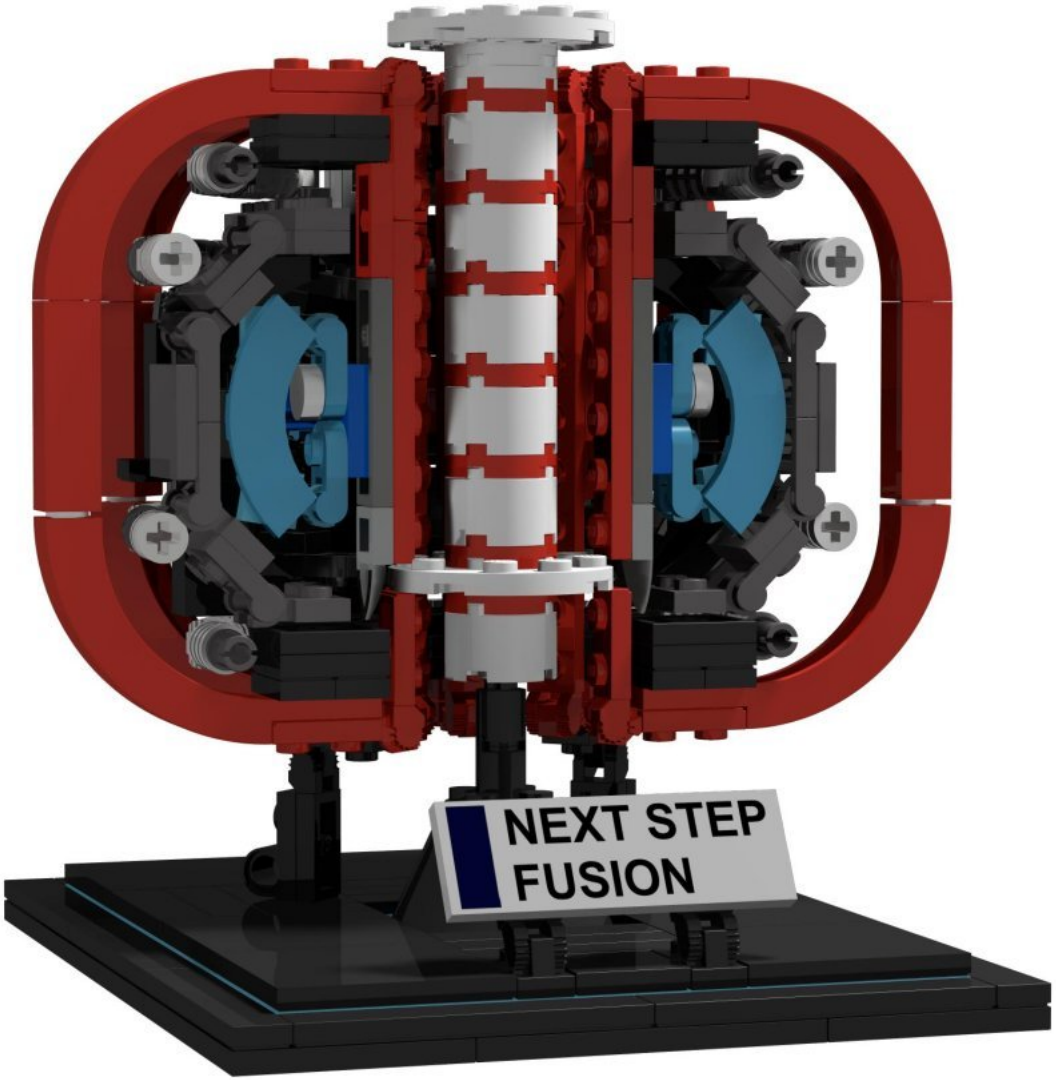
LEGO TOKAMAK ver.2

Instruction



WARNING: CHOKING HAZARD

Recommended age: 6+
Adult supervision is recommended.
Keep small parts away from young children.



READ ME

Before you start

This model needs no glue. The parts hold together firmly, so the finished model can stand proudly on your shelf.

A few things to know before you begin:

Precision matters.

Many connections only work well when the parts are positioned exactly right relative to each other. If a piece is even slightly off, the joint gets loose, gaps appear, and the finished model won't look as good as it should. Press each part fully into place and check its position before moving on.

Engineering thinking required.

Some steps are deliberately tricky and make you work out how the parts fit together. Others turned out harder than planned, and I'm working on making the instructions clearer.

Glue is optional.

If you want the model to be extra sturdy and permanent, you can glue the more unusual, custom connections as you build. Glue is not included in the set.

Enjoy the build!

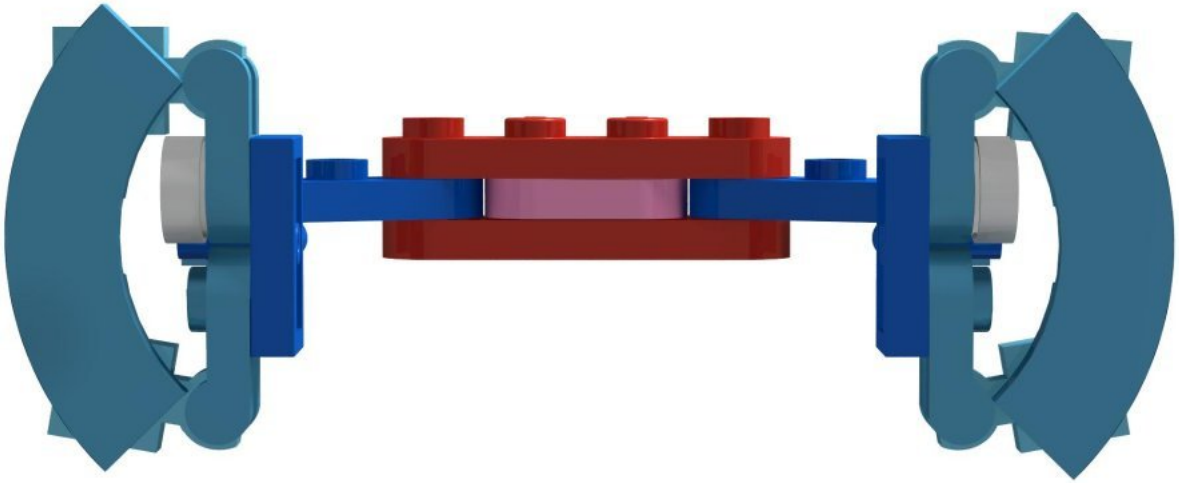
Plasma

A hot ionized gas where fusion reactions can occur under suitable temperature, density, and confinement conditions. Its visible color depends on the gas species, impurities, temperature, density, and observation conditions.

Blue / violet plasma can be associated with argon or nitrogen-rich discharges.

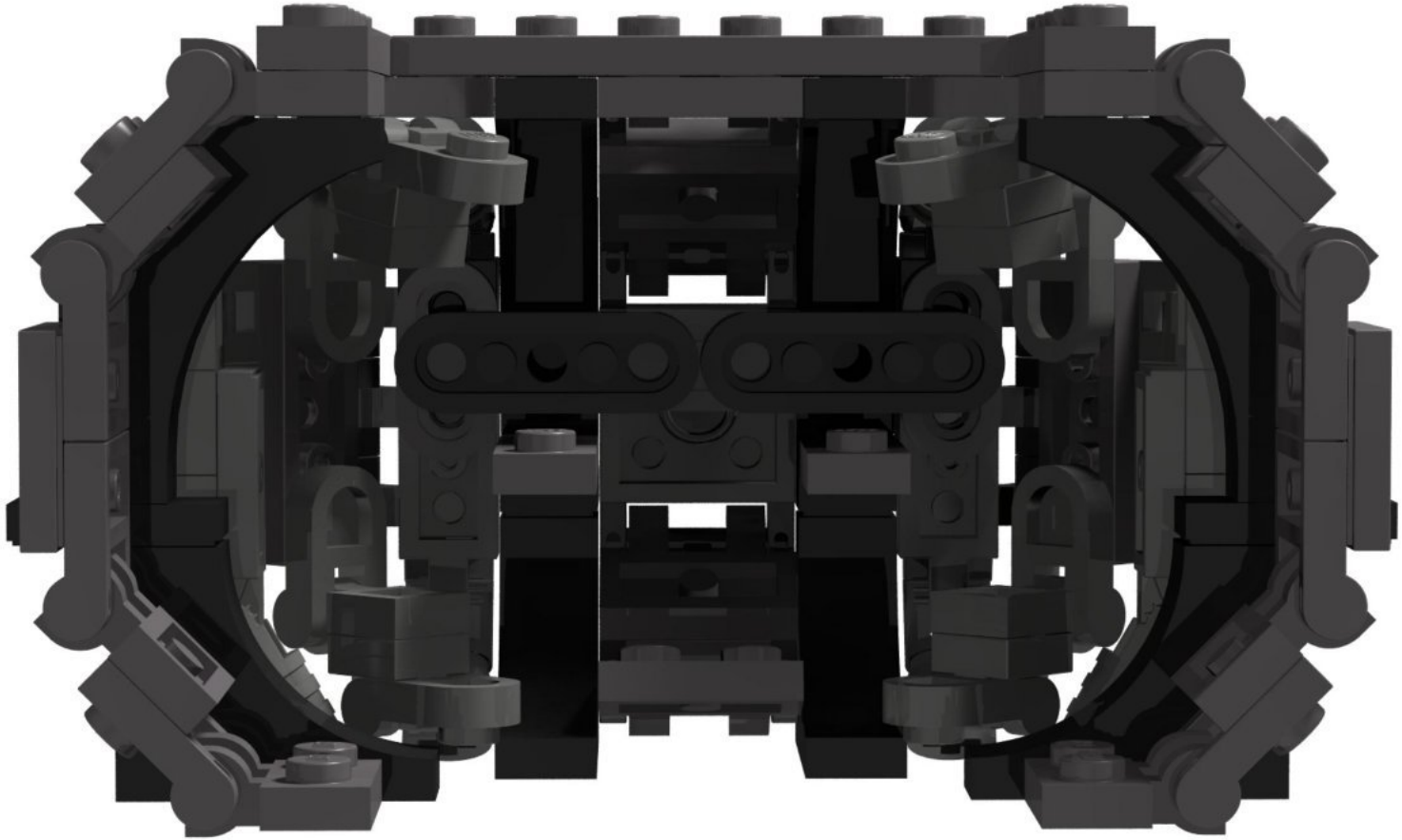
Red / pink plasma is often associated with hydrogen or deuterium emission, especially the H-alpha / D-alpha spectral line.

NOW IT GLOWS!



Vacuum Vessel

A sealed chamber that contains the plasma and provides the required vacuum environment for fusion experiments



PF Coils — Poloidal Field Coils

External magnetic coils are designed to control the shape, position and vertical stability of the plasma.



CS Coil — Central Solenoid

A central magnetic coil is designed to induce plasma current and assist with plasma formation and control

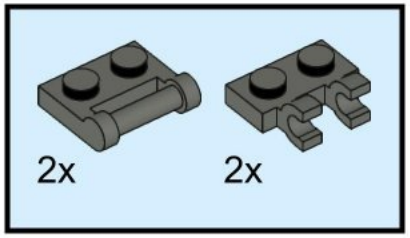


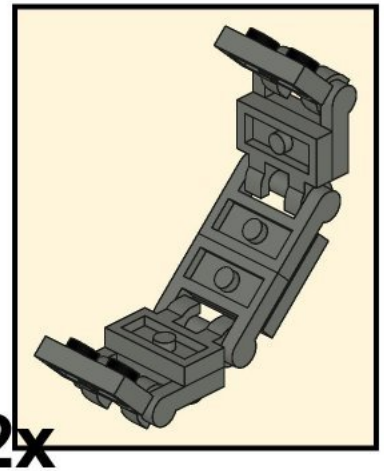
TF Coils — Toroidal Field Coils

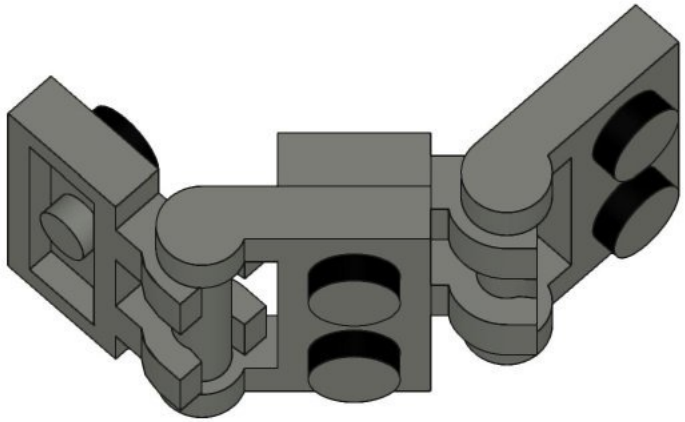
Magnetic coils that generate the main toroidal magnetic field, helping to confine the plasma inside the tokamak.



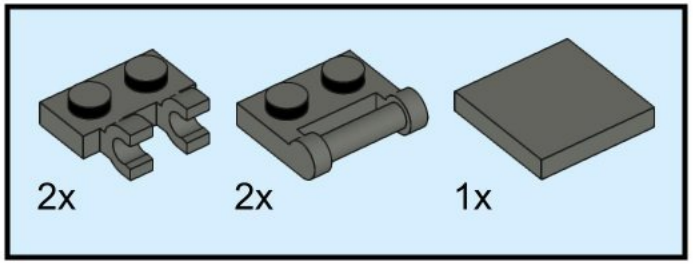
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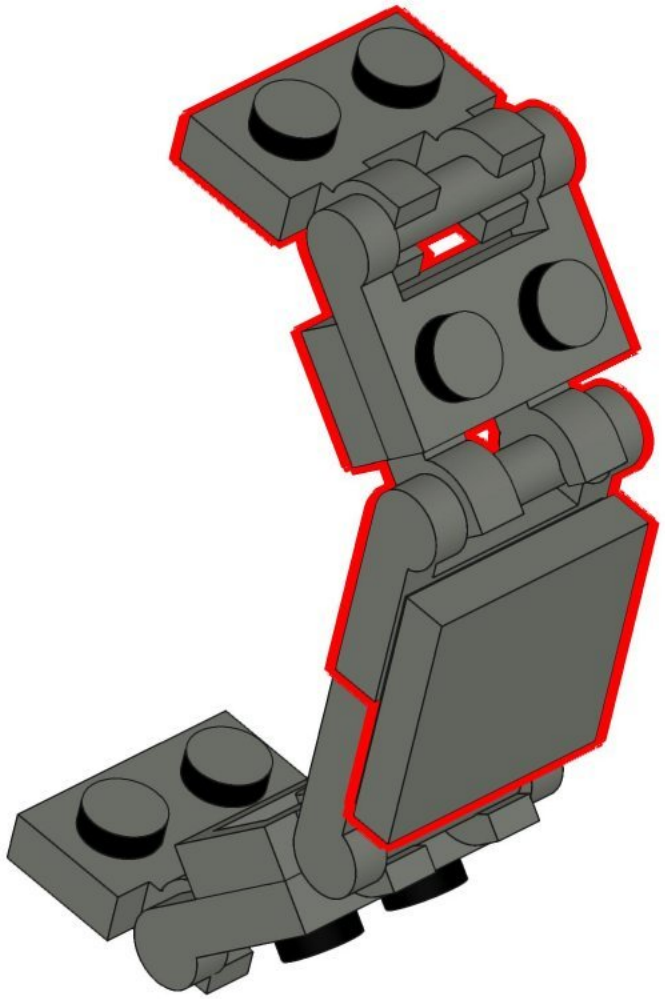




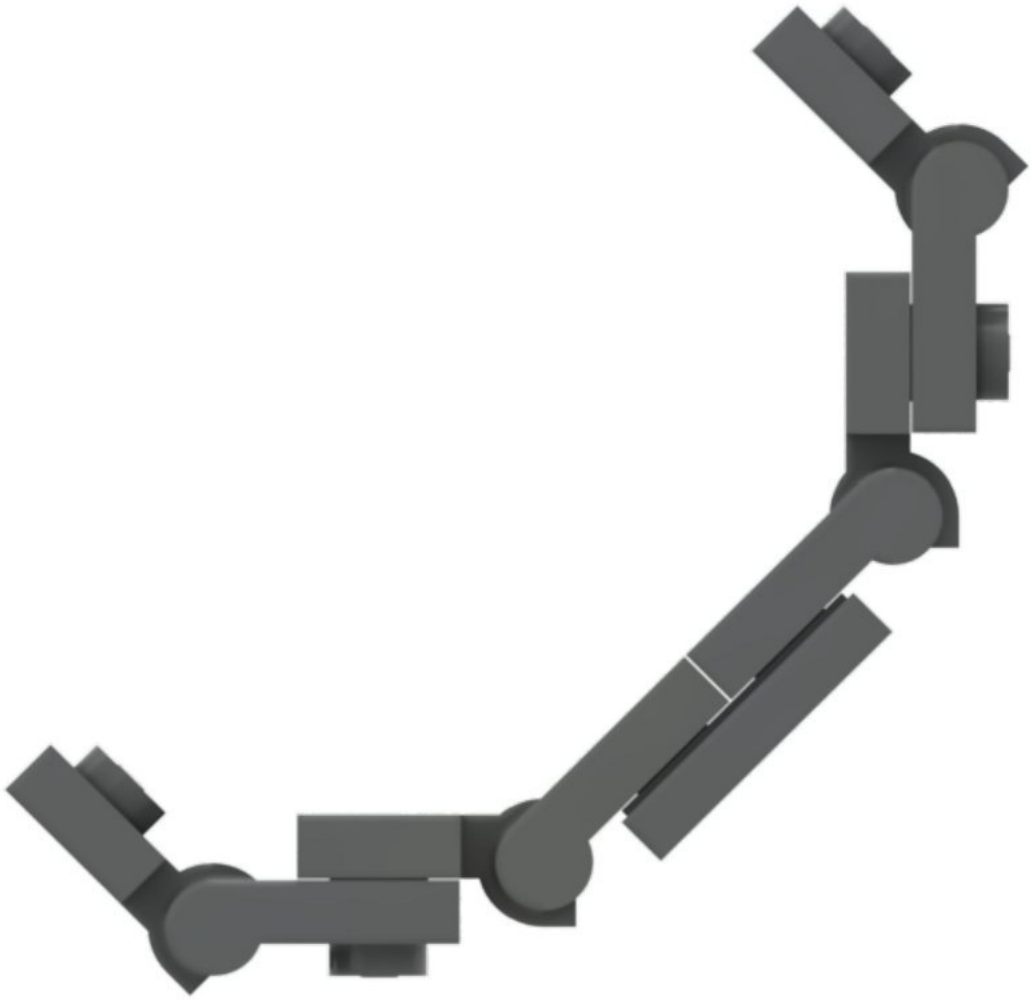


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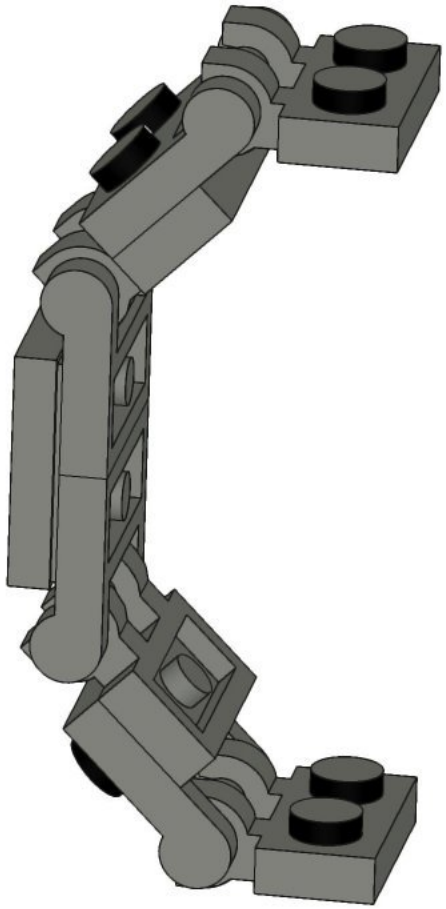


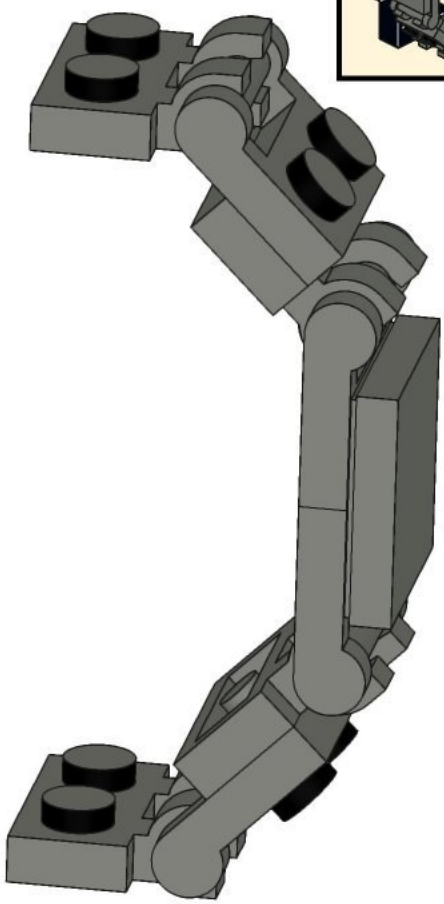


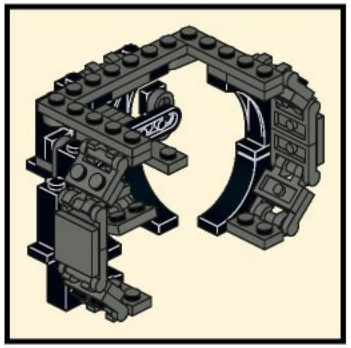
ALIGN GUIDE



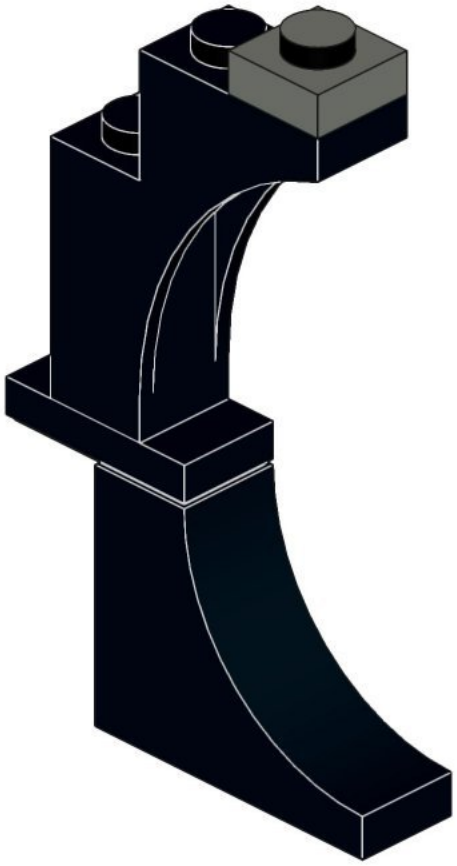
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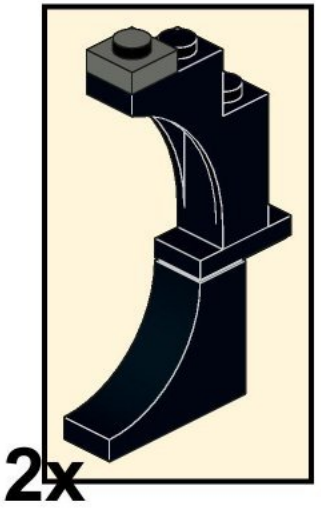


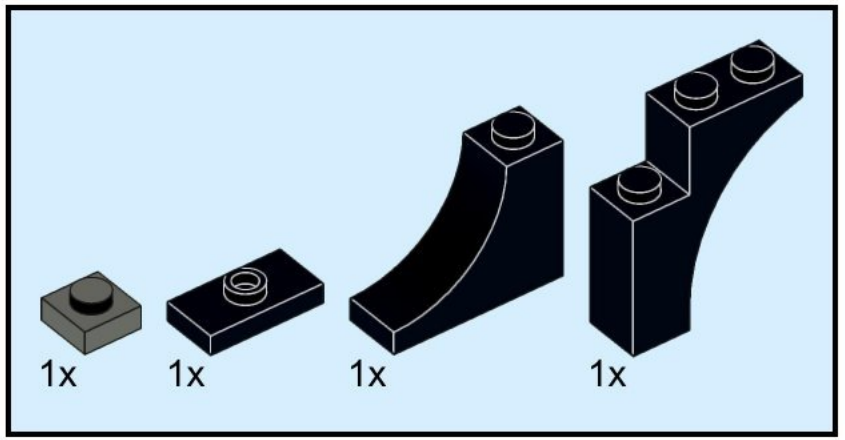




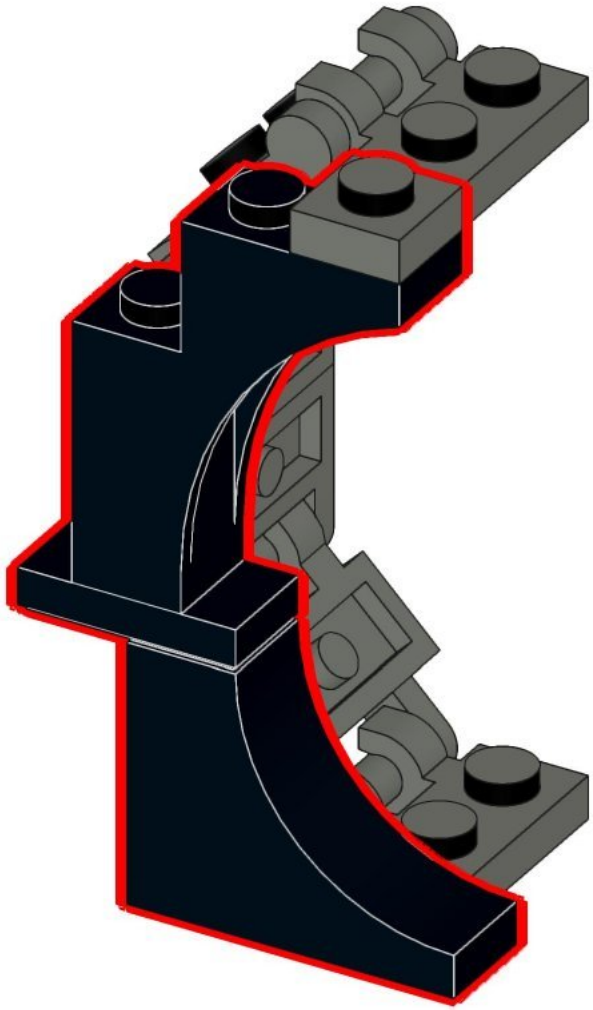
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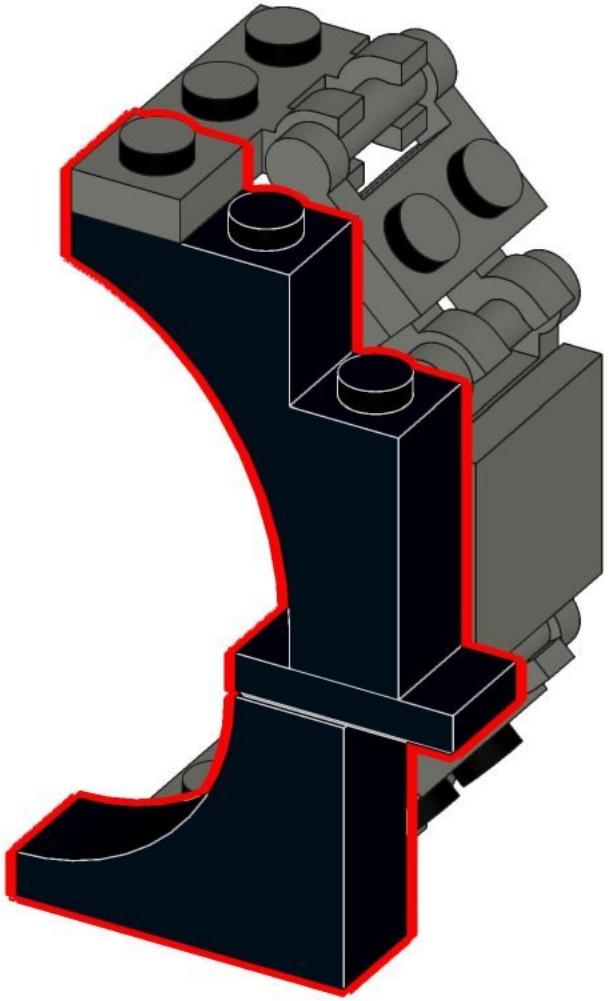




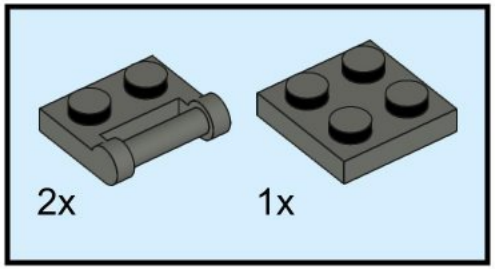


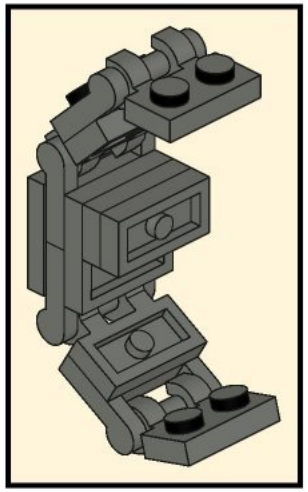
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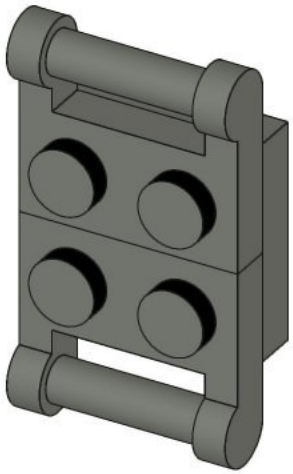




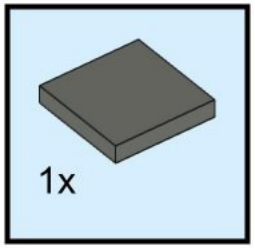
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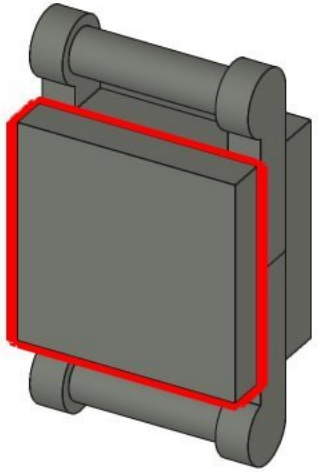




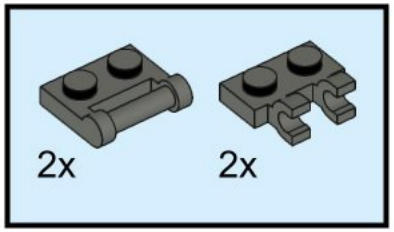


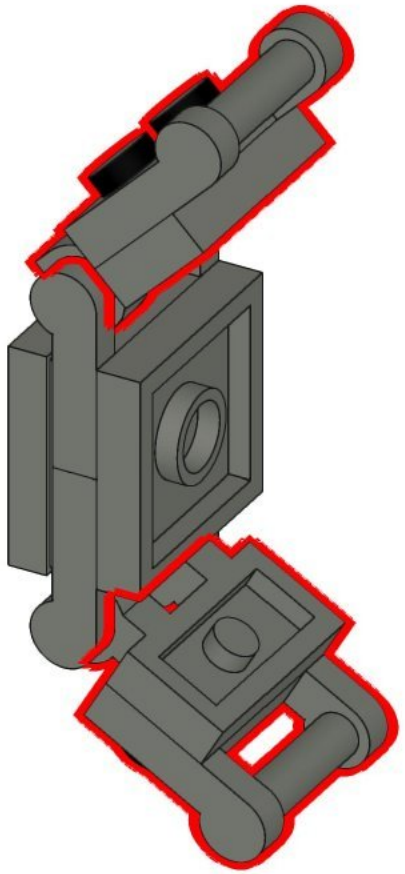
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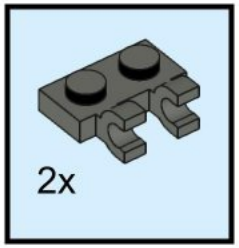


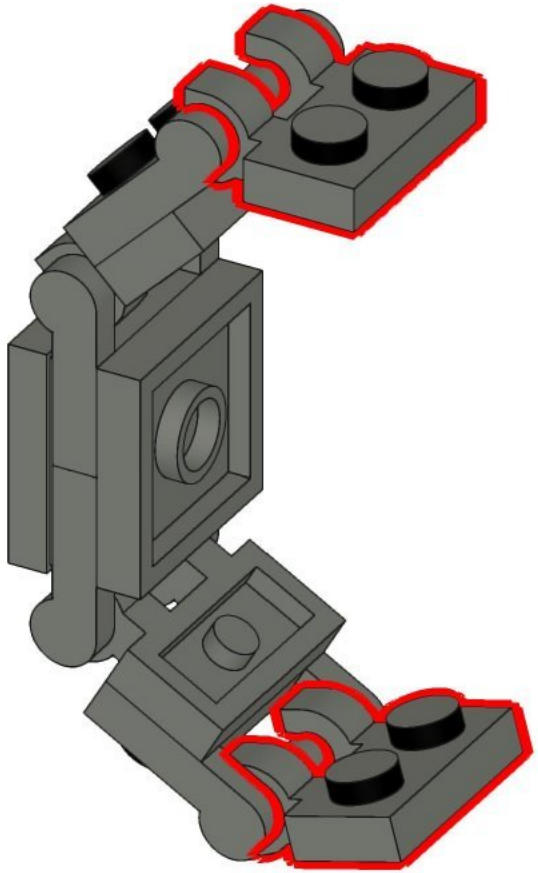
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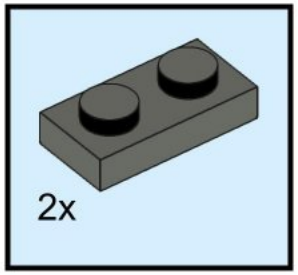


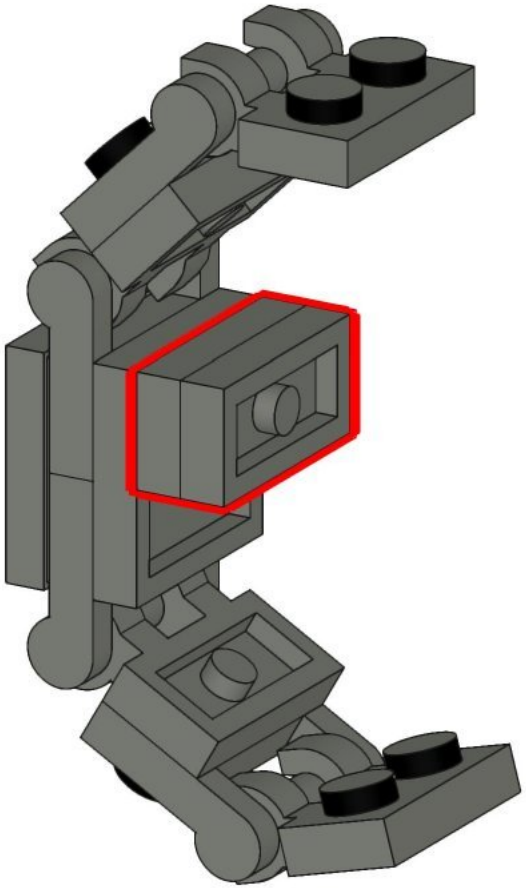
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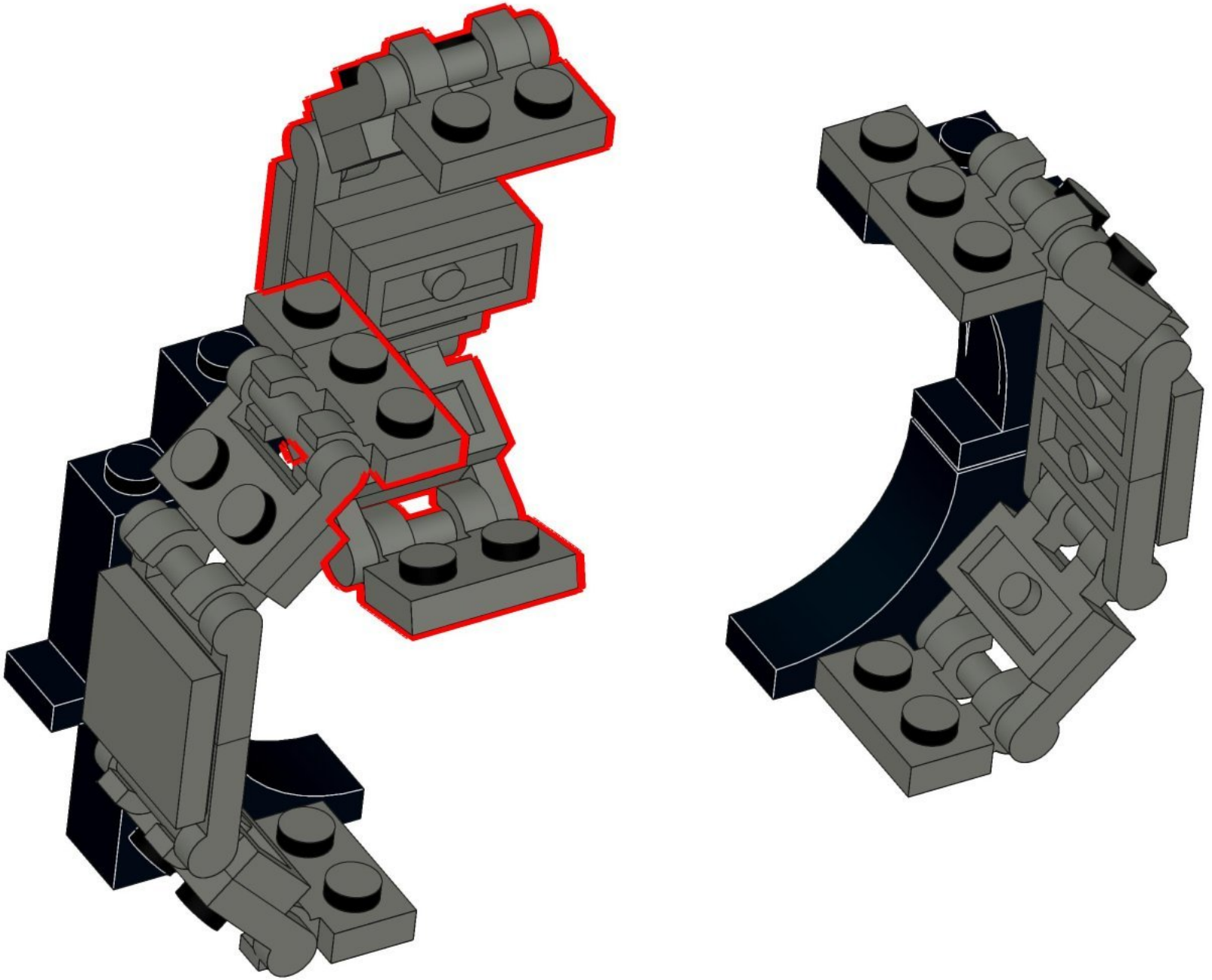


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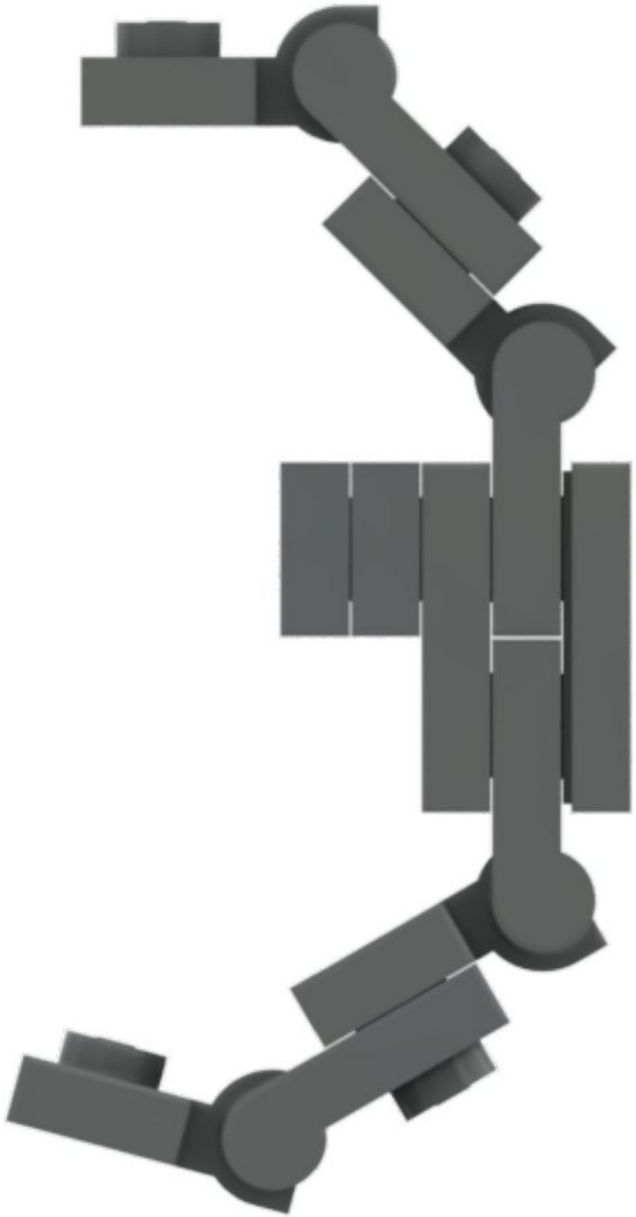




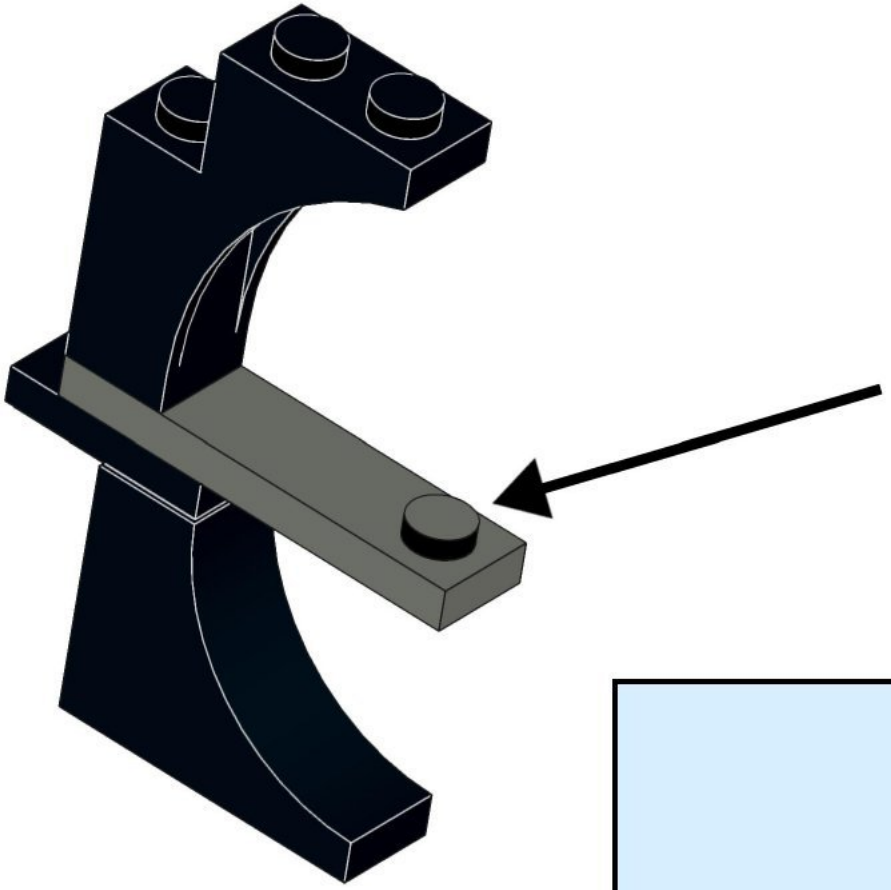
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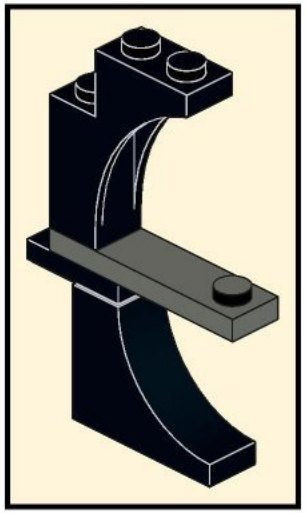
ALIGN GUIDE



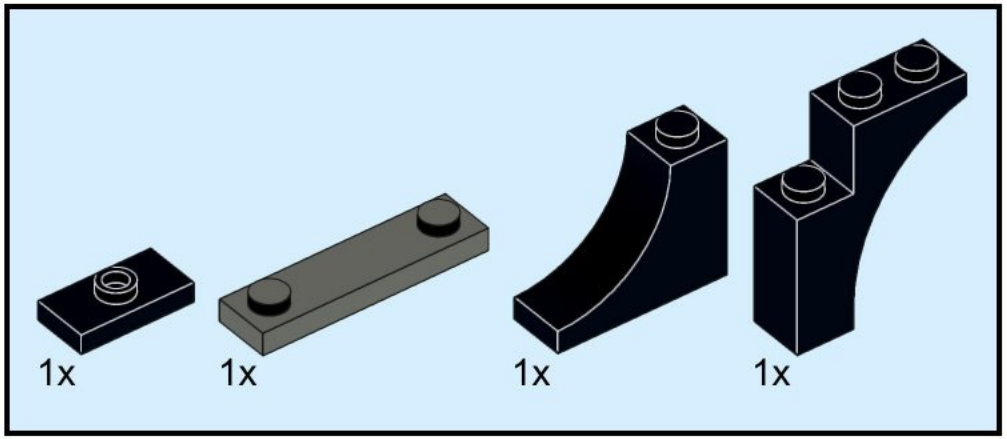
12



Connection place
for plasma part

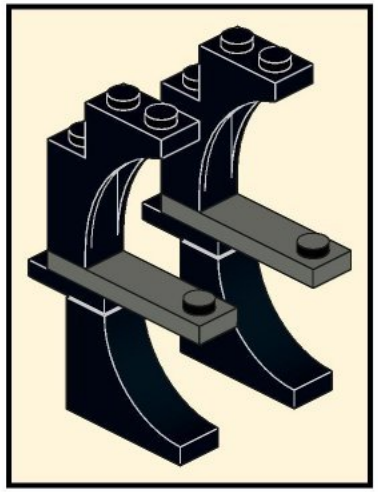


2x



13

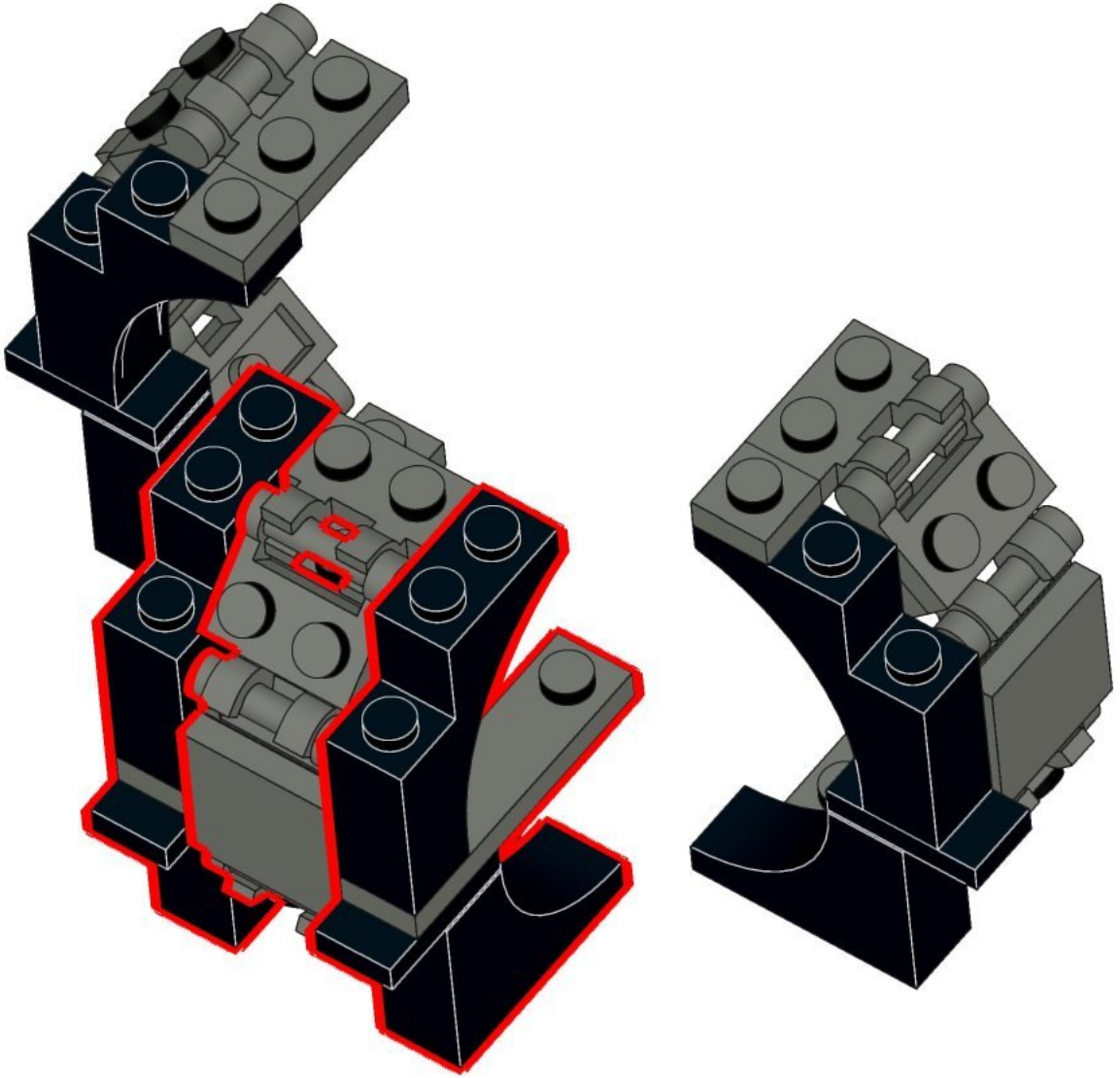




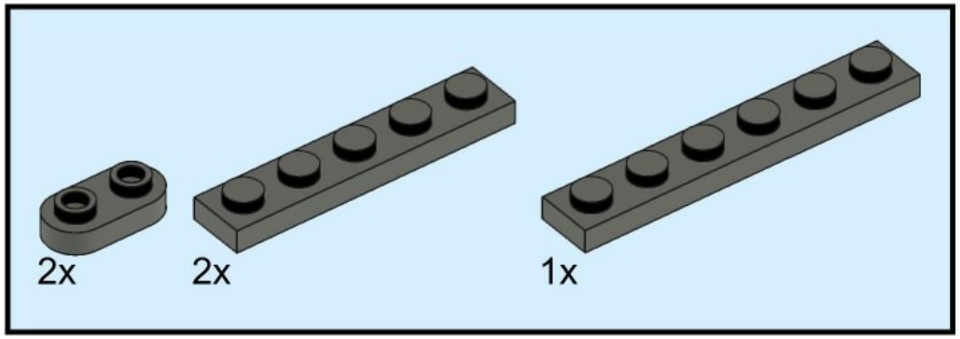
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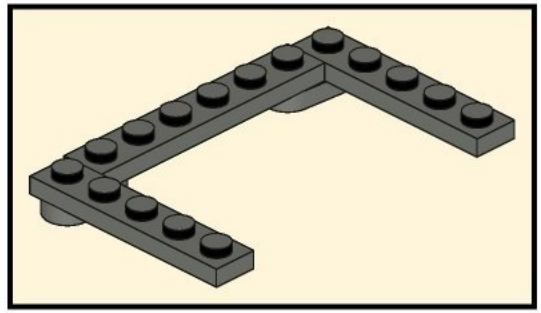
At this stage there is no connection between this separate parts

This view just to show correct location for each part

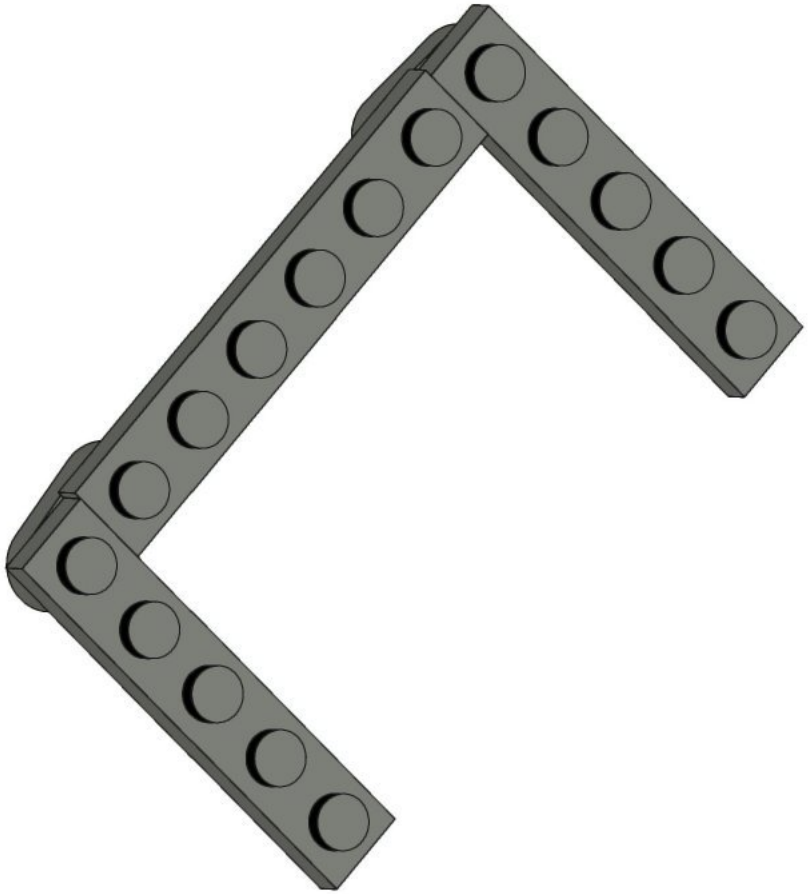


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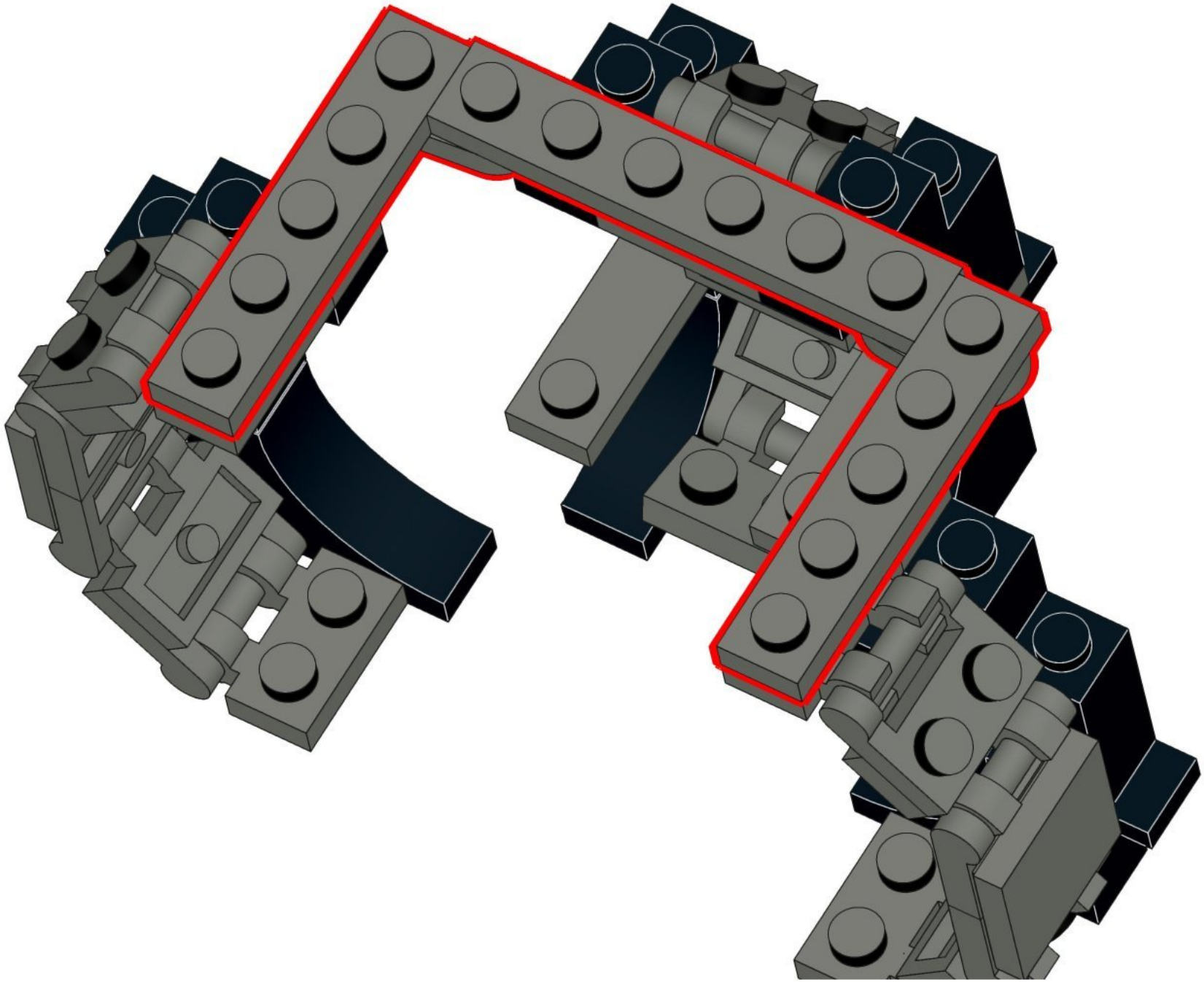




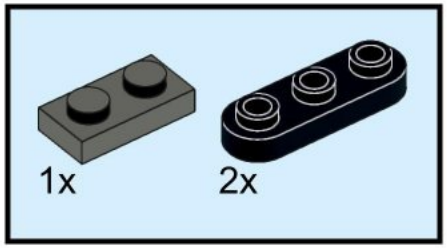
Note the slight offset. The rounded plates let this part shift a little from the grid. This small offset makes room for the corner pieces later.

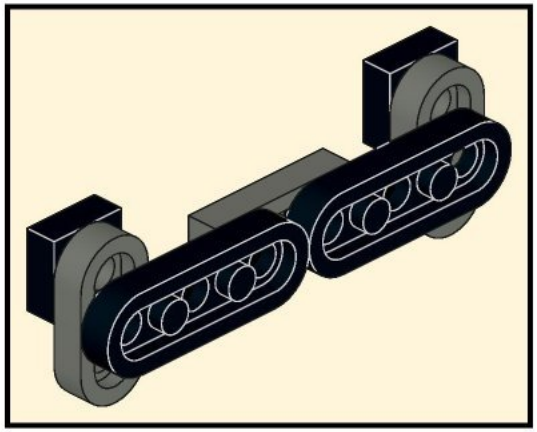


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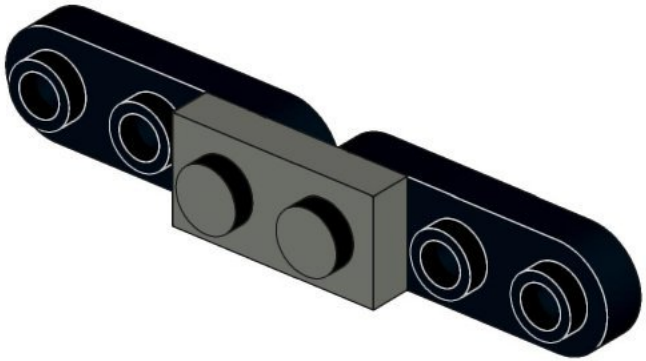


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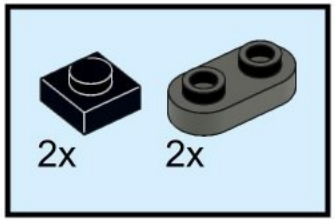


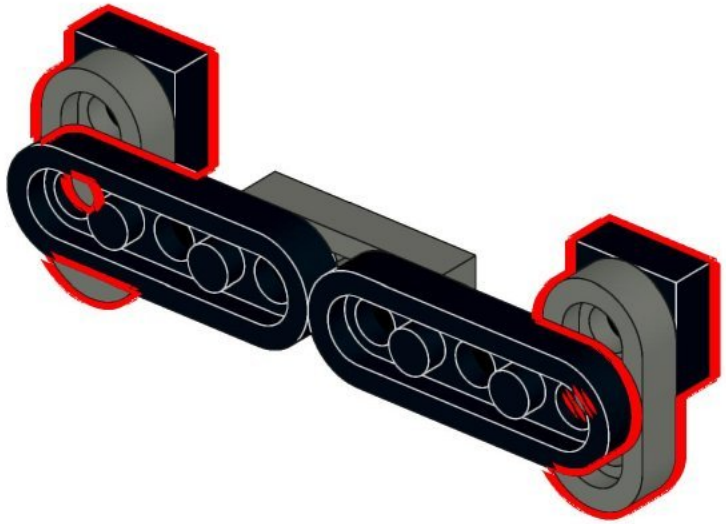




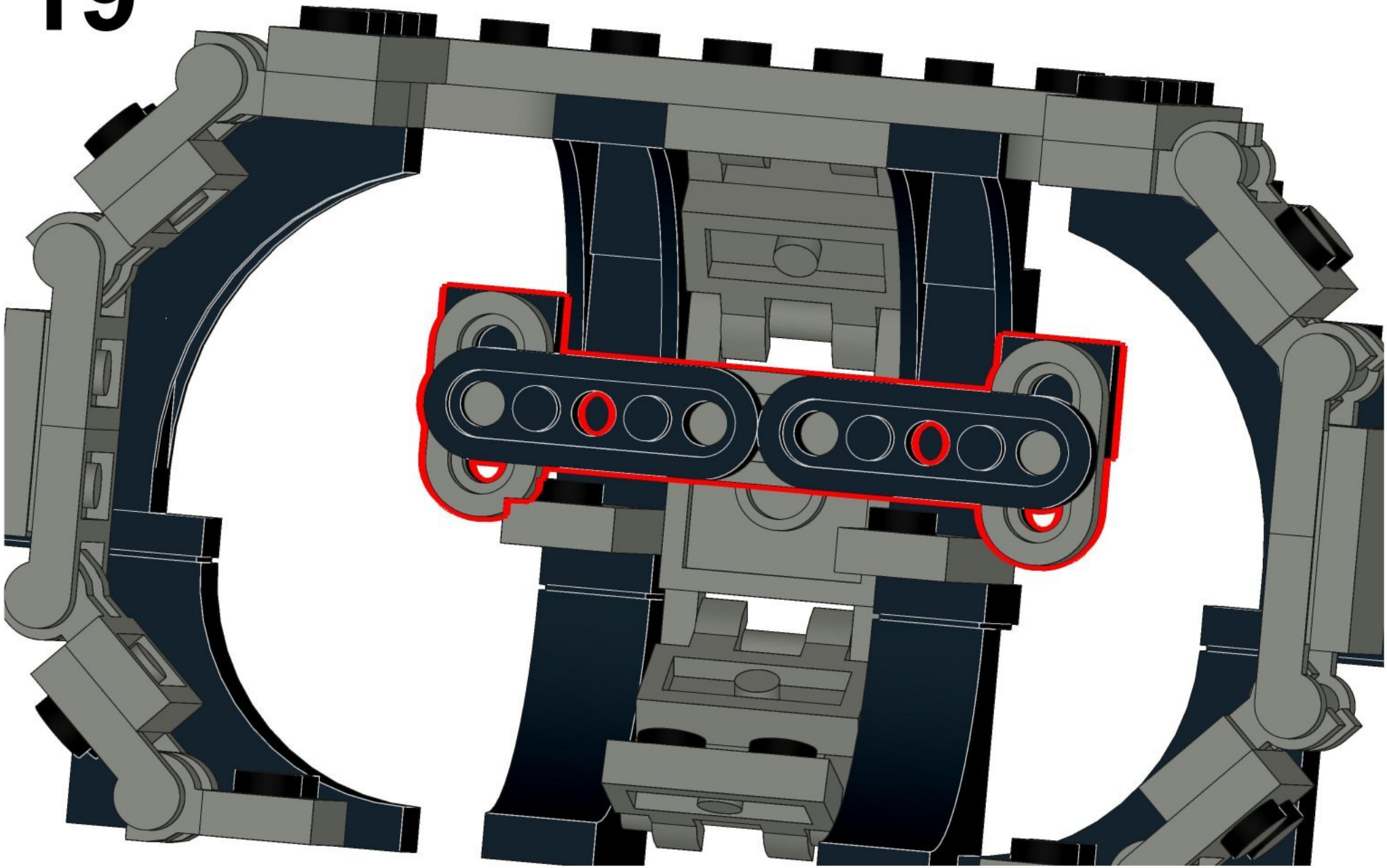


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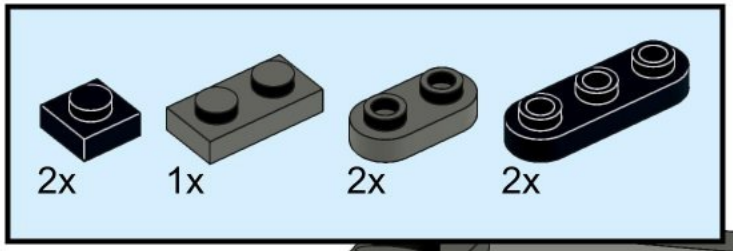


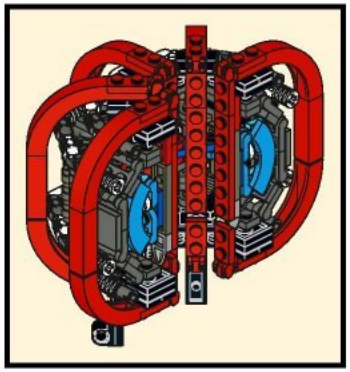


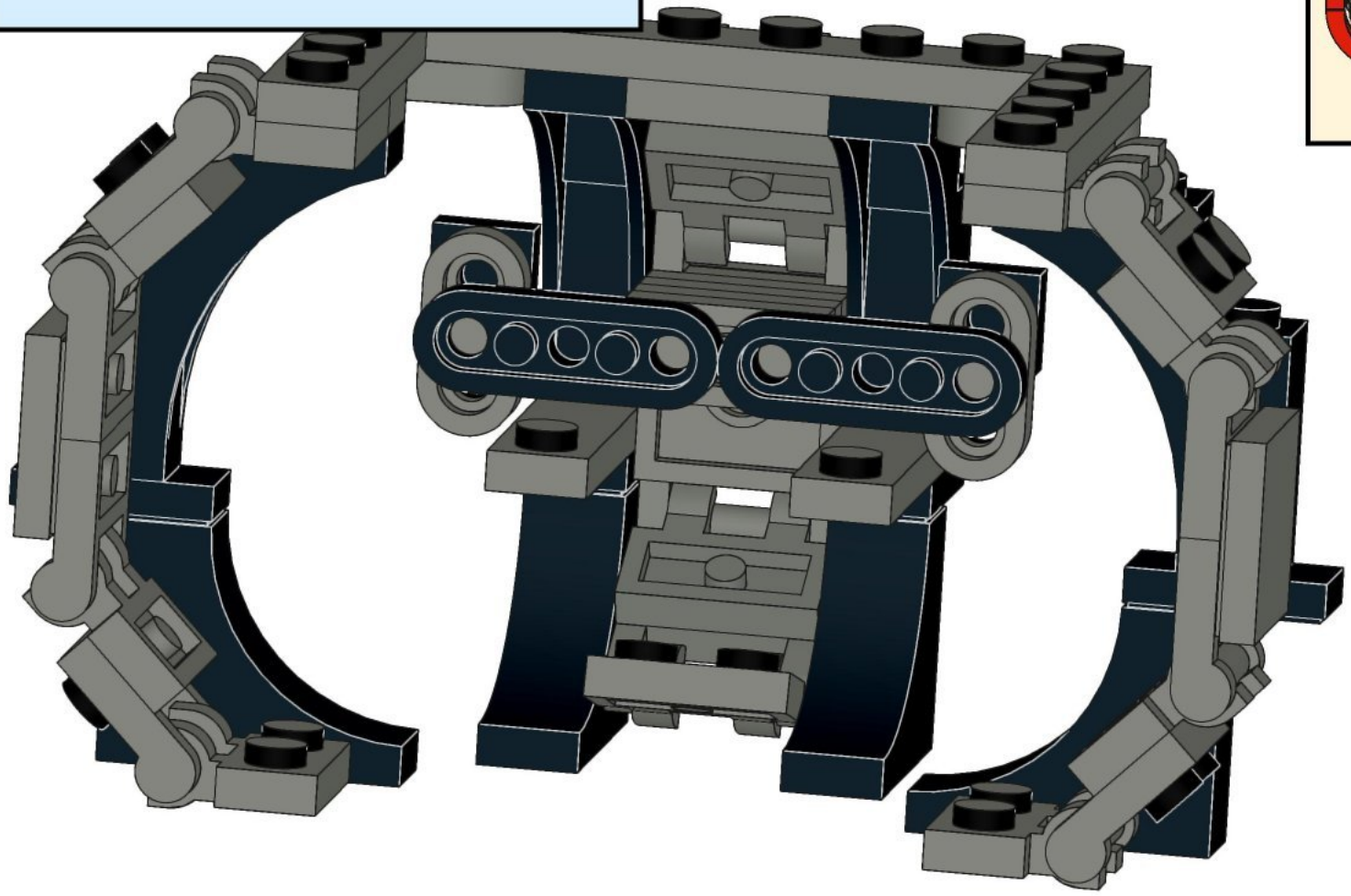
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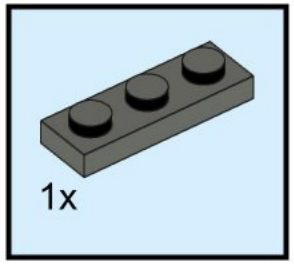
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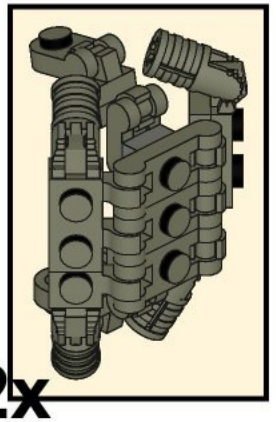


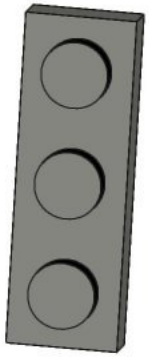




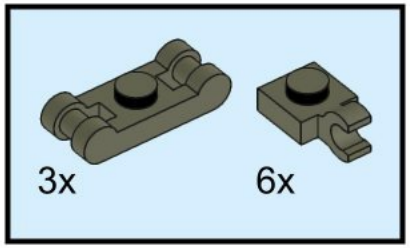
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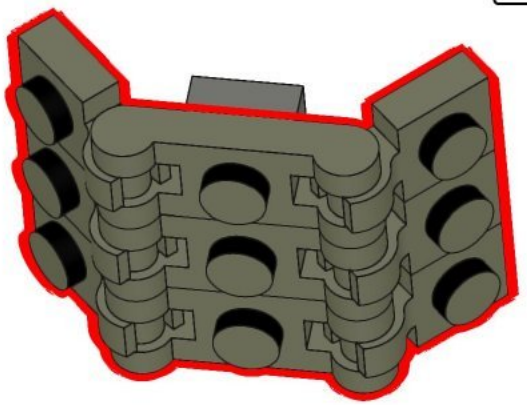




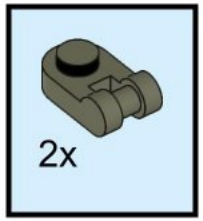


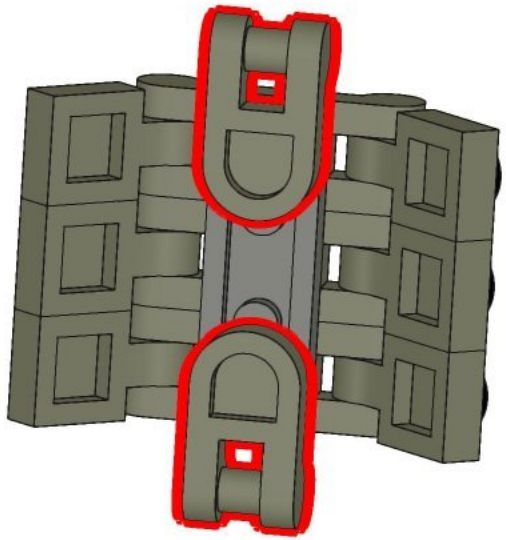
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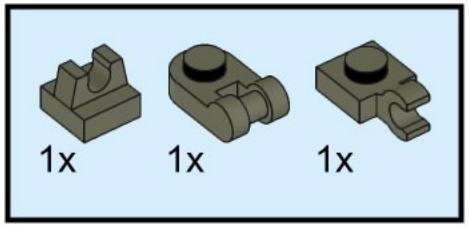


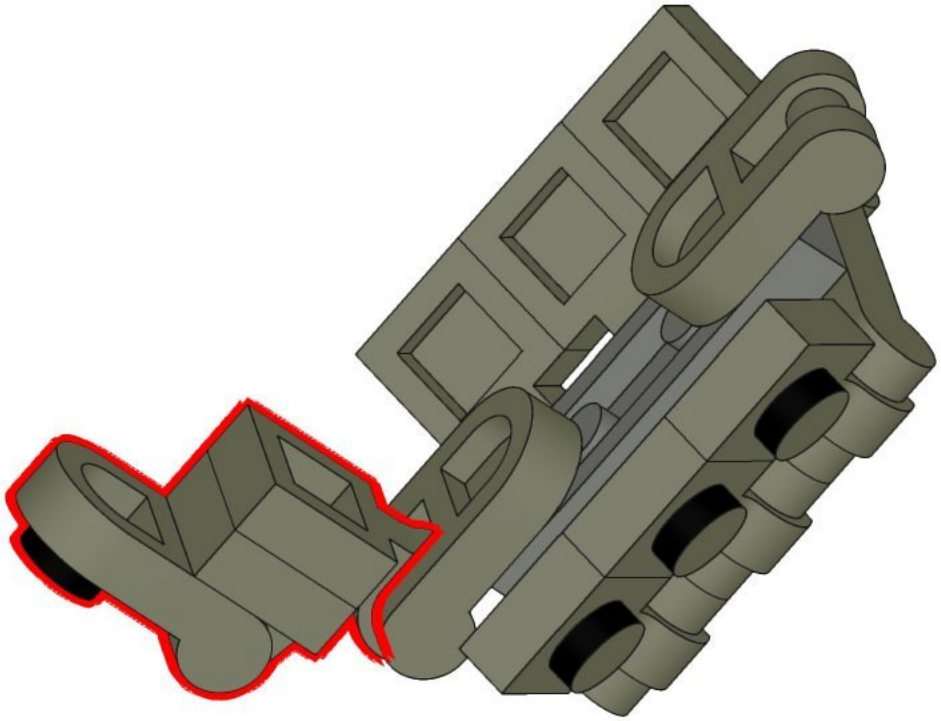
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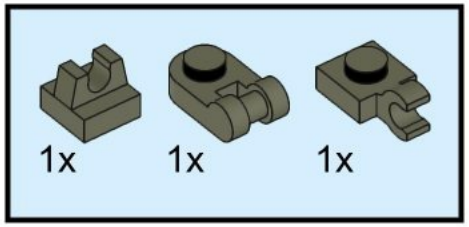


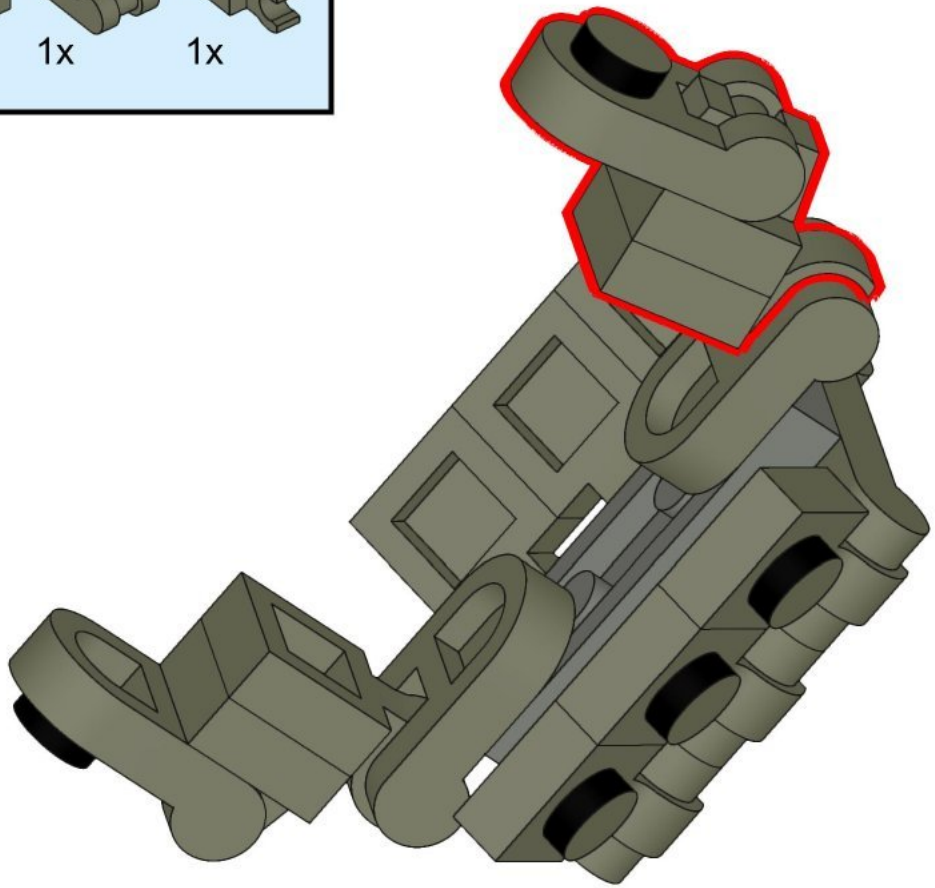
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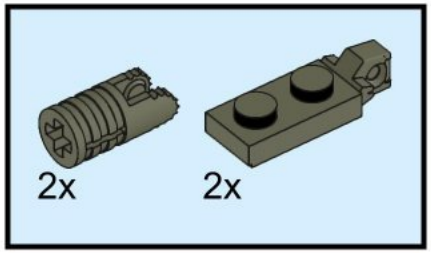


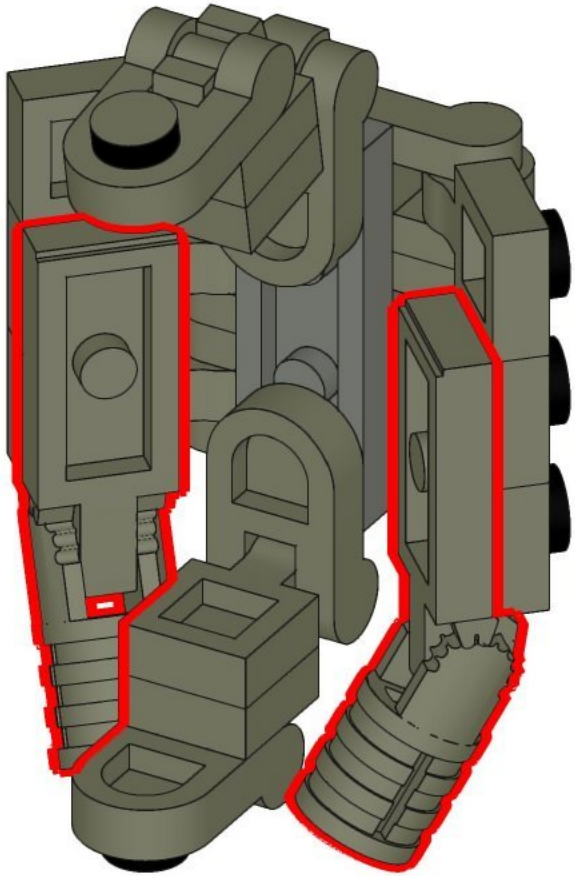
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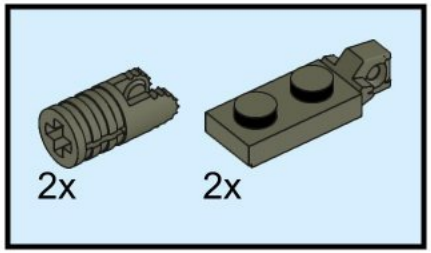


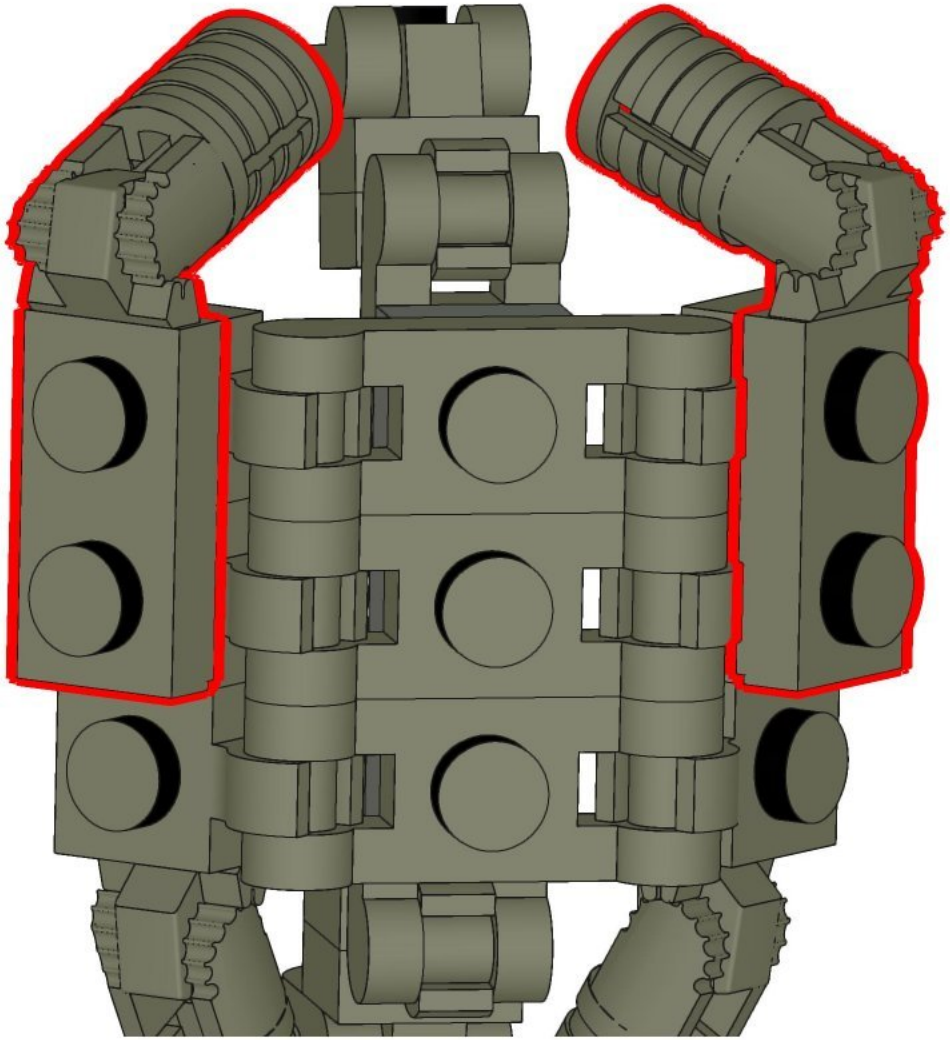
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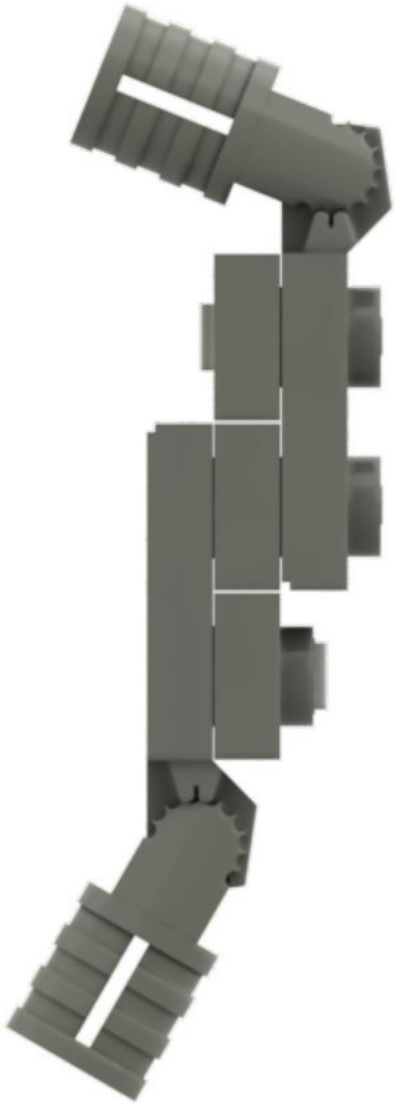


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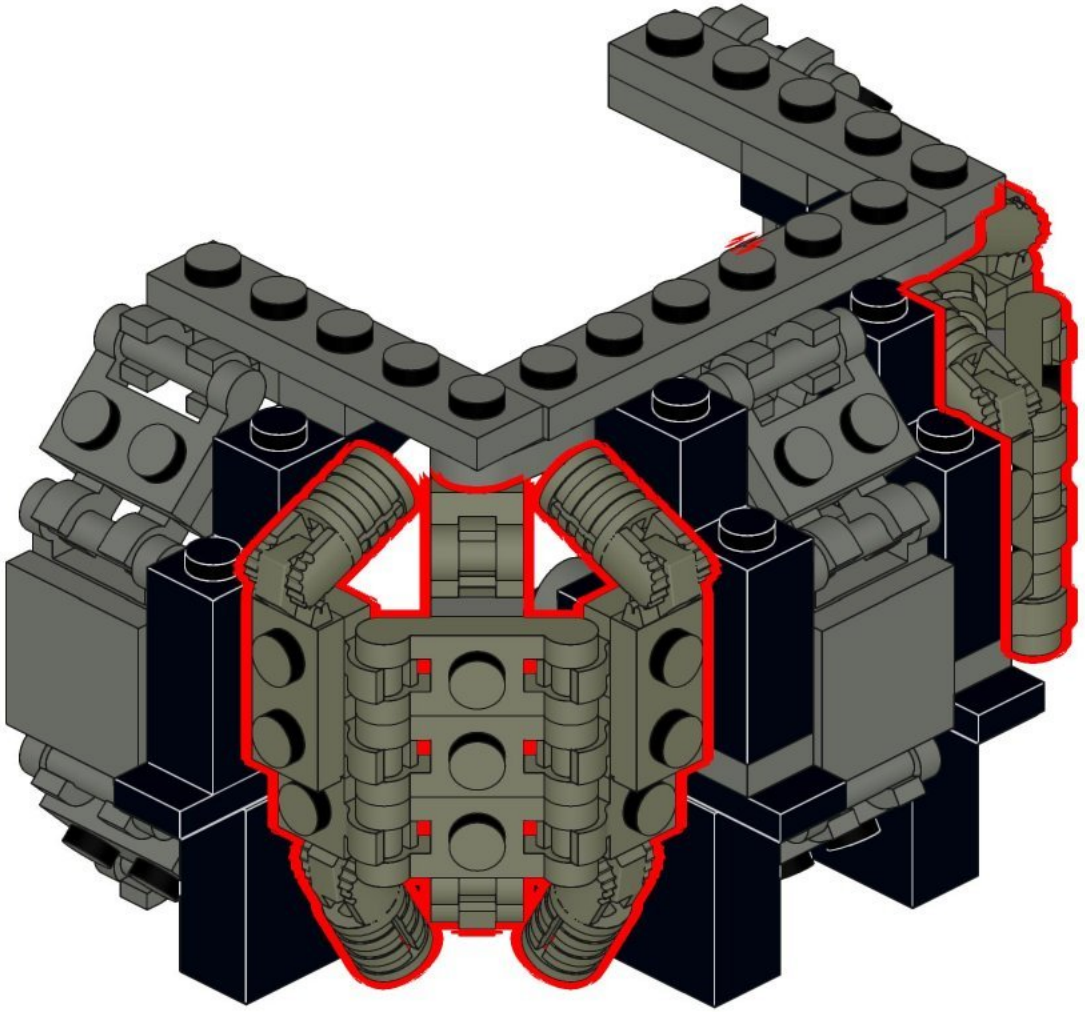


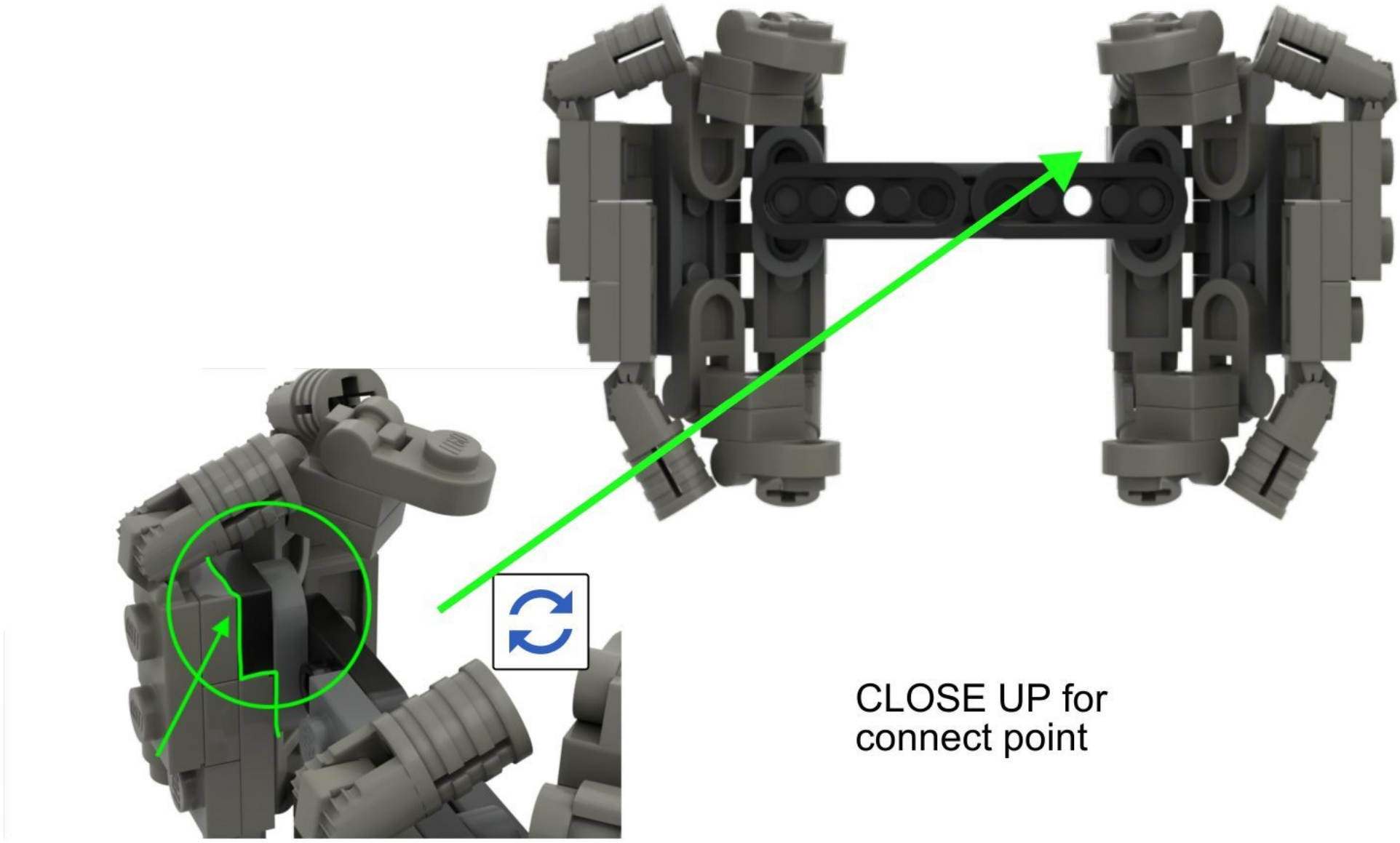


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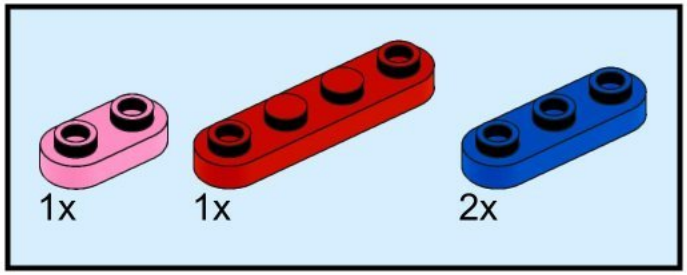


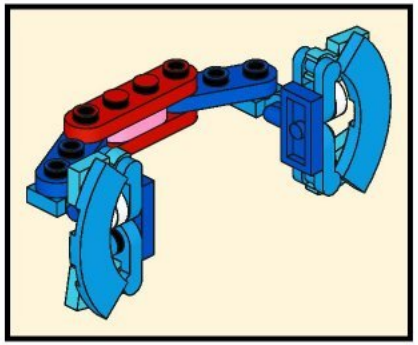
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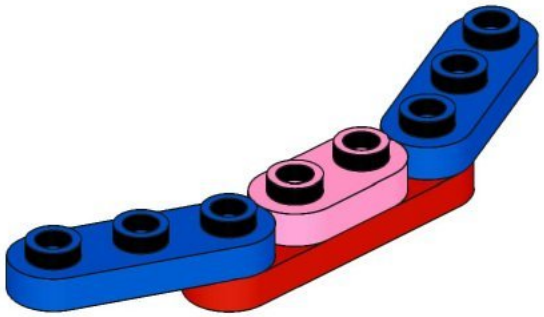



CLOSE UP for
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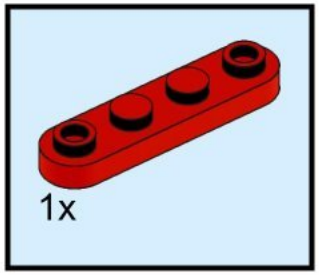
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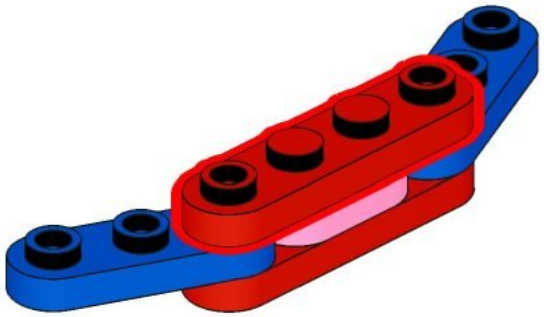




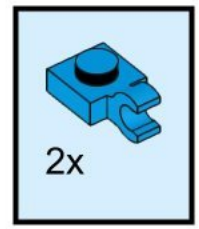


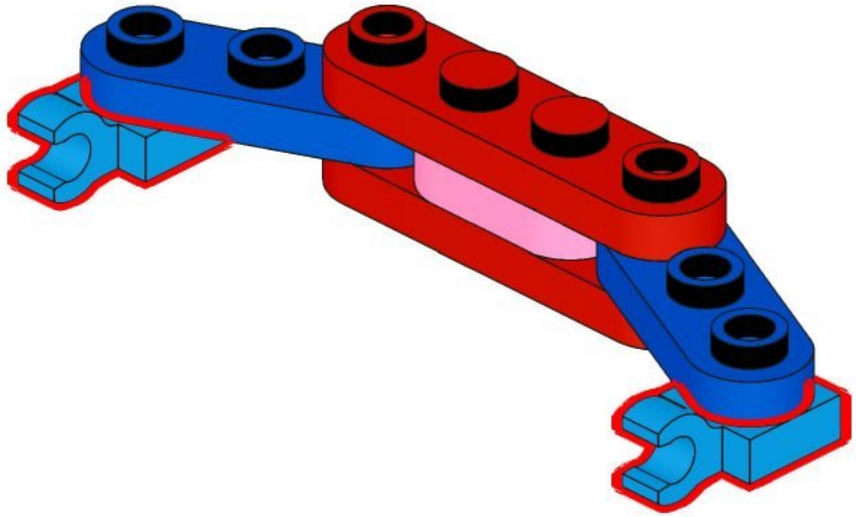
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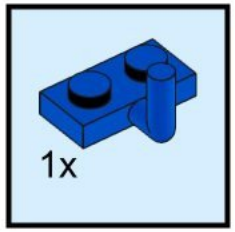


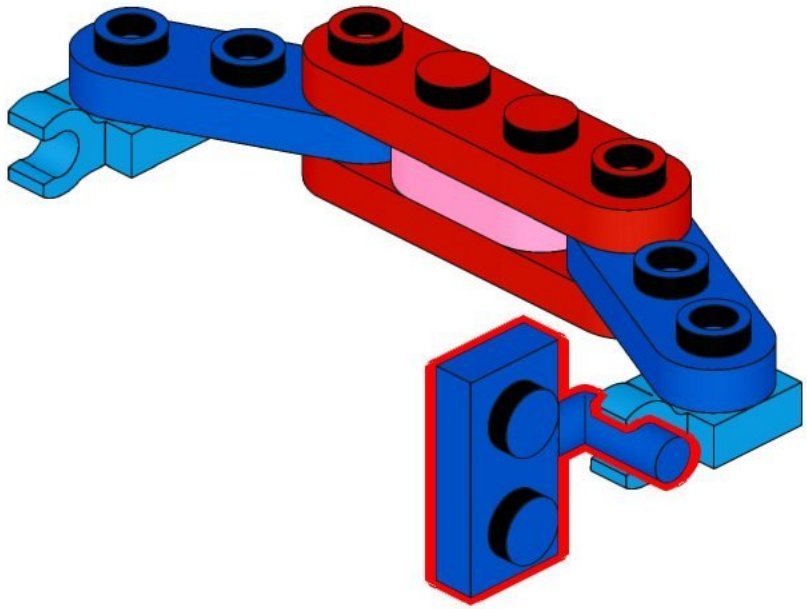
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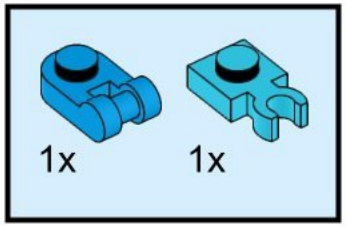


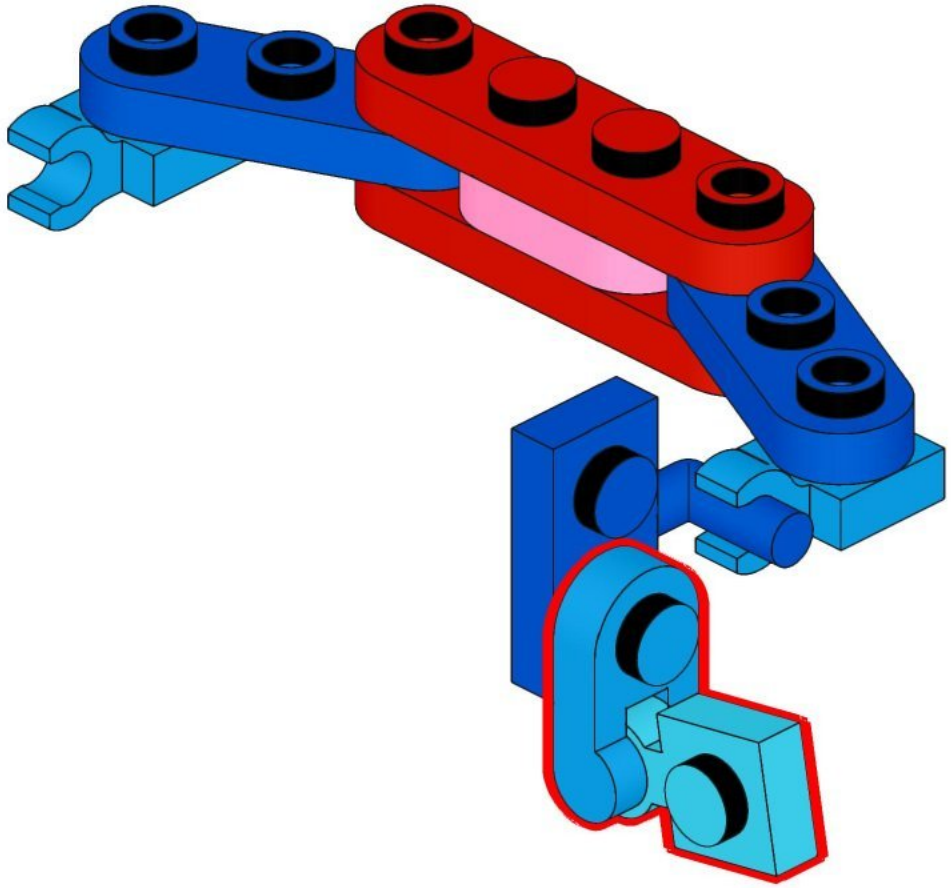
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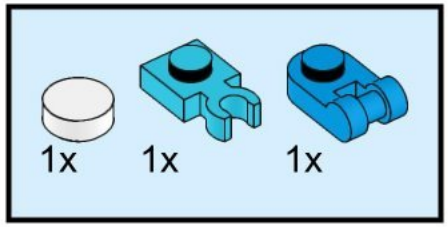


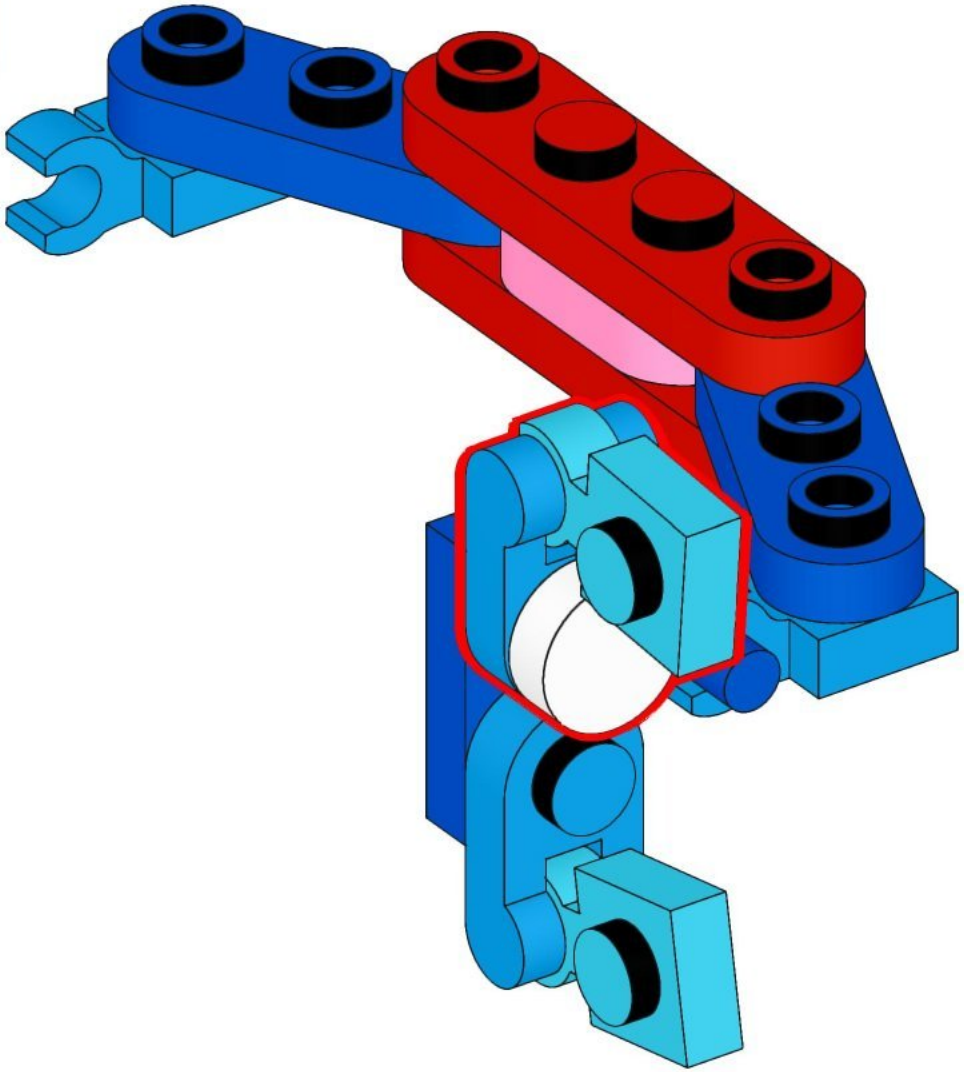
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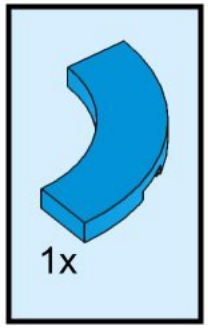


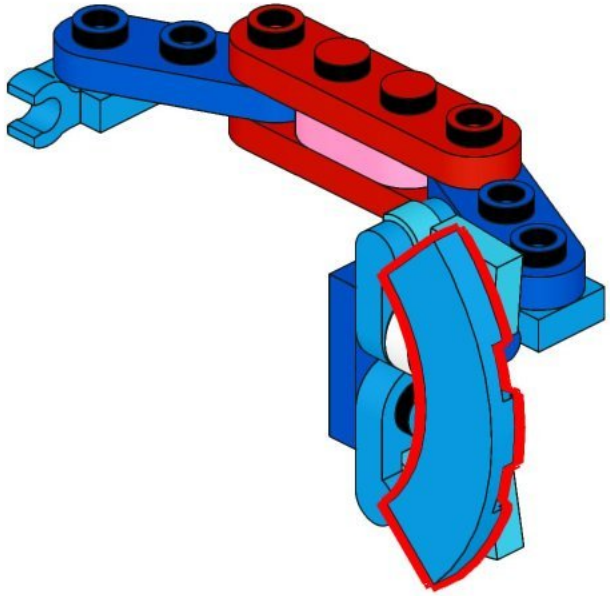
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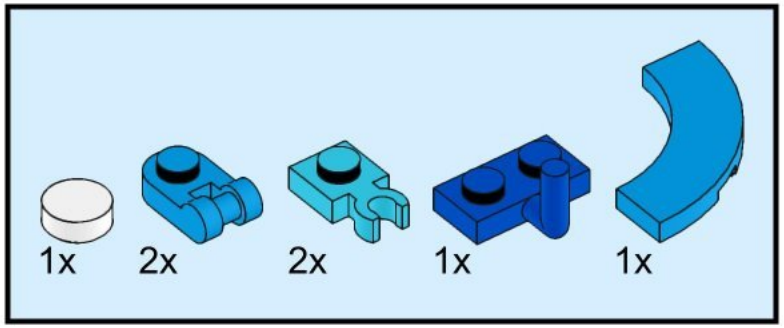


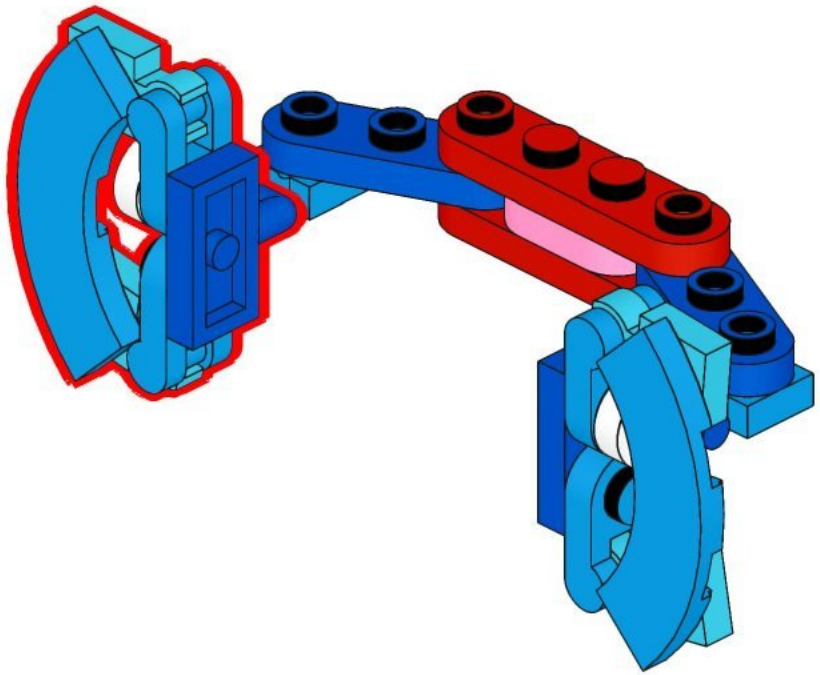
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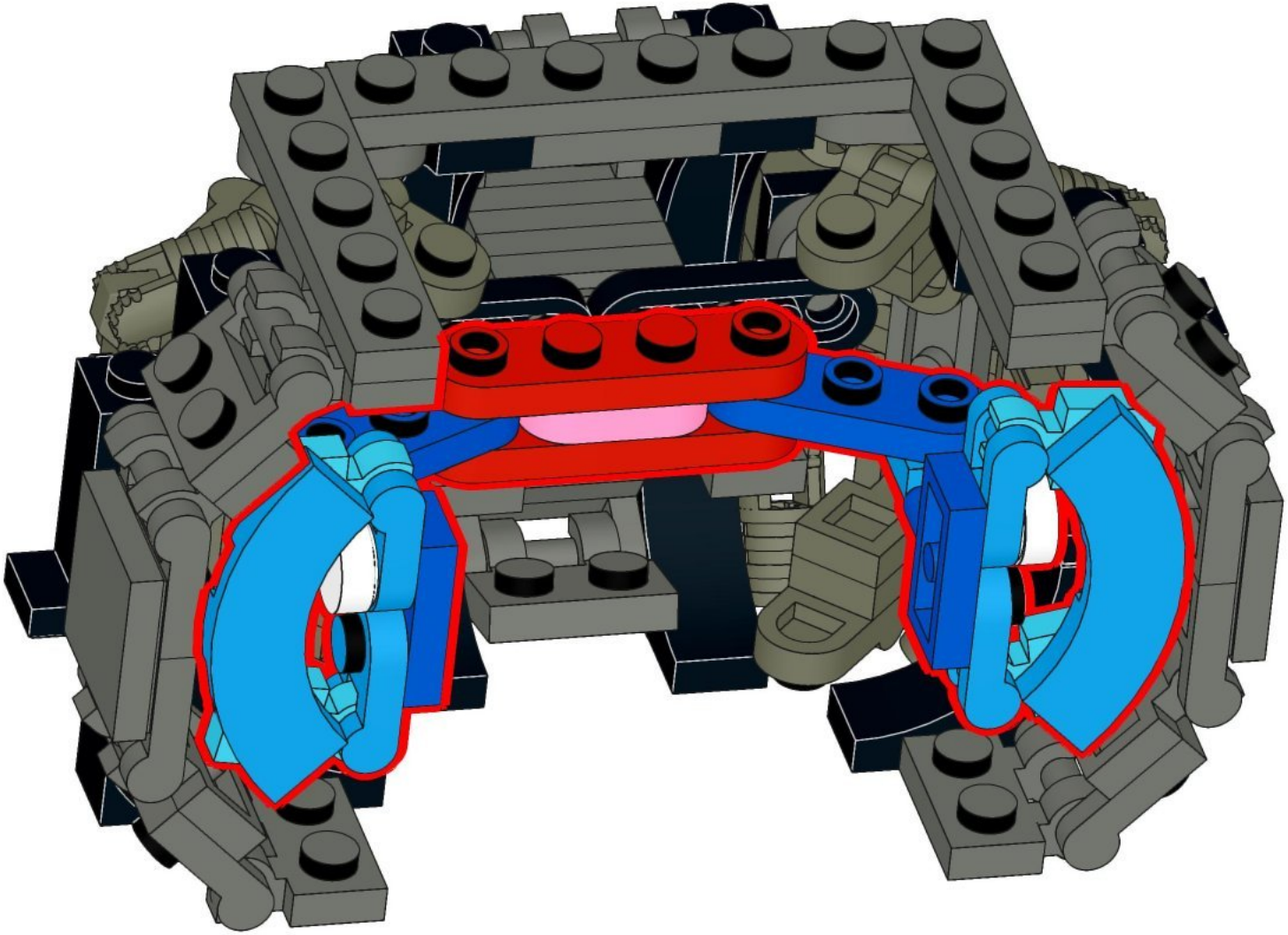


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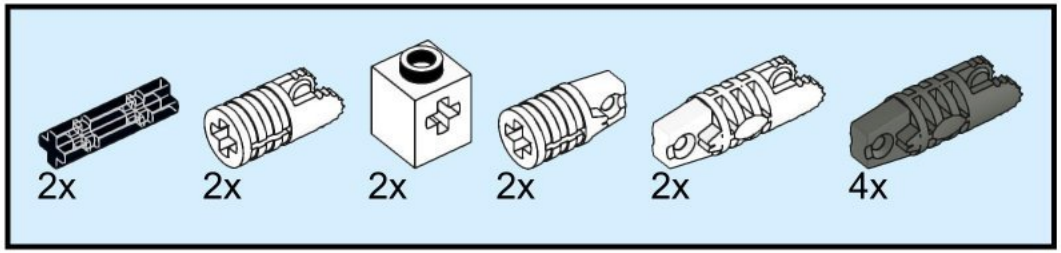


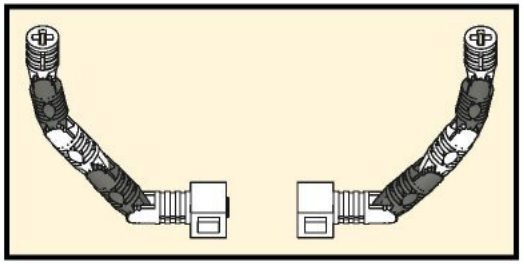


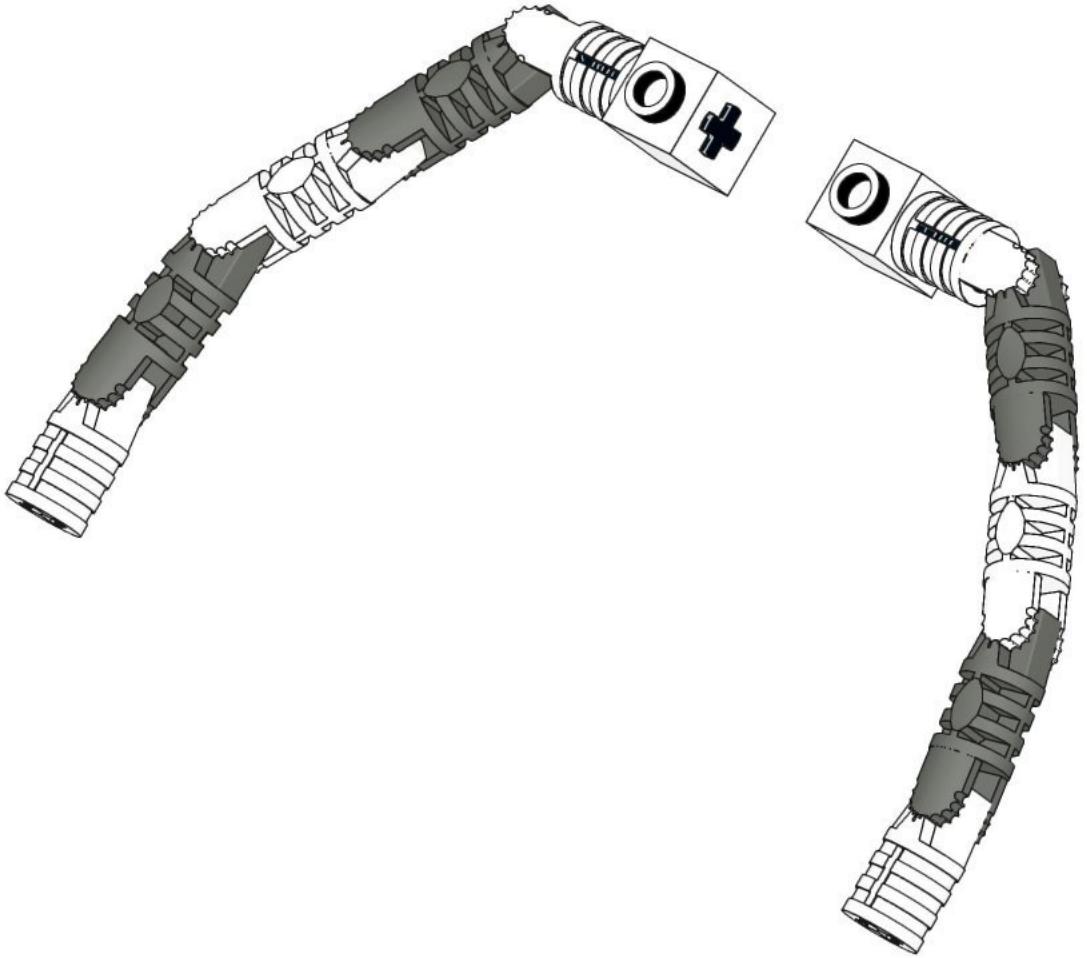
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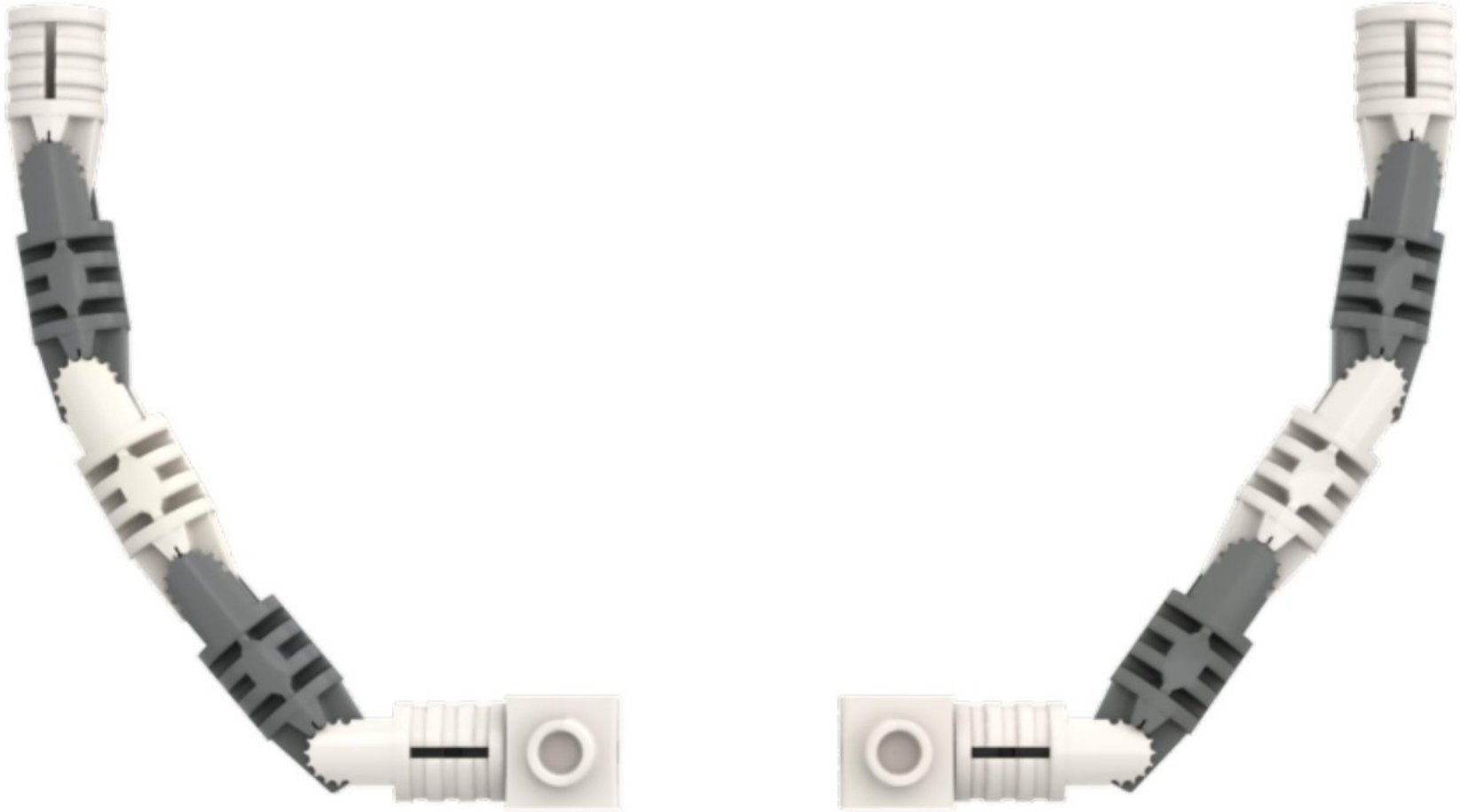
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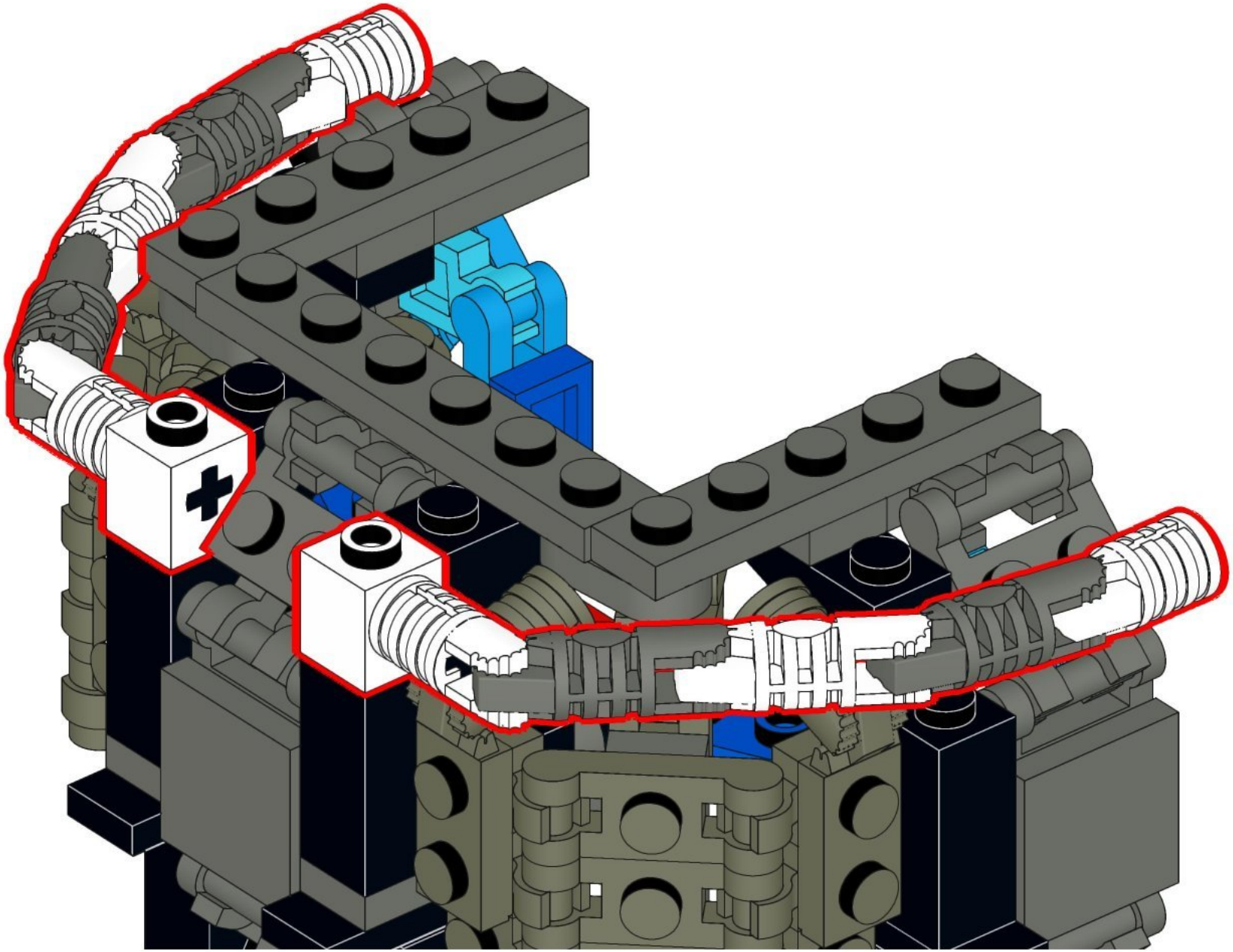




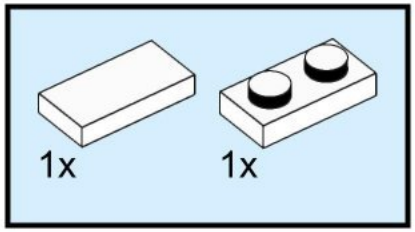
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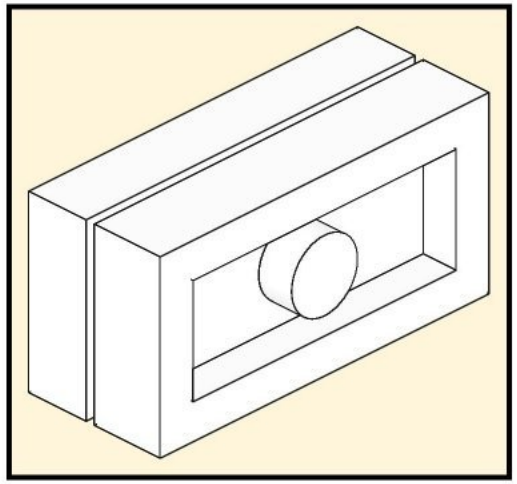


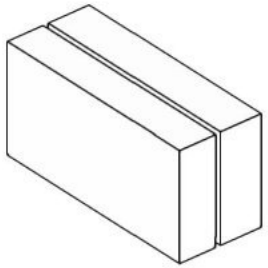
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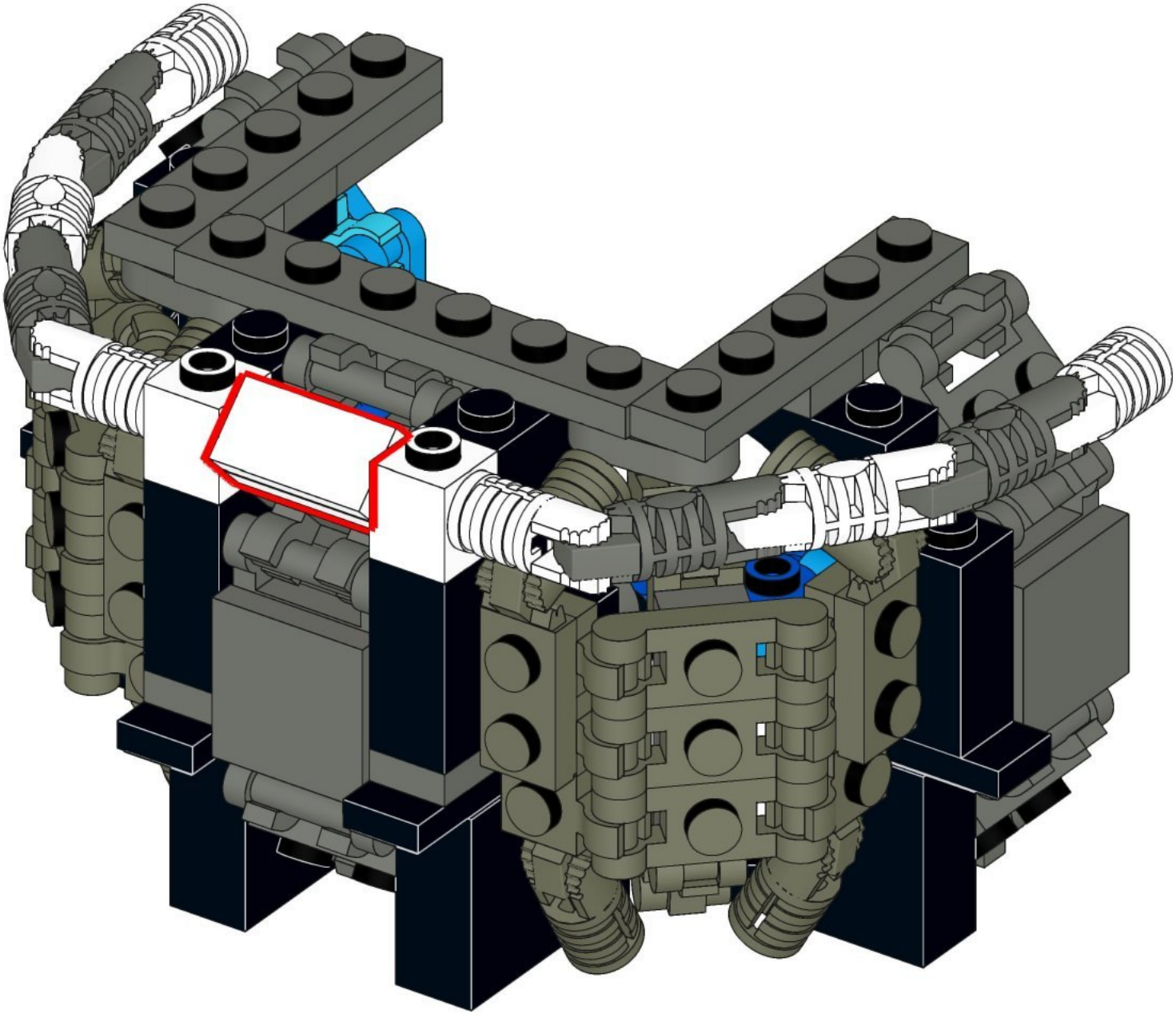
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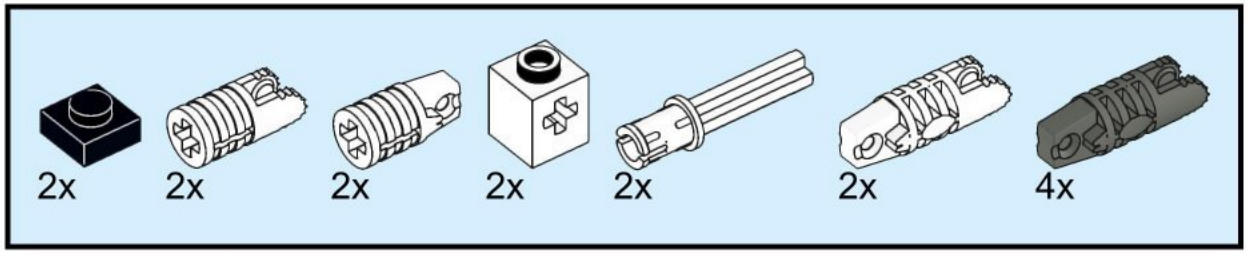


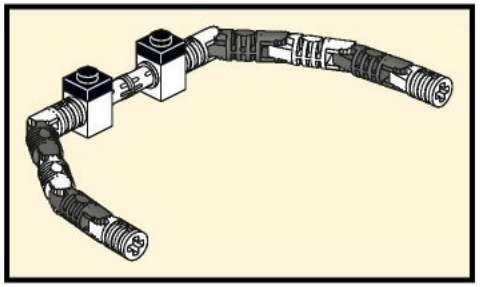


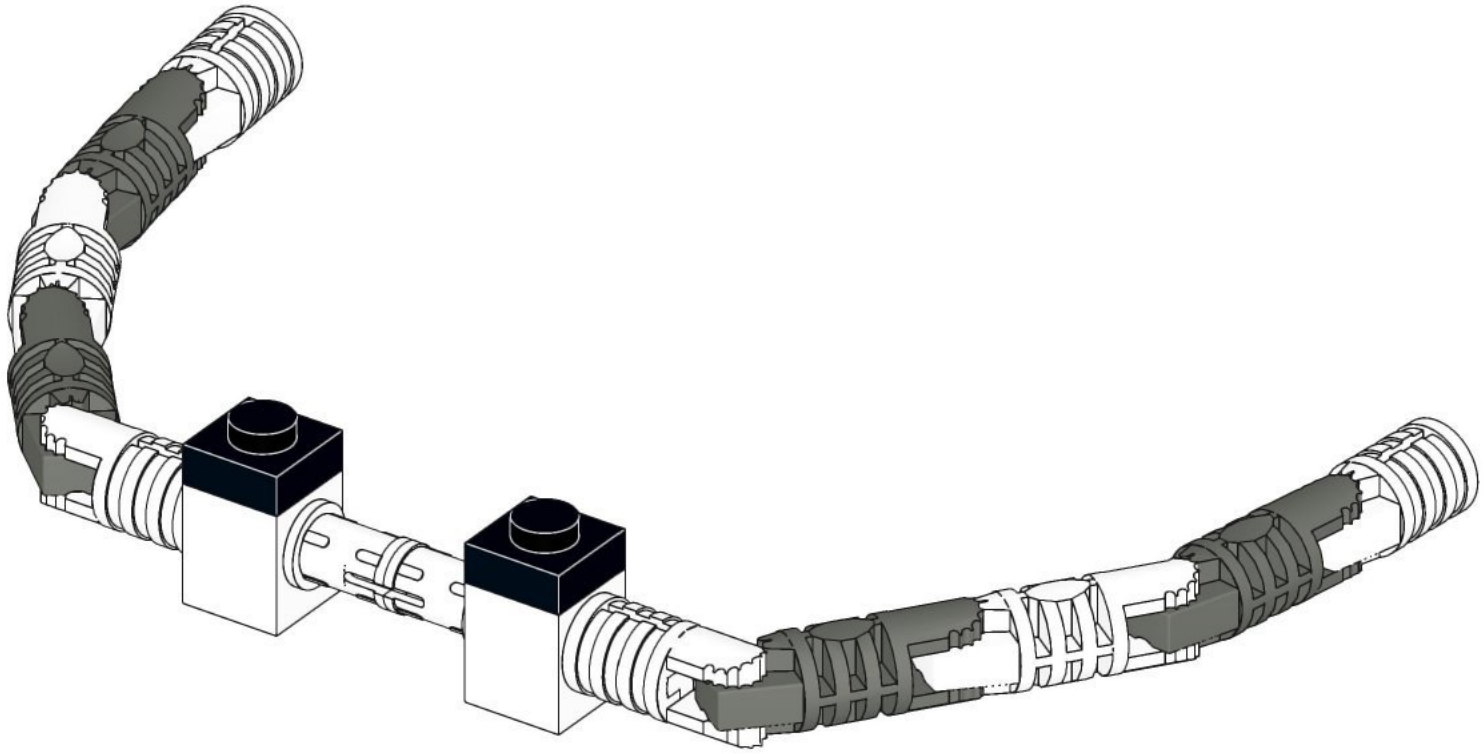
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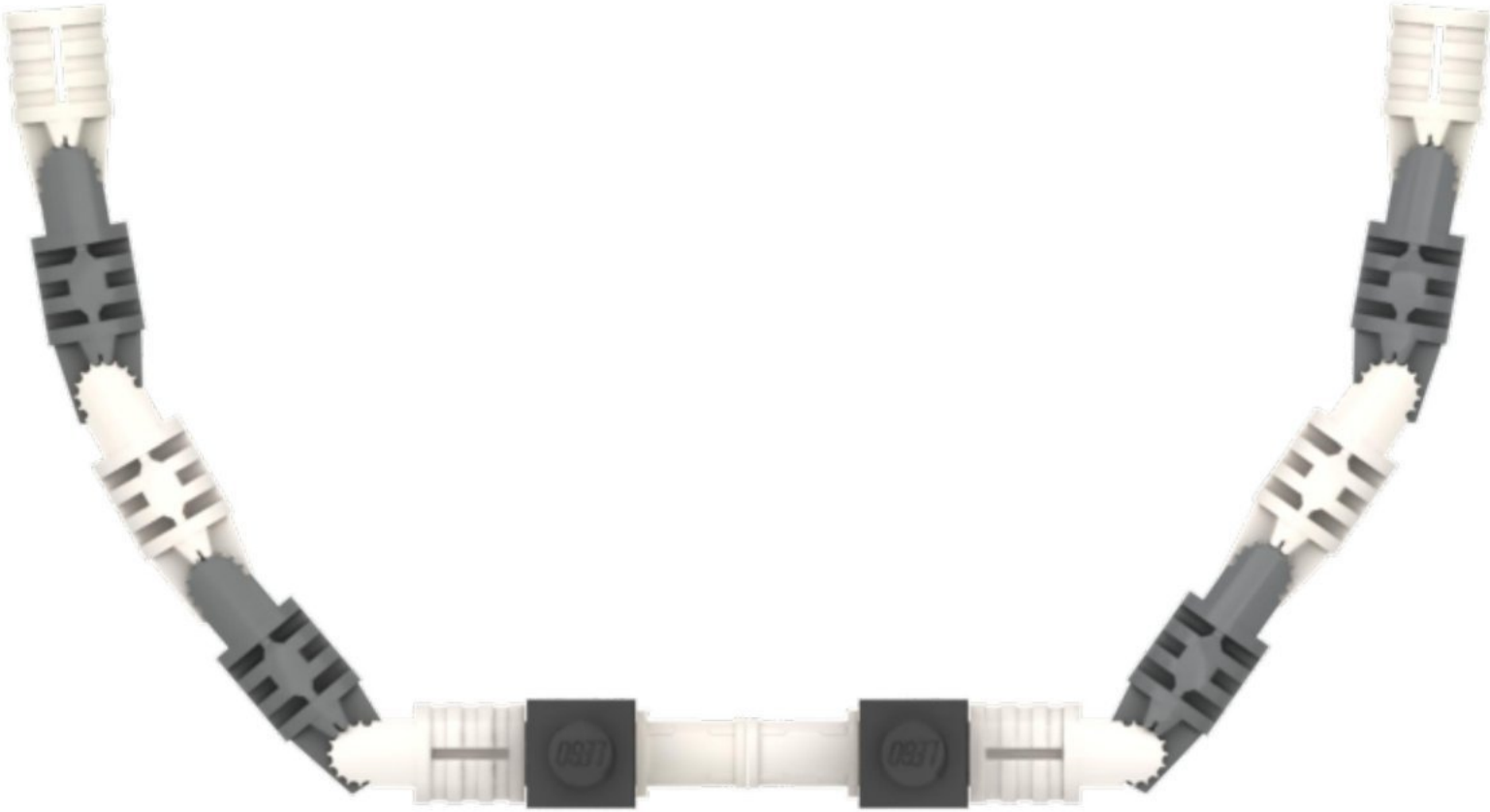
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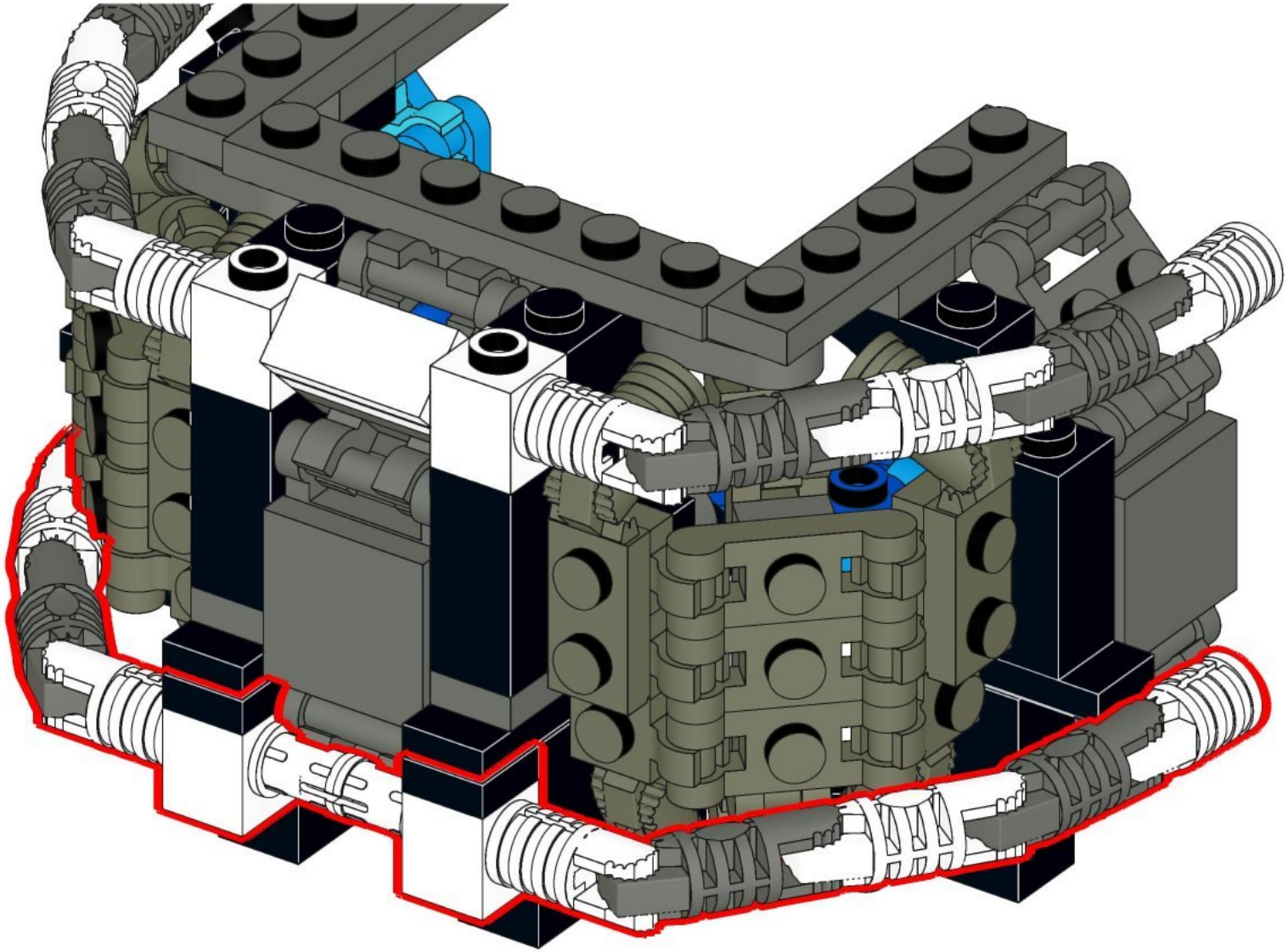




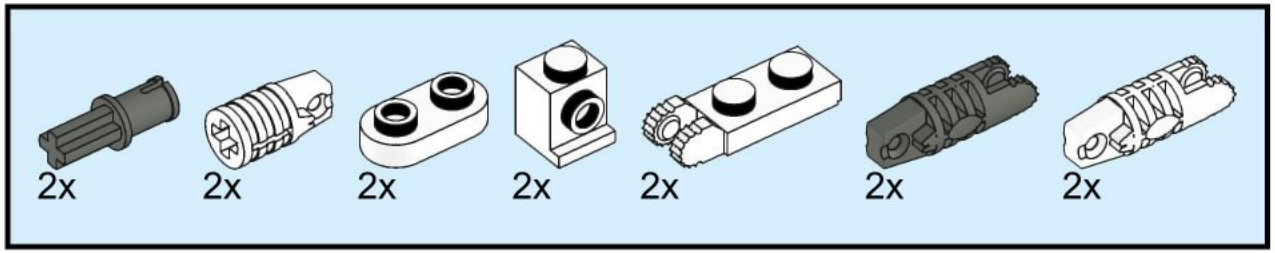
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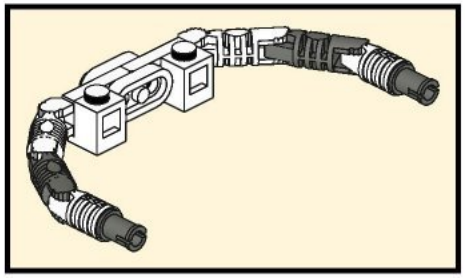


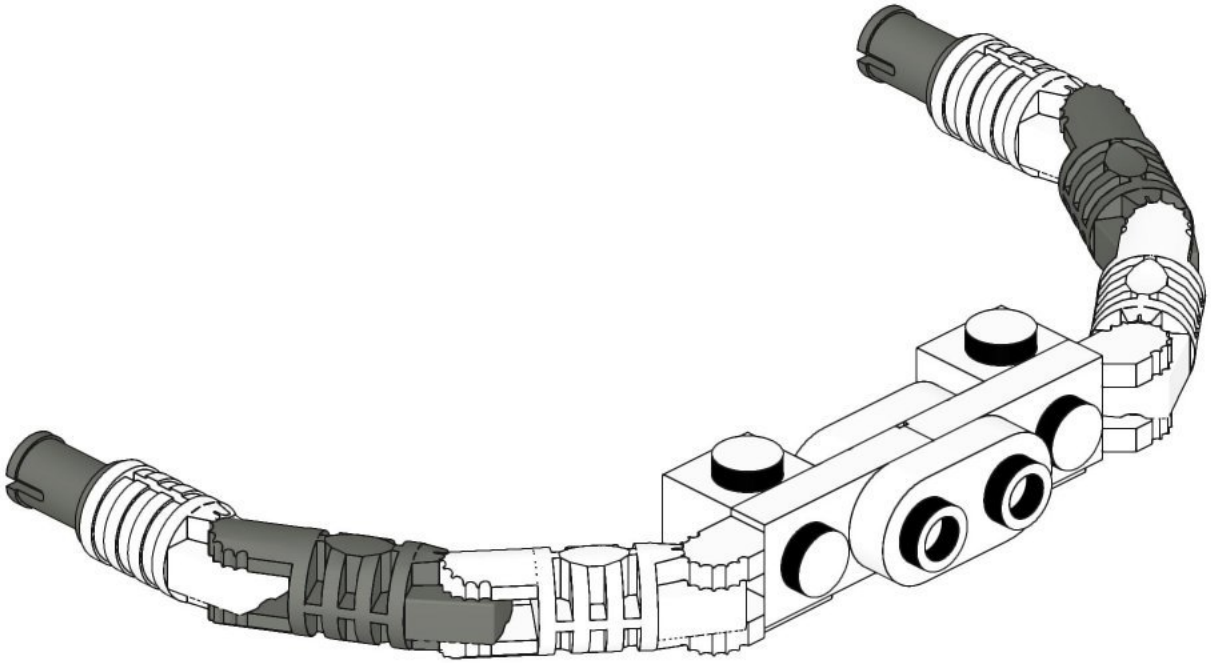
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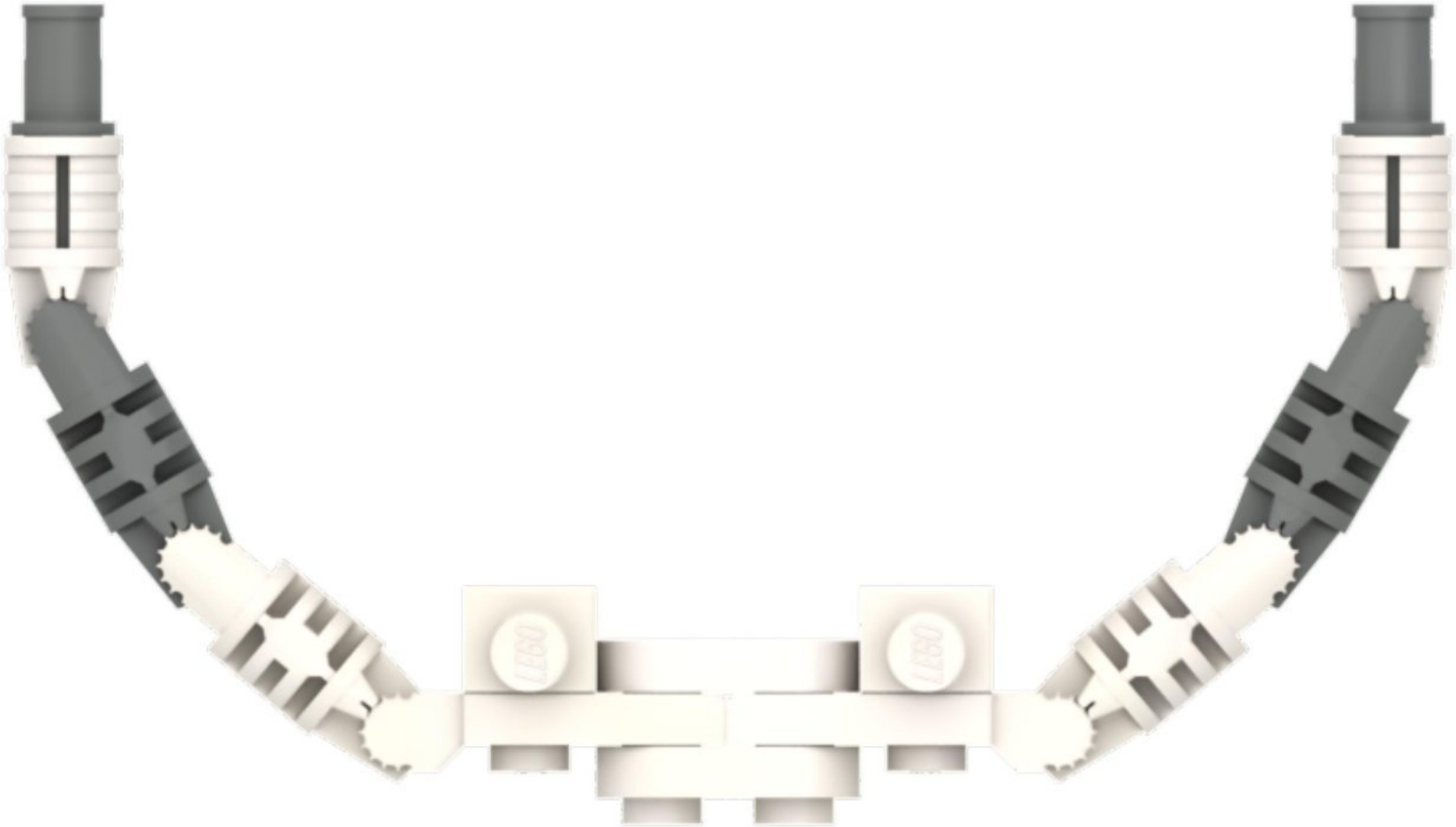
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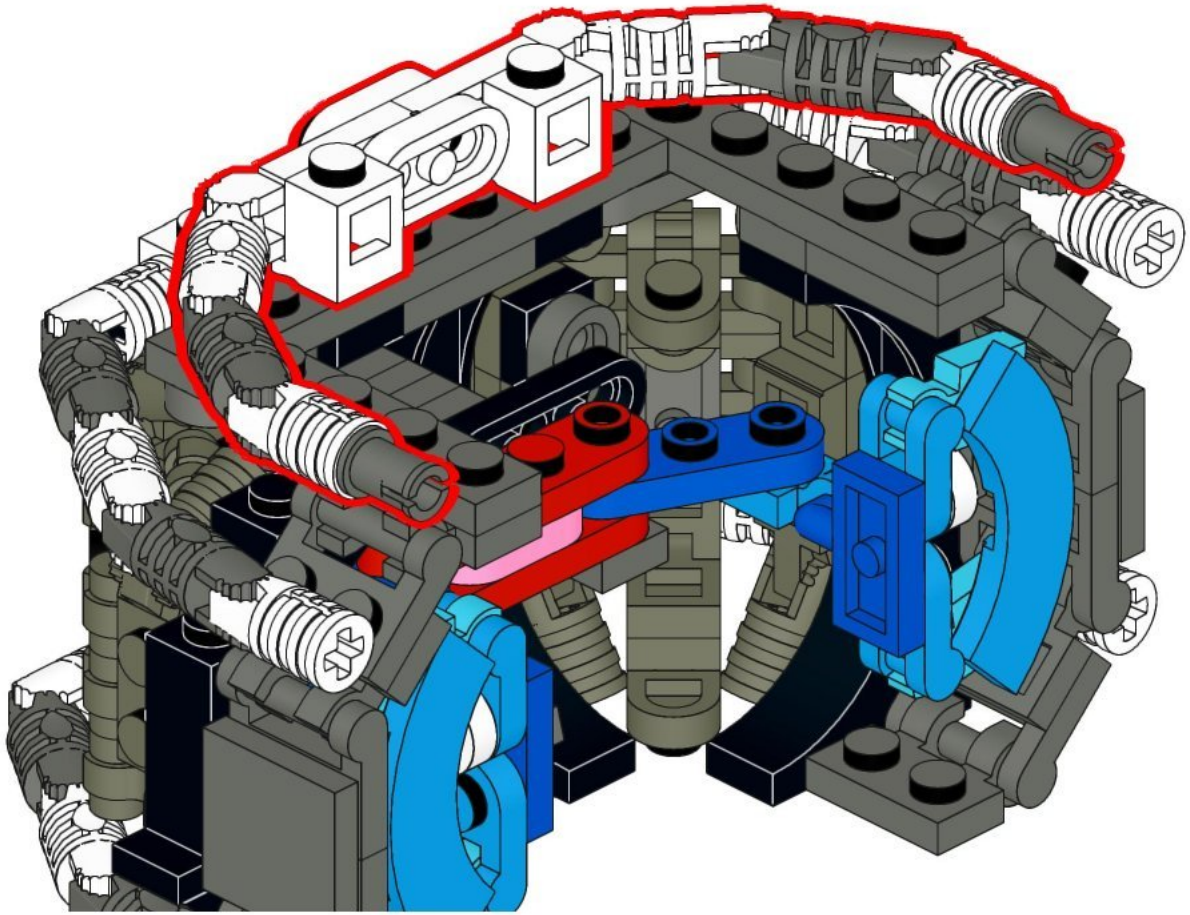




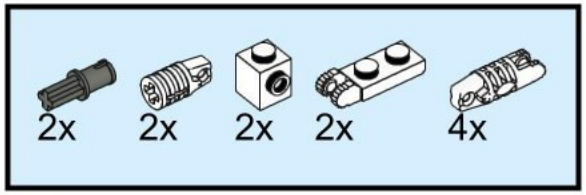
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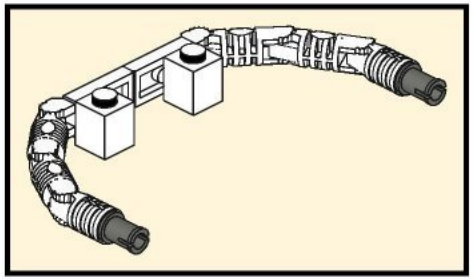


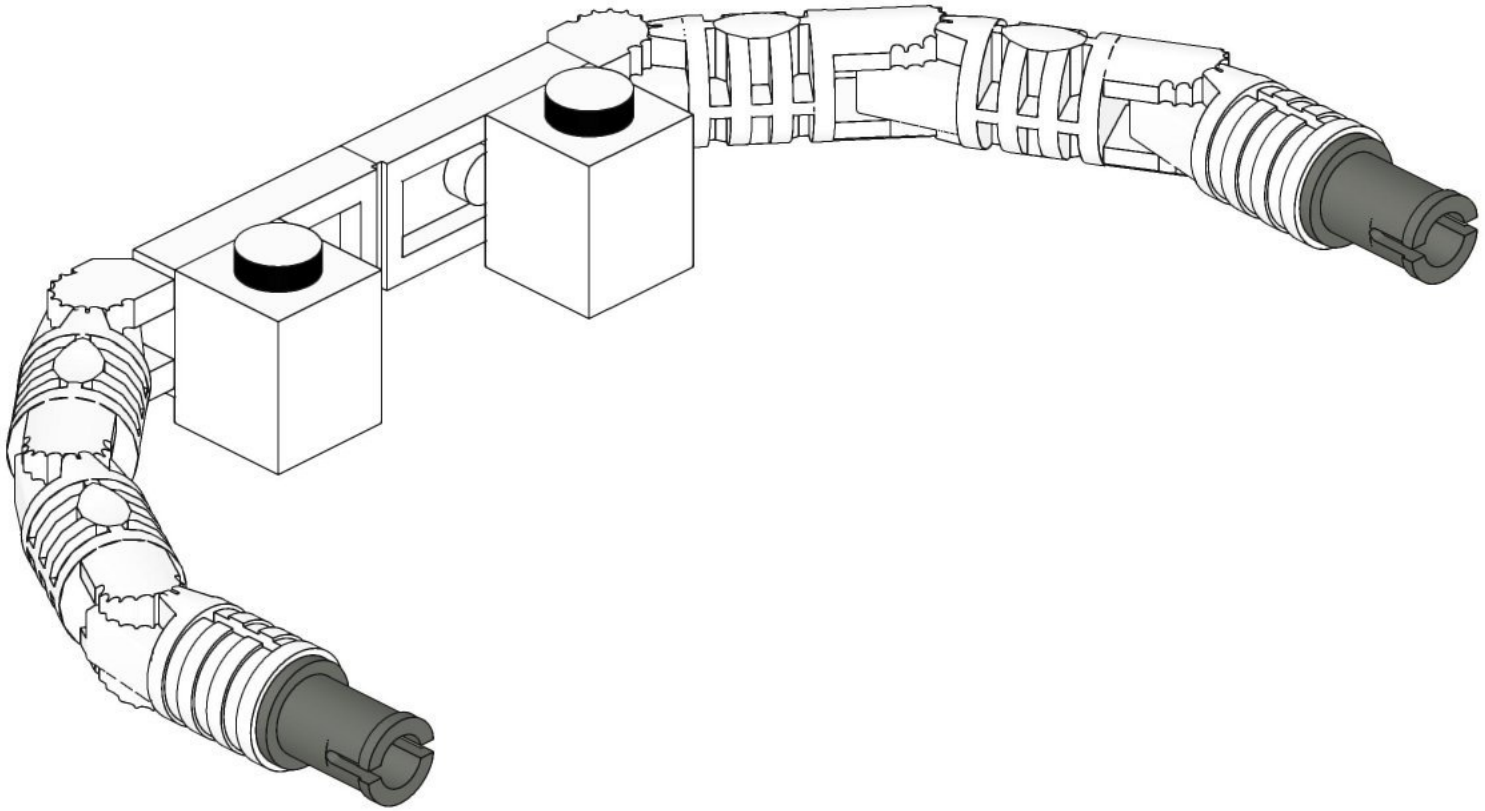
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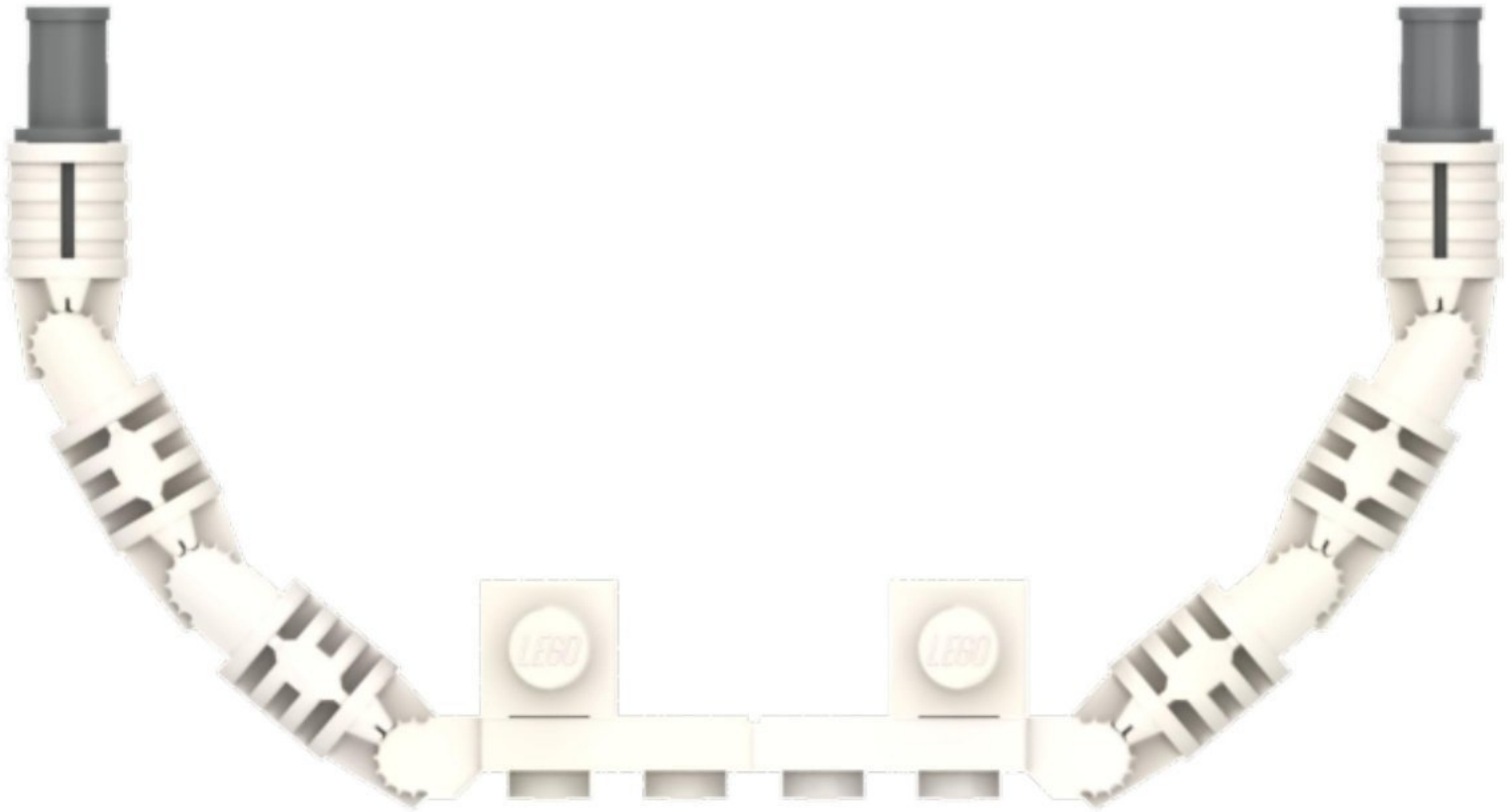
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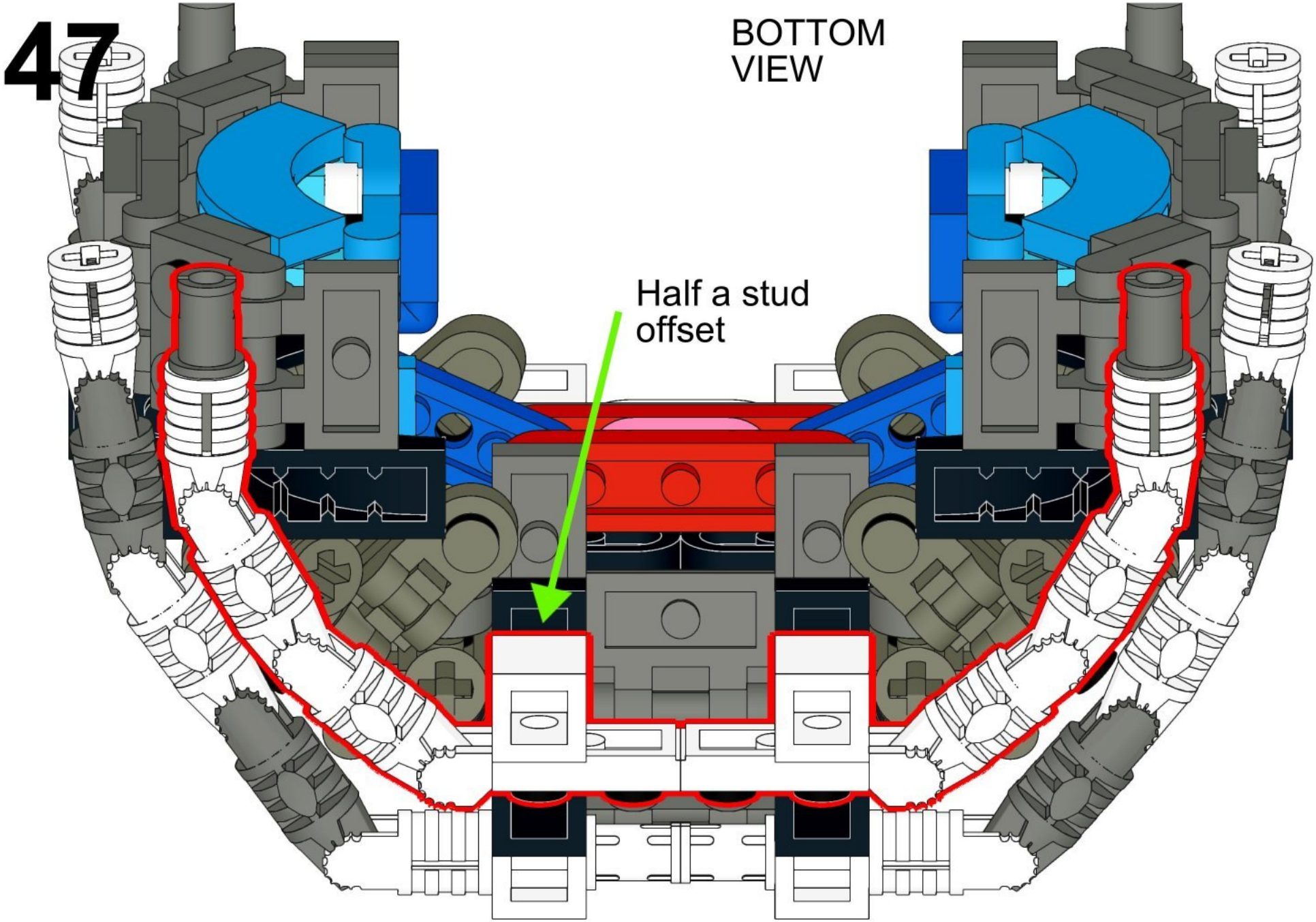






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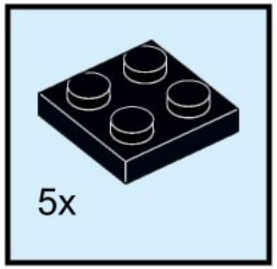


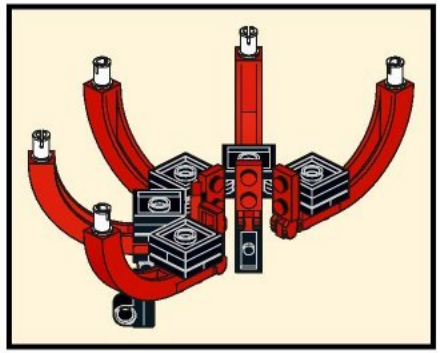

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offset

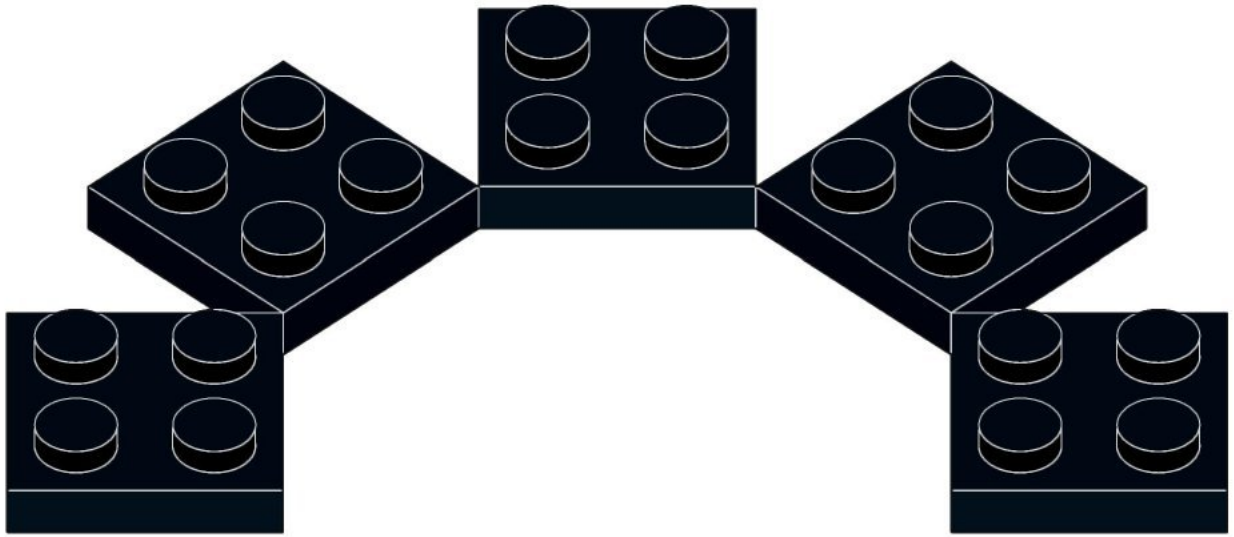
CLOSE UP
VIEW



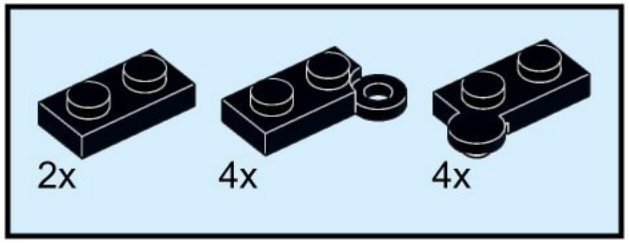
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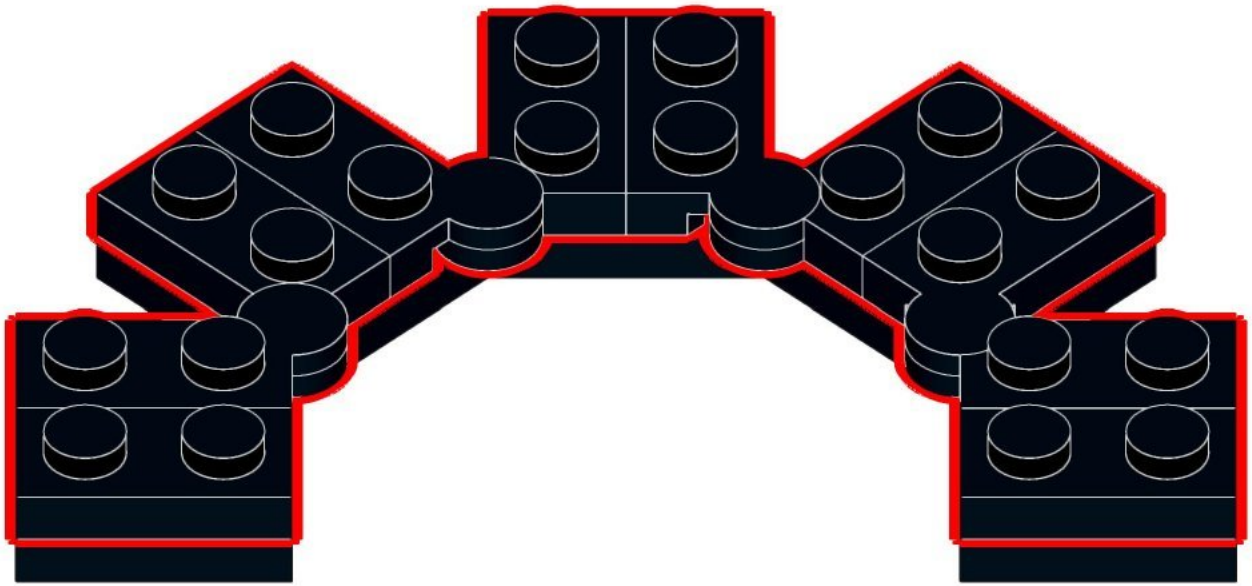




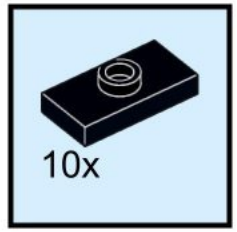


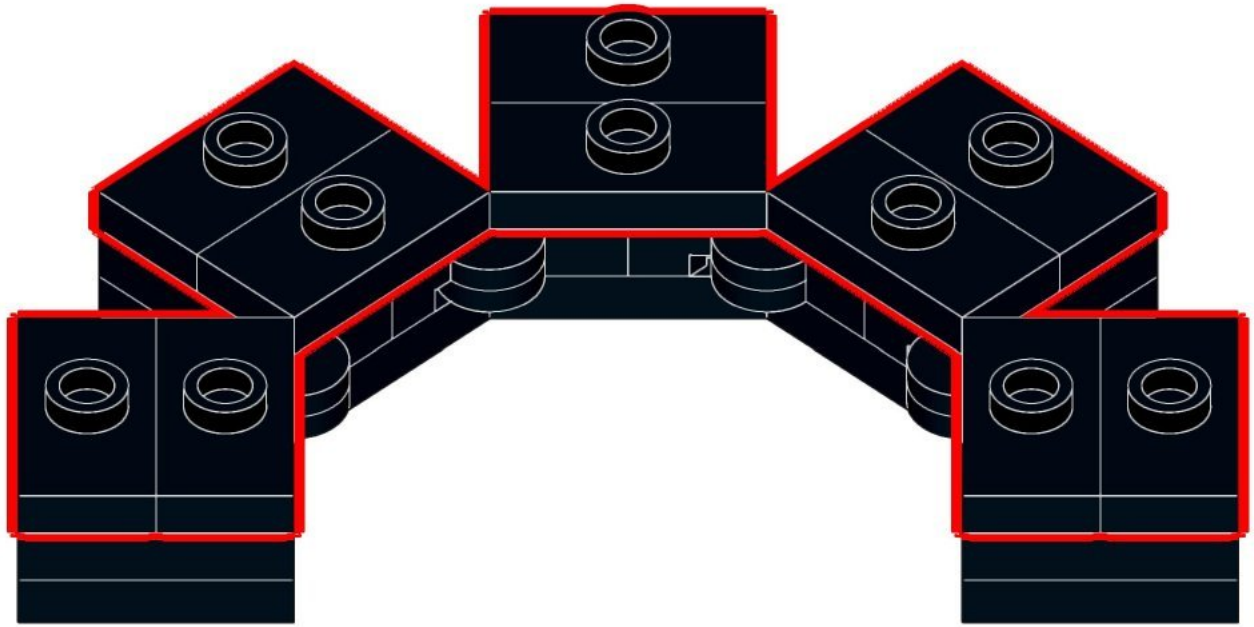
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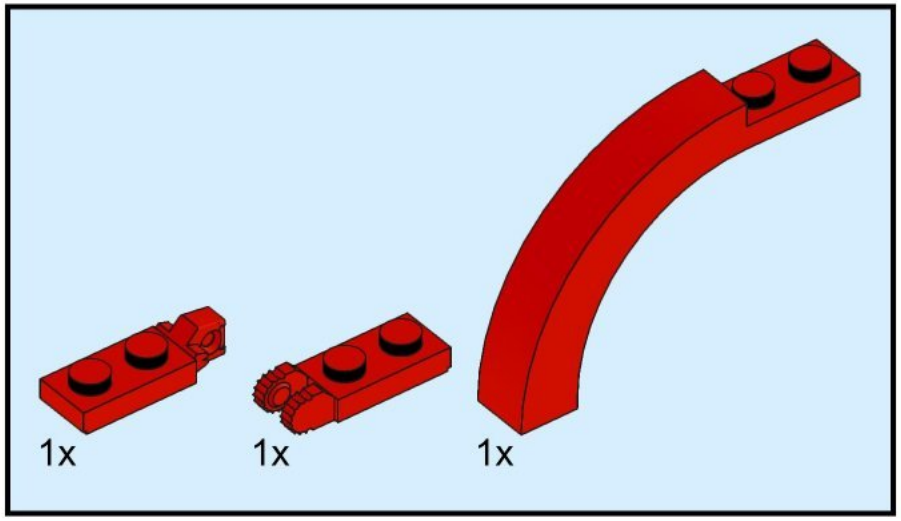


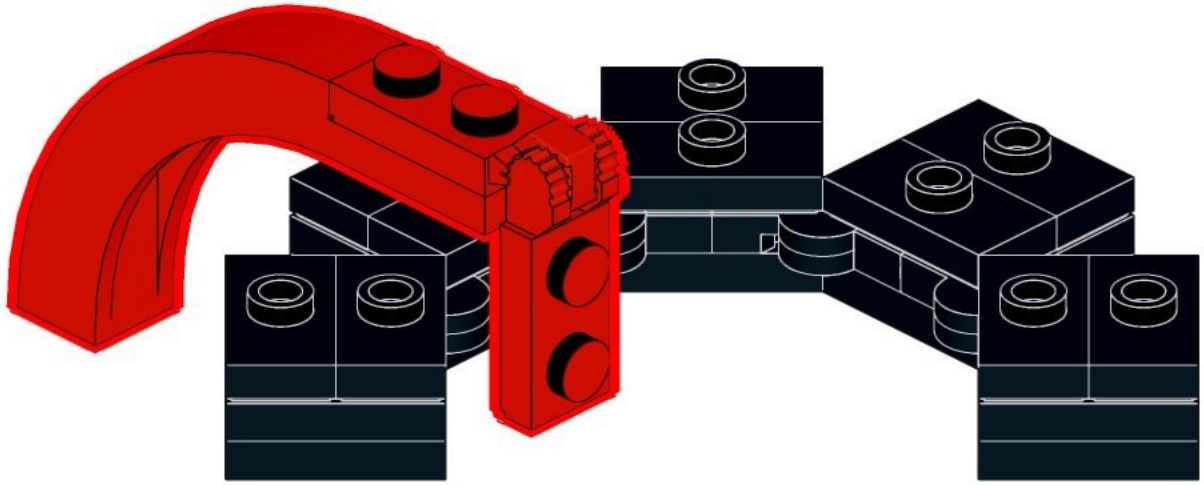
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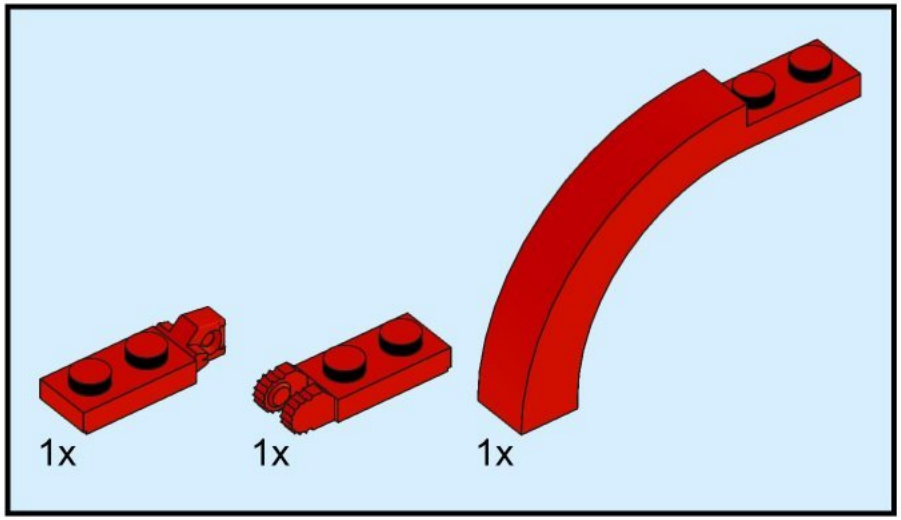


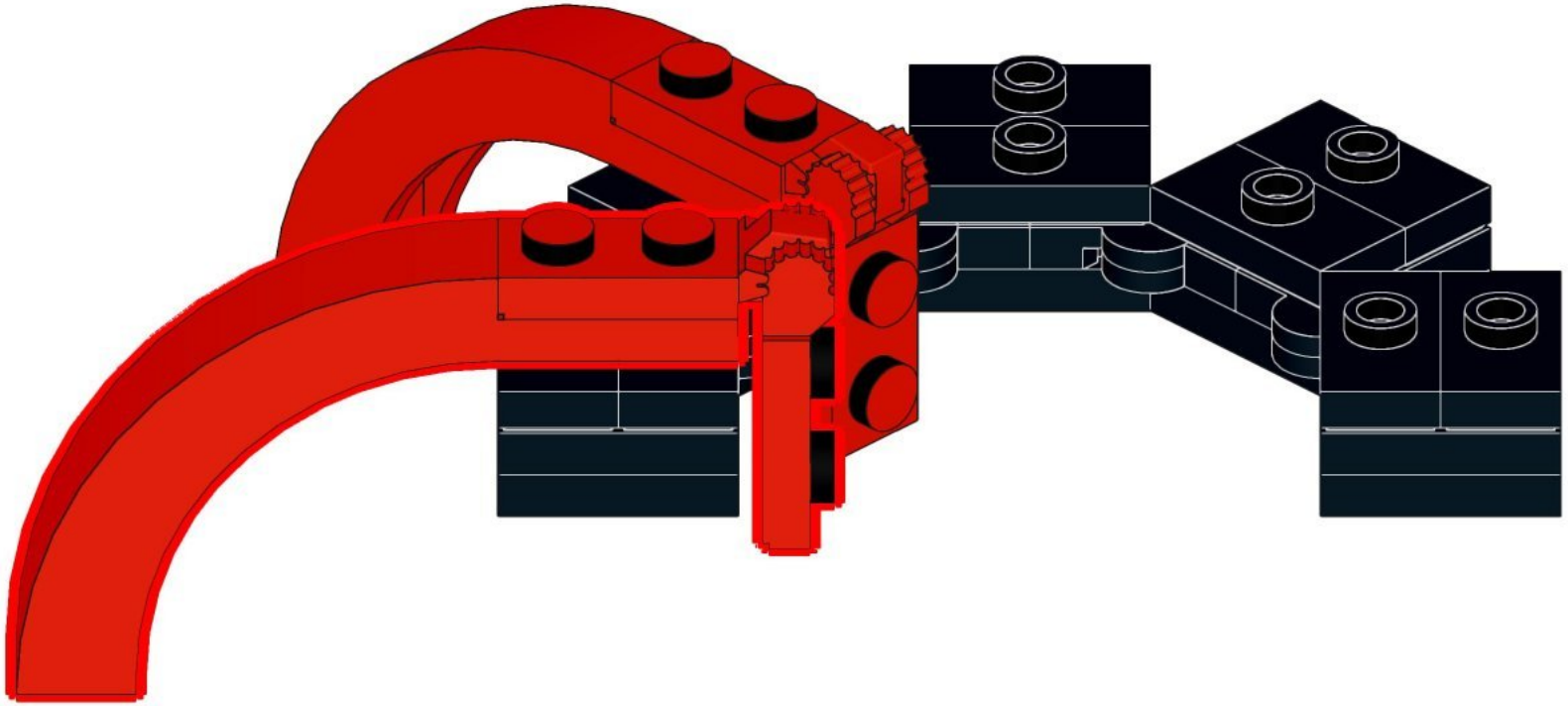
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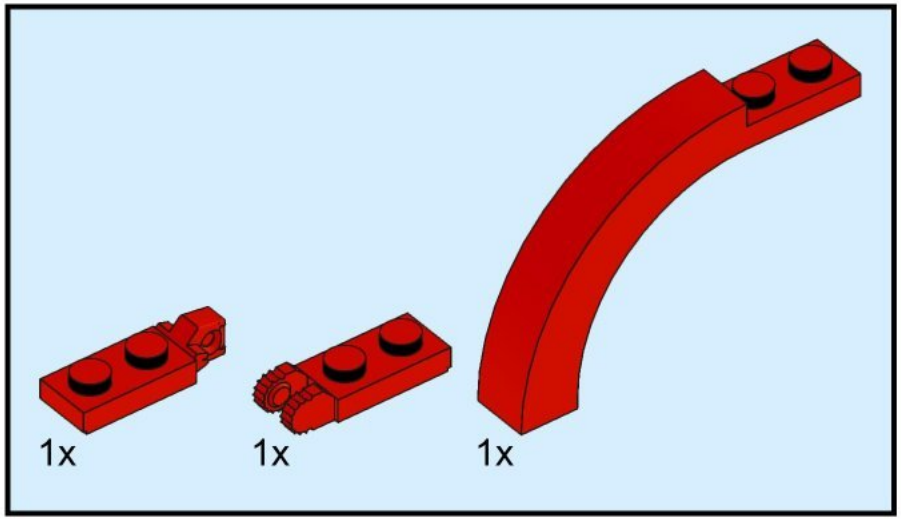


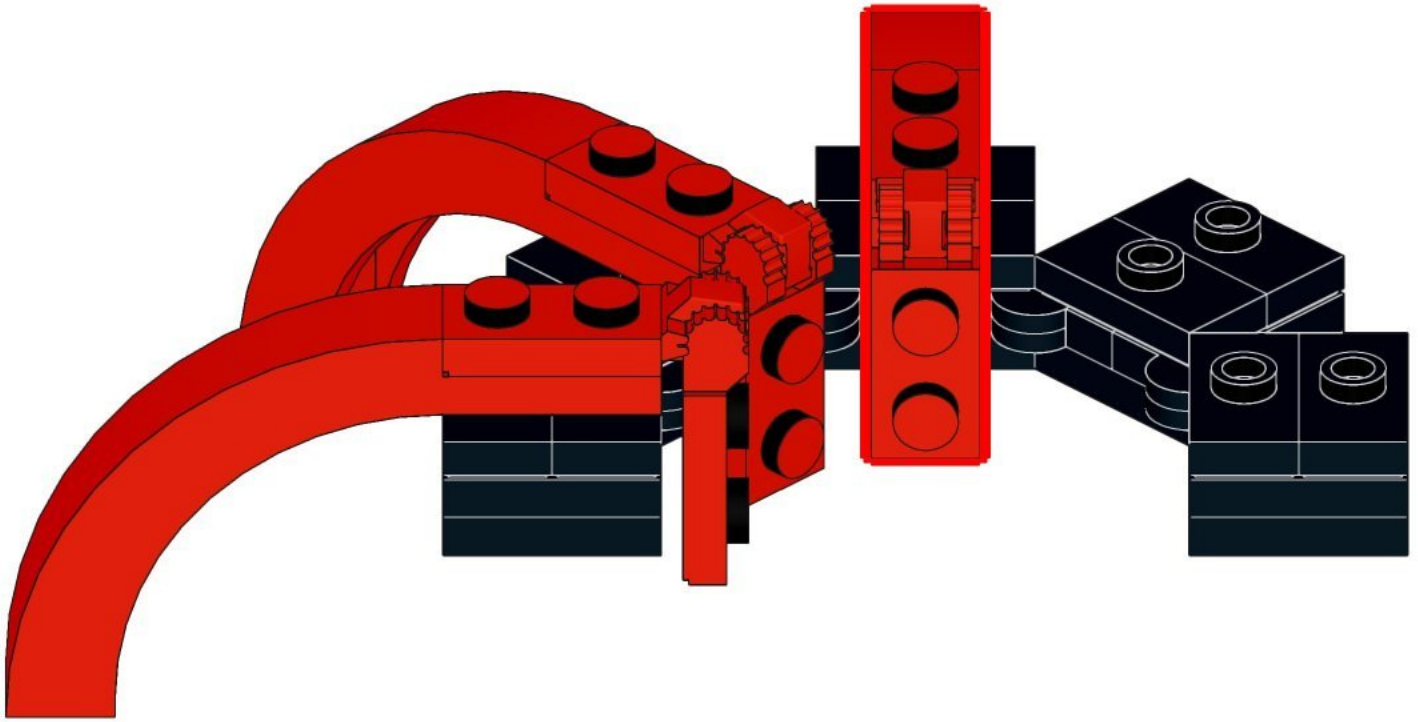
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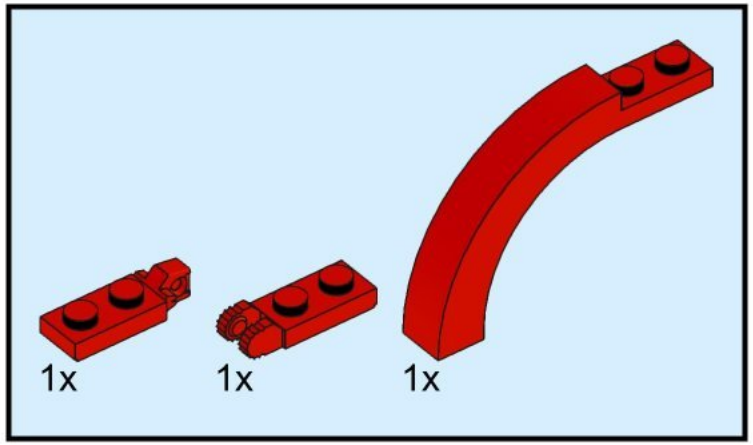


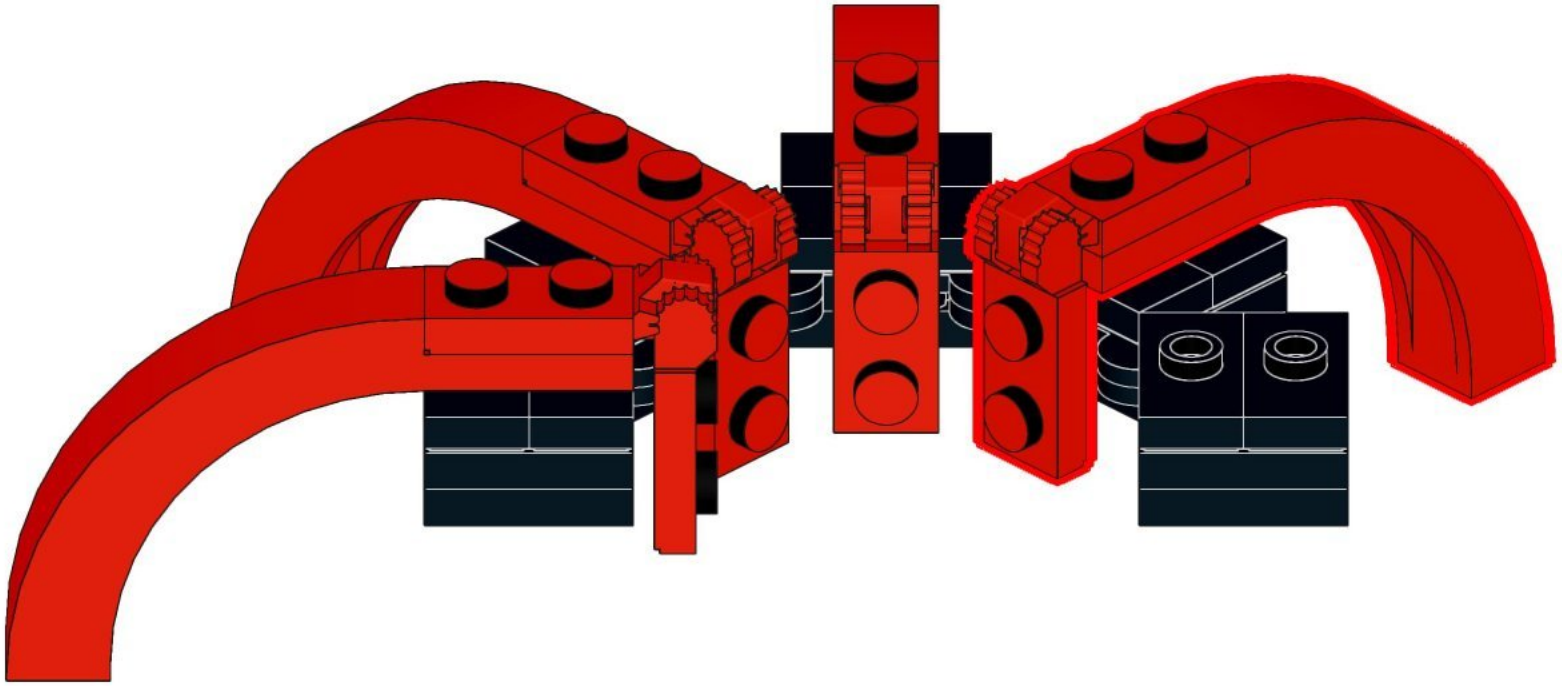
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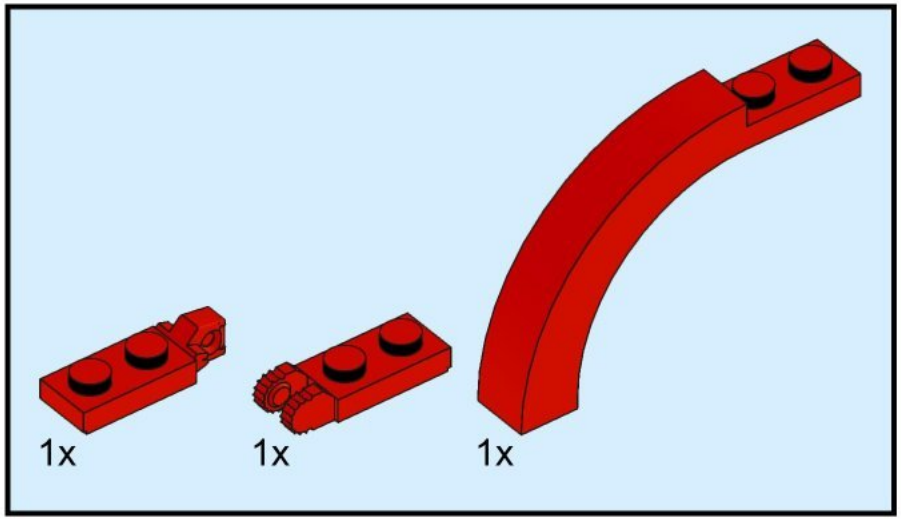


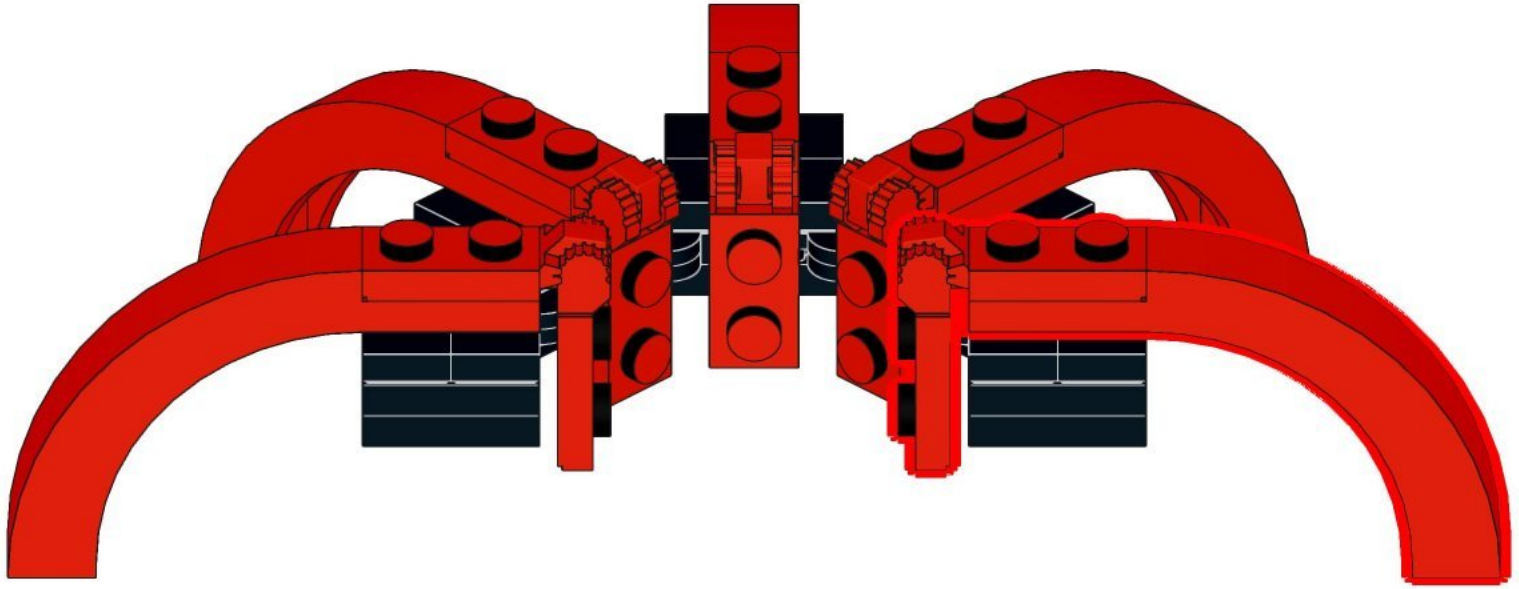
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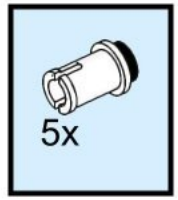


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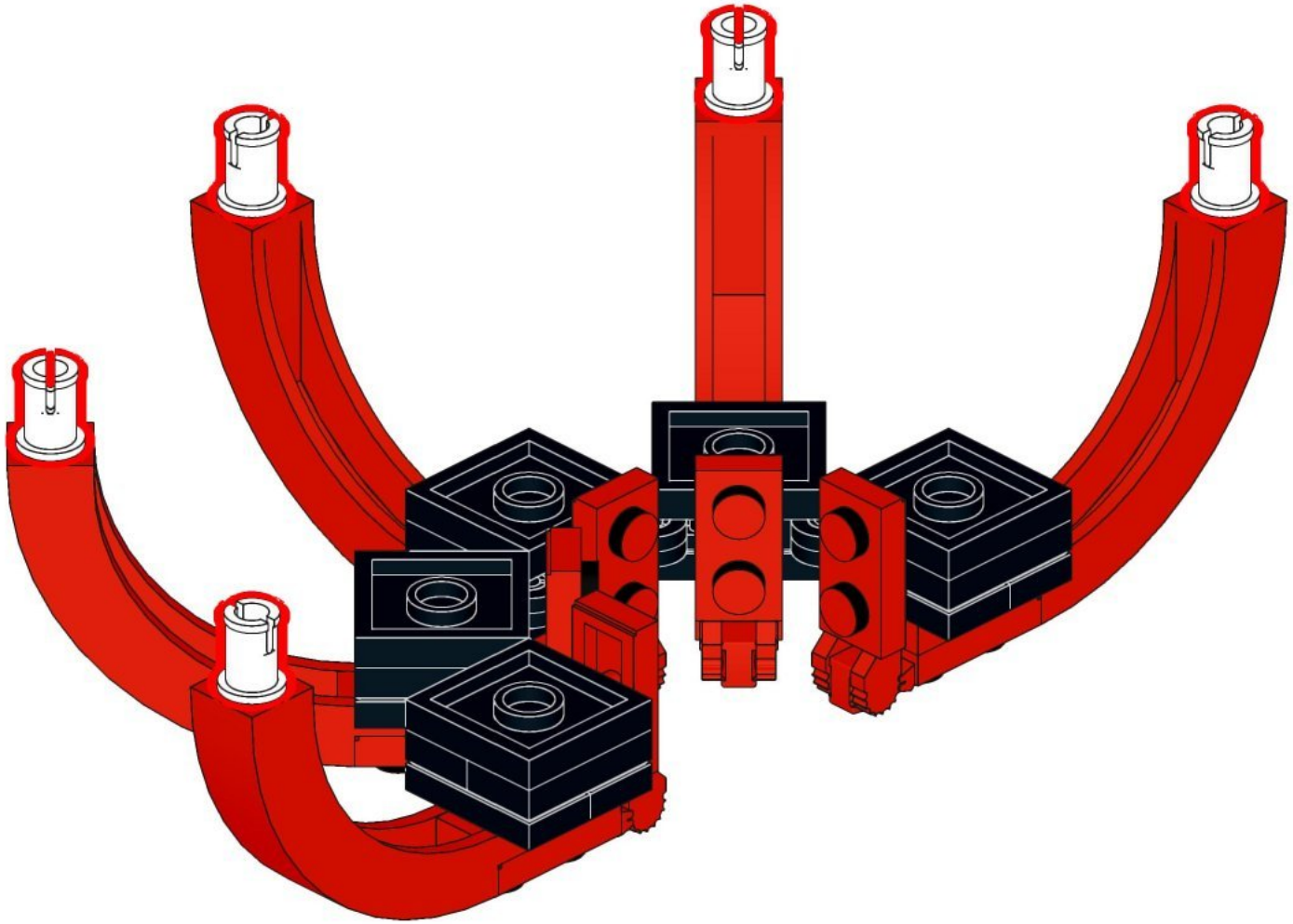




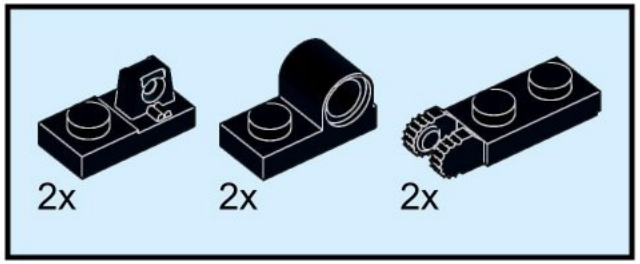
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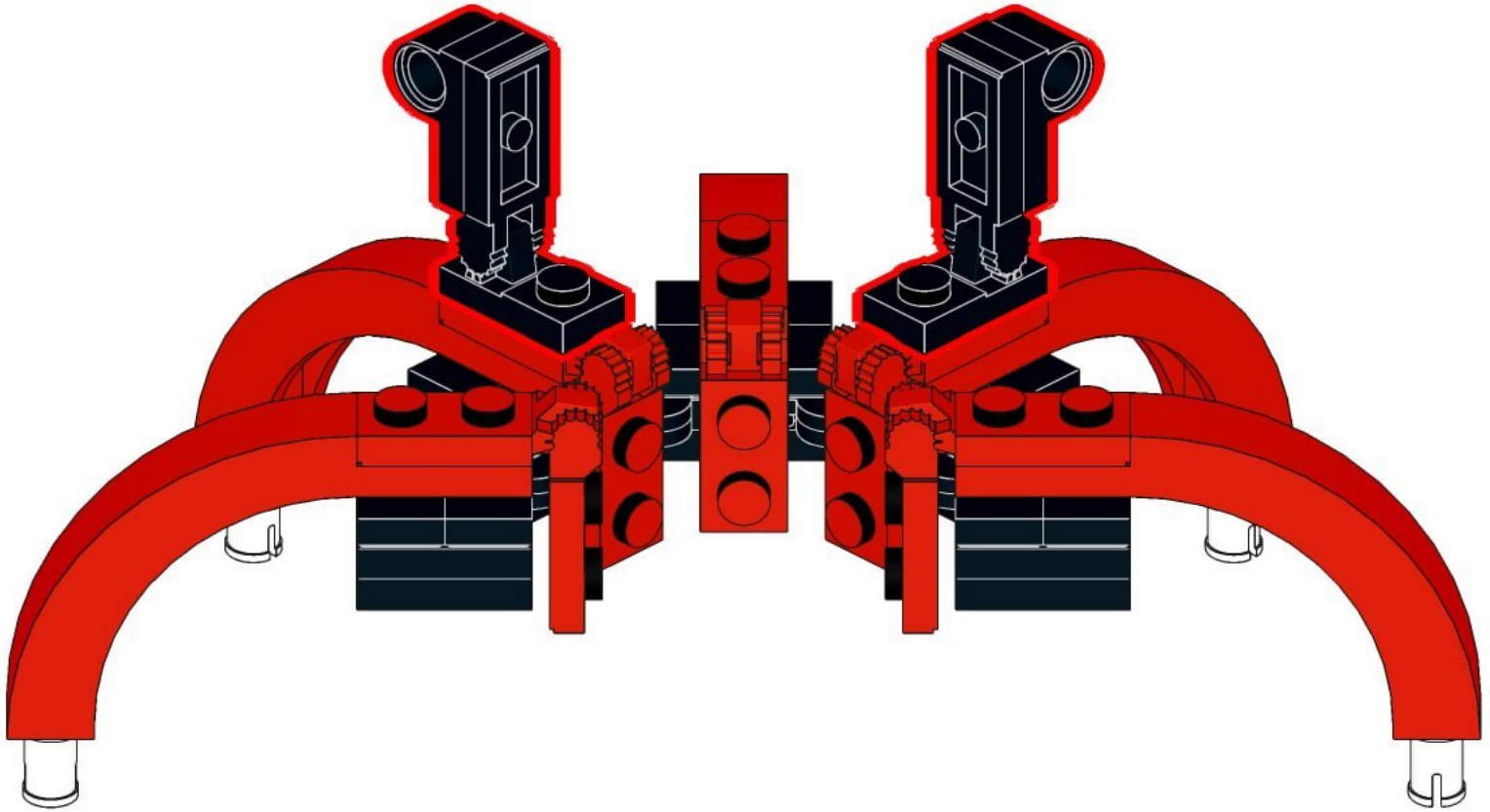


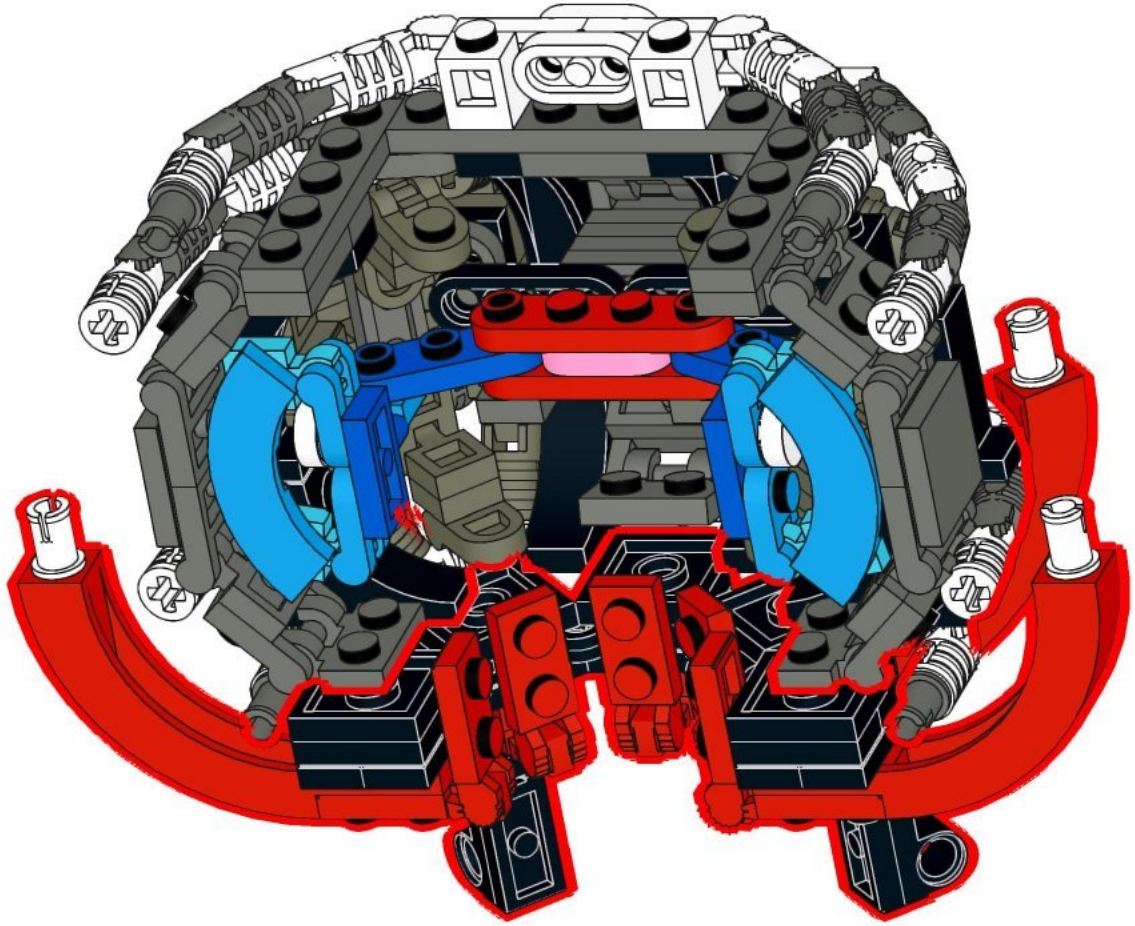




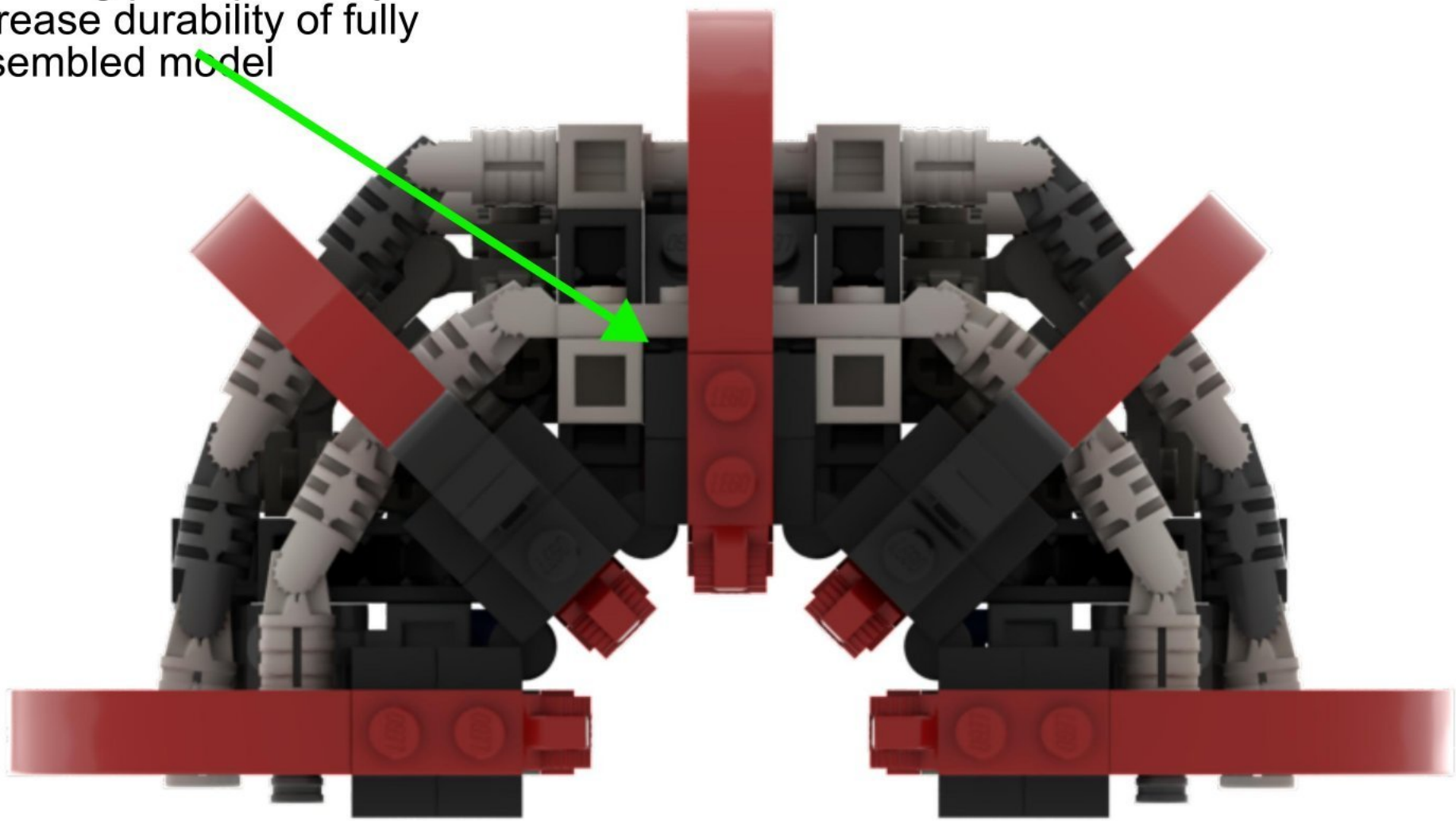
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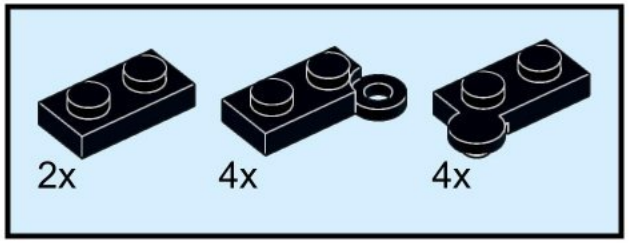


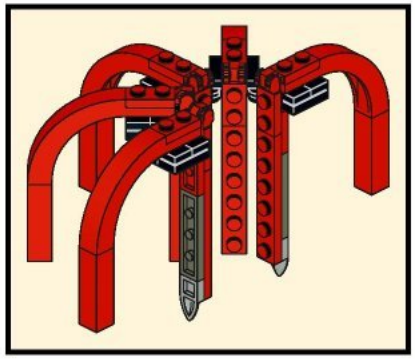


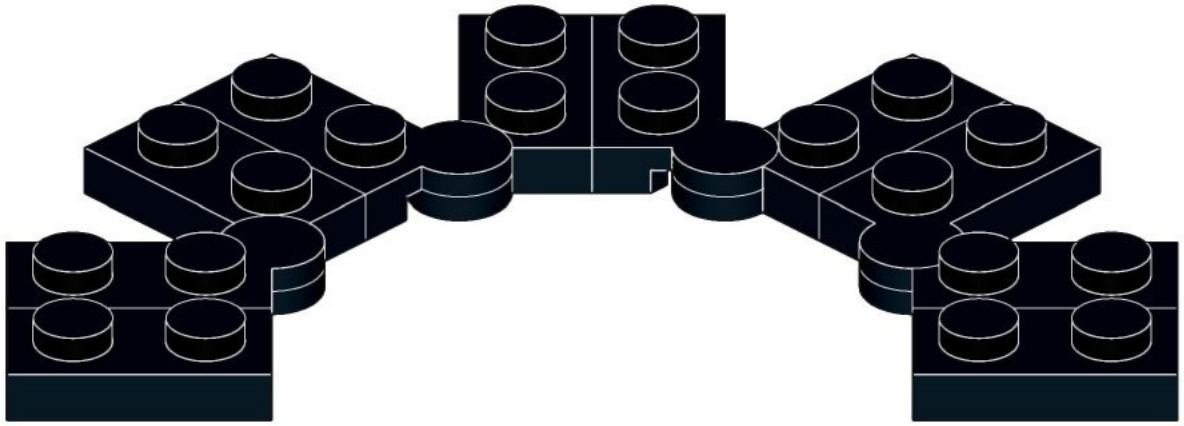
With correct assembling, this mounting point perfectly fits and increase durability of fully assembled model



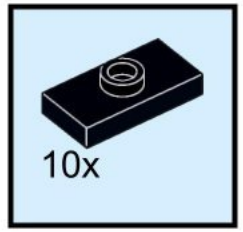
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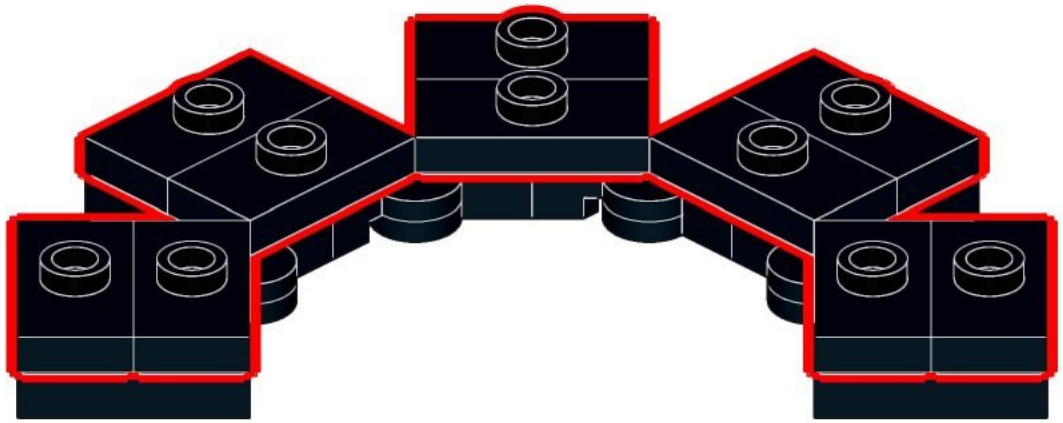




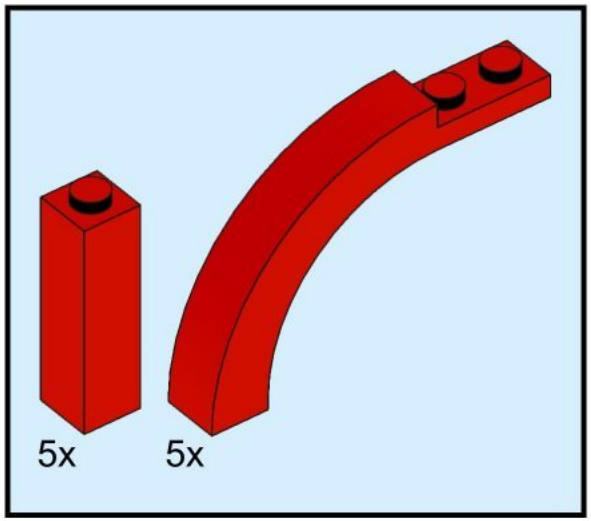


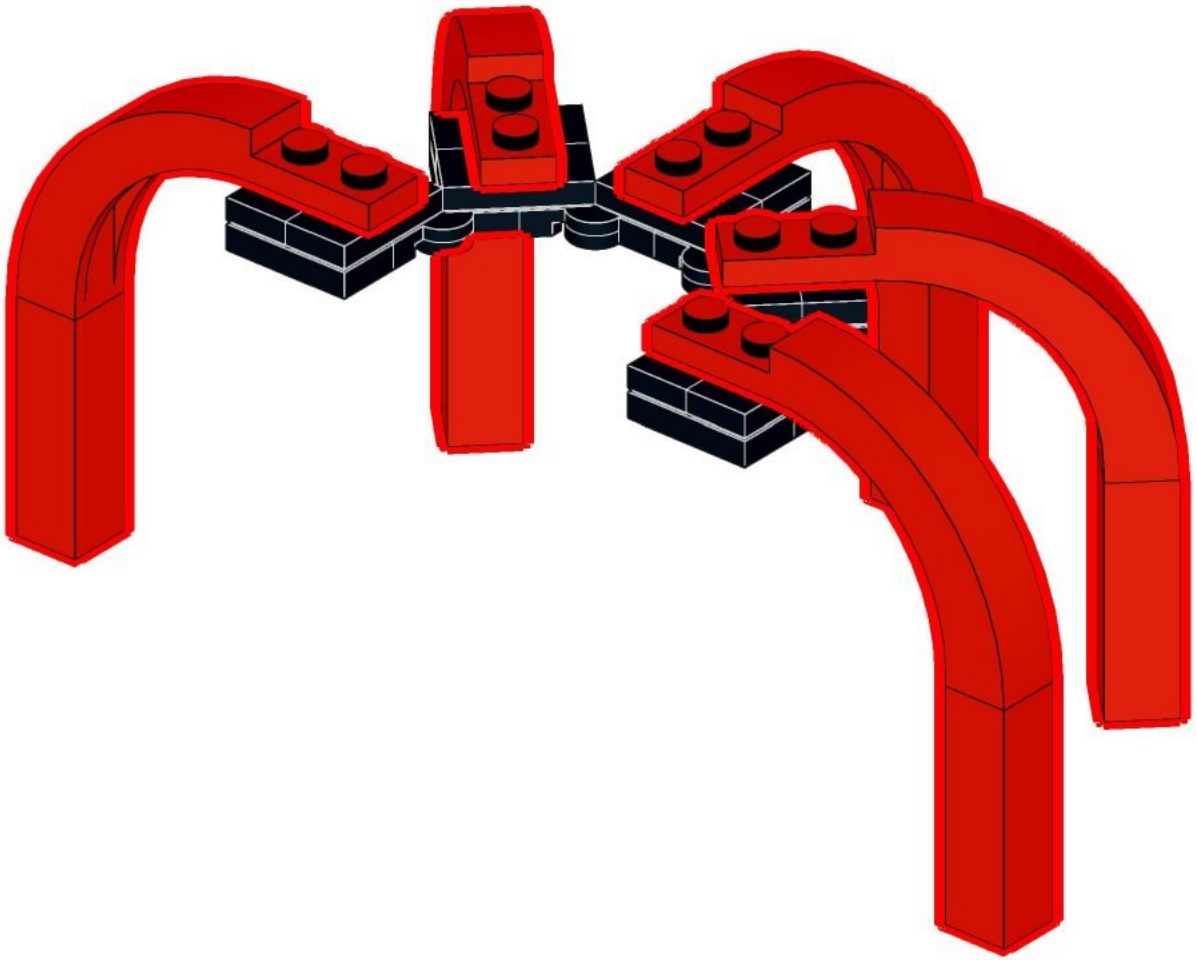
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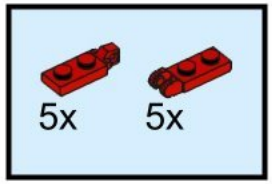


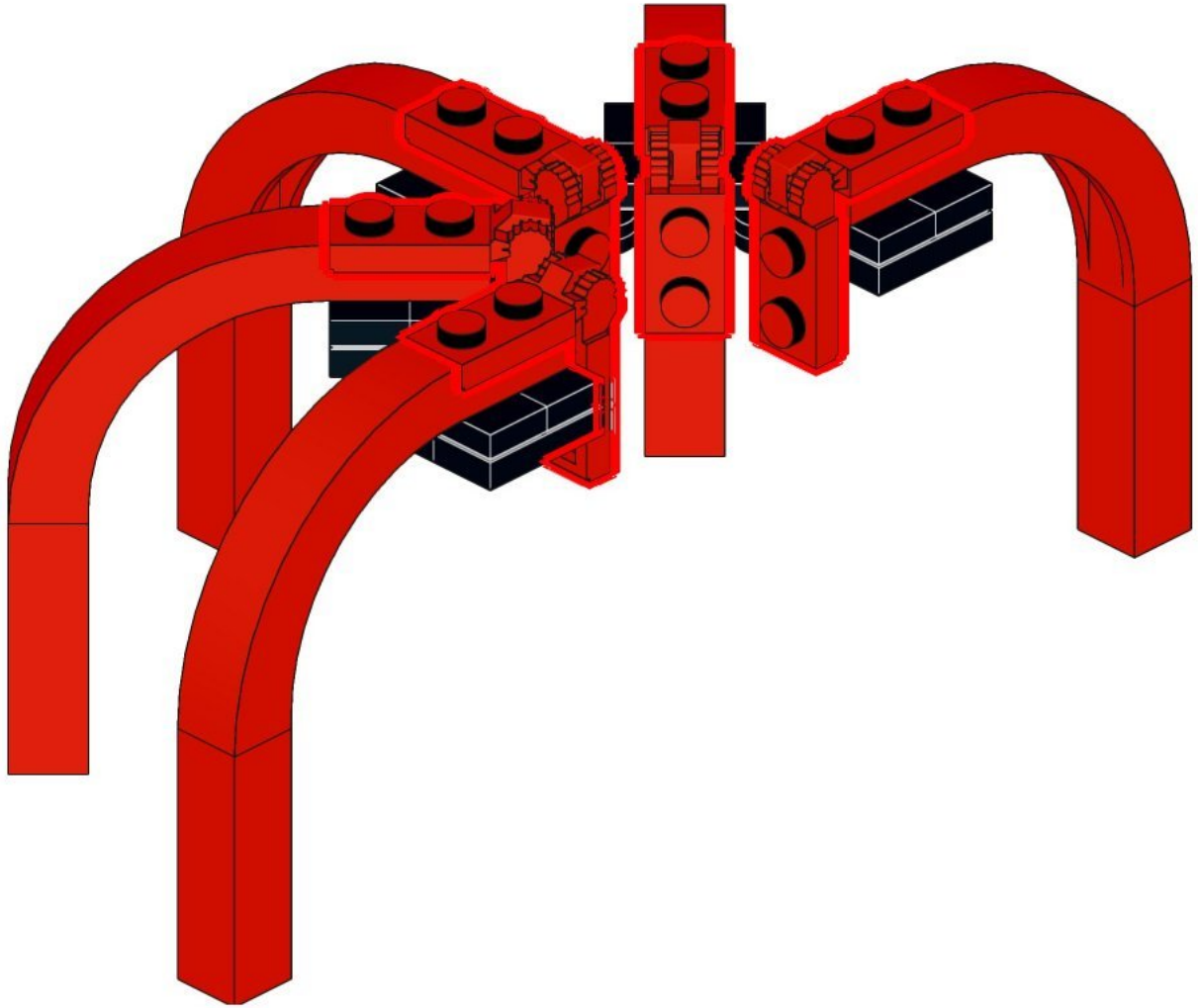
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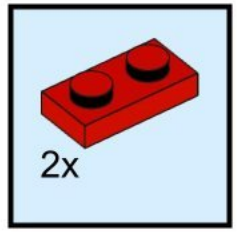


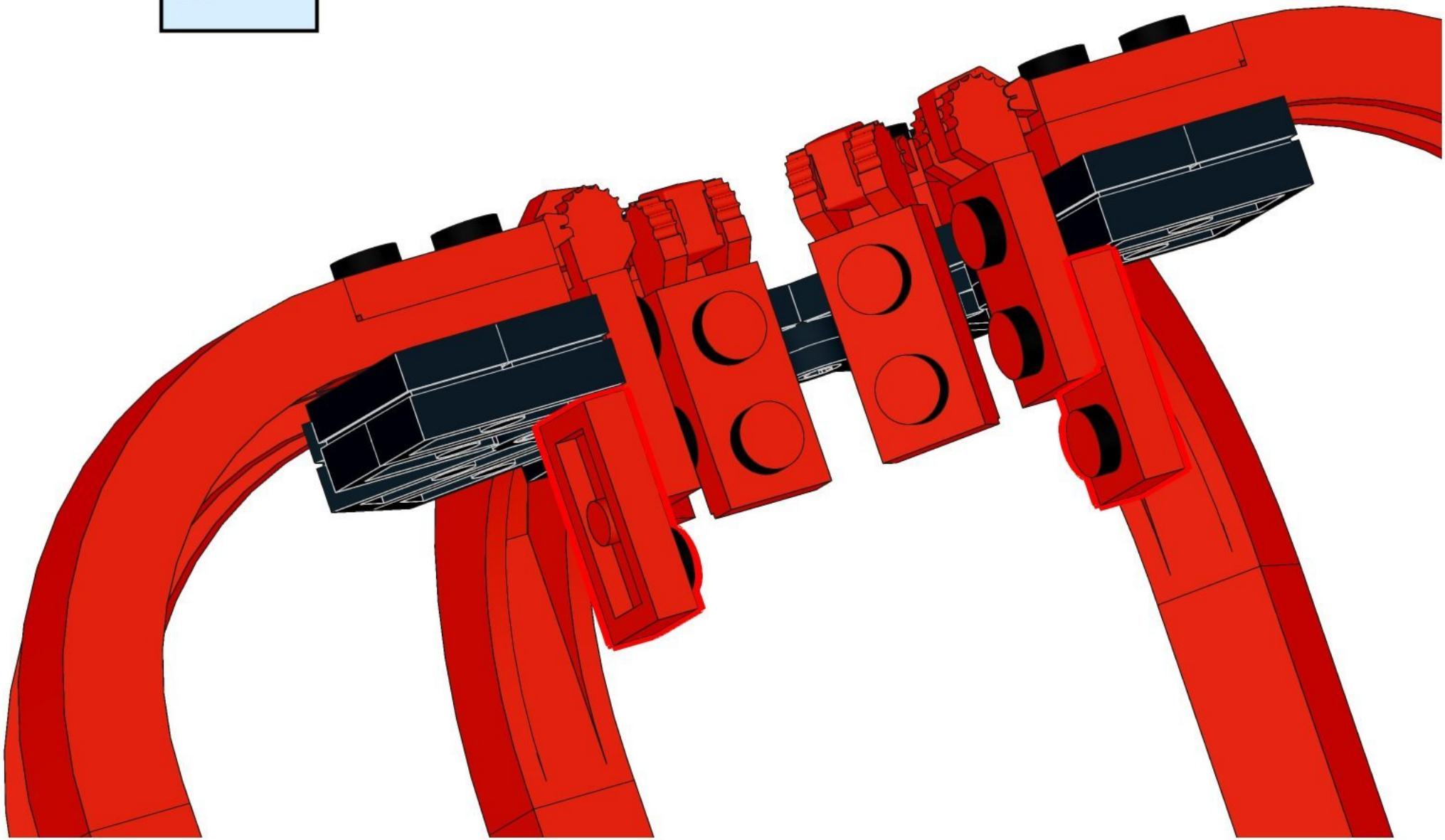
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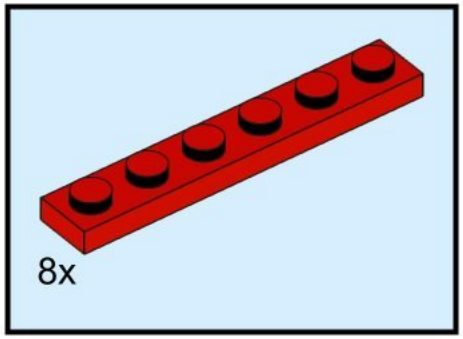


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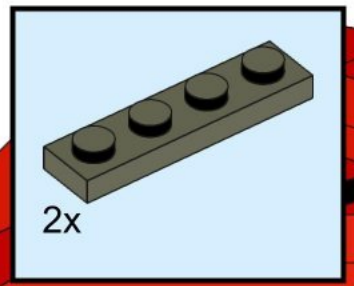




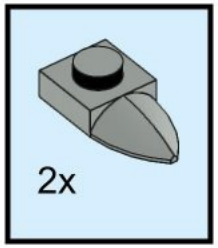
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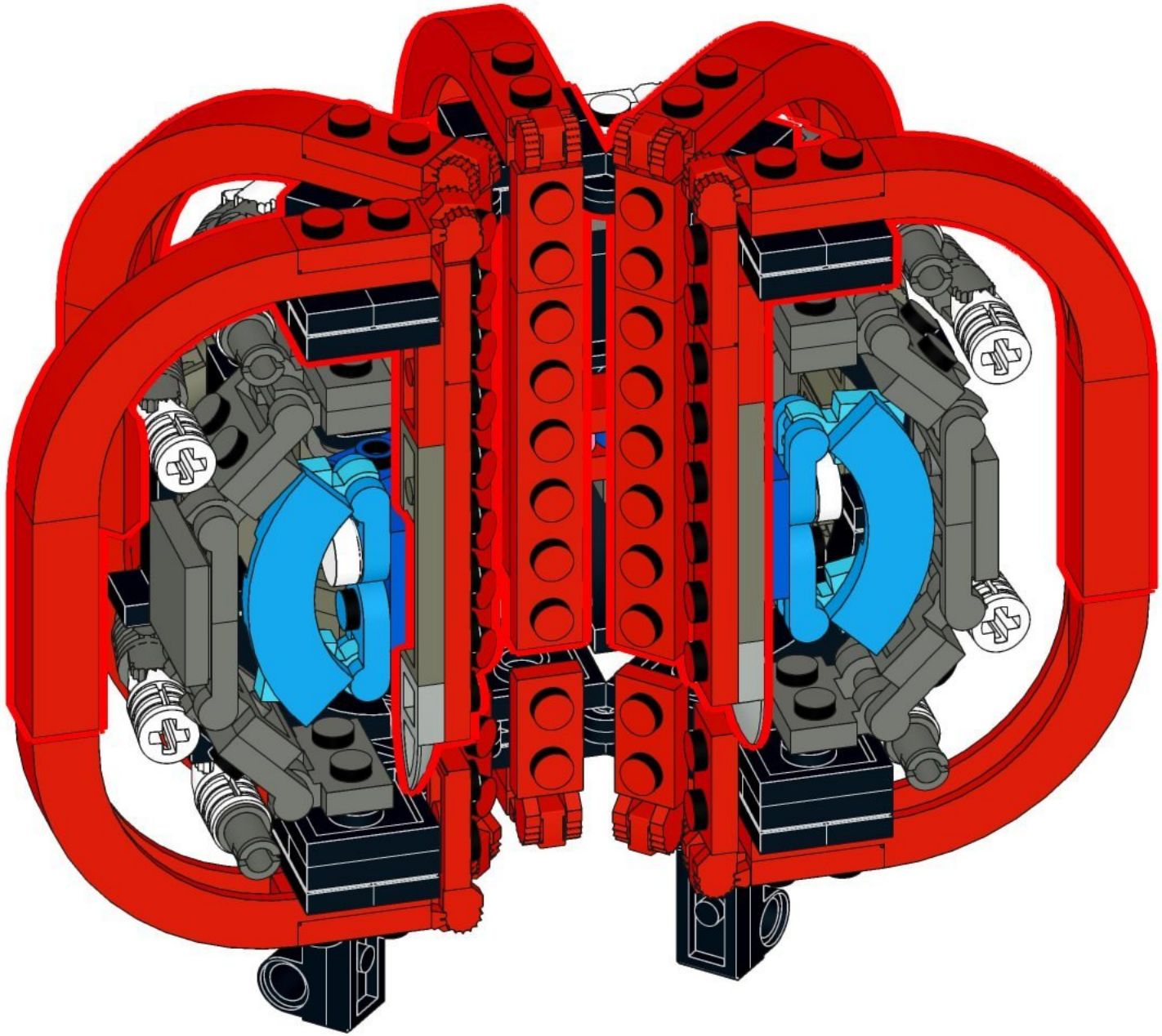
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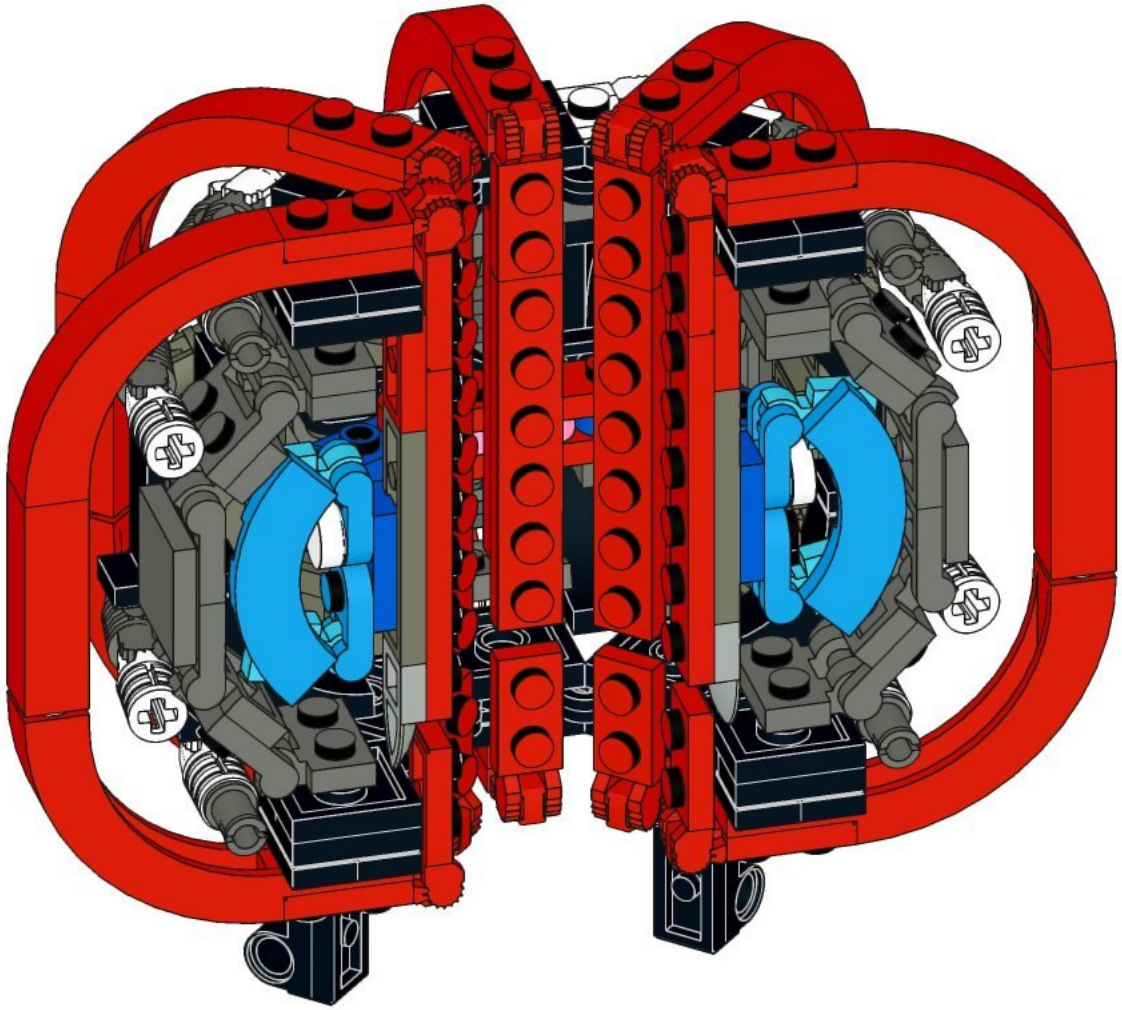


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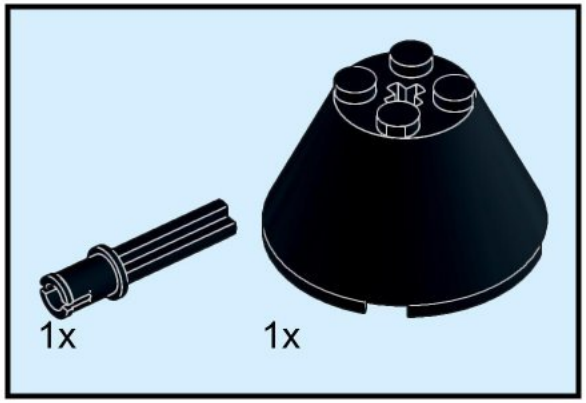
Tip: this step is easier if you first line up all the parts, then lay the assembly face down (the side shown on the box). Carefully join the upper and lower halves of the toroidal field coils with the white pins, so they form a cage around the vacuum vessel.

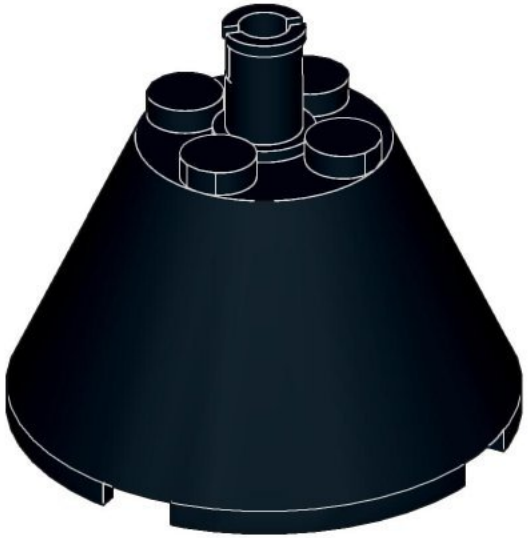


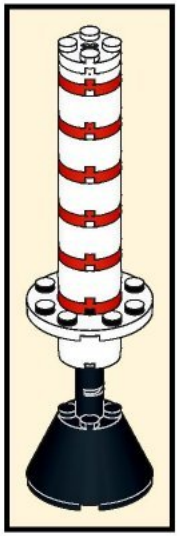
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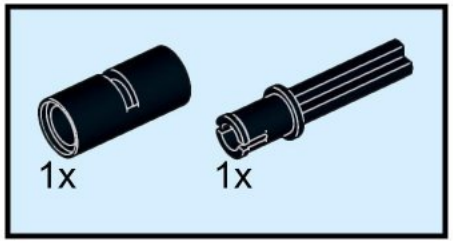
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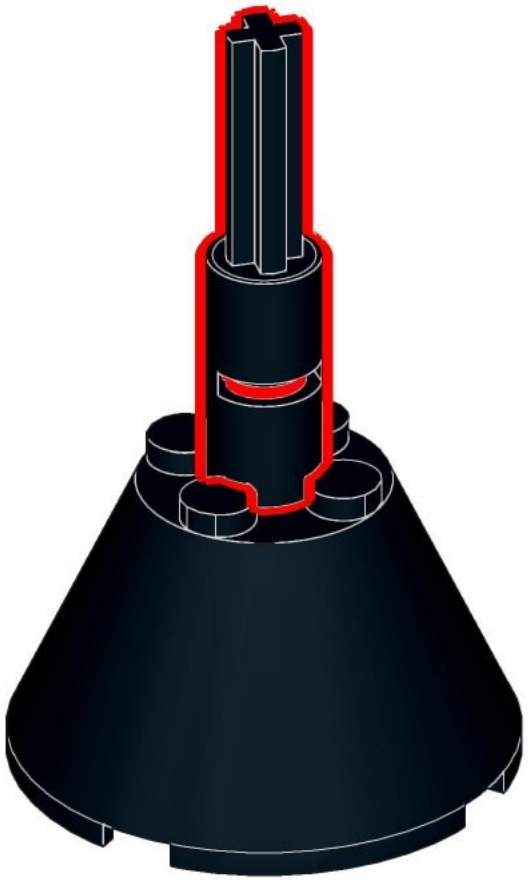




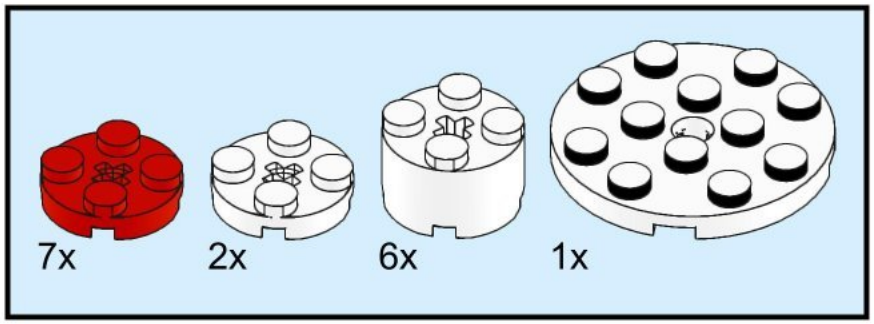


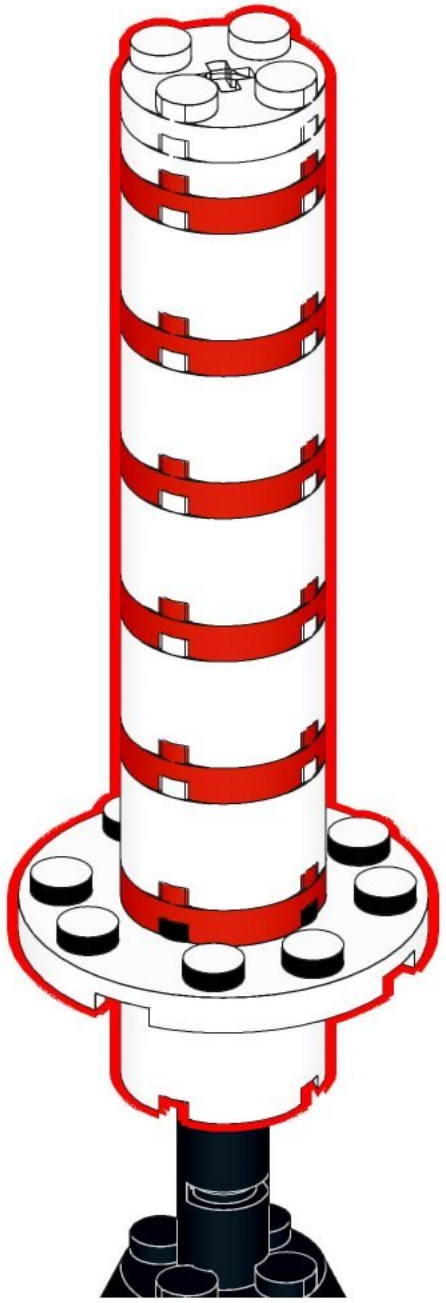
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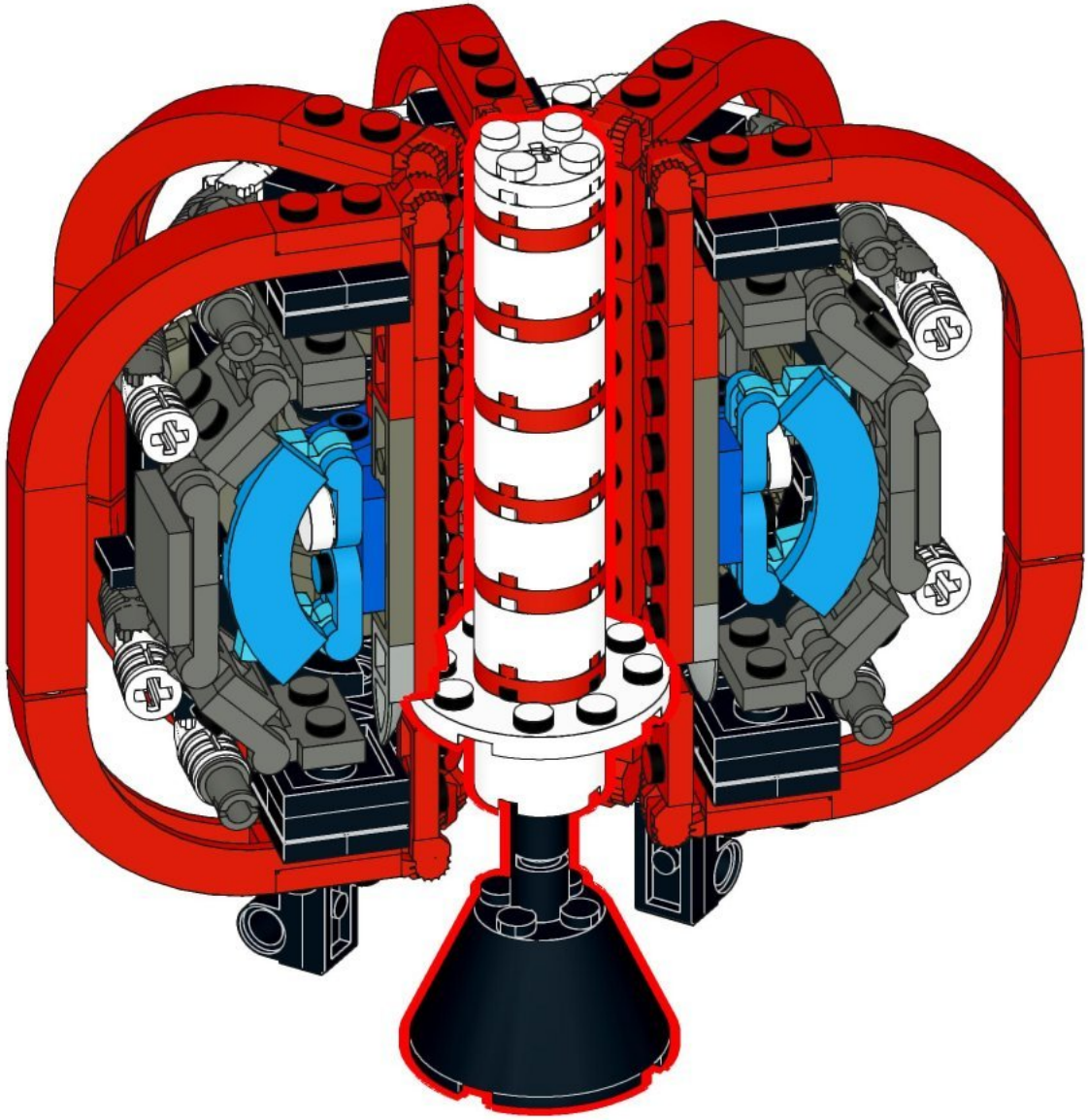




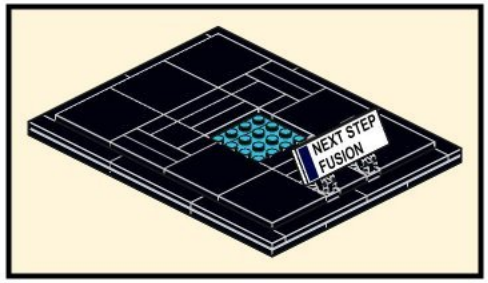
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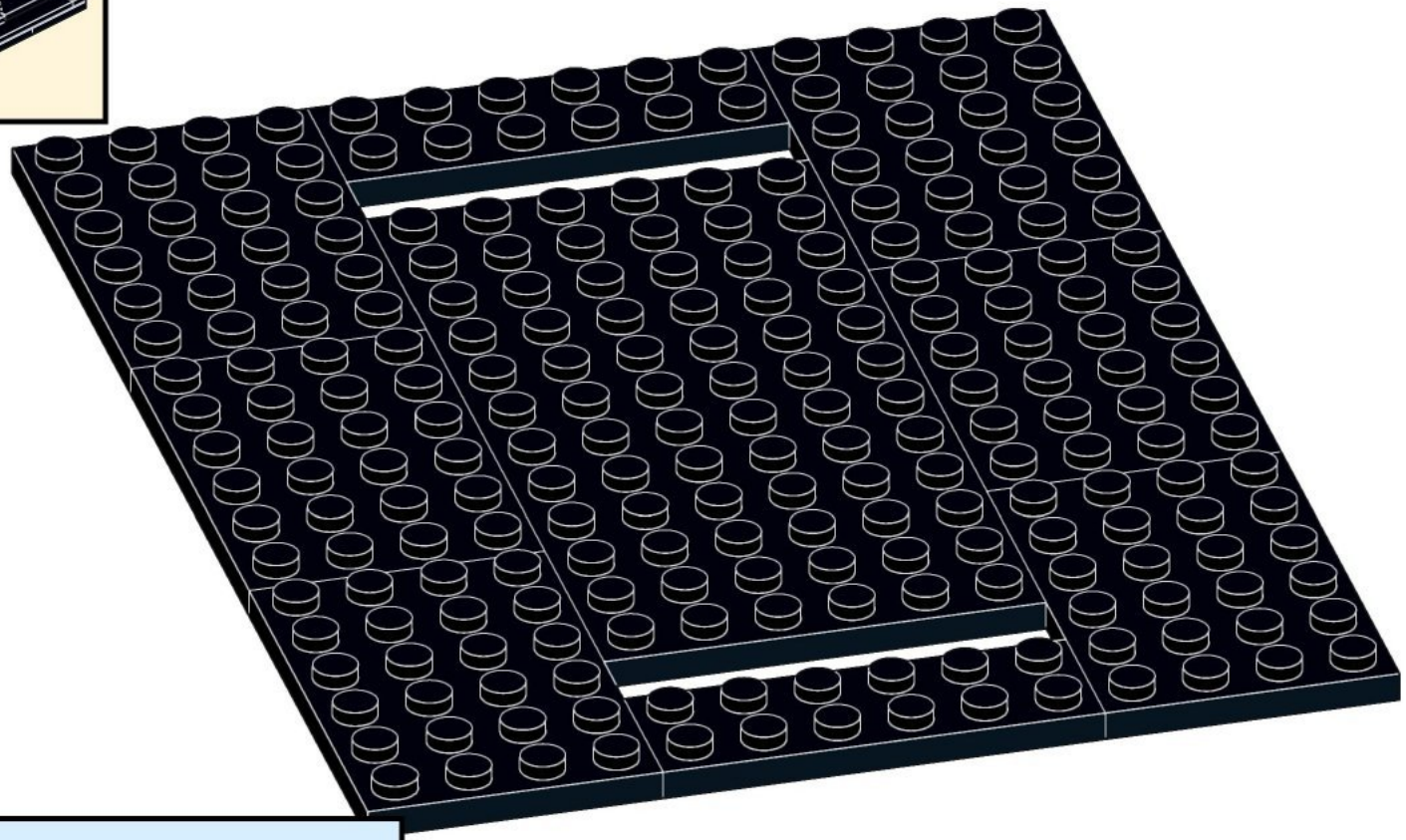


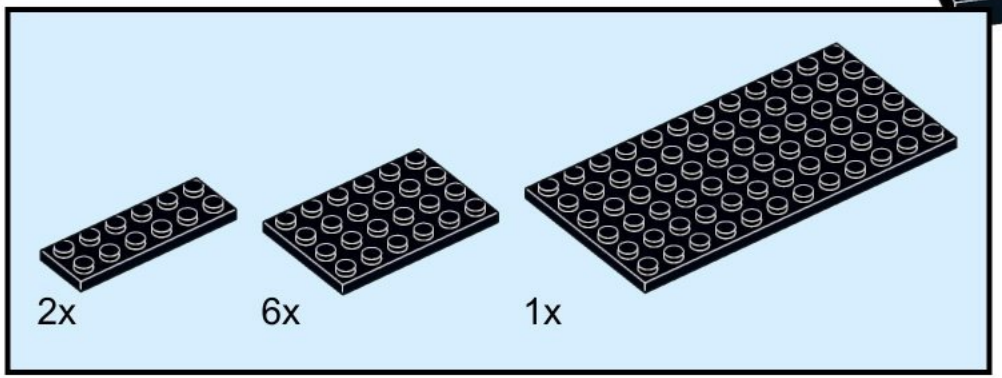




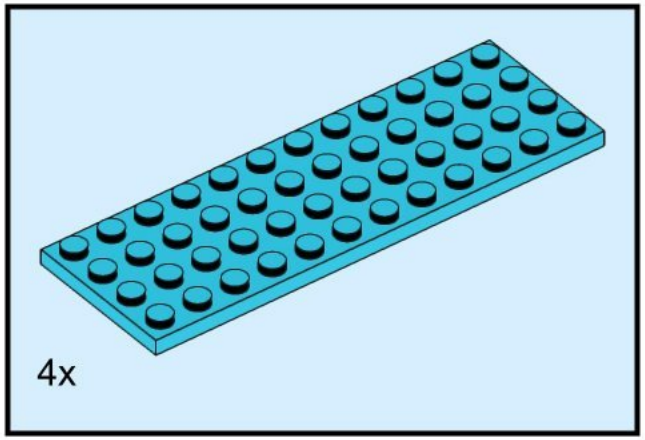
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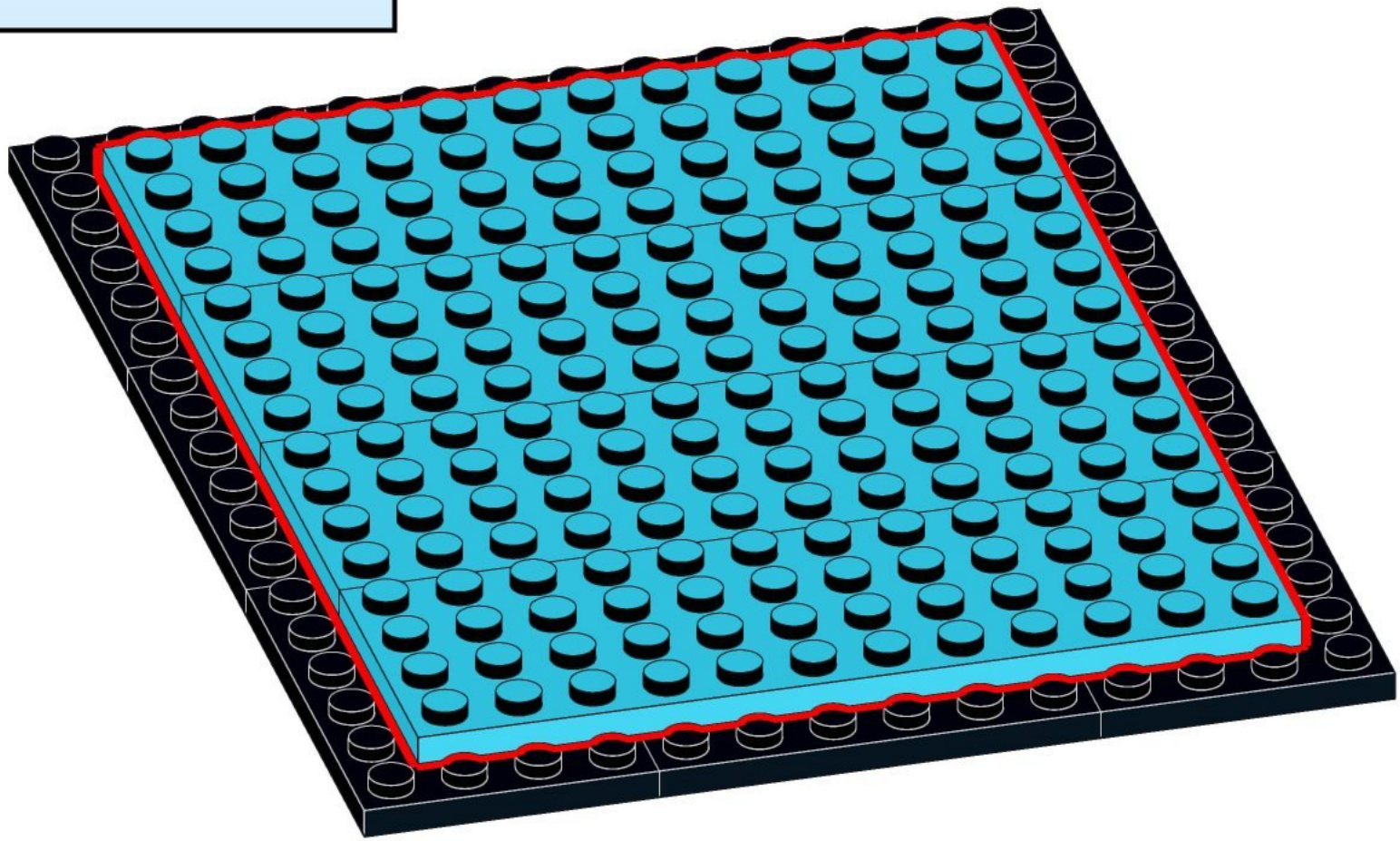




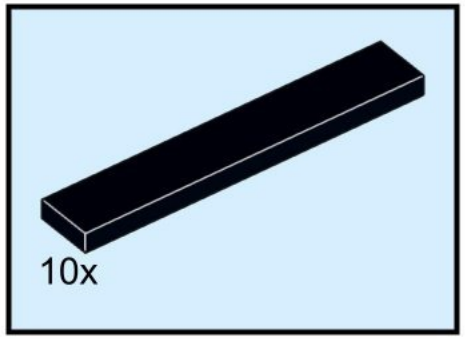


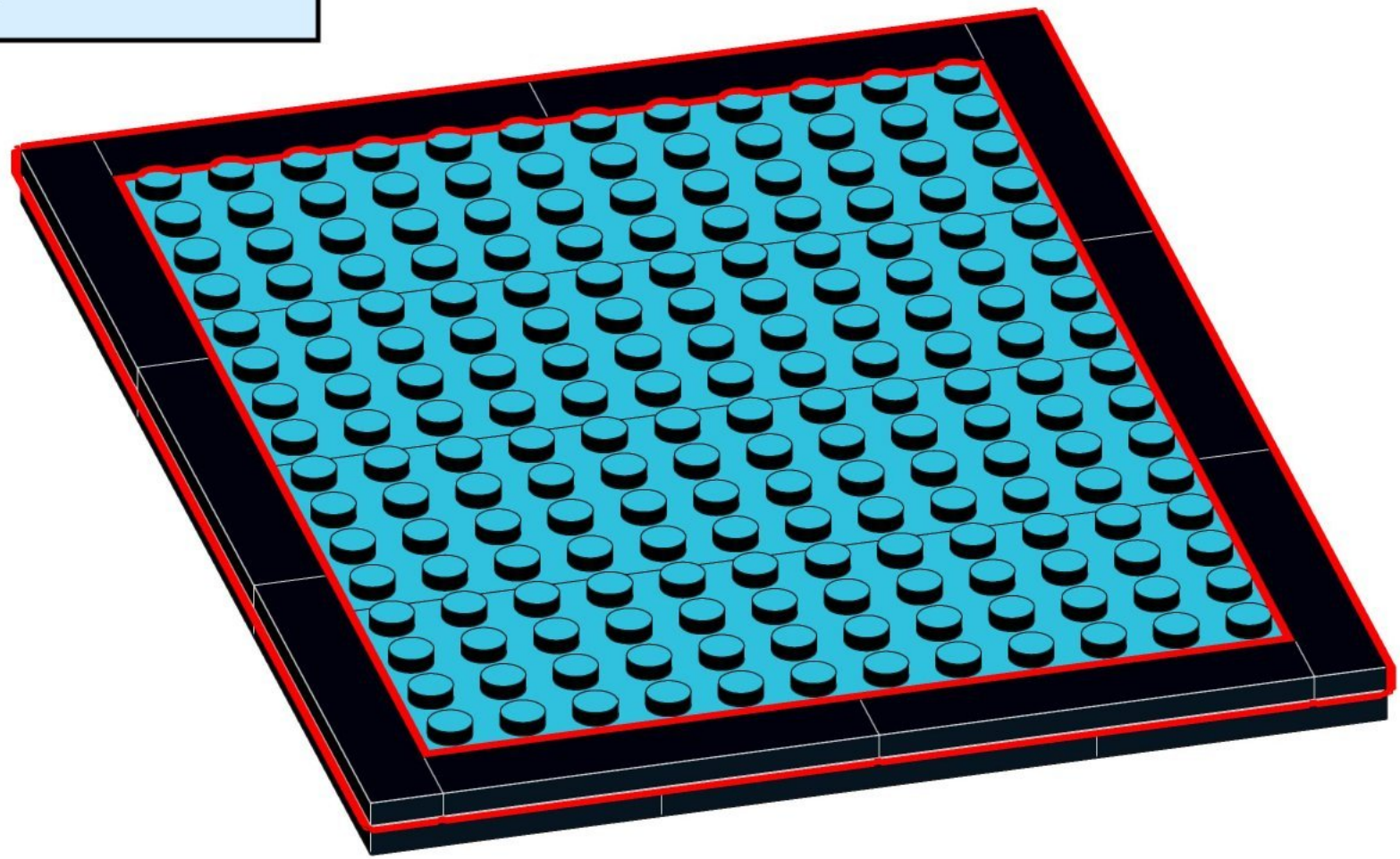
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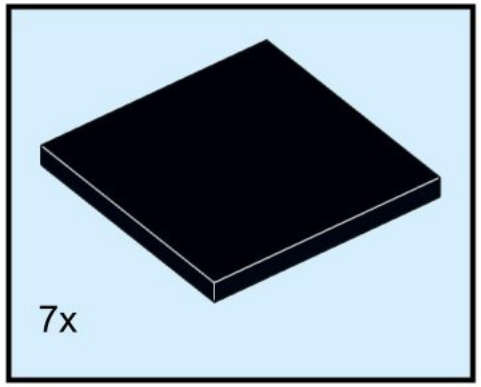


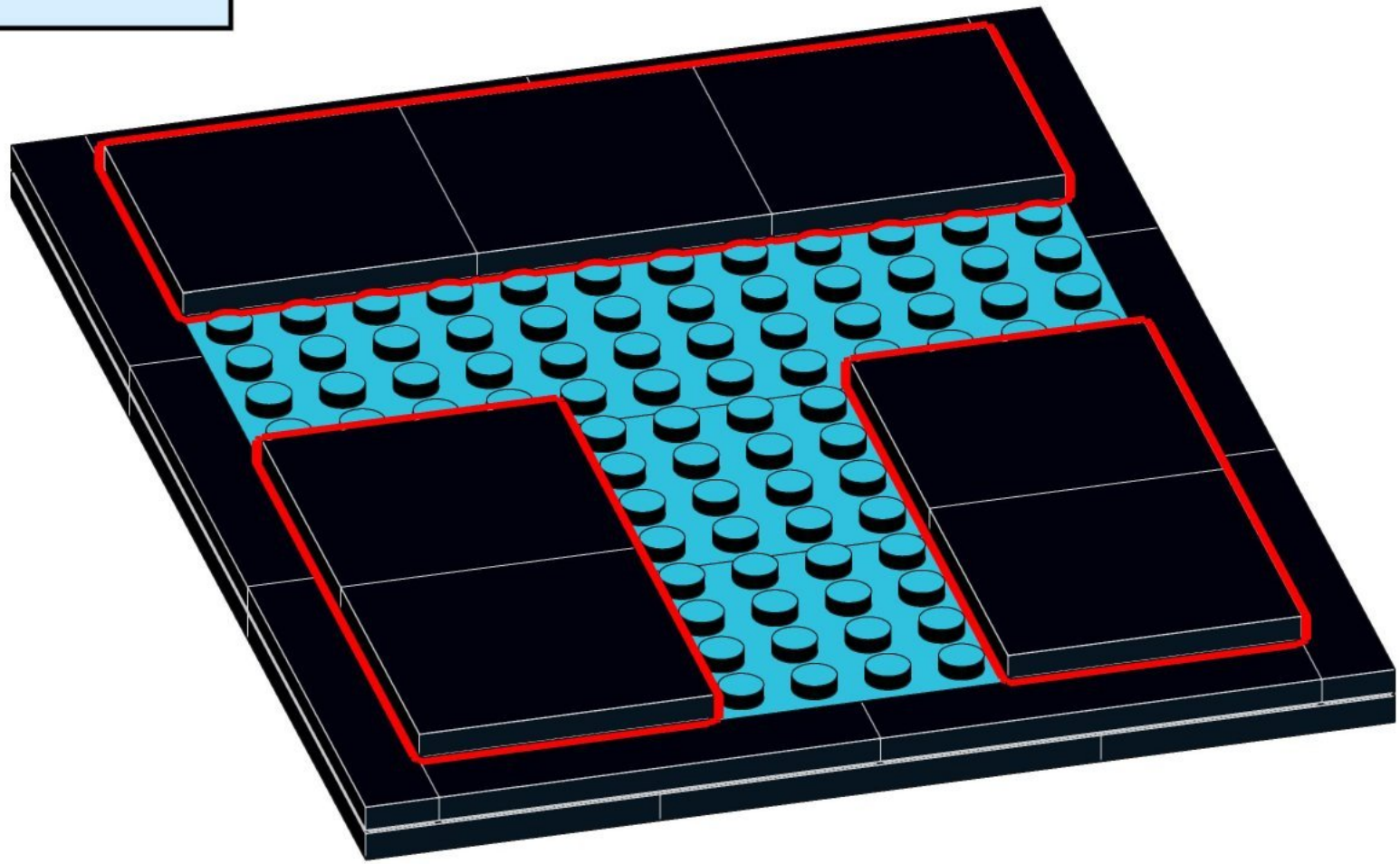
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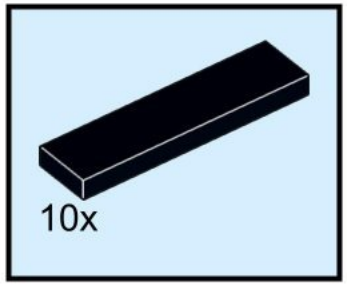


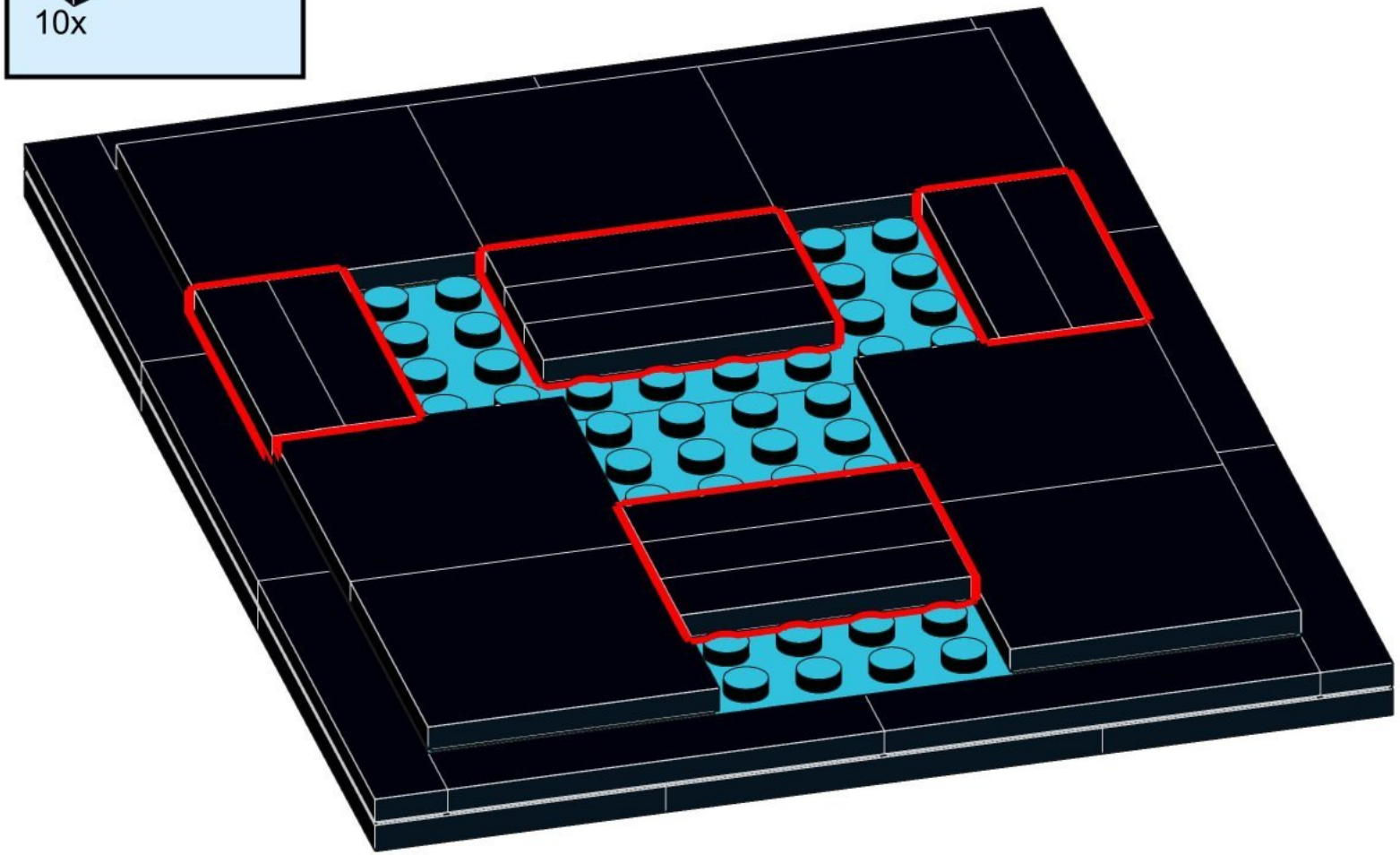
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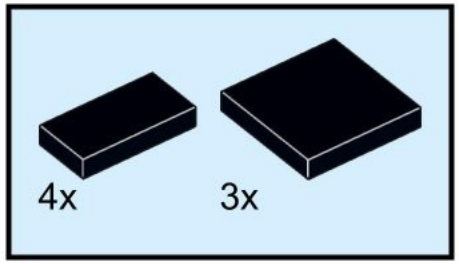


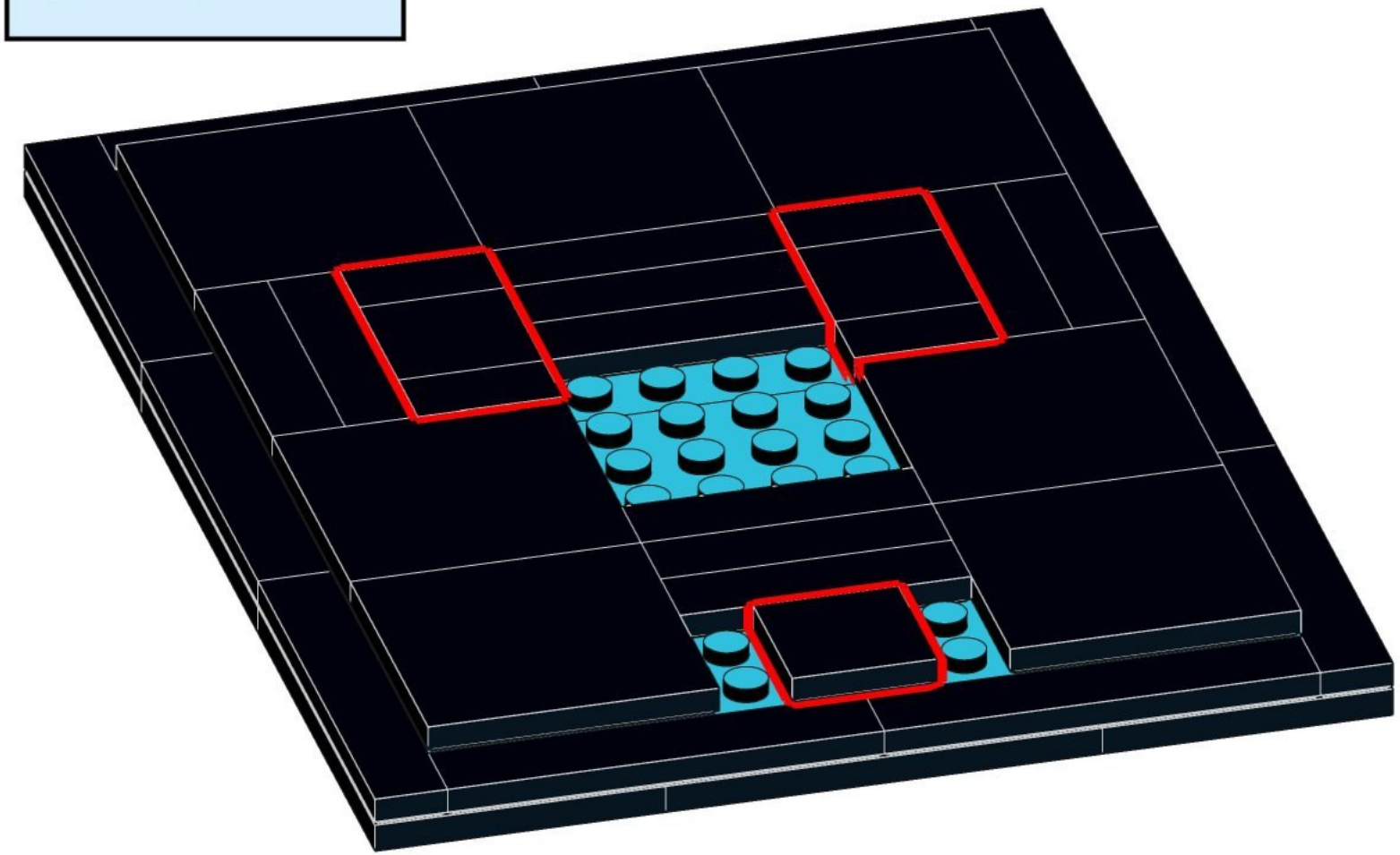
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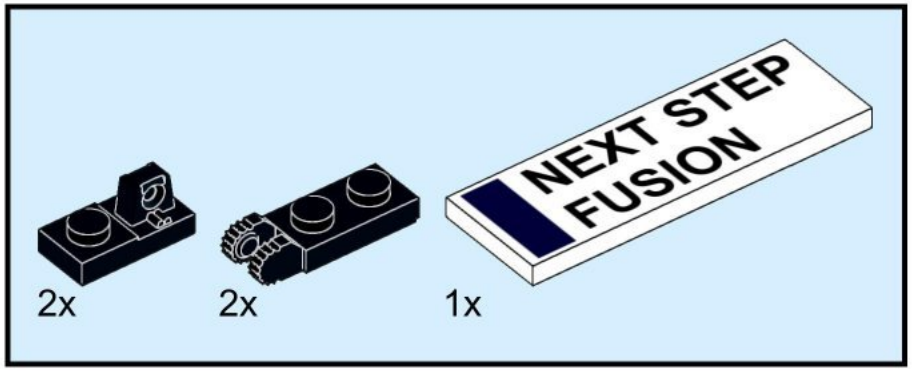


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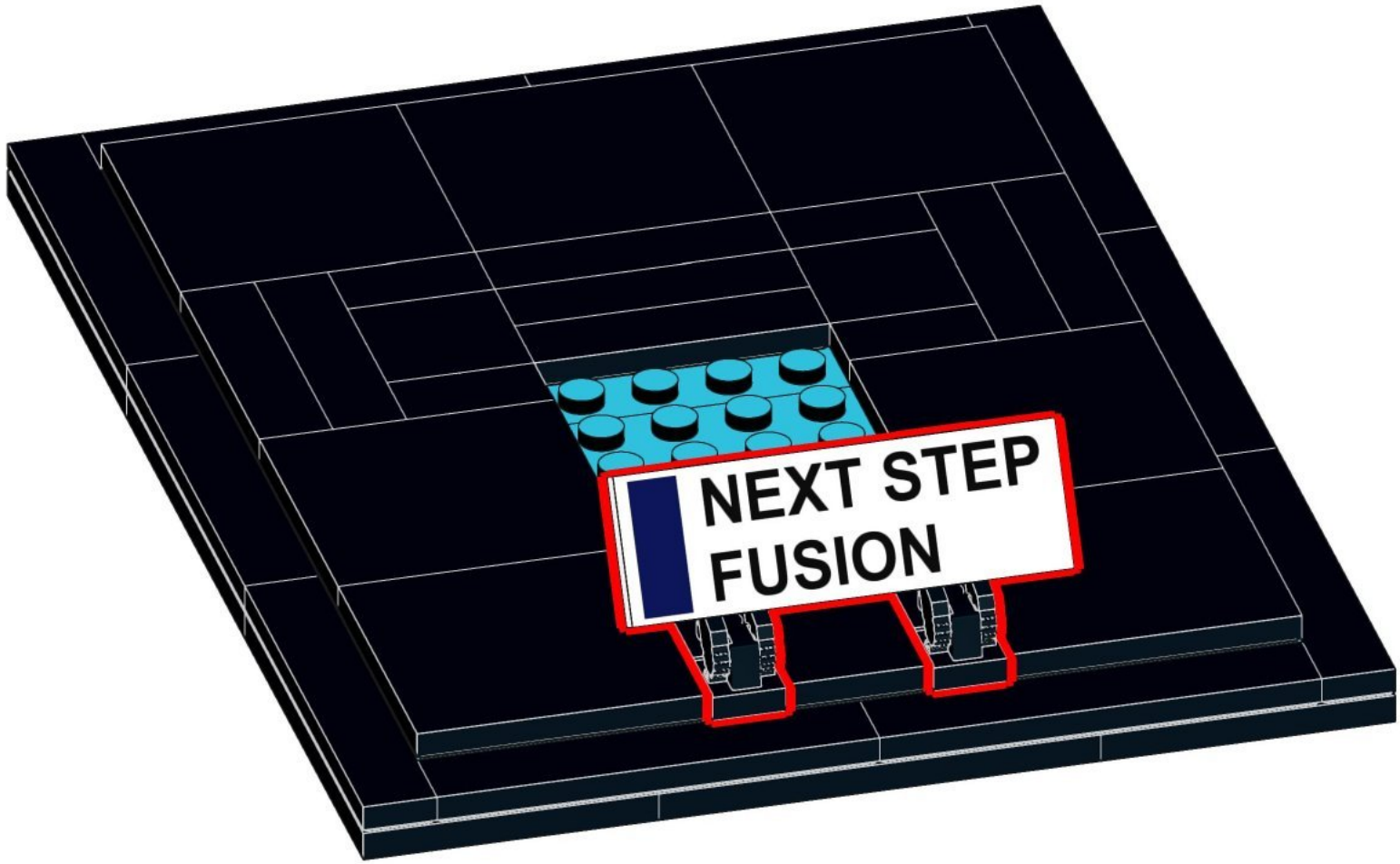




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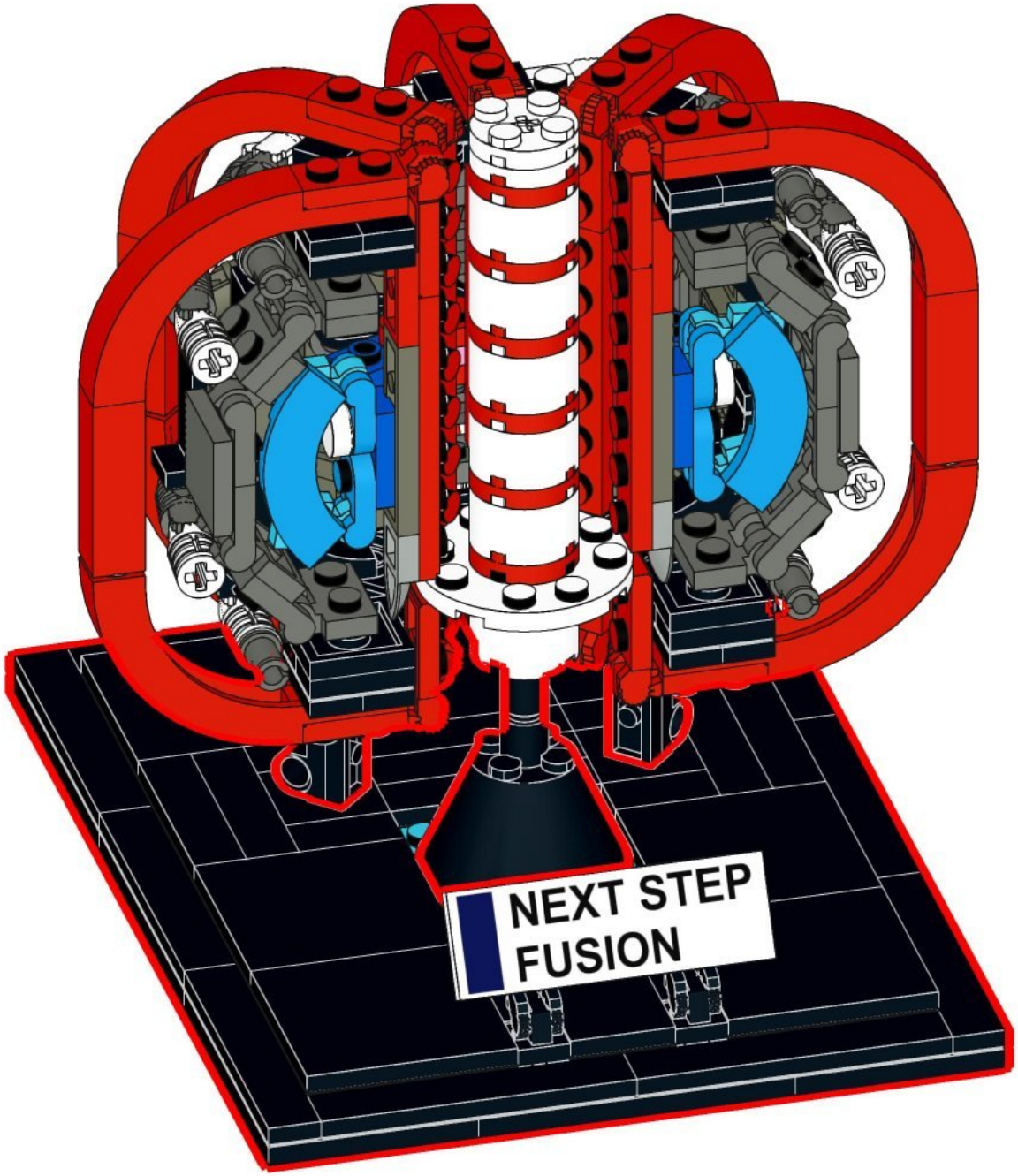


place the sticker on
the white panel

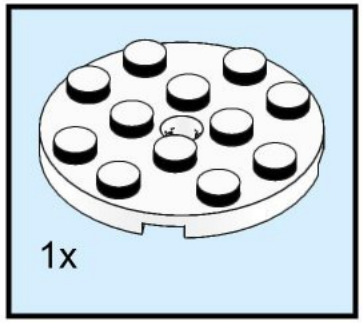


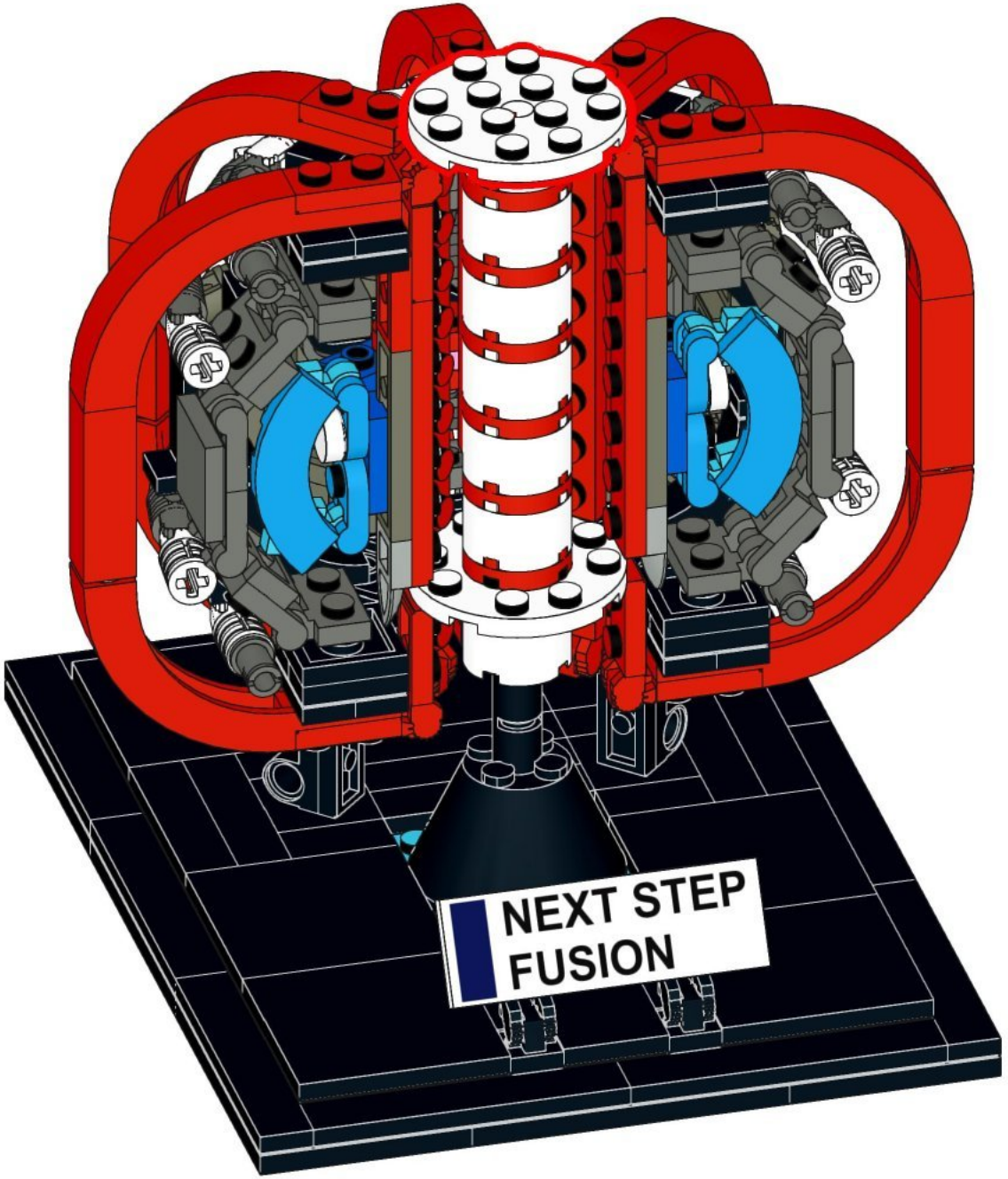
80

Tip: first mount the central solenoid on the stand, then slide the rest of the assembly down onto the thicker section of the solenoid.



81





NEXT STEP
FUSION

Congratulations!
You have built your own tokamak!
You are breathtaking!

Now just enjoy the final result

It was quite a challenging build, but We hope it was also an interesting one.

Real tokamaks are similar to this model in many ways: they are fascinating, complex and truly impressive — both during their construction and operation.

Good luck with your future projects and new beginnings!

— The Next Step Fusion Team