

Santa and Rudolph

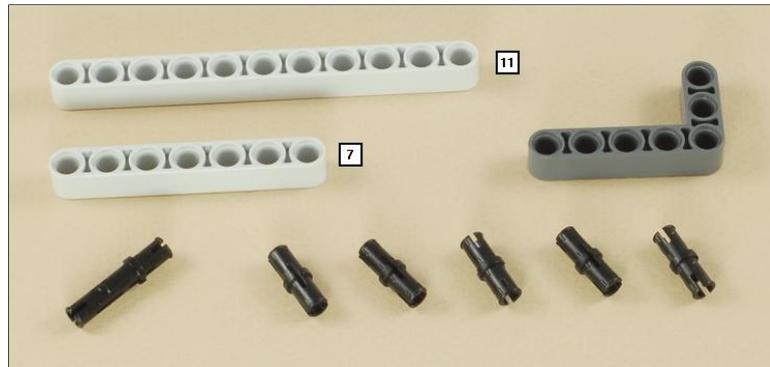
Building: 

Program: 

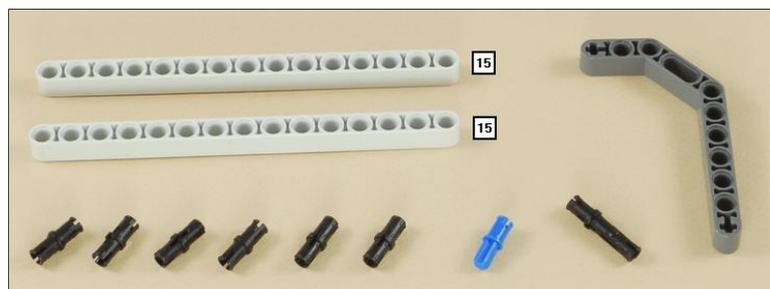
Designed for **NXT 1.0** (8527, or 9797 + 9695/9648)

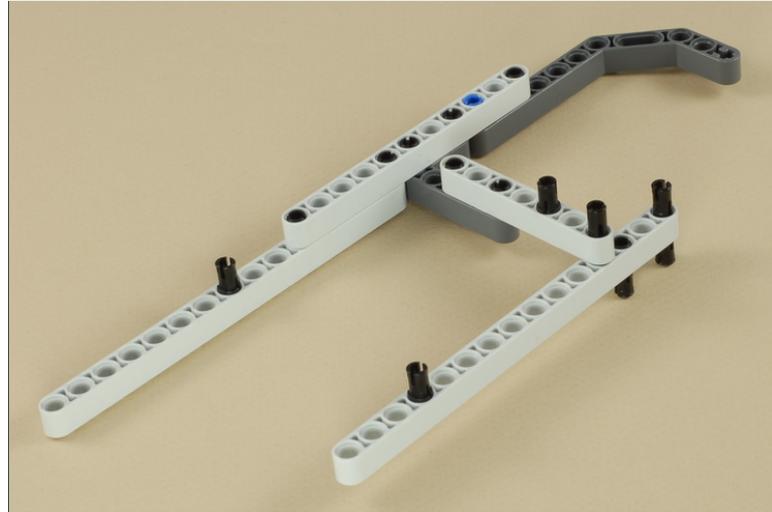
Building Instructions

1

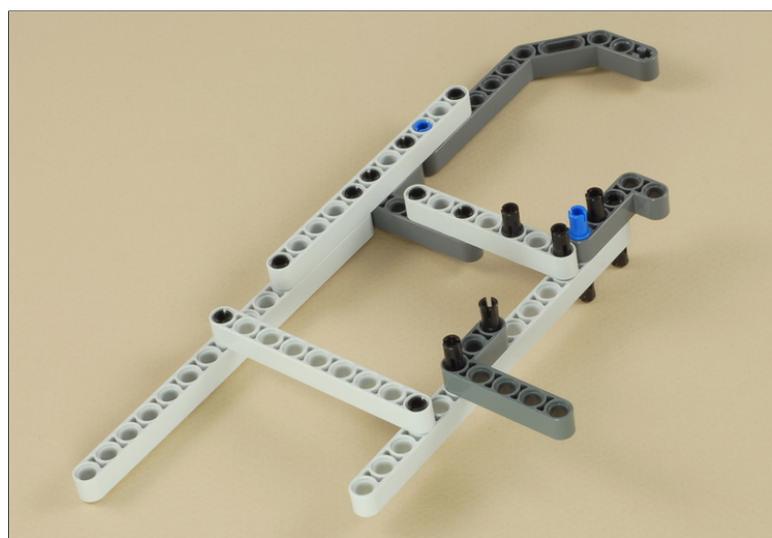
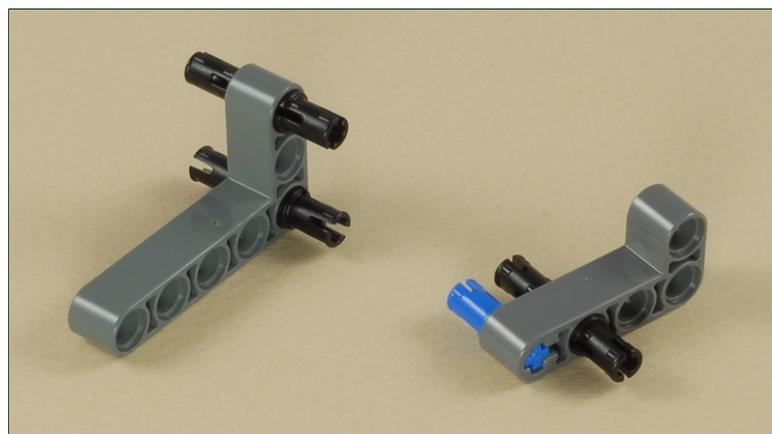
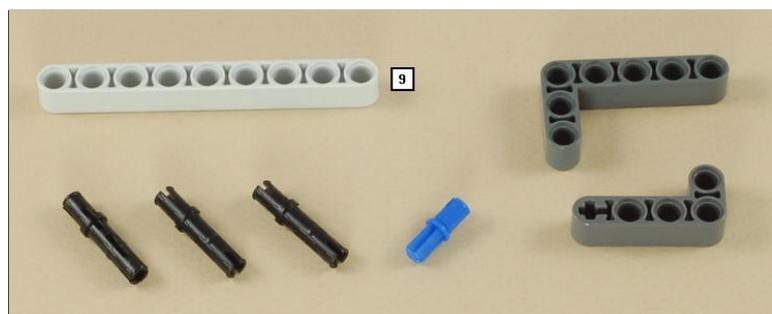


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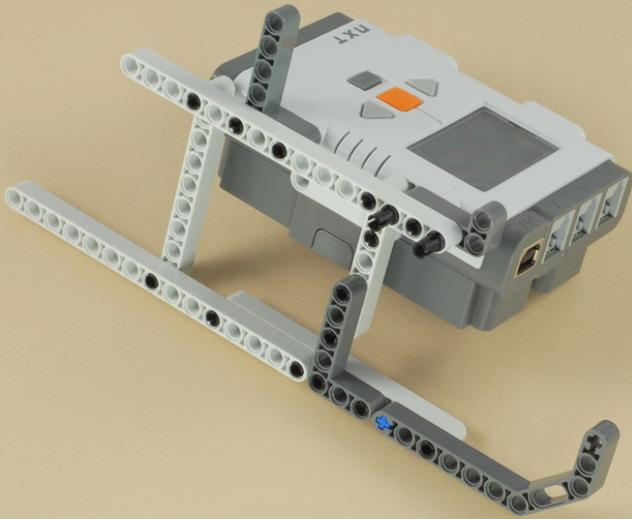




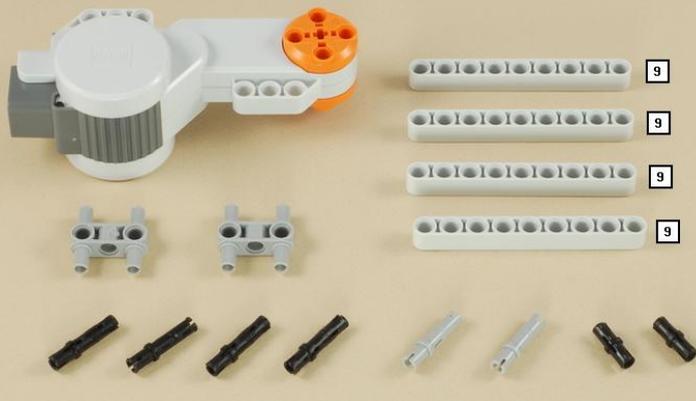
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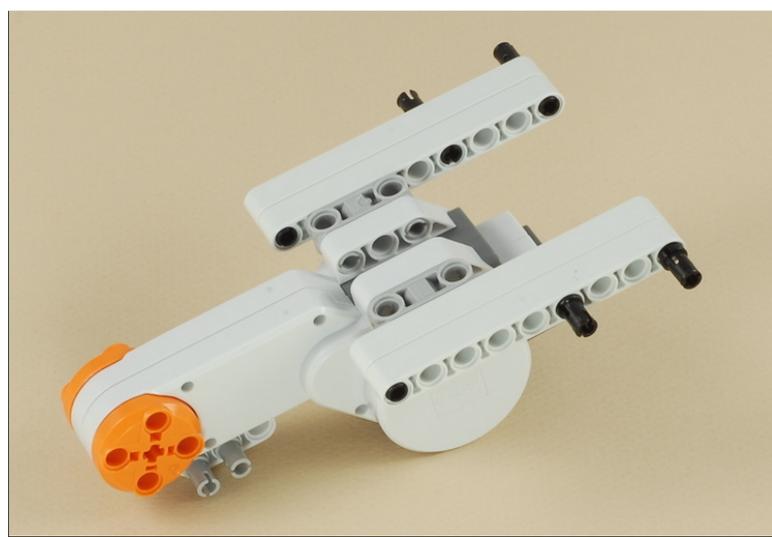
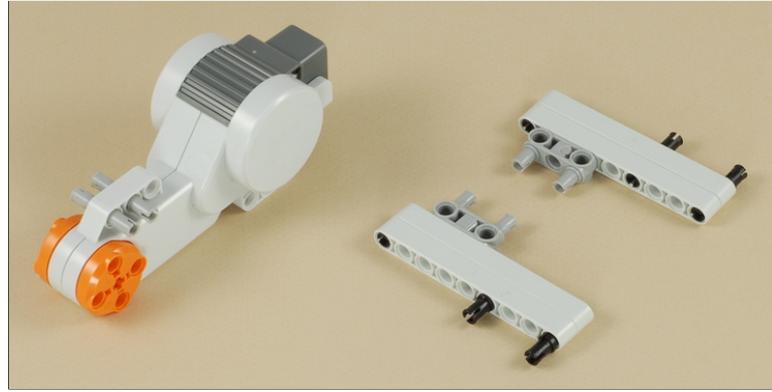


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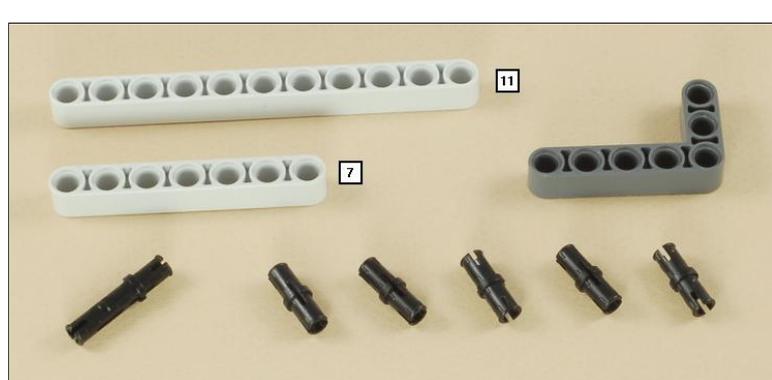


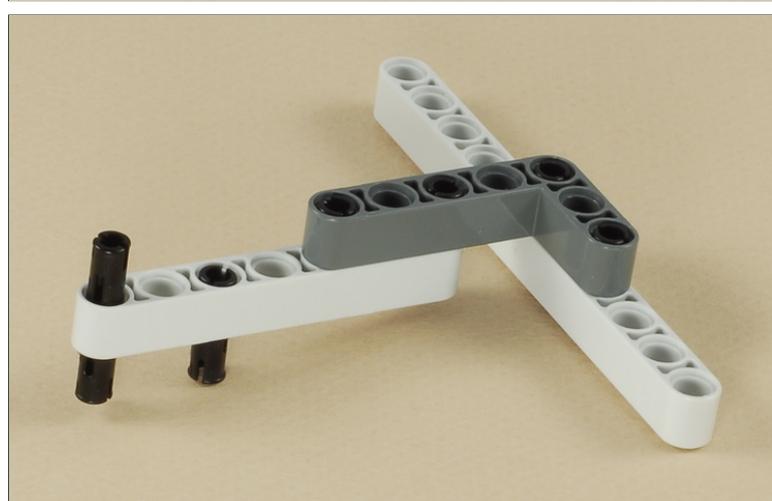
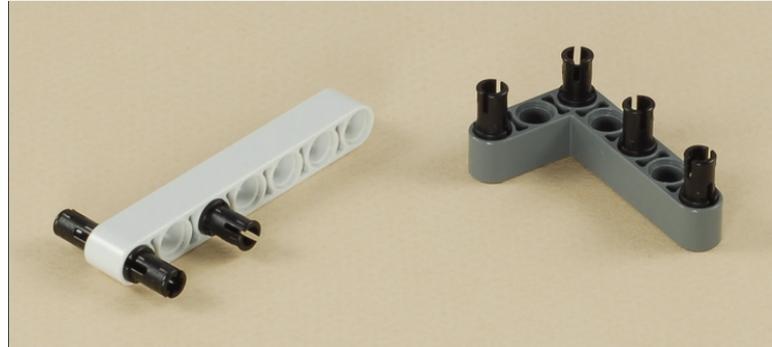
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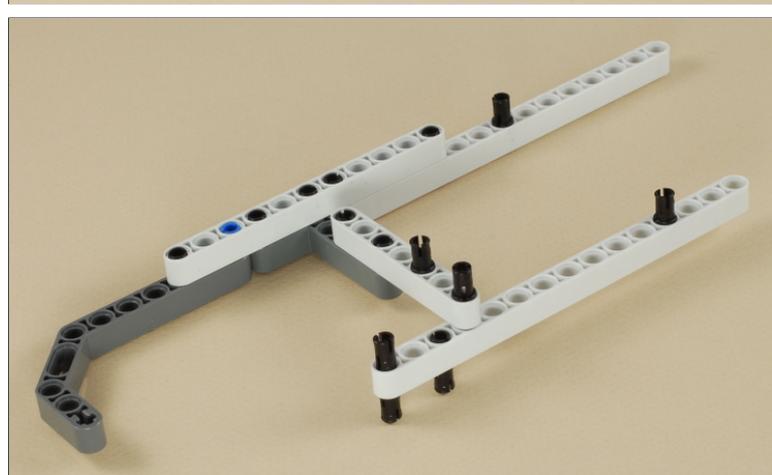
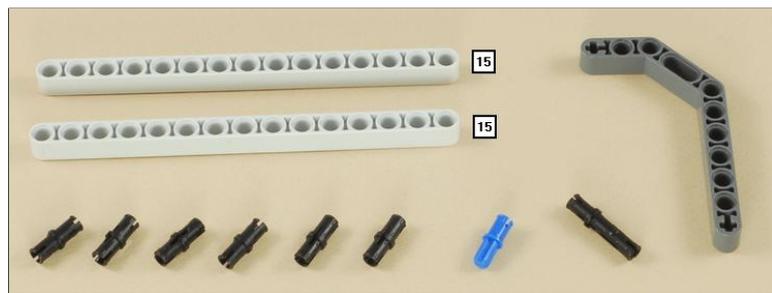


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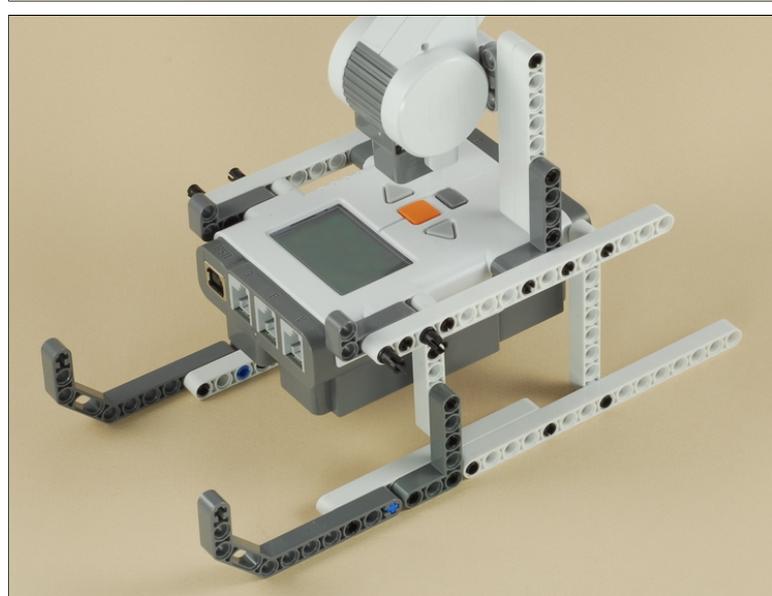
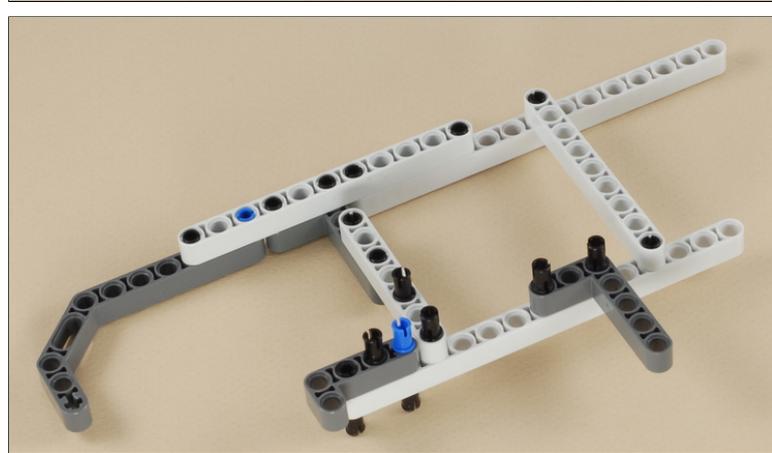
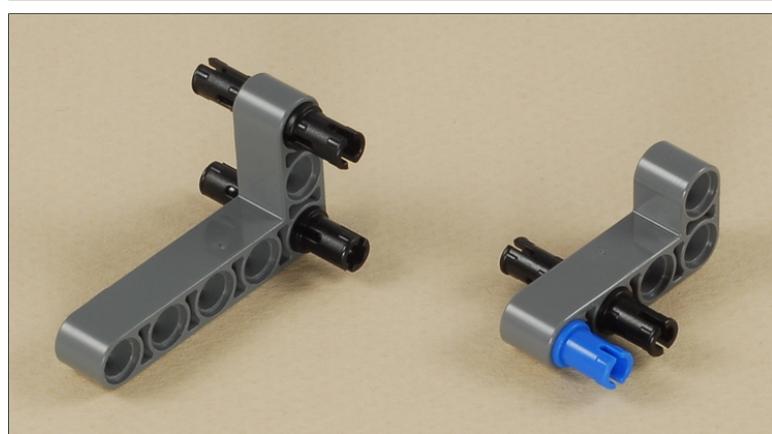
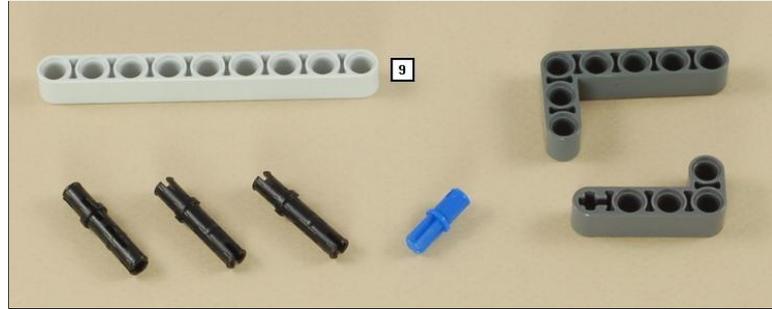


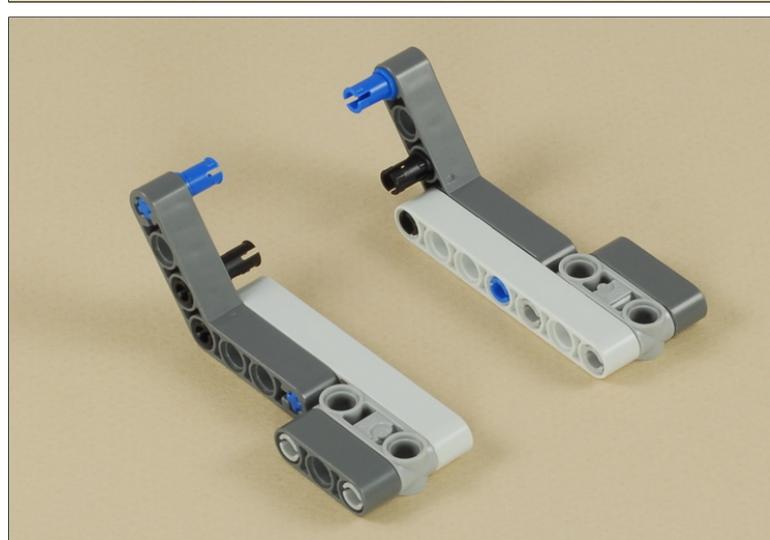
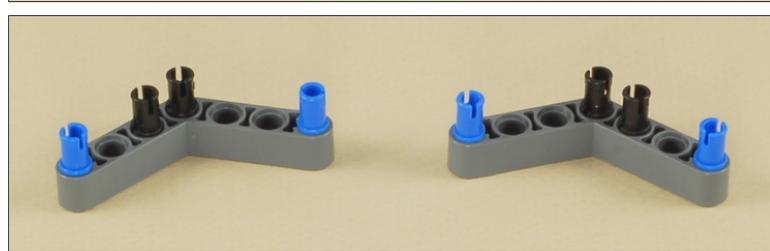
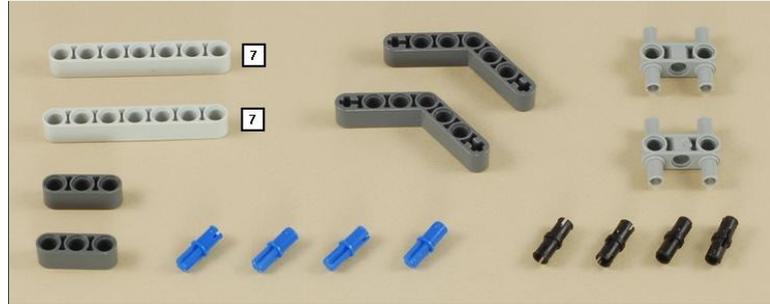


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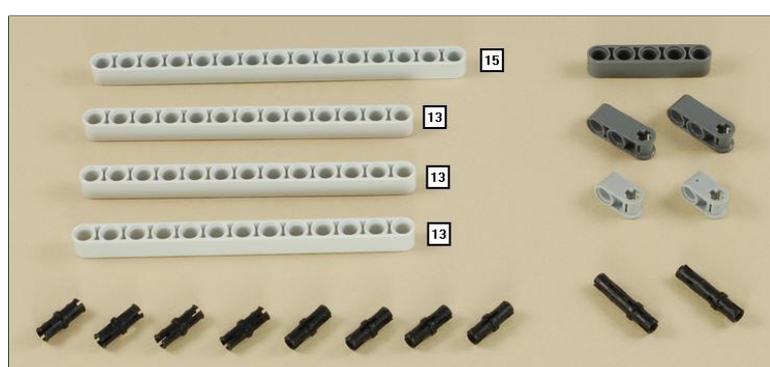


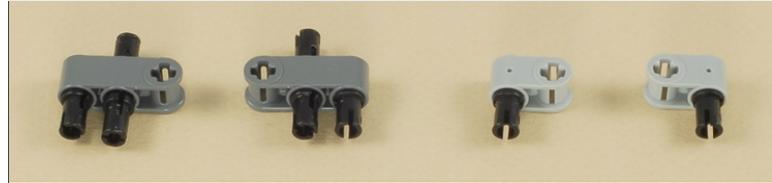
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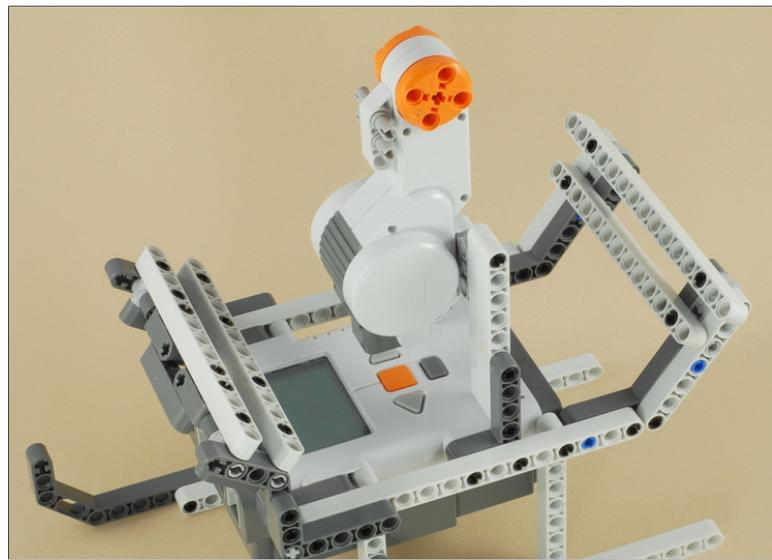


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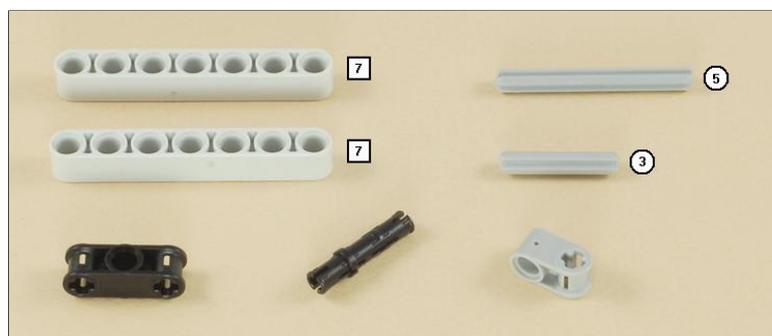


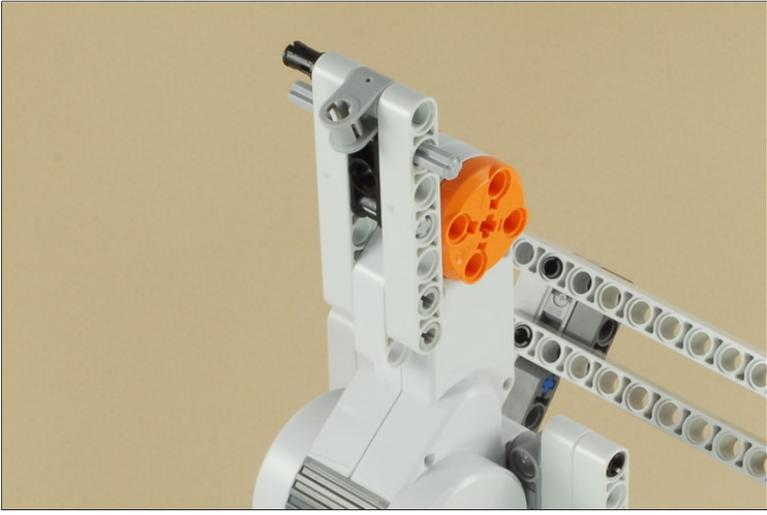
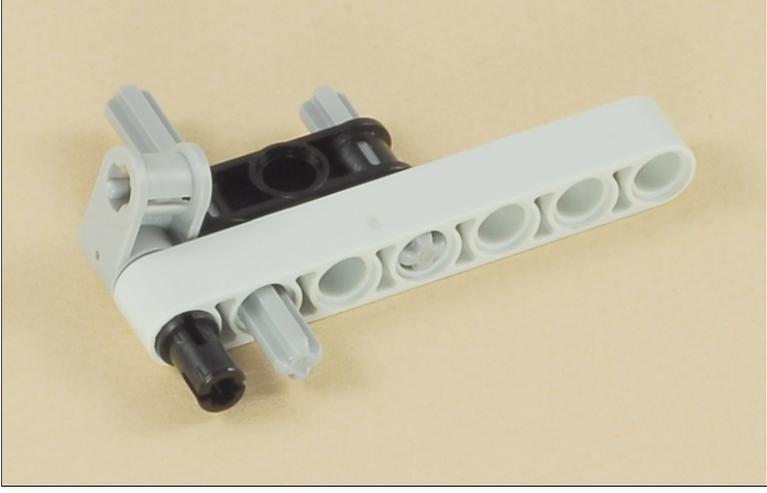


These parts are attached left to right on the model in the same left to right order shown above.

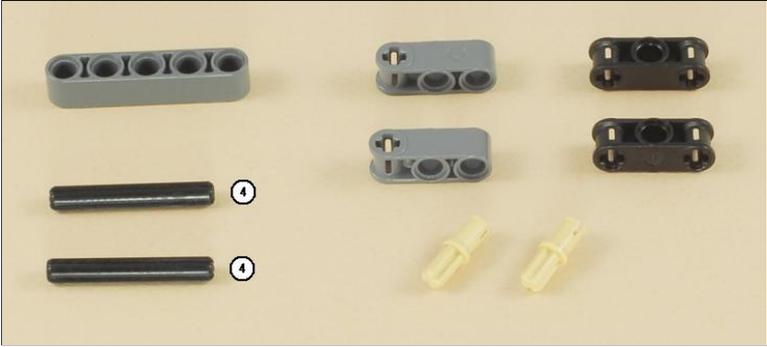


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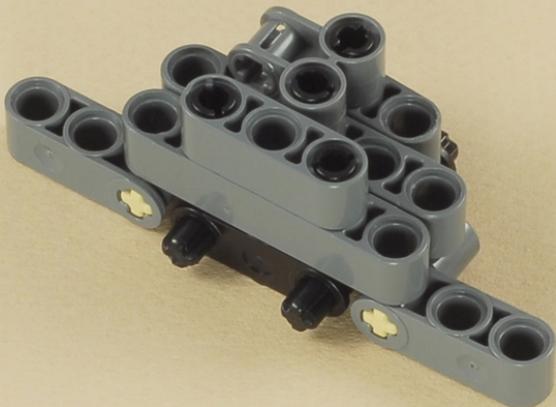
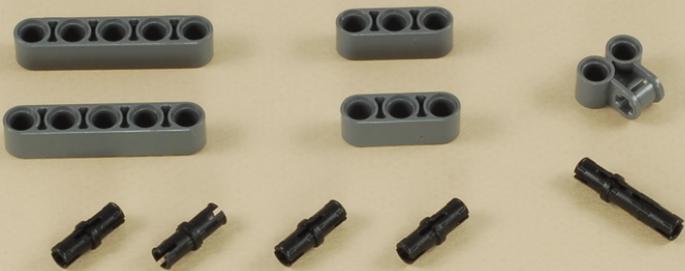


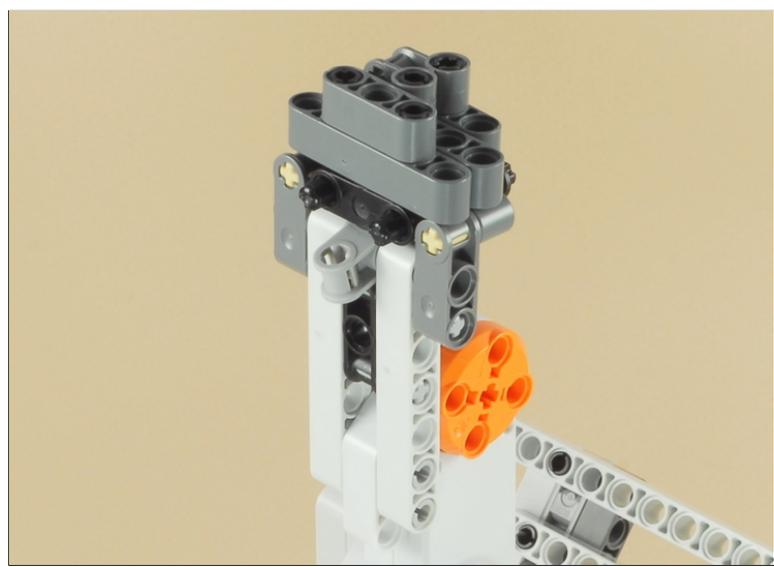
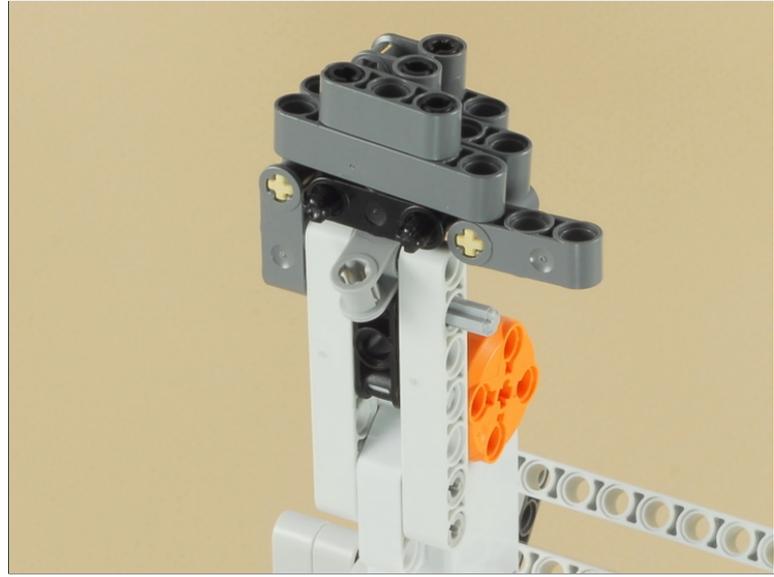
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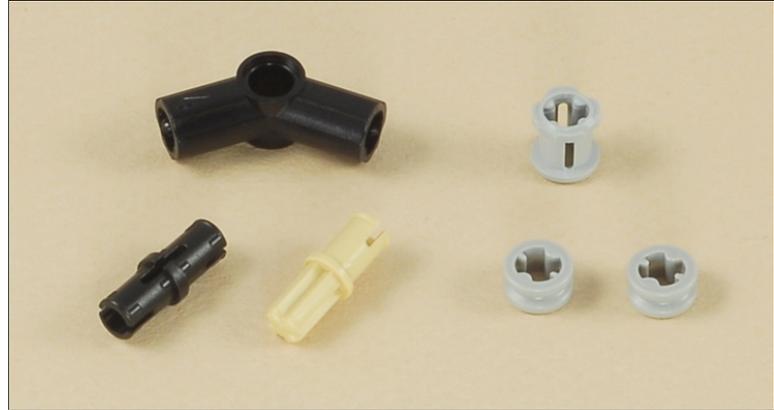


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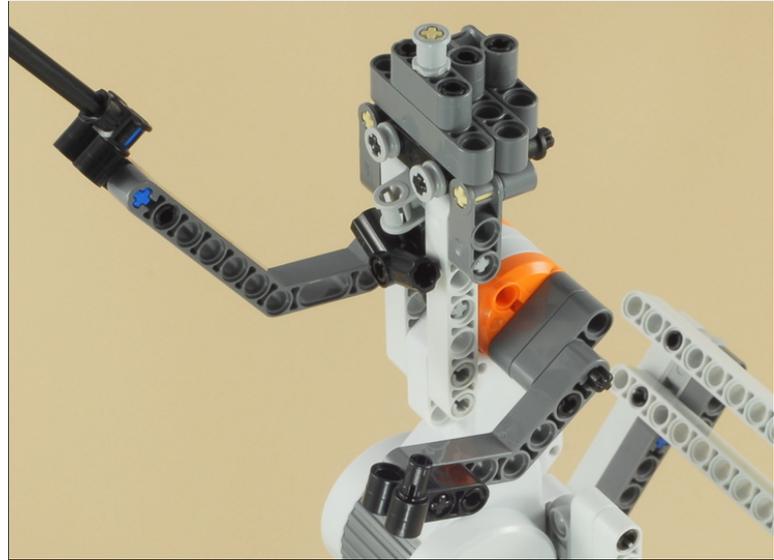
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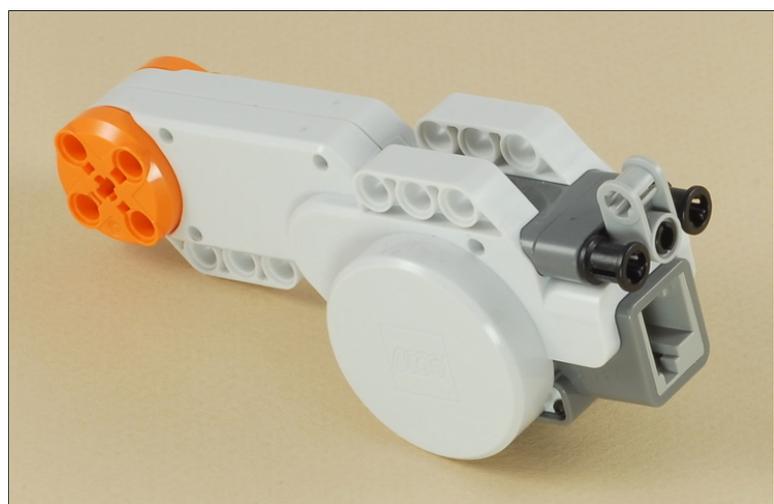


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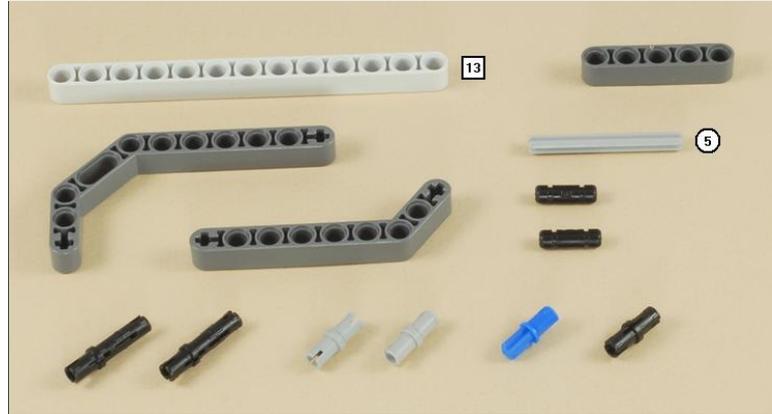




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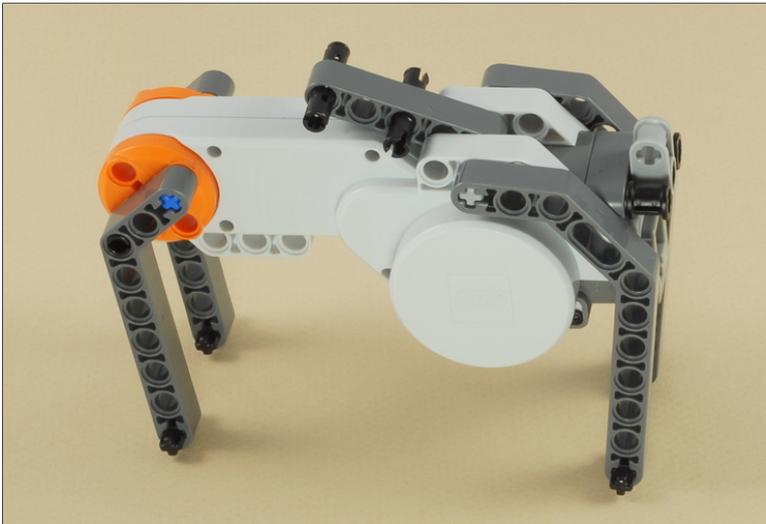
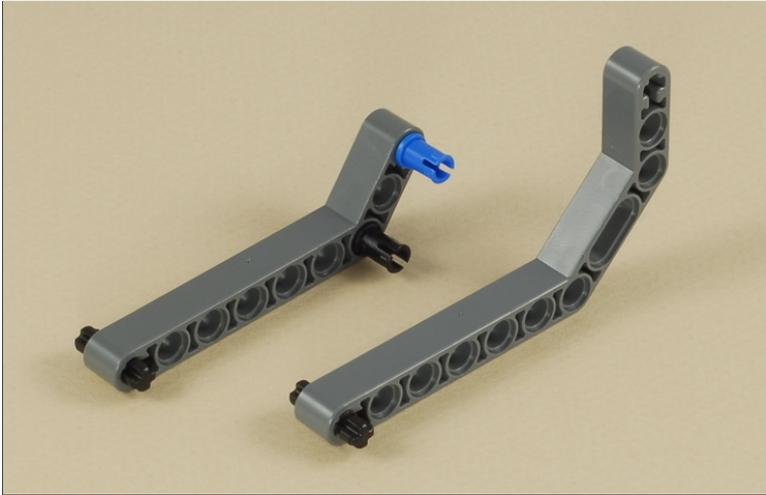


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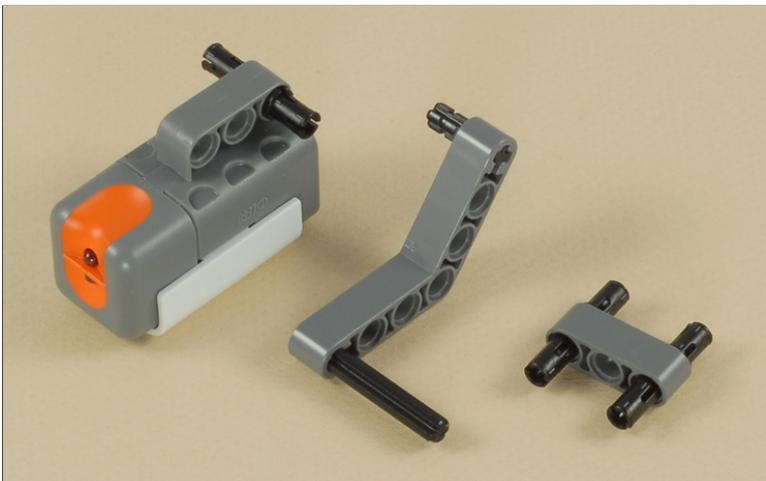
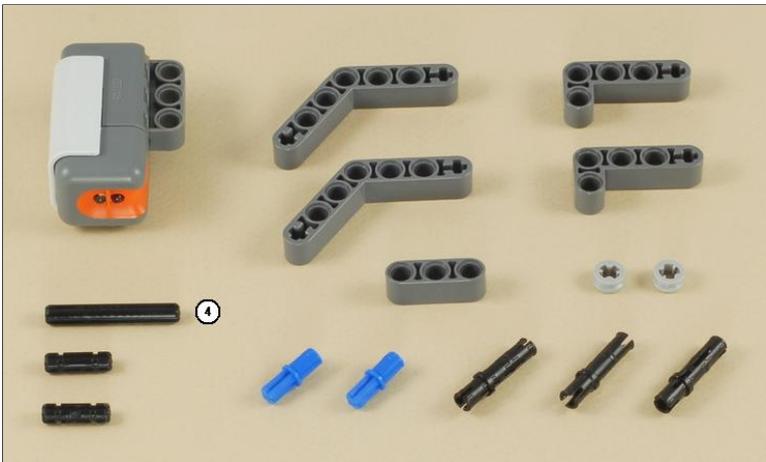


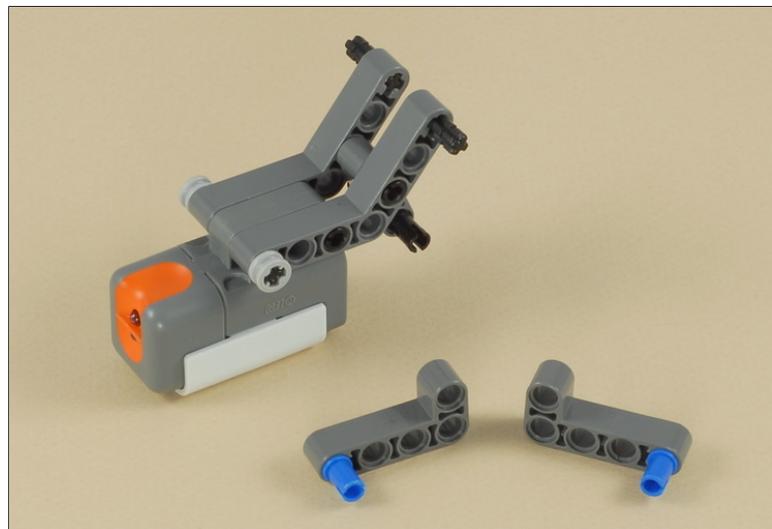
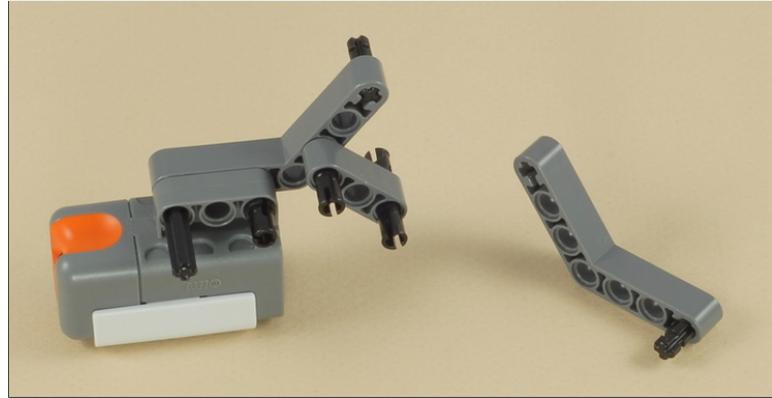
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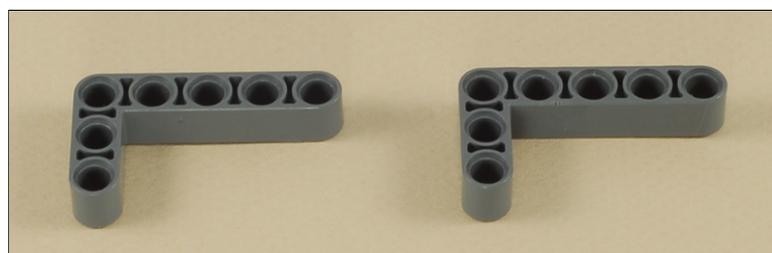


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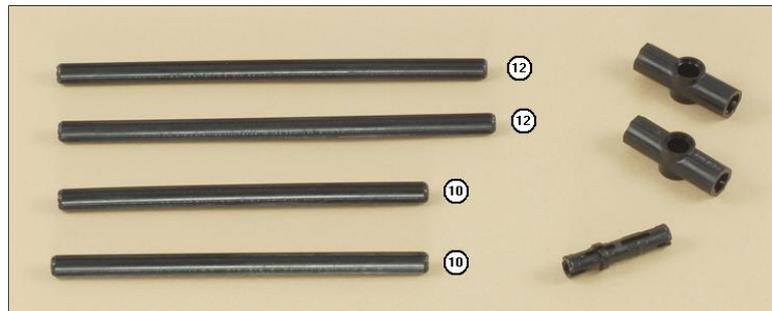


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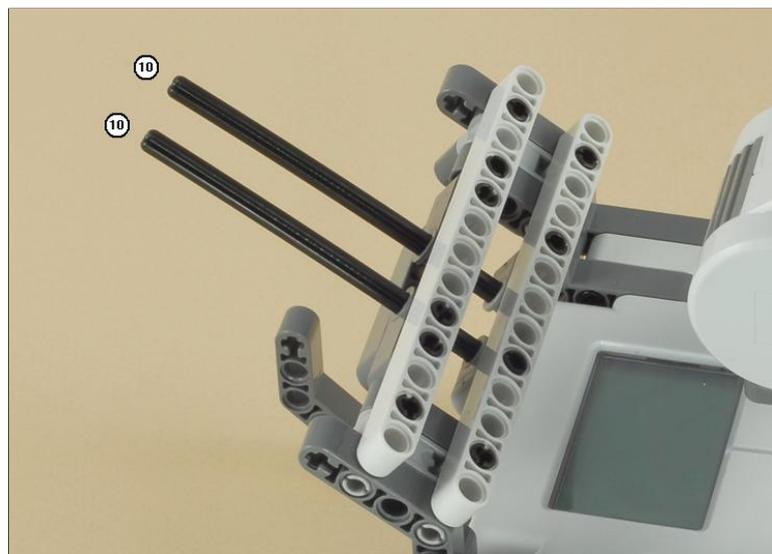




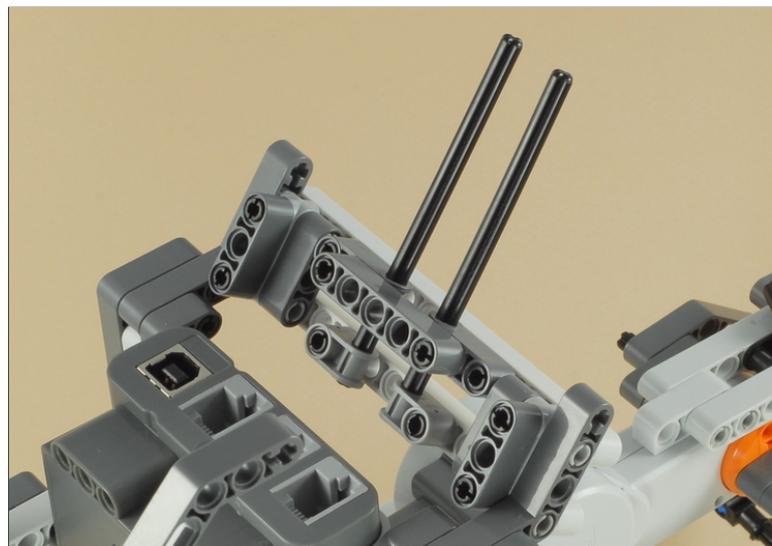
23



Rotate the axles as necessary until the holes line up so you can put the peg in.



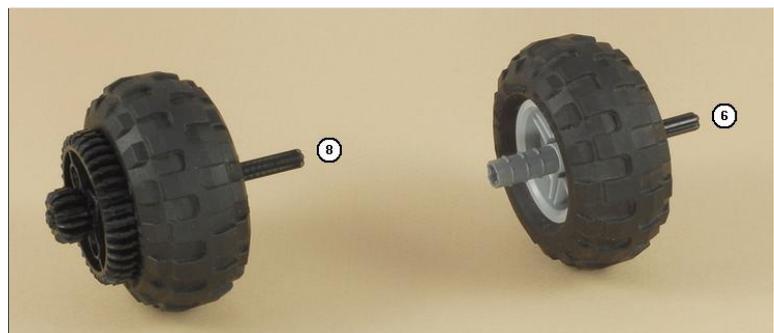
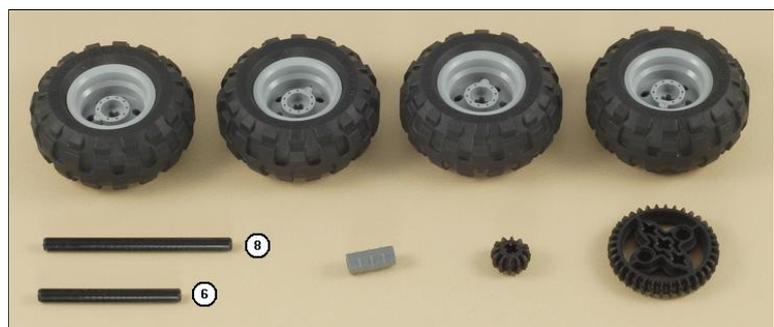
Make sure these two axles go all the way through to both supports, as shown below.



The axles bend a little under Rudolph's weight, so you should remove Rudolph by unplugging the axles when the model is not being used. This will help keep the axles from staying bent.



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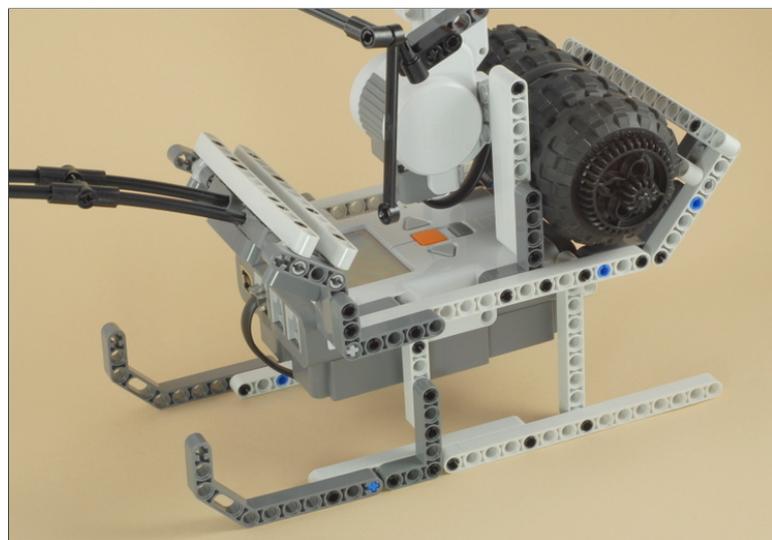




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Use a medium-length wire to connect Santa's motor to port **C** on the NXT. You can temporarily remove Santa if you have trouble getting the wire in under him.

To hide the wire, you can route it from Santa, up and over the sack of toys (tires), then down under the NXT brick, as shown in the two pictures below. This is a tight fit, but it makes it if you push the sack of toys down all the way.





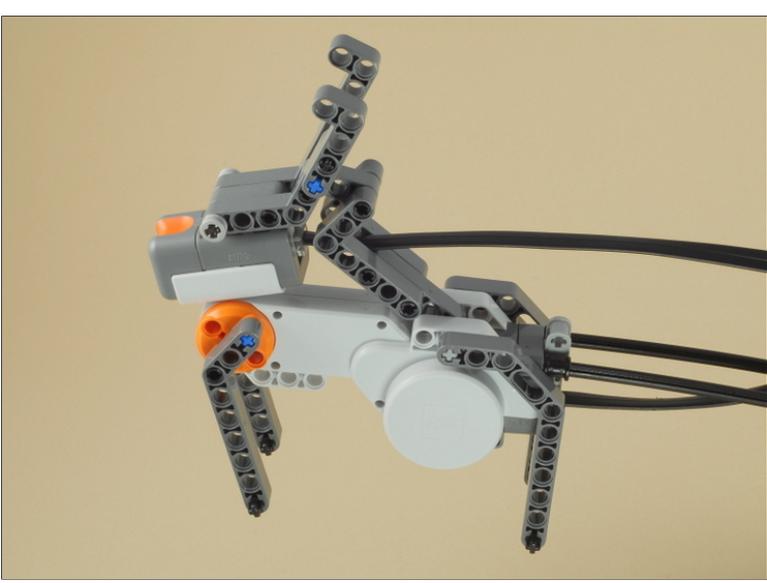
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Use the shortest wire to connect Rudolph's motor to port **B** on the NXT. You can route it over the peg in the support as shown to help it look better.



27

Using the longest wire, connect one end to Rudolph's head (the light sensor), routing it through his neck as shown below.



Route the other end of the wire over Santa's left hand (on the inside of the peg), then down behind the sack of toys and into port **3** on the NXT brick.



28

(Optional) Design and build some presents to add to the back of the sleigh. Here are some ideas.



Santa and Rudolph Programming

Use the program [Santa](#) for the Santa and Rudolph project. This program uses a series of tone sounds to play "Jingle Bells" at the same time that it controls the motors to make Santa and Rudolph move.

Using Santa and Rudolph

- To make sure Santa pulls on the reins correctly, you should start him out with his left forearm parallel to the ground, as shown in the last picture above. If you routed the rein wire (Rudolph's head to port 3) properly, then the wire should be fairly tight, but Rudolph's head should still be pointing mostly straight ahead.
- You can position the whip however you want to start, but straight out works well.

Challenges

- The [Santa](#) program uses a series of tone sounds to play Jingle bells, with some loops thrown in for parts that repeat. The main trick to getting music tones right is the timing. If you know something about music and a little math, then you just need to decide how long one beat is in seconds, then you can work out the time needed for each tone. Another little trick is that you need to put a slight pause after each note if you don't want it to sound "slurred" and repeated notes "tied". See the program for details. After you understand the basic technique, try programming some of your own music, perhaps a different Christmas carol for this project.
- Try designing another motorized musical decoration of some kind. Start out simple and add features to it one at a time. There are lots of possibilities, use your imagination!

