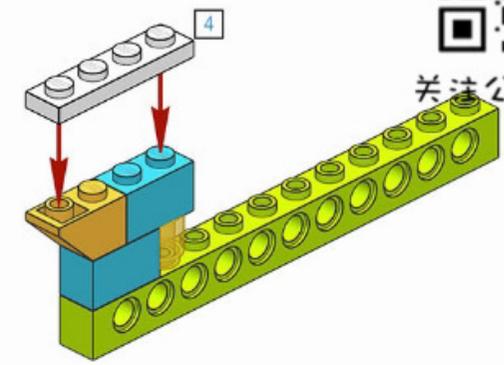
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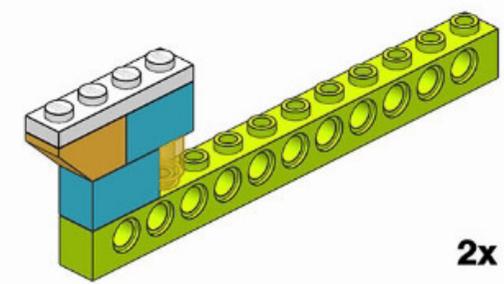
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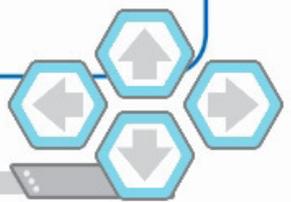


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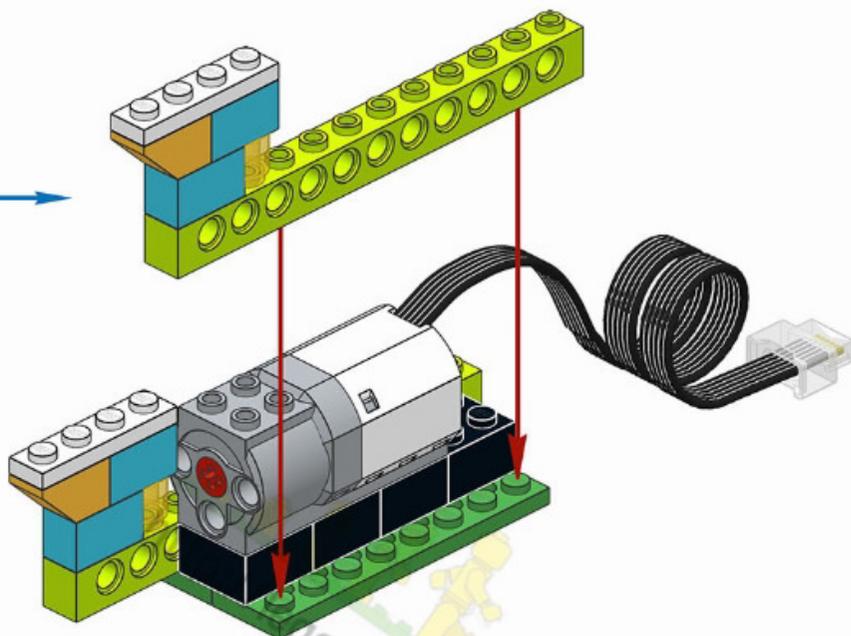
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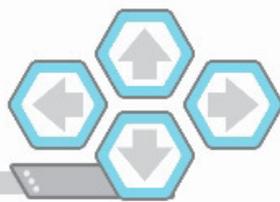


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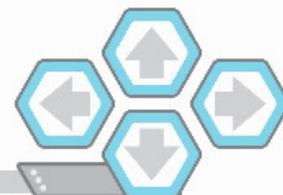
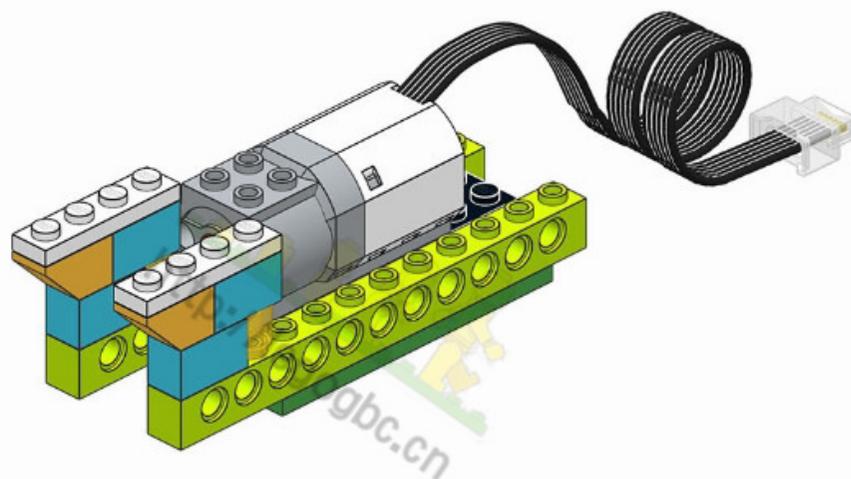
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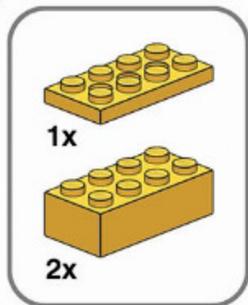


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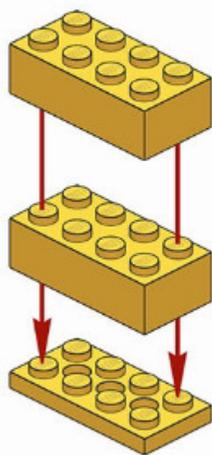




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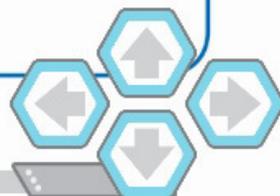
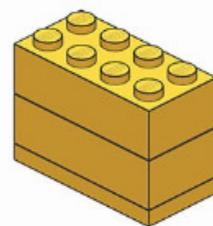


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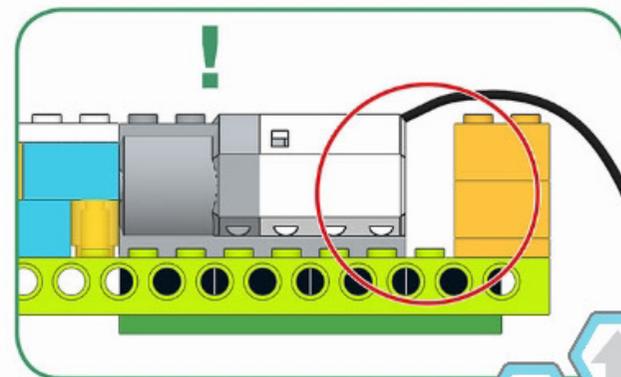
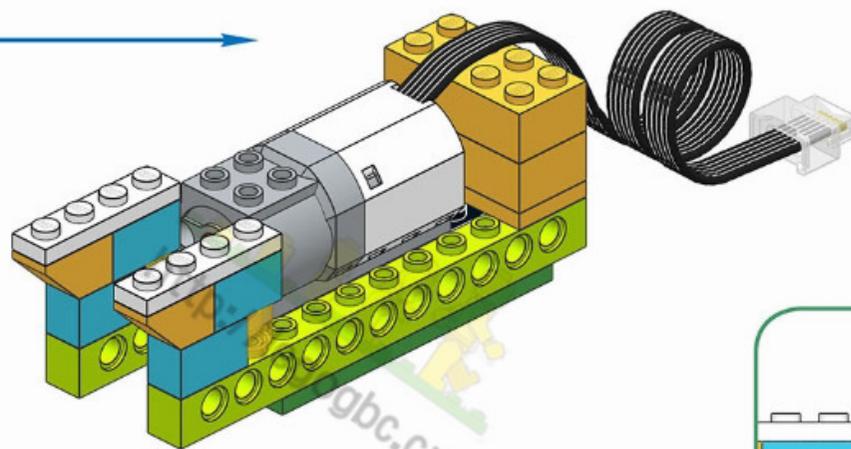
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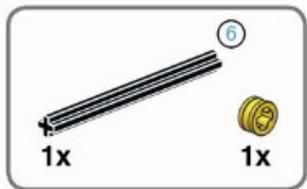


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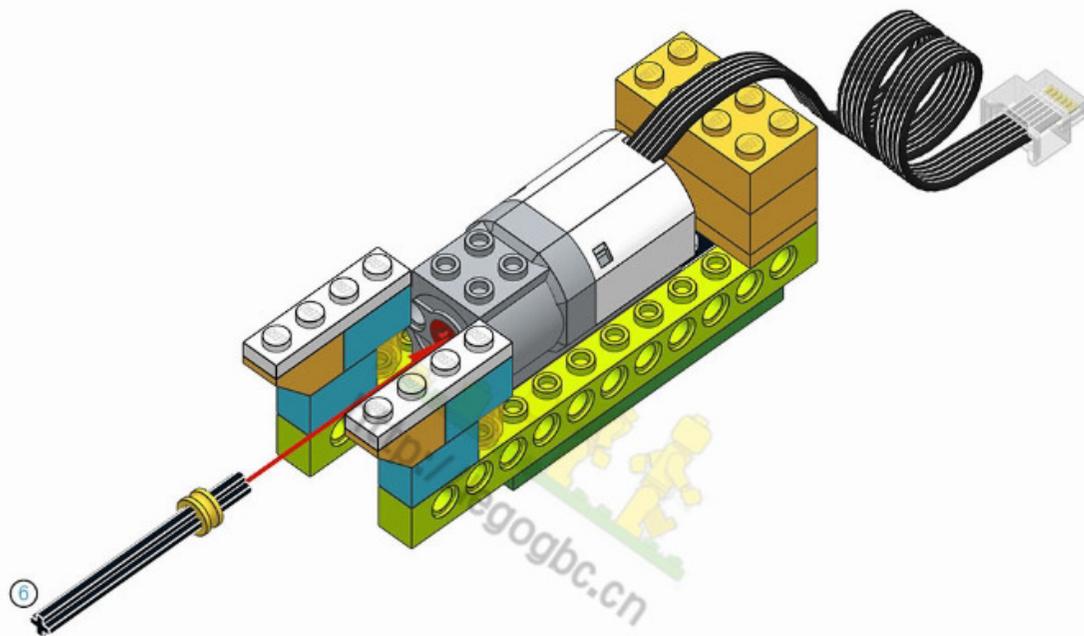




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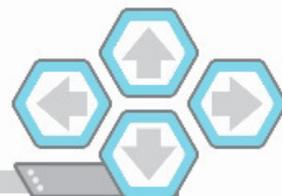
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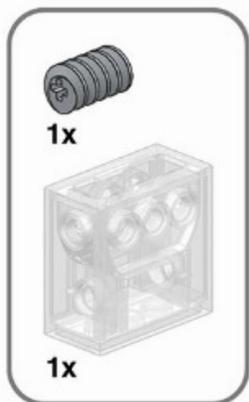
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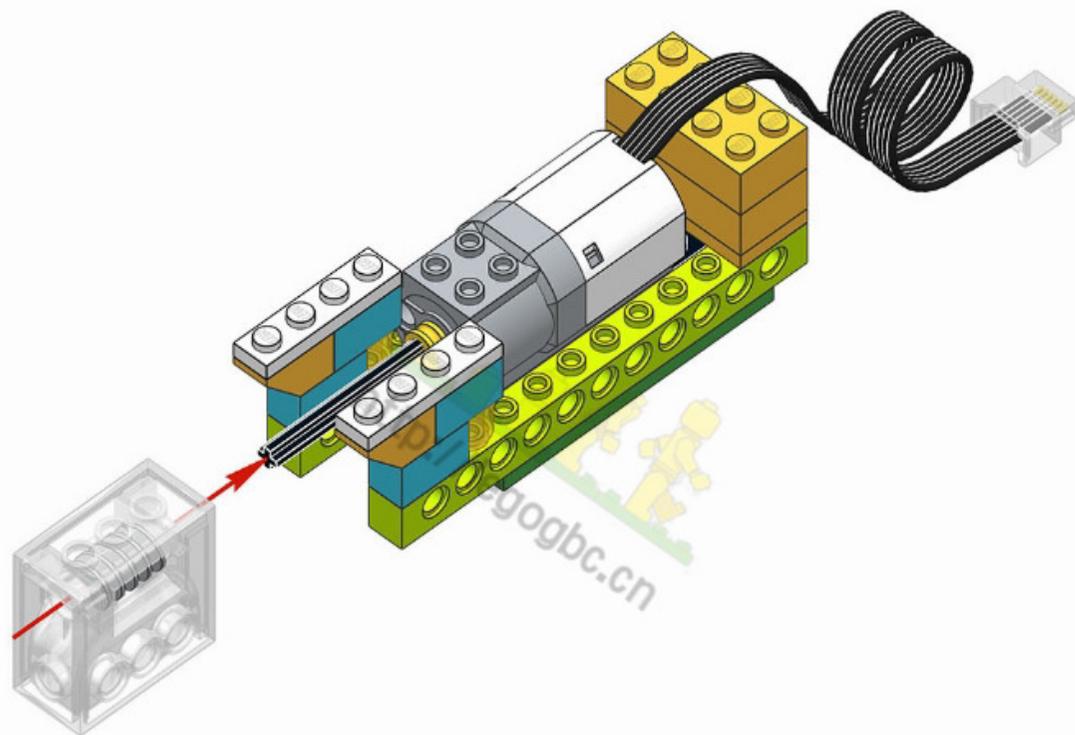




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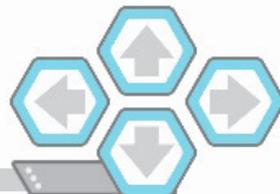
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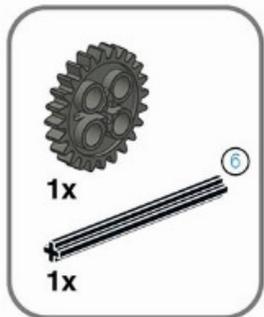
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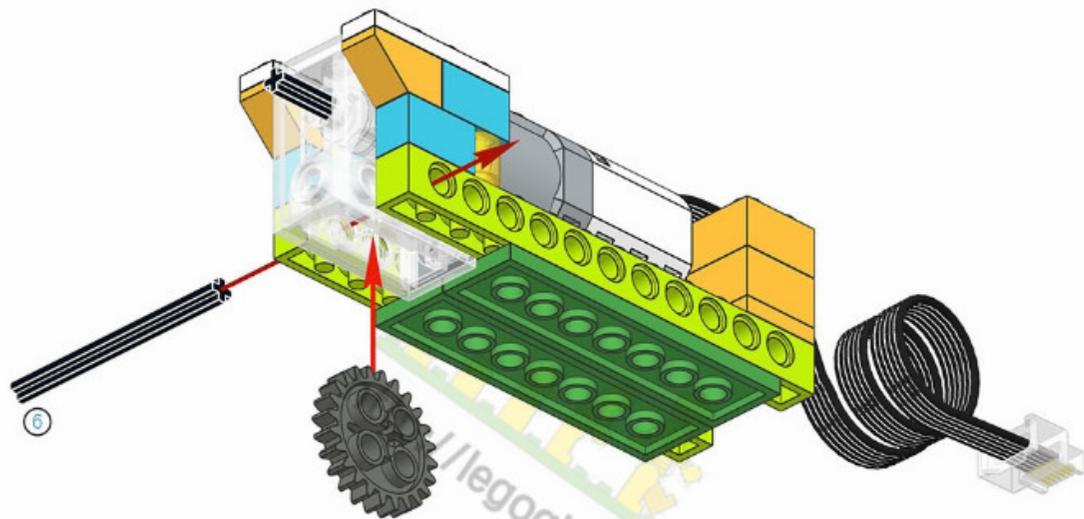




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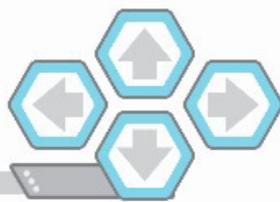
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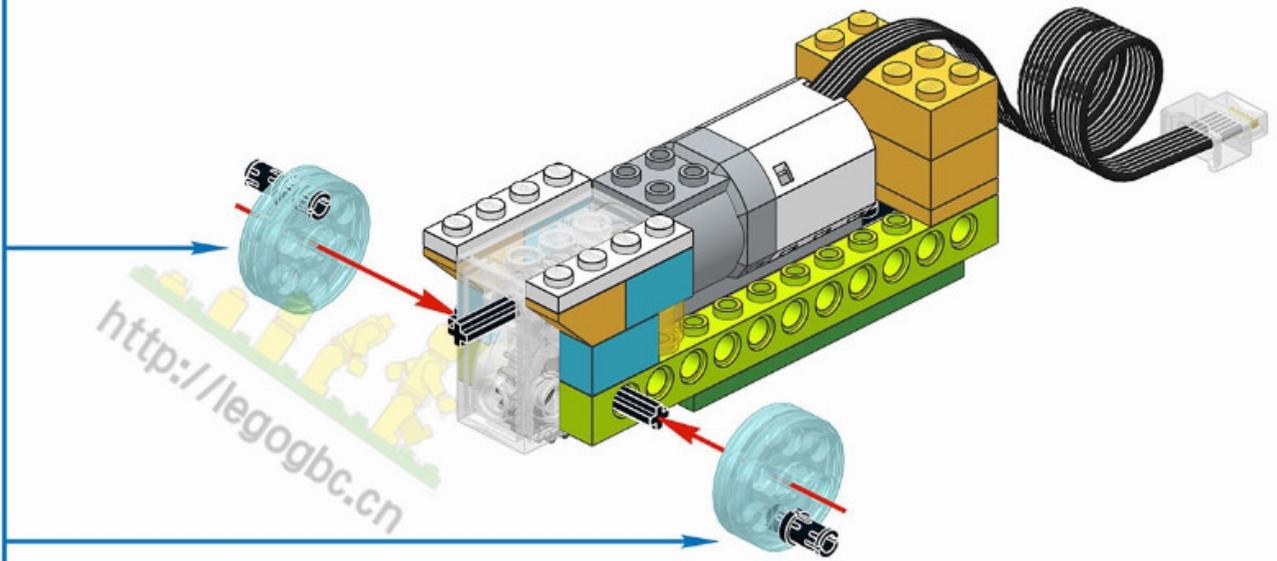
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**1**

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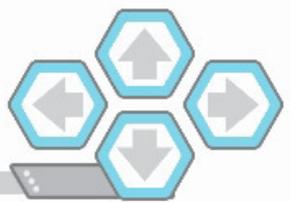
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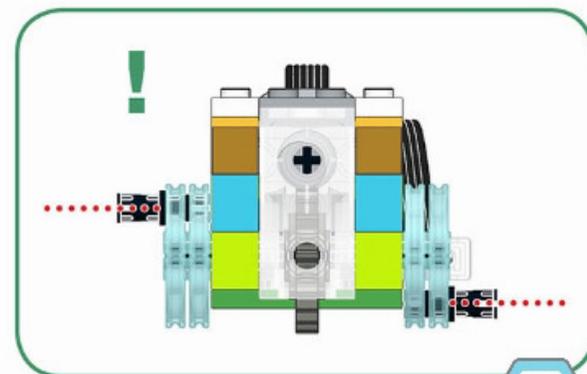
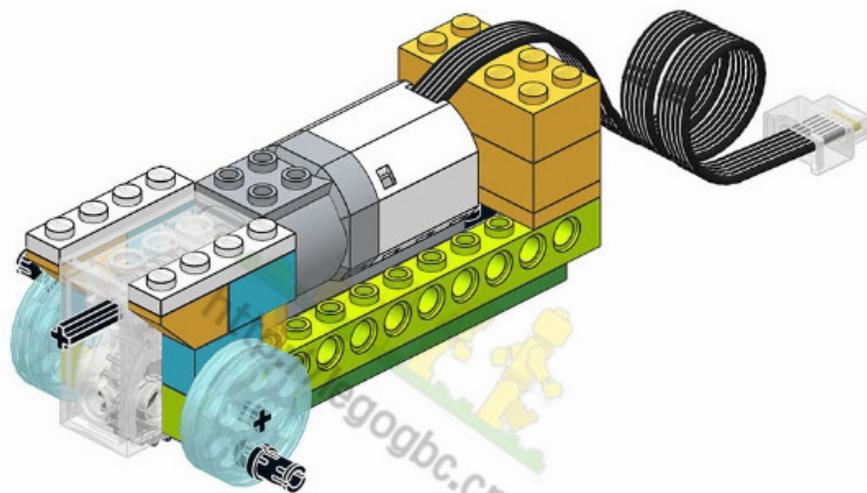
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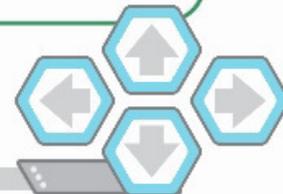
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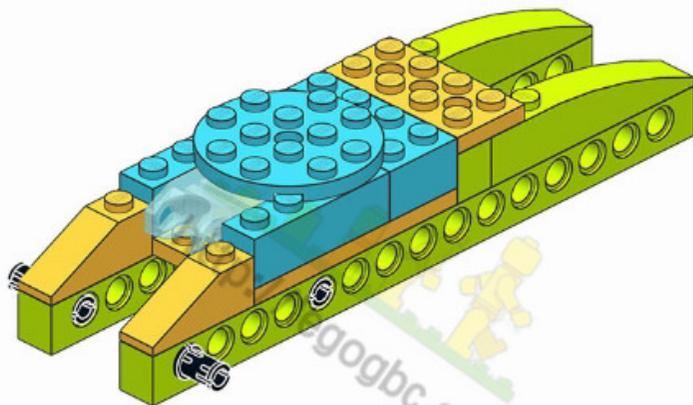
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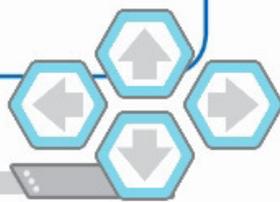
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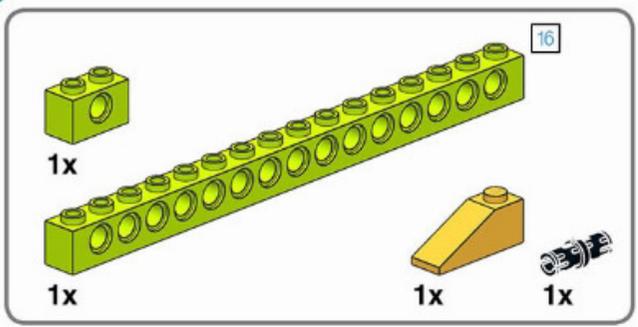
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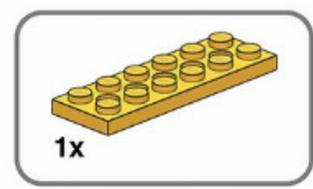
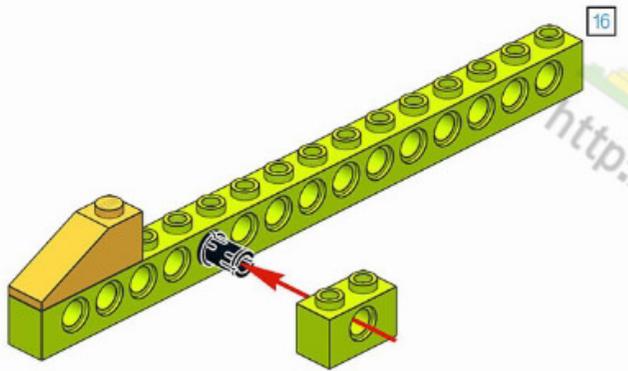




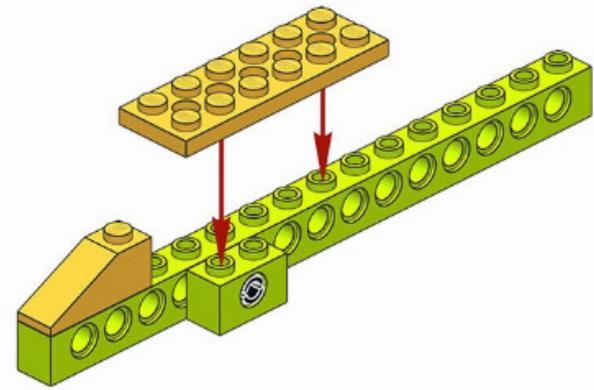
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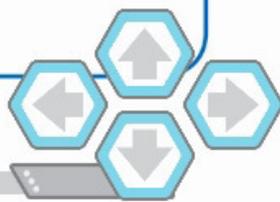
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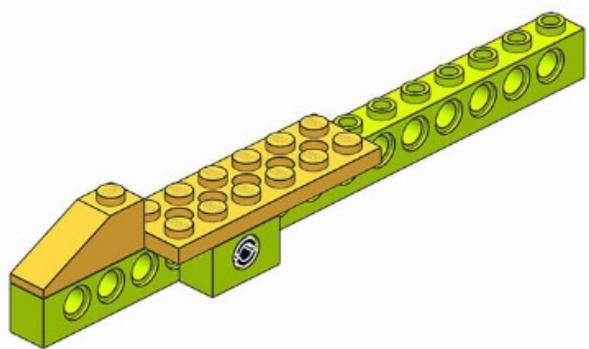


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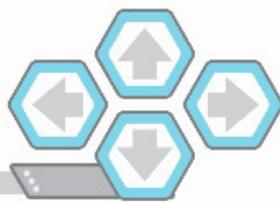


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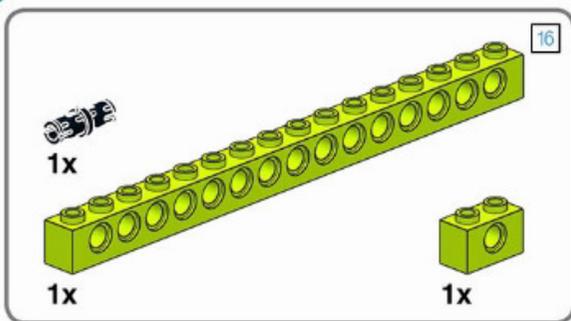
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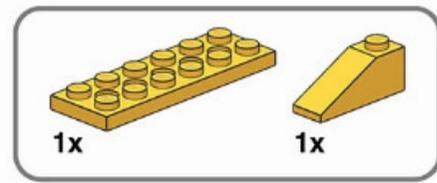
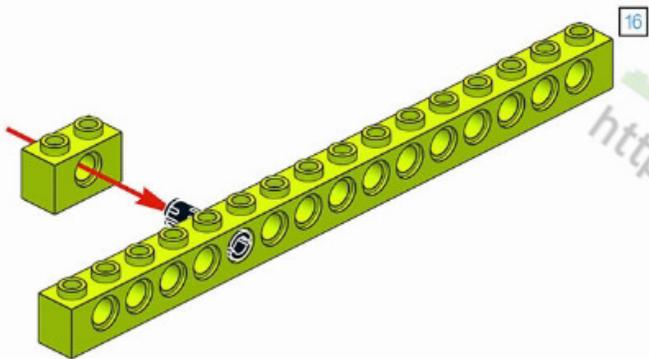




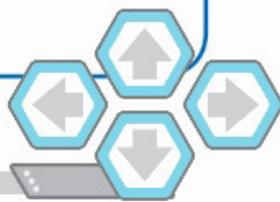
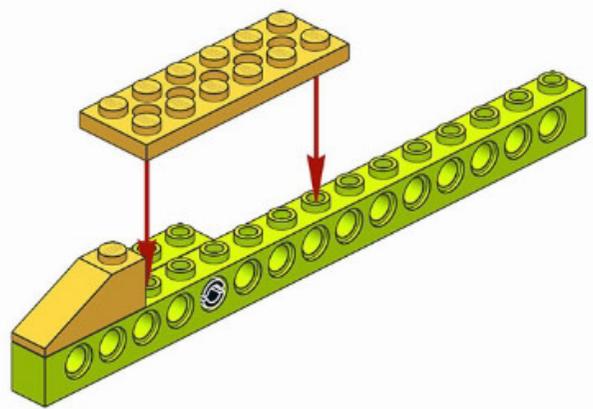
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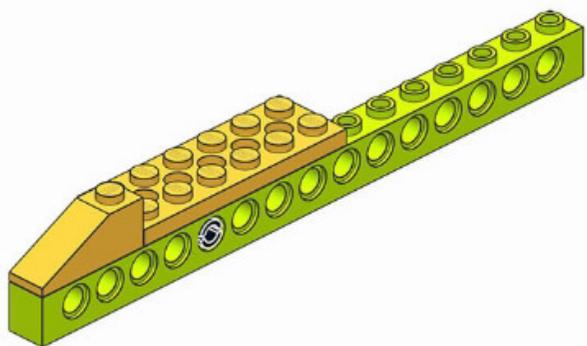


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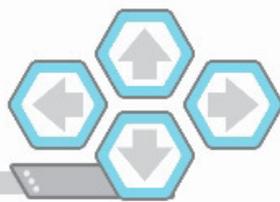


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4

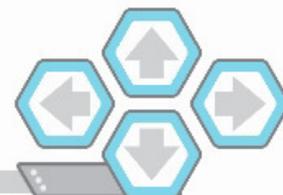
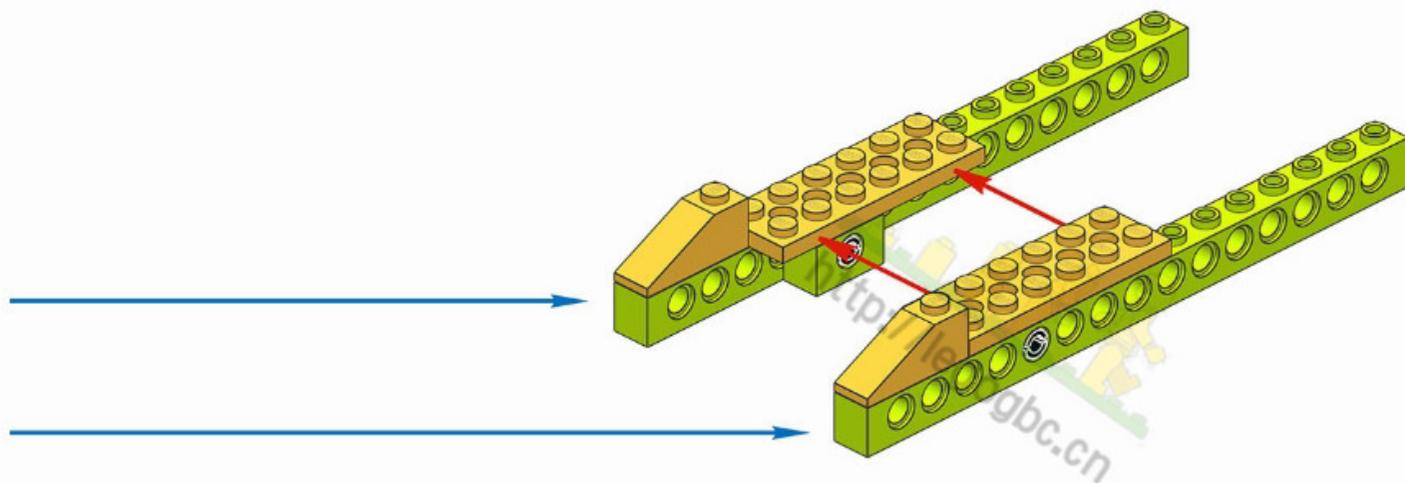
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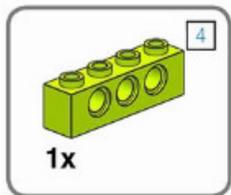


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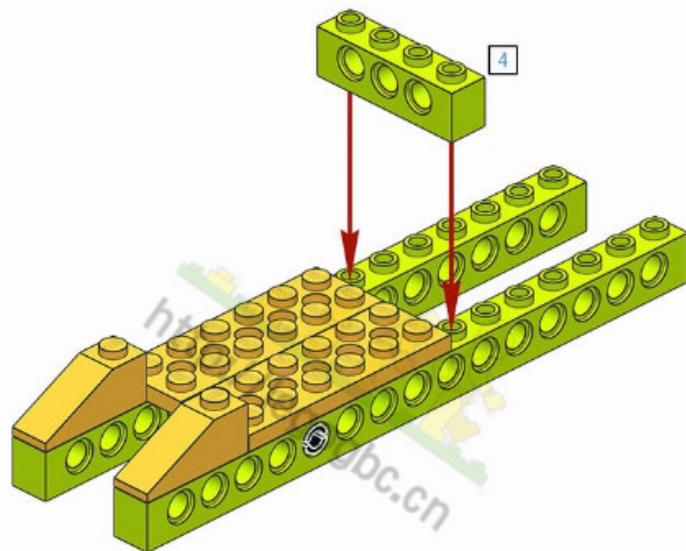




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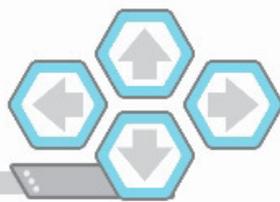
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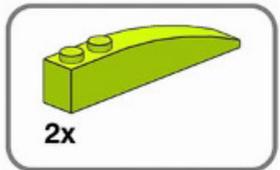
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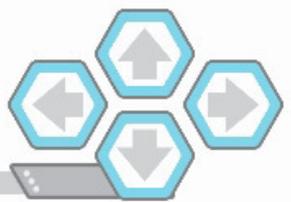
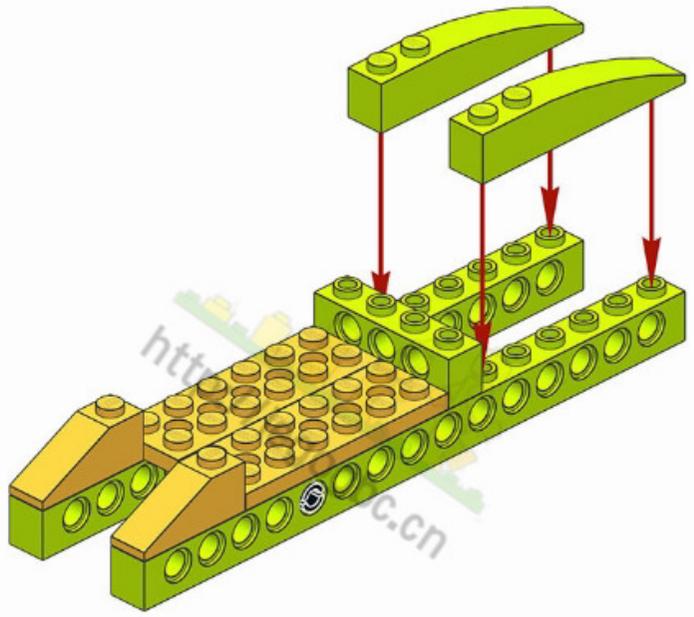


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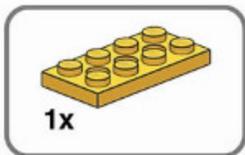
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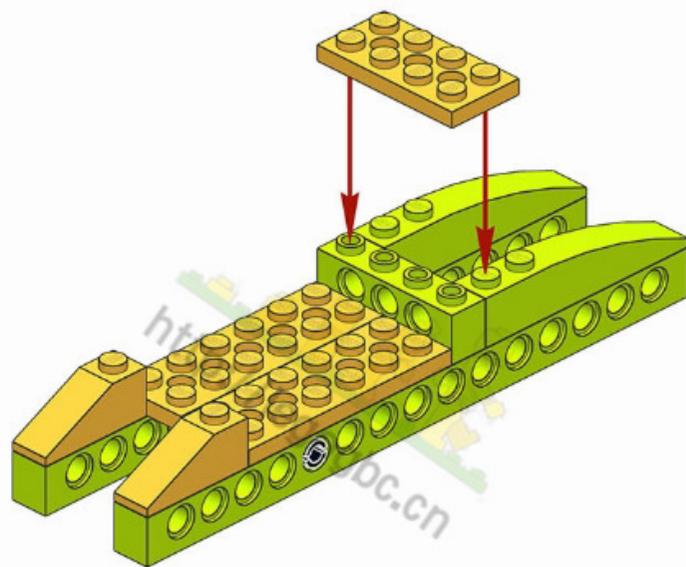




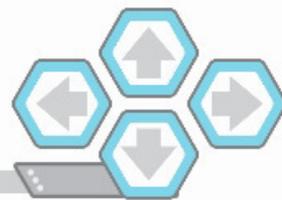
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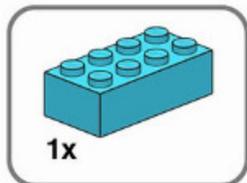


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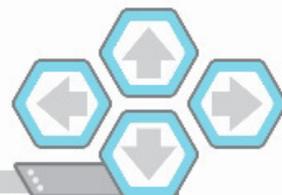
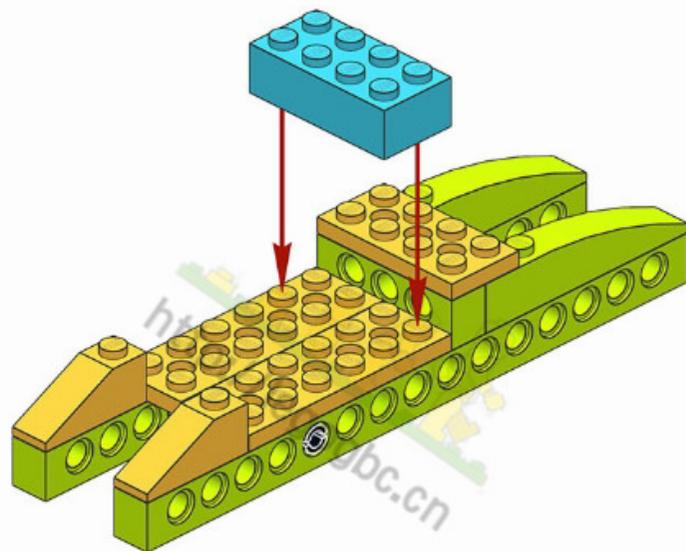




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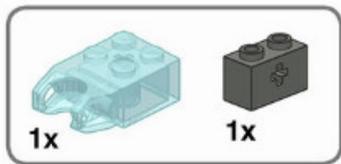


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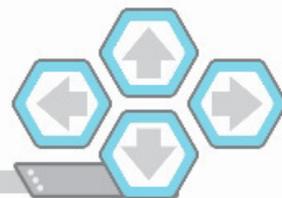
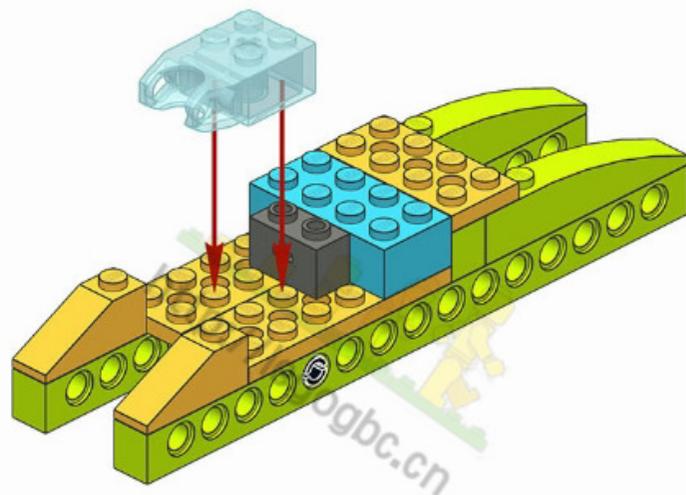




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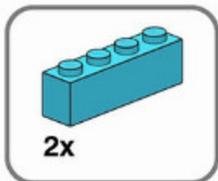


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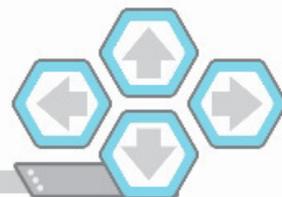
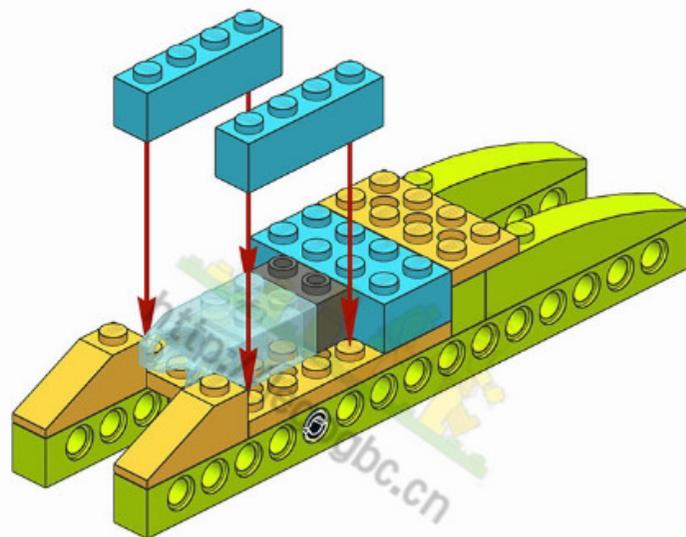




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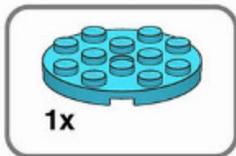


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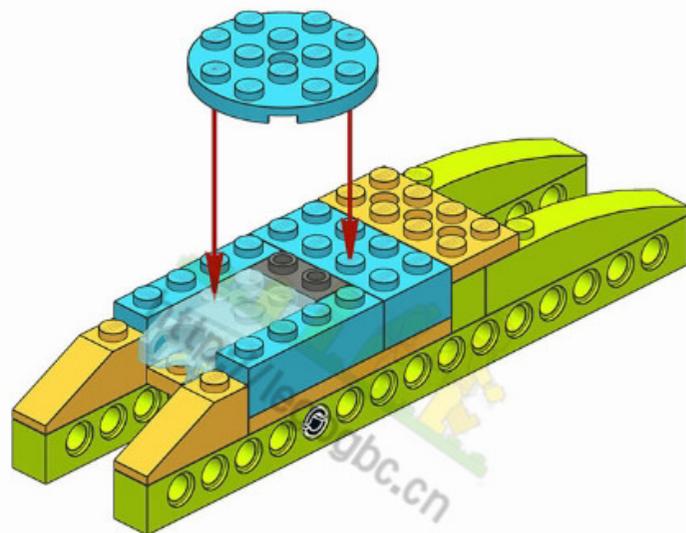




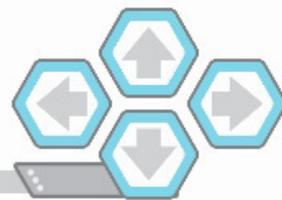
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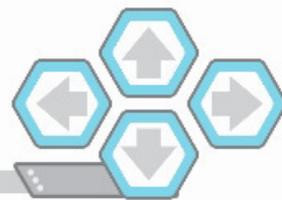
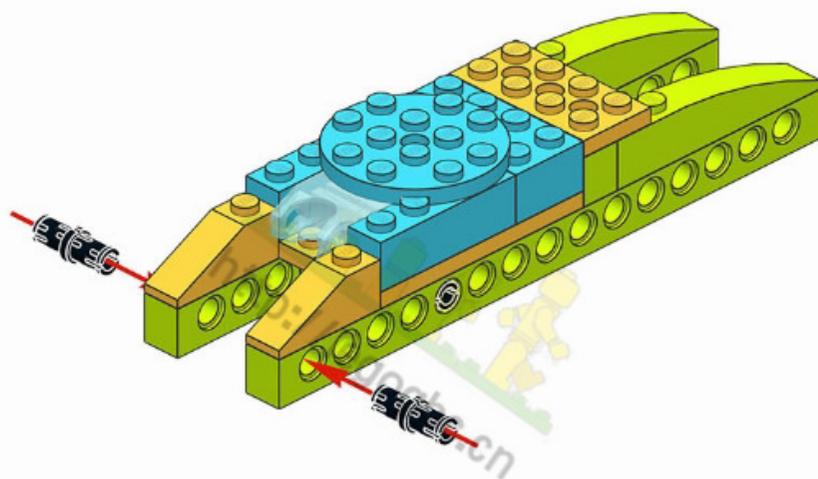




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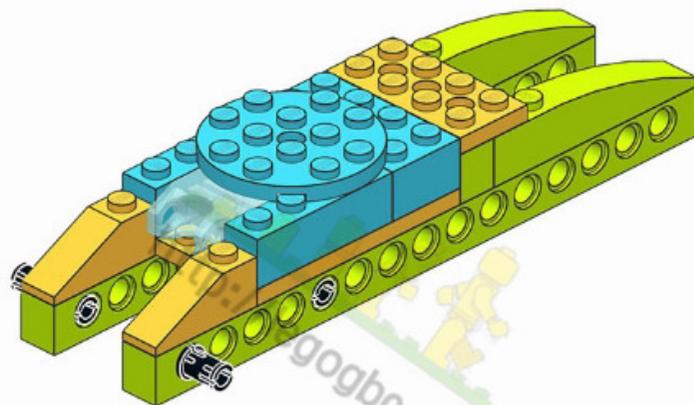
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# 29



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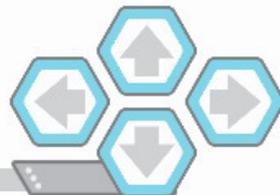


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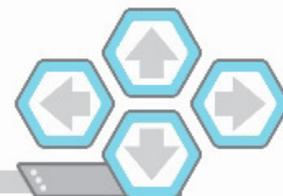
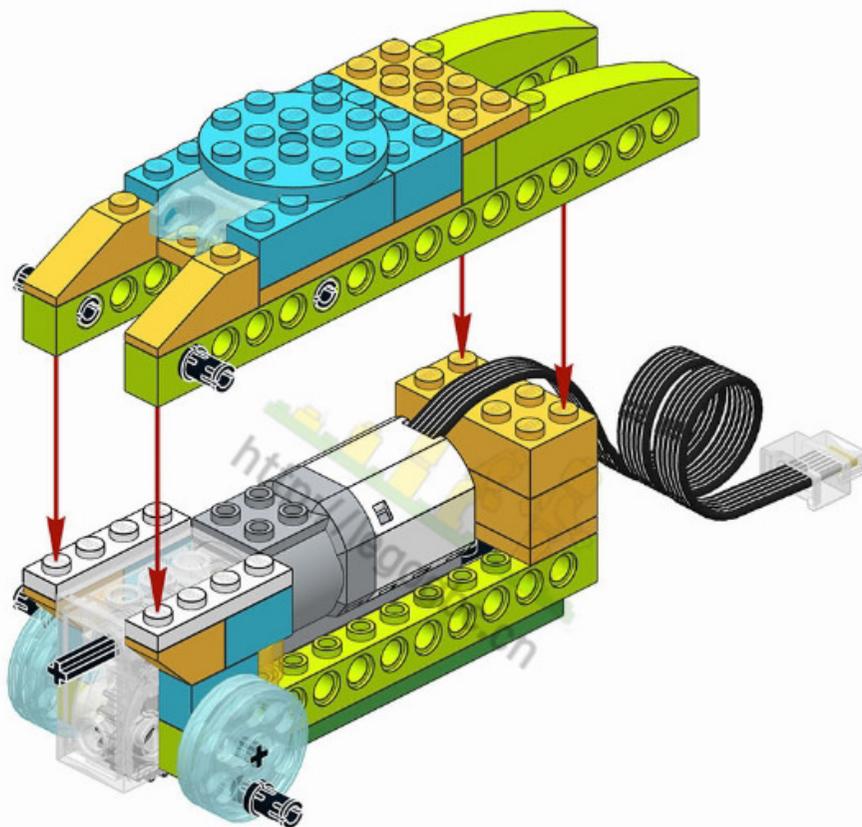
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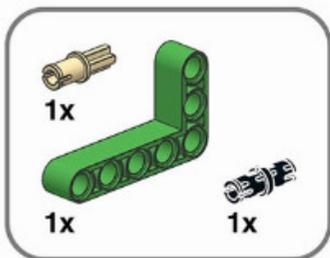


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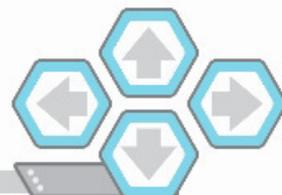
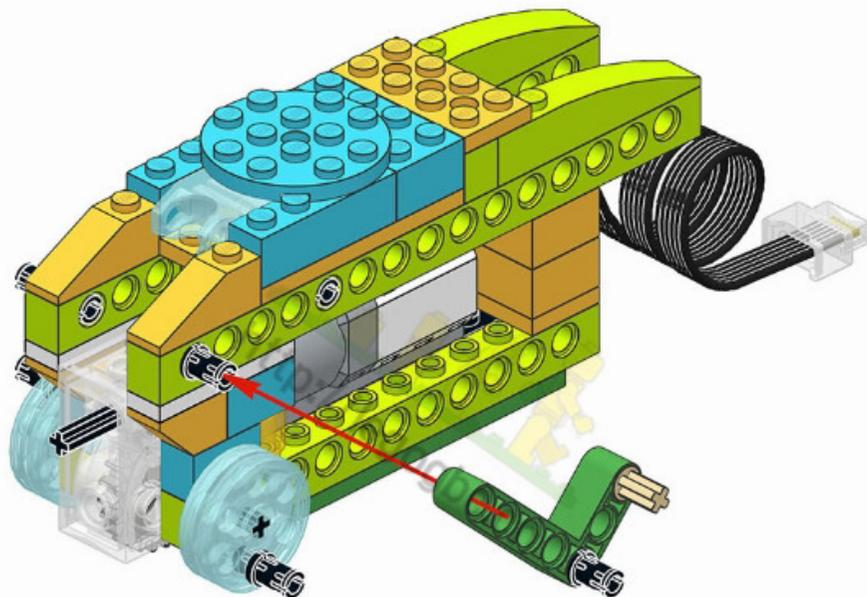




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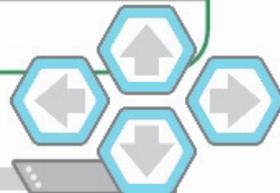
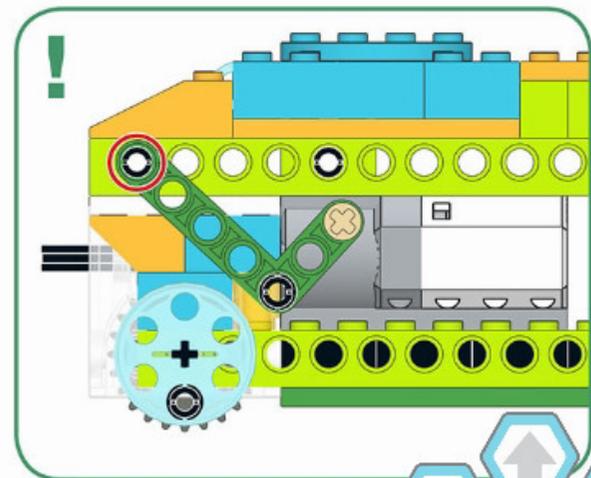
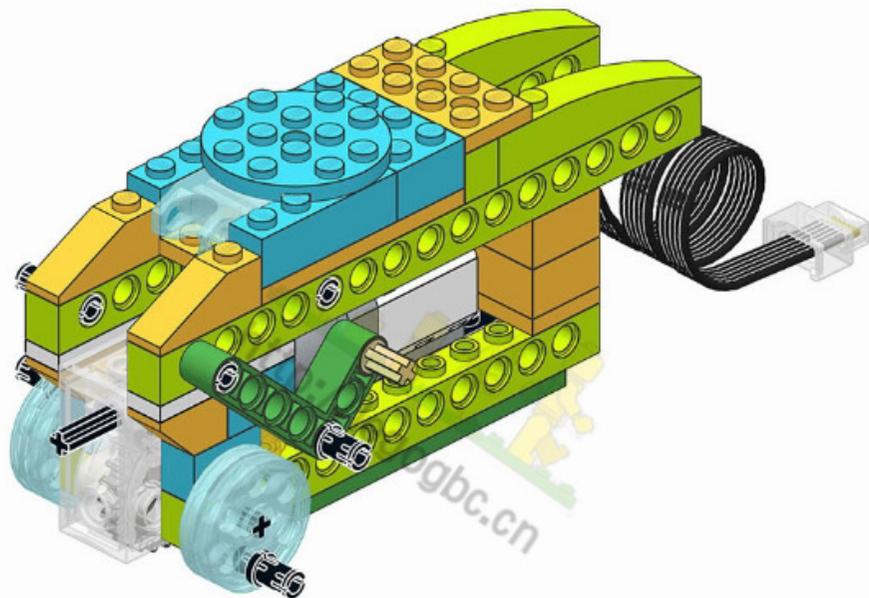
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# 32



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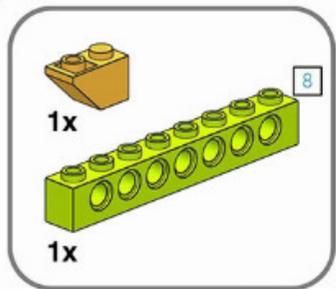
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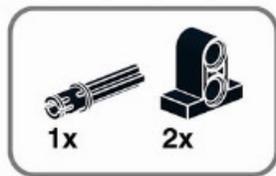
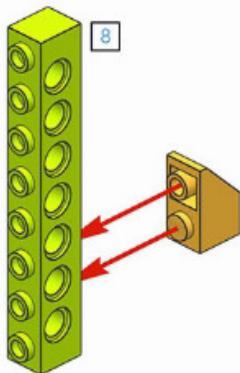
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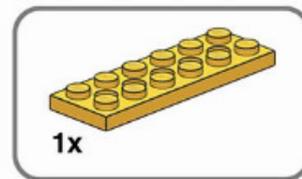
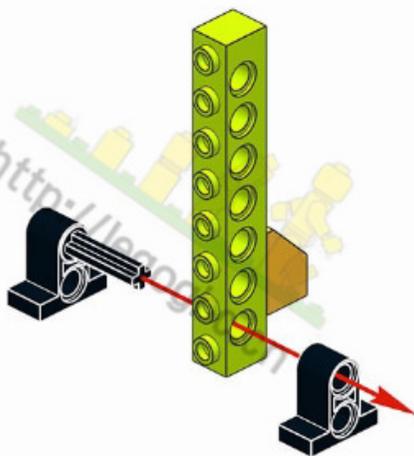
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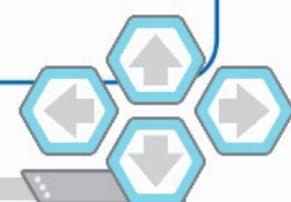
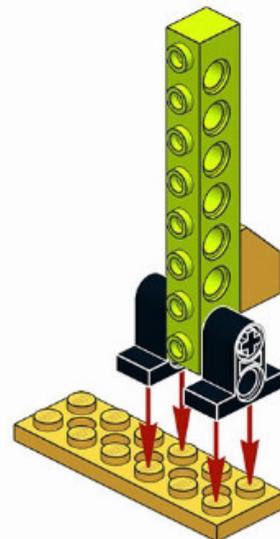
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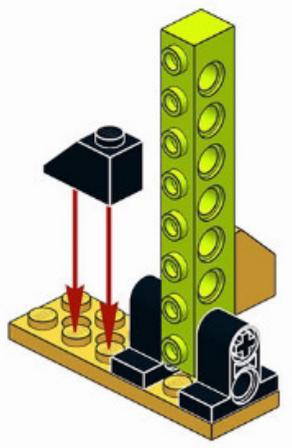




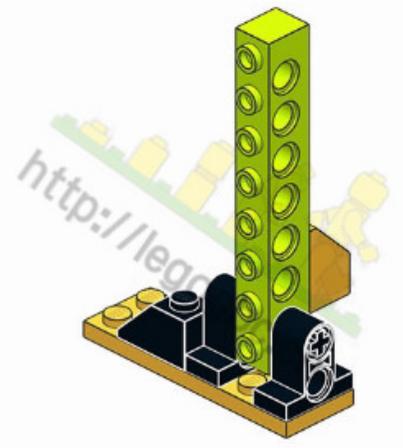
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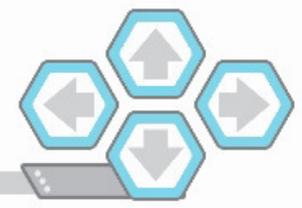
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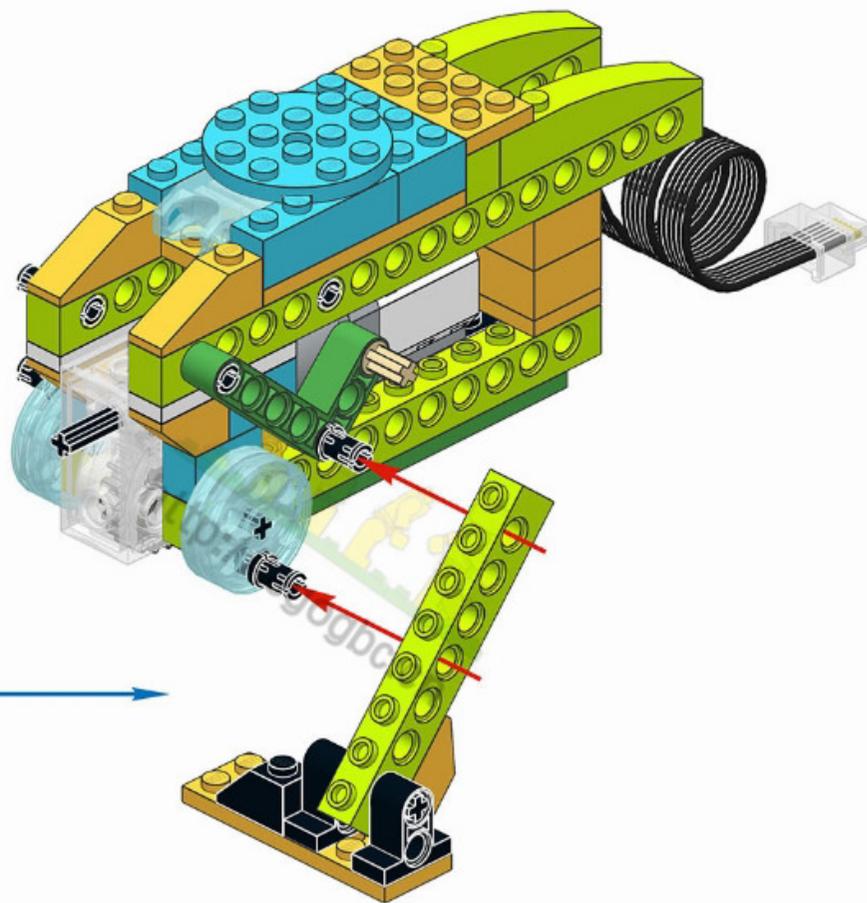
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# 35



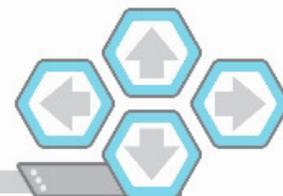
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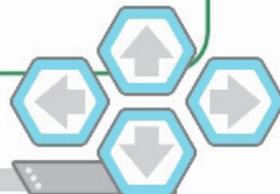
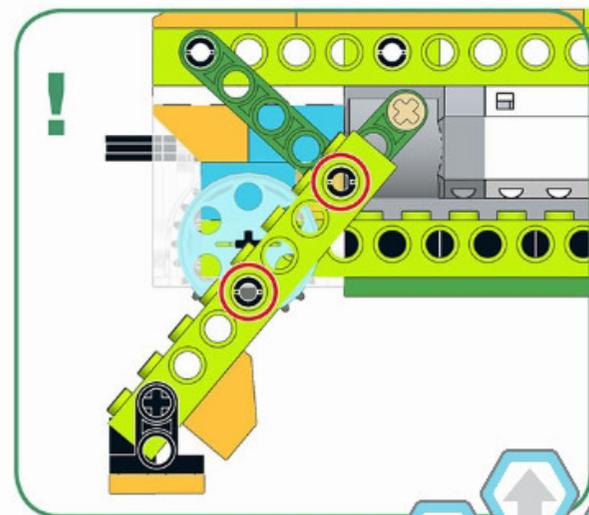
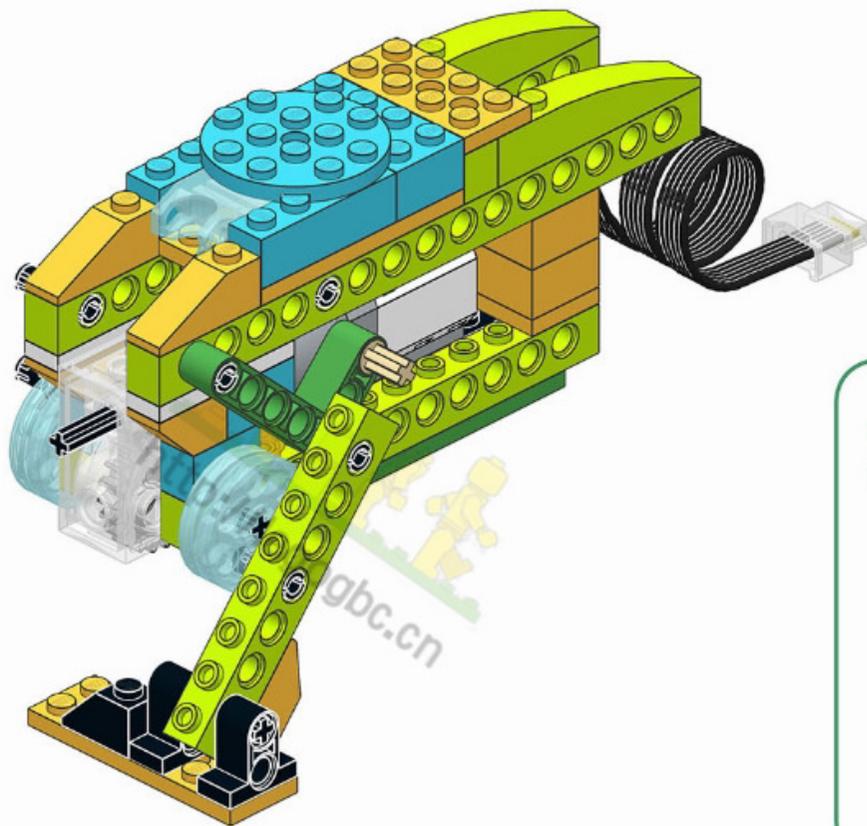
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# 36



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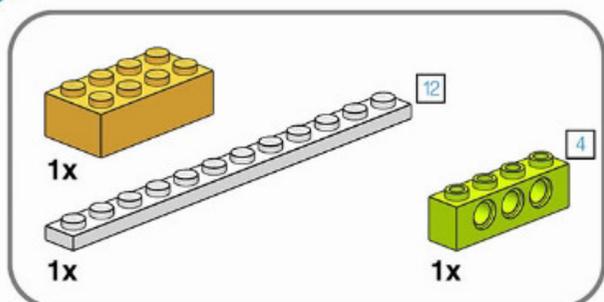
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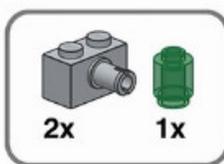
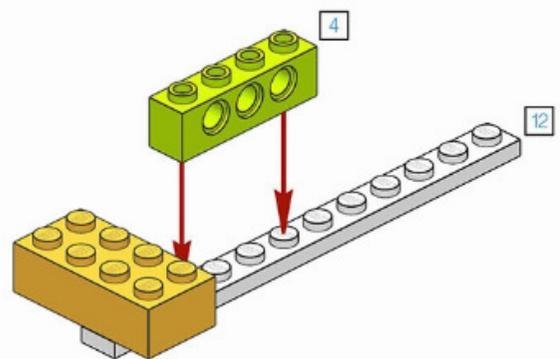
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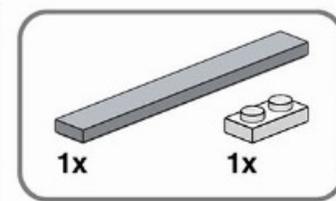
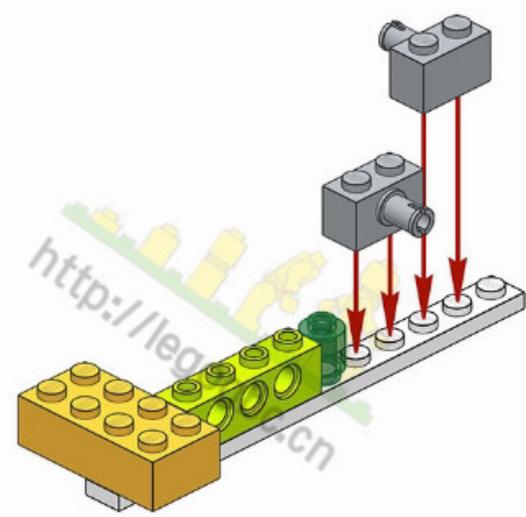
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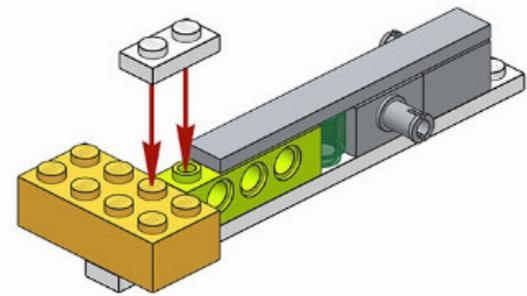
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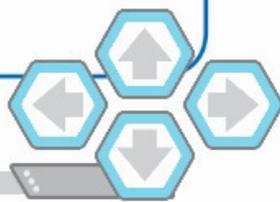
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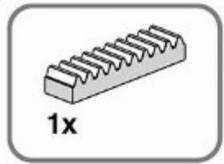
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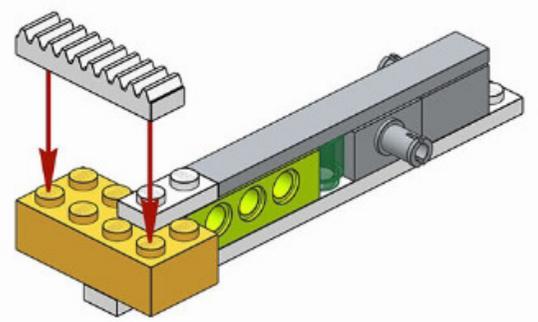




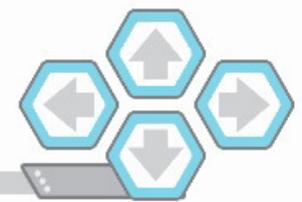
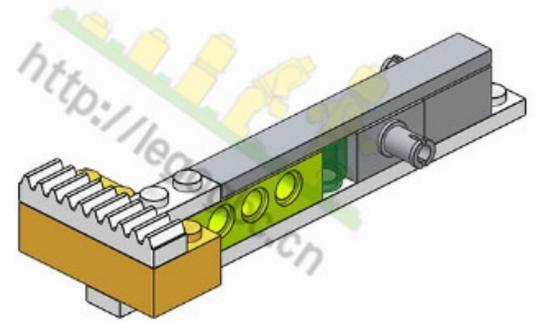
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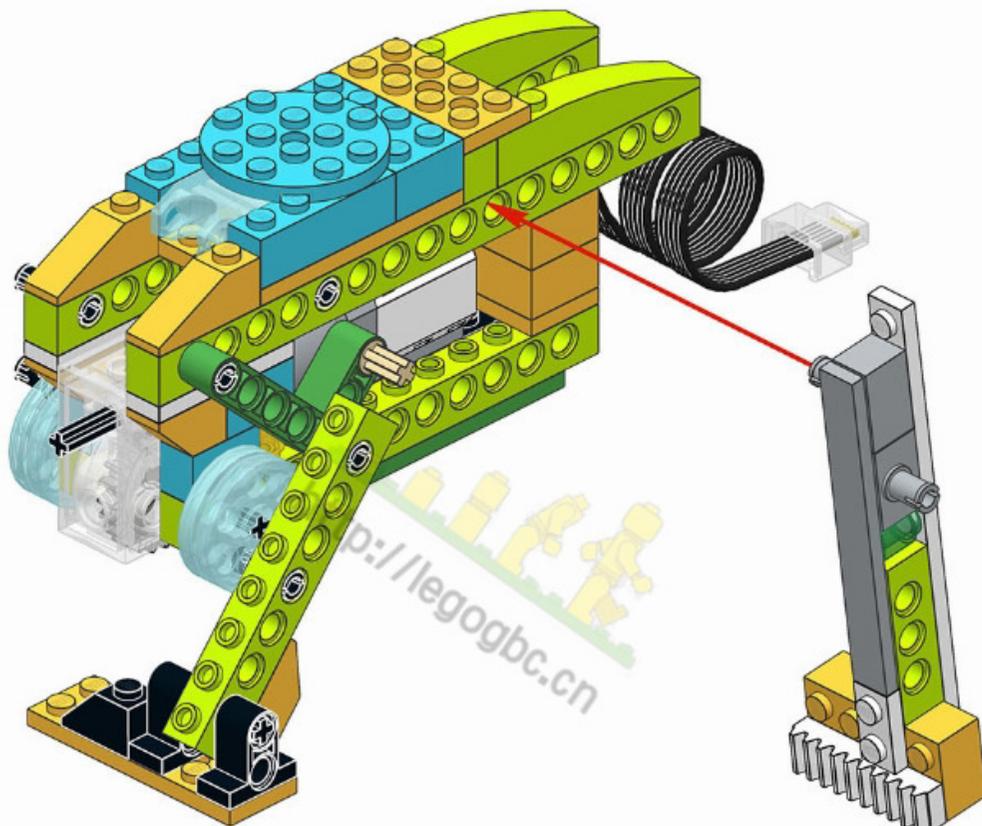
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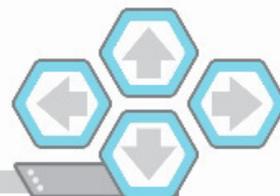
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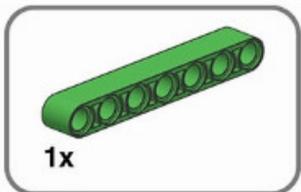
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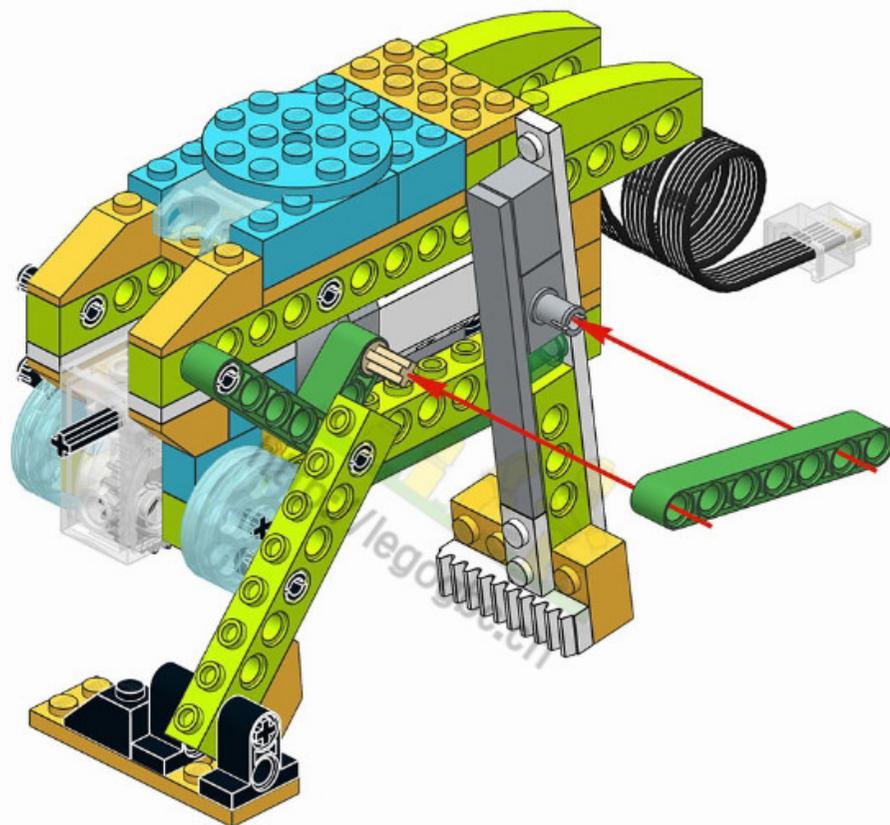




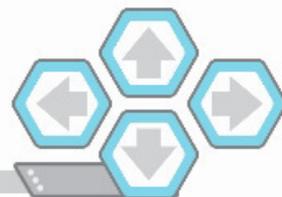
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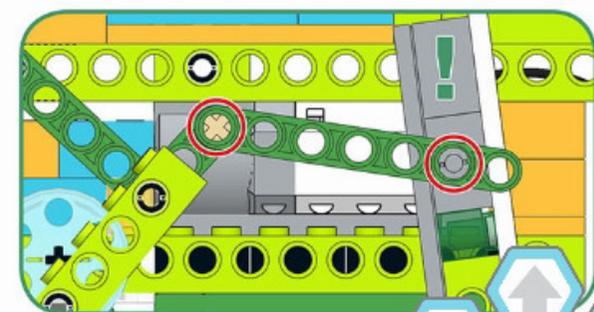
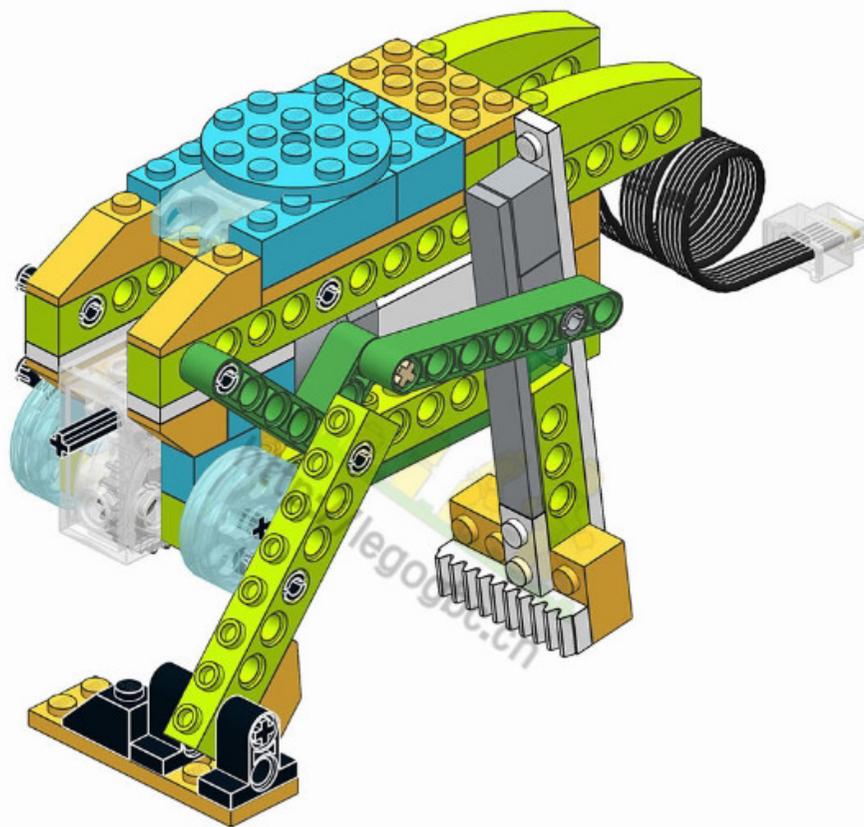
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# 41



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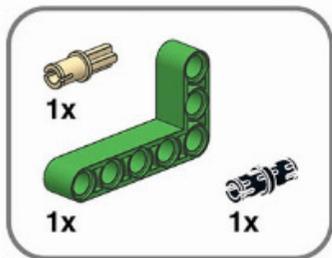
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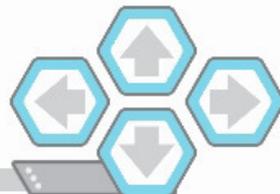
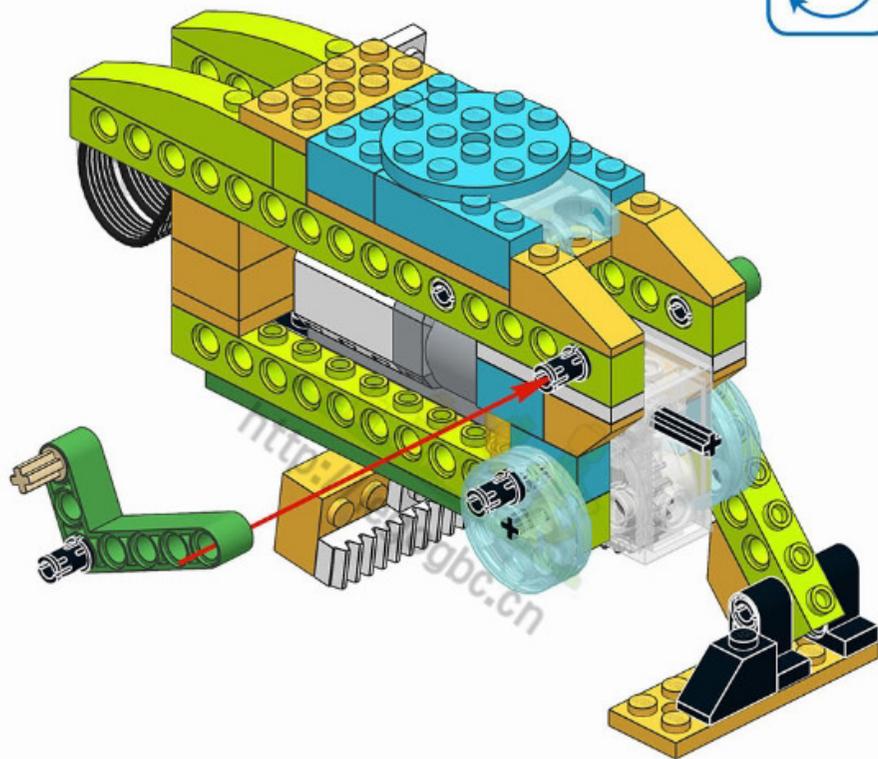
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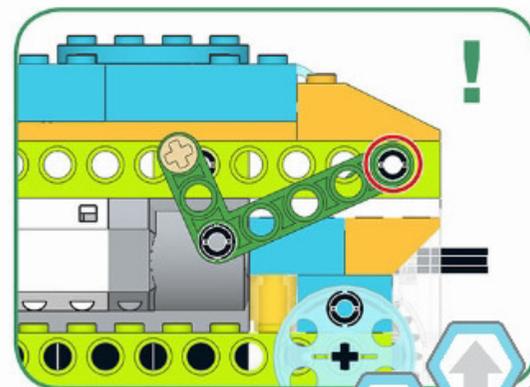
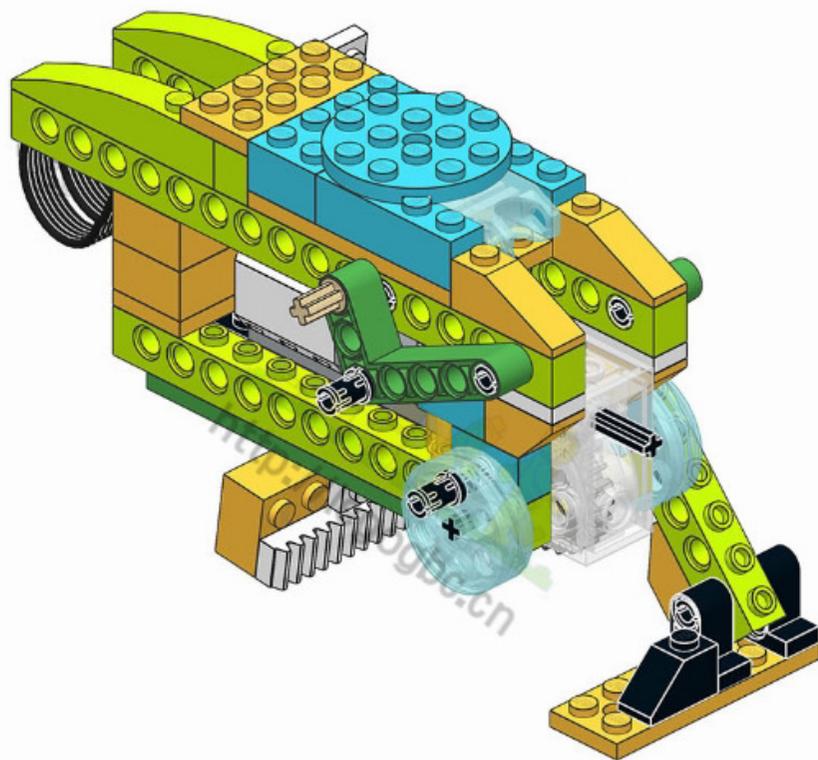
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# 43



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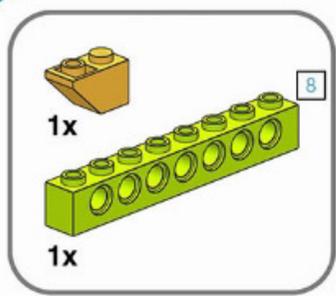
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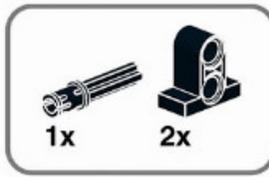
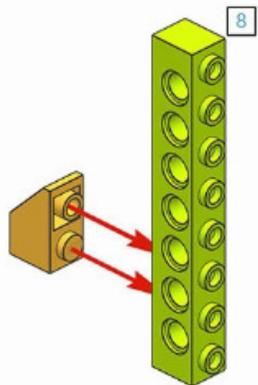
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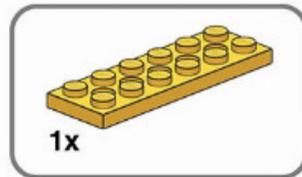
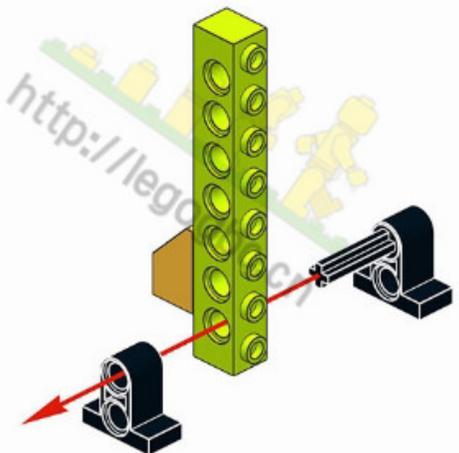
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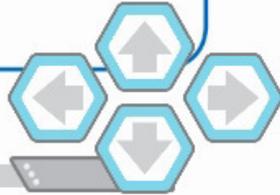
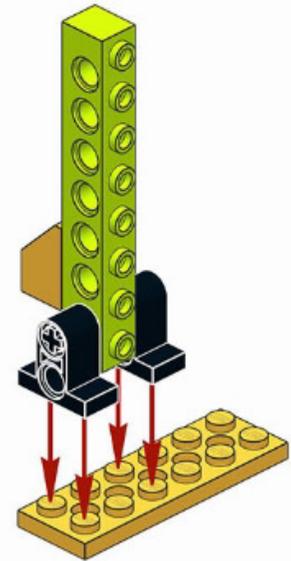
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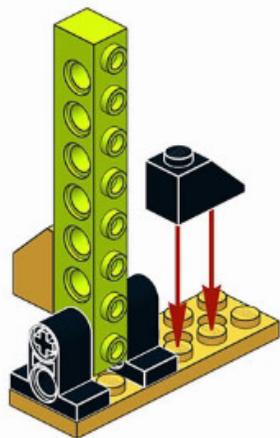




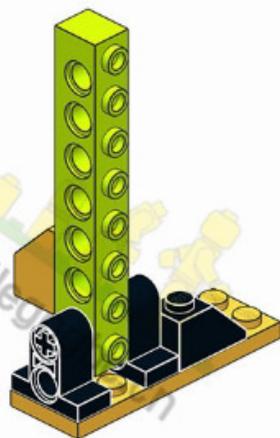
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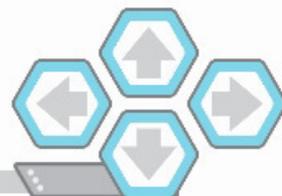
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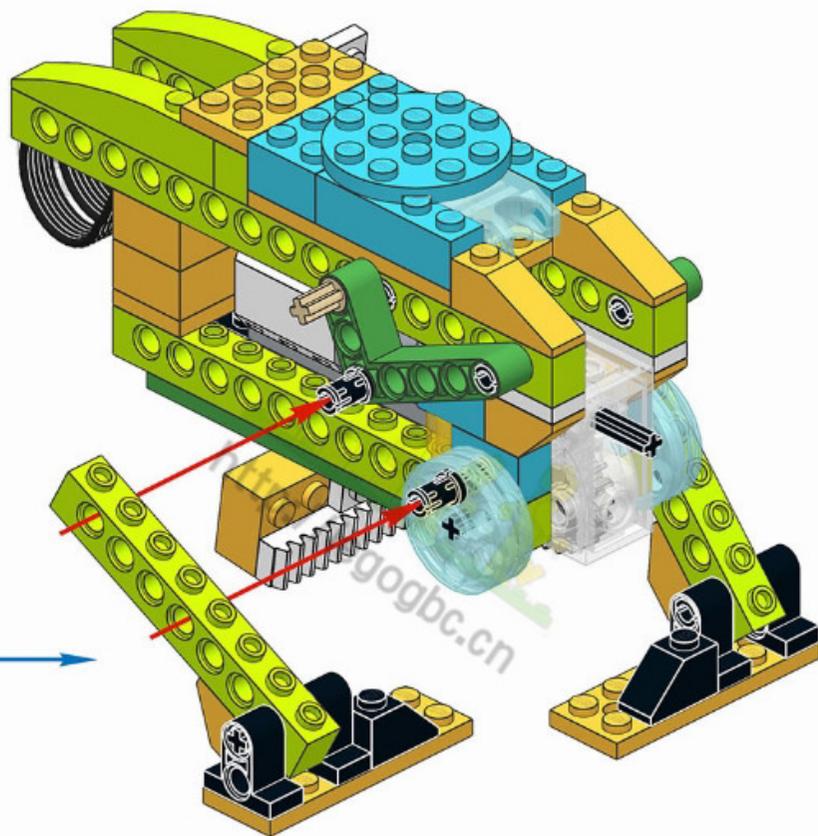
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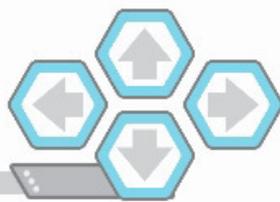
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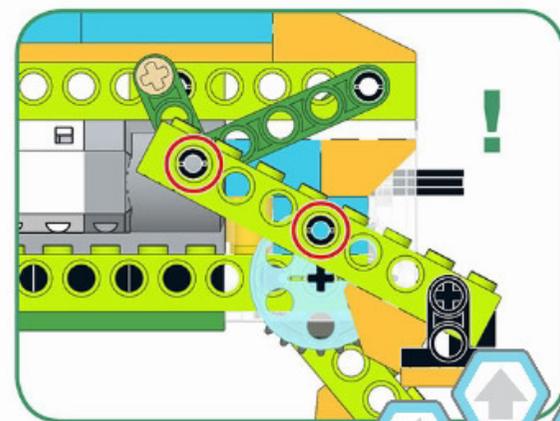
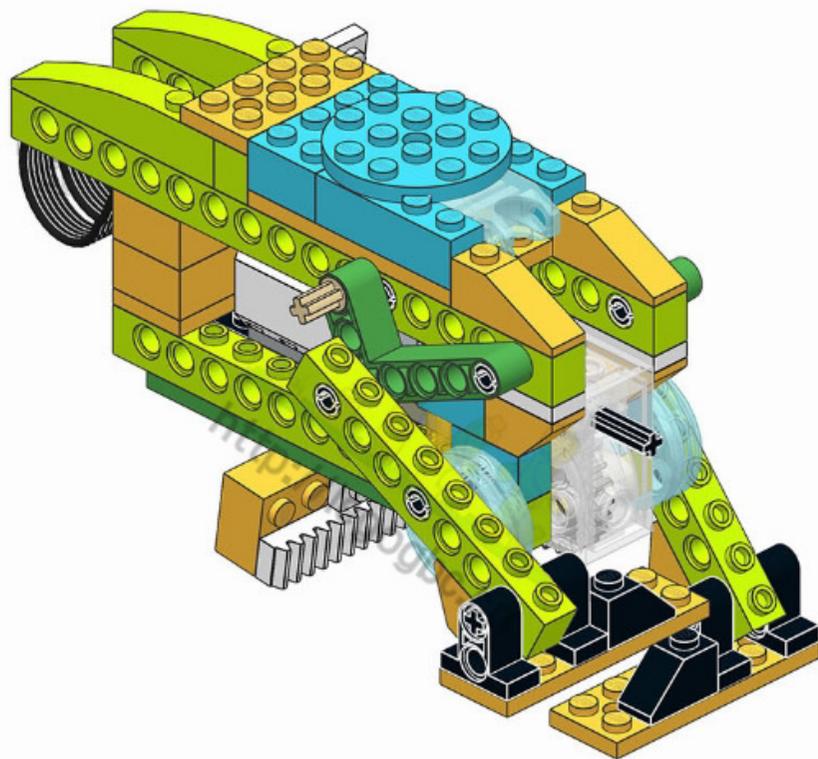
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47



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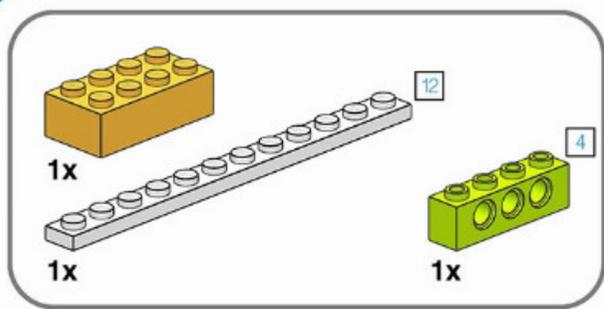
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4

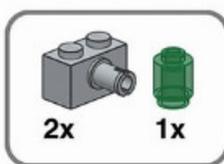
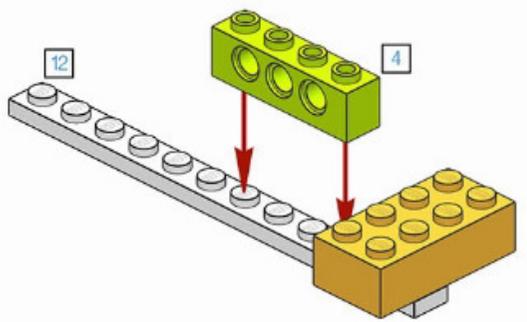
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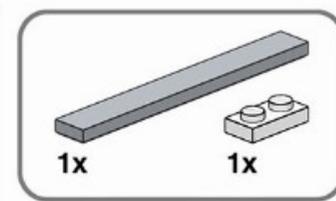
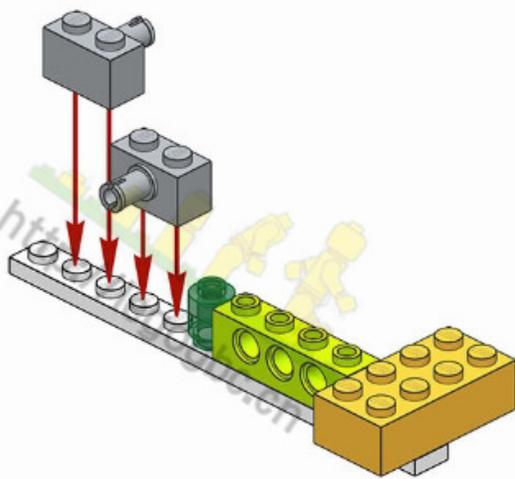
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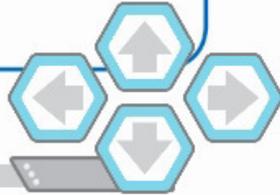
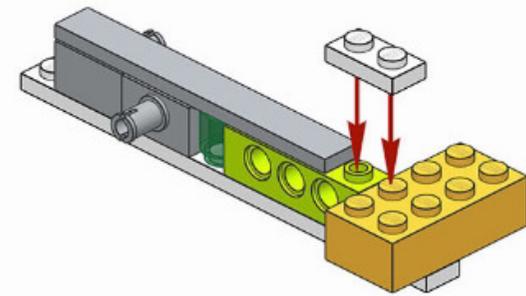
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2

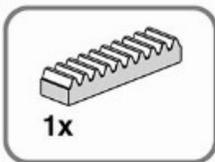


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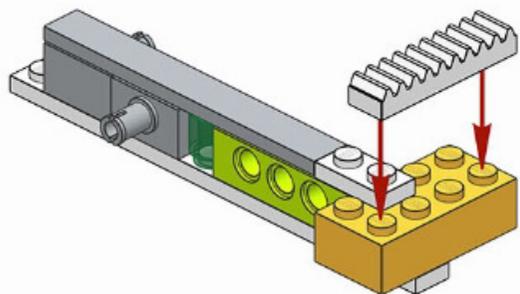


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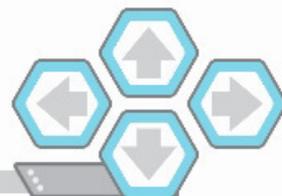
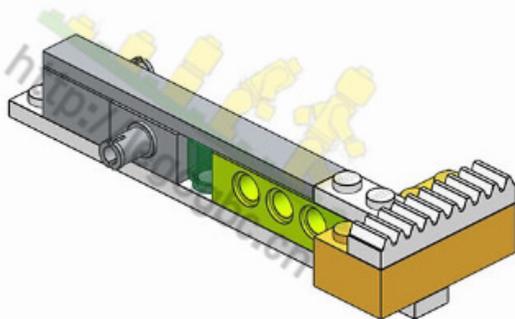


1x

4



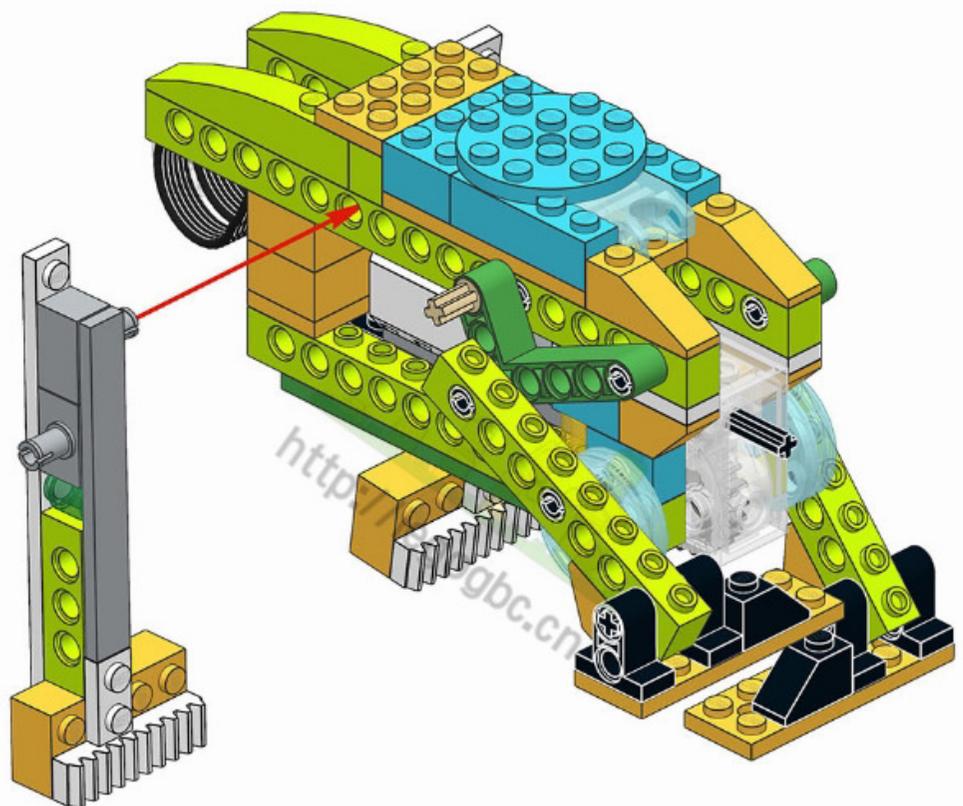
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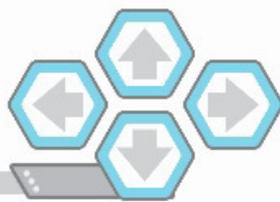


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50/70

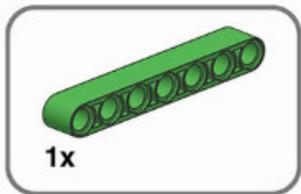
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78



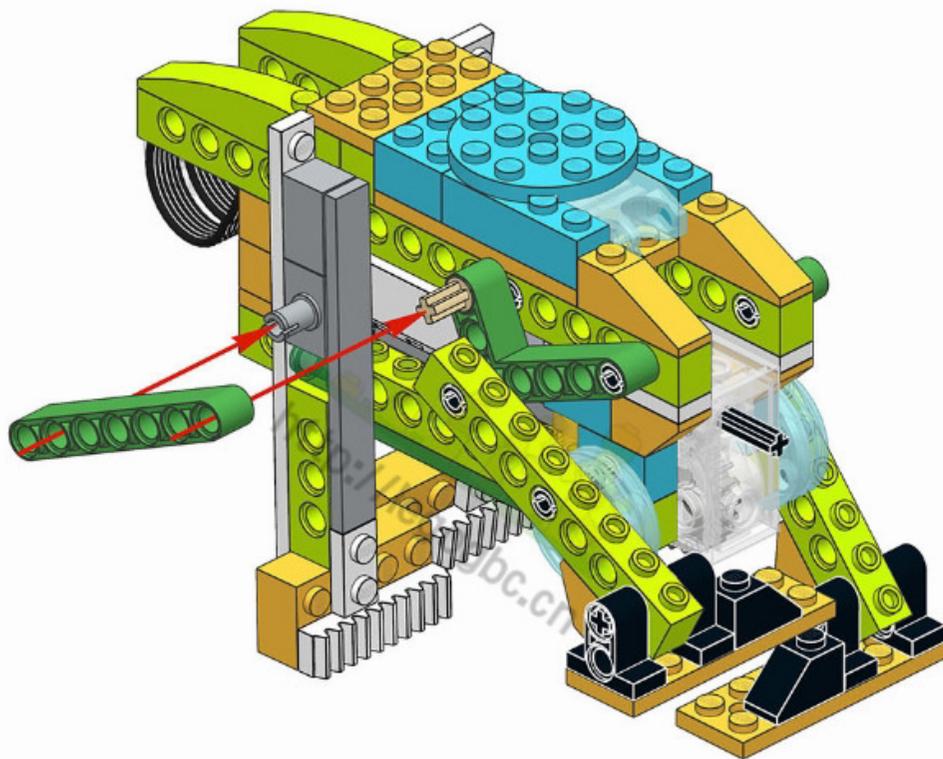


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1x

51



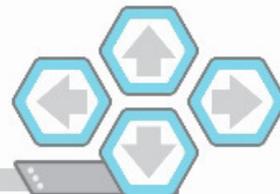
51/70



4



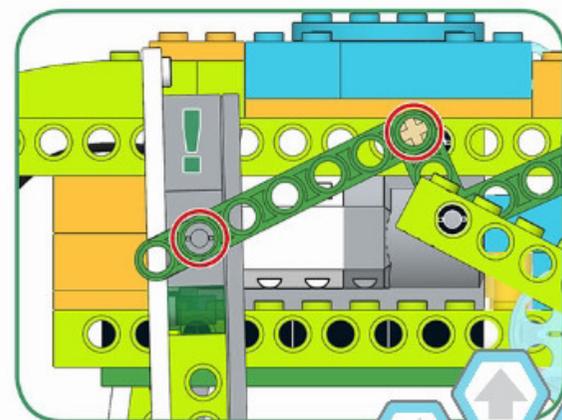
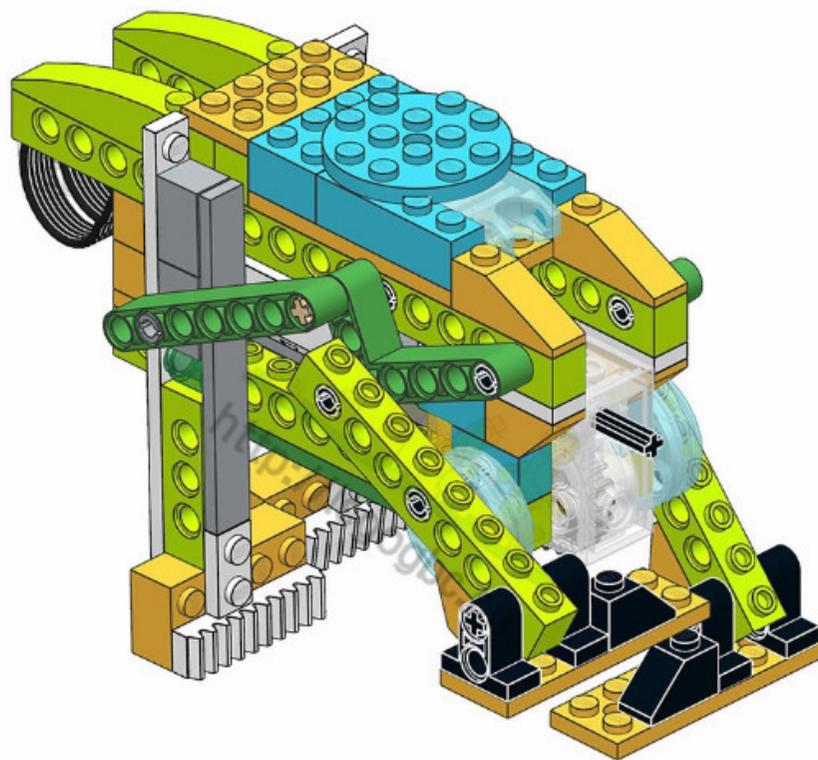
79



# 52



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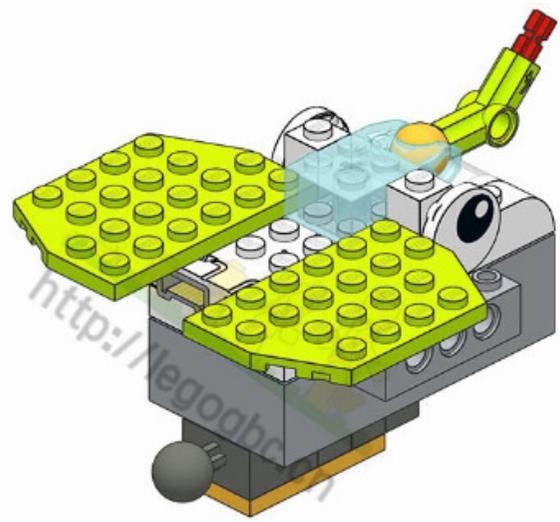
52/70

4

80



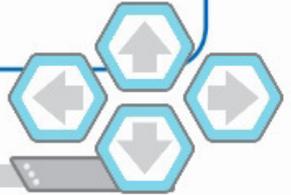
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53/70

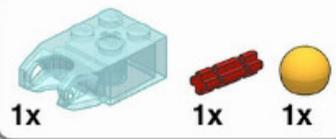
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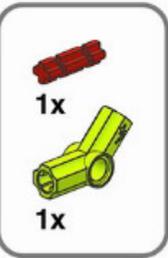
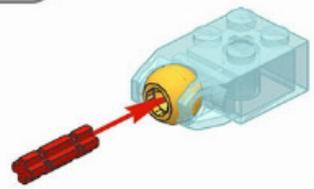




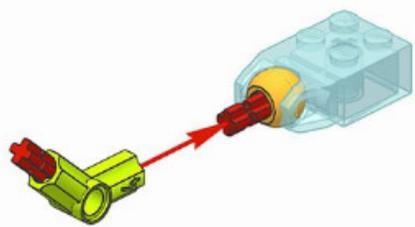
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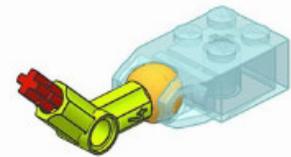
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2



3

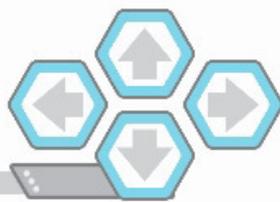


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54/70

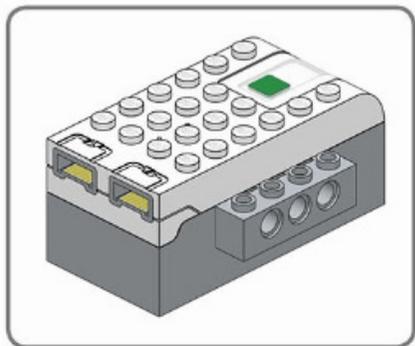
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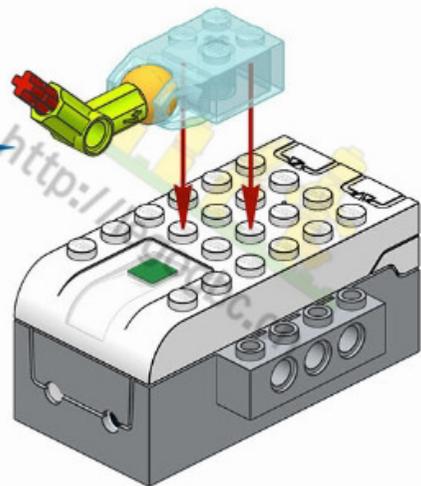




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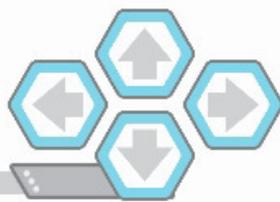
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55/70

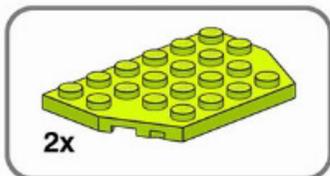
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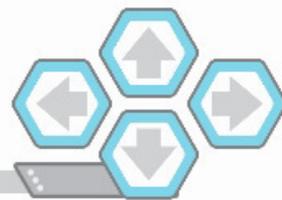
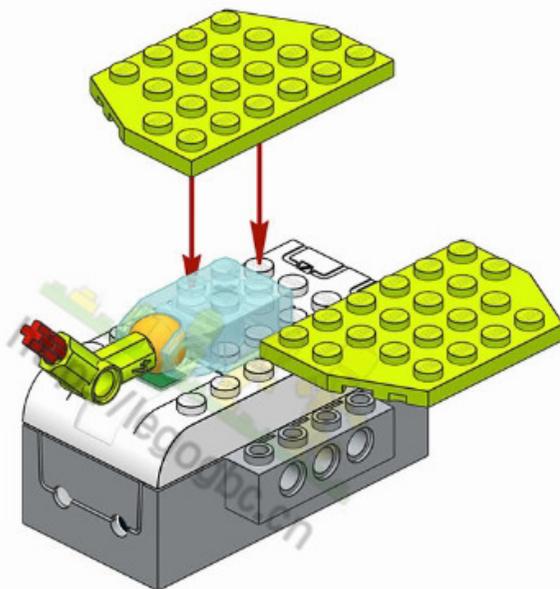




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56

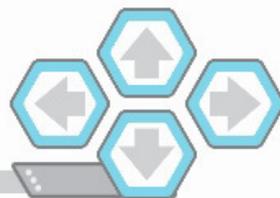
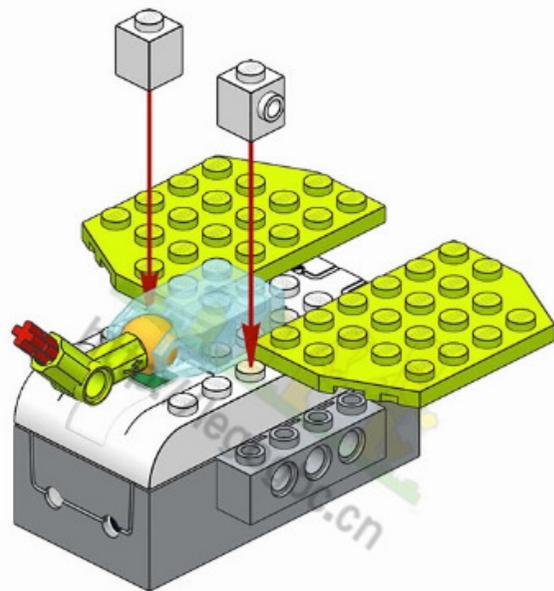




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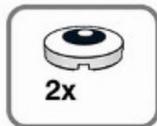


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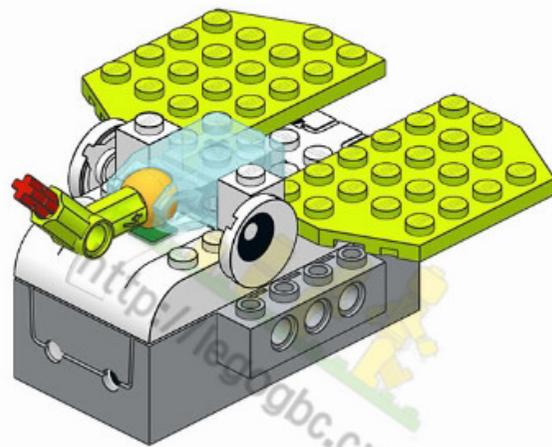




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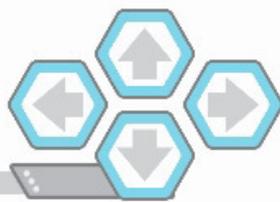
58



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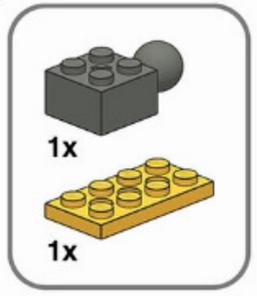


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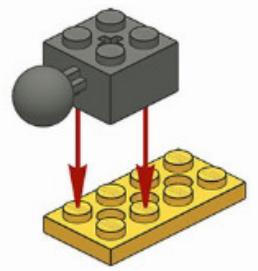




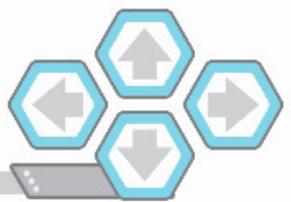
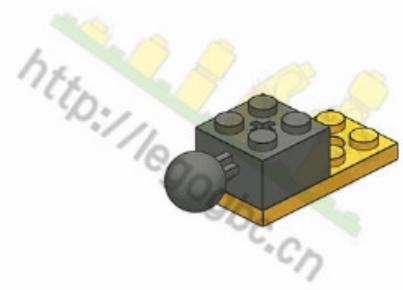
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1



2





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**3x**  
**1x**

**1**

**2**

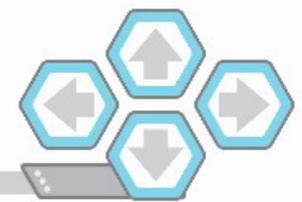
The image shows two steps of a LEGO assembly process. Step 1 shows three dark grey 1x2 Technic bricks being connected in a line. A grey Technic axle is inserted into the hole of the second brick, and a grey Technic axle pin is inserted into the hole of the third brick. A red arrow points to the axle pin, with a circled number '3' next to it. Step 2 shows a dark grey 1x2 Technic brick with a white cross symbol on its top surface. A blue arrow points from the assembly in step 1 to the right, indicating the next step in the build.

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60/70

4

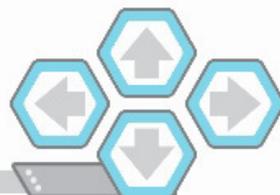
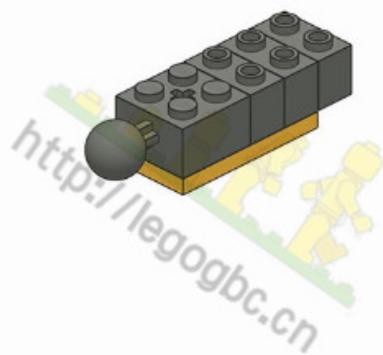
88



# 61



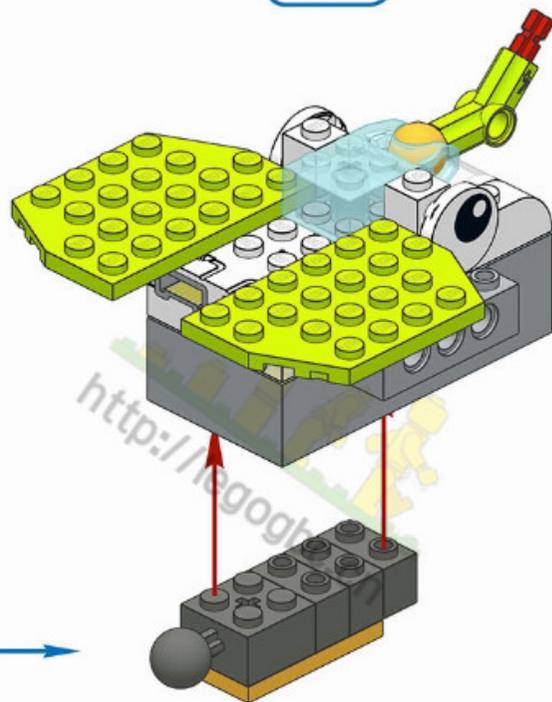
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# 62



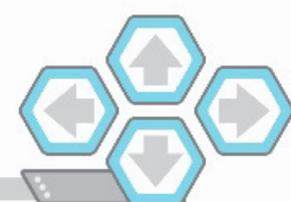
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4

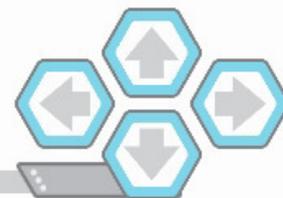
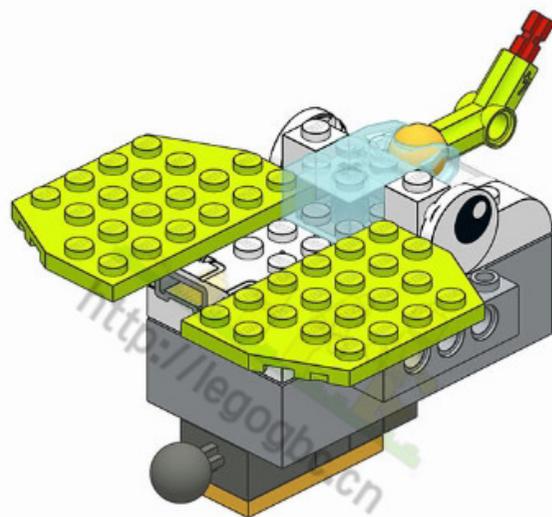
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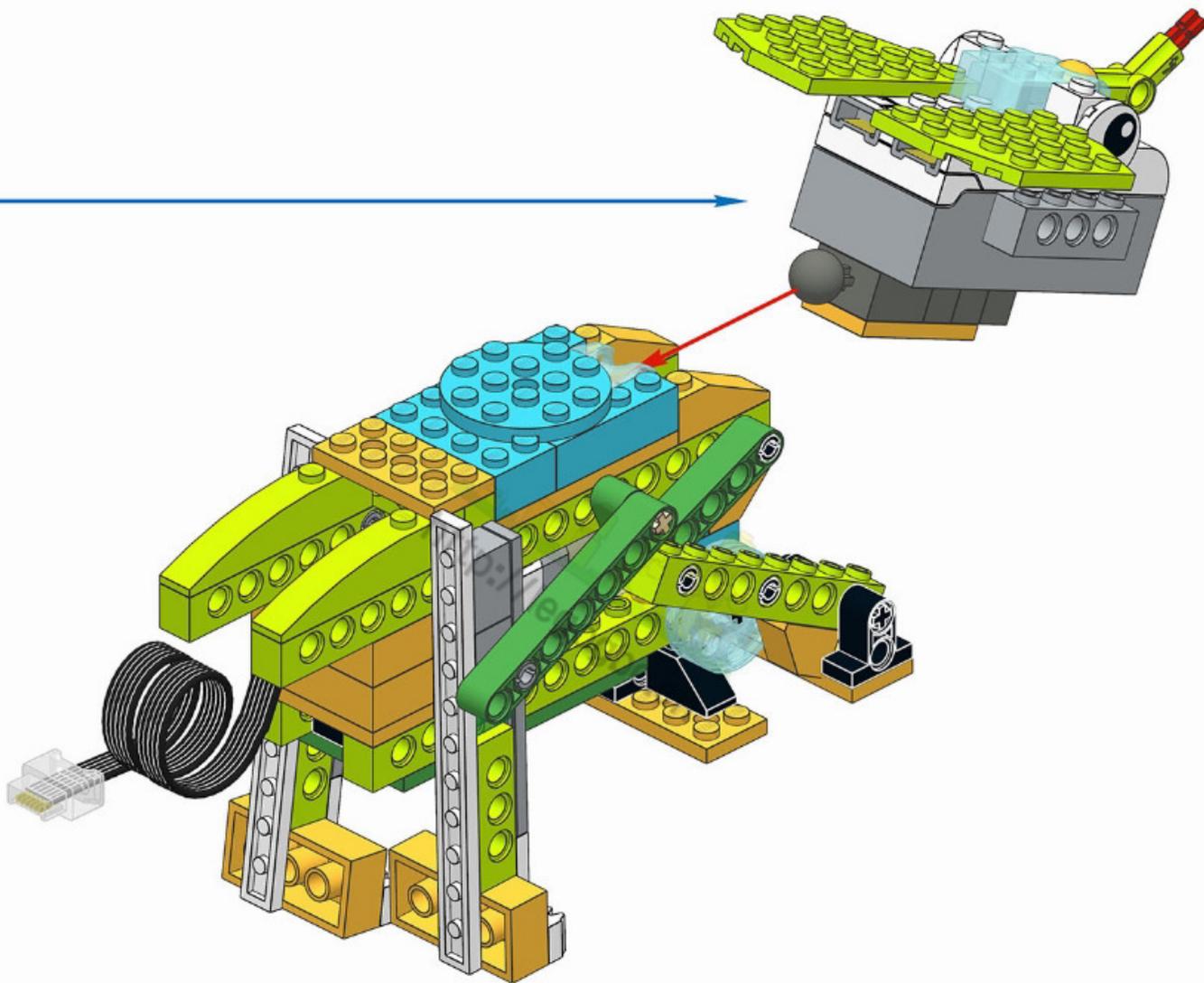
# 63



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# 64

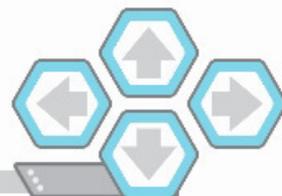


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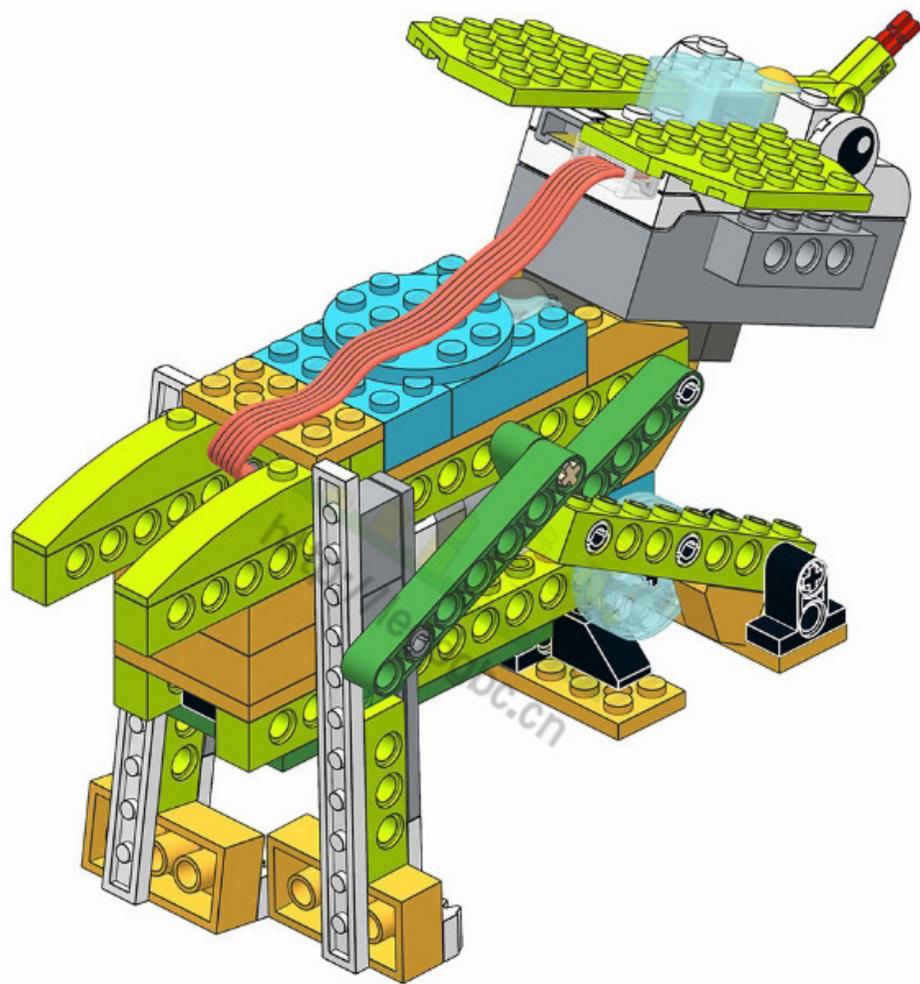
64/70

4

92



# 65

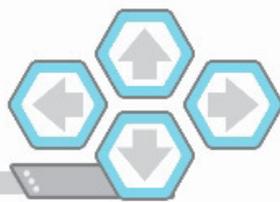


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65/70

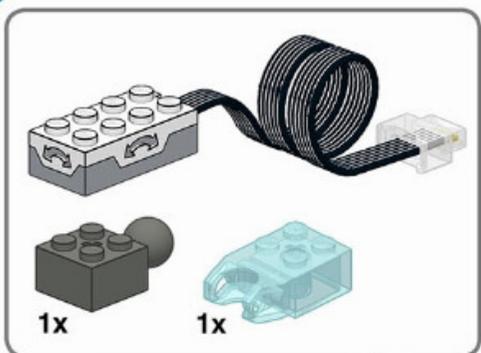
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93

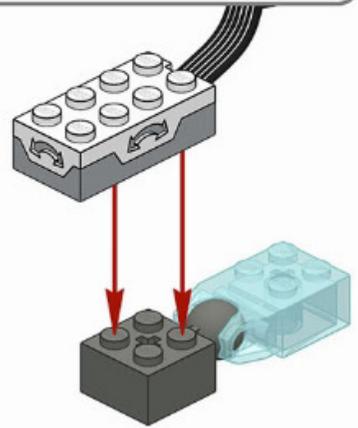




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1



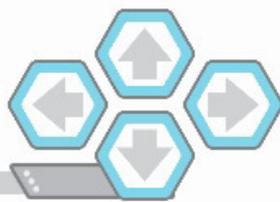
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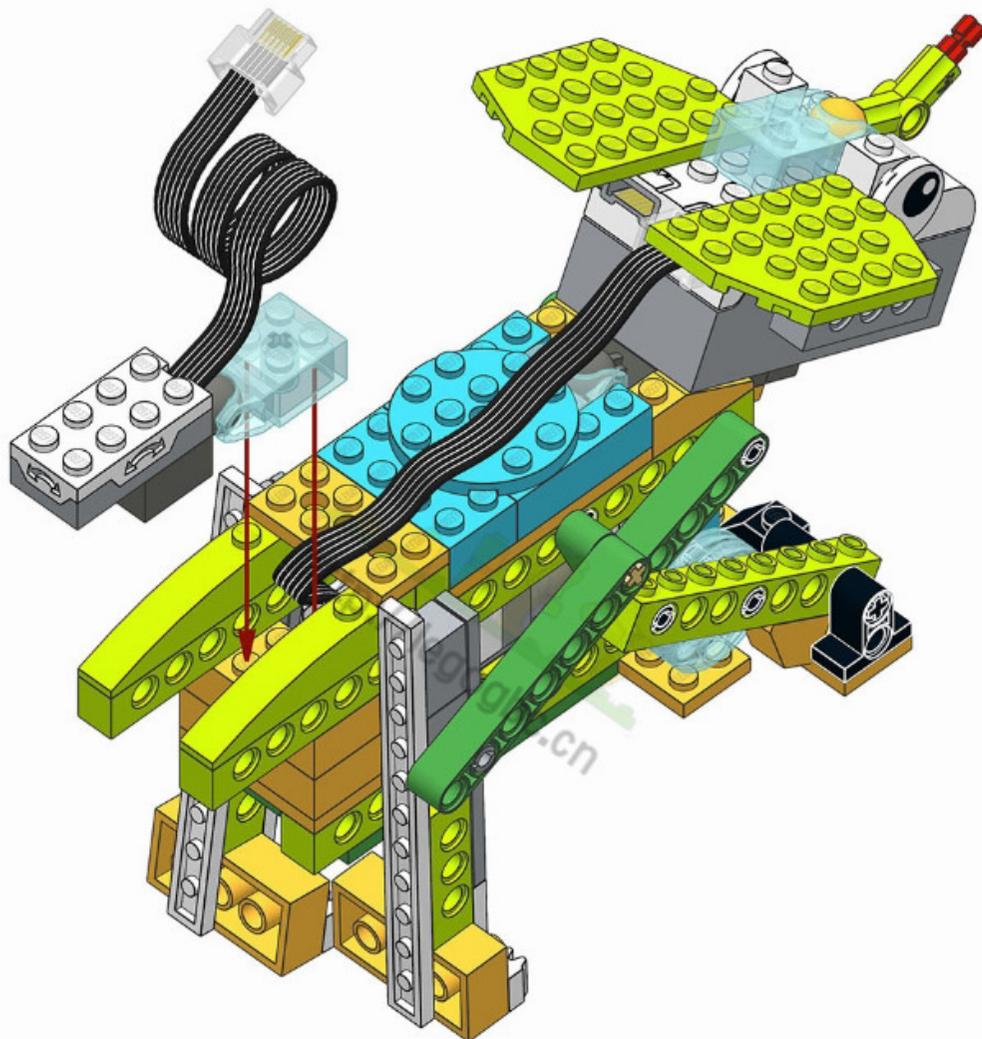
66/70

4

94



67

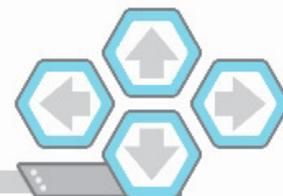


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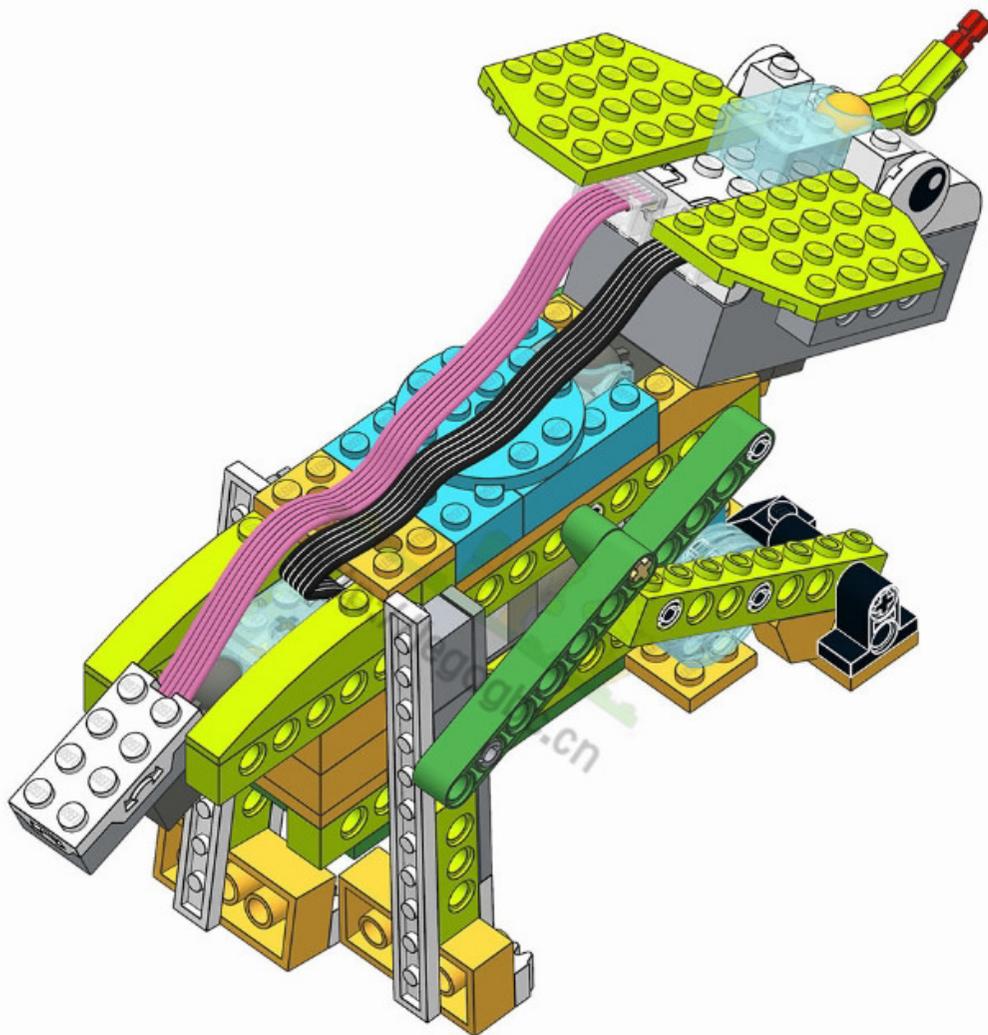
67/70

4

95



# 68

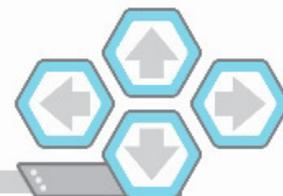


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68/70

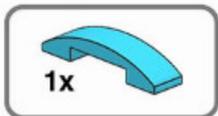
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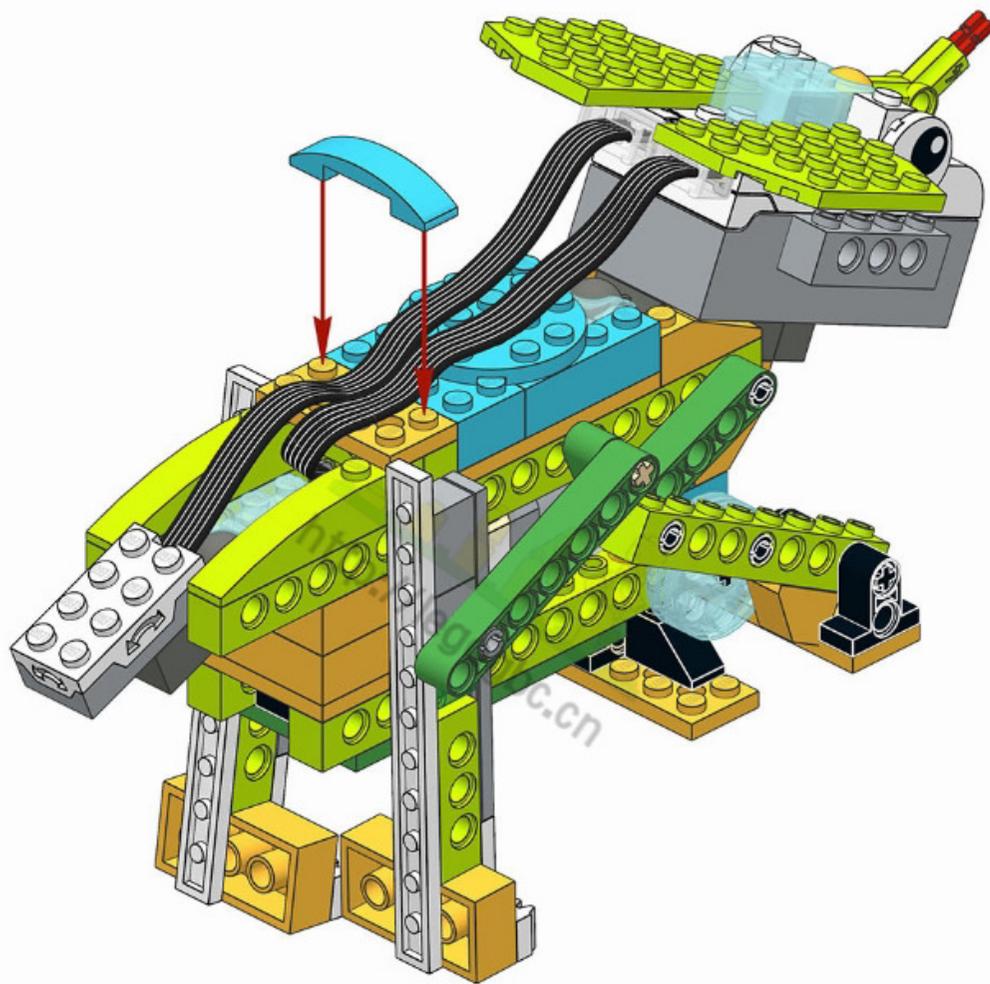


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1x

69

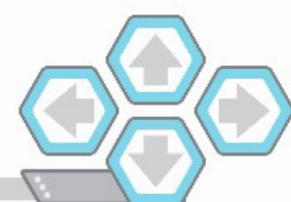


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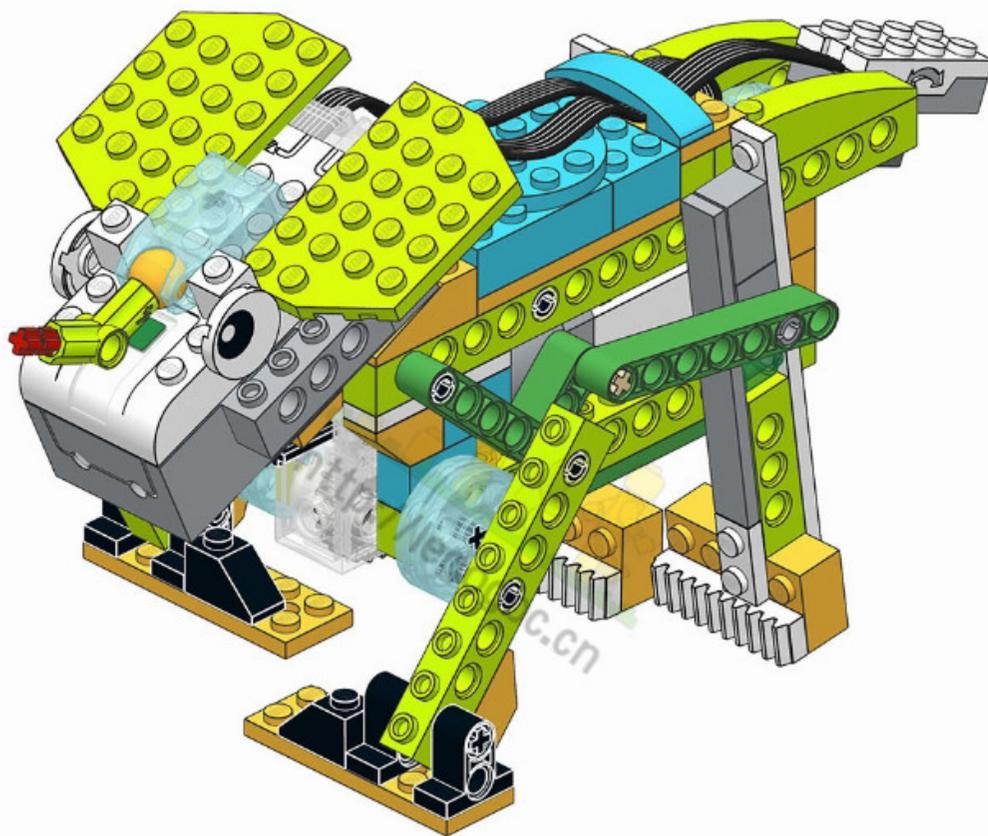
69/70

4

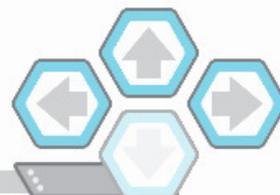
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# 70



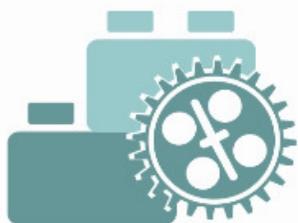
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## Enhanced version

Add decorative elements of the legs, tail and head of the robot!



**Triceratops**



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4

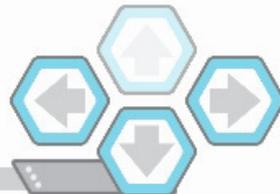
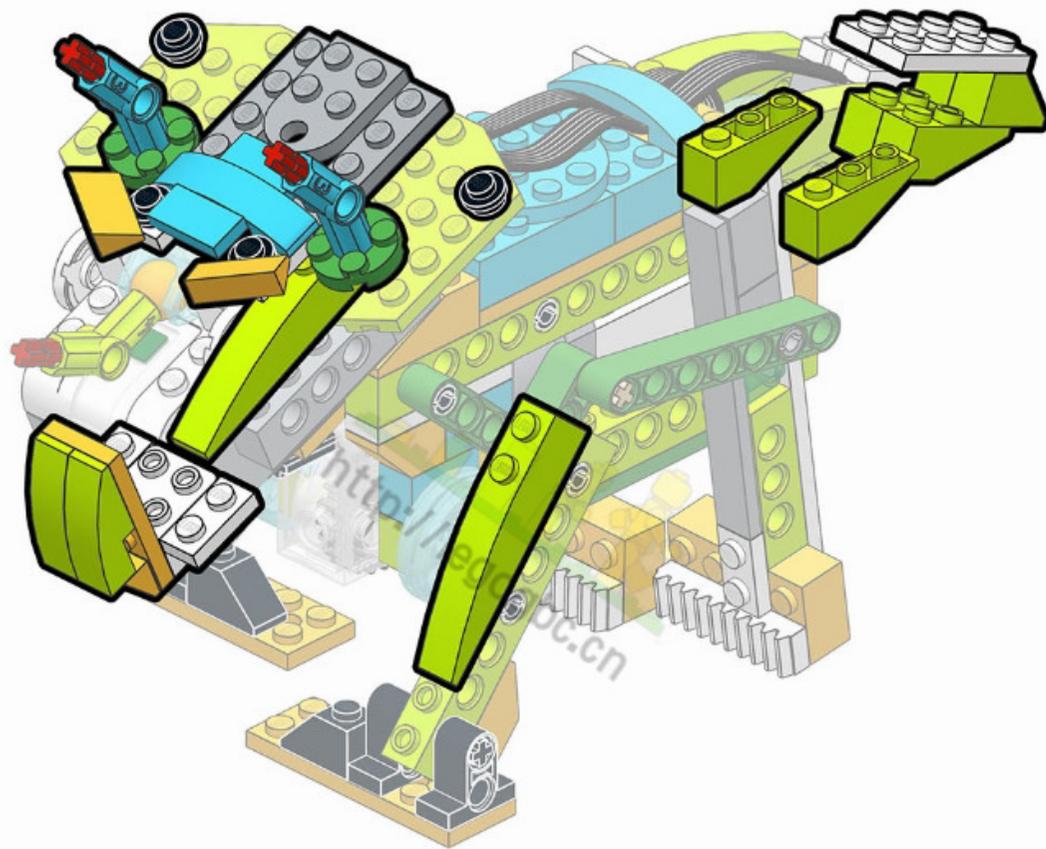


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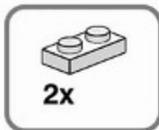


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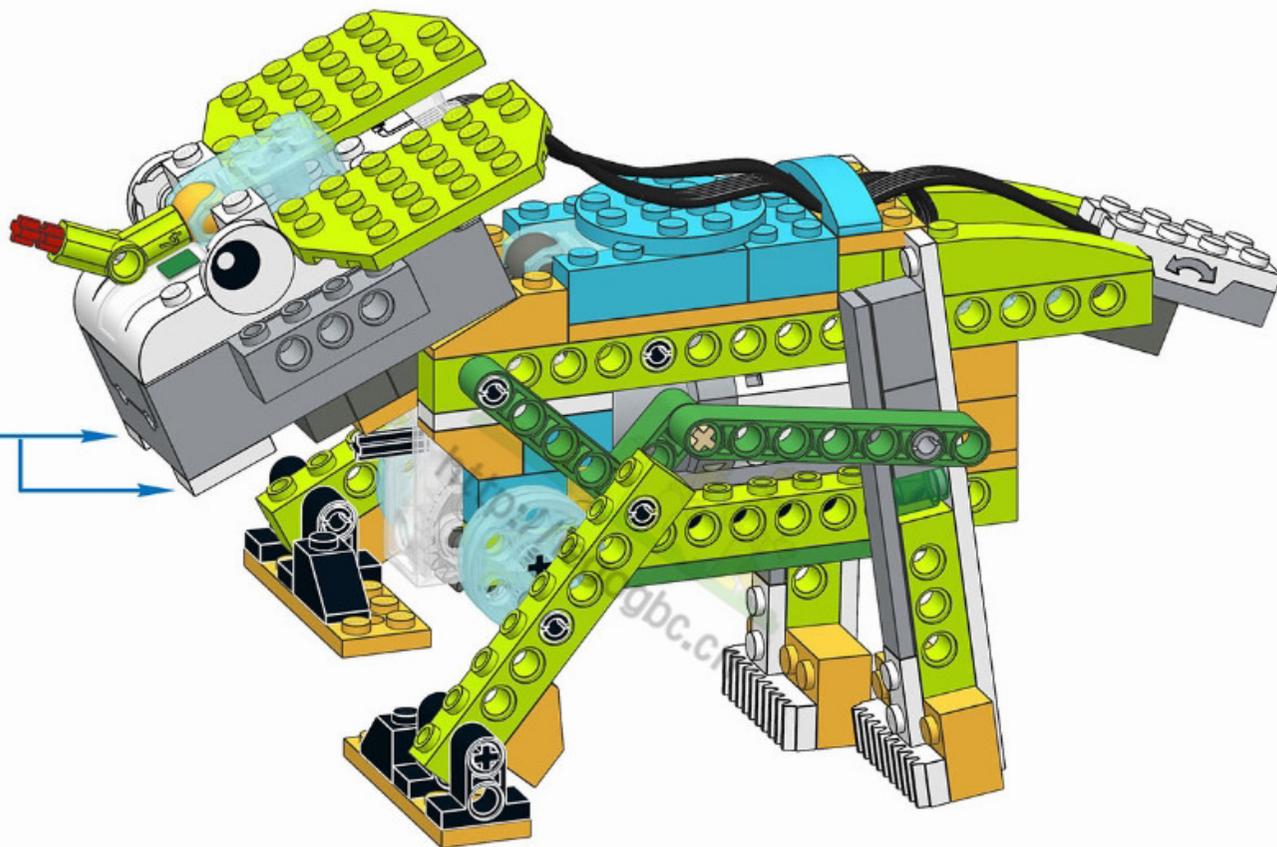
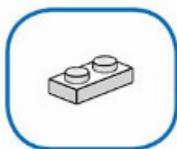




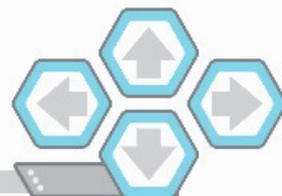
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71

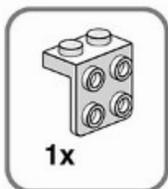


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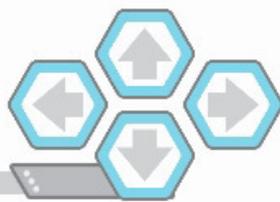
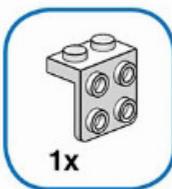
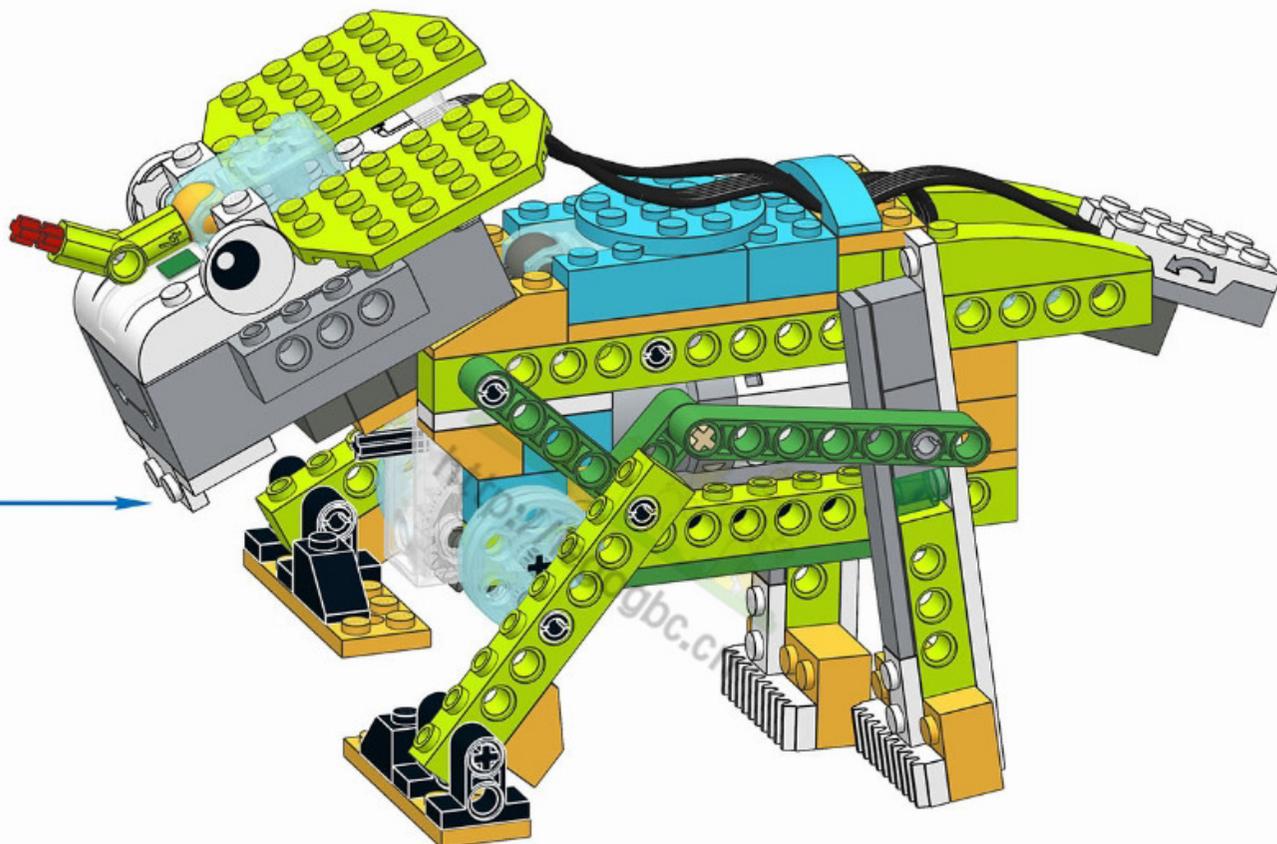




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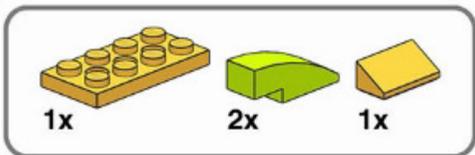


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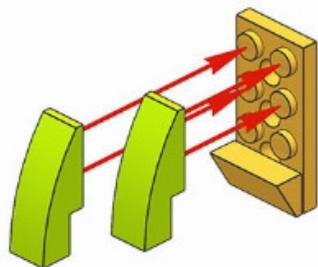




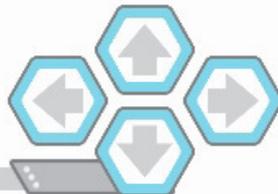
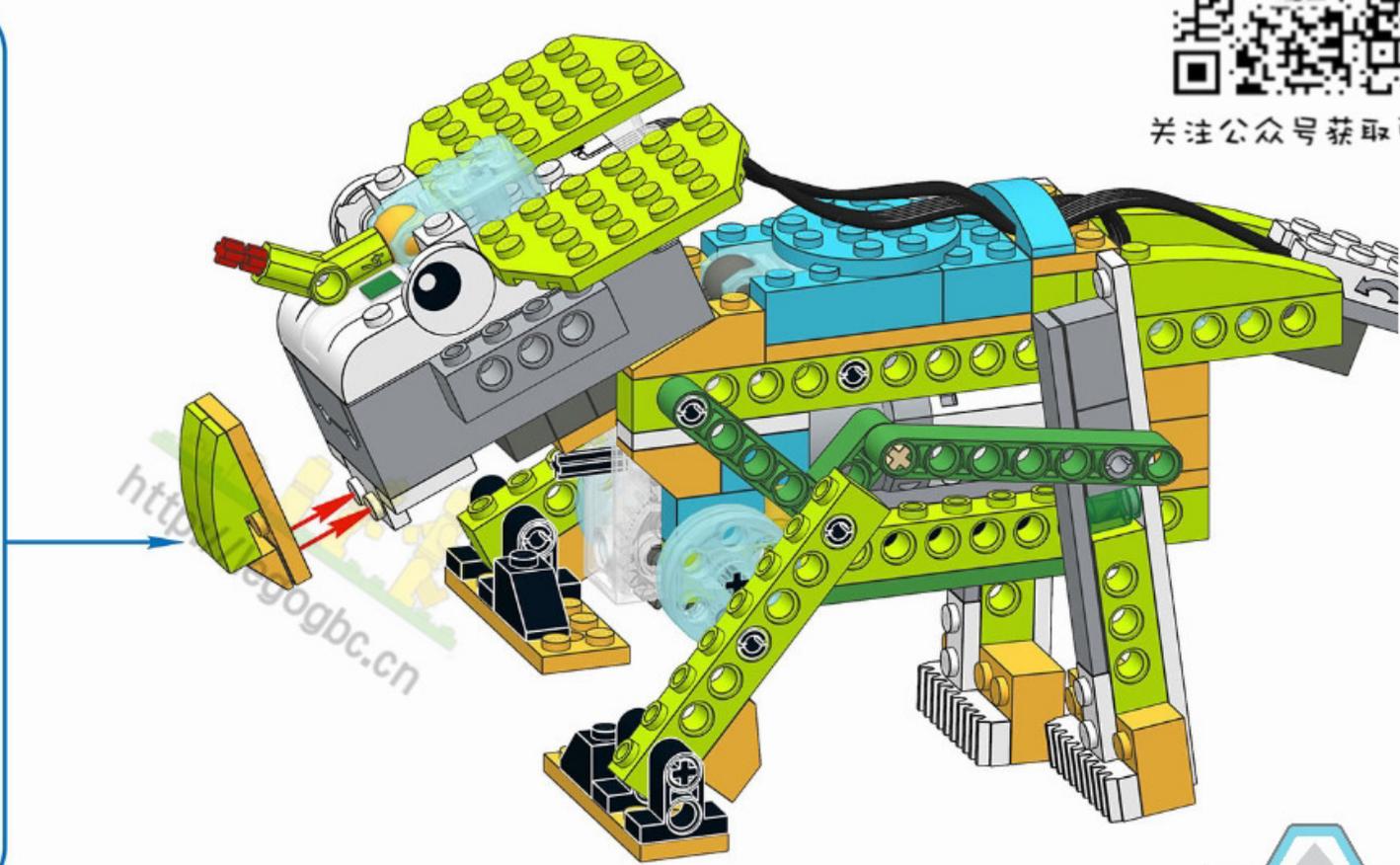
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1

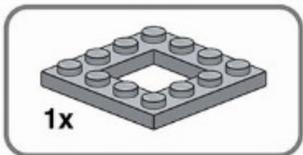


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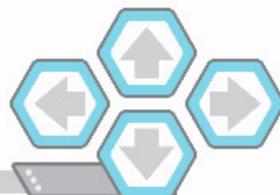
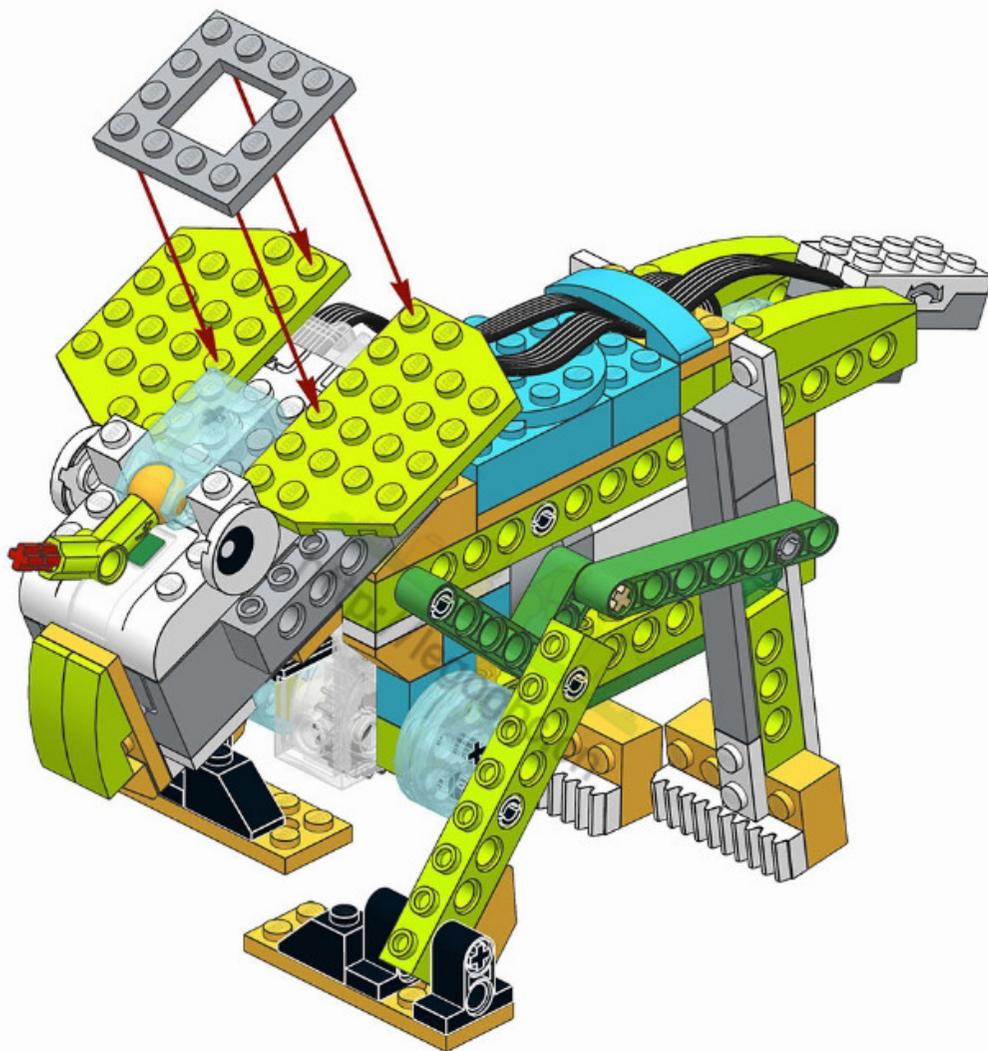




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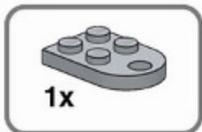


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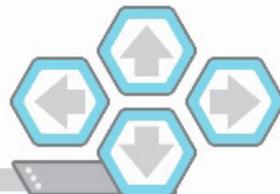
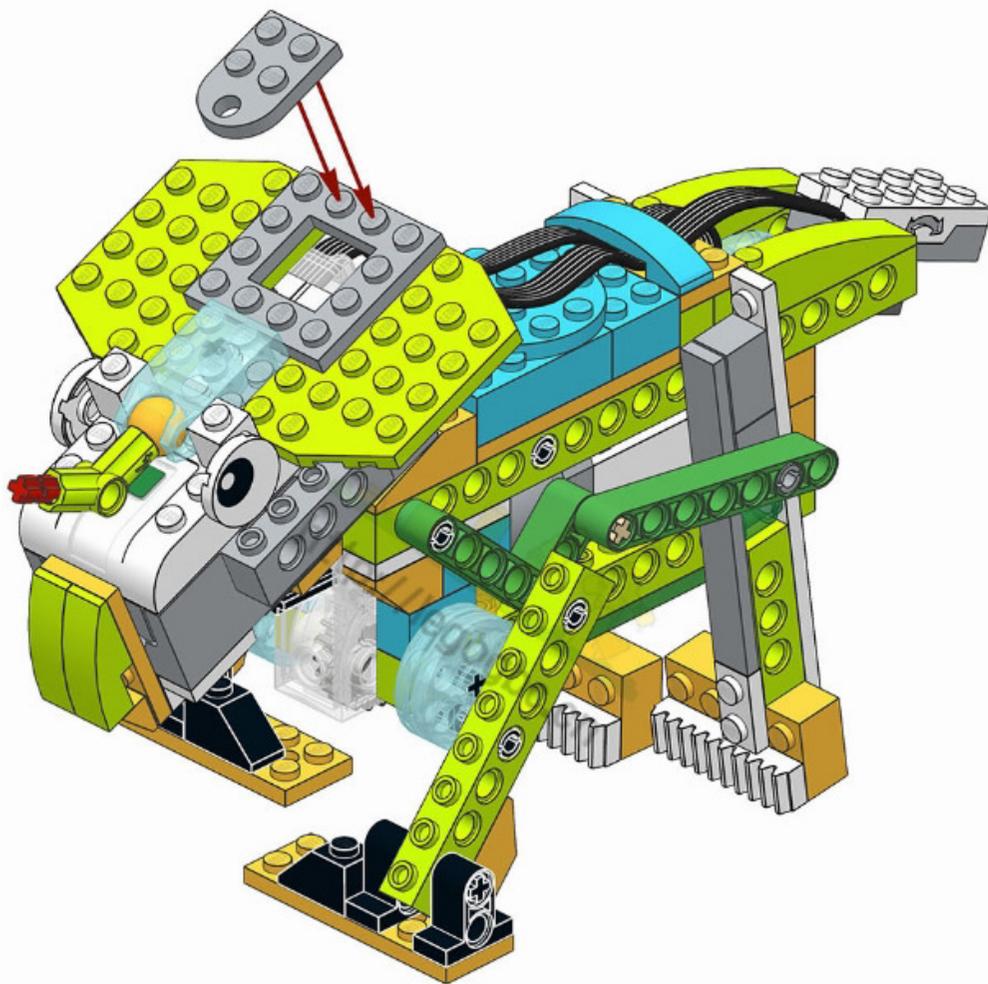




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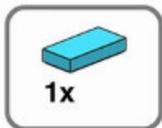


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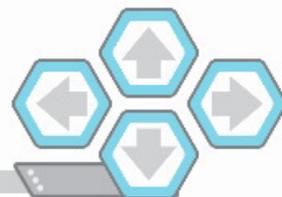
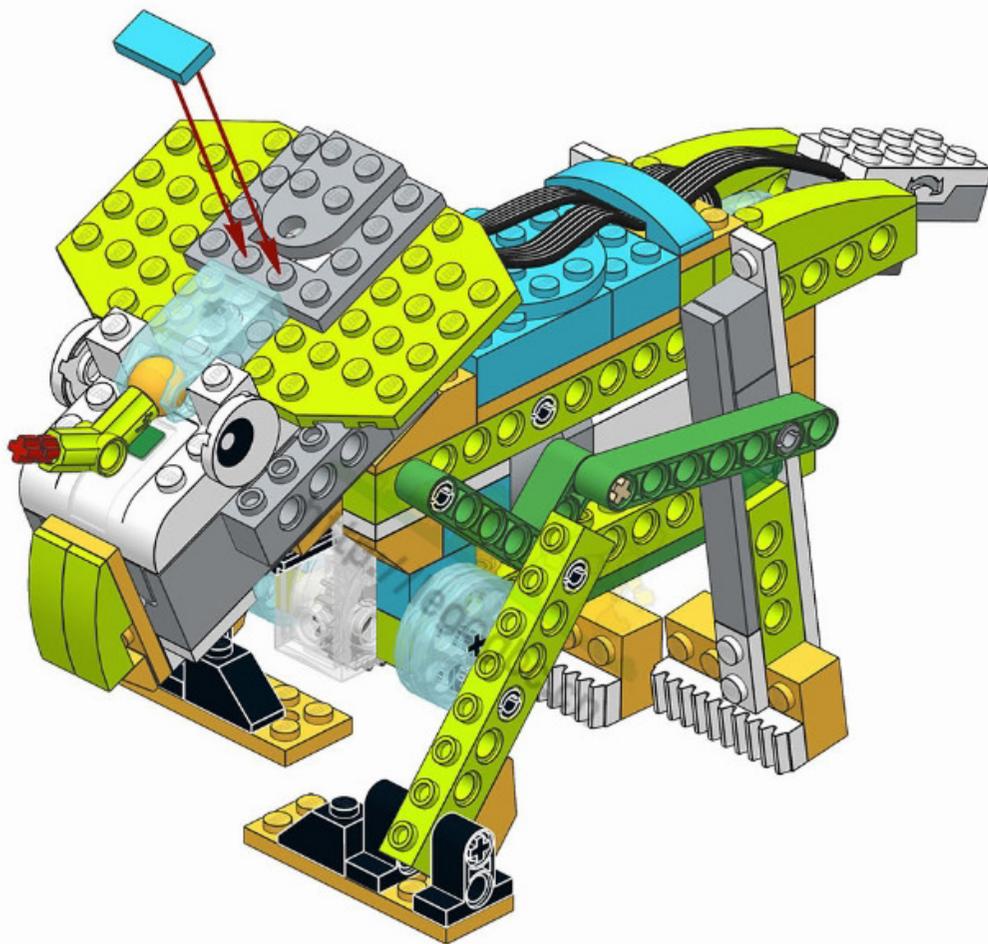


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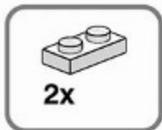
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76



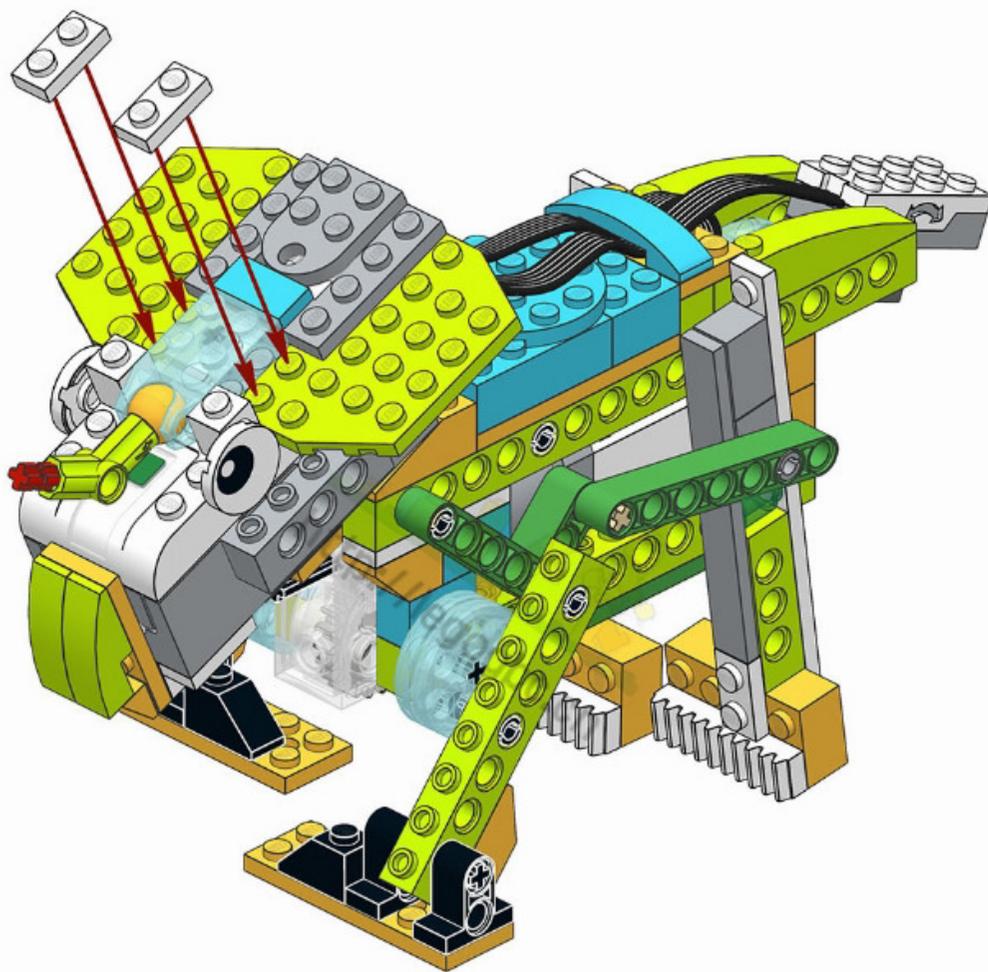


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2x

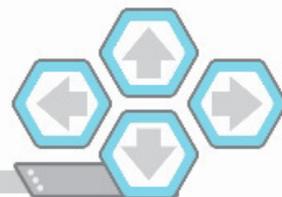
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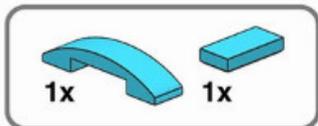
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107

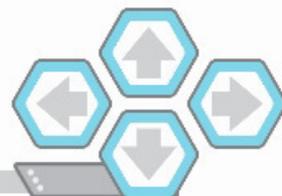
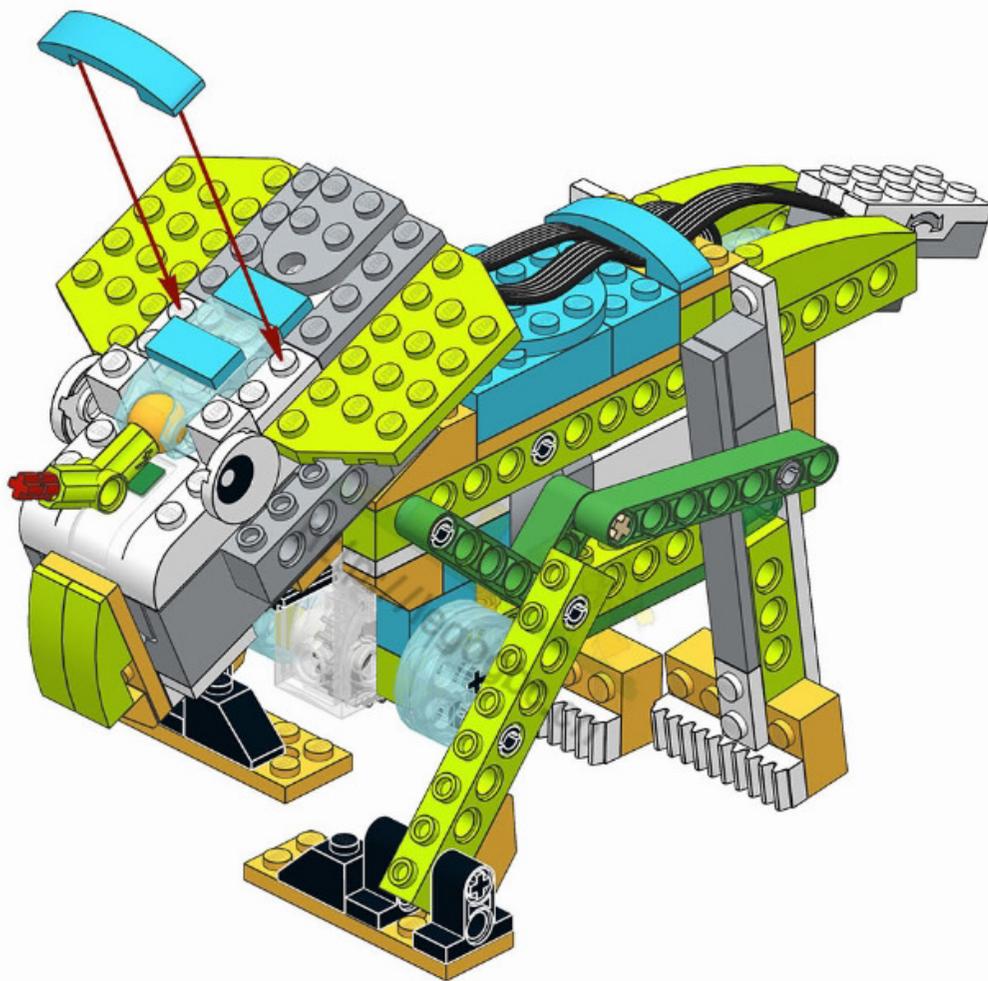




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78

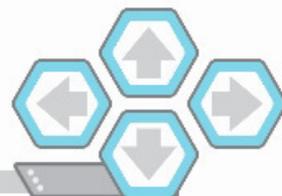
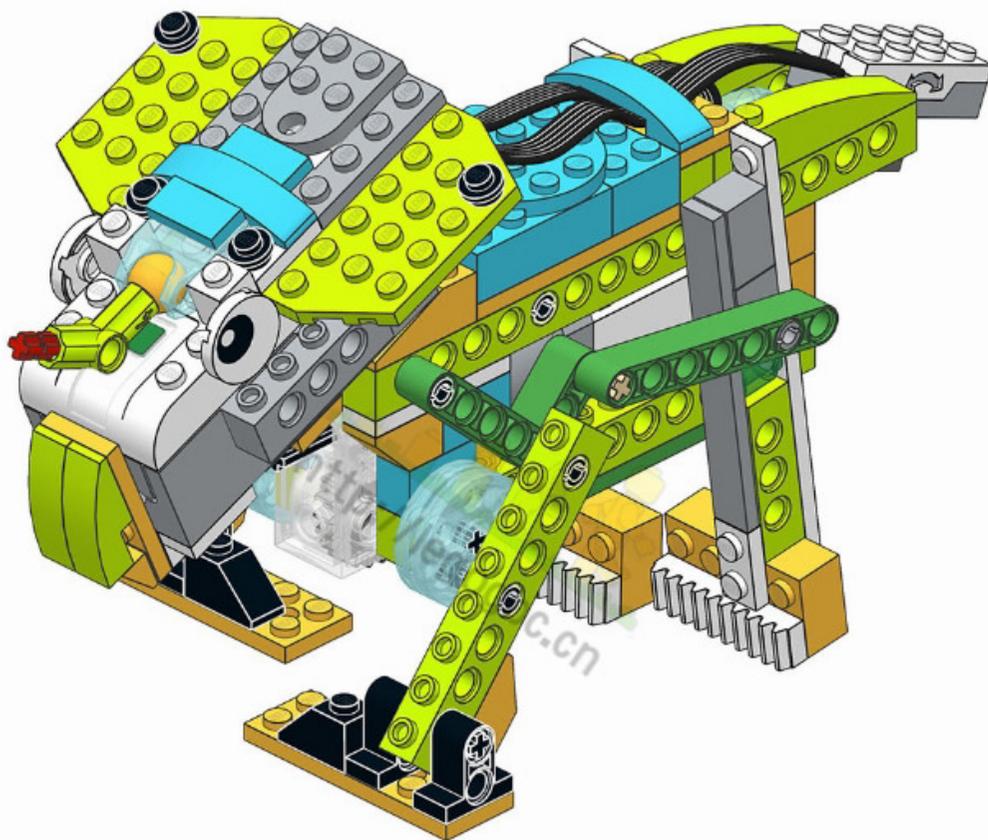




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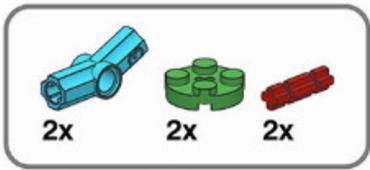


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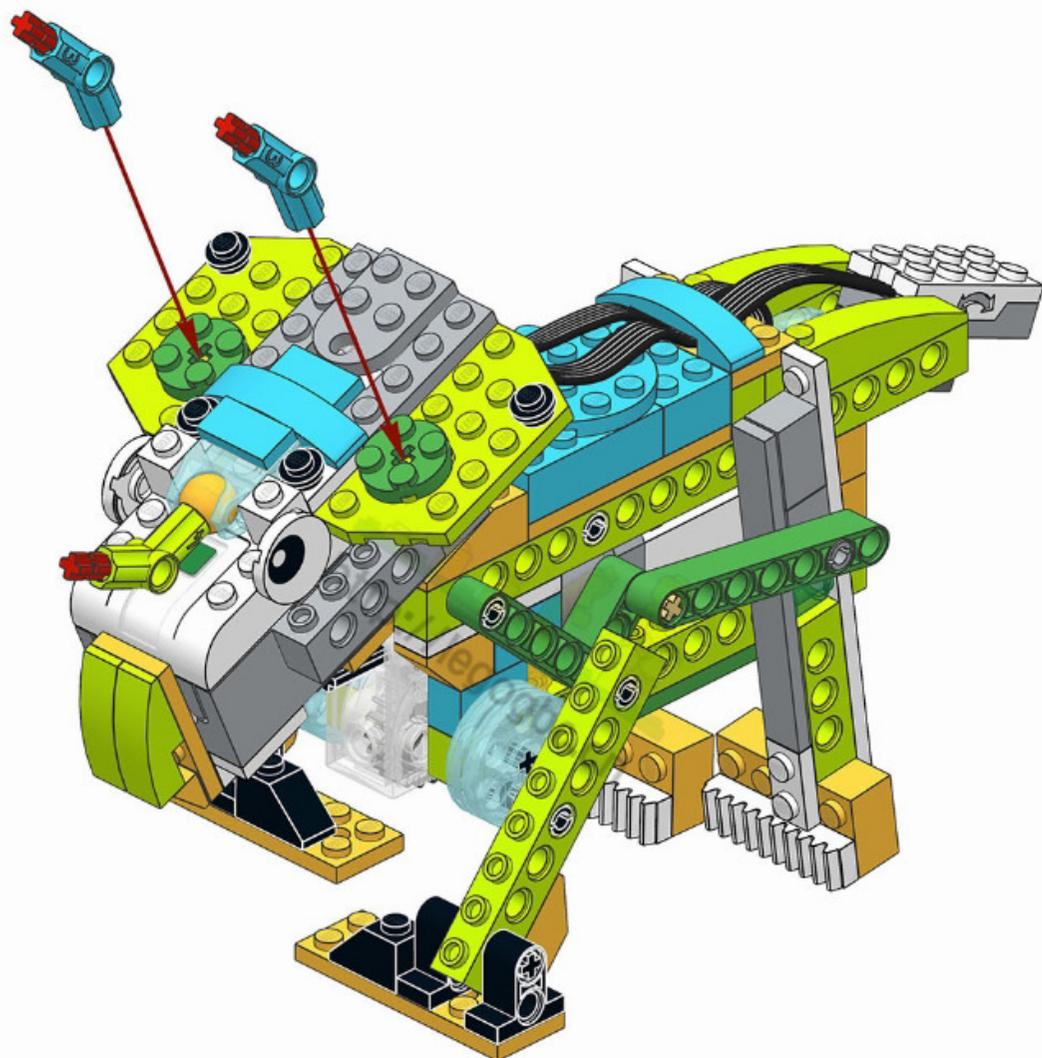




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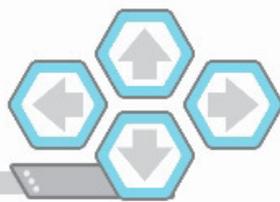
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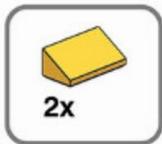
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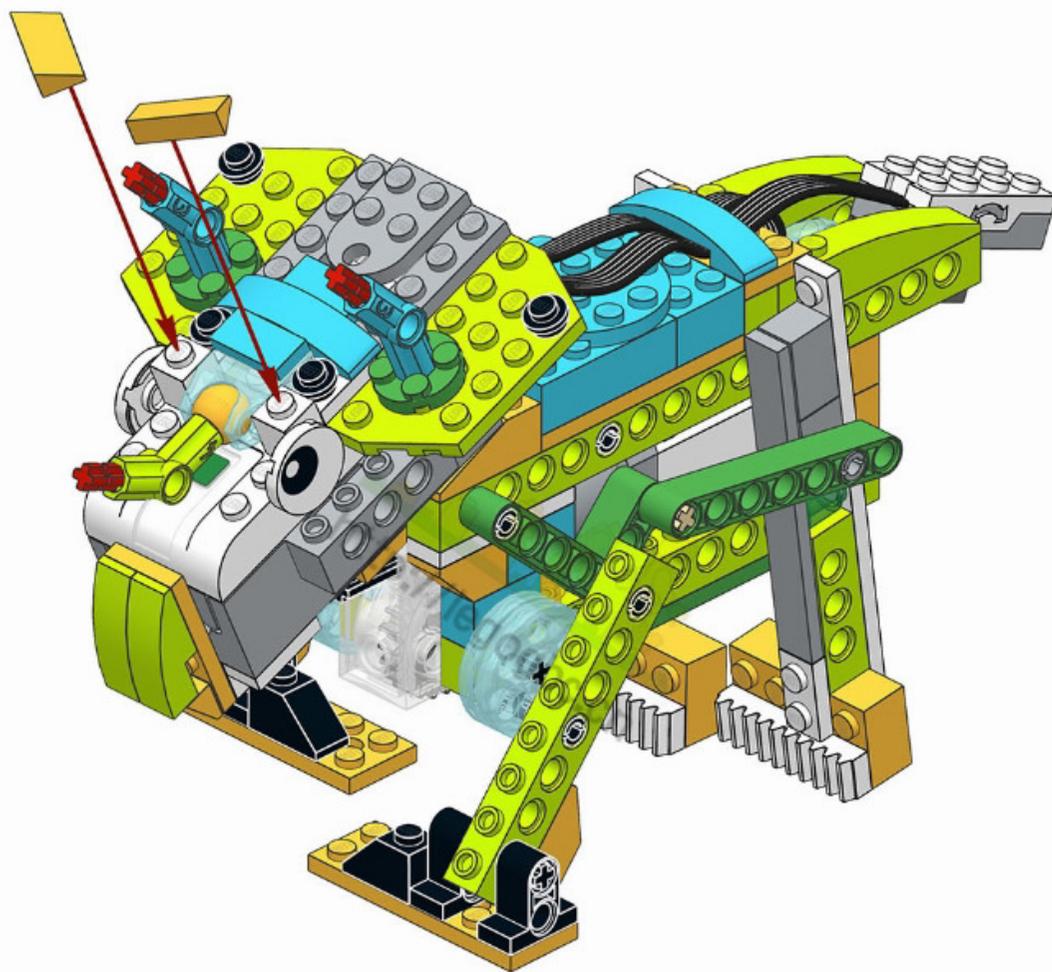


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2x

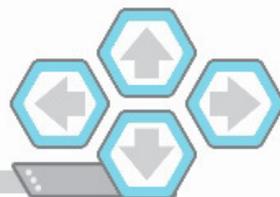
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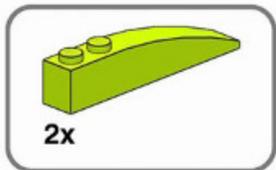
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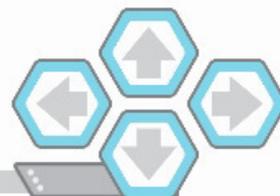
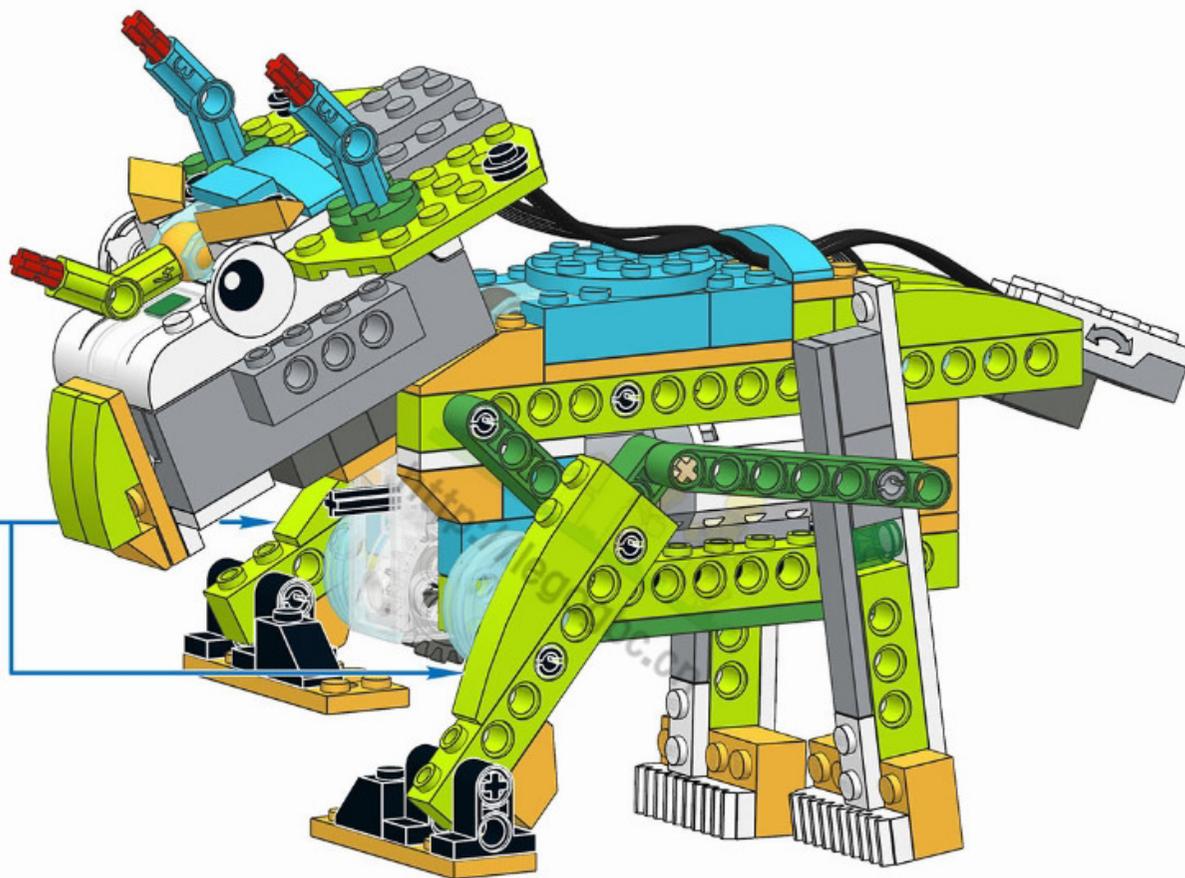
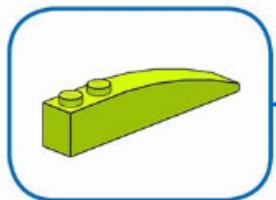


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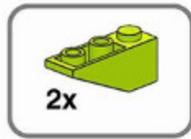
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82

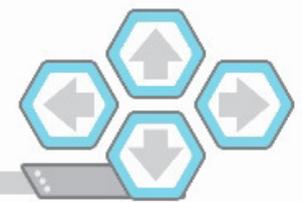
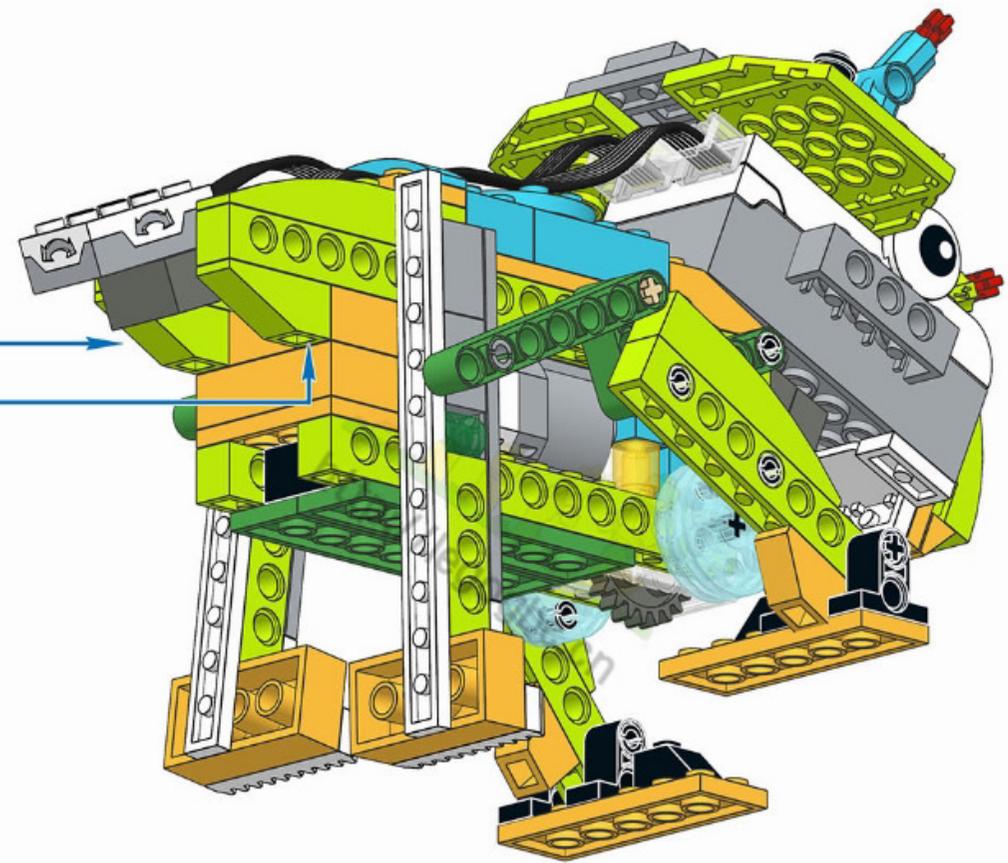
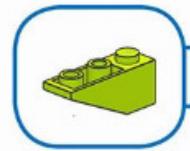




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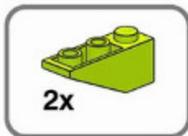


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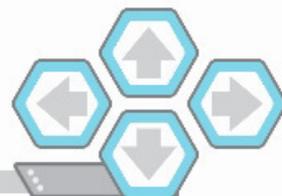
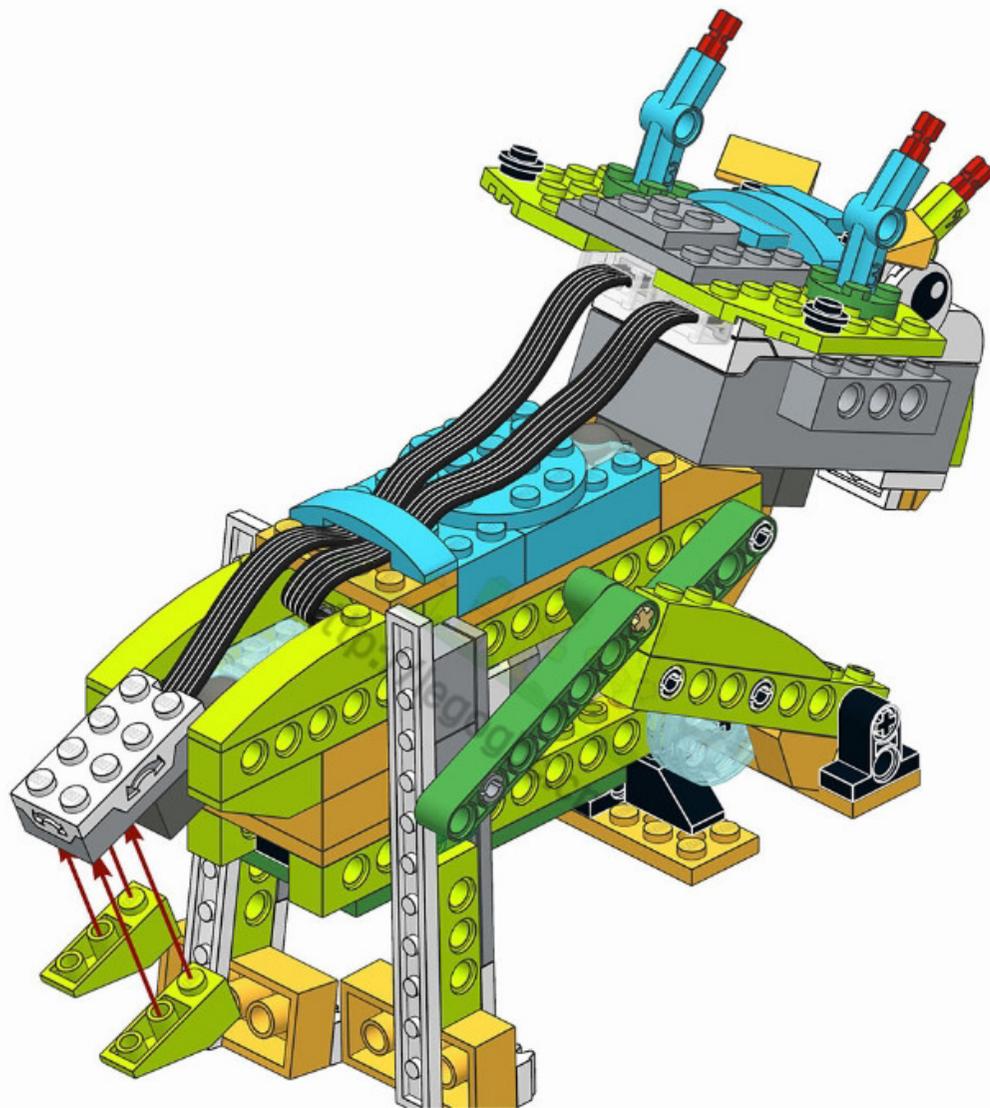




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4

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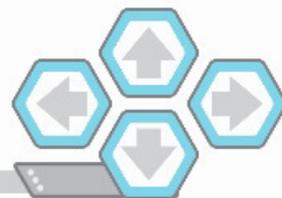
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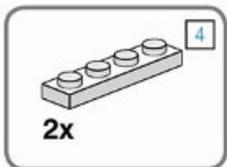
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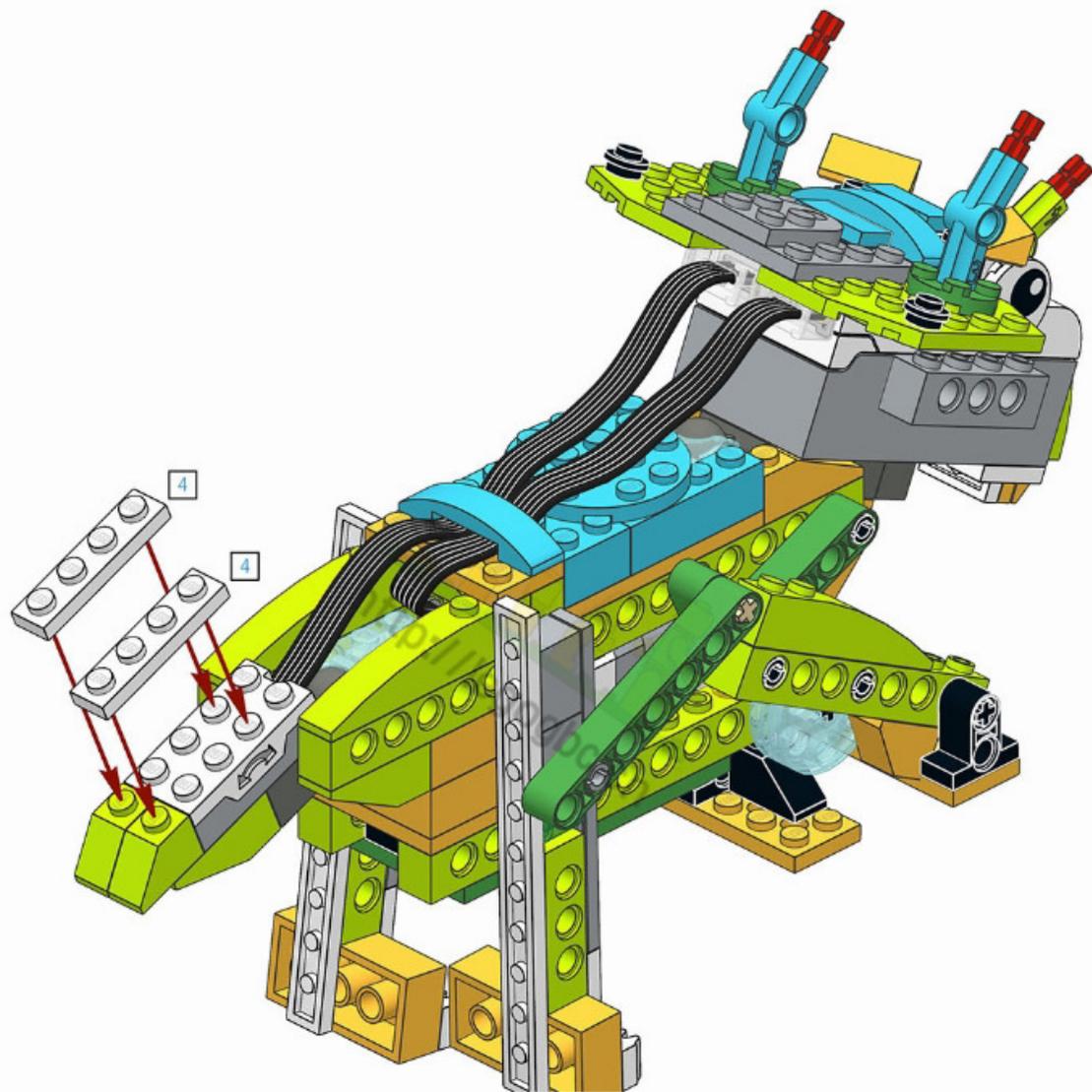




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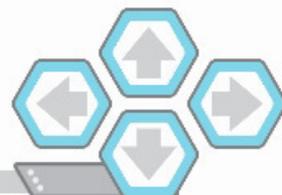
86



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4

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87



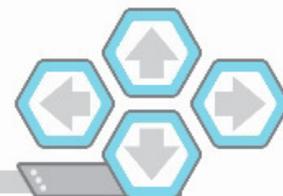
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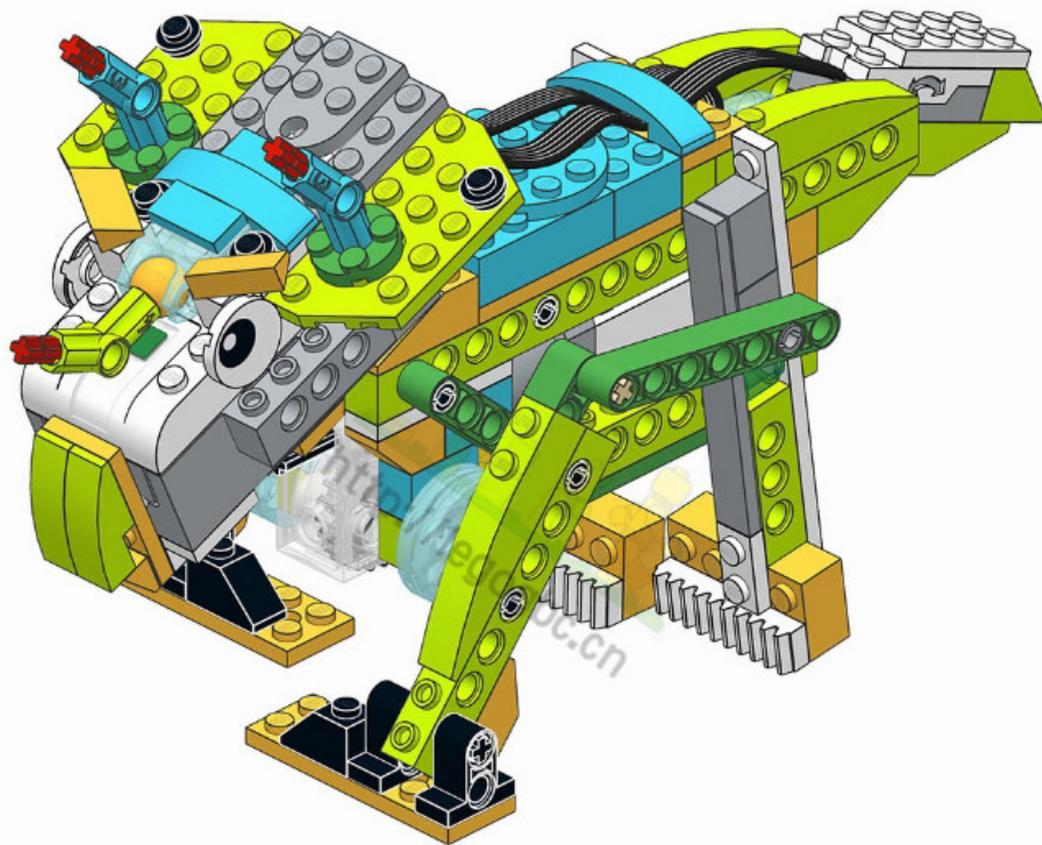
18/19

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88

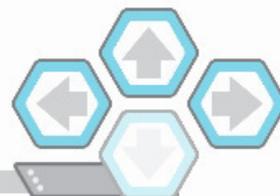


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4

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# Check it out!

Avoid any friction  
between the cables  
while robot is moving.



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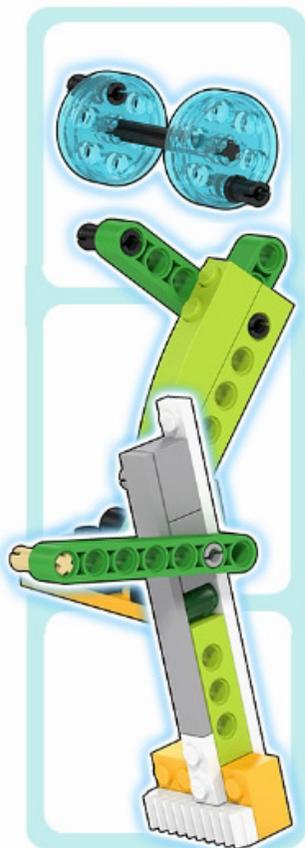




# Task



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Place parts of the robot on the right places



120



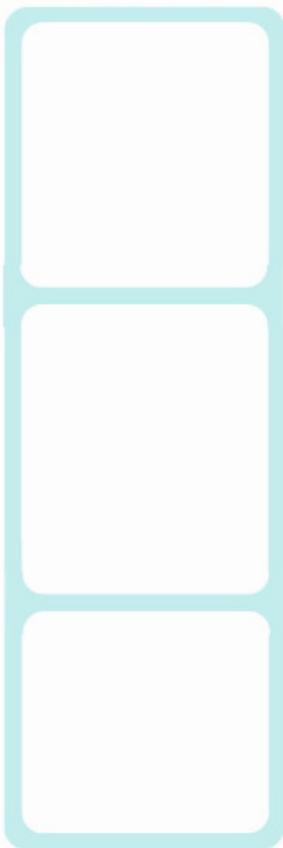


# Task



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Place parts of the robot on the right places



120





# Task 1

Program the robot movement for 10 seconds. Check the work of the mechanism.



<http://legogbc.cn>

Programming sequence: Play button, Motor icon, Motor icon, Motor icon with timer icon.

8	10
---	----

robotiseit.com



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Navigation icons: 7, 121, and a play button icon.

Navigation icons: Four directional arrows (up, down, left, right).



# Task 2

Program the control of the robot's speed by position of the tilt sensor:



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# Task 2

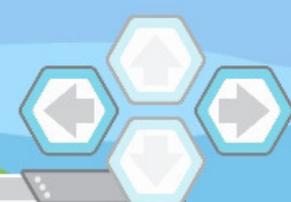
Program the control of the robot's speed by position of the tilt sensor:



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# Task 3

Program a change in the robot's direction, depending on the position of the tilt sensor:



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