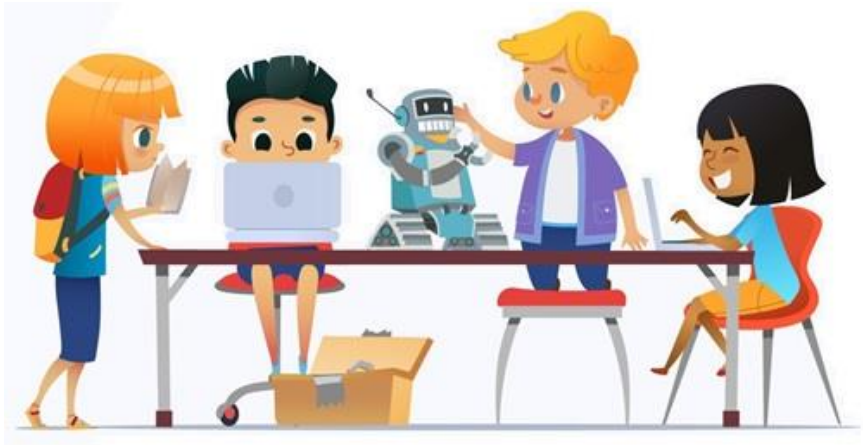
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Automation Engineers



Automation Engineers

Gears & Pulleys



Study the gears in your box. How many teeth are of each kind? What is the relation among teeth gears?

				
8	12	20	20	24

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The relation among gears: 20:20, same number of rotations, 8:24 = 1:3, triple number of rotations

Automation Engineers

Gears & Pulleys

So, what are we going to build today?



Today we will do many small constructions, to study gears well!

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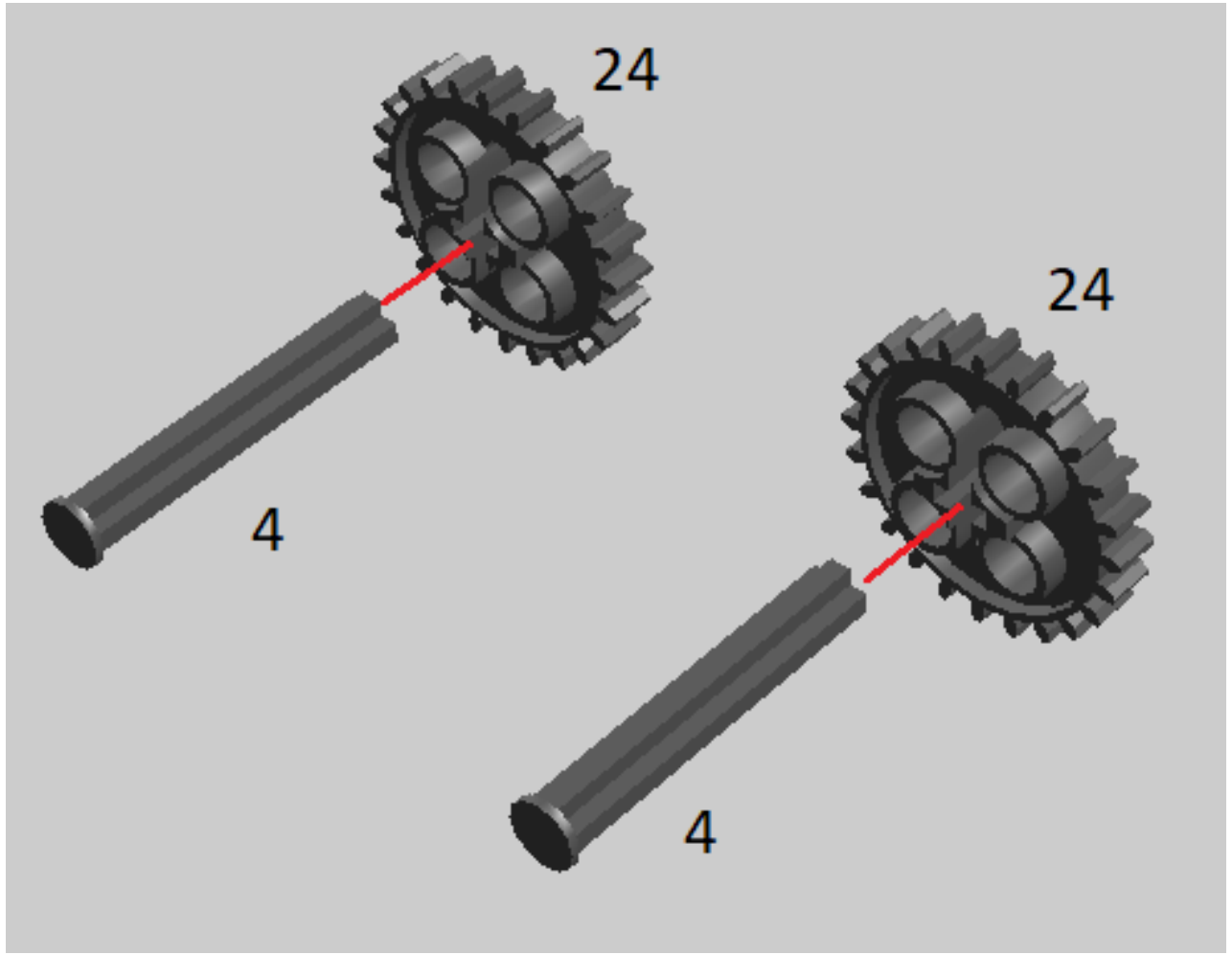
MOVE ON TO THE 1ST BUILT



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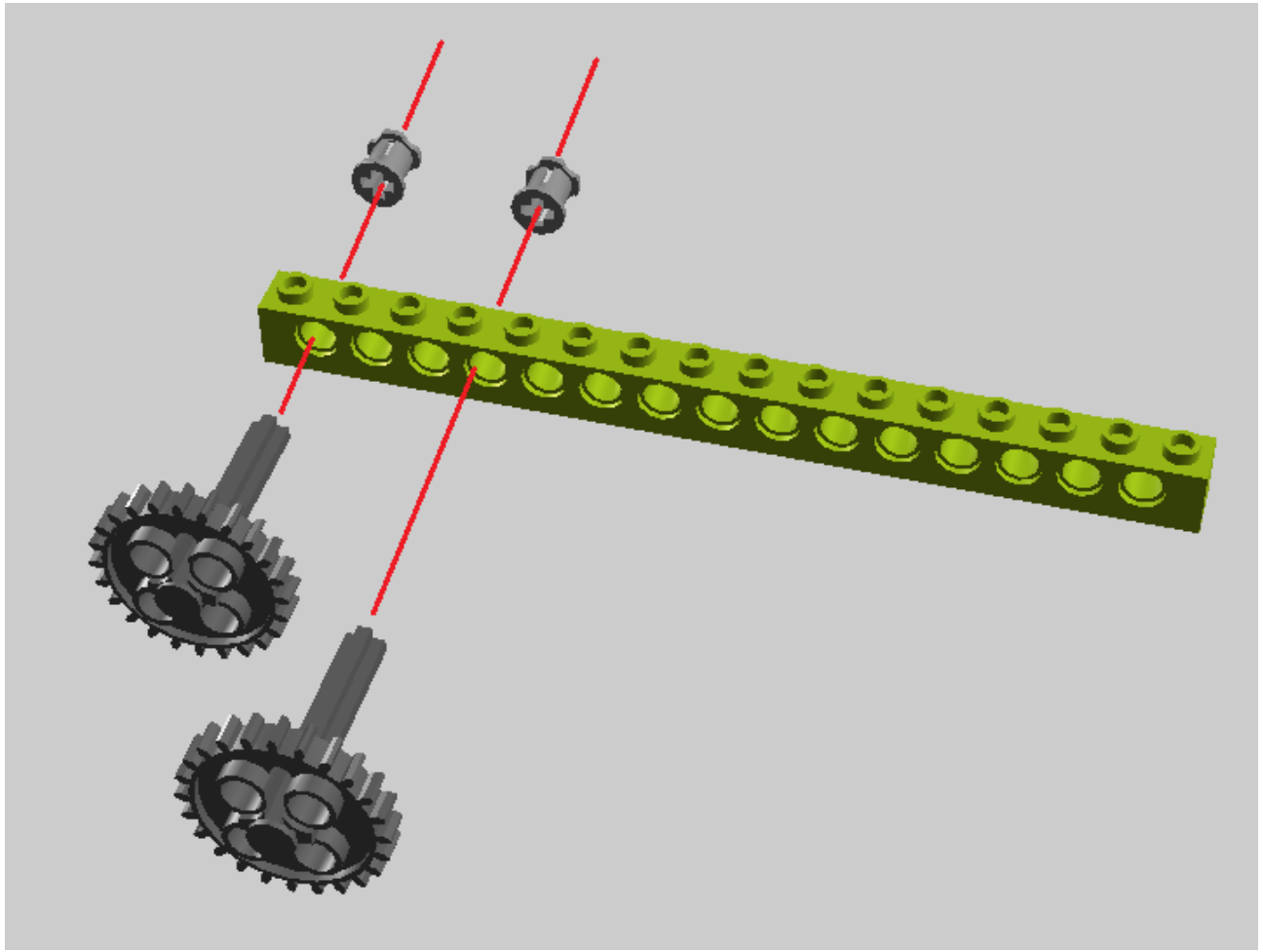
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1



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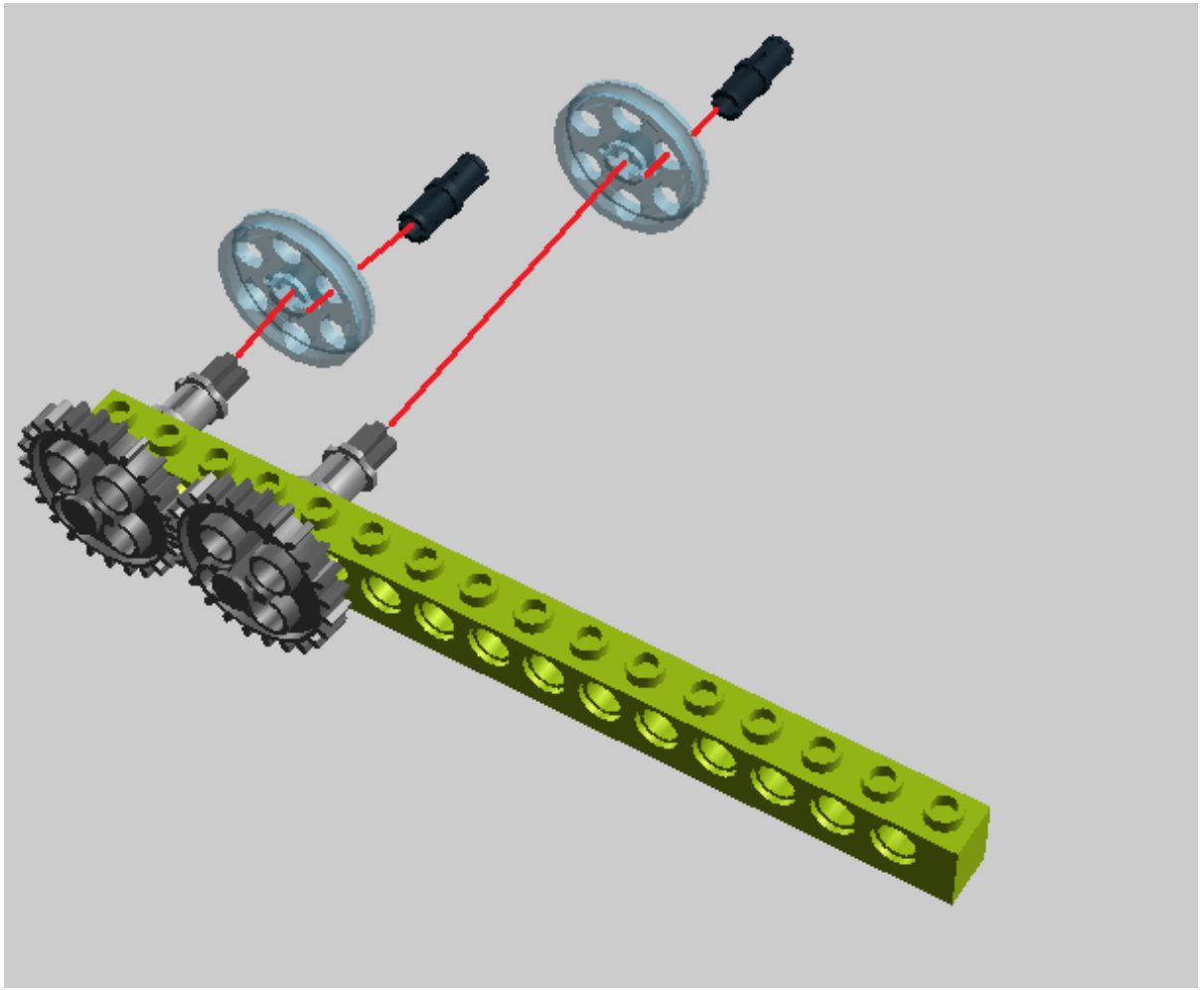
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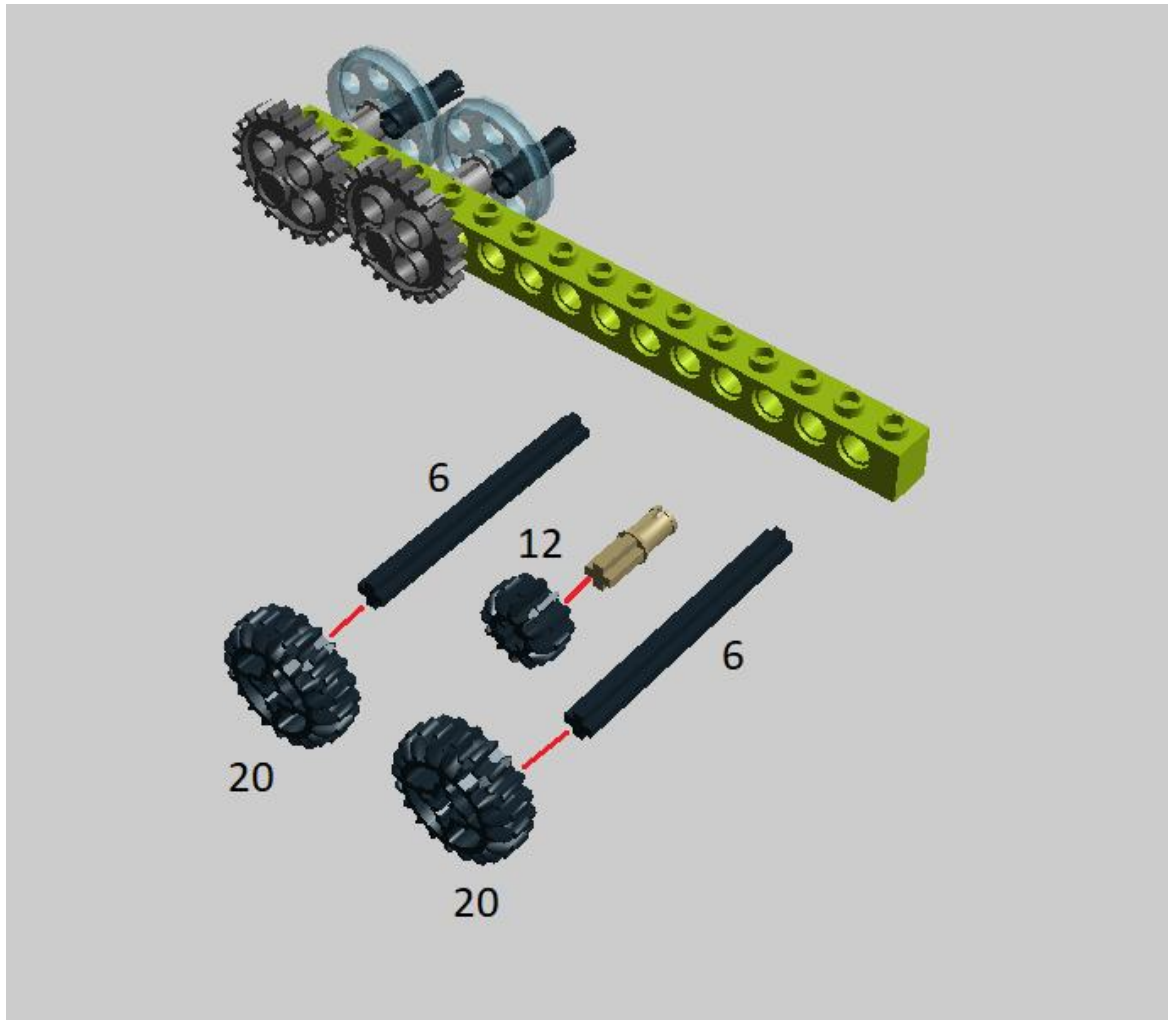
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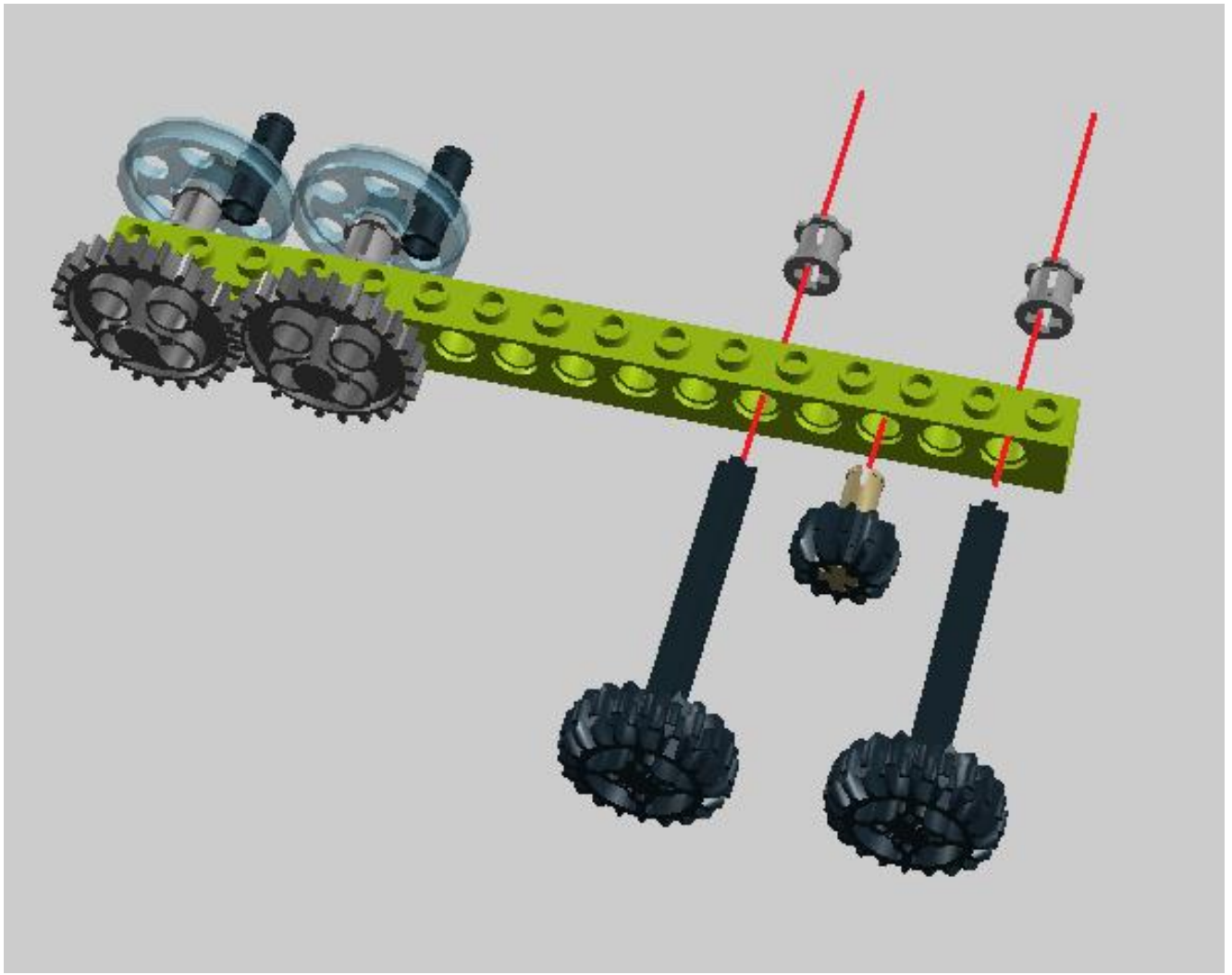
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5



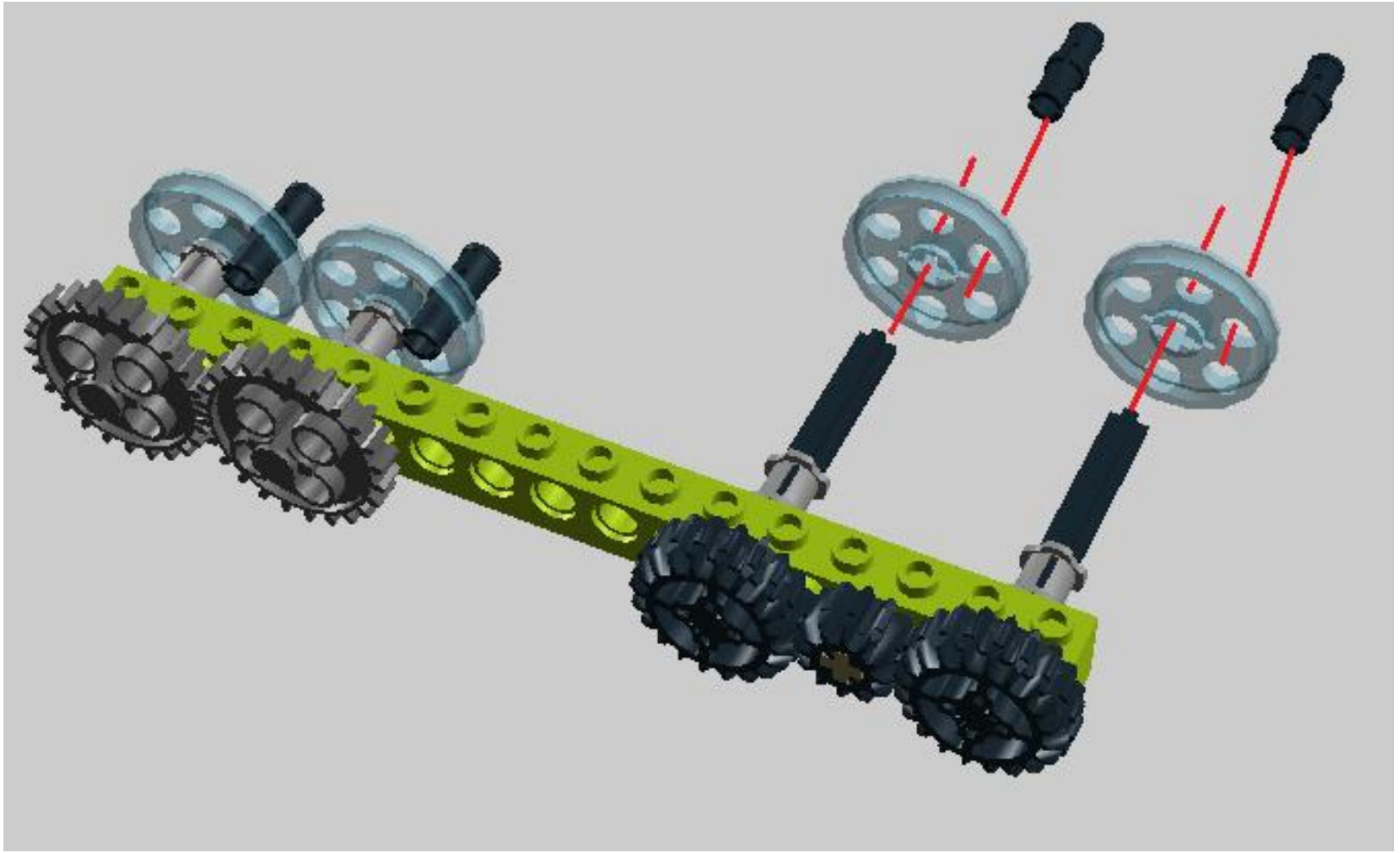
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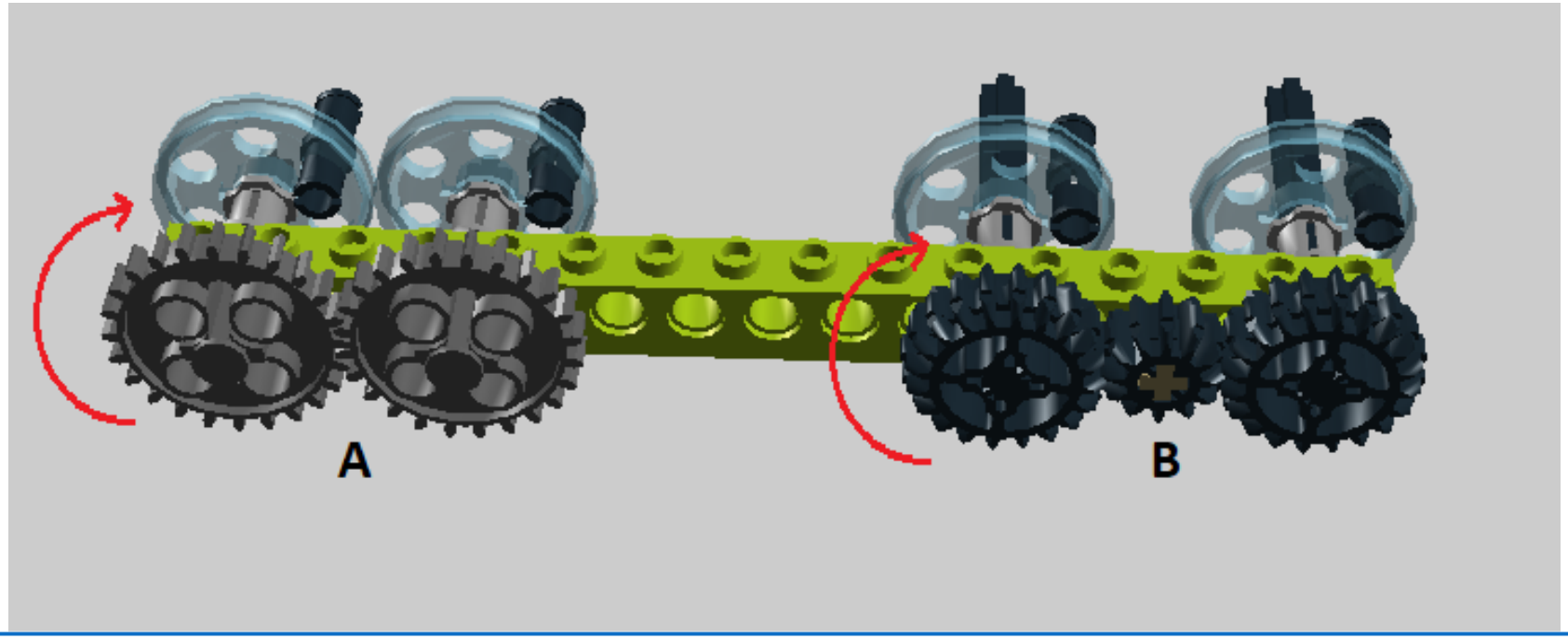
Gears & Pulleys

6



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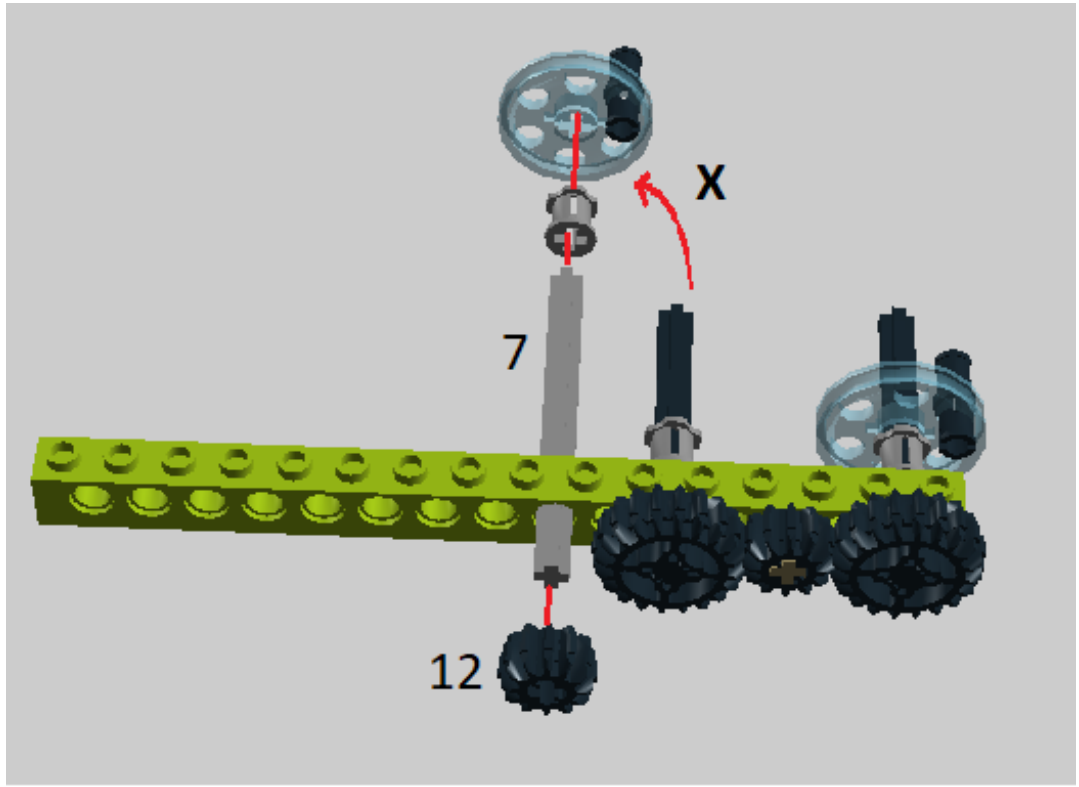
7



At this point, experiment with the rotation of the two systems to see the result. In the next step you will remove system A to extend B

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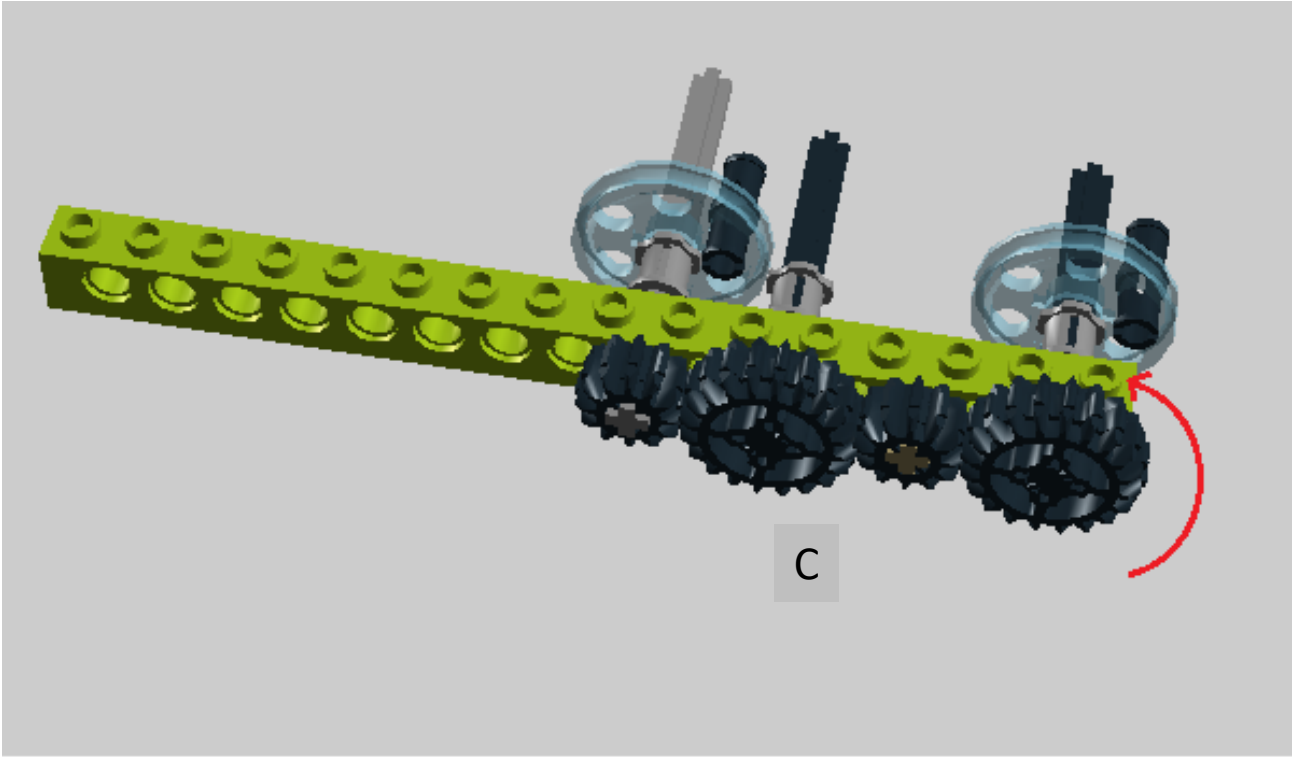
8



When you remove system A, add the new pieces and change the position of X

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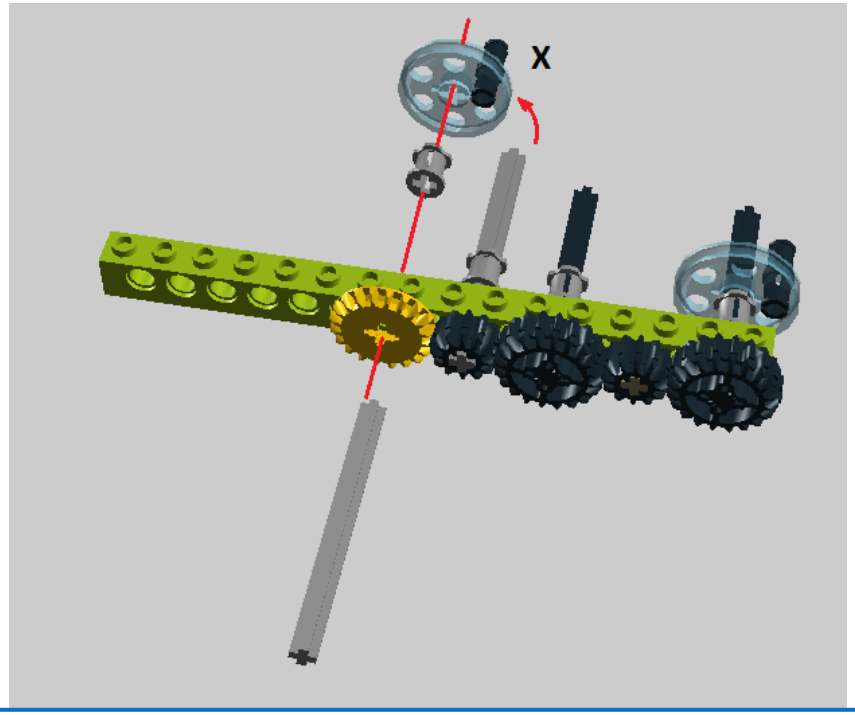
9



Try to rotate the system again and observe the result.

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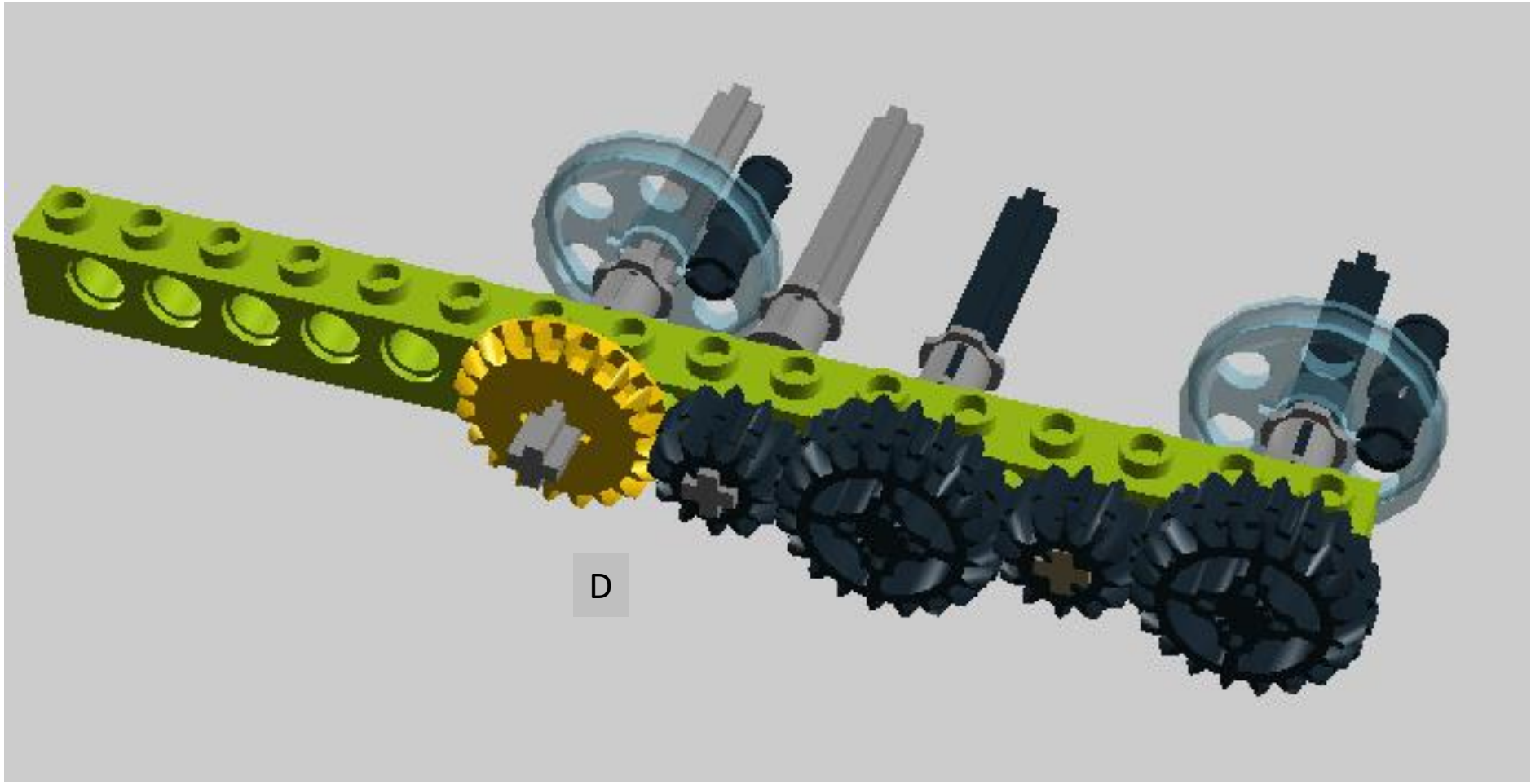
10



First place the gear at its place and then put the axl. As you did before, change place to the X piece.

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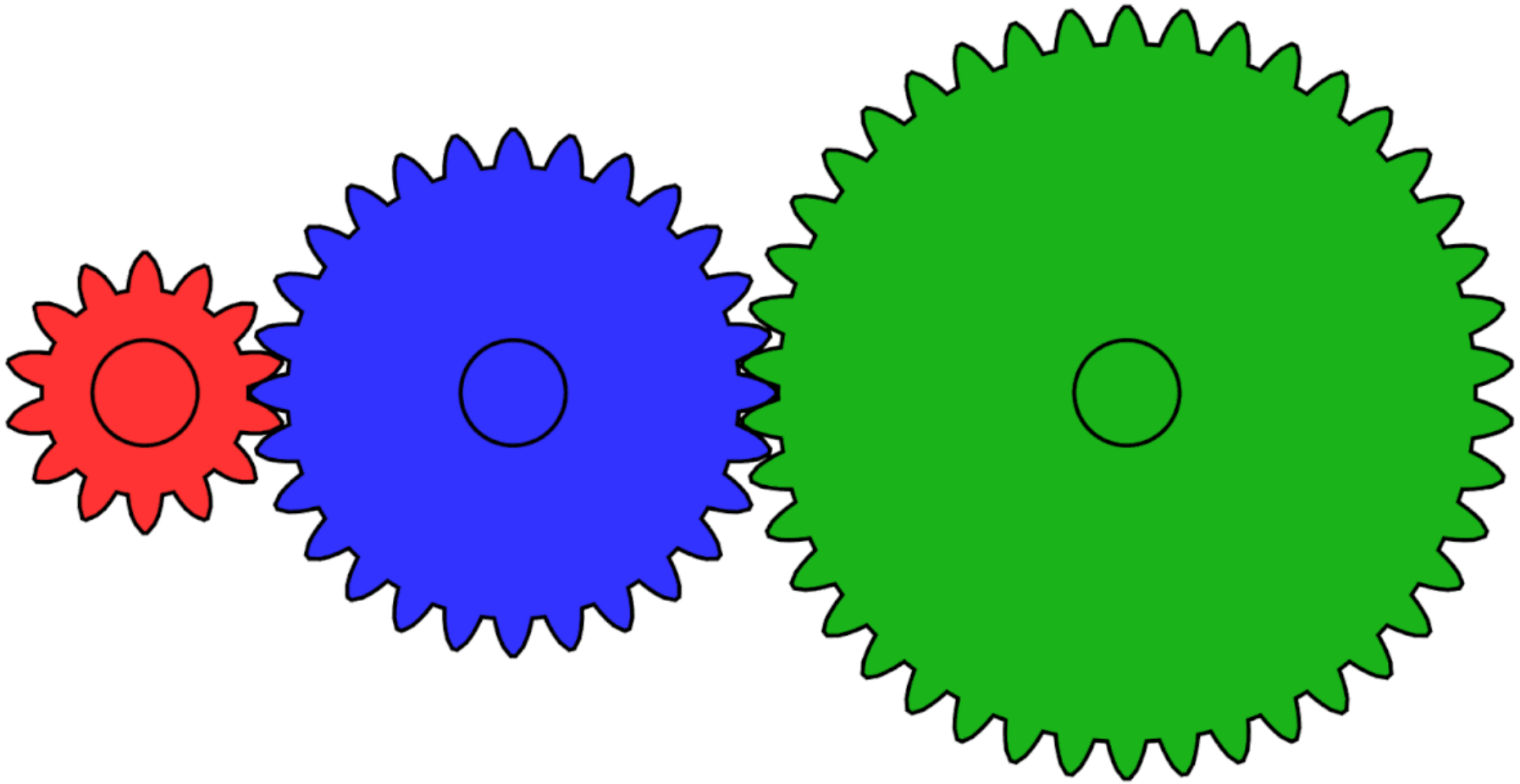
D

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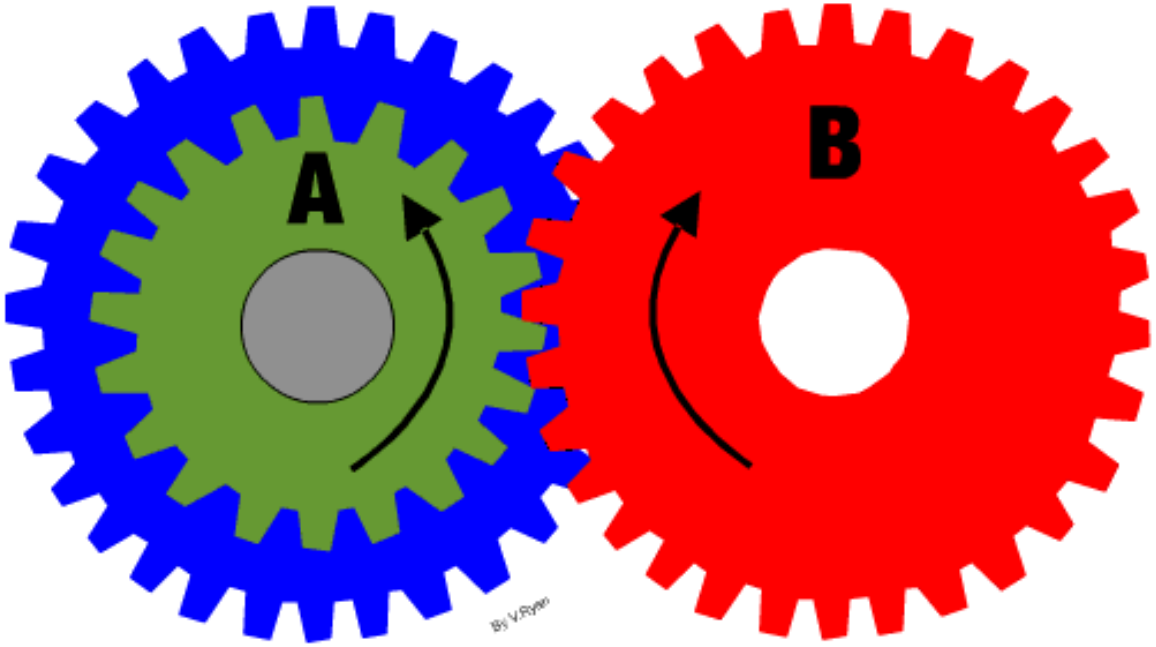
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Gears & Pulleys



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Study the direction of the rotation of the gears that mesh and their speed



Driver - gear

Driven - gear

As for the speed, 1 tooth drives another tooth.
The speed that each gear rotates depends on the relation between the teeth of the gears that mesh.

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When the driver-gear has less teeth than the driven one, the rotation speed of the second one is lower



MOVE ON TO THE 2ND BUILT



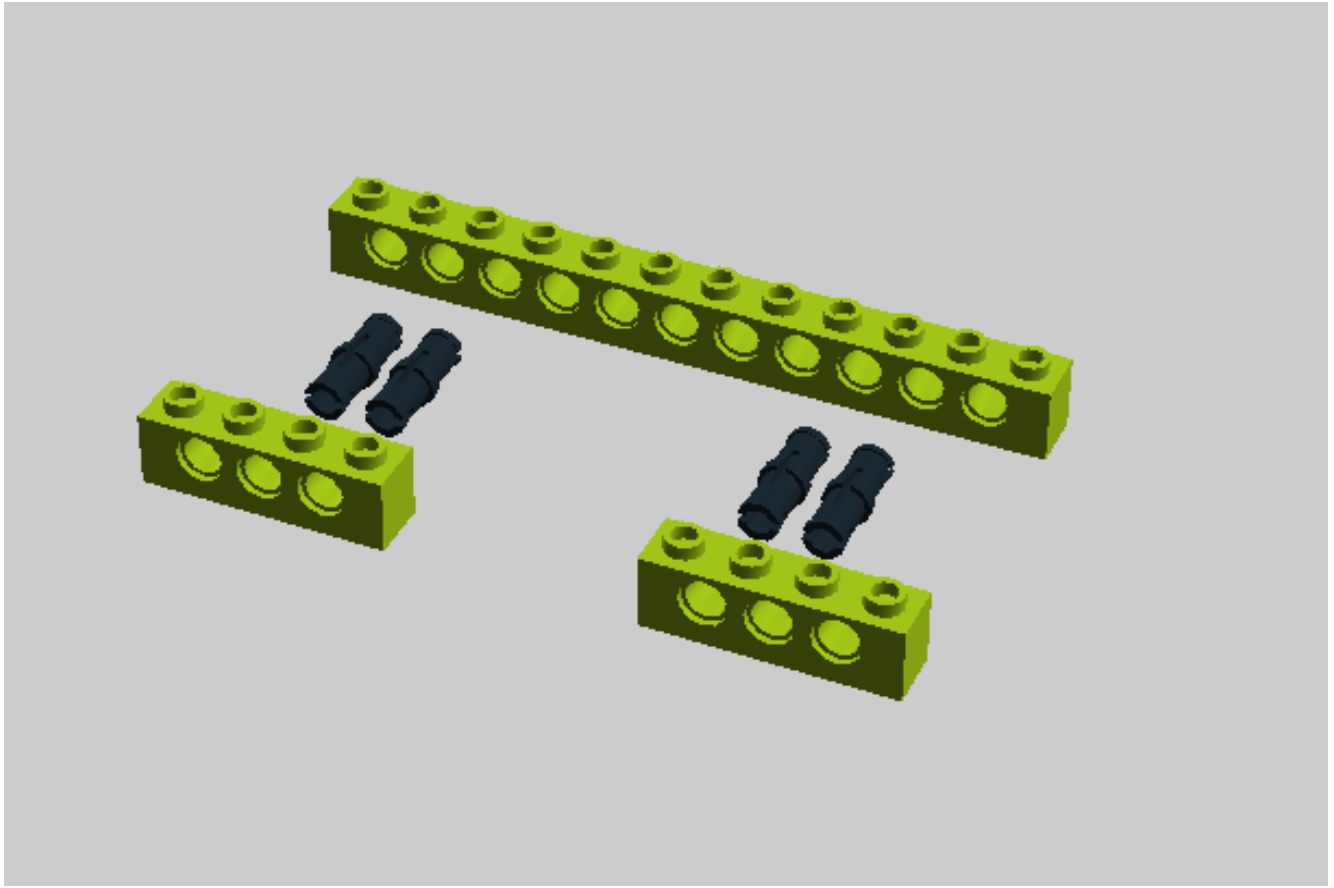
We study the acceleration



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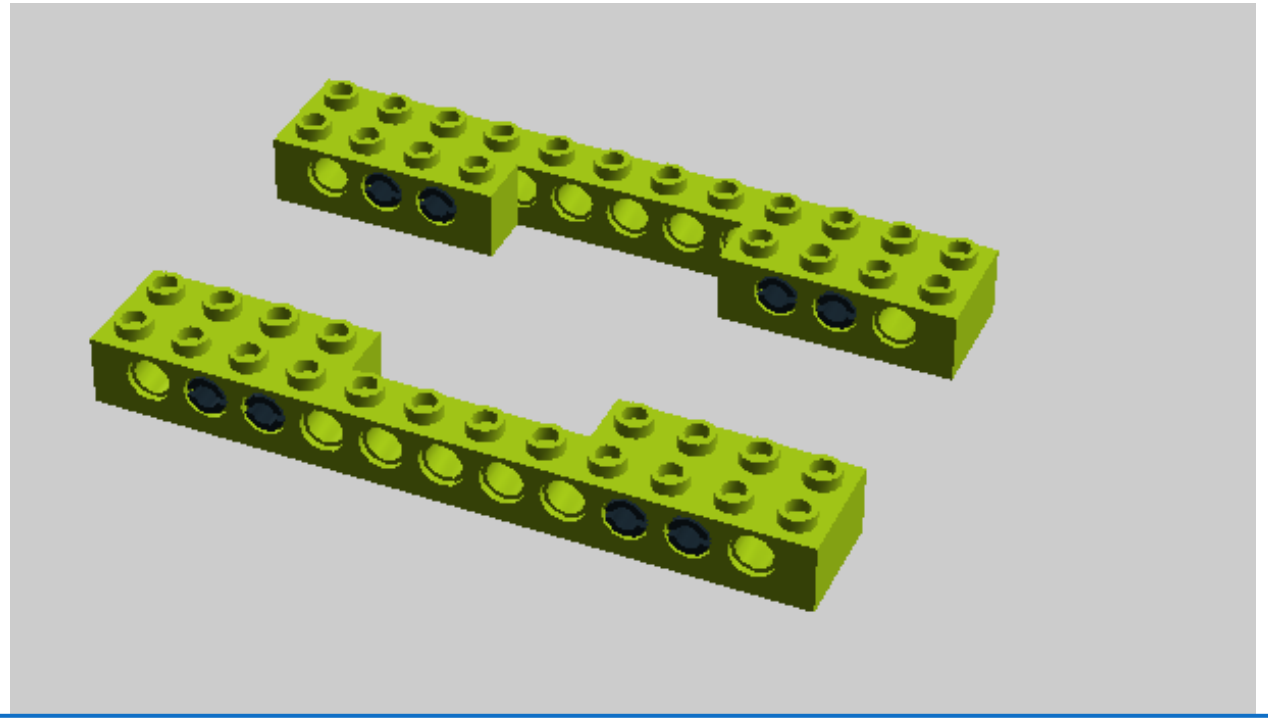
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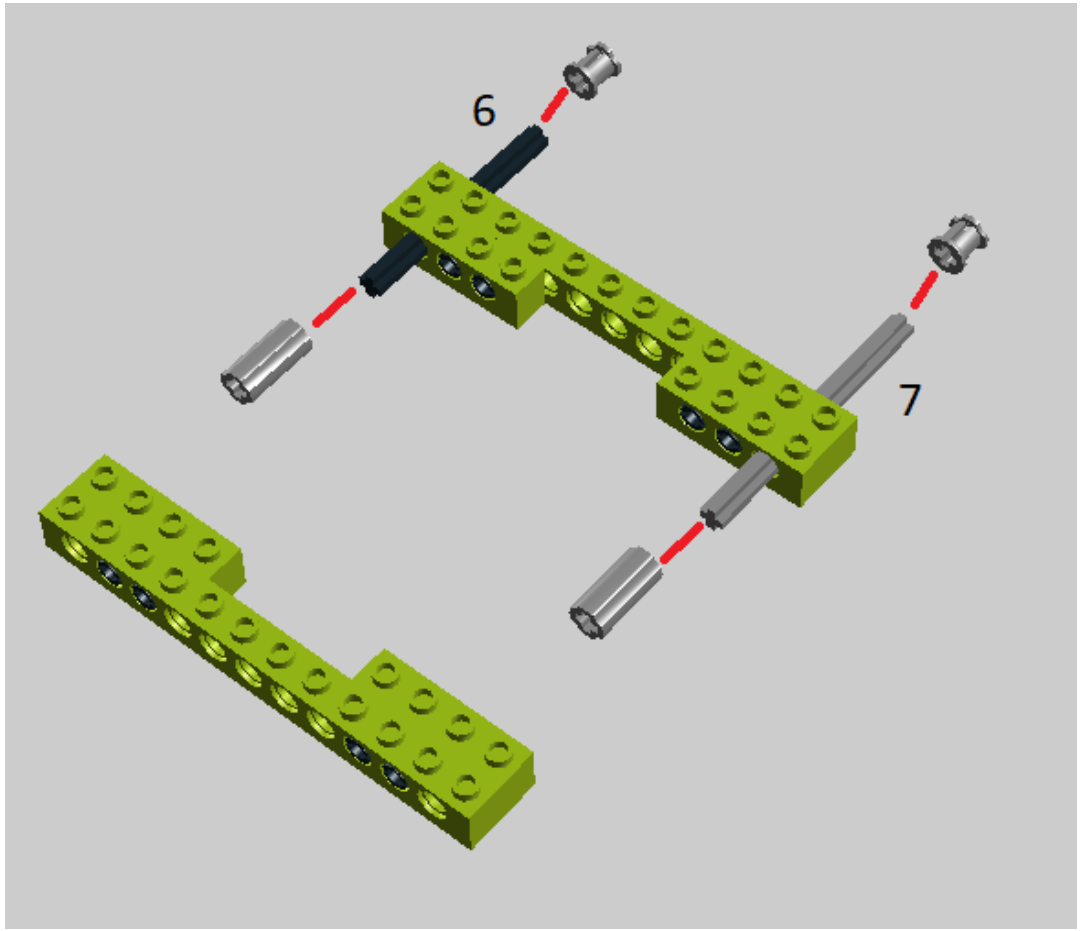


Repeat the previous step to build another similar part

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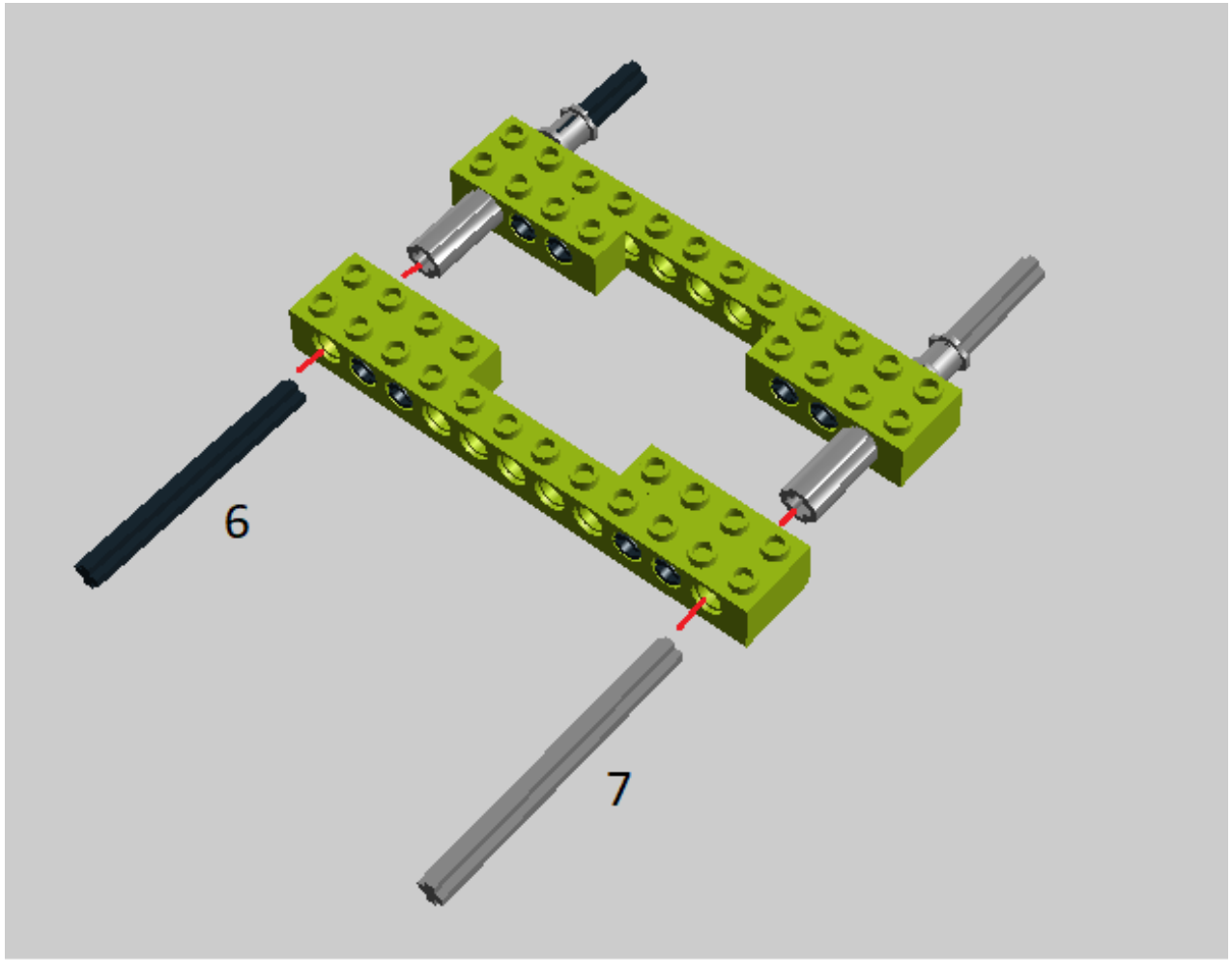
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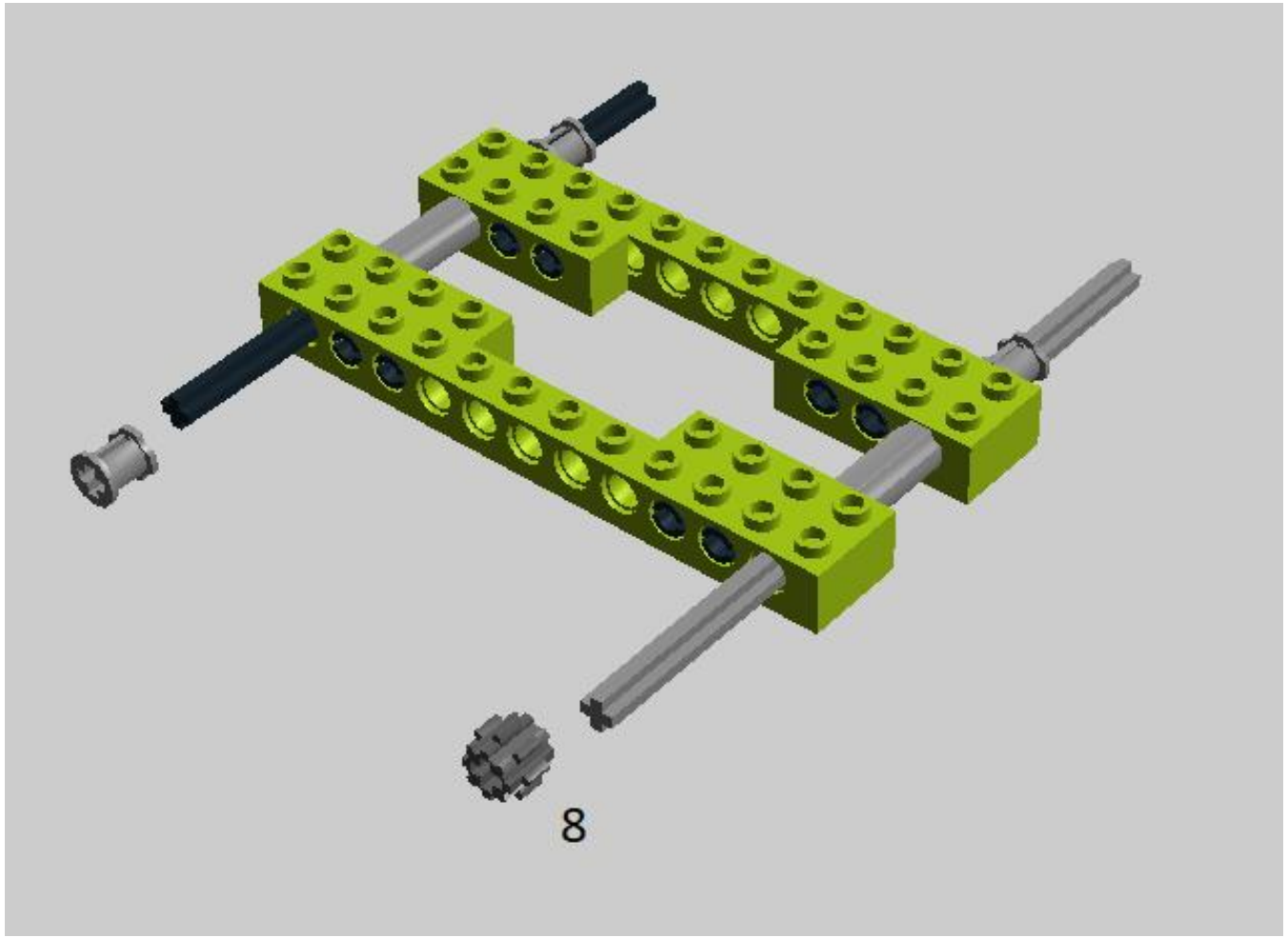
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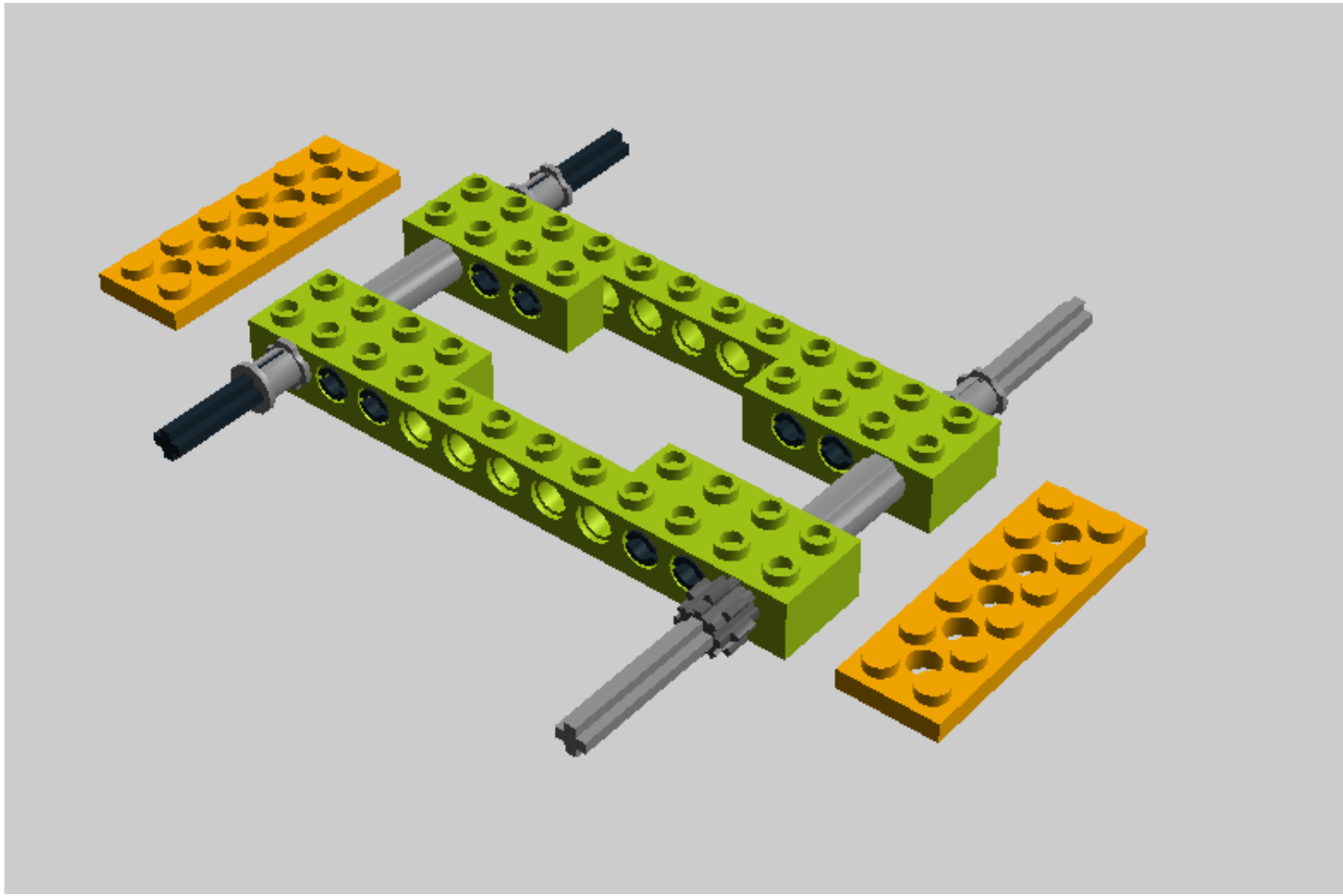
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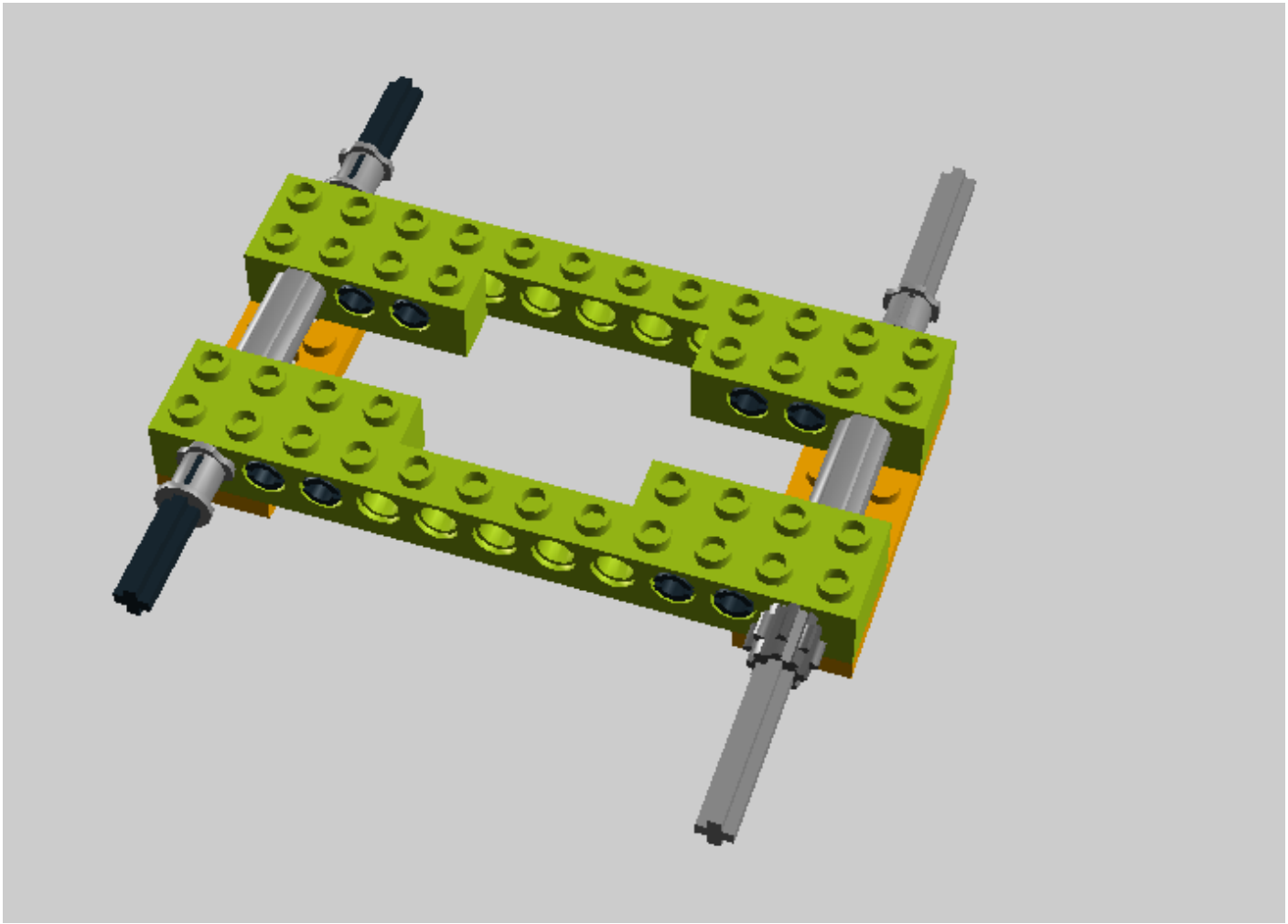
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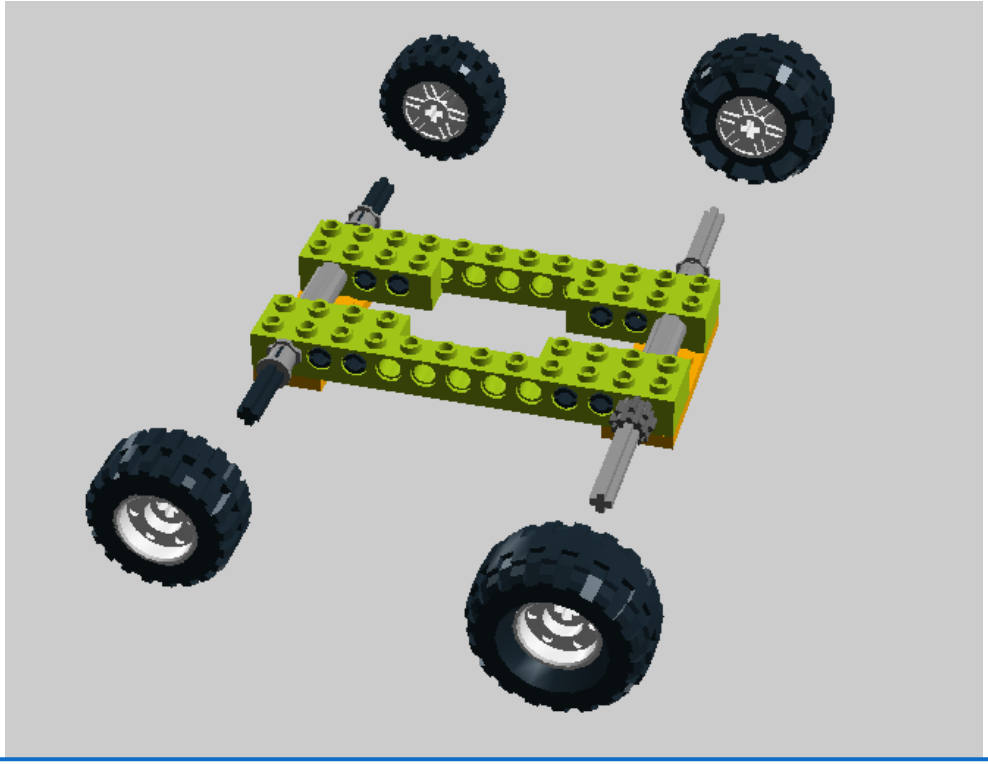
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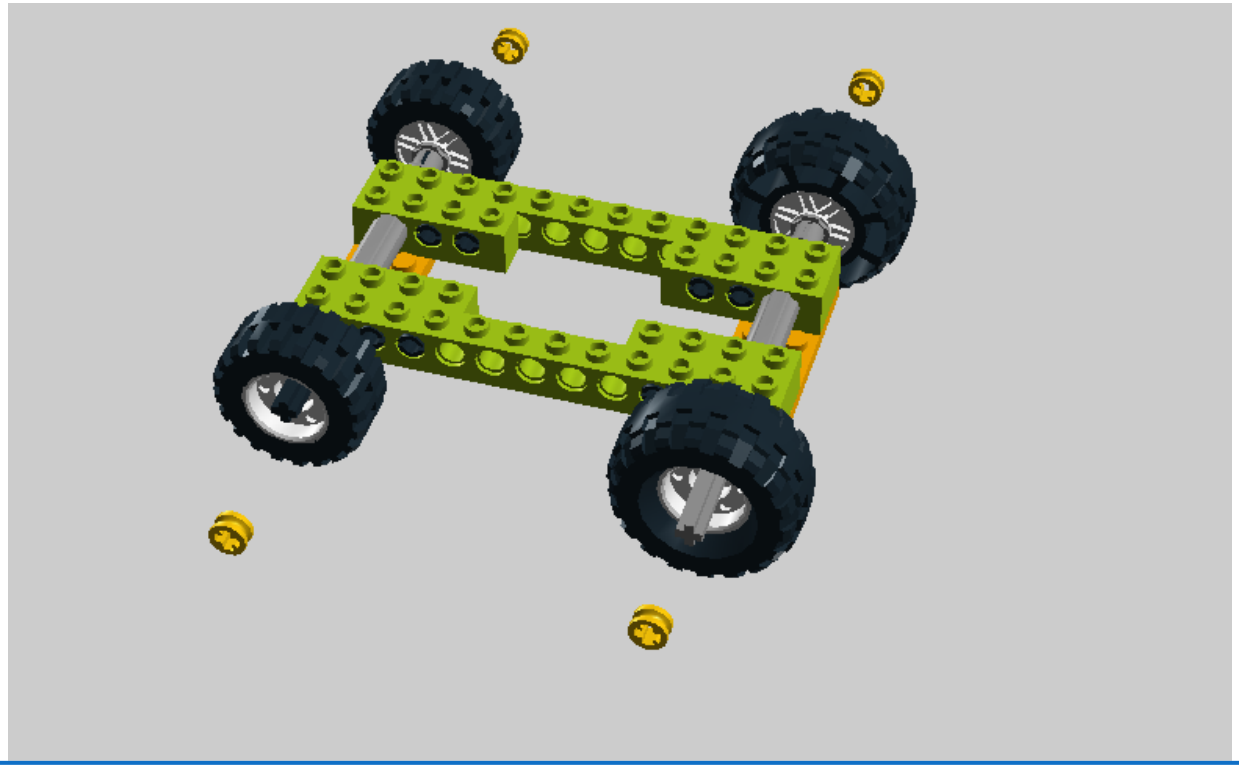


Place the small wheels forward and the big ones backward (where the gear is)

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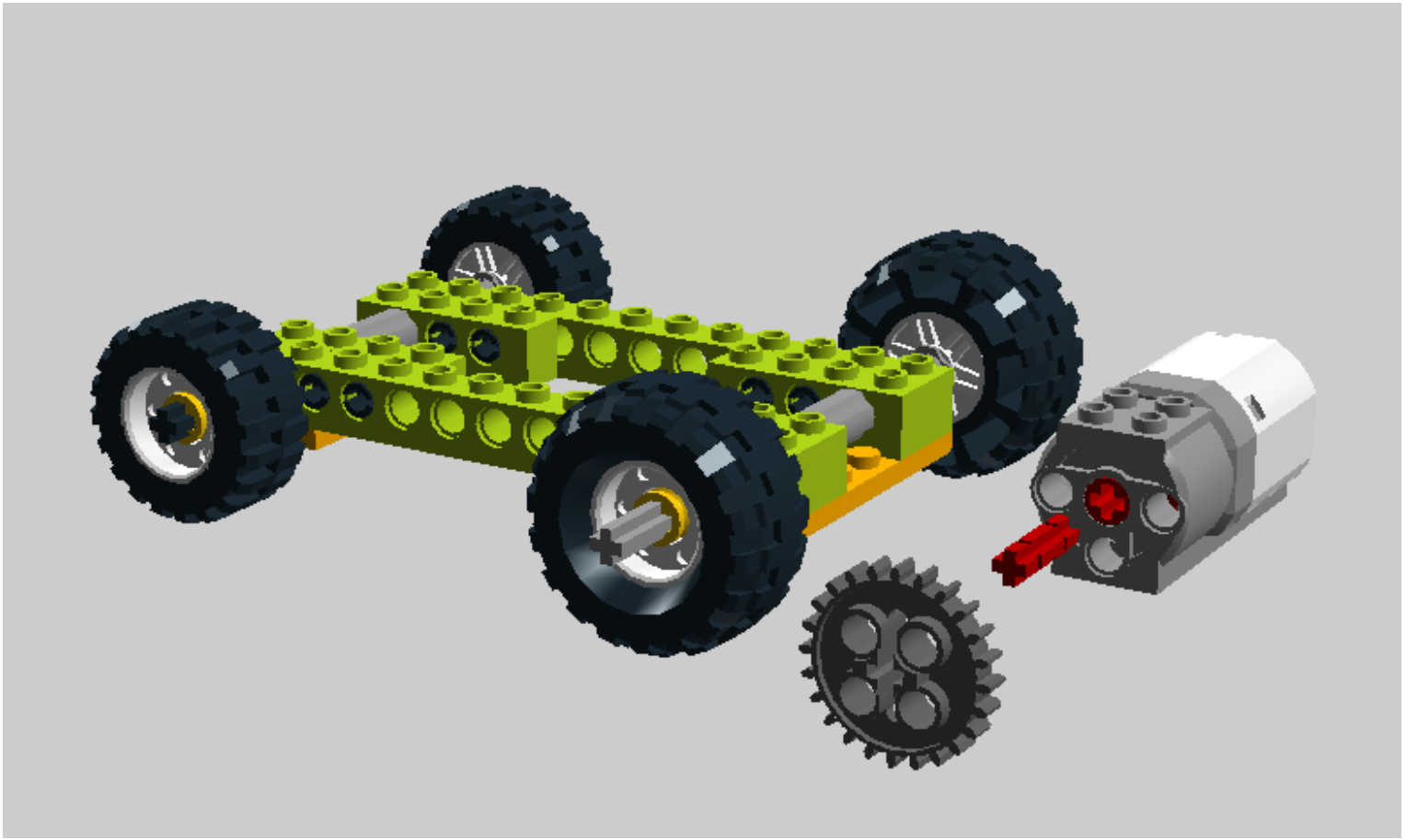


Place the green rings in the wheels and push them

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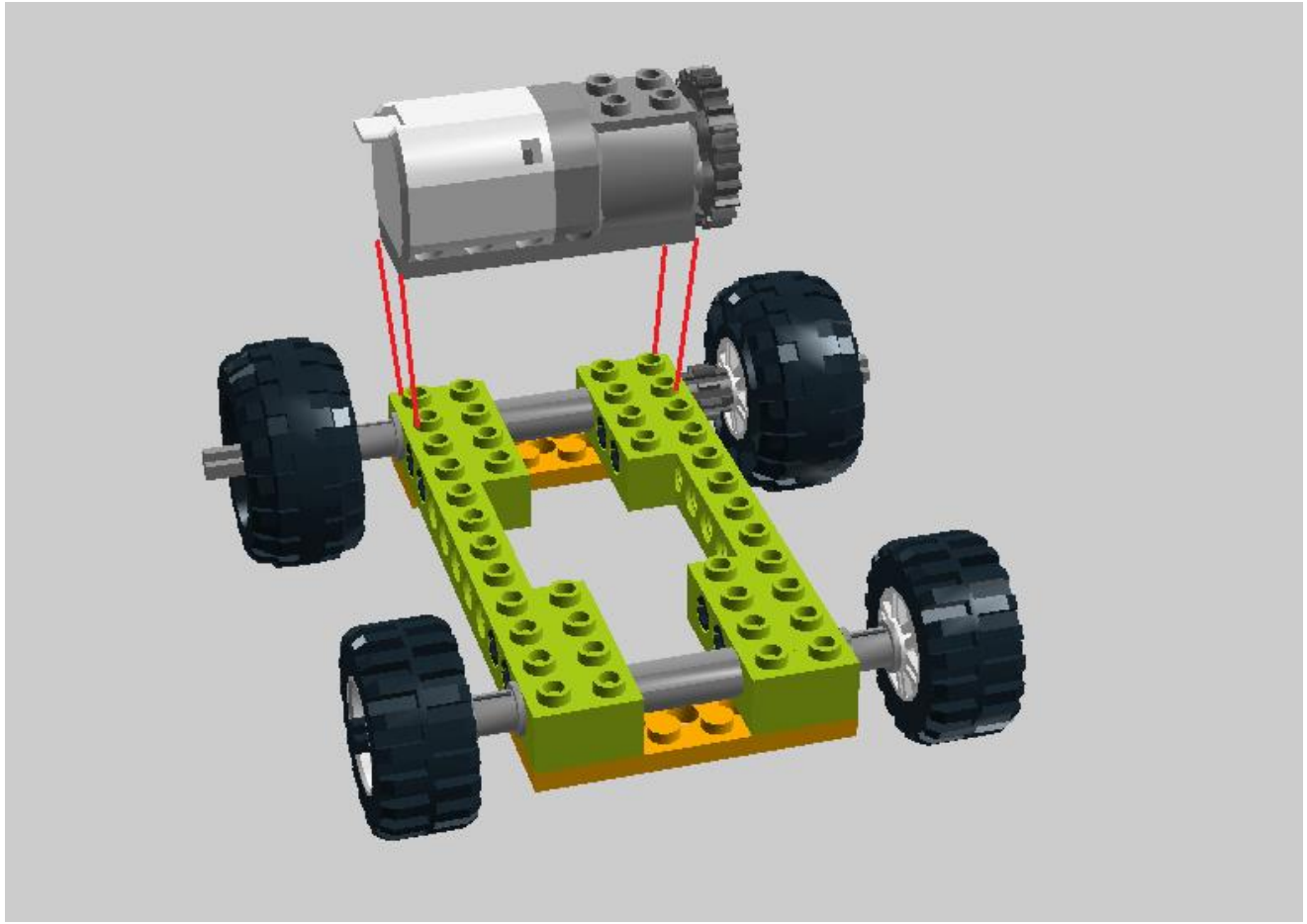
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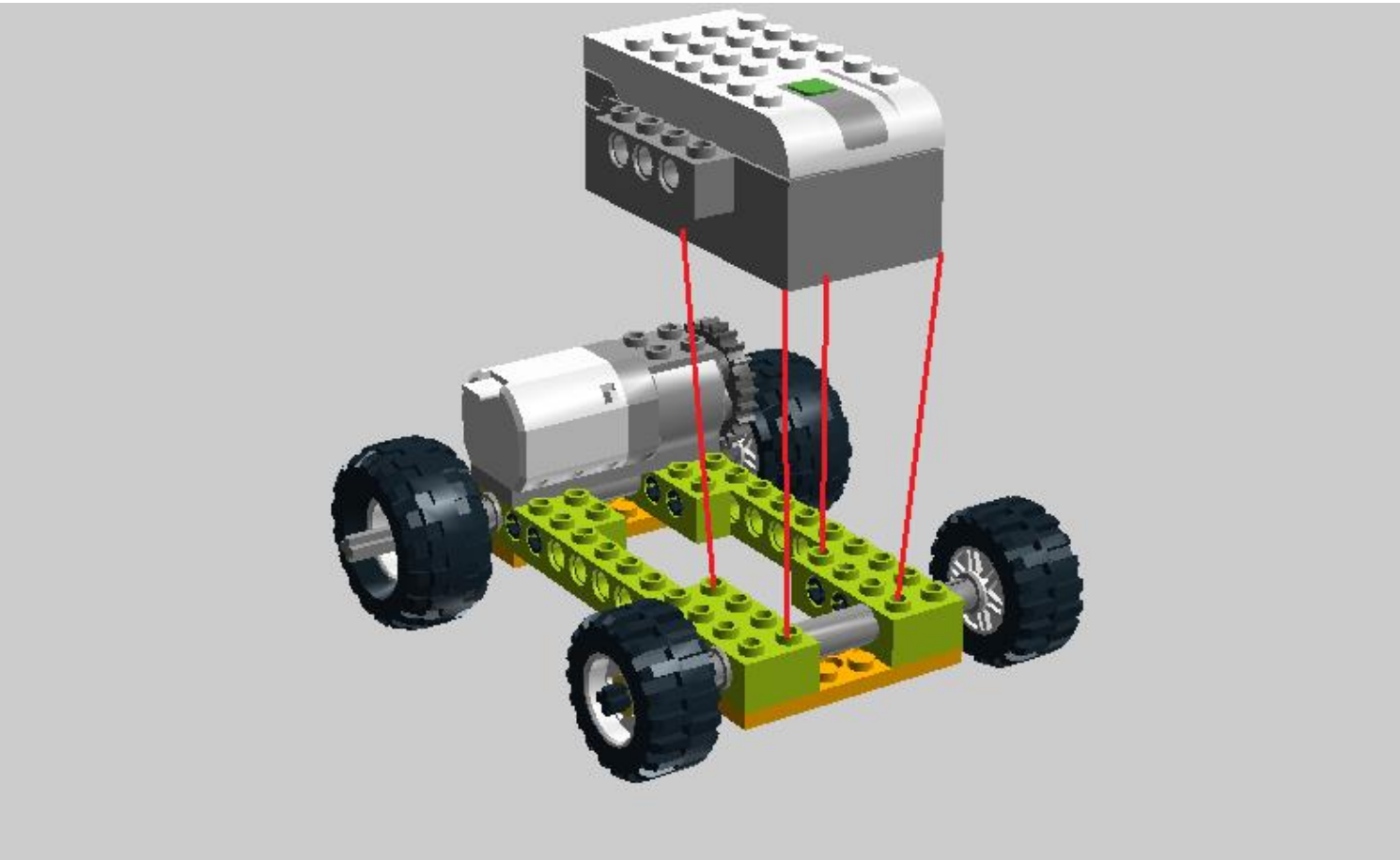
11



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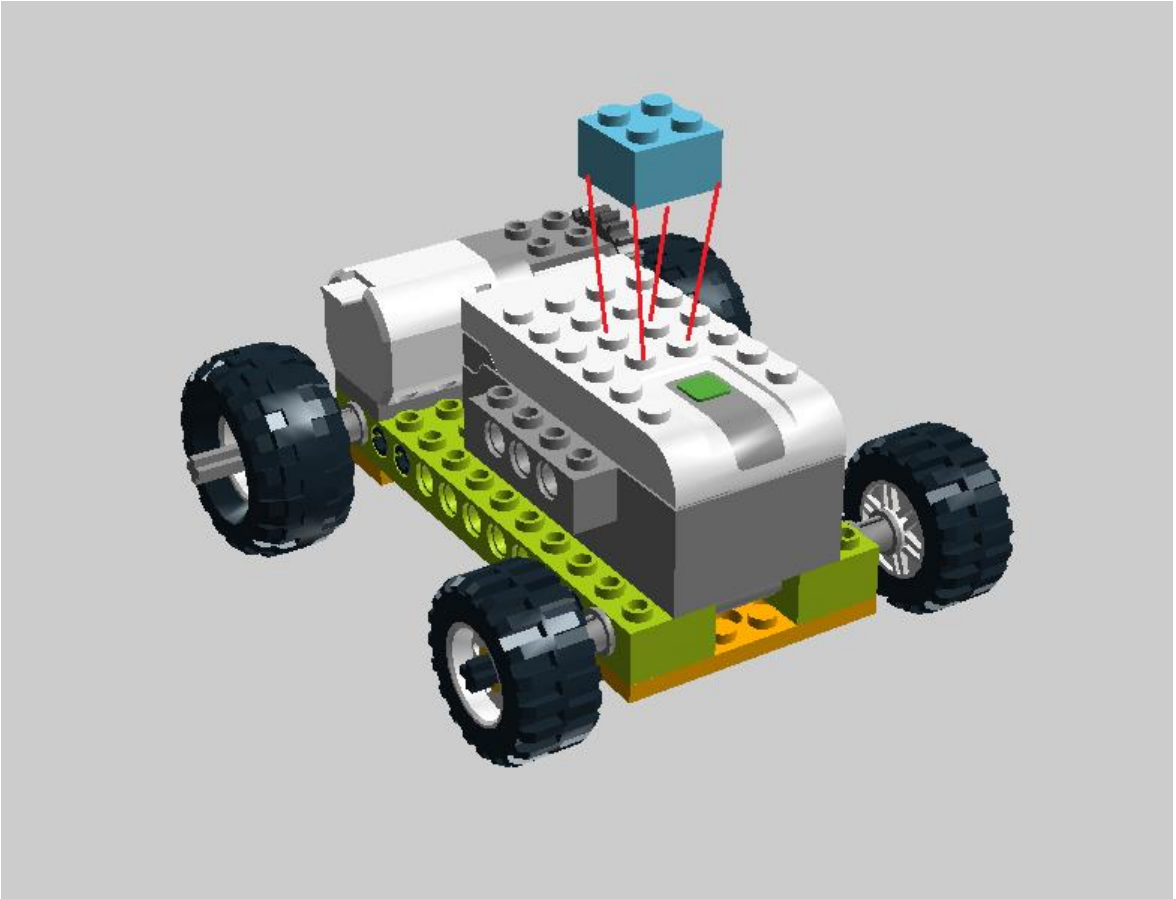
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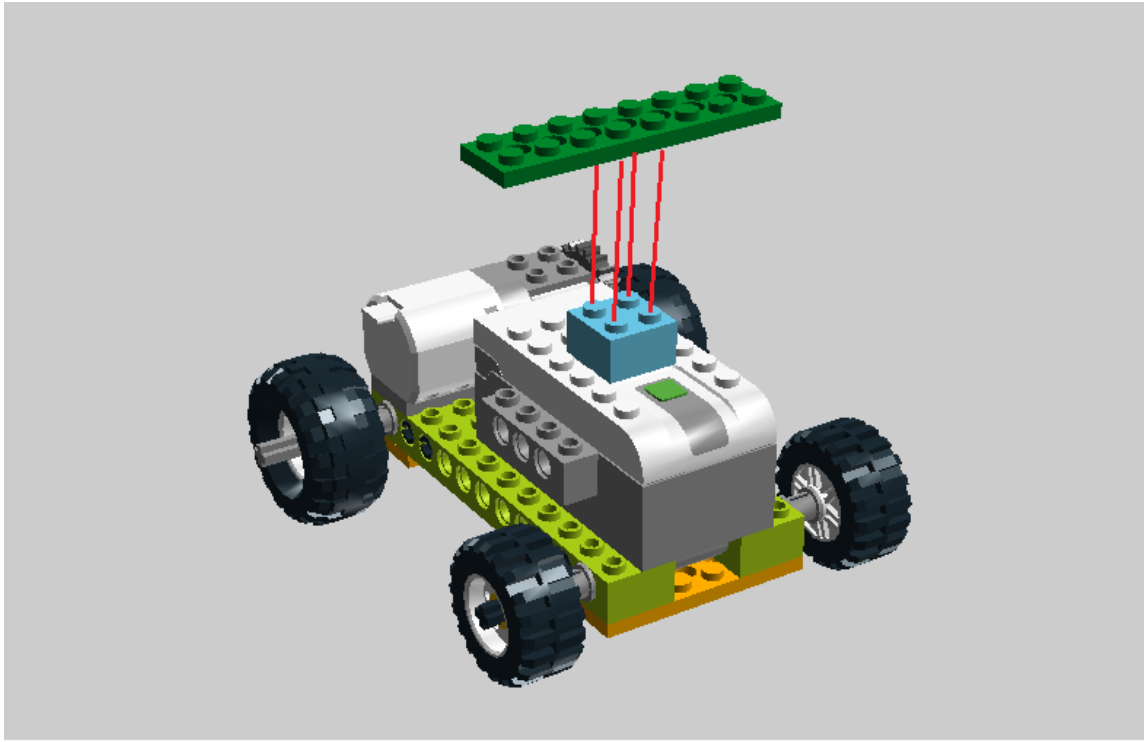
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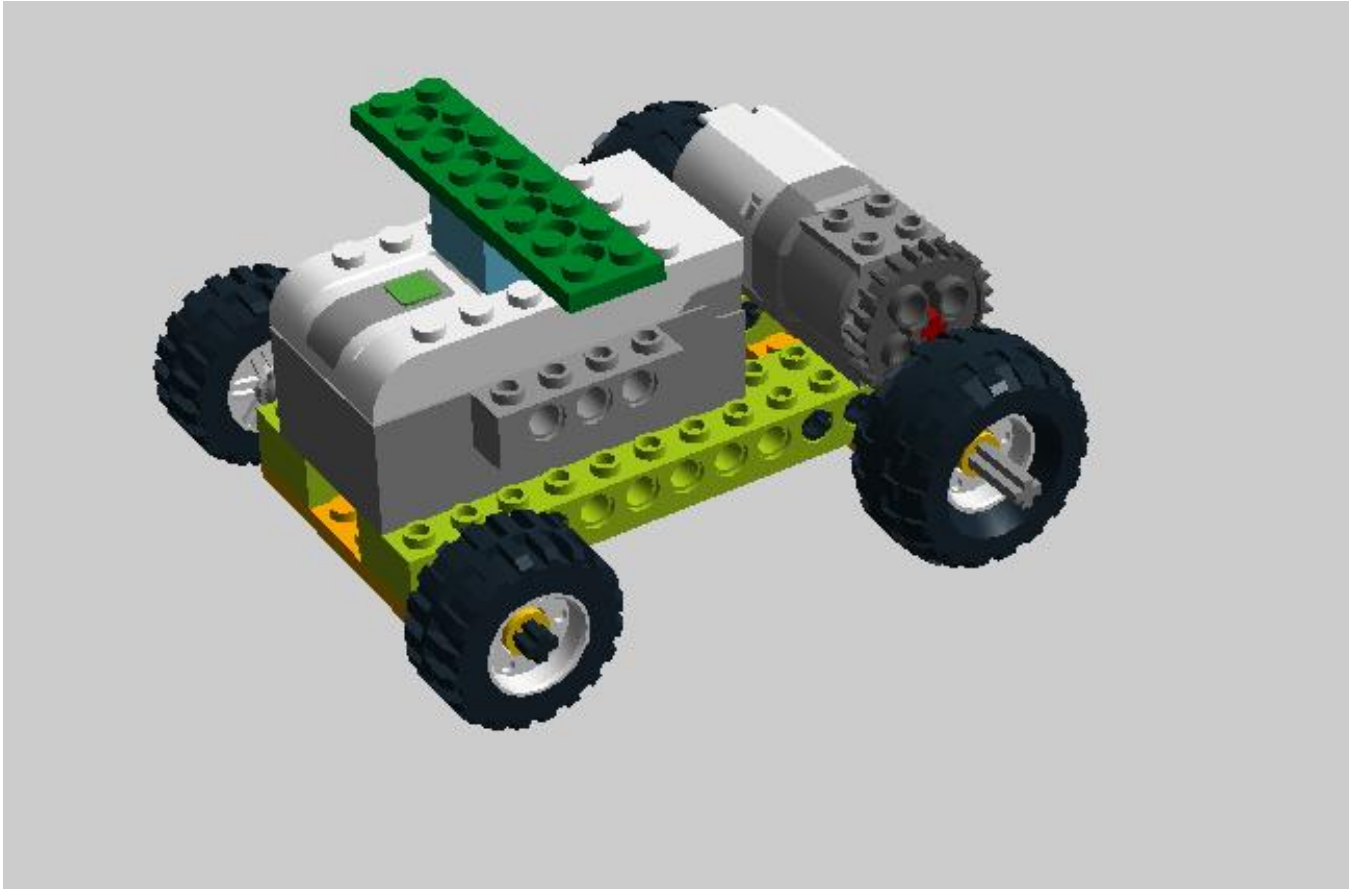


The piece at the top of the vehicle allows you
to pass the cable of the motor, for cable management

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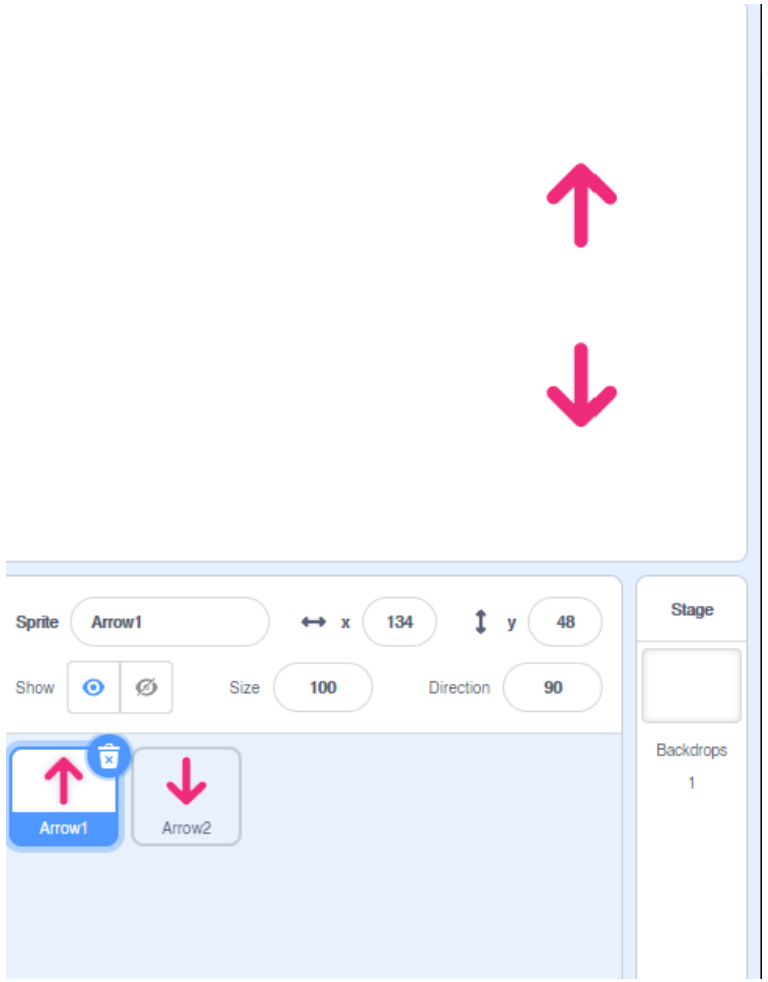


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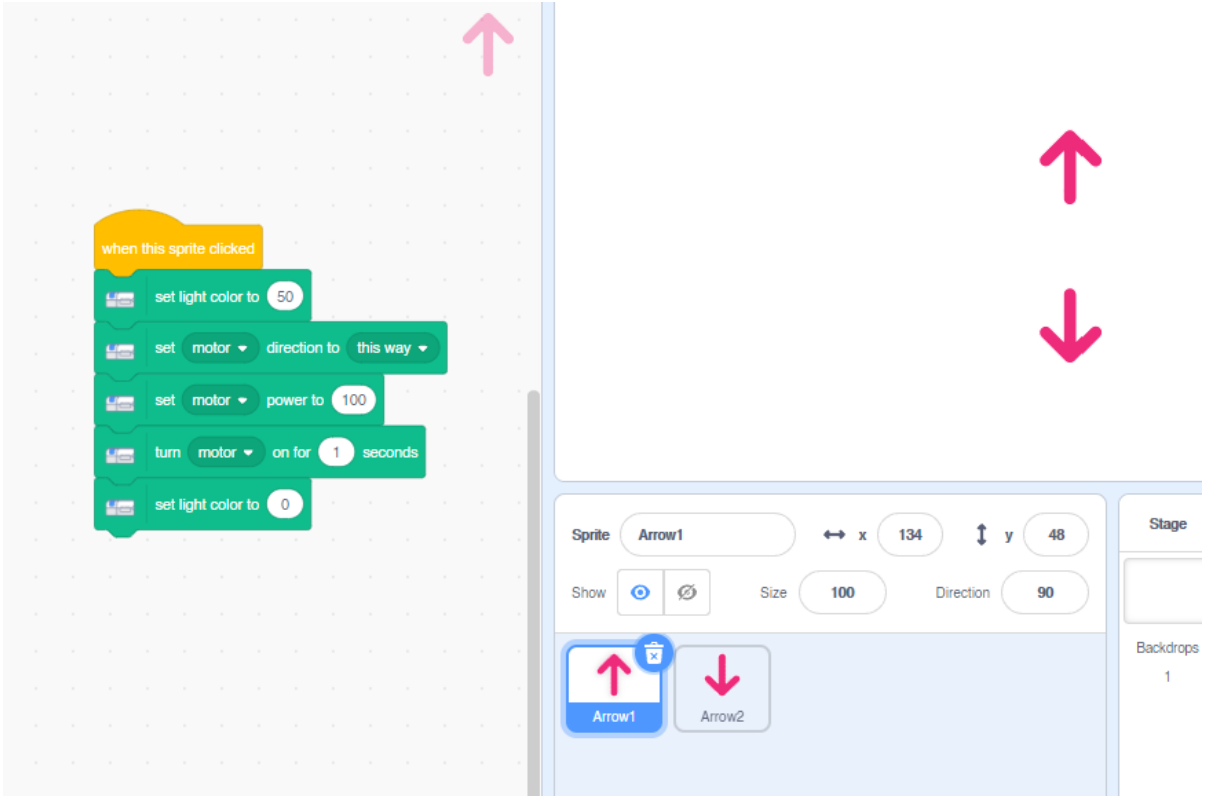
Coding

Program the vehicle to move "this way" with 100 power for 1 sec.
Your program will activate with the up arrow key.
Add a second sprite. The program will be activated with the down arrow key.
The vehicle will move "that way", with 100 power for 1 sec.
Experiment how to use the vehicle.



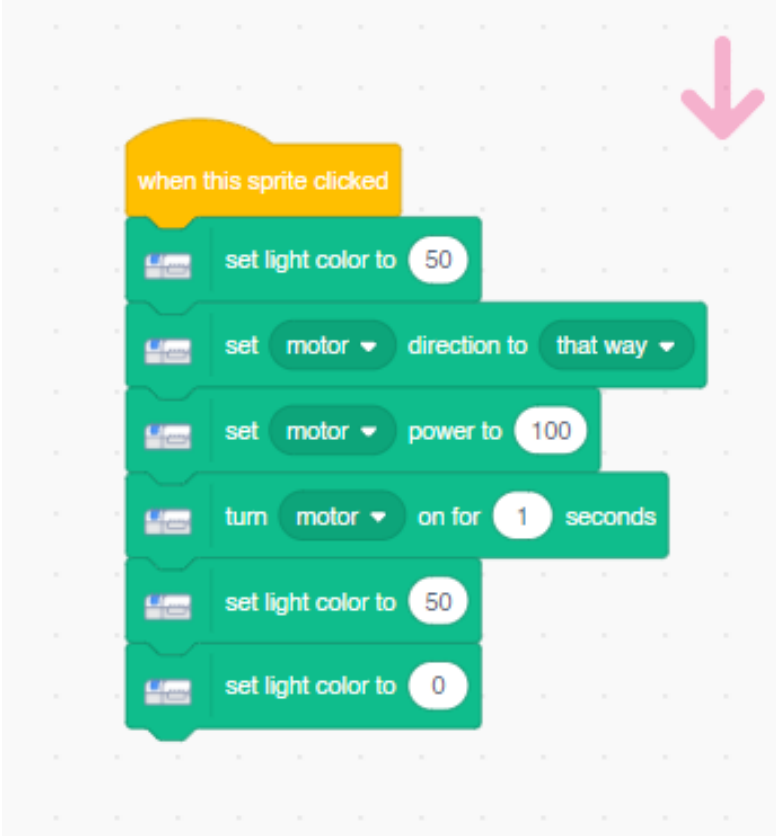
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- Create two arrows, pointing up and down.
- Check the up-pointing arrow and write the code you see.



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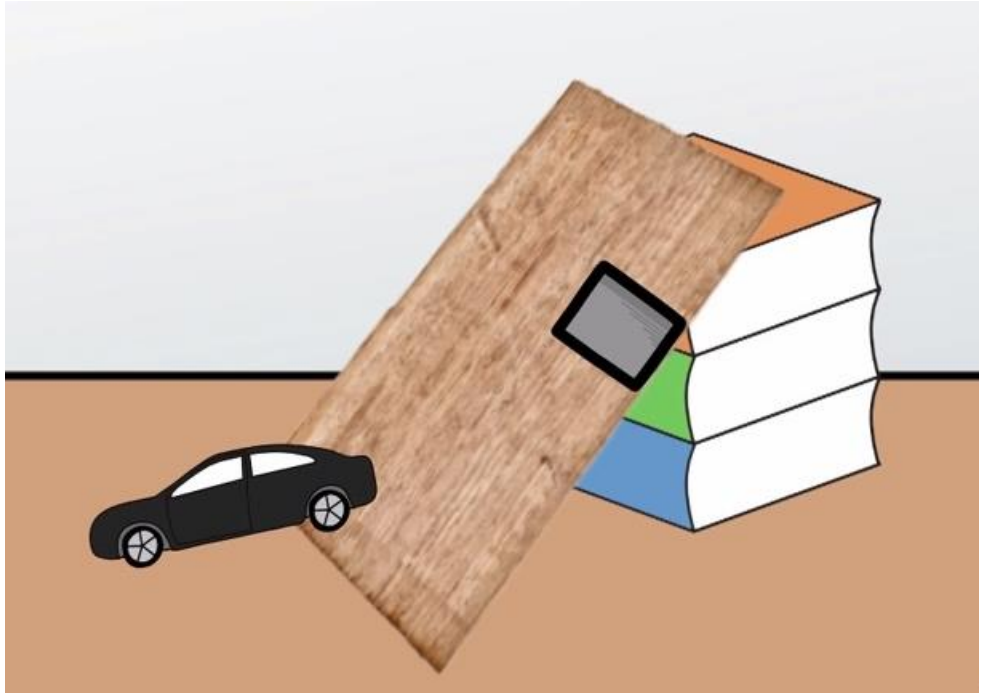
- Check the down-pointing sprite and copy the code you see.
- Experiment how your program works.



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Use some books or a plank to create an inclined plane.

Use the previous program and try to make your car go uphill for different inclinations of the inclined plane.
When does it stop moving?



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MOVE ON TO THE 3RD BUILD
without disassembling the previous one

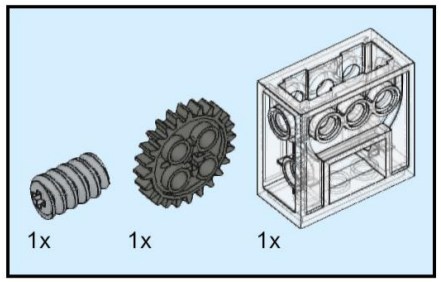


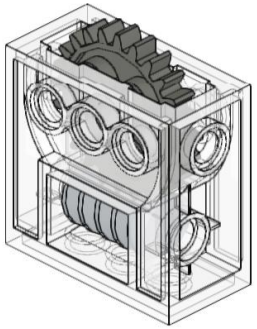


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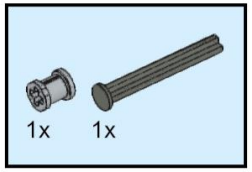
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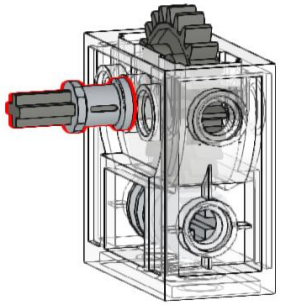
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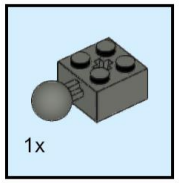
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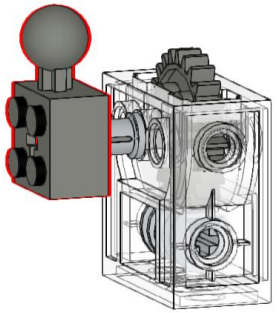




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3

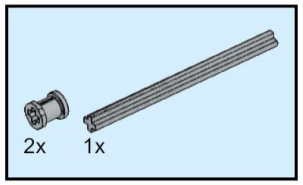


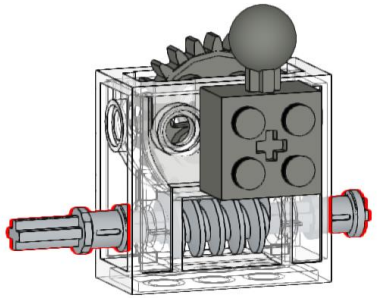


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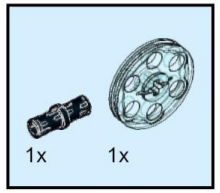
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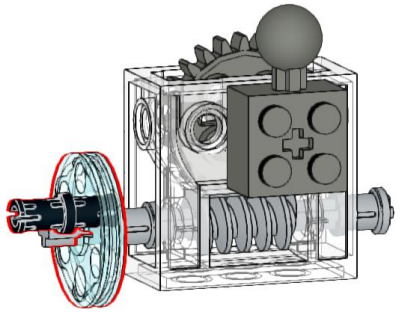
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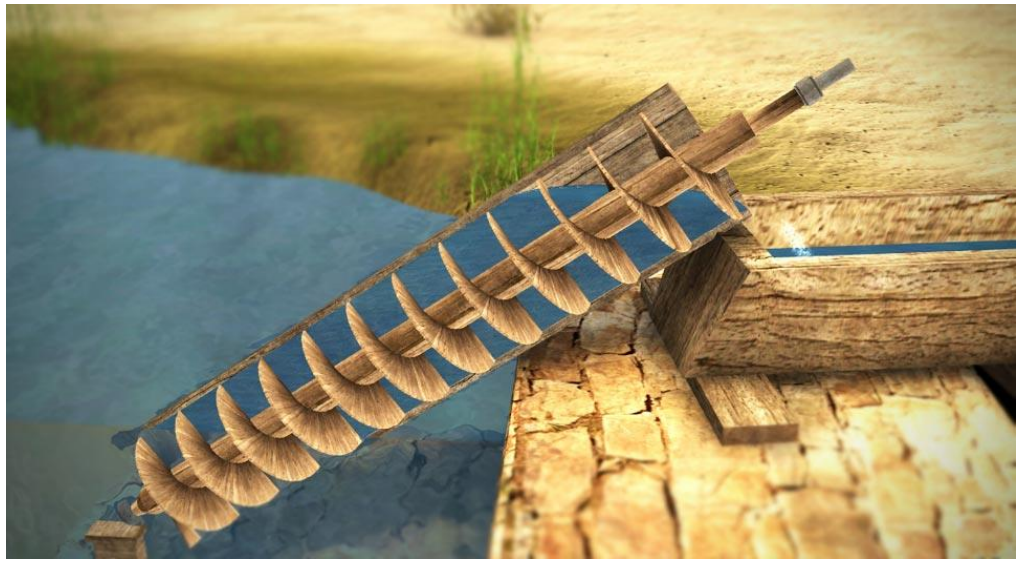


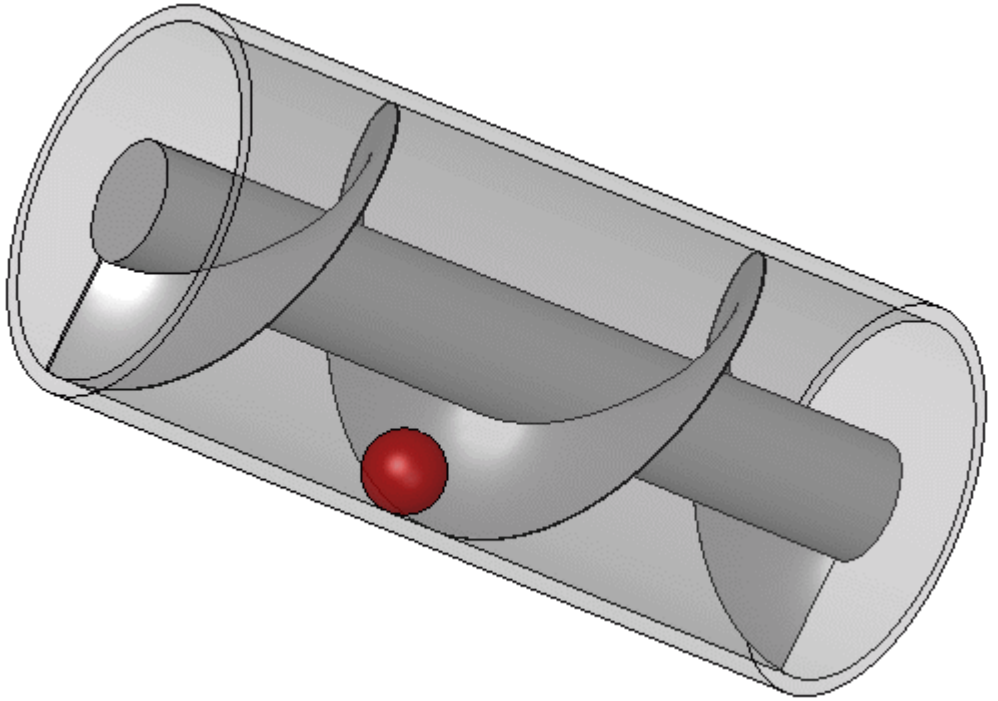


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Automation Engineers

Gears & Pulleys







We made a screw,
a machine Archimedes
did. See how many
applications it has!



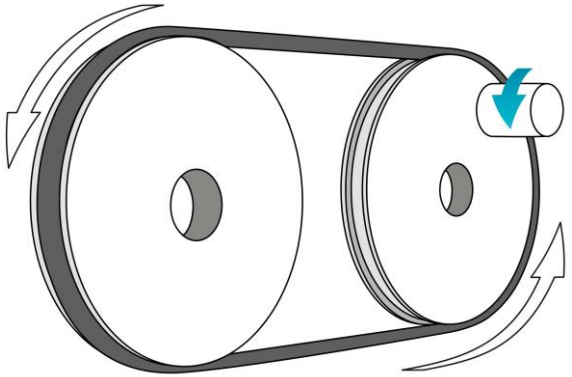
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MOVE ON TO THE 4TH BUILD

We replace gears with rubbers. We make pulleys!

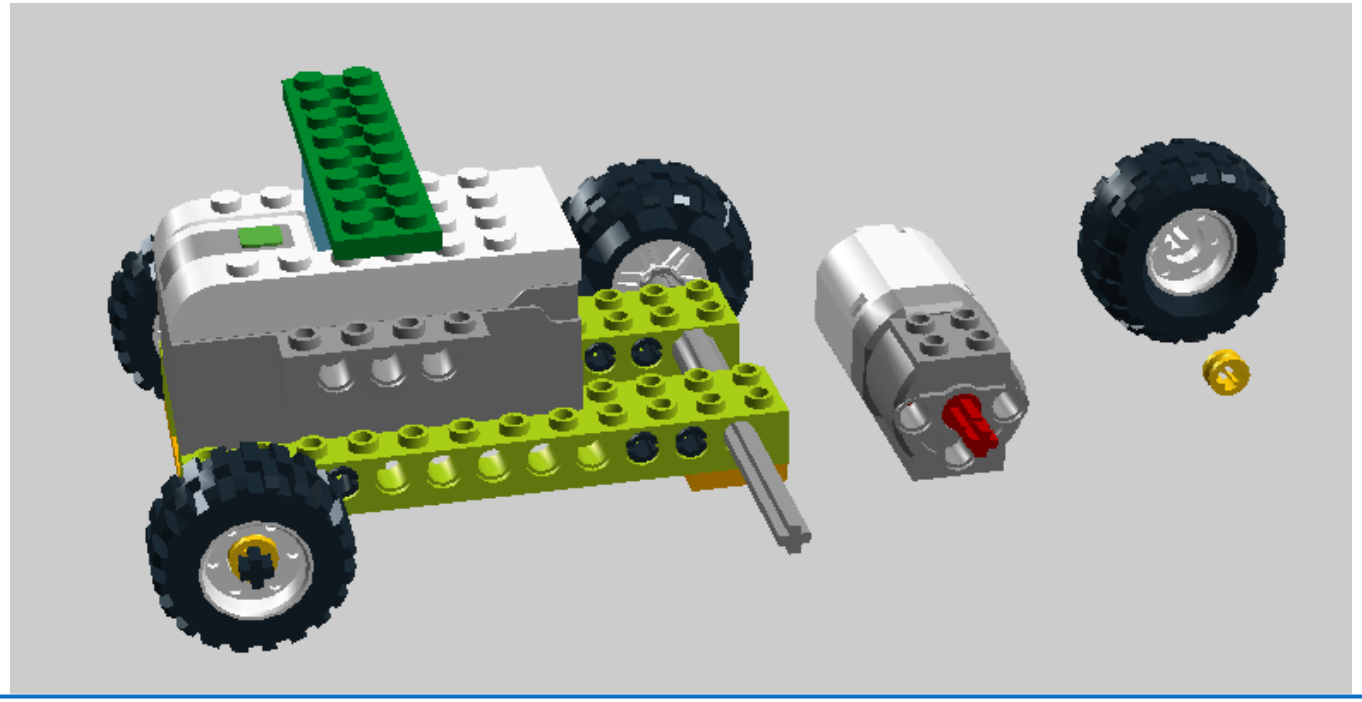






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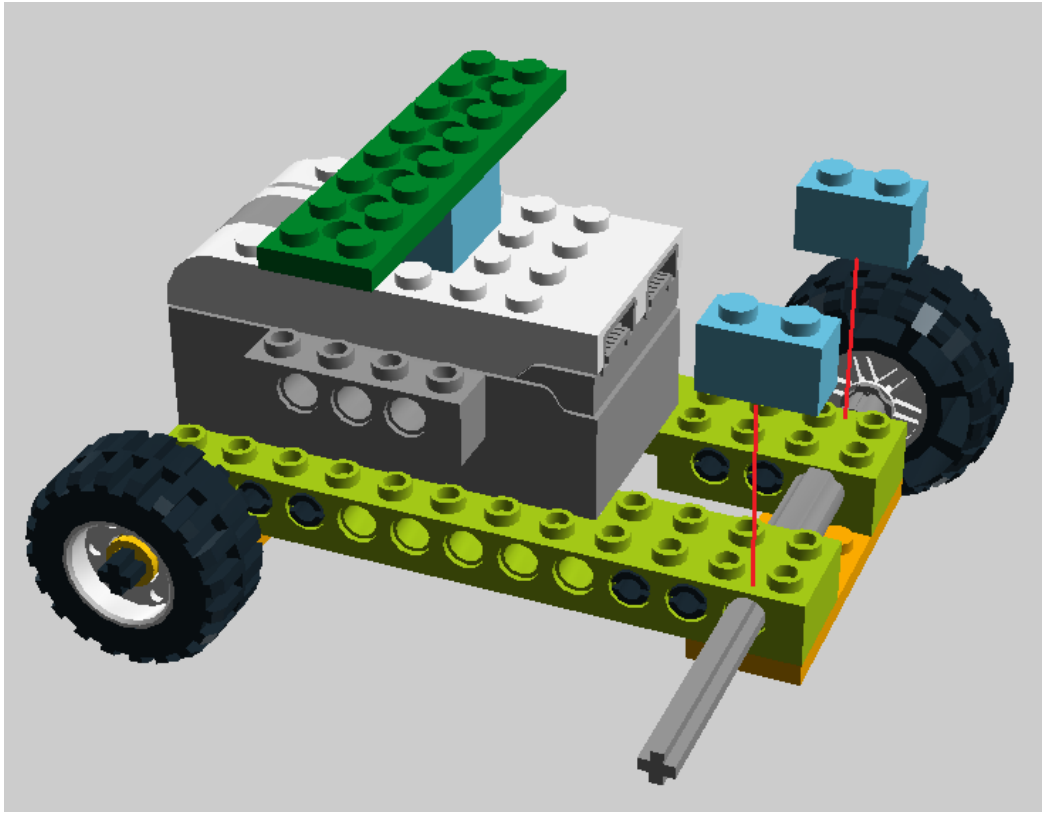


Take off the back wheel and remove the gears.

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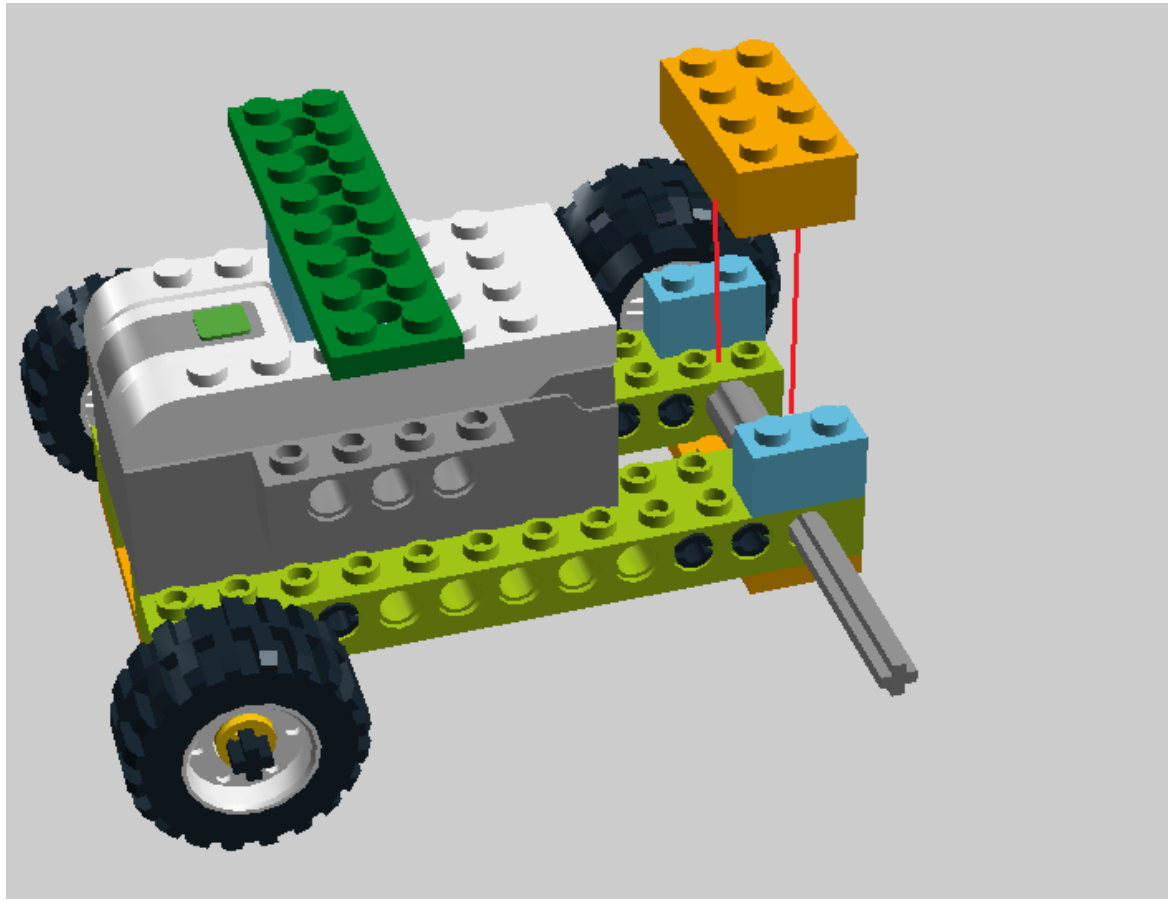
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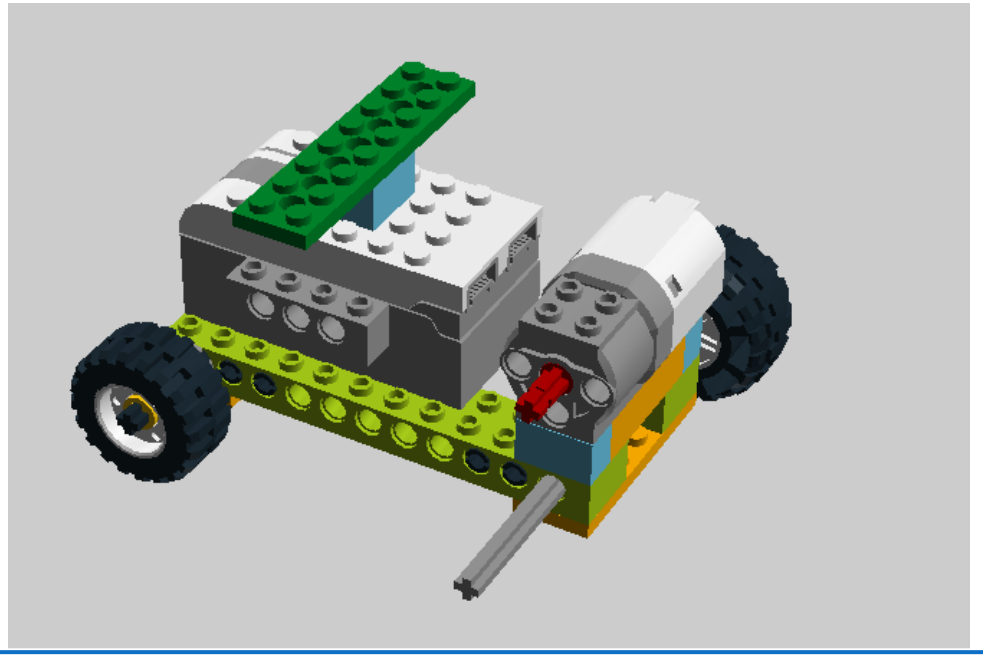
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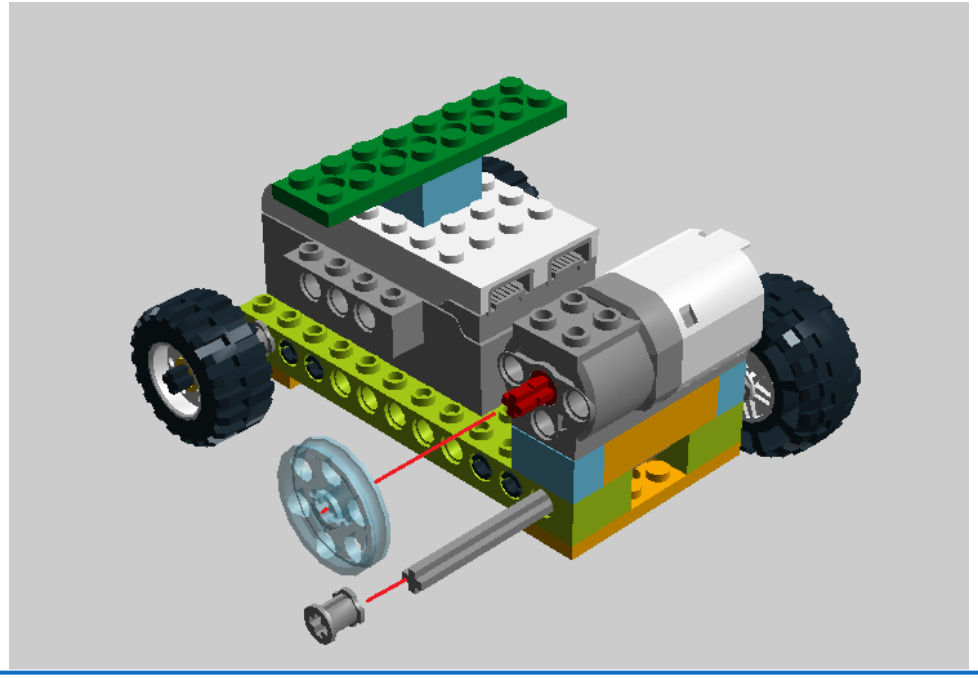
4



The more pieces you used were necessary to stretch the rubber we will place in the next step. Now we place the motor on them.

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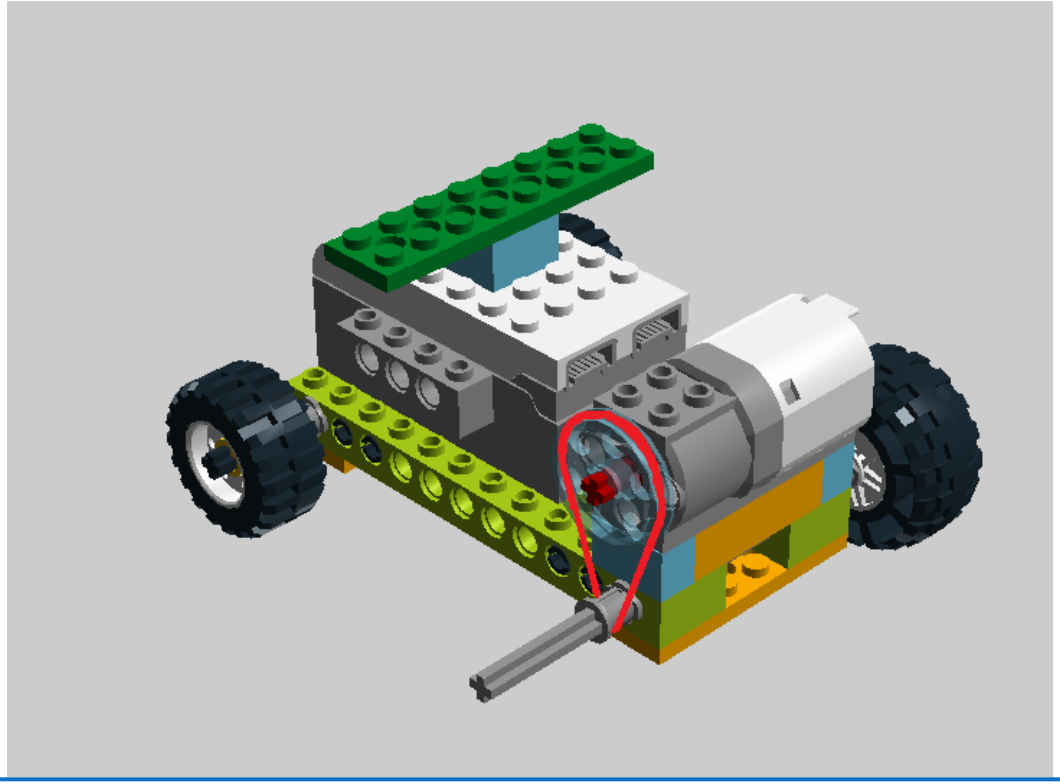
5



Place the blue semi-transparent pulley and the grey stop. There is a groove for the rubber.

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6



Place the red rubber as you see in the picture.

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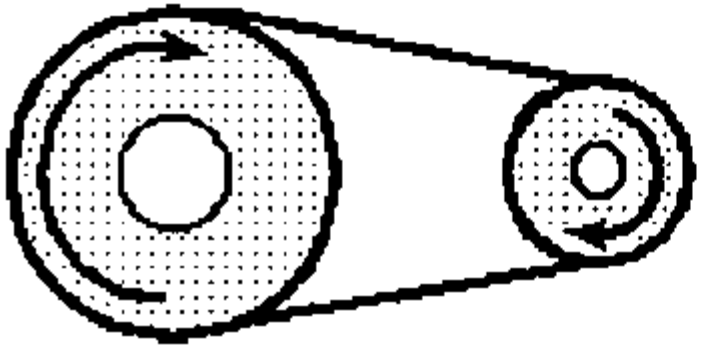
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Automation Engineers

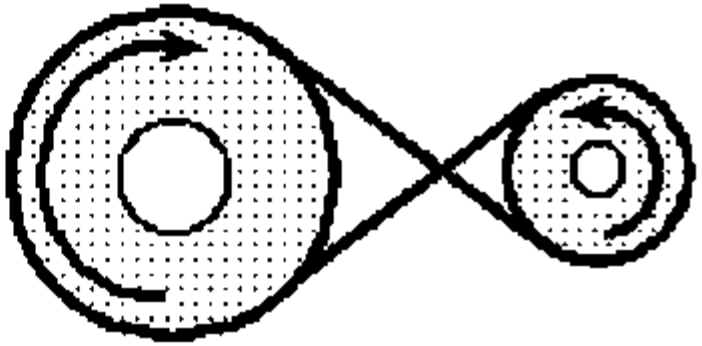
Gears & Pulleys

Apart from using the gears, there is another way for motion transmission.





Same rotating direction

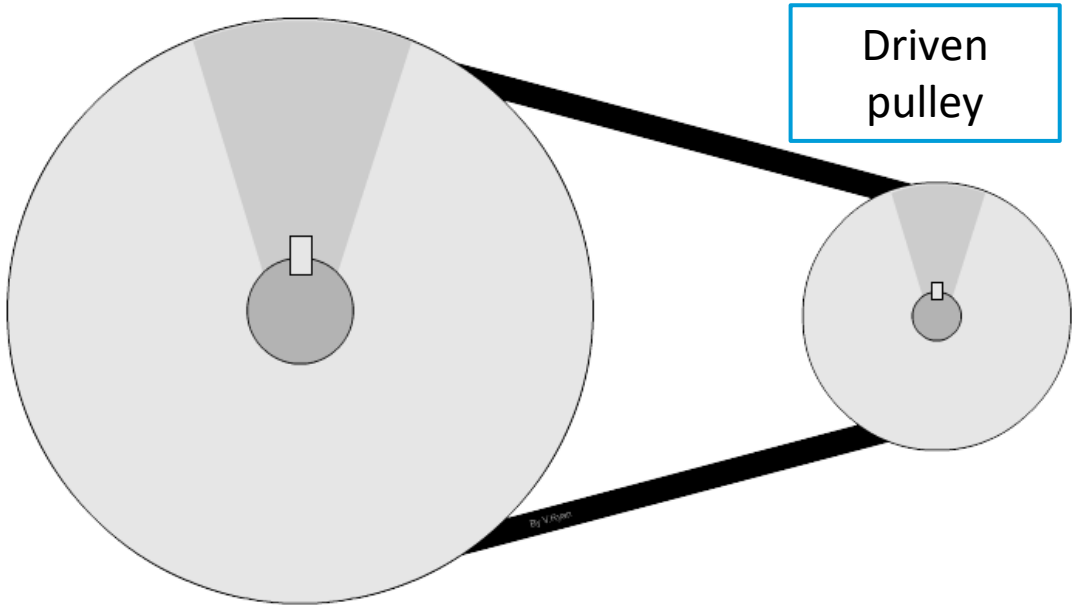


Different rotating direction

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Driver - pulley

Driven pulley





There is a driver and driven pulley here as well!

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When you finish your worksheet,

disassemble your build,

and put every piece in its right place.



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