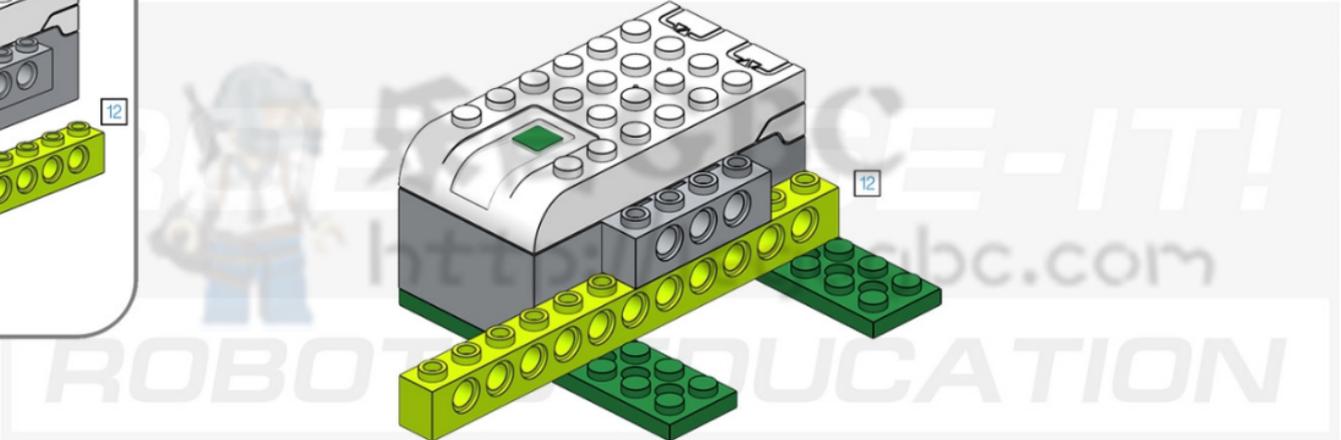
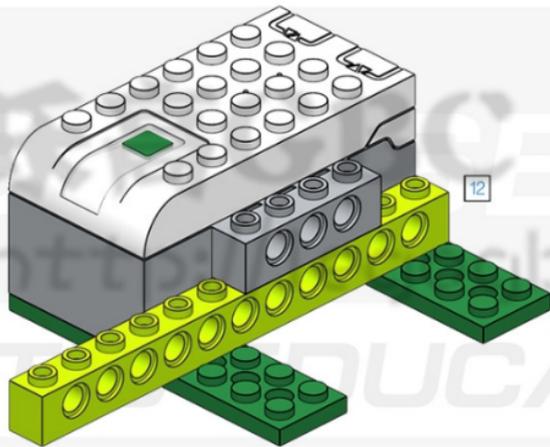
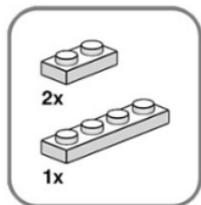
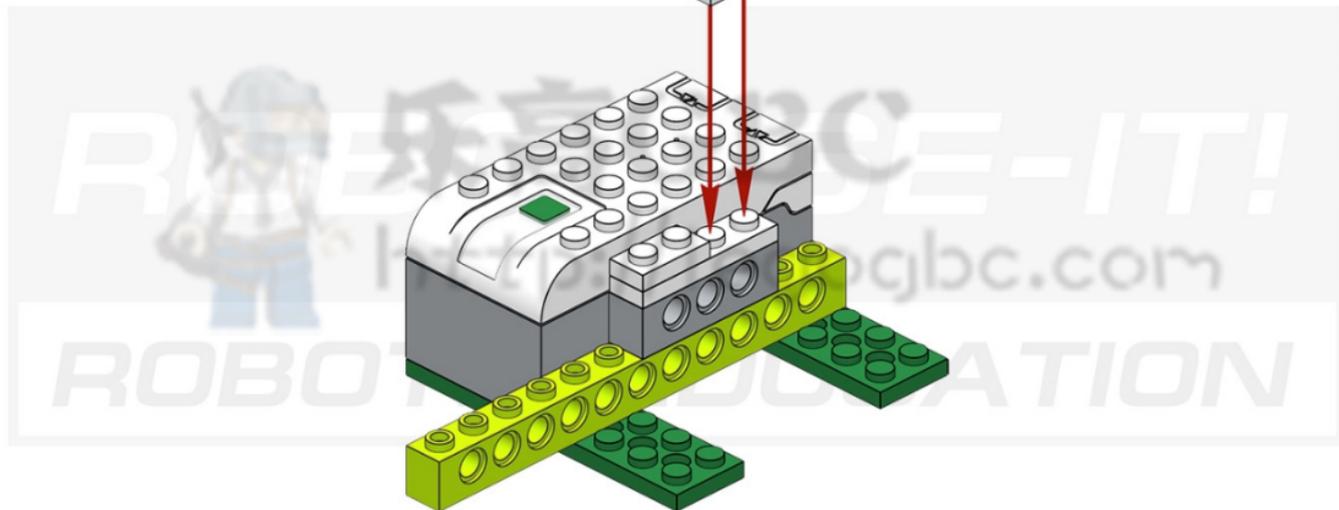


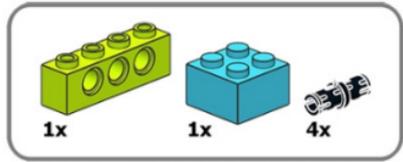
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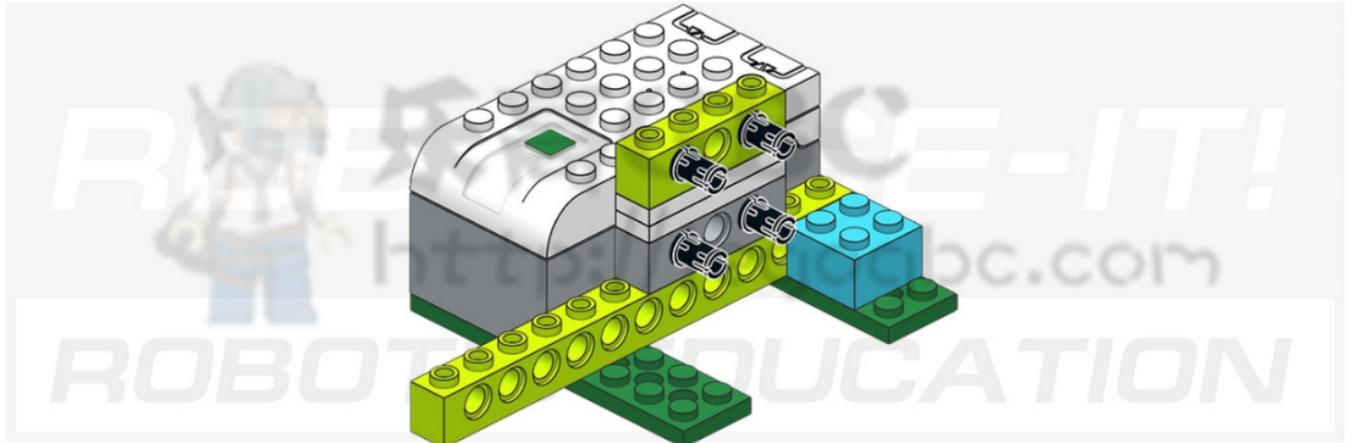


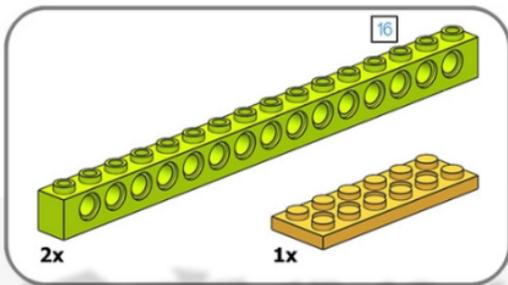
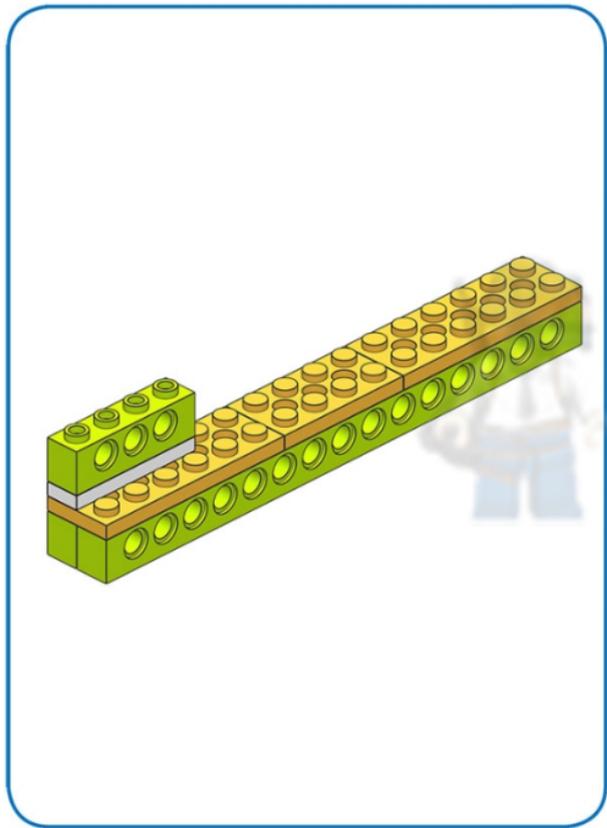
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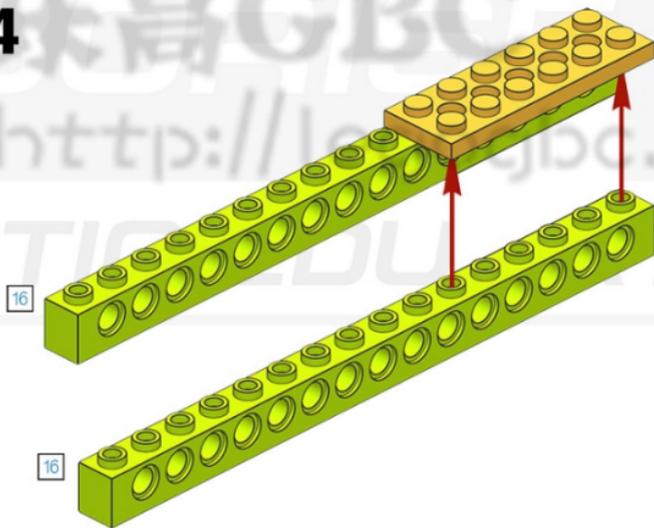


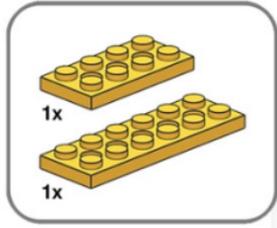
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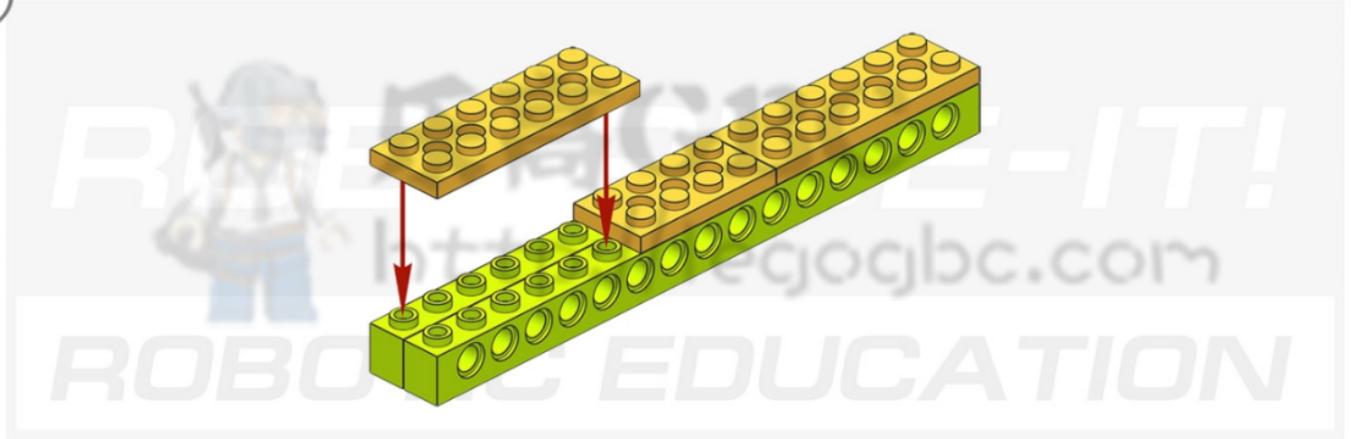


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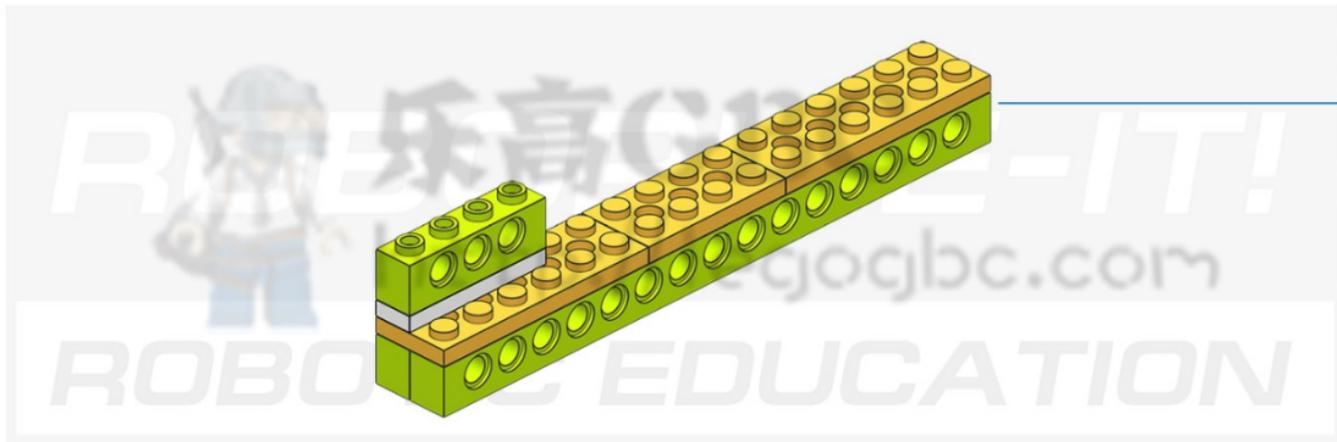


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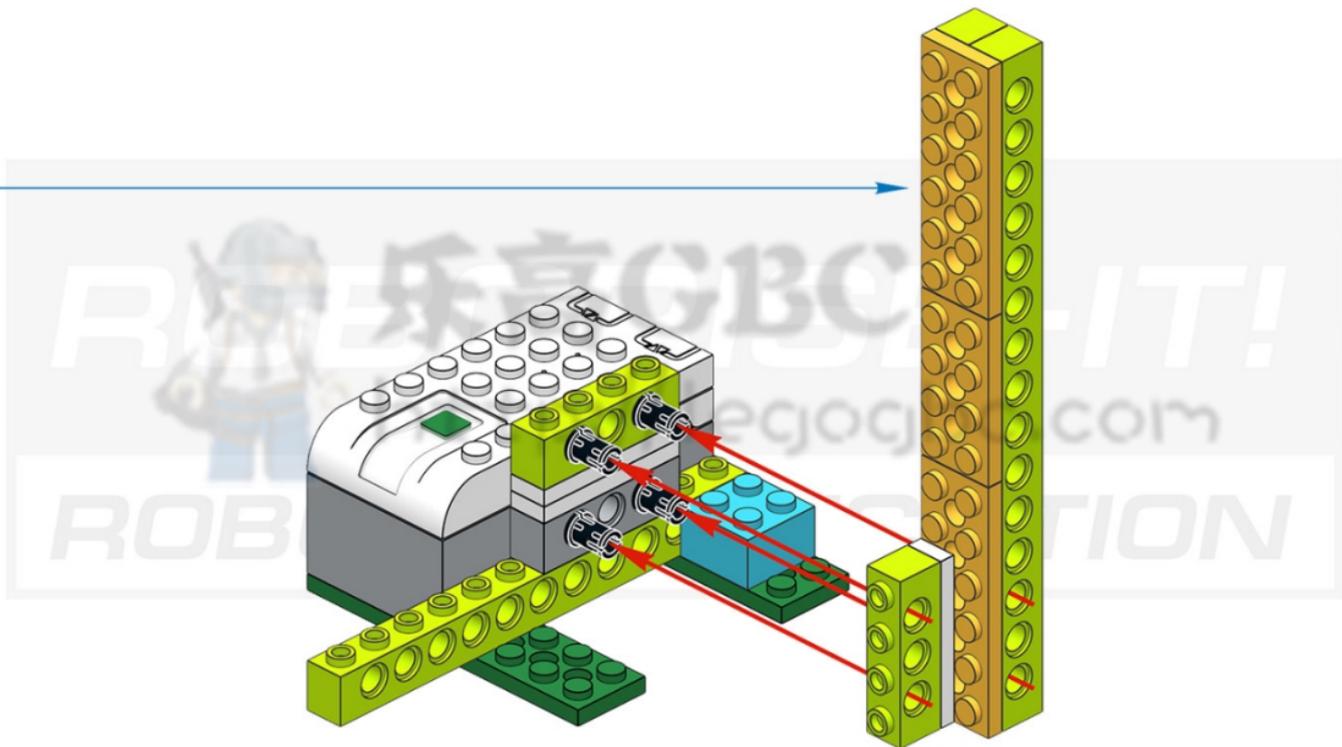


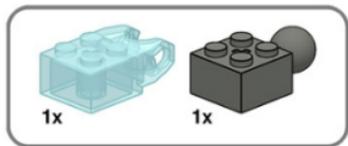


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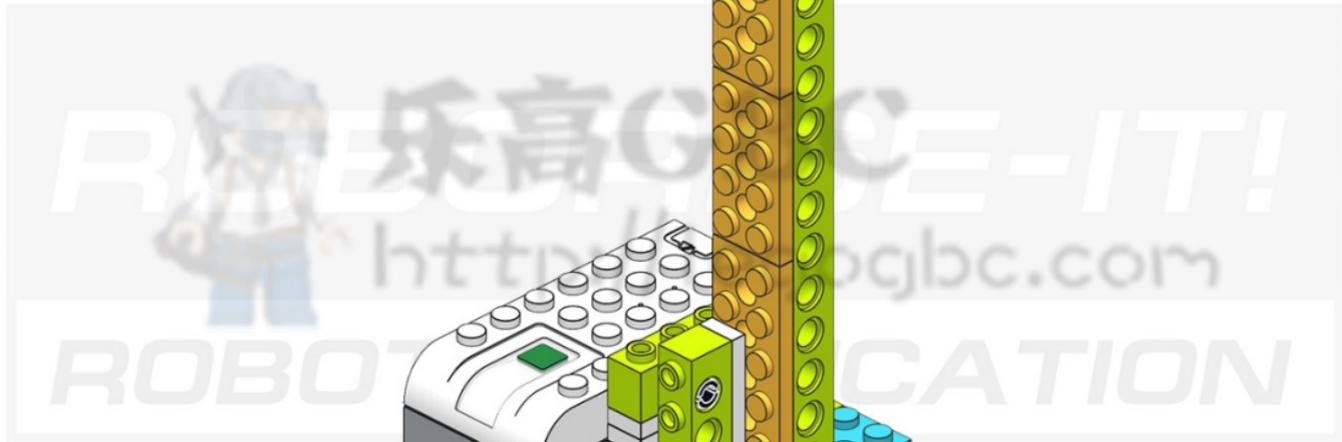
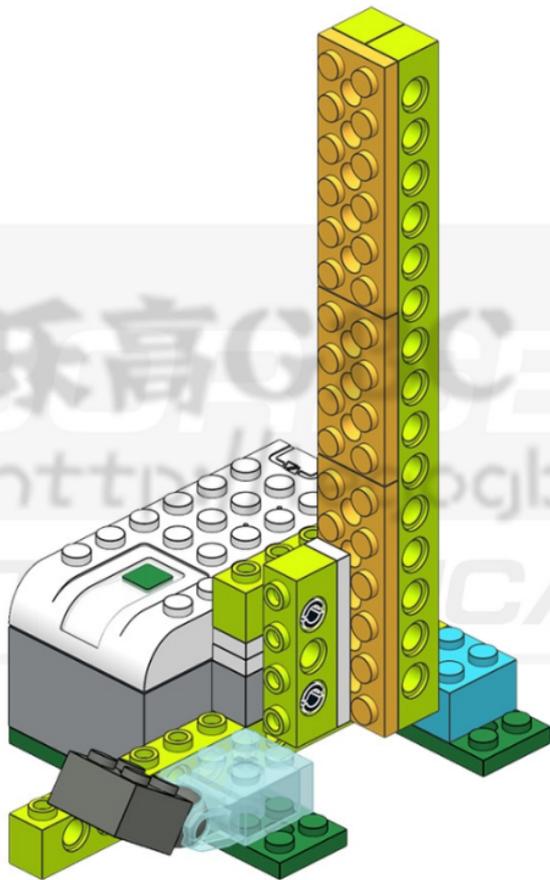


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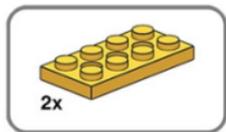




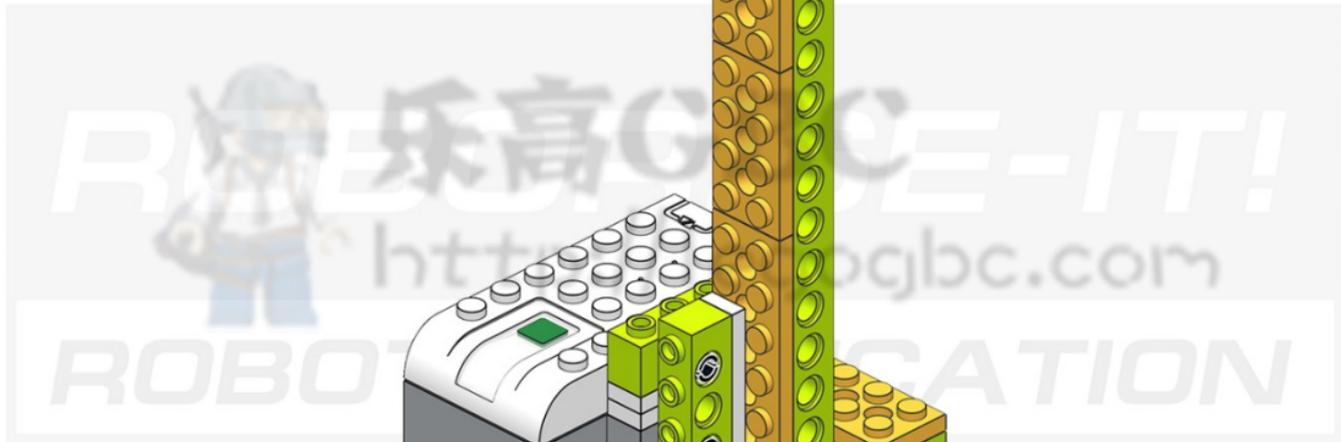
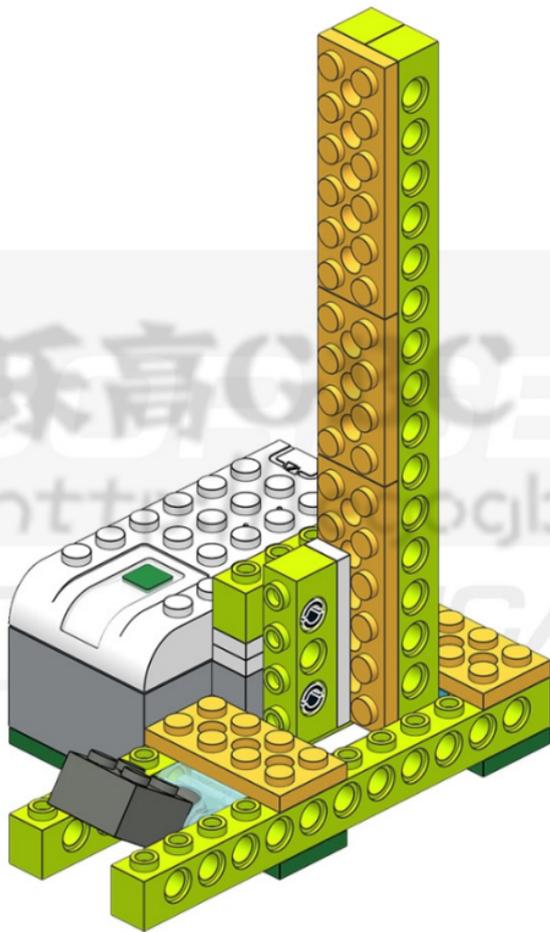
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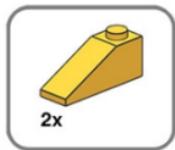




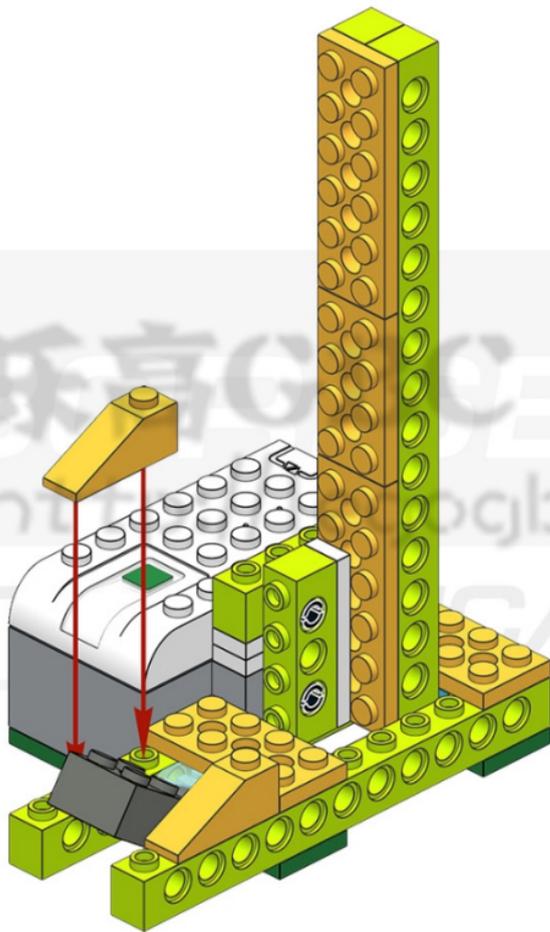


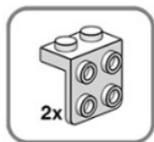
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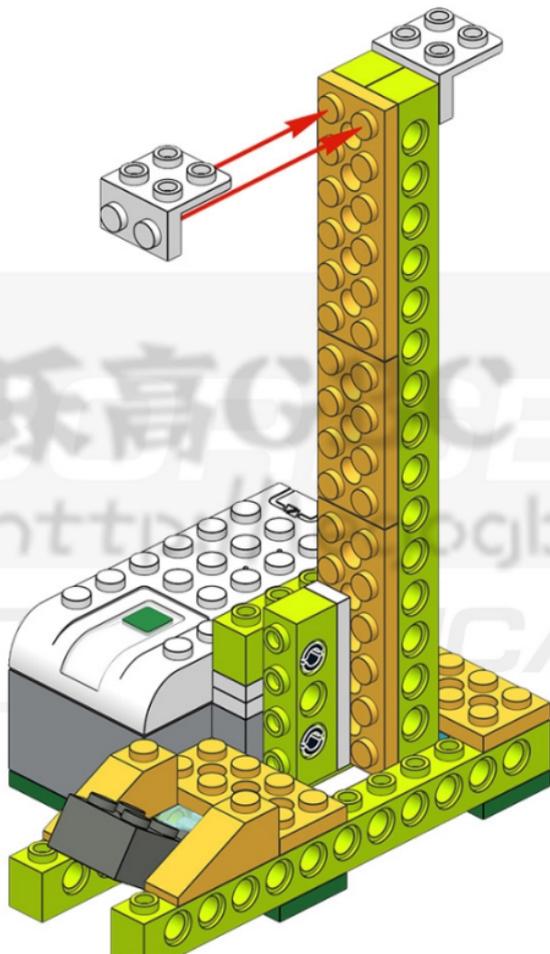
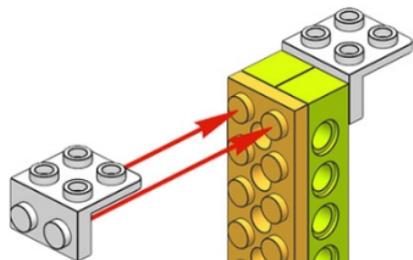


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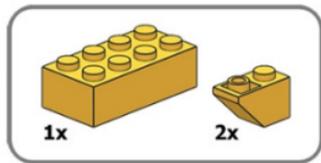


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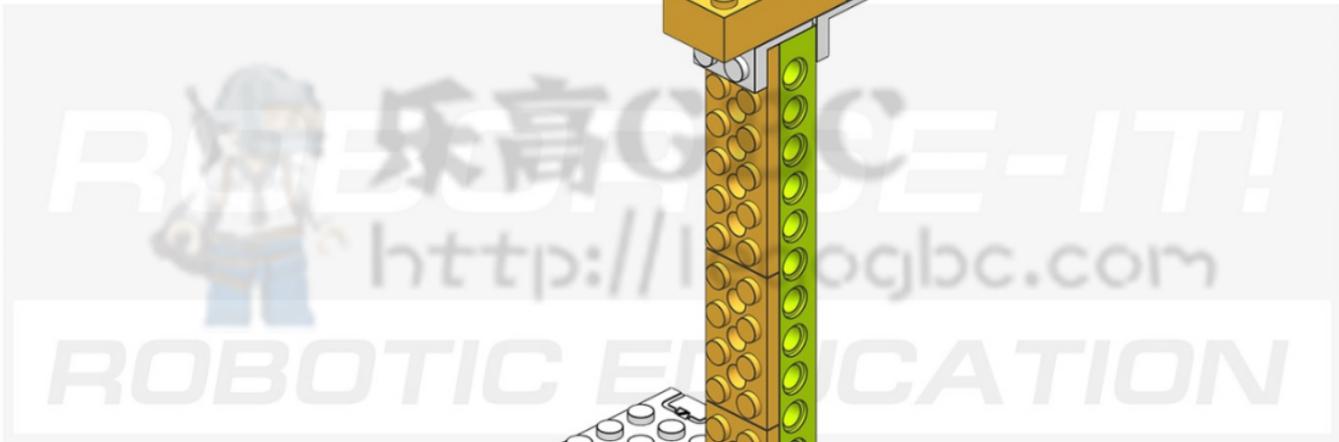
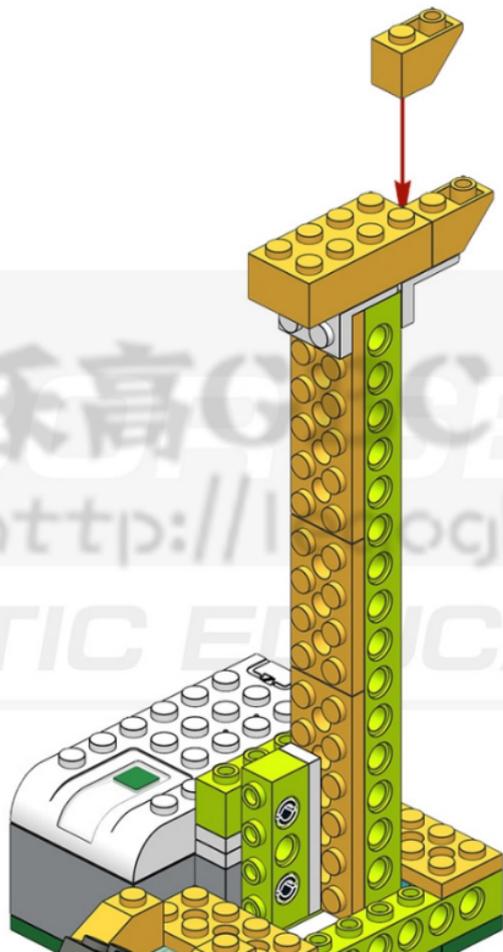


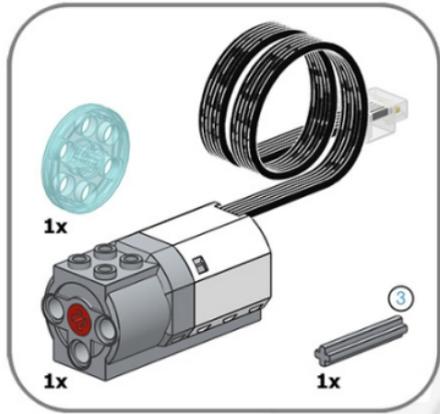
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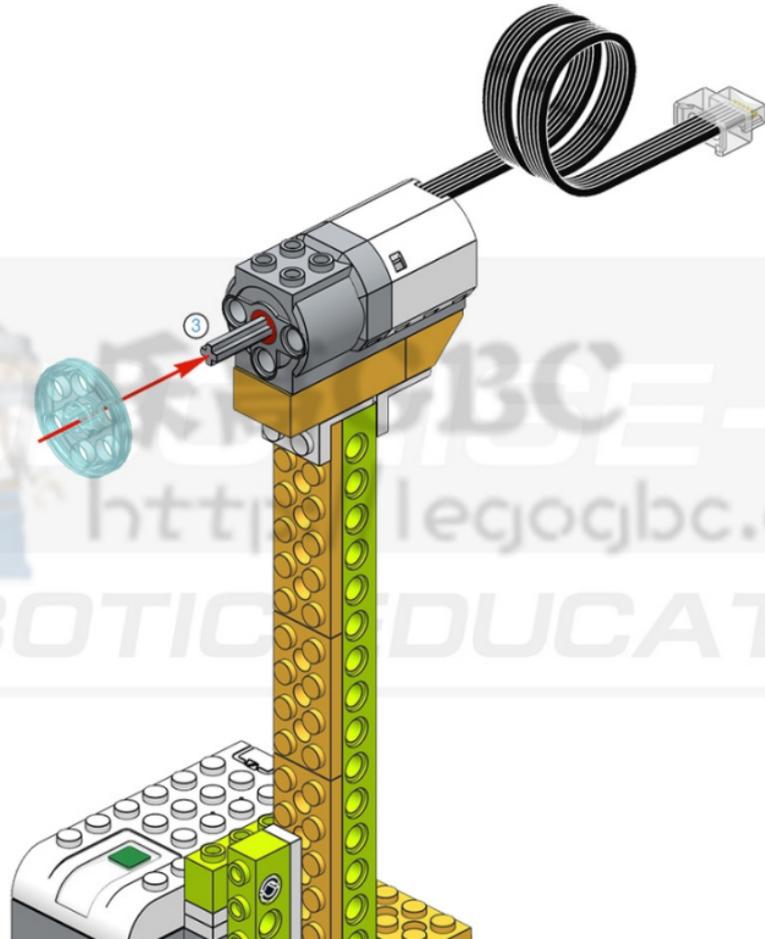


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16

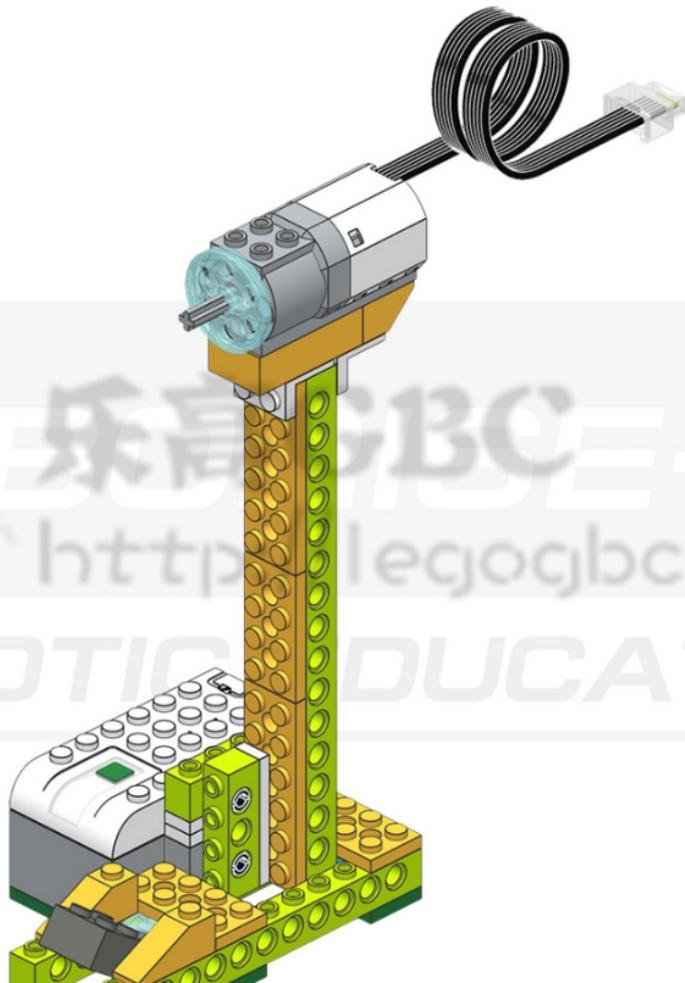


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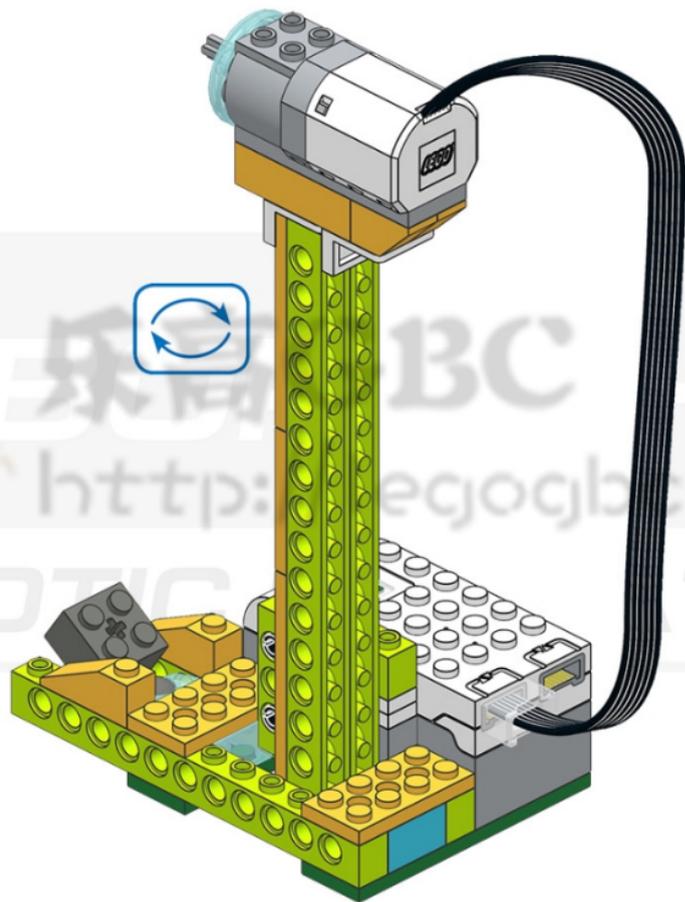
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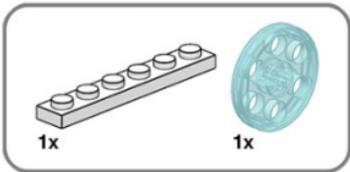
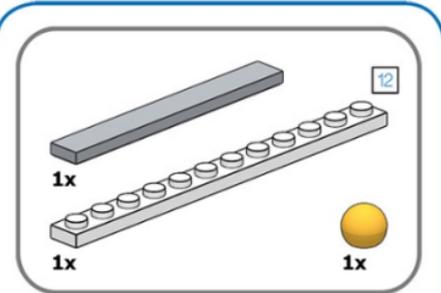
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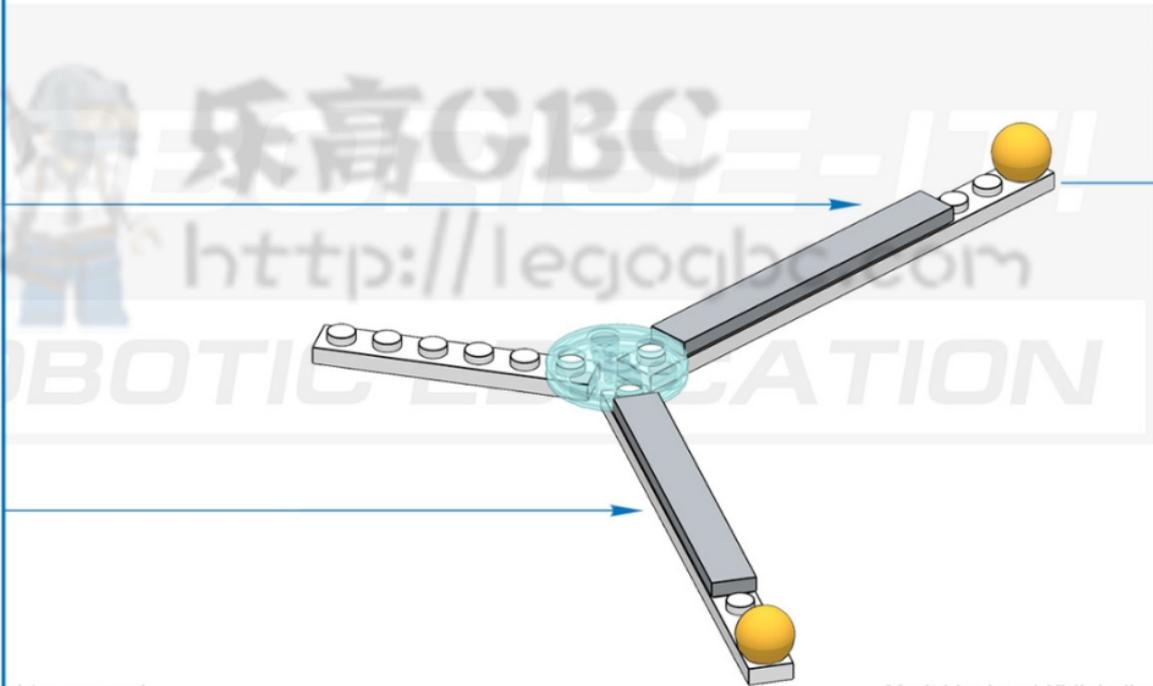
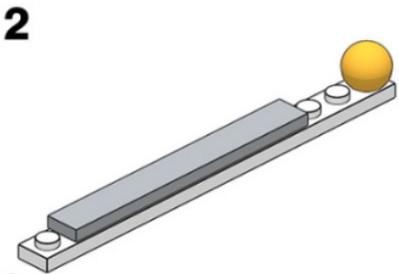
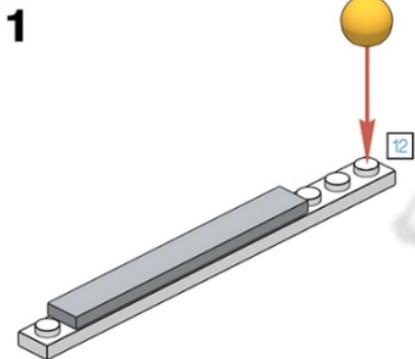
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18

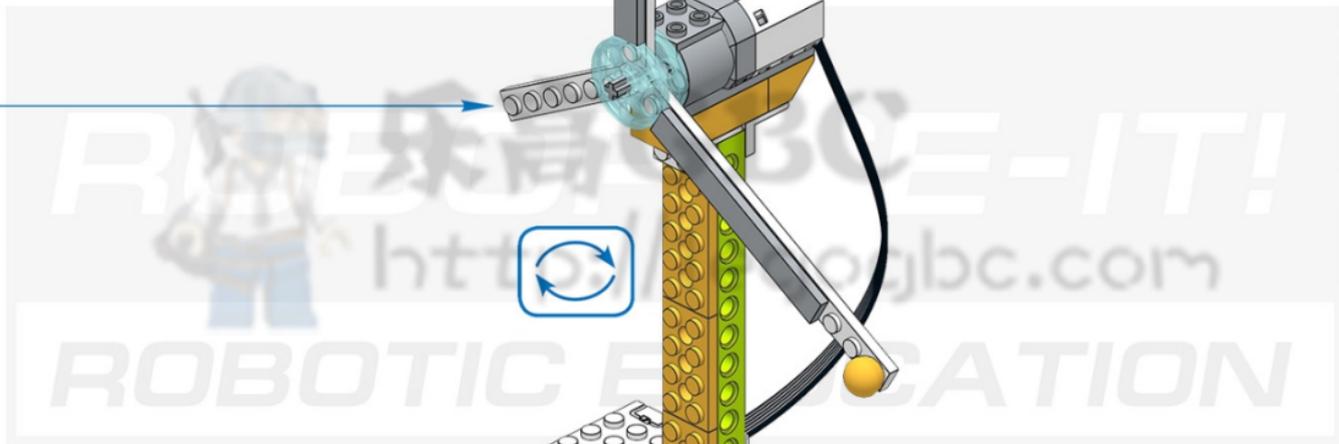
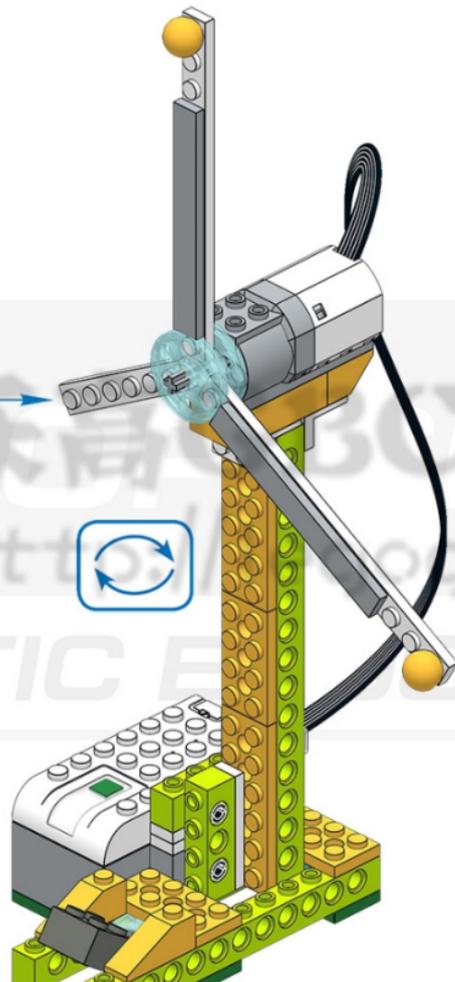


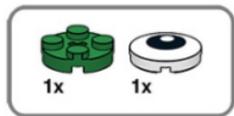


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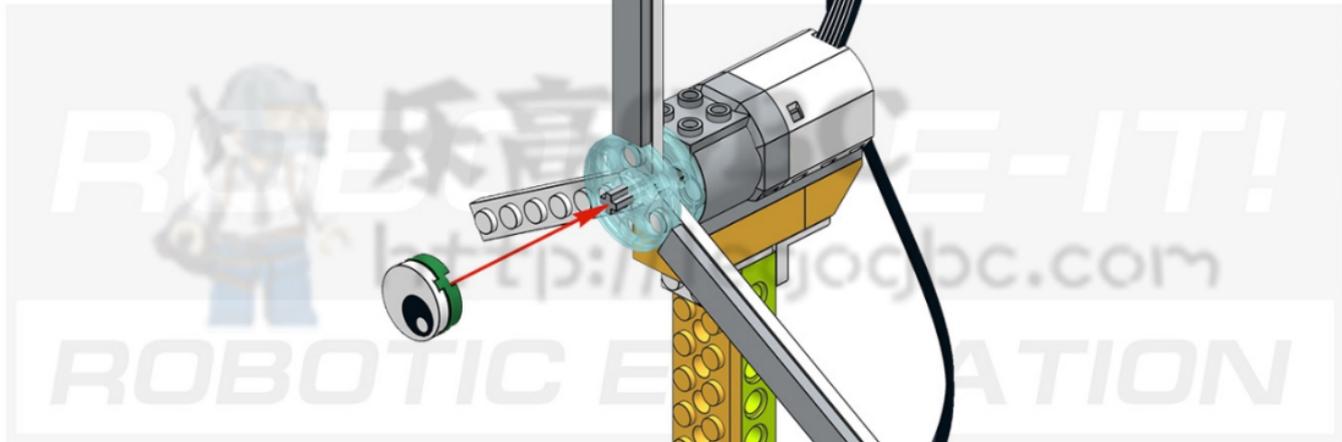
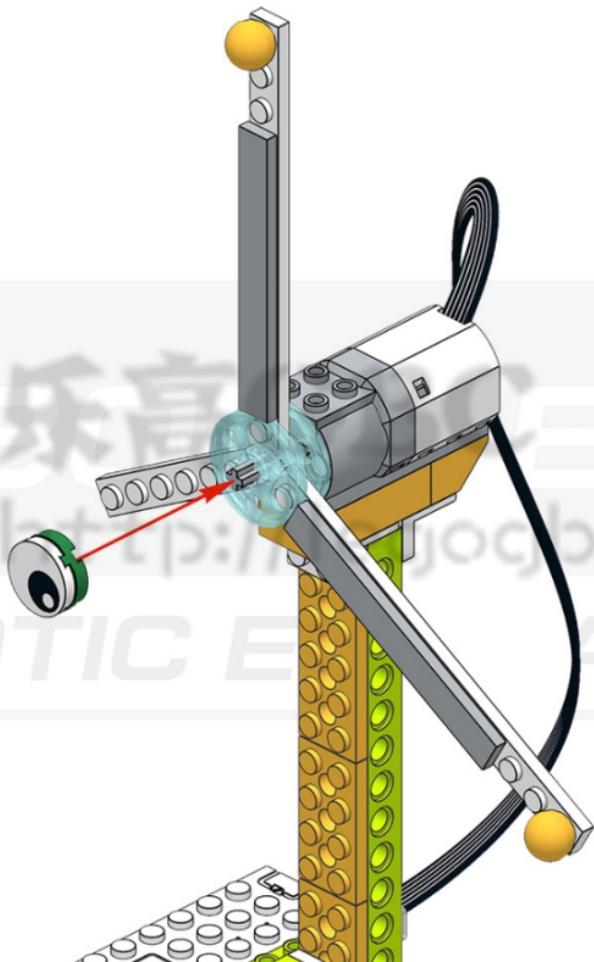


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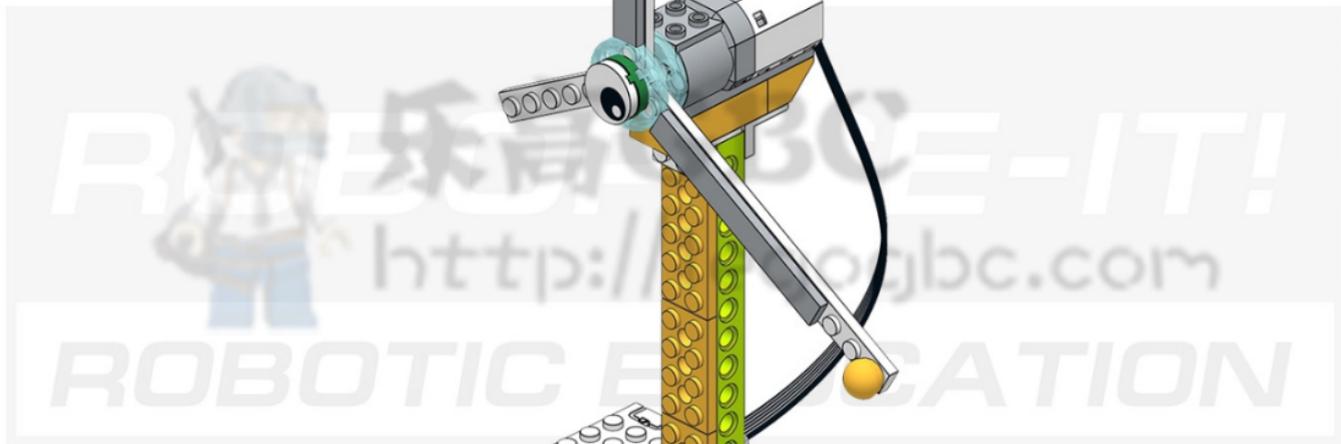
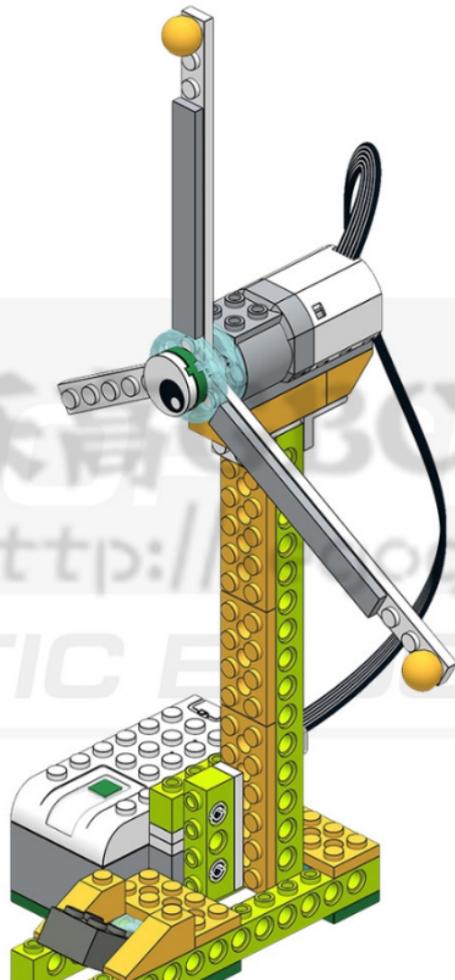




21



22





## Note!



The cables must not rub while the robot is moving!



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# Task 1

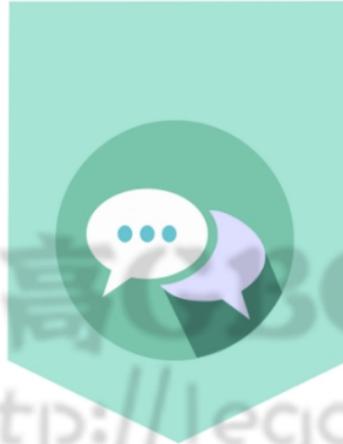


Turn on the rotation of the power plant propeller. Pay attention to the vibration that has arisen. Why do you think she appeared?





## Discuss!



Why does vibration occur when turning a broken propeller on? What needs to be done in order to avoid it?



## Task 2



Repair the broken propeller blade and retest. Assess the vibration of the tower. Has it decreased or increased?





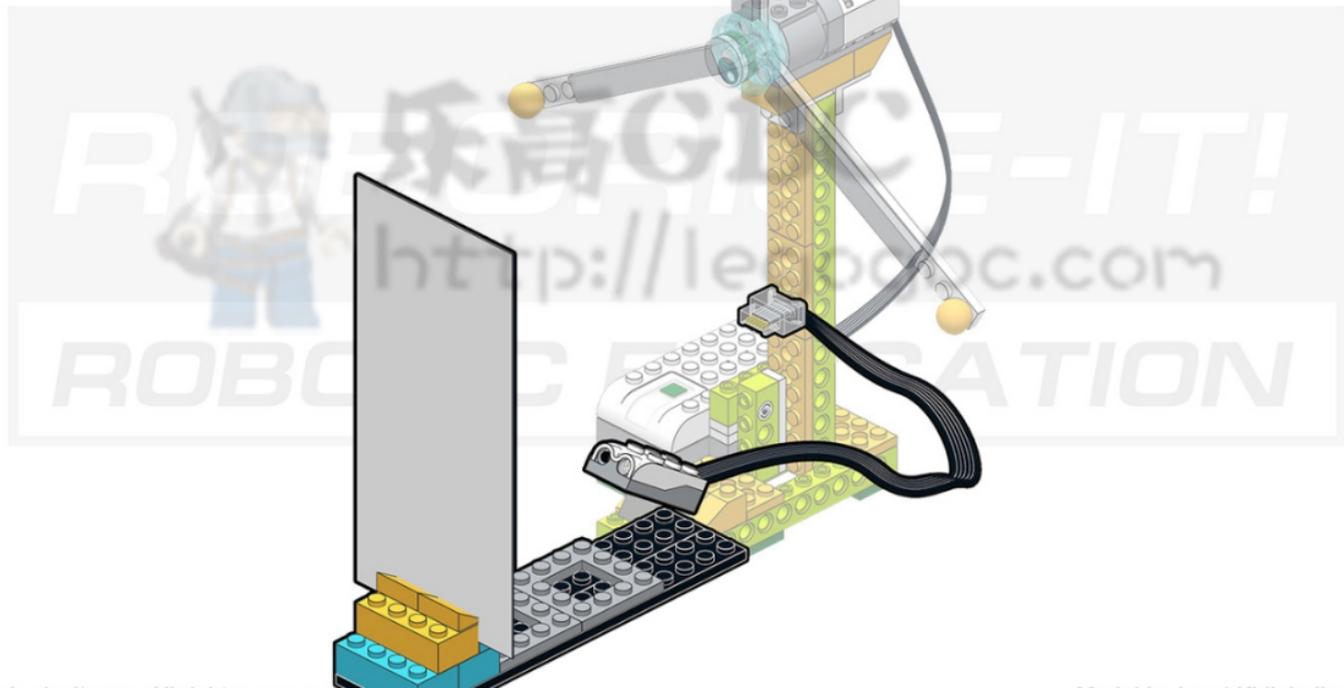
# Weather station



Complete a weather station that will protect the wind farm from overloads during strong winds.

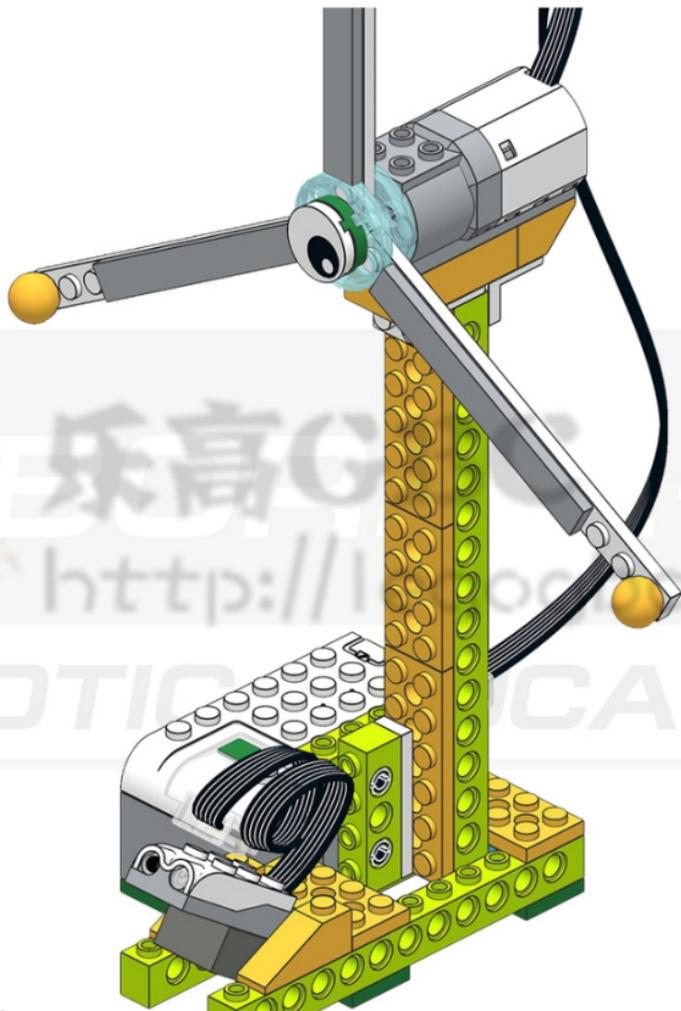


Go to the first slide of the instruction



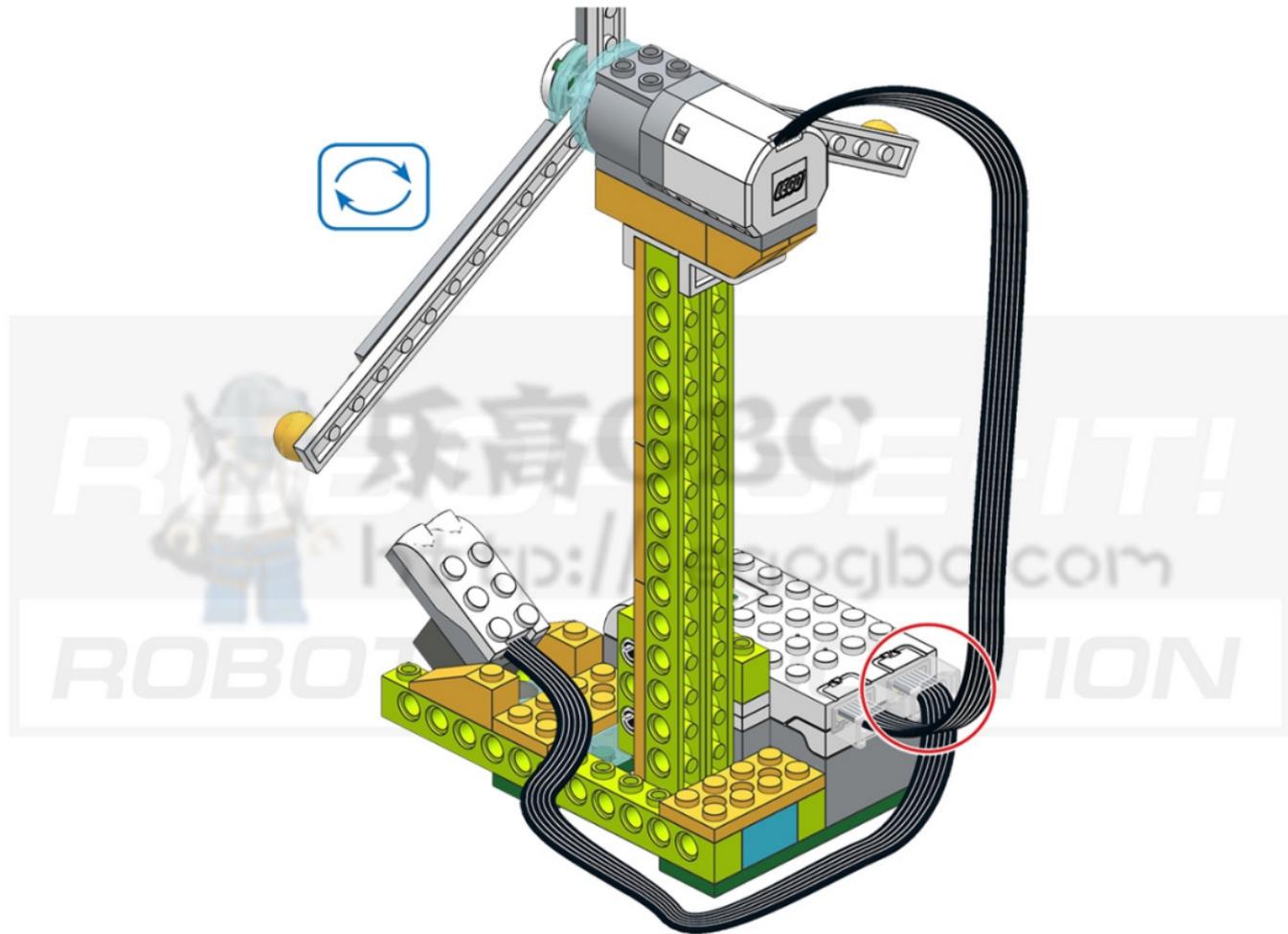


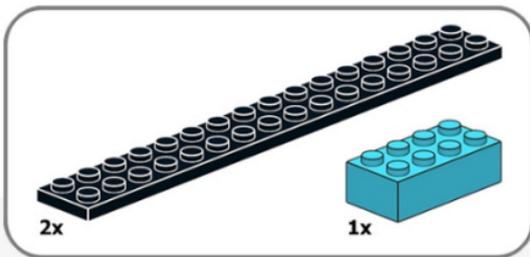
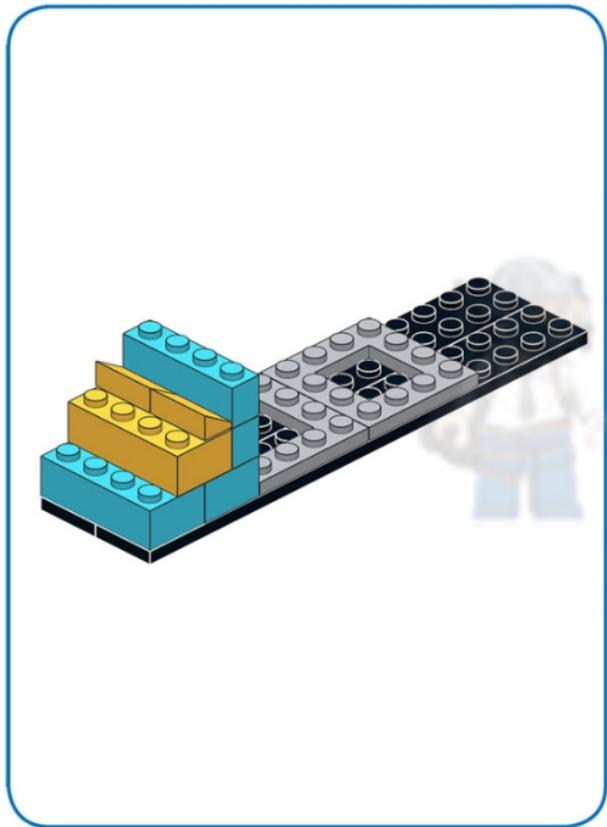
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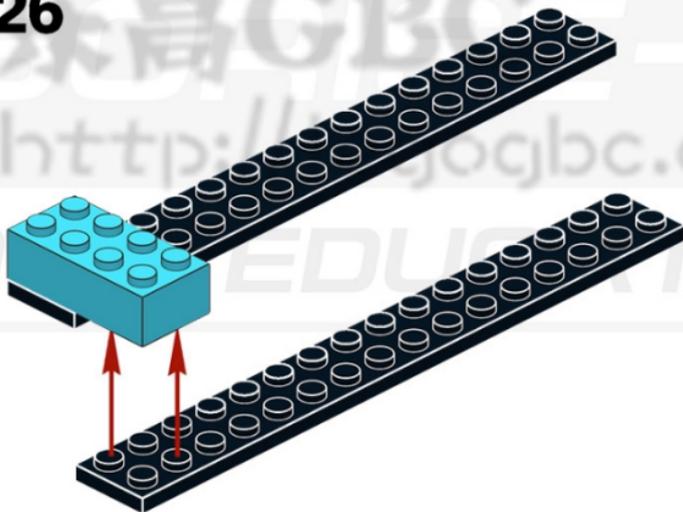
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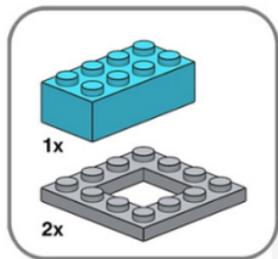




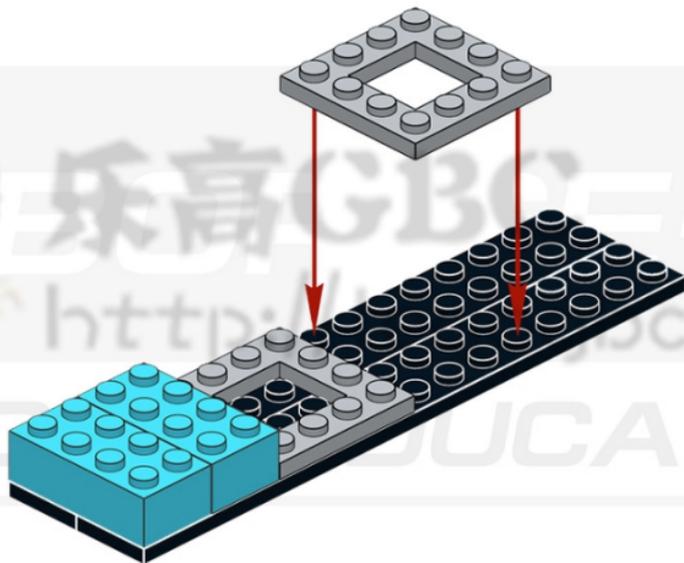
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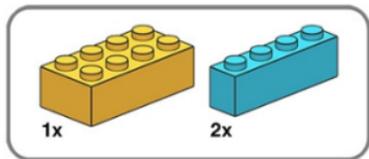
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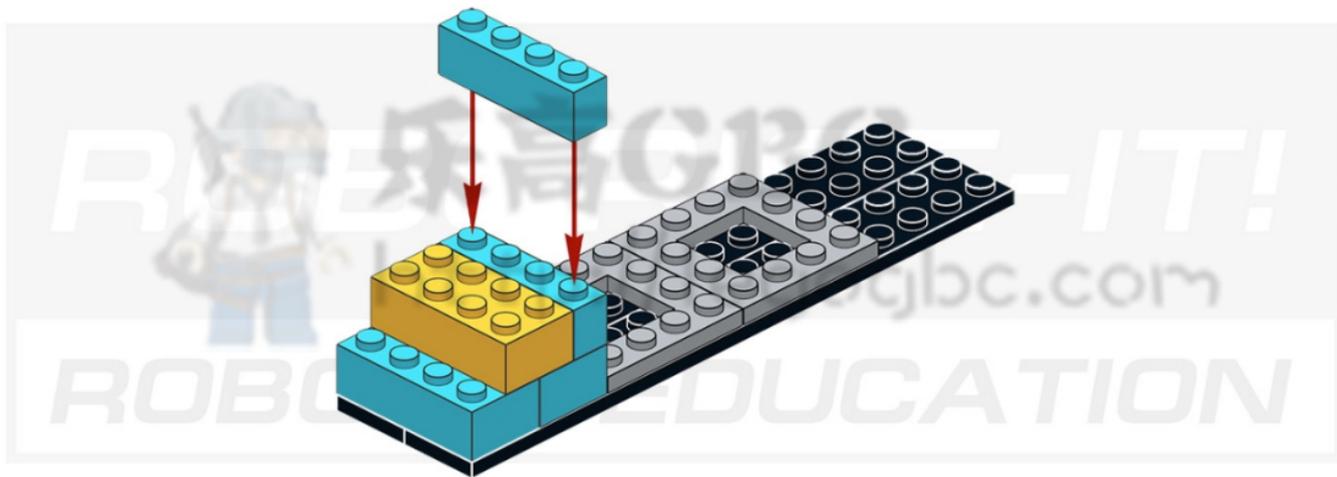
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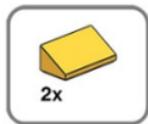


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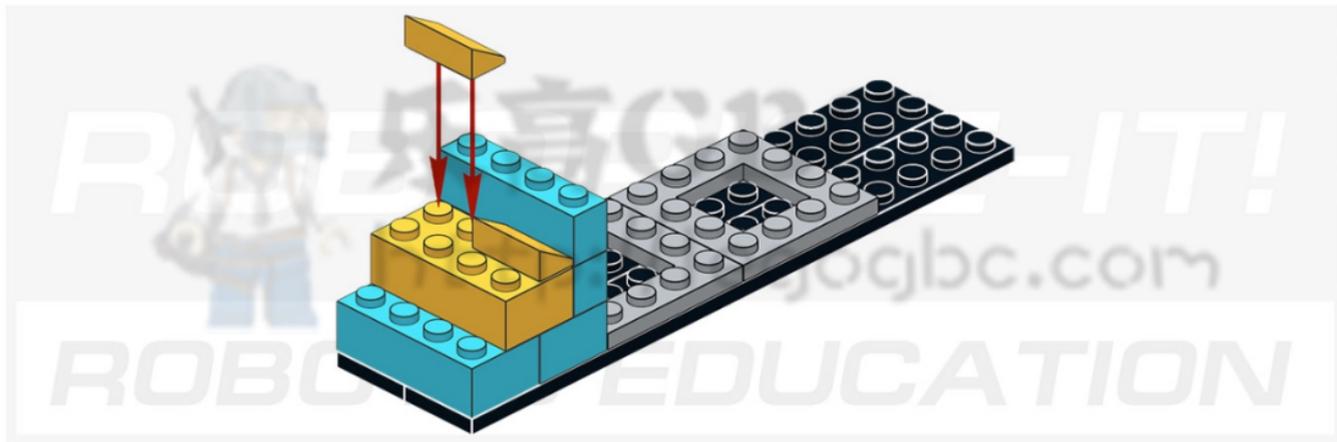


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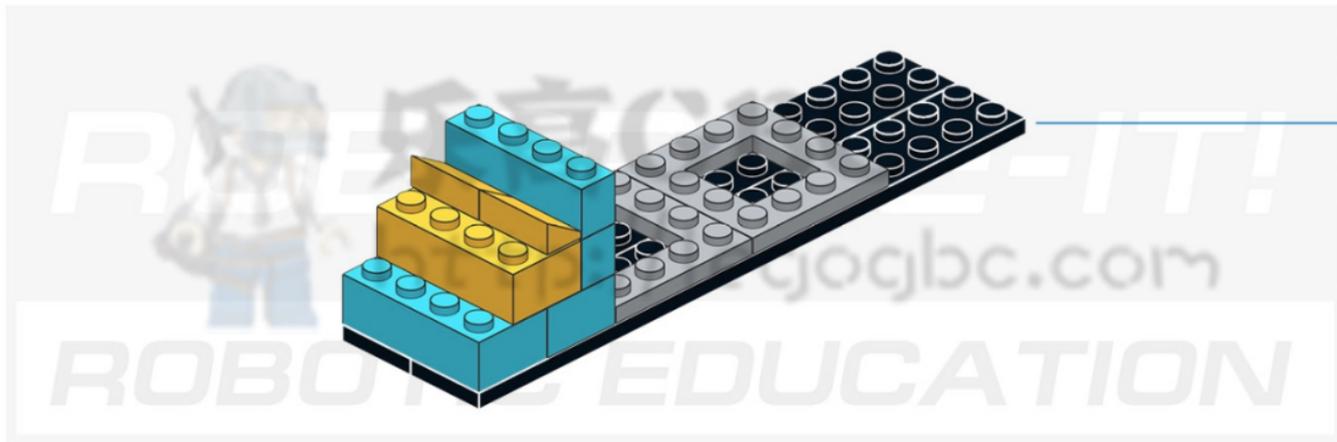




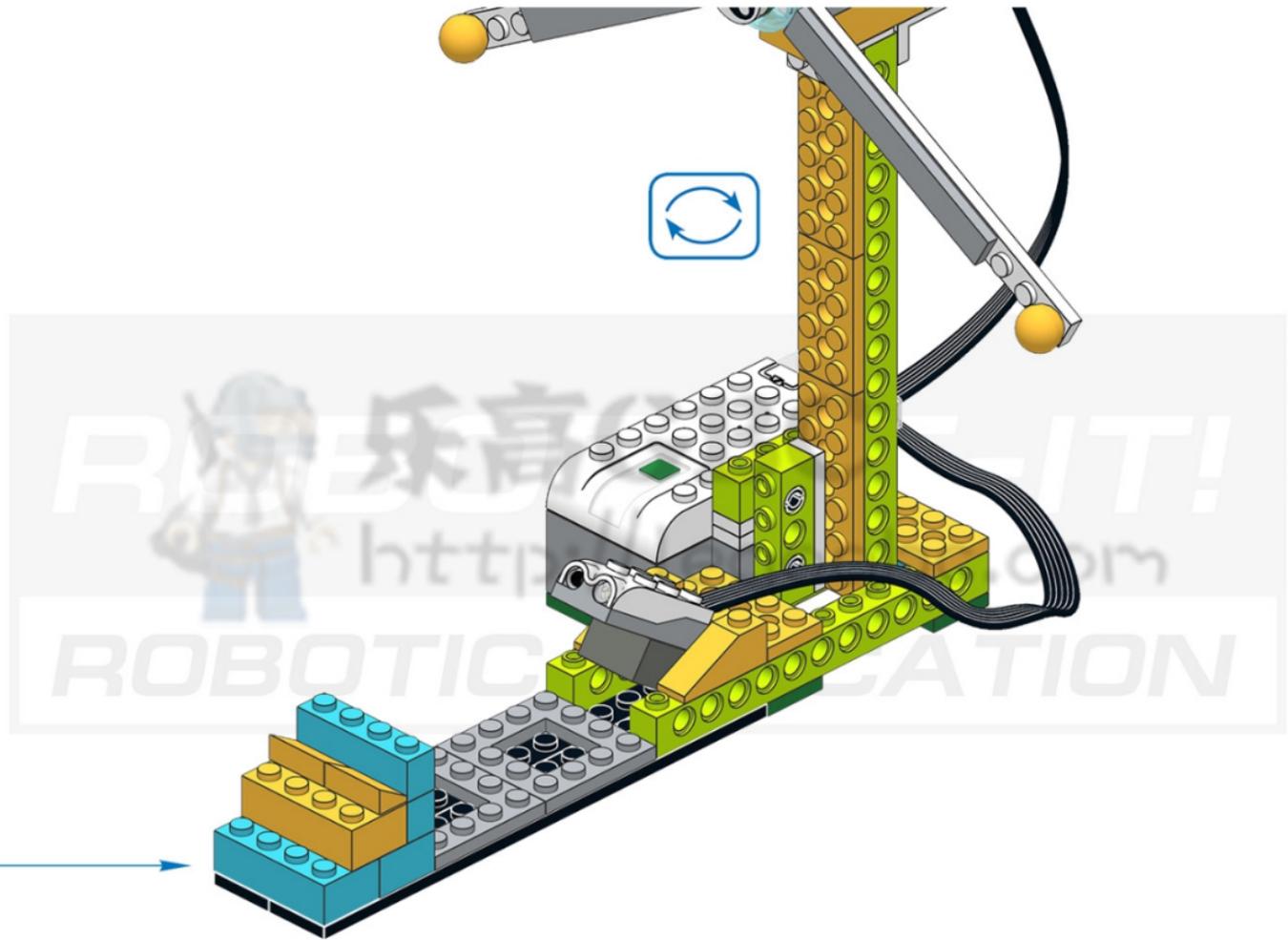
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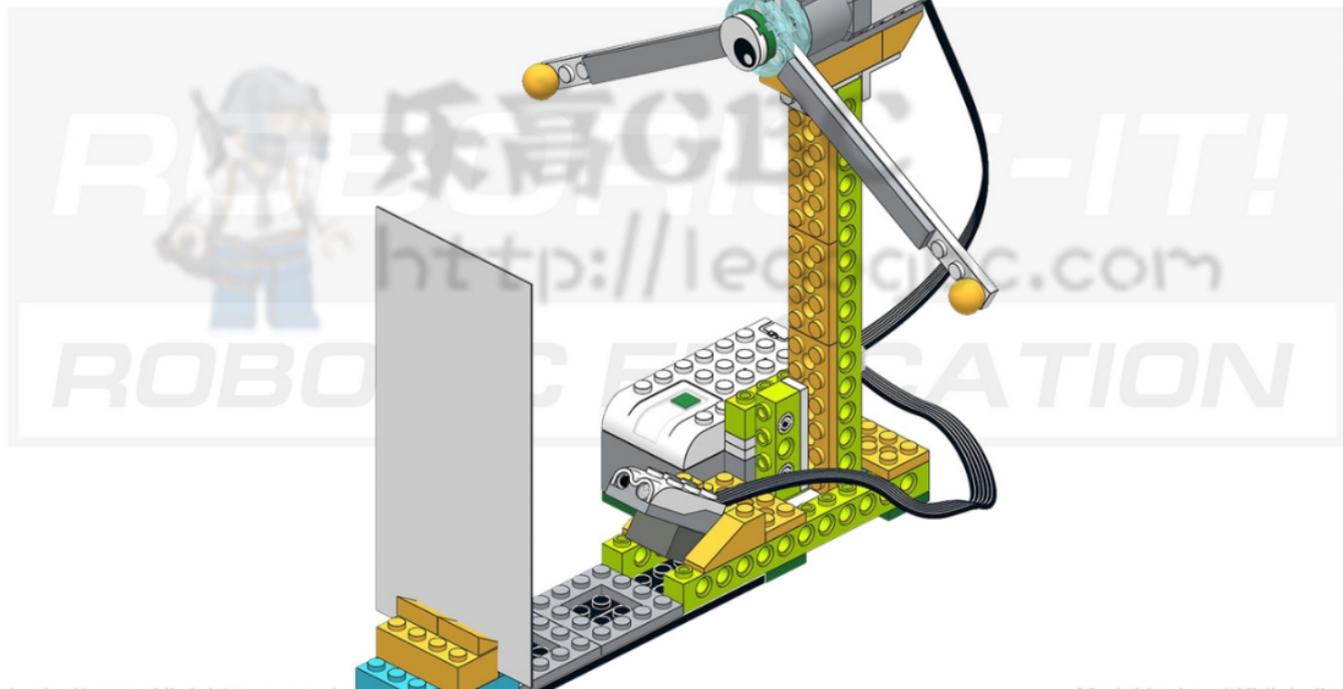
30



31



32





# Tasks

Place the robot parts in the correct places



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## Task3



Program the speed control of the propeller depending on the strength of the wind. In order to measure the wind speed, you can use the angle of inclination of a sheet of paper - the larger it is, the stronger the wind.





## Task 3



To complete the task, it is convenient to take a regular A4 sheet, cut a strip 50 mm wide and 230 mm long from it, and bend it in half.





## Task 3



Adjust the angle of inclination of the sensor so that in calm weather the sensor returns a value of 10, and during strong winds - 0.





## Task 3



Program the change in the propeller rotation speed depending on the wind strength.





# Task 3. Program



Scratch



WeDo Software



Program the propeller speed to match the wind speed

In the Scratch 3.0 programming environment, the program looks like this:





# Task 3. Program



Scratch



WeDo Software



Program the propeller speed to match the wind speed

In WeDo Software, a similar program looks like this:

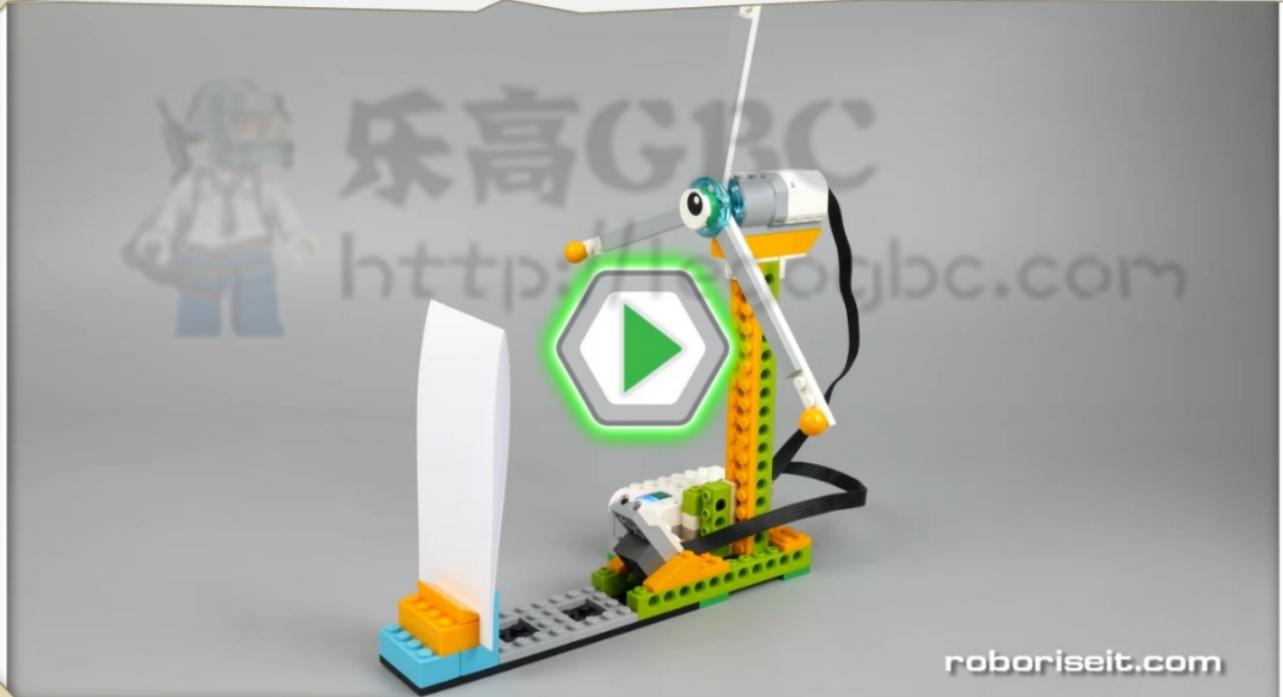




## Task 4 \*



Program the propeller to stop during strong winds. This will save the power plant from destruction during a hurricane.





# Task 4 \*. Program



Scratch



WeDo Software



Modify the main program as follows and add the programs to stop the propeller in strong winds.

In the Scratch 3.0 programming environment, the program looks like this:





# Task 4 \*. Program



Scratch



WeDo Software



Modify the main program as follows and add the programs to stop the propeller in strong winds.

In WeDo Software, a similar program looks like this:





# Virtual testing



Change the wind speed and watch the change in sensor data and propeller speed

THE POWER OF  
THE WIND

0



SENSOR DATA

10

Rotational speed

0





## Task 5 \*



Program the color indication of the power plant operation status. In strong winds, the backlight LED should flash red.



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# Task 5. Program



Scratch



WeDo Software



Modify the programs you have written as follows:

when clicked

forever

if



distance =

100

or



distance <

20

then



turn

motor

off



set light color to

100

else



set

motor

power to

100 -



distance



set light color to

50





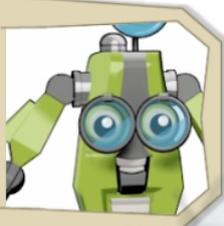
# Task 5. Program



Scratch



WeDo Software



Modify the programs you have written as follows:

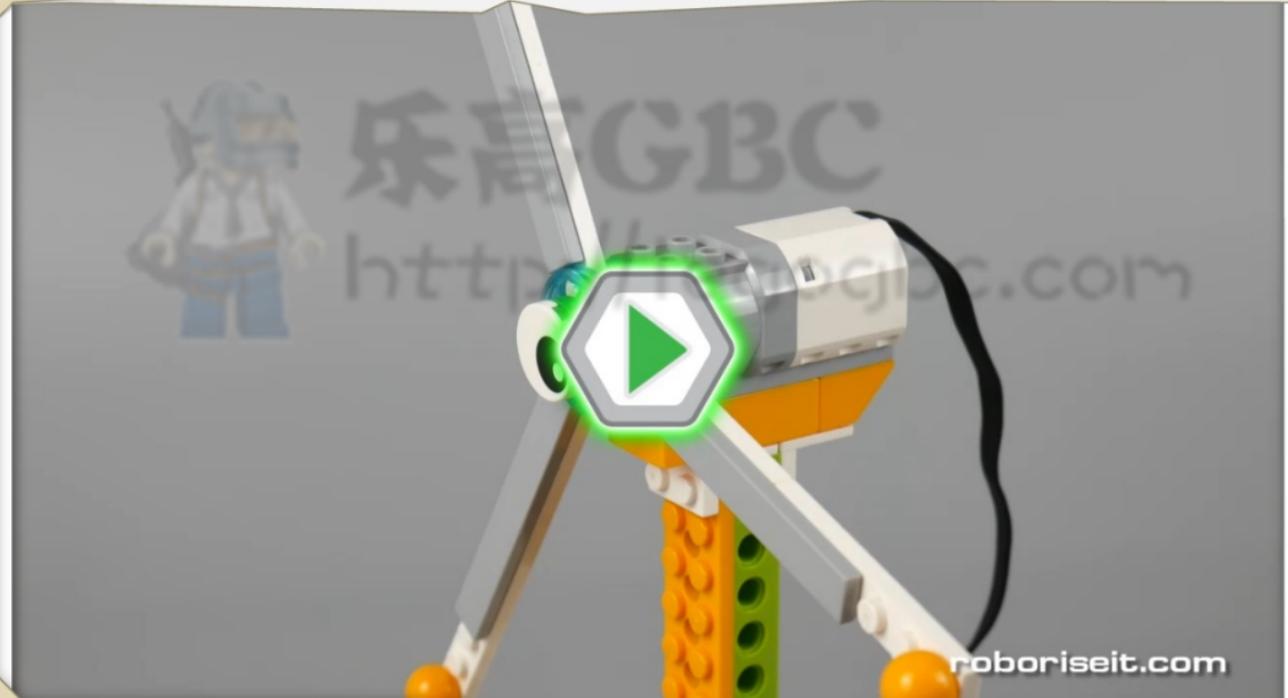




## Task 6 \*

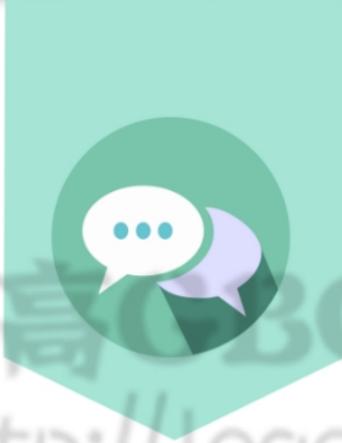


Wind power plants with a horizontal generator axis must return in order to always be directed towards the wind. Modify the design so that your robot also has this capability.





## Discuss!



Return the power plant propeller 90 degrees from its original position. Will it rotate if you blow on a piece of paper from a weather station?



## Discuss!



Your robot simulates the operation of a wind power plant and its motor rotates the propeller at a speed corresponding to the strength of the wind. And how is the conversion of energy into a real wind farm?



# Question



Which of the pictures shows the strongest wind force?



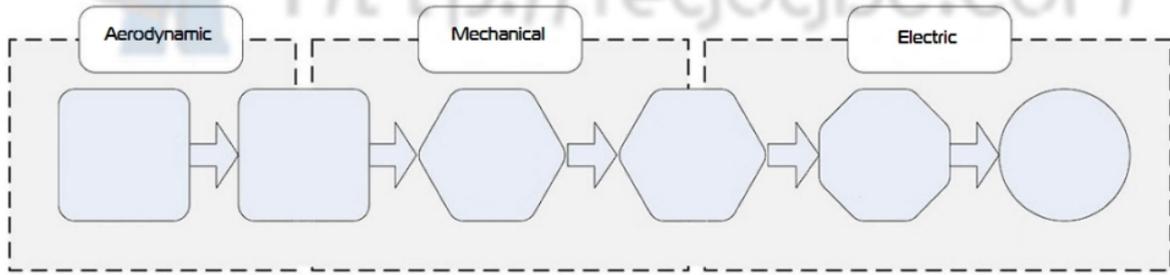
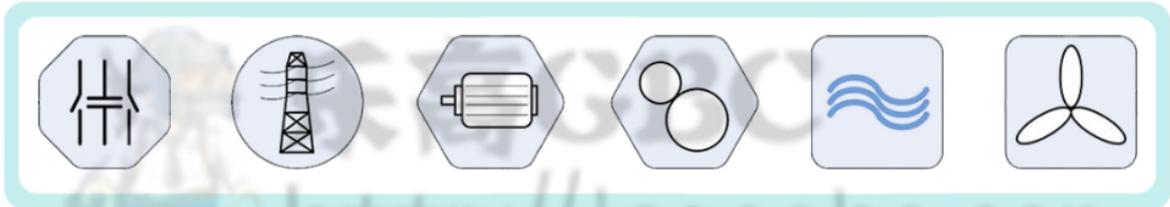
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# Tasks



Create a logical chain that describes how energy is converted into a real wind farm





# Question



Scratch



WeDo Software



Which of the shown program blocks calculates the motor power?



```
when green flag clicked
  forever loop
    if (distance = 100 or distance < 20) then
      turn motor off
    else
      set motor power to 100 - distance
```



# Question



Scratch



WeDo Software



Which of the shown program blocks calculates the motor power?



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# Discuss!

- ▶ What is vibration and why did it occur when using a broken screw?
- ▶ What have you built to keep track of the speed of the wind?
- ▶ What is the difference between horizontal and vertical wind propeller?
- ▶ What kind of step-down and step-up gear transmission is used in real wind farms?





# Your achievements

Total:

0



1



2



3



4

