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Artist, Artisan, Aviation Architect

Leonardo da Vinci (1452-1519) is the undisputed master of Renaissance innovation. Adored by his contemporaries for his visionary talent, boundless curiosity and flamboyant character, da Vinci is still rightfully celebrated for his creative ingenuity. He devoted his life to exploring and pushing boundaries in art, human and animal anatomy, physics and engineering, with unparalleled passion, determination and craftsmanship. Painted masterpieces like the *Mona Lisa* and *The Last Supper* originally catapulted him to worldwide fame, but his lifelong fascination with human flight invokes equal awe.

"The noblest pleasure is
the joy of understanding."
– Leonardo da Vinci

Imitating the flight of birds

Although, reportedly, Leonardo da Vinci's aeronautical inventions never came to life during his time, his ideas, designs and studies provided valuable inspiration for the first working aircraft centuries later. The ornithopter is one of his most famous works, but they all rest on the same idea of a single person piloting a mechanical machine with wings. Using their own body strength, the pilot would pull and push on cranks and strings that would make the wings flap up and down.

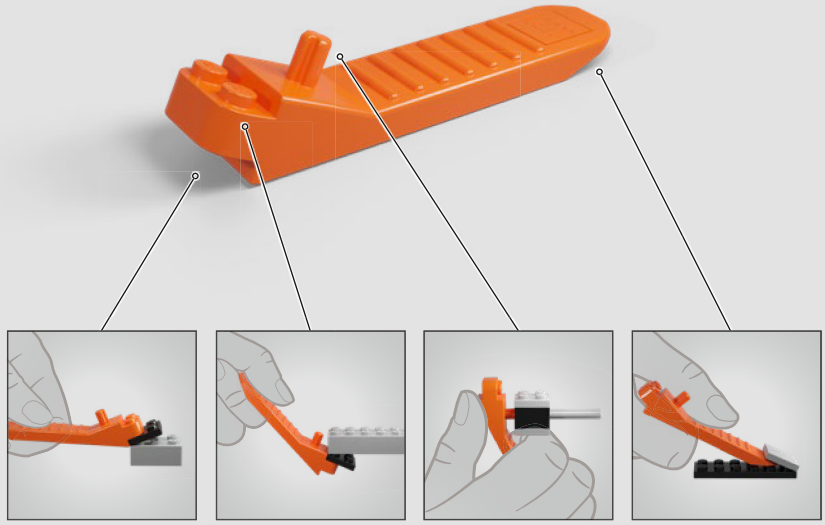
"Simplicity is the ultimate sophistication."

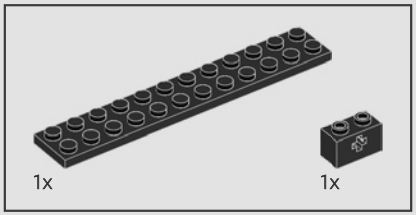
– Leonardo da Vinci

From the LEGO® Design Team

"This was where our concepting started – to make a machine with movable parts that are all linked together and activated when pulling on strings or, in this case, on one single string. It's a seemingly simple model, yet a great LEGO® engineering challenge. The model is designed to look as if it was made from wood, linen and rope. It has a brick-built skeleton for the tail and wings, and textile wings with a printed pattern. Incorporating the textile string as the main part of the wing-flapping mechanism was a great challenge! The mechanical parts of the model are left exposed to celebrate the functional parts and Leonardo's vision and to let our own interpretation of the original design take flight."

Antica Bracanov
LEGO® Senior Designer





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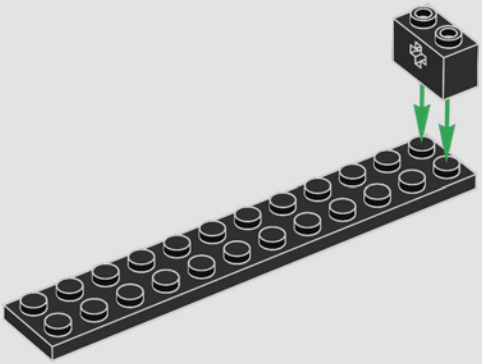

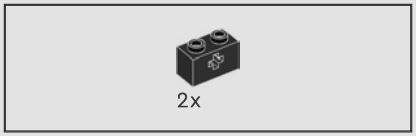

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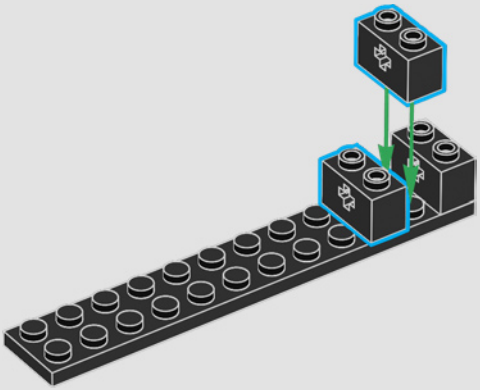

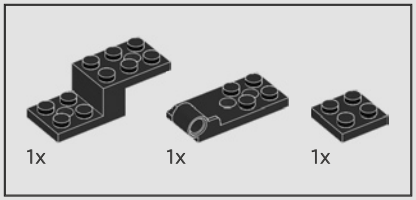

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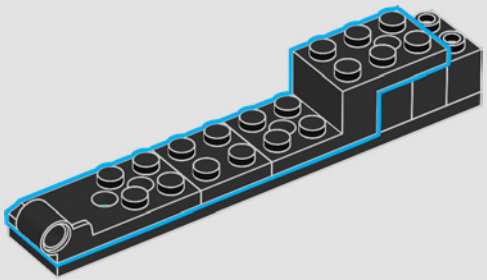

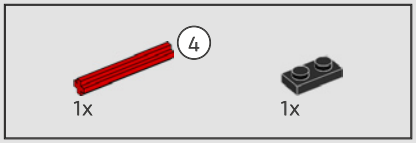

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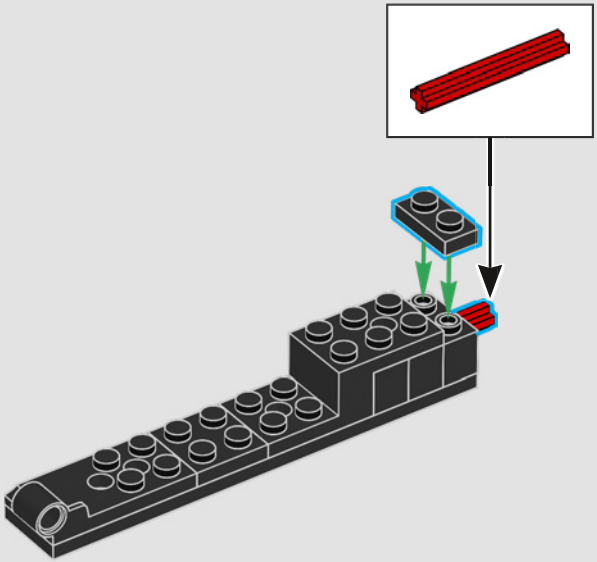

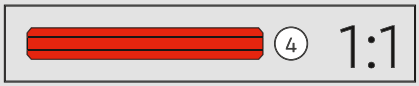

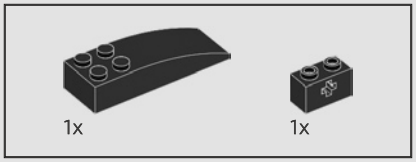

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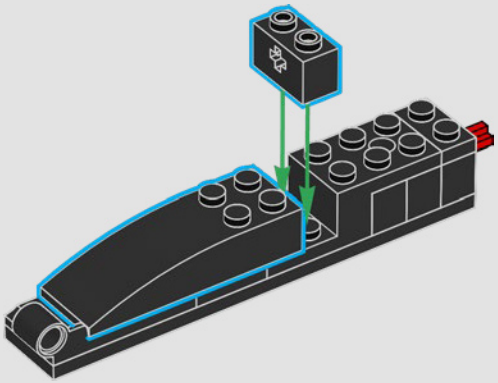

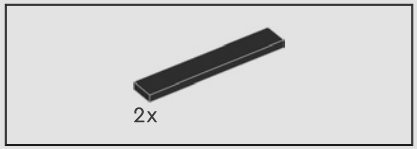

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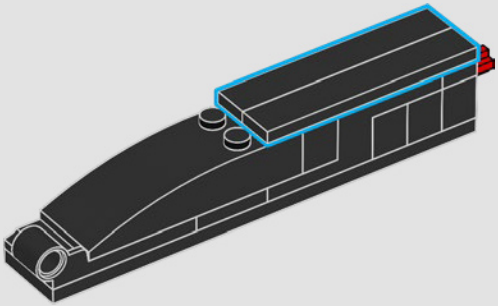

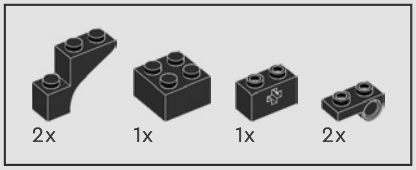

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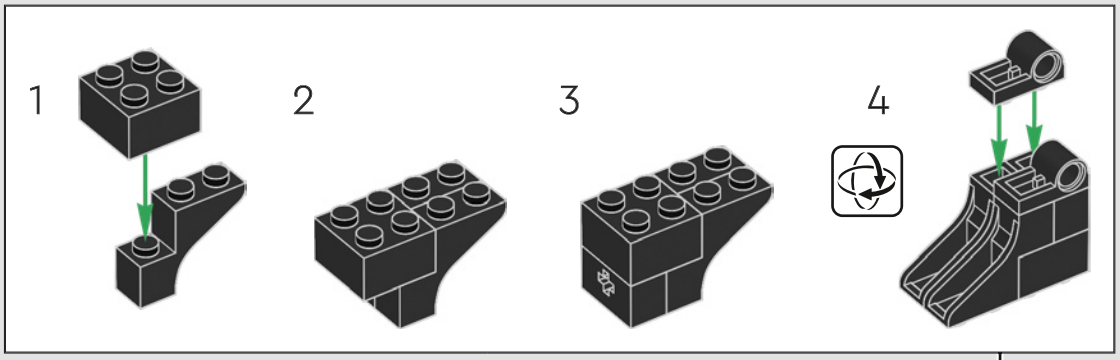

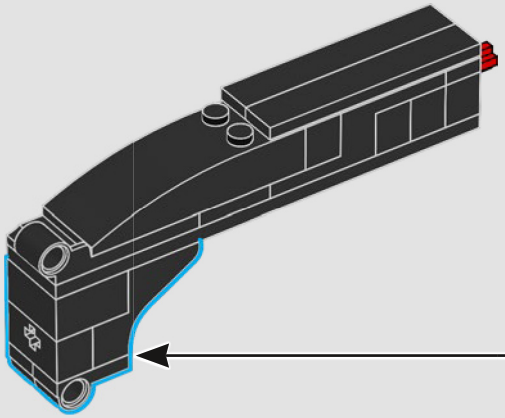

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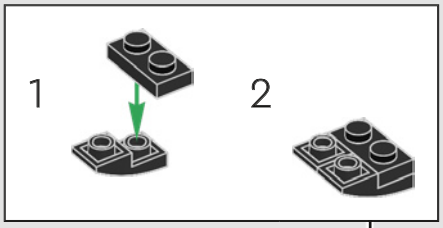

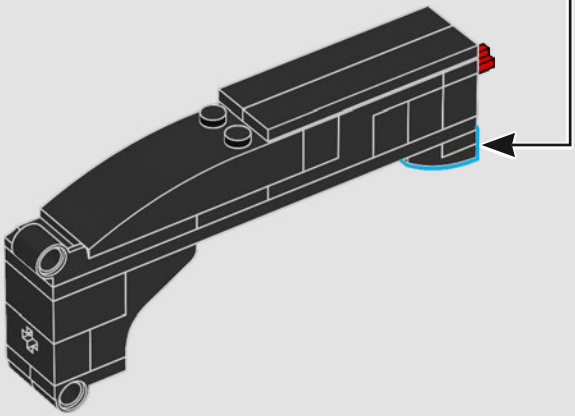

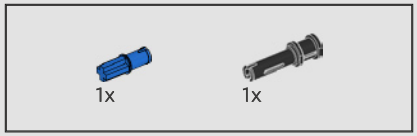

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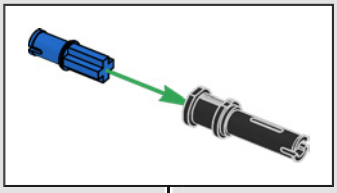

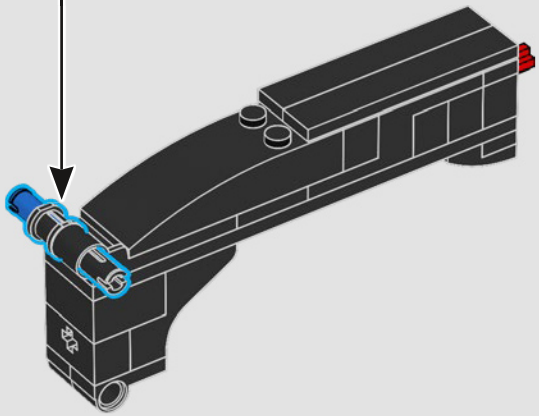

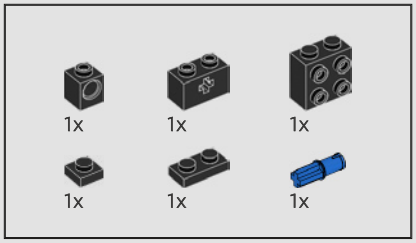

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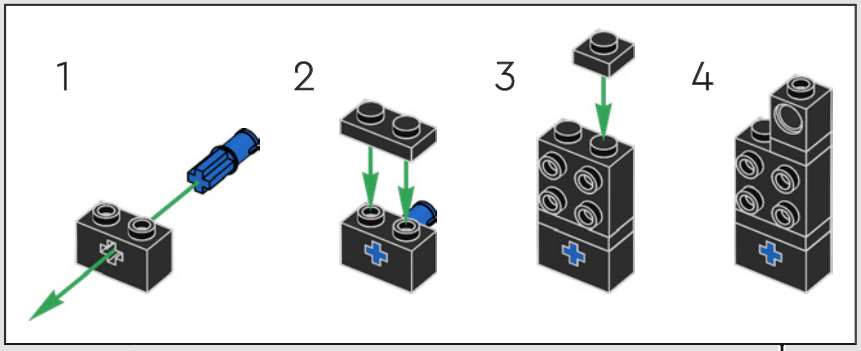

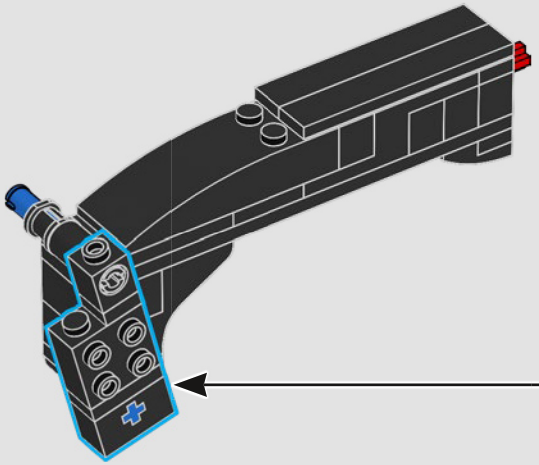

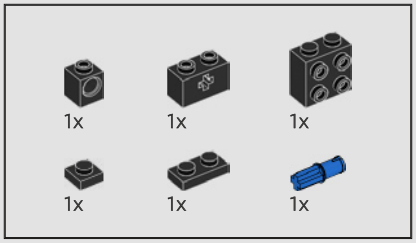

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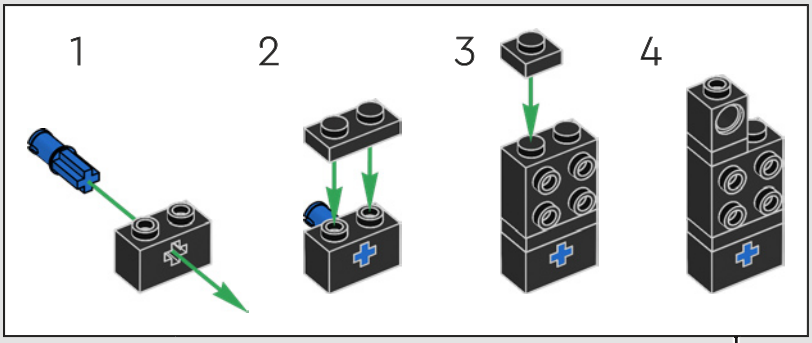
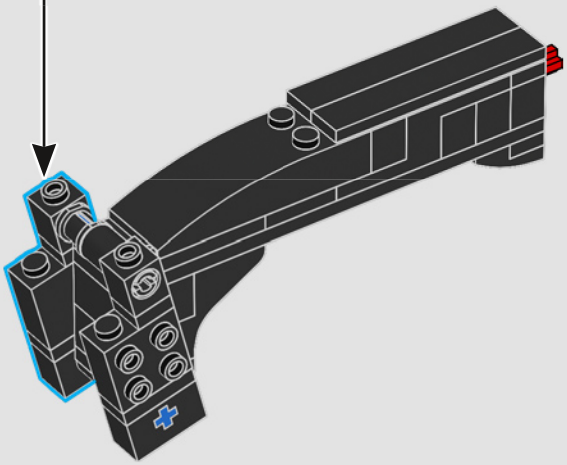
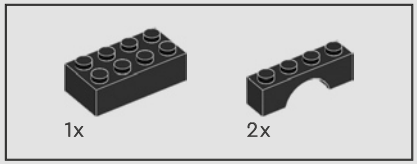




One of da Vinci's machines, known as *Il Grande Nibbio*, was inspired by and named after a bird from the *Accipitridae* family: the kite.



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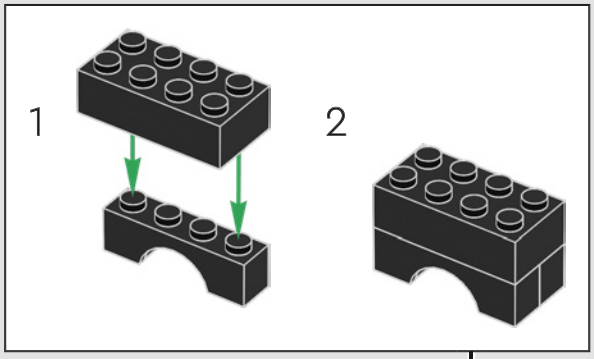

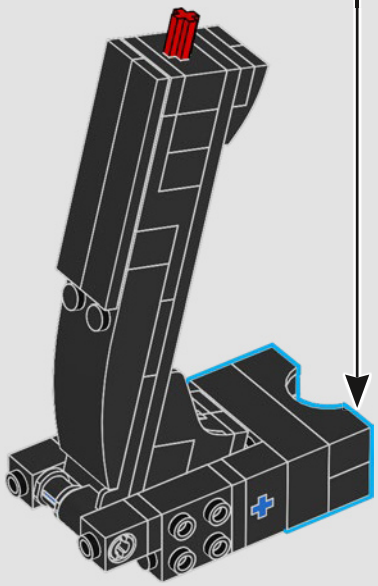

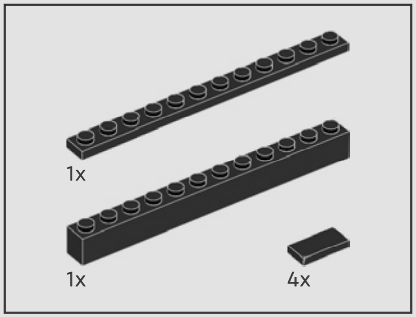

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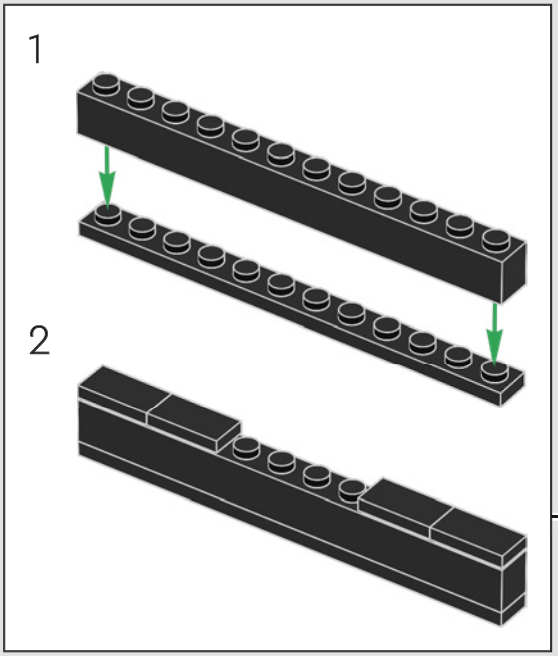

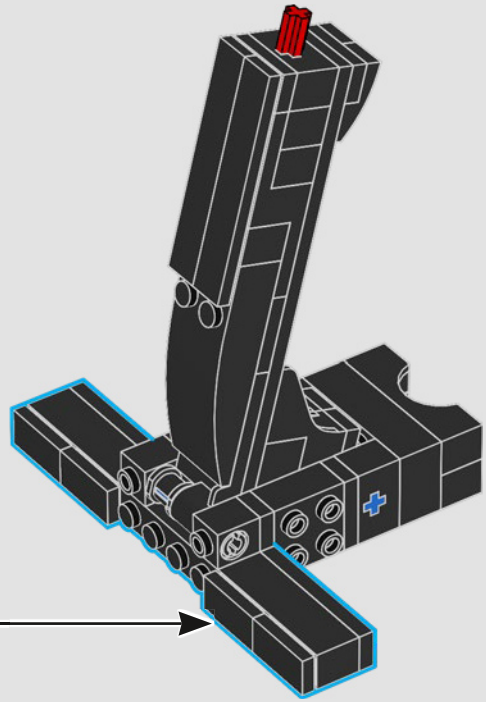

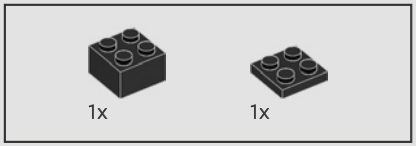

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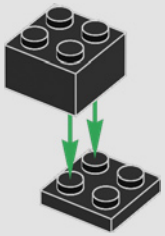

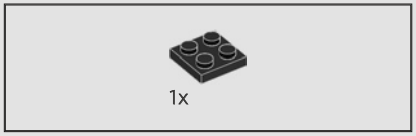

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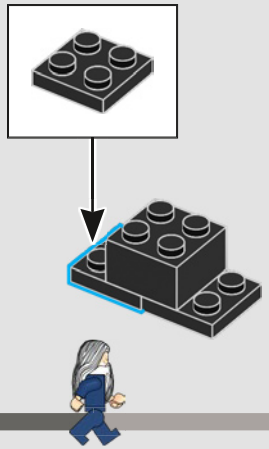

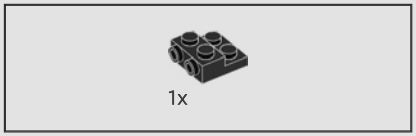

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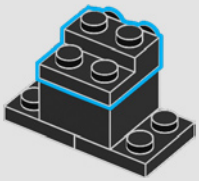

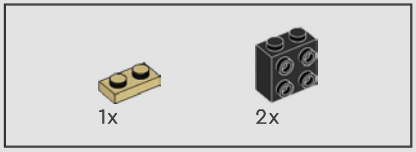

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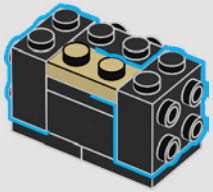

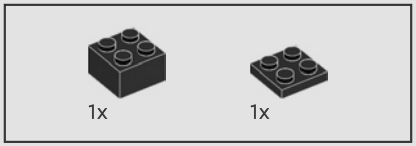
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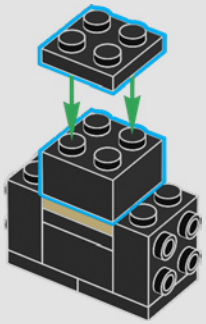

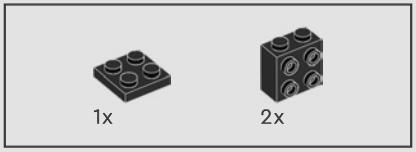
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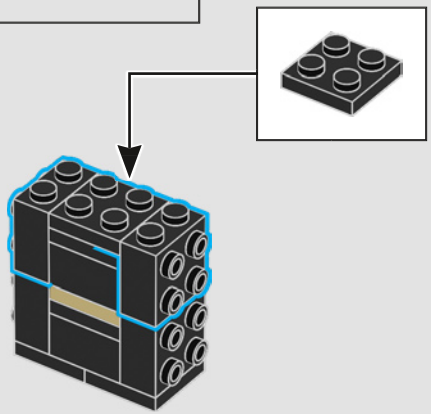

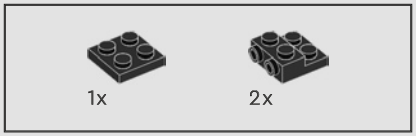
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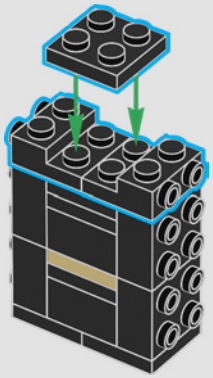
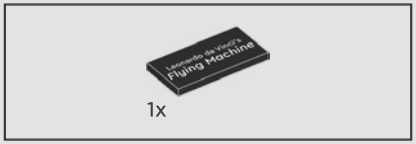


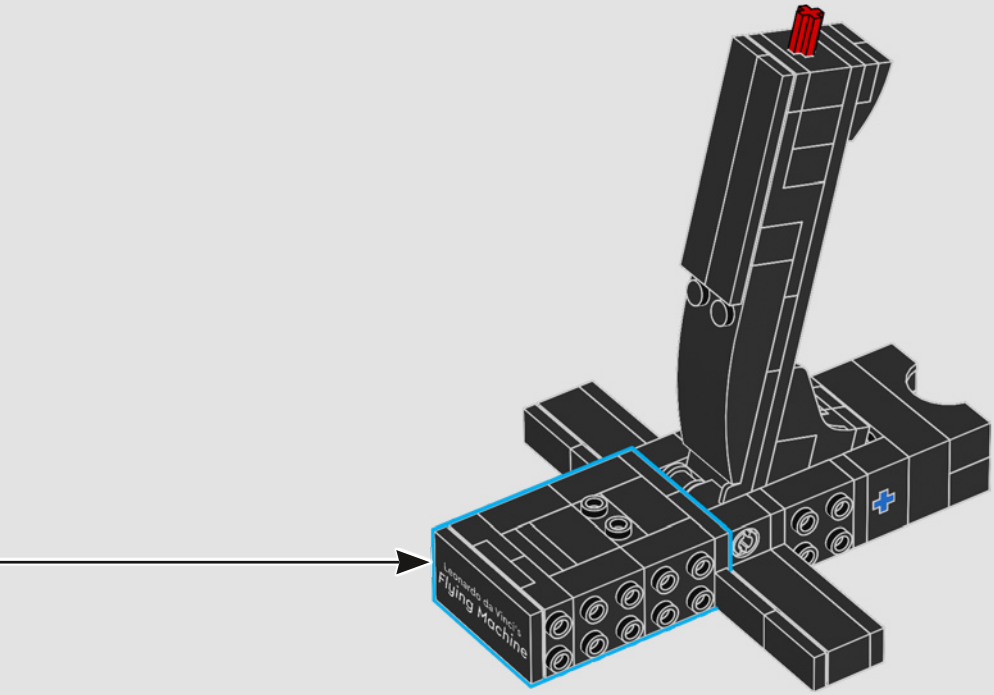

Leonardo da Vinci's
Flying Machine
1x

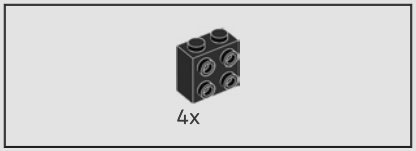
21


Leonardo da Vinci's
Flying Machine

Da Vinci famously wrote in his notebooks in backwards handwriting.
It could only be read correctly when reflected in a mirror.

22





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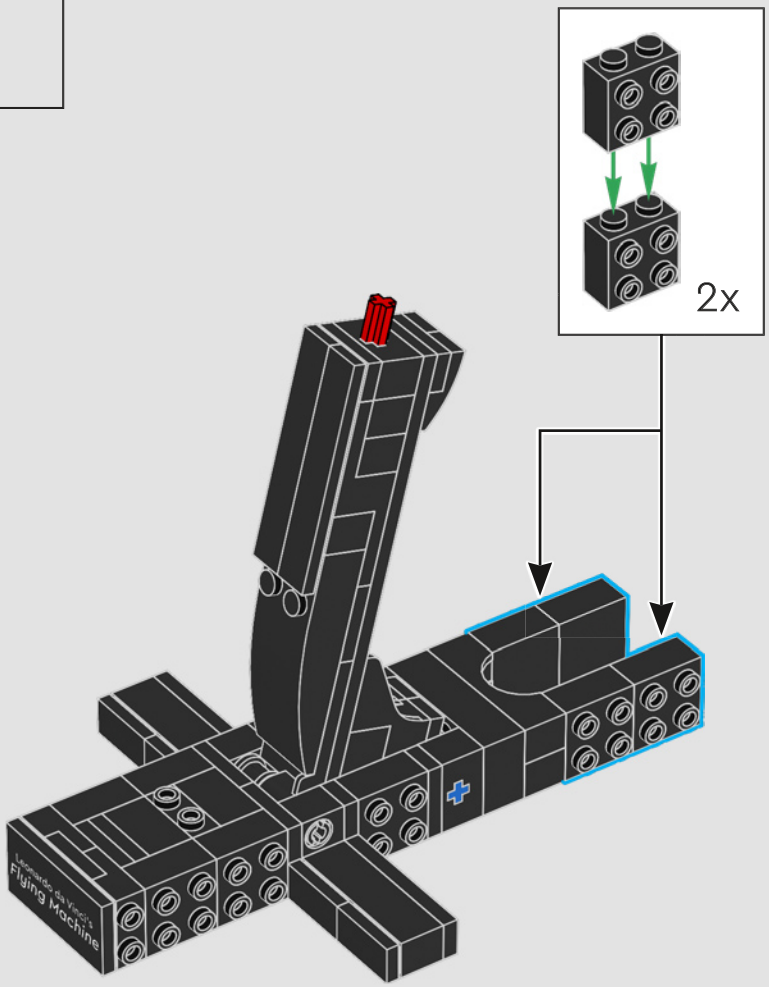

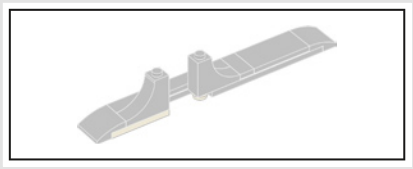

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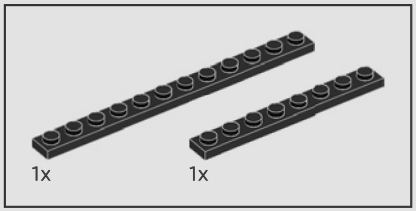

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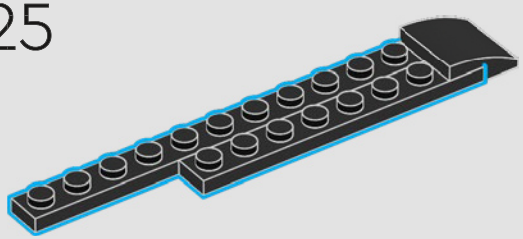

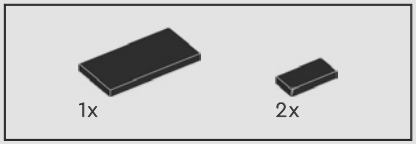

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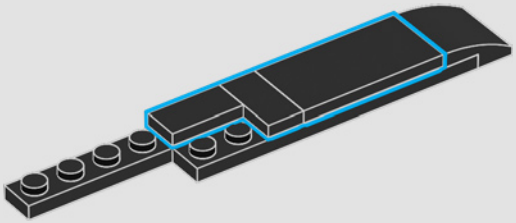

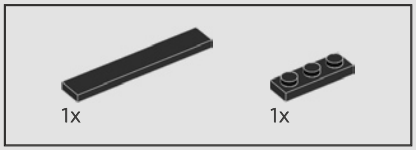

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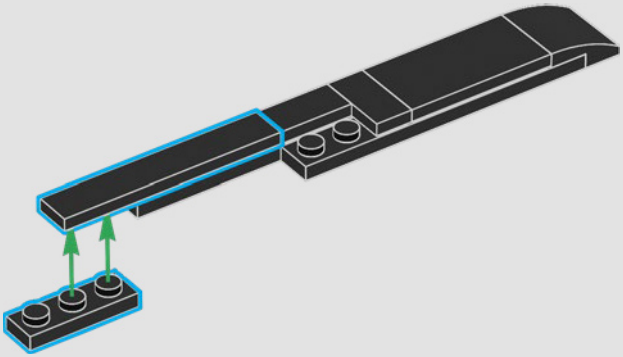

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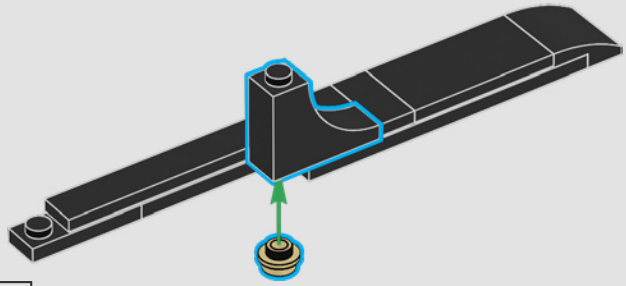

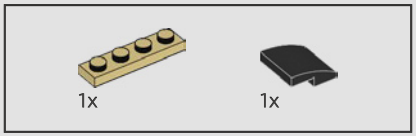

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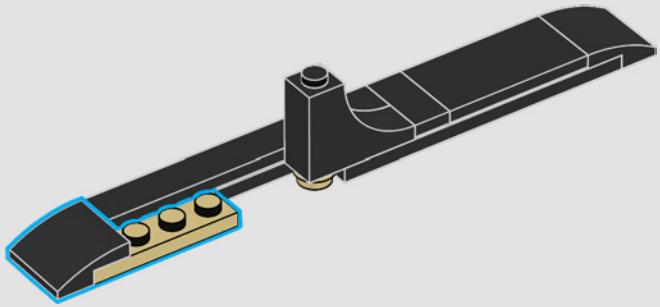

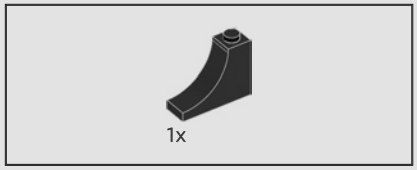

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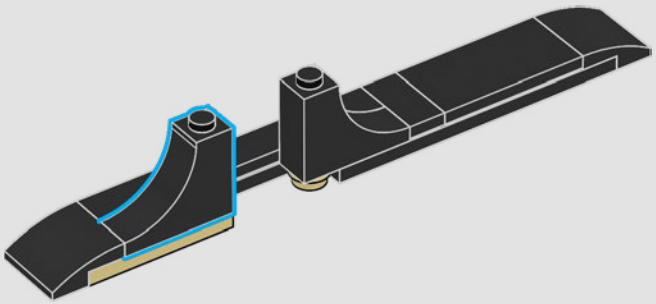

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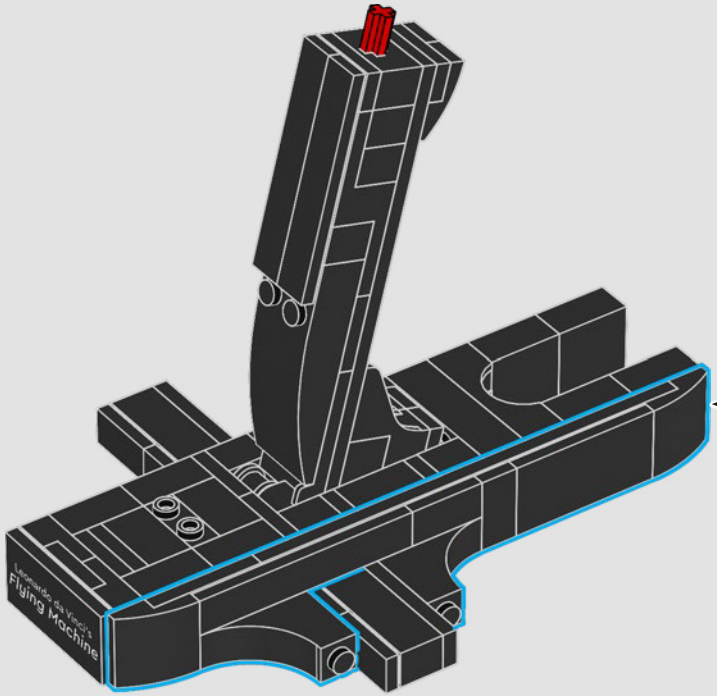

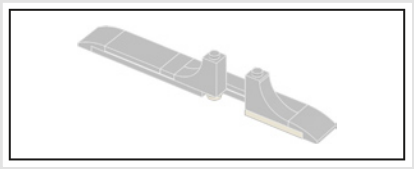

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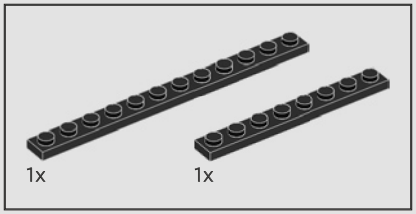

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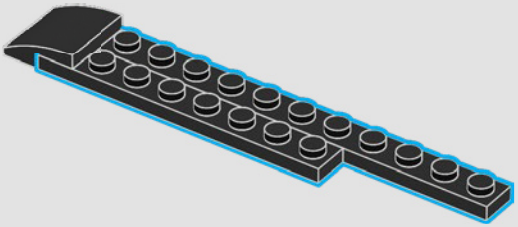

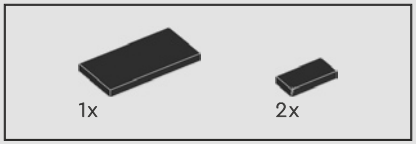

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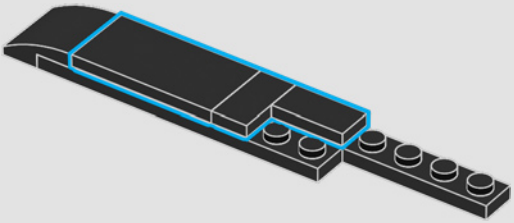

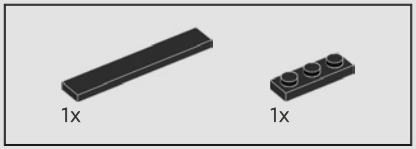

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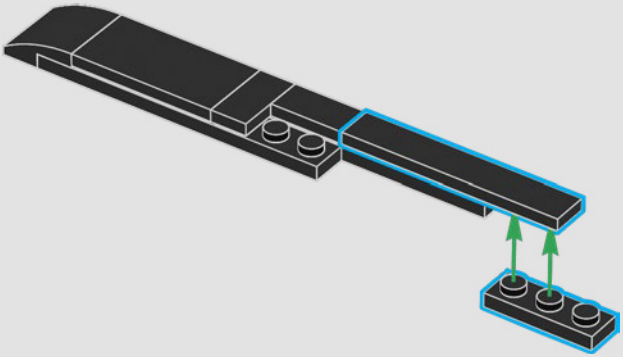

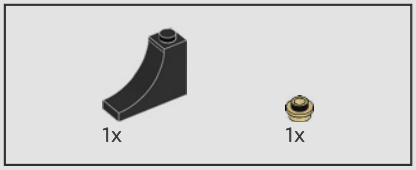

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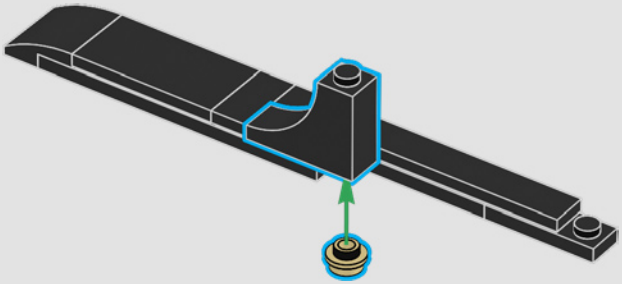

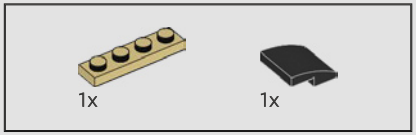

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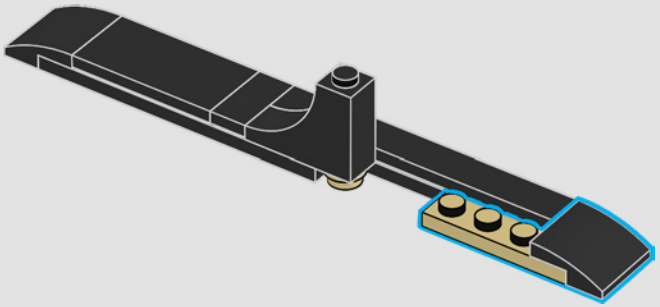

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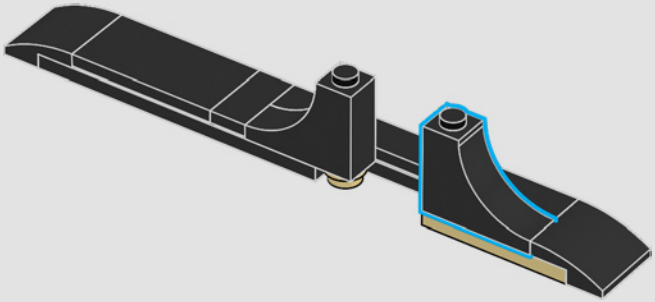

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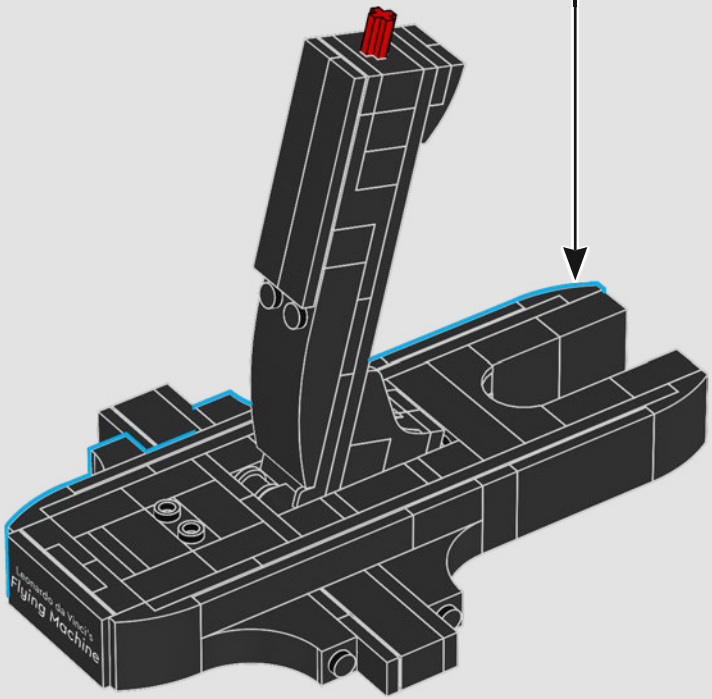

Leonardo da Vinci is known to have produced more than 35,000 words and 500 sketches on flight and flying machines!

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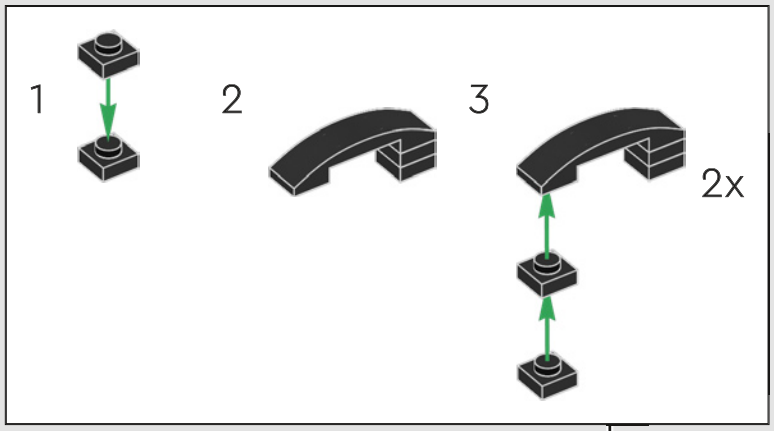

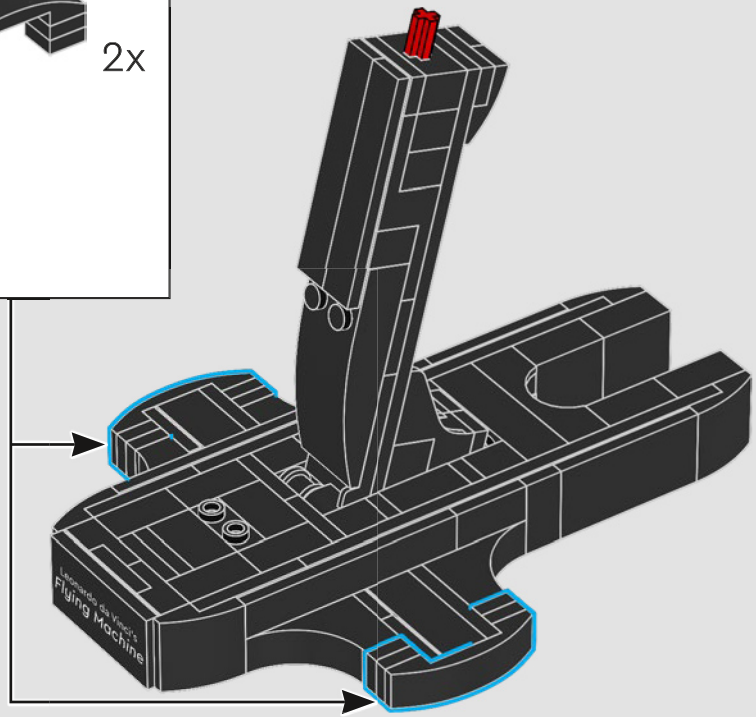

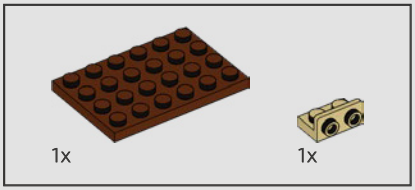

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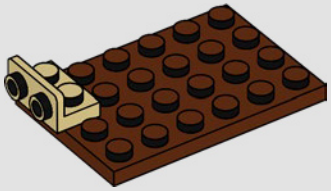

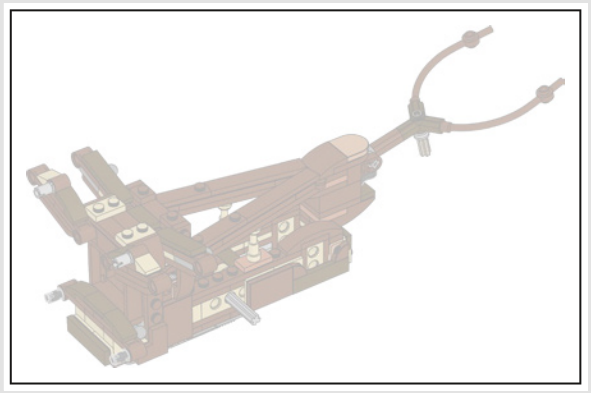

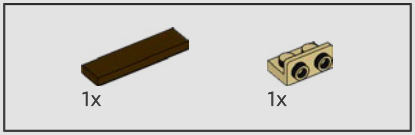

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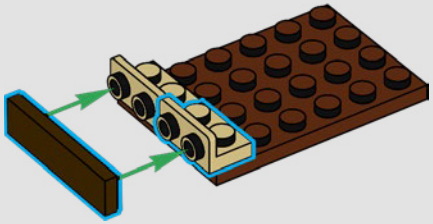

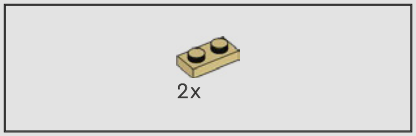

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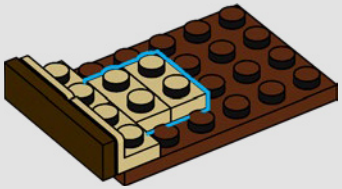

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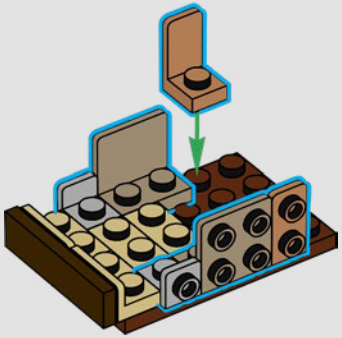

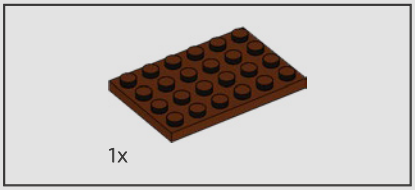

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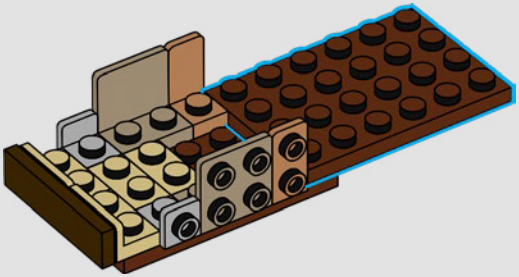

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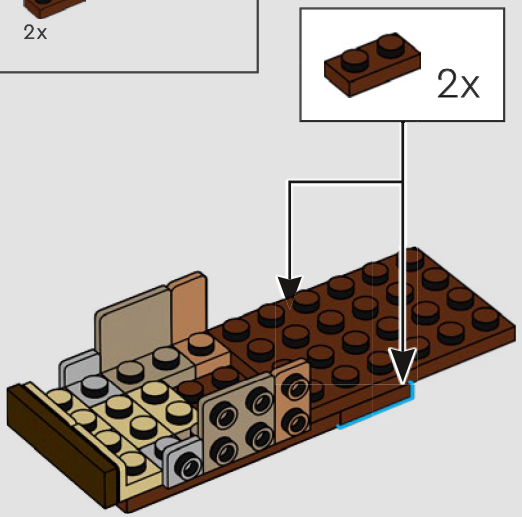

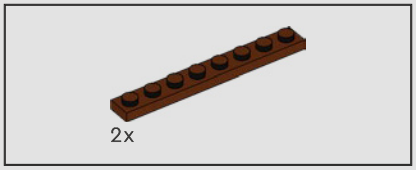

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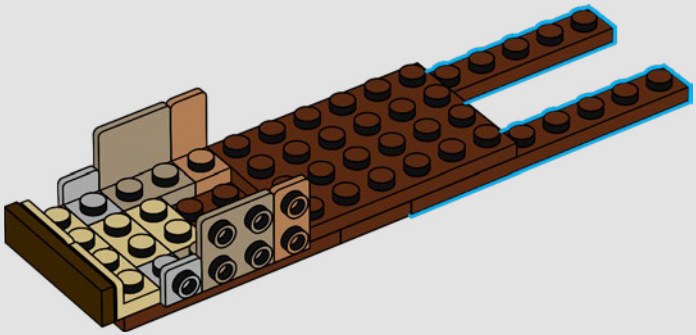

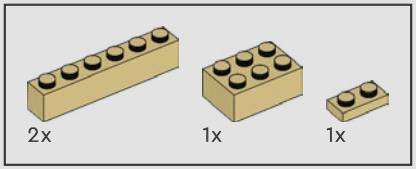

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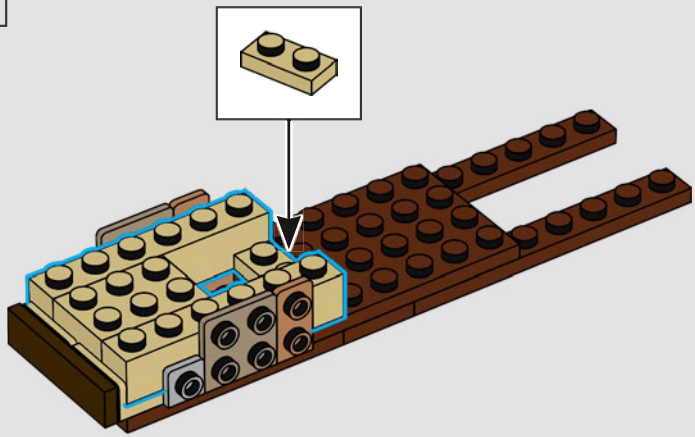

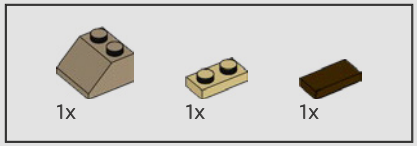

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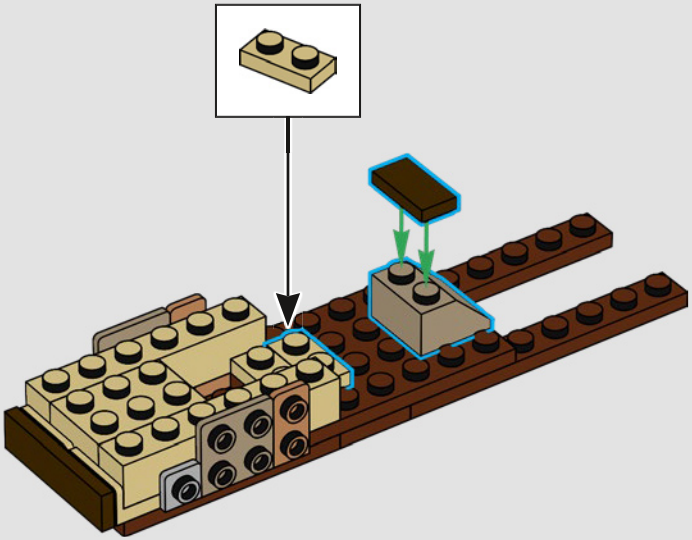

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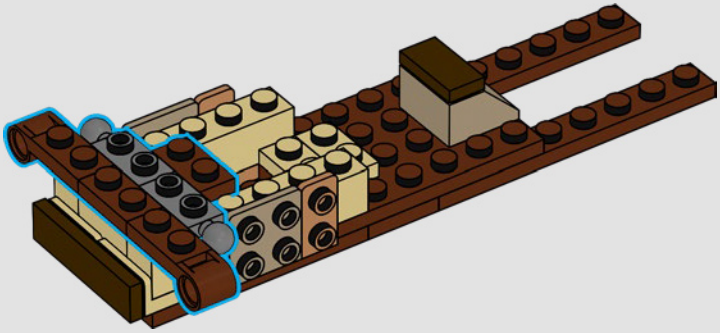

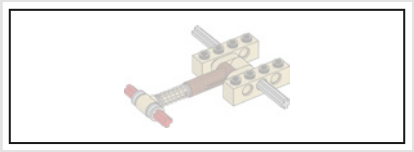

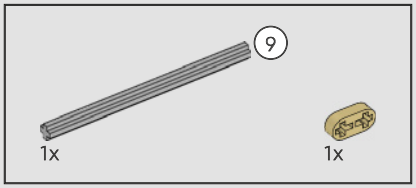

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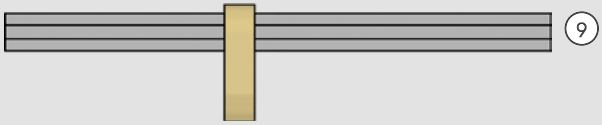

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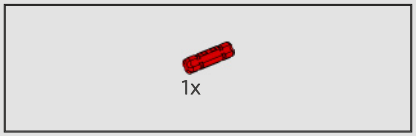

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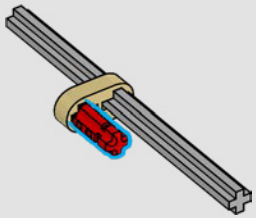

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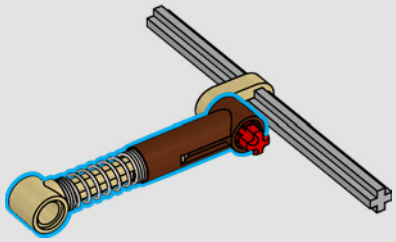

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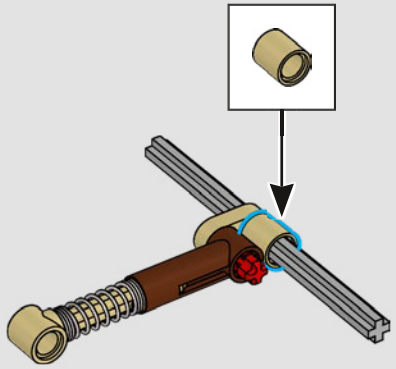

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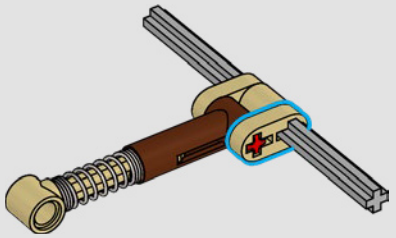

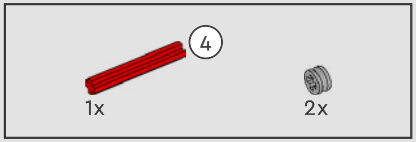

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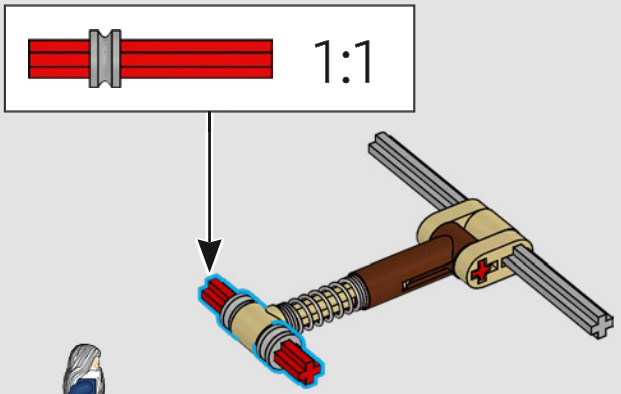

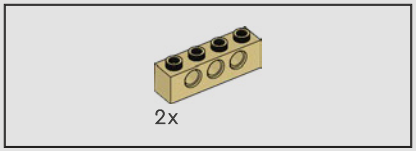

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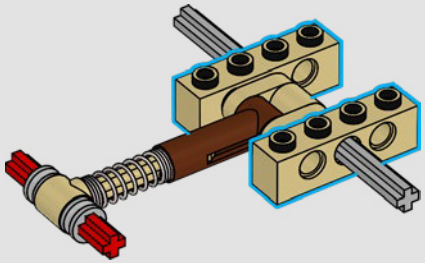

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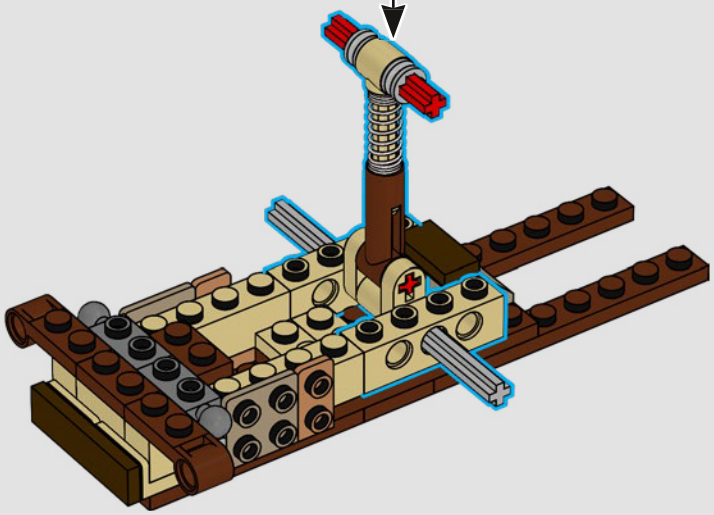

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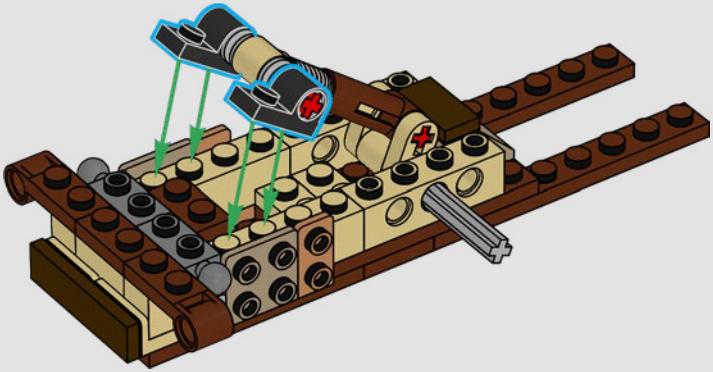

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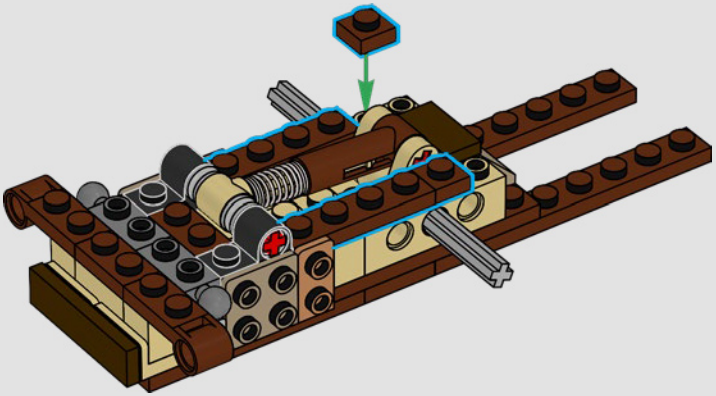

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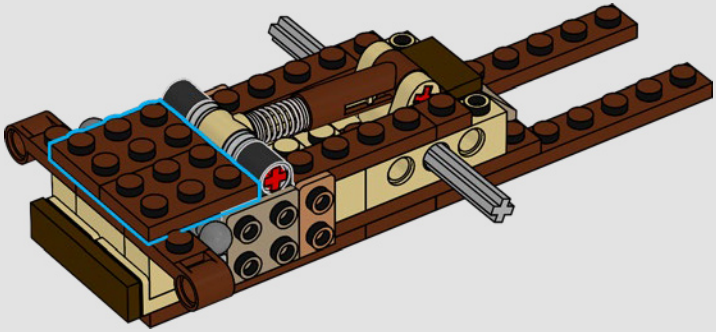

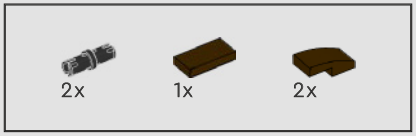

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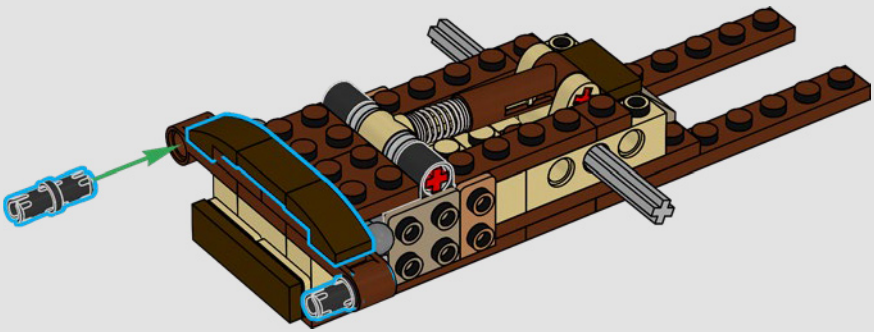

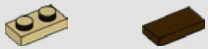

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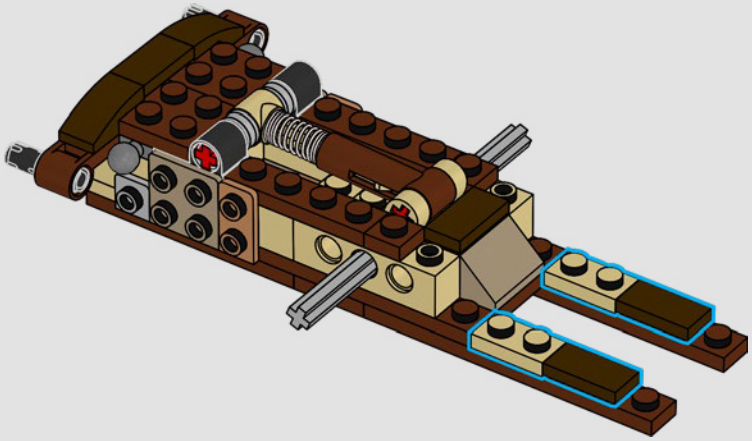

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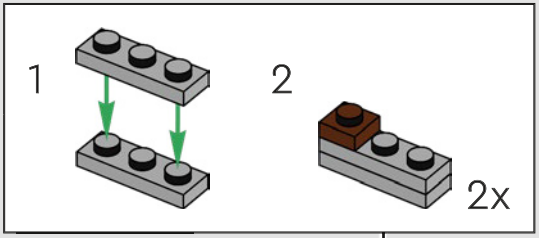

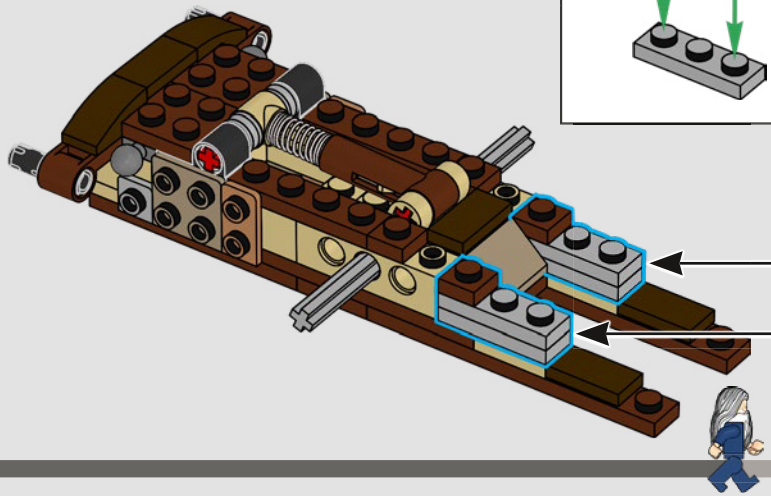

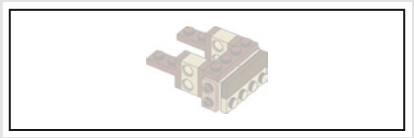

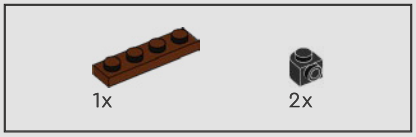

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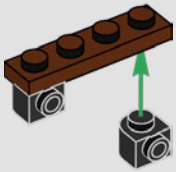

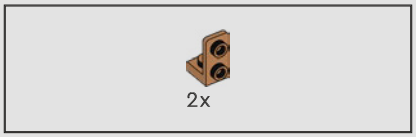

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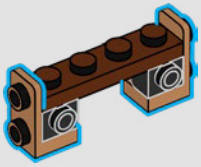

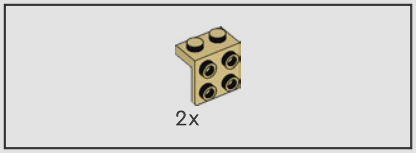

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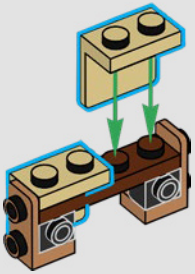

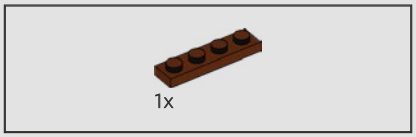

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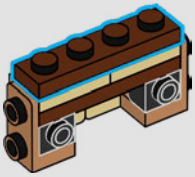

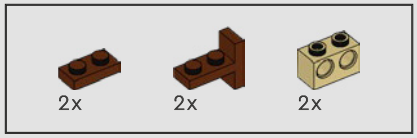

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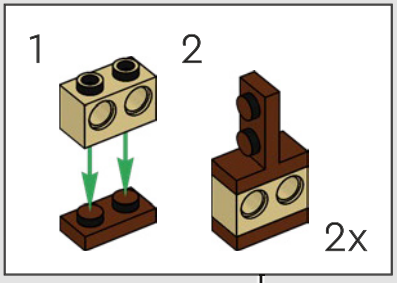

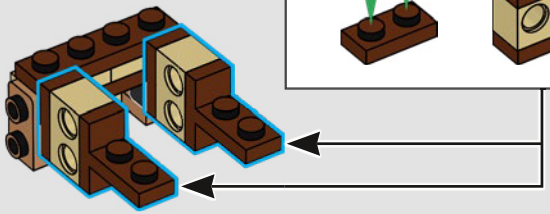

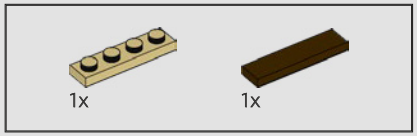

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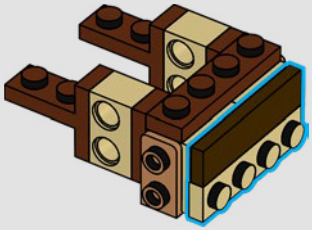

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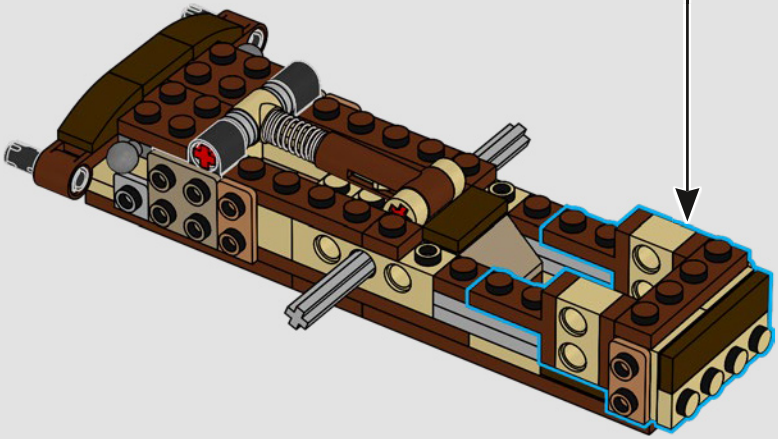

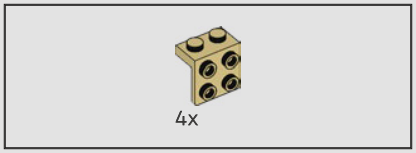

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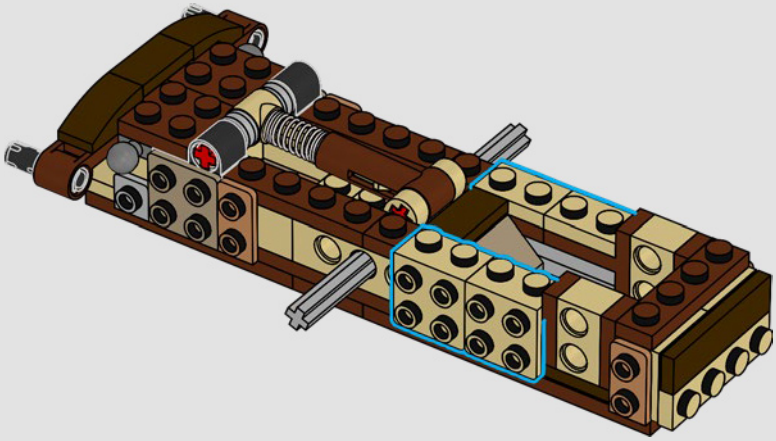

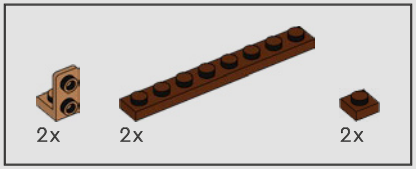

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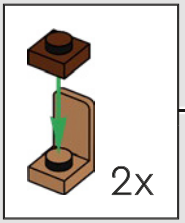

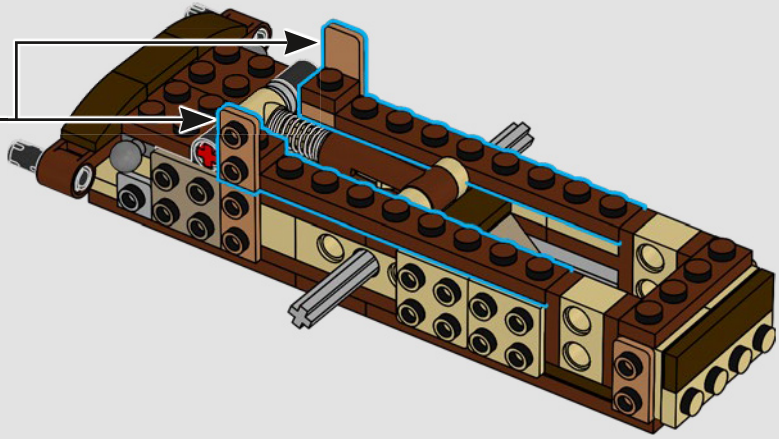

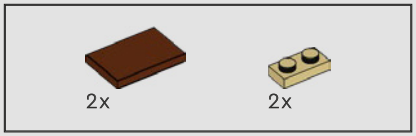

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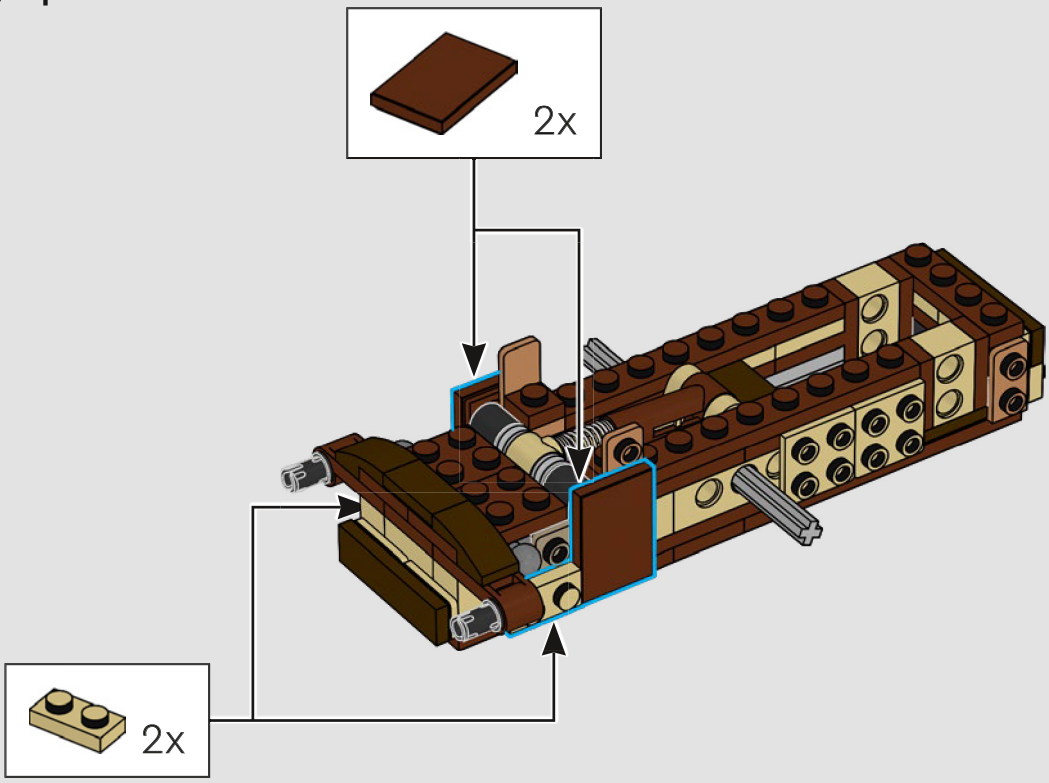

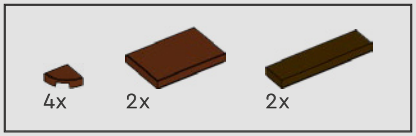

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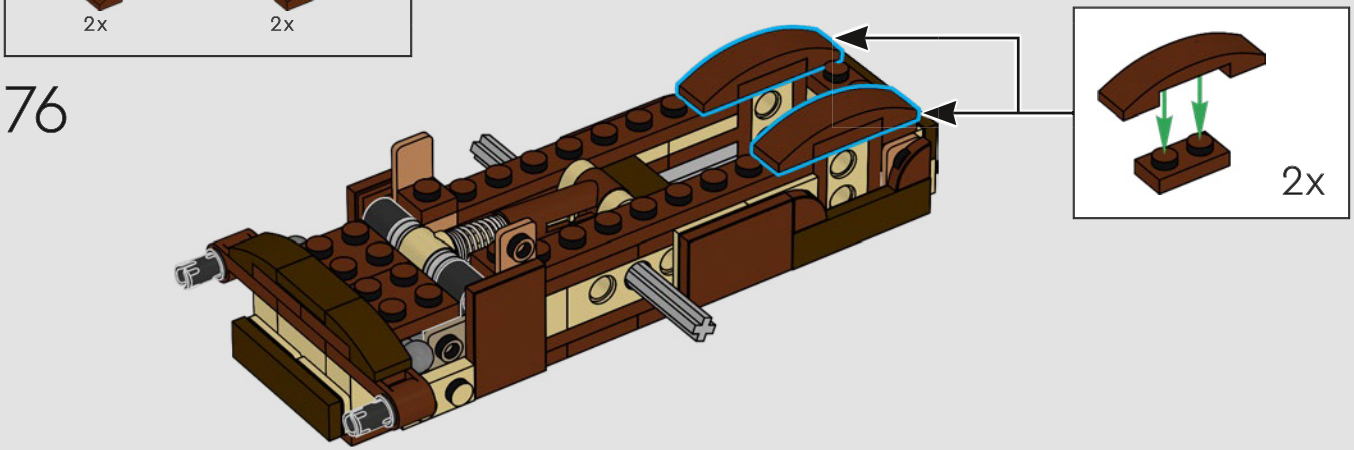

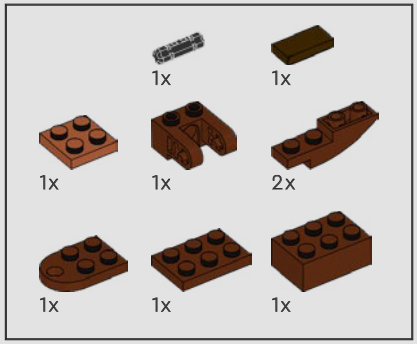

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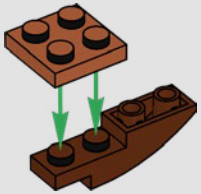

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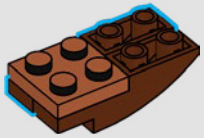

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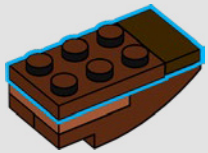

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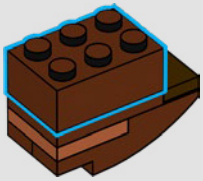
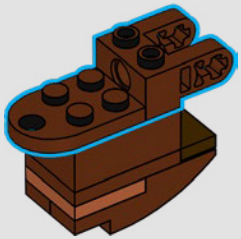


Leonardo's ornithopter, built for and test-piloted from a low altitude by a friend of the artist, wasn't entirely successful. The machine crashed, and da Vinci's friend broke a leg.

5



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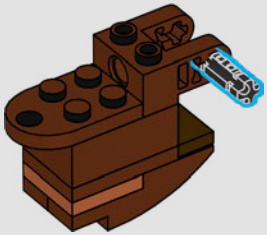

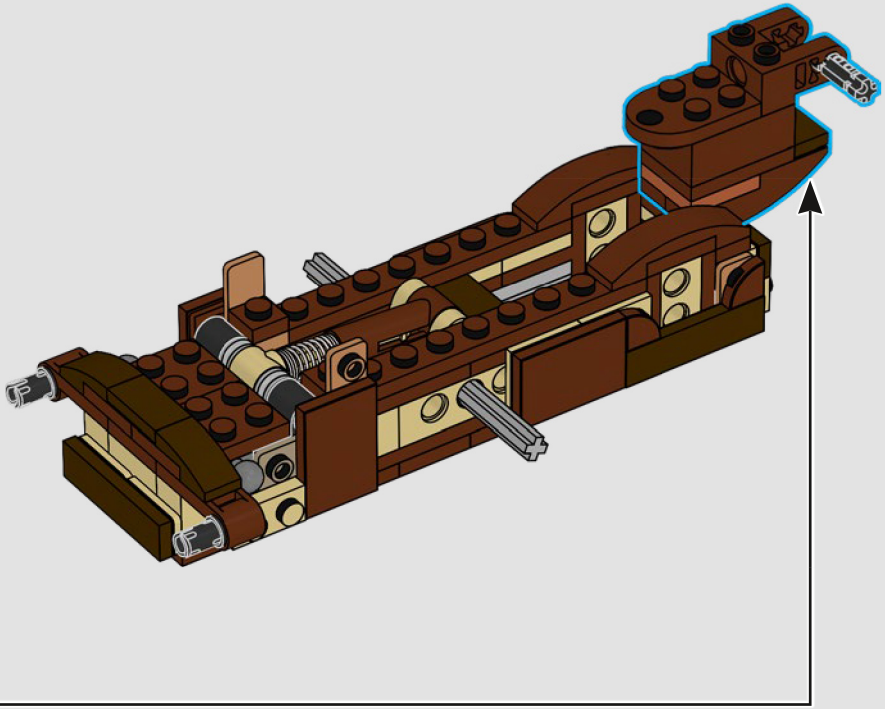

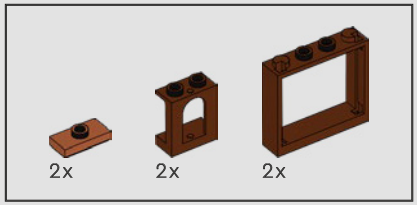

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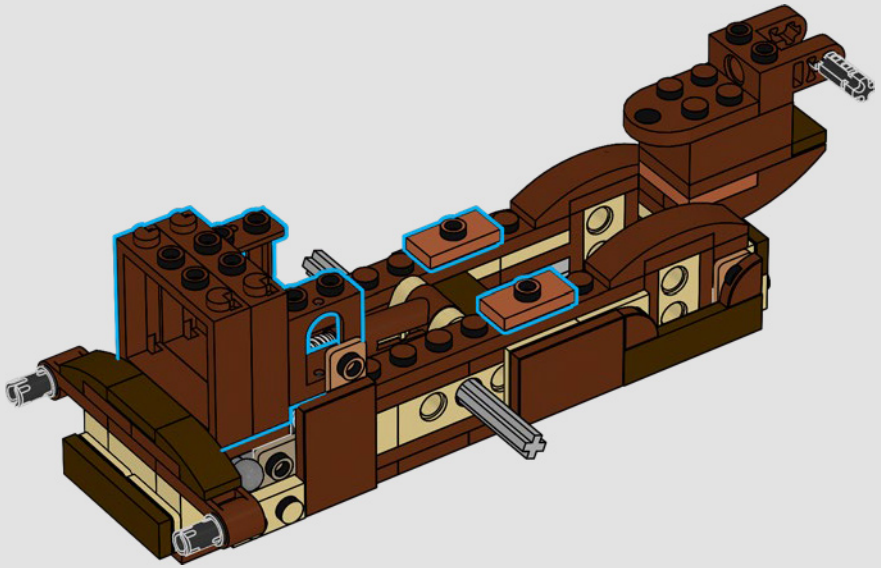

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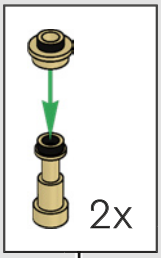

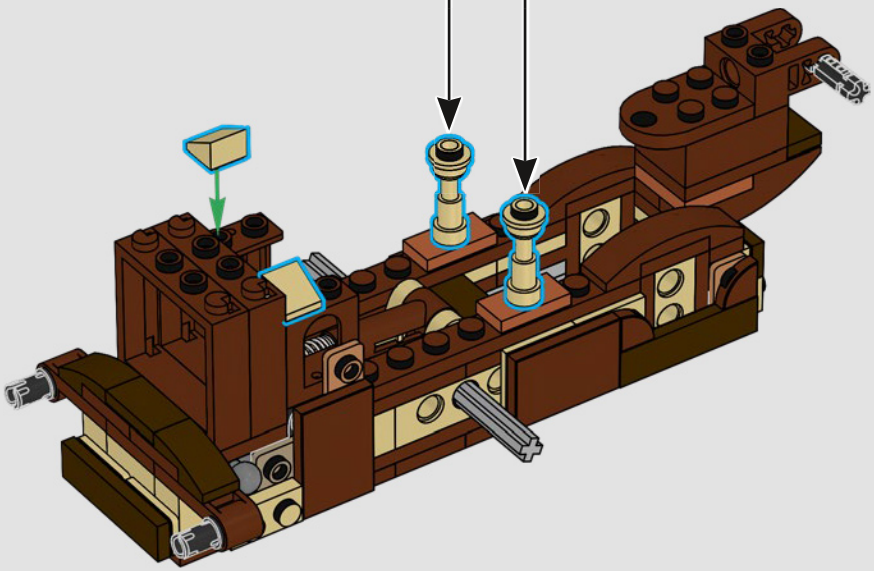

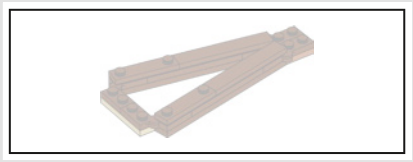

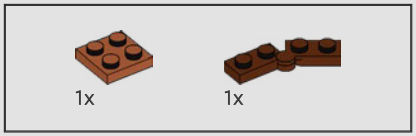

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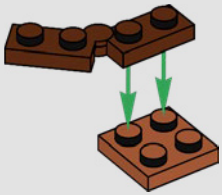

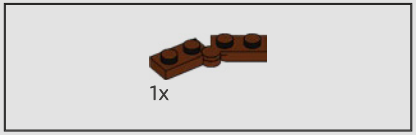

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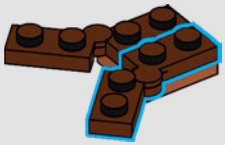

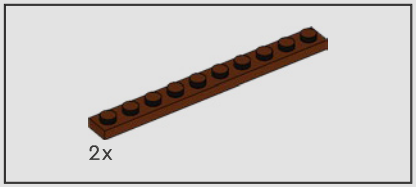

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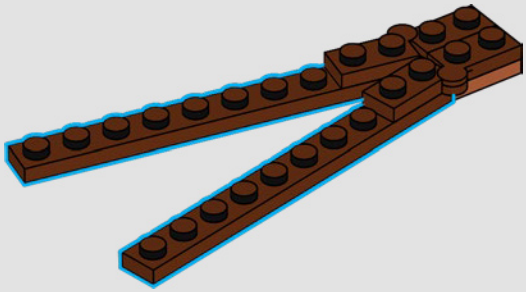

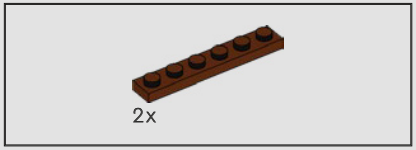

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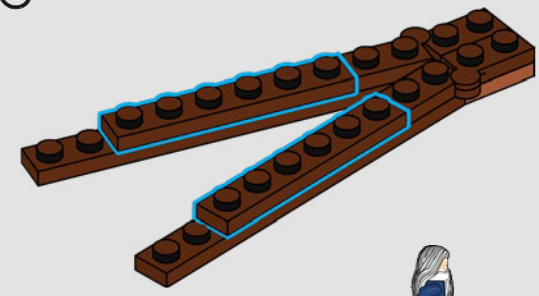

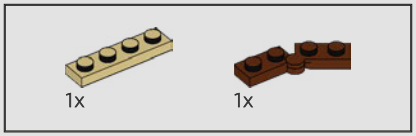

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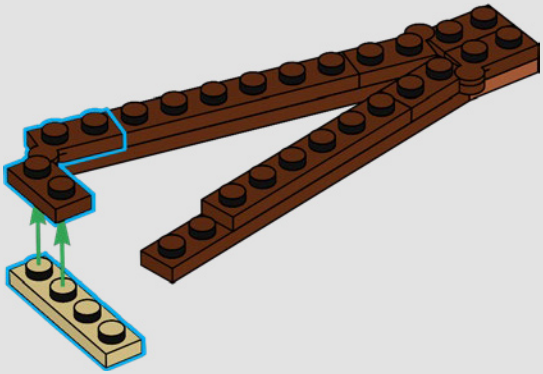

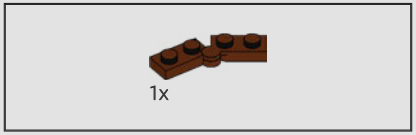

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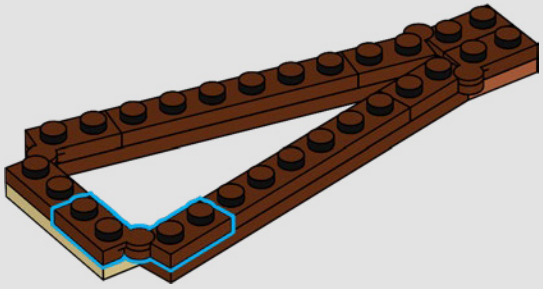

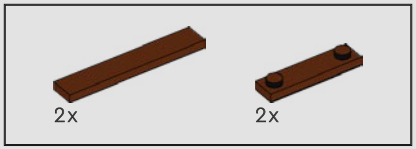

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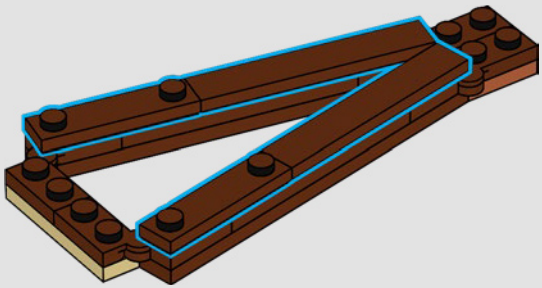

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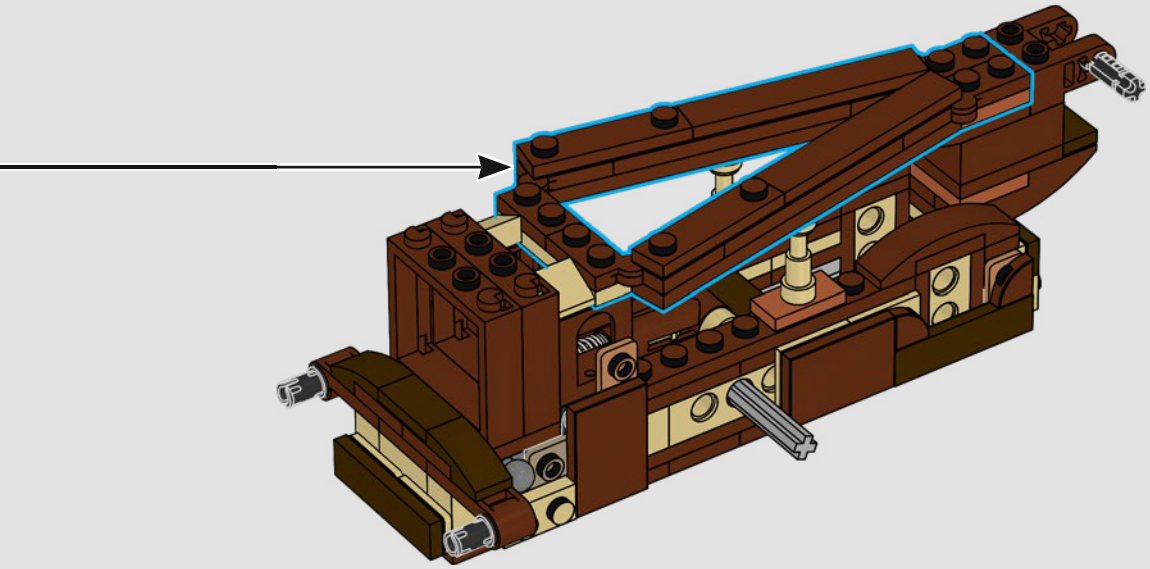

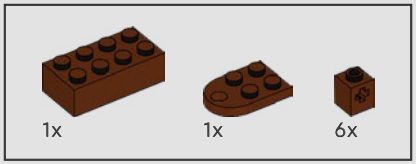

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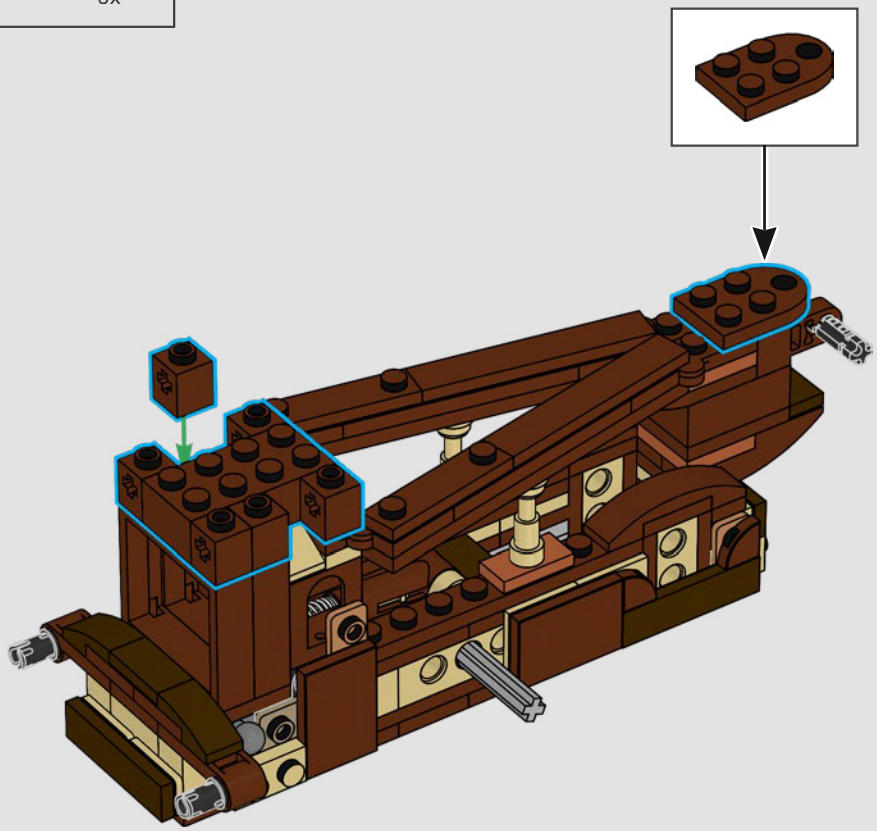

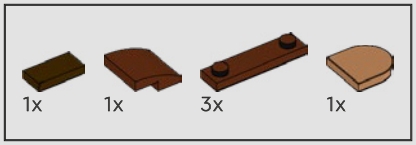

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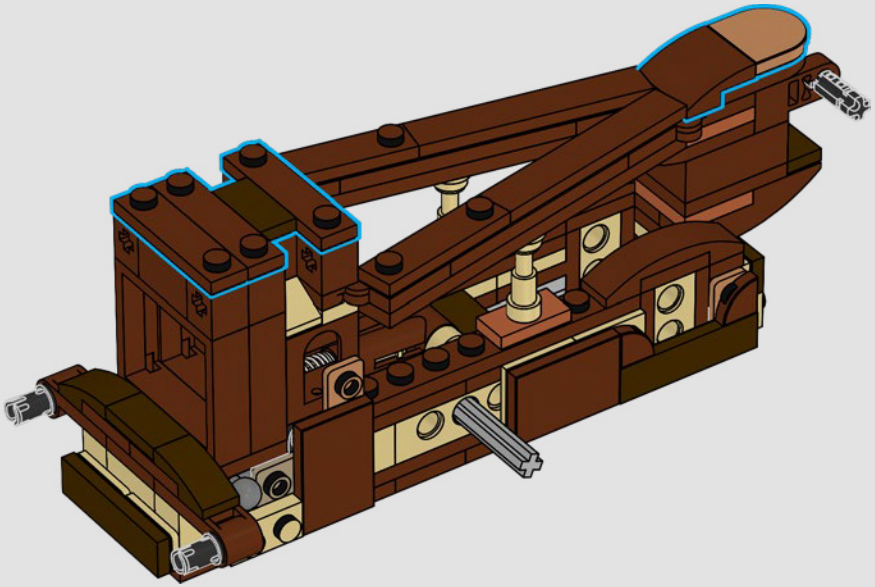

Leonardo da Vinci was persistent in his idea that the human body could produce enough energy to power a flying machine.

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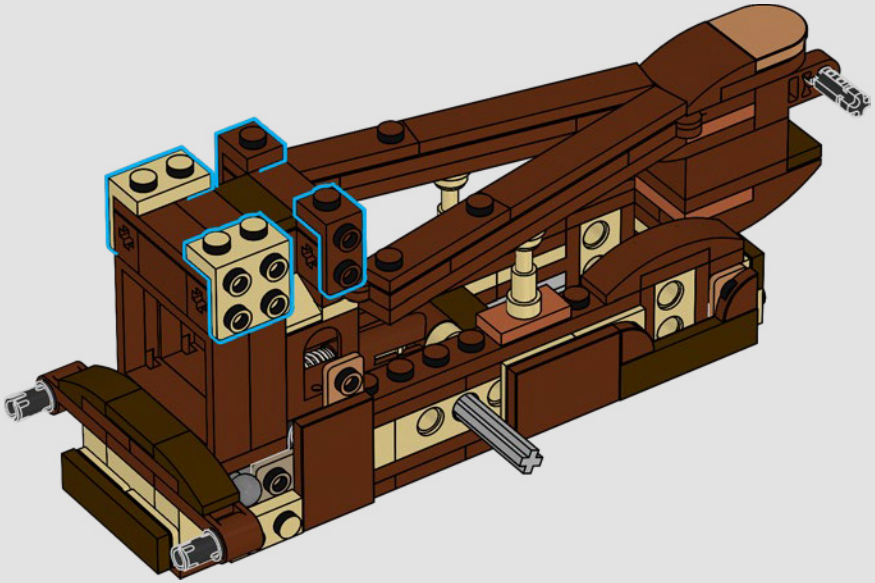

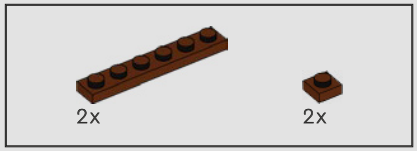

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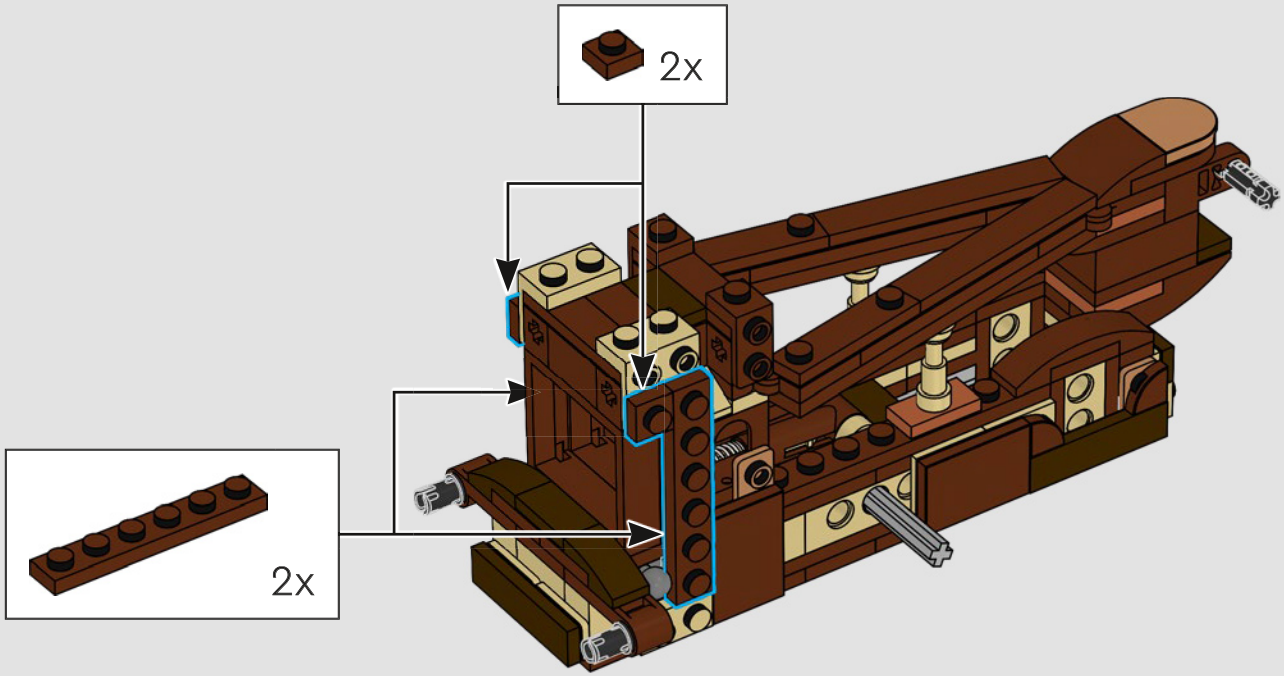

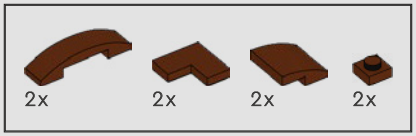

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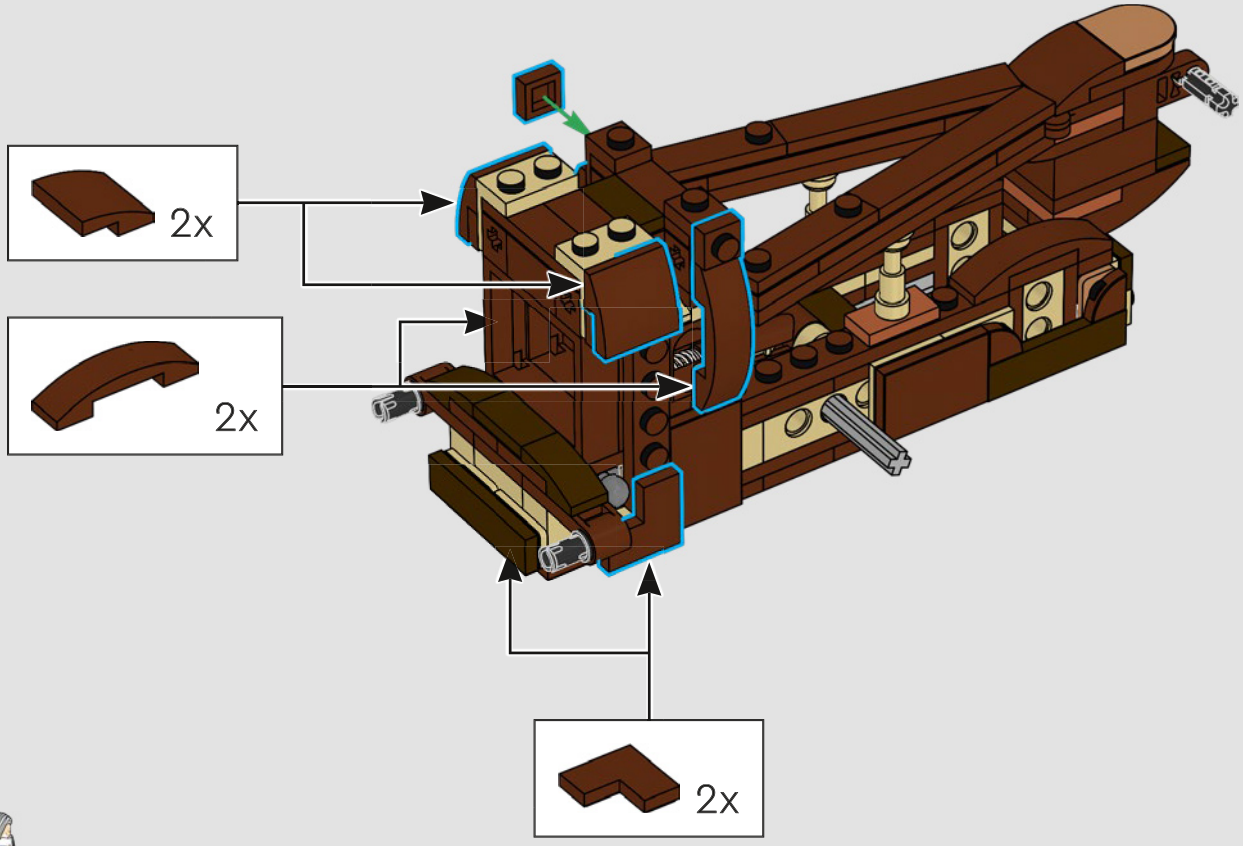

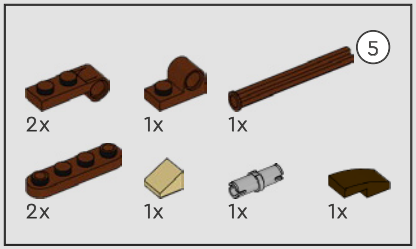

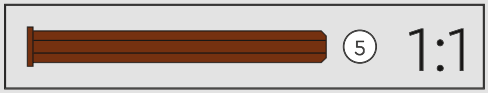

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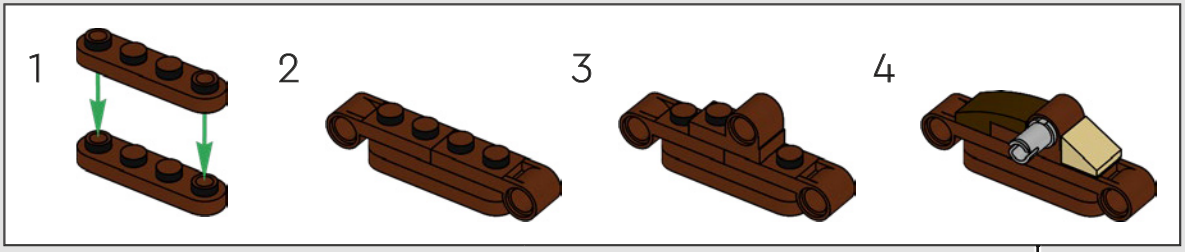

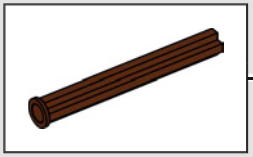

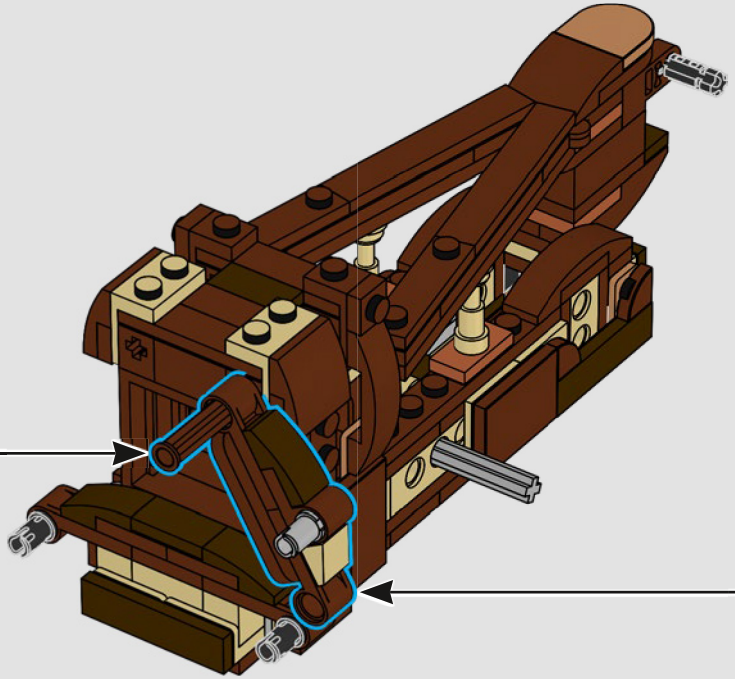

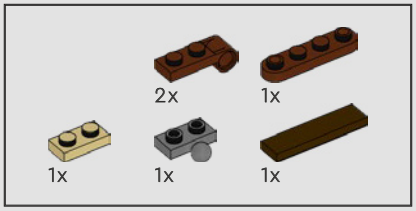

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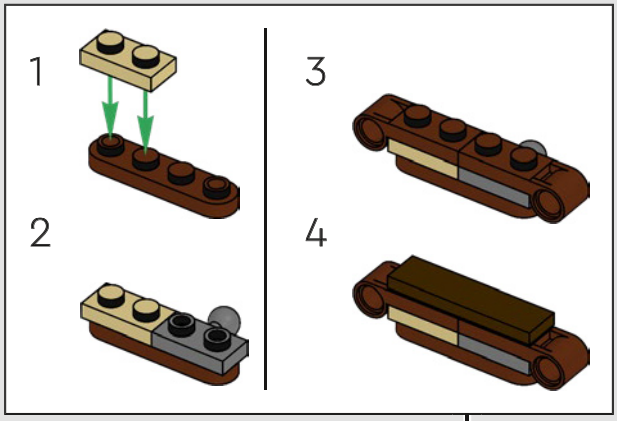

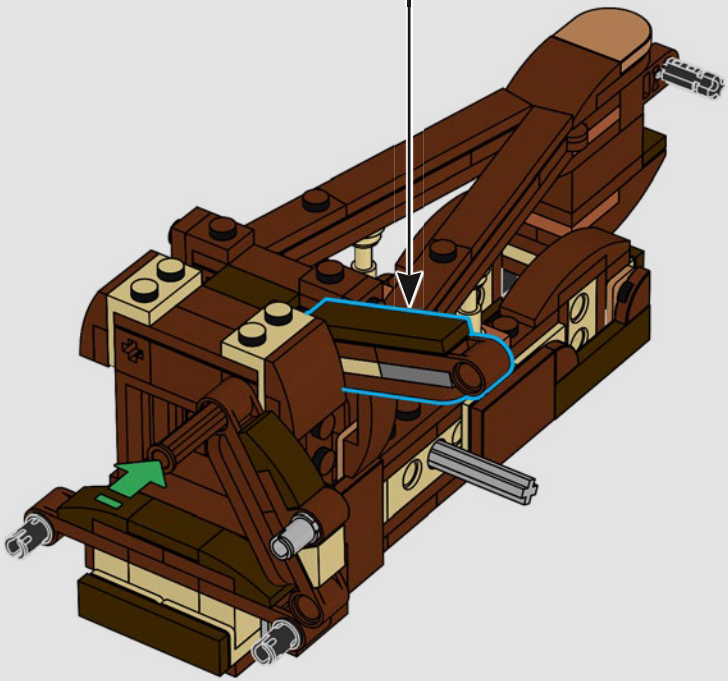

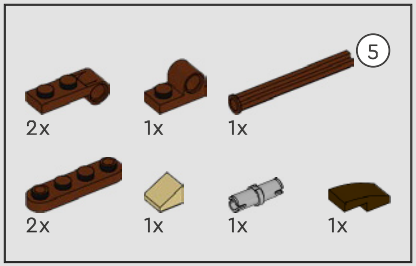

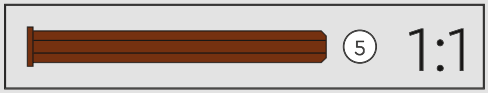

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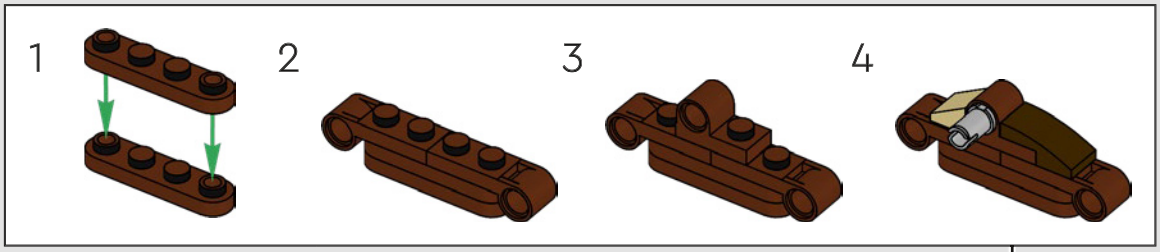

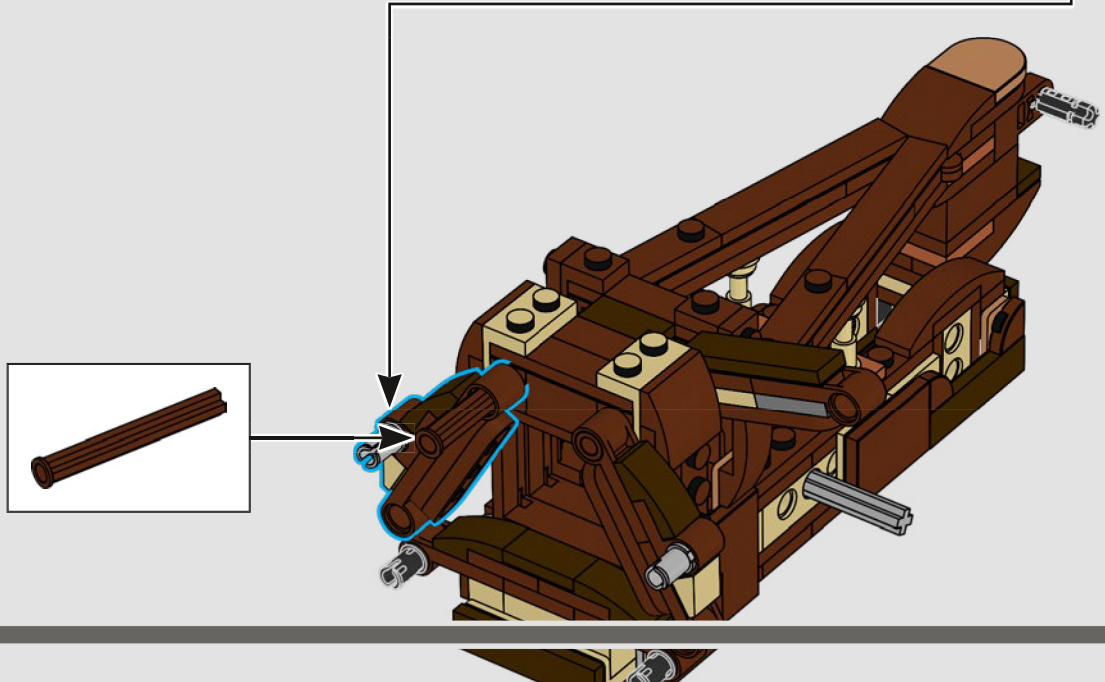

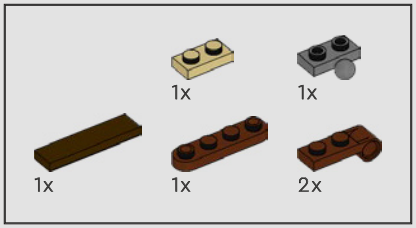

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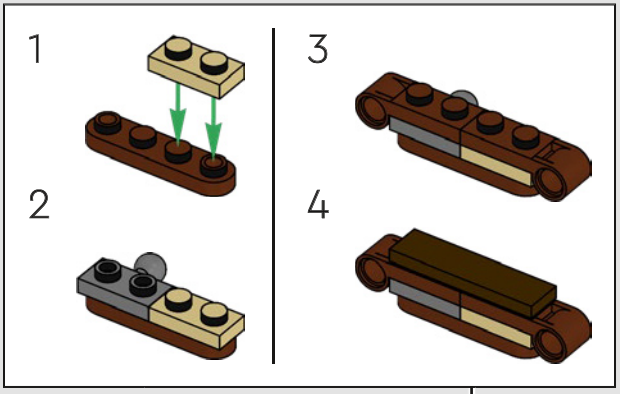

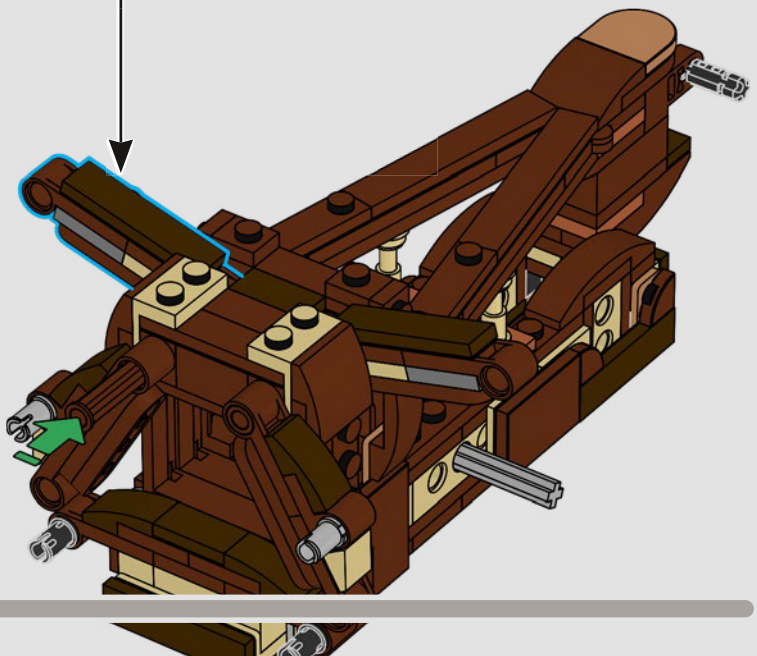

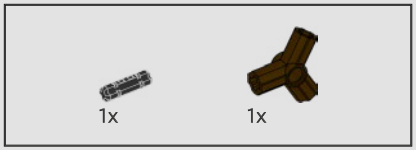

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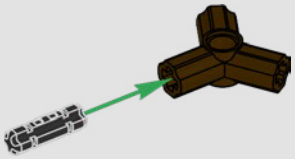

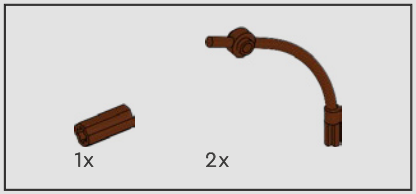

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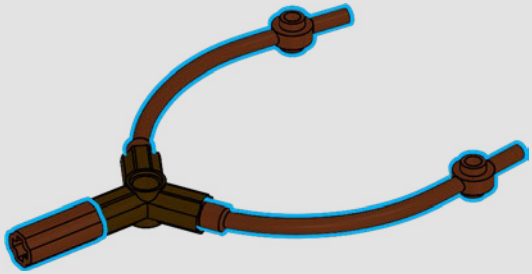
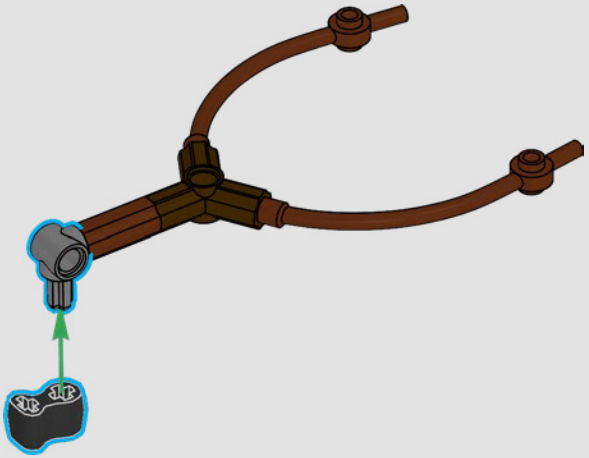
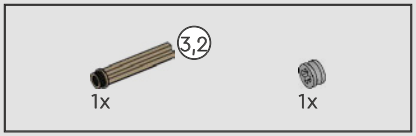


Leonardo da Vinci's sketches show different flying machines operated by a pilot using various power mechanics – some powered by legs, some by legs as well as arms, and others even with rudders connected to the pilot's head.

99





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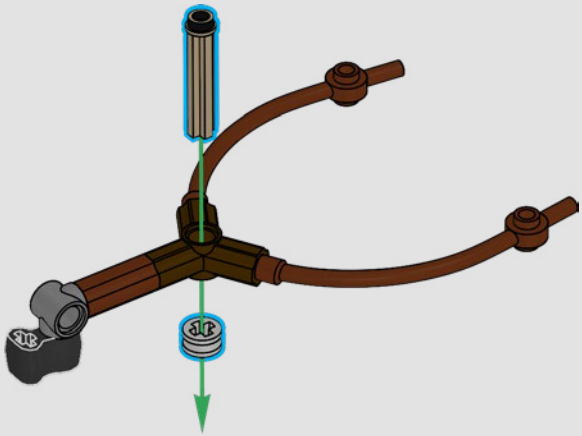

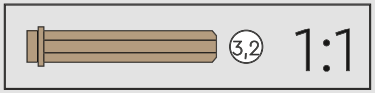

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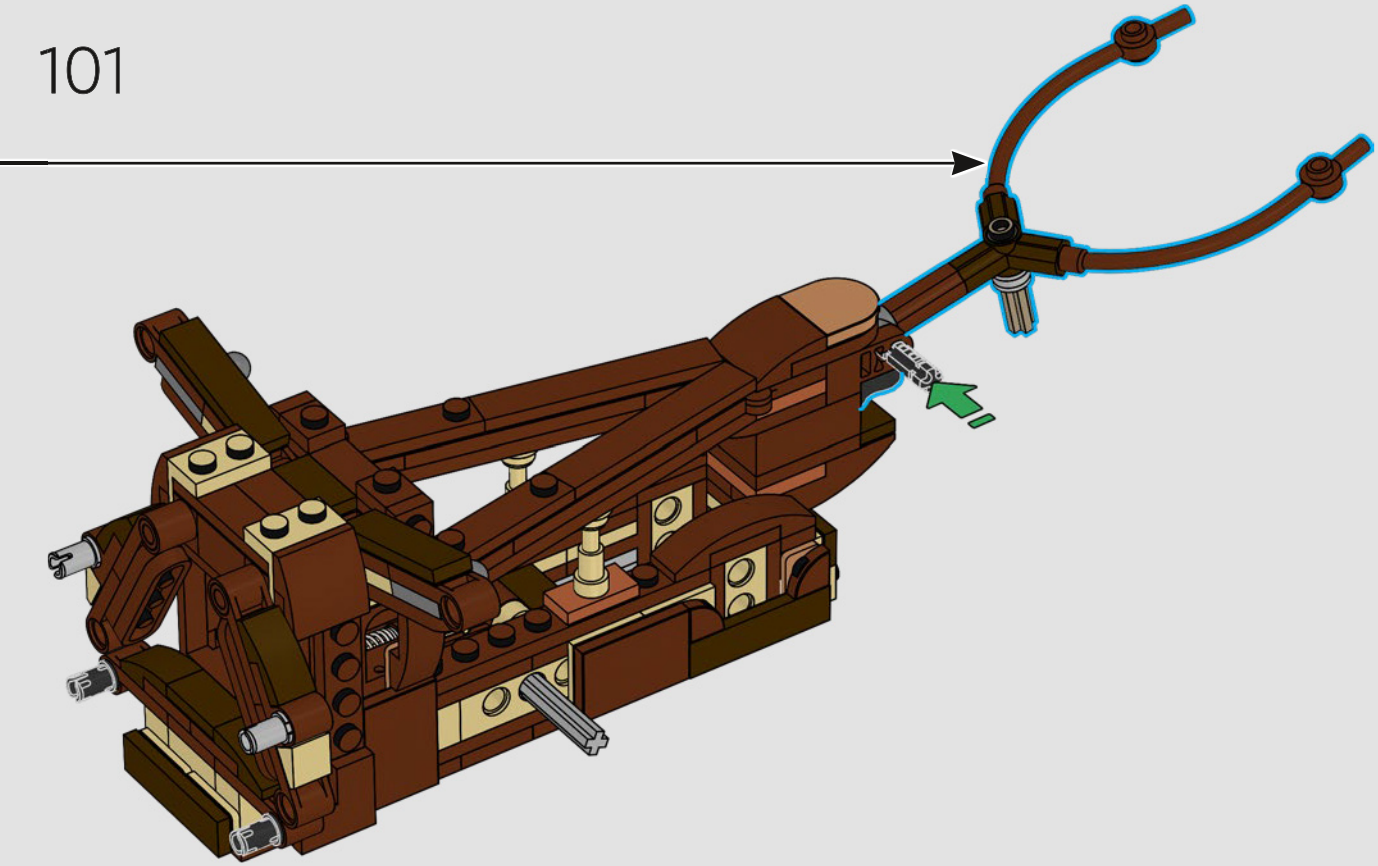

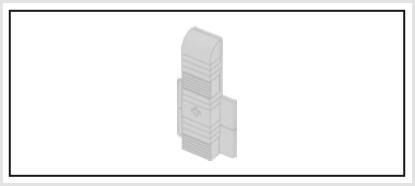

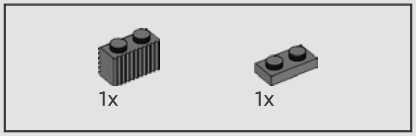

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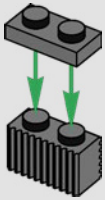

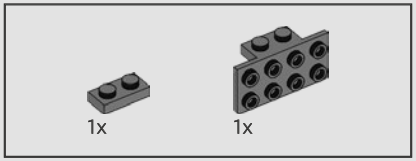

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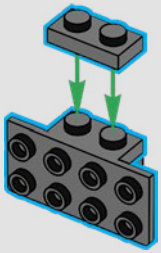

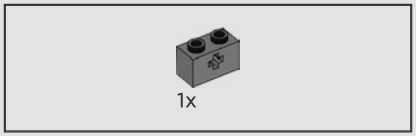

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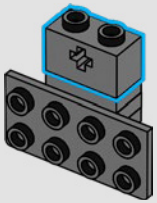

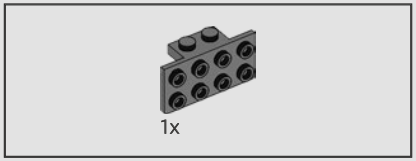

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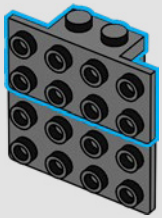

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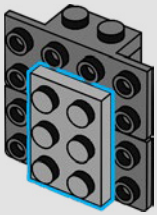

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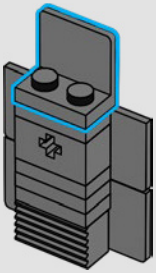

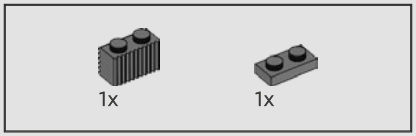

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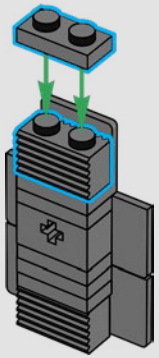

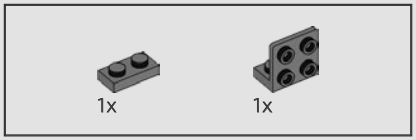

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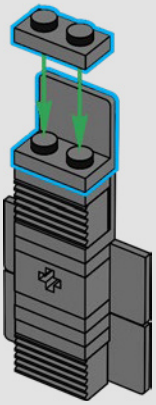

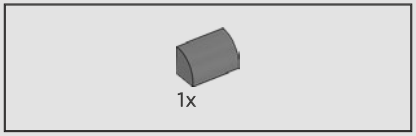

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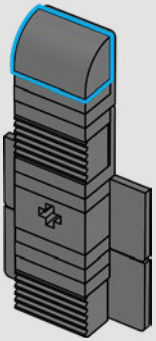

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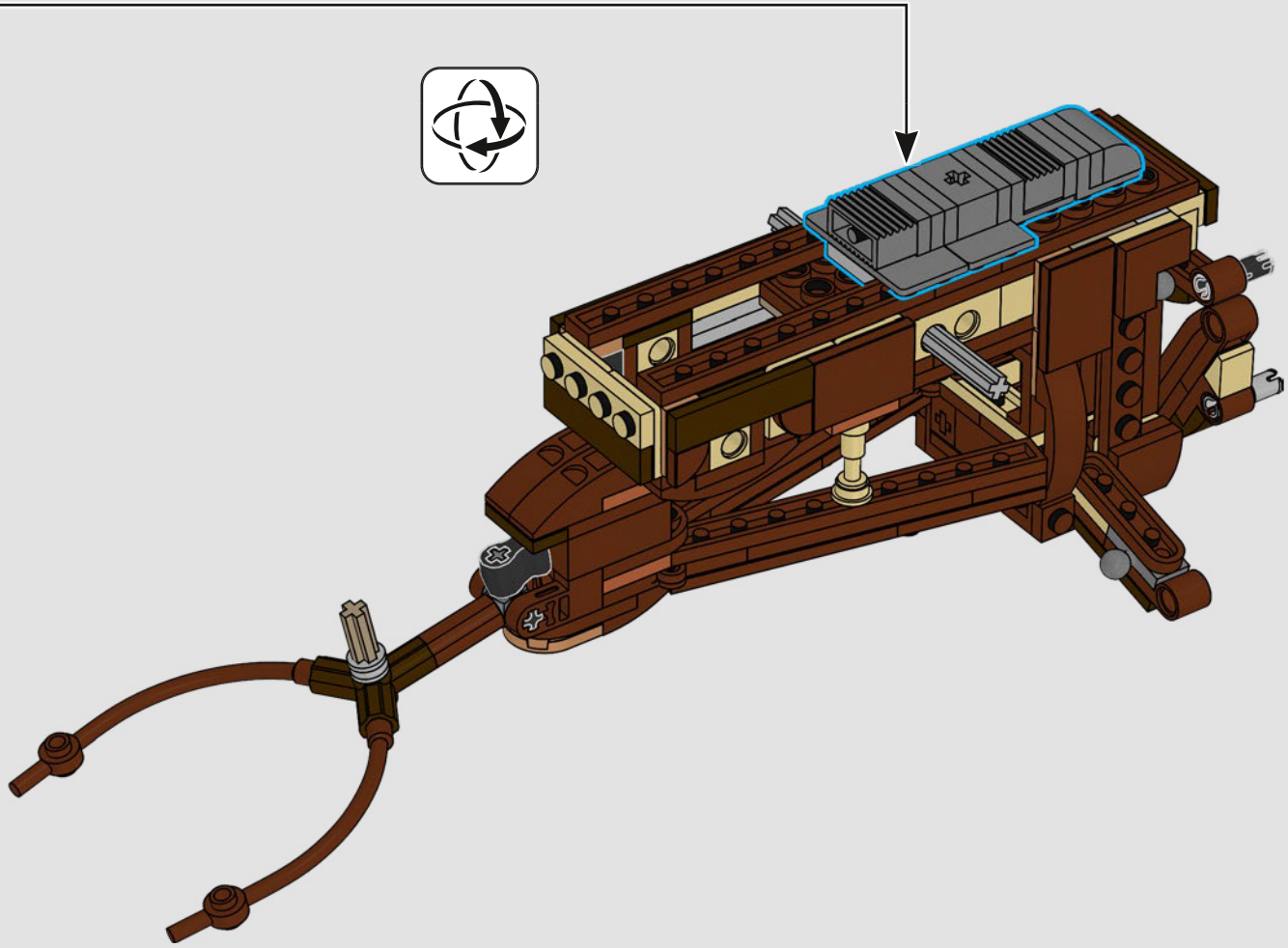
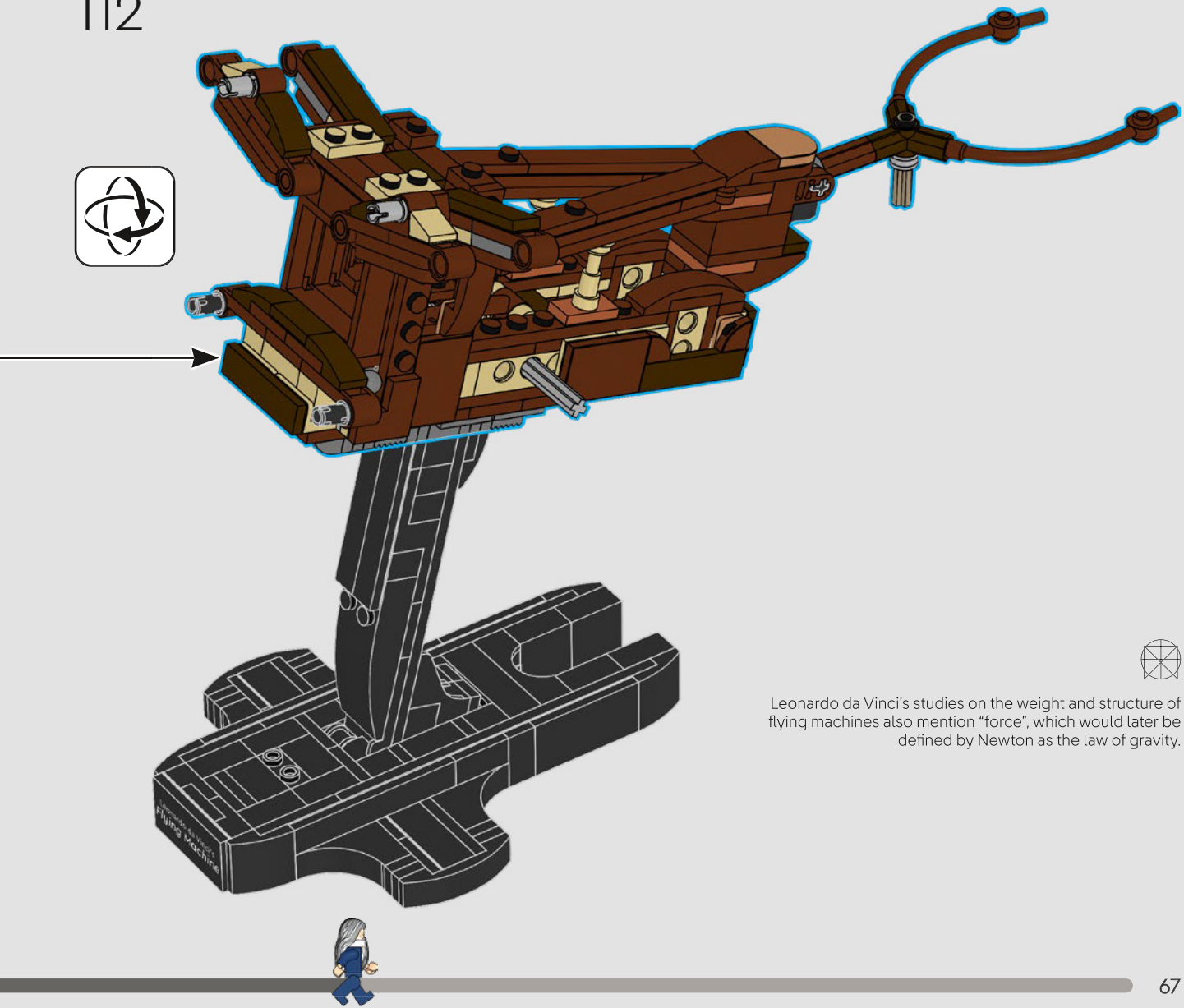
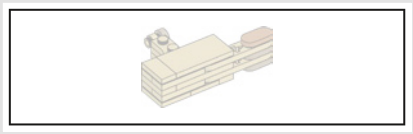
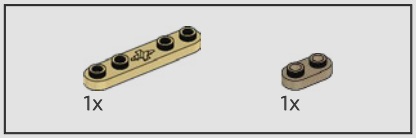




Leonardo da Vinci's studies on the weight and structure of flying machines also mention "force", which would later be defined by Newton as the law of gravity.





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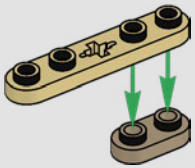

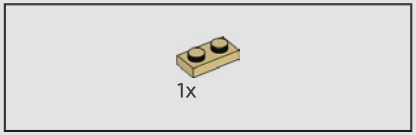

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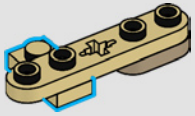

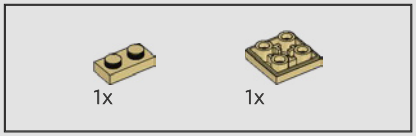

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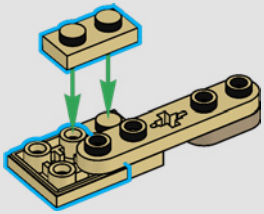

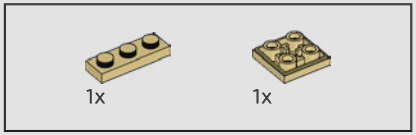

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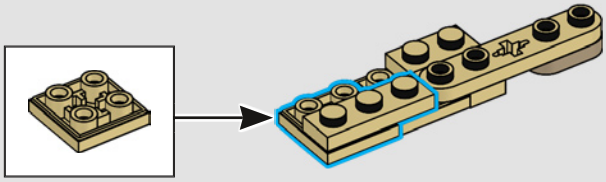

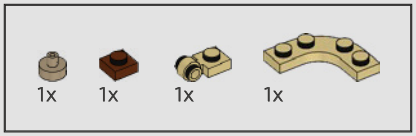

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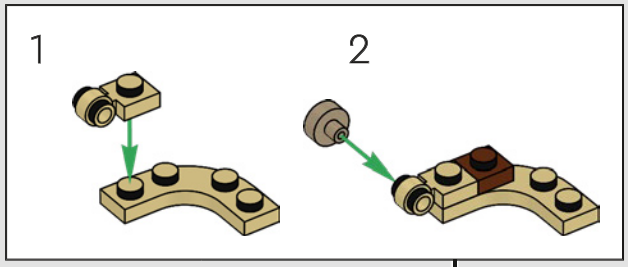

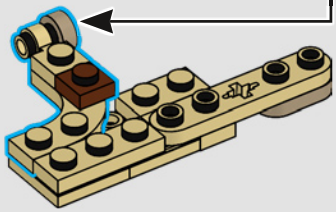

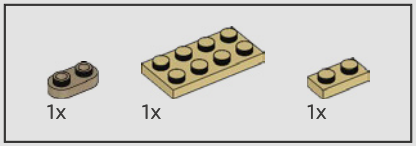

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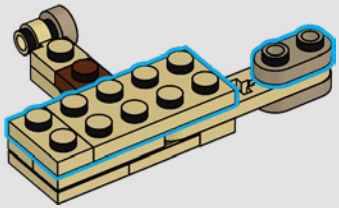

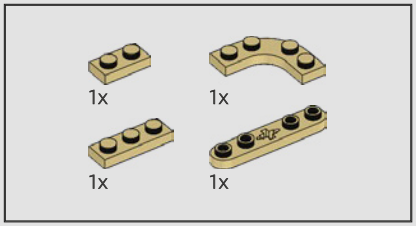

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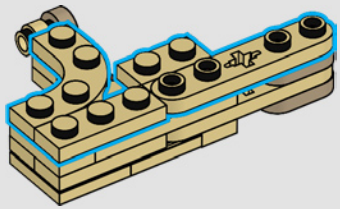

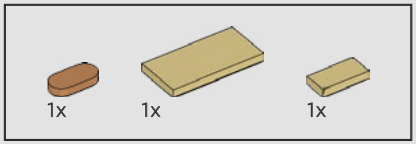

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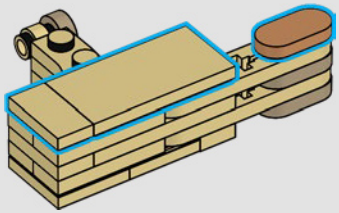

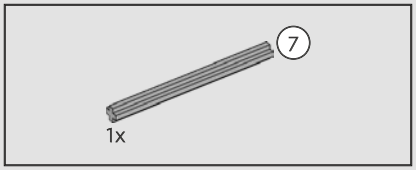

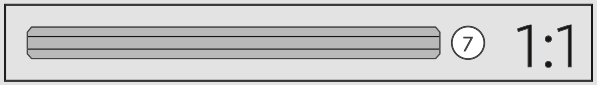

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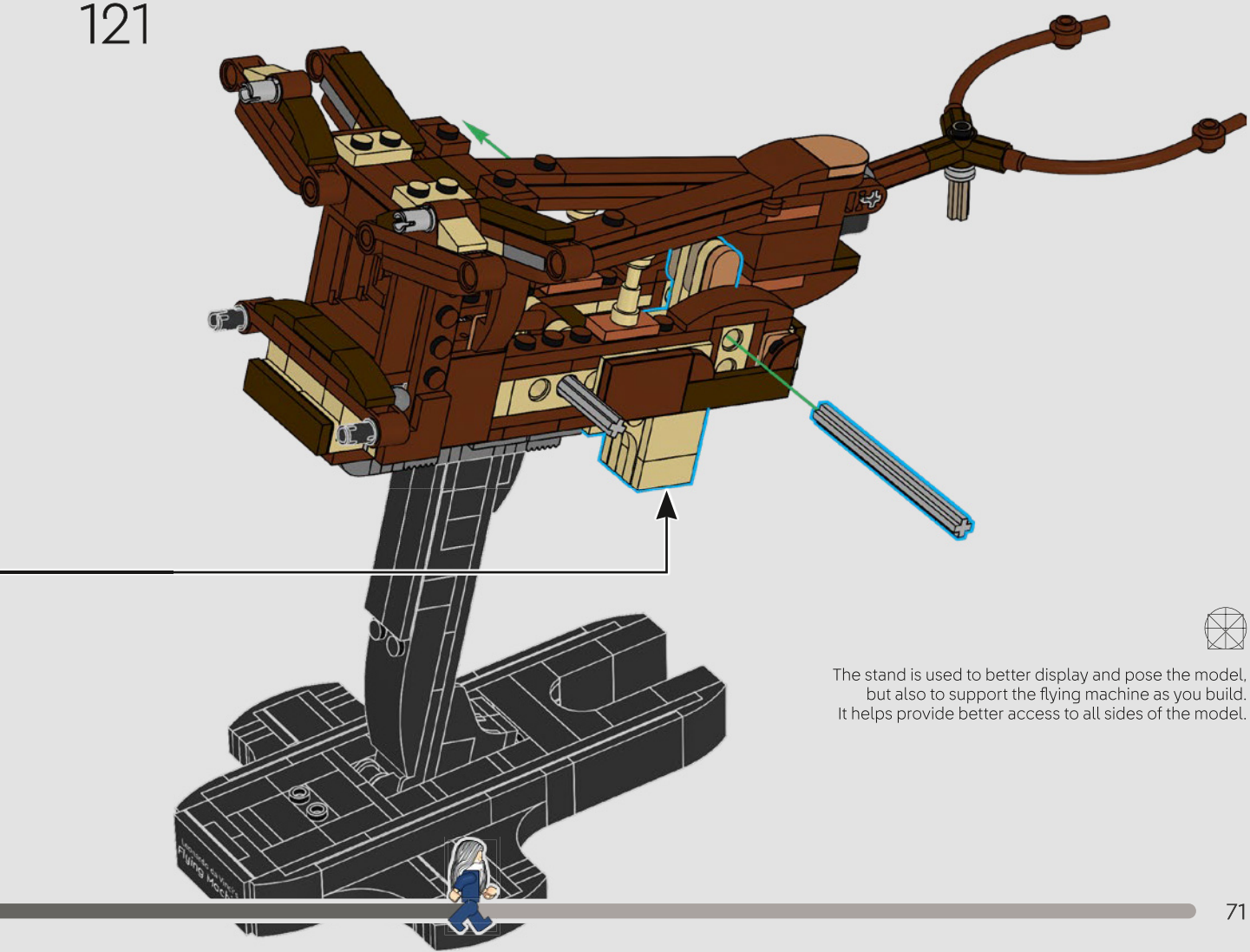
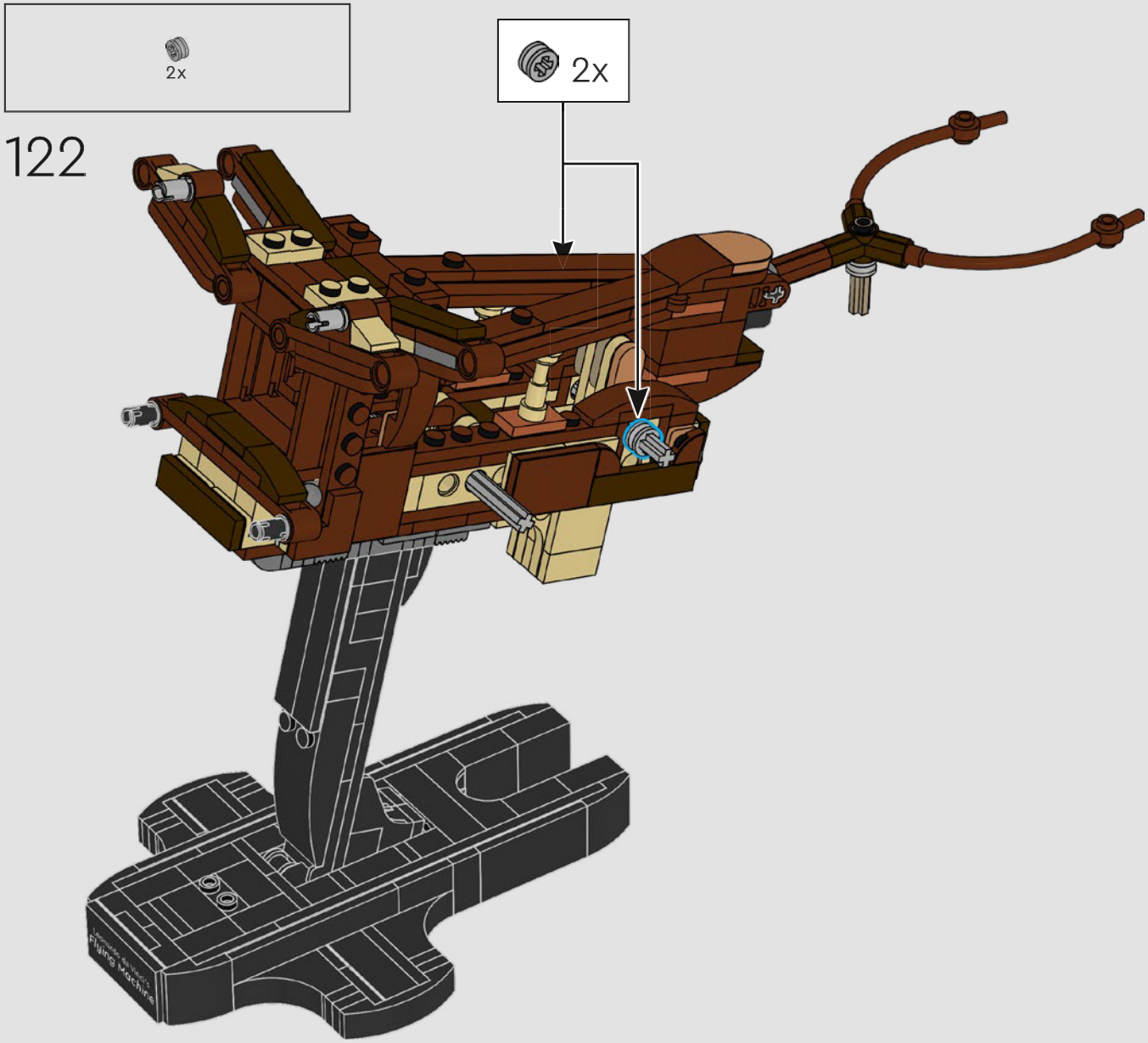
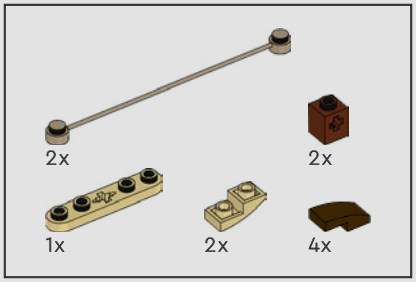


The stand is used to better display and pose the model, but also to support the flying machine as you build. It helps provide better access to all sides of the model.


2x
2x
122
Flying Machine



123

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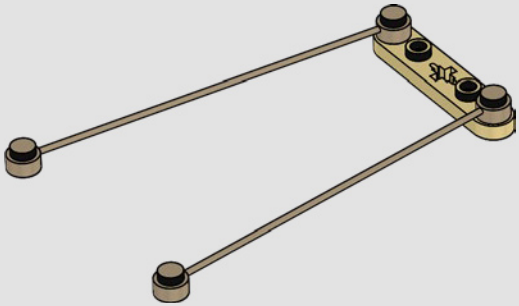

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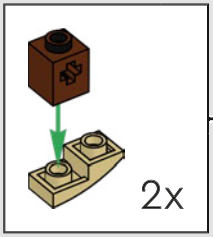

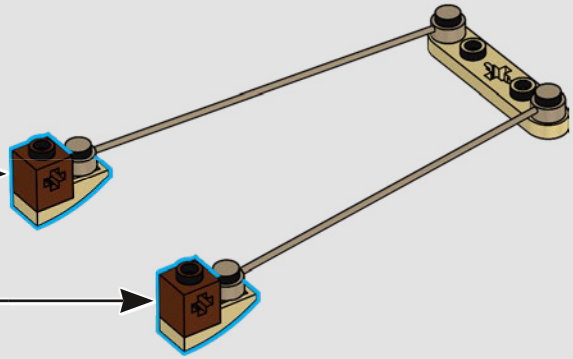

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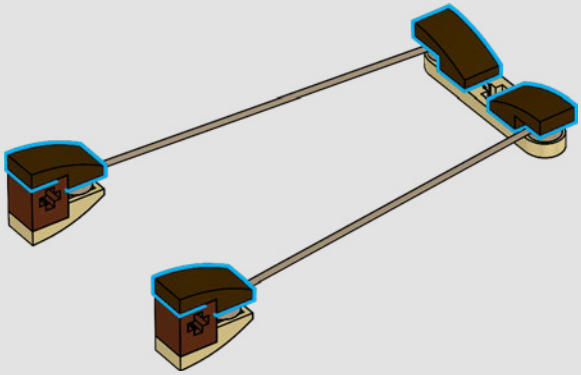
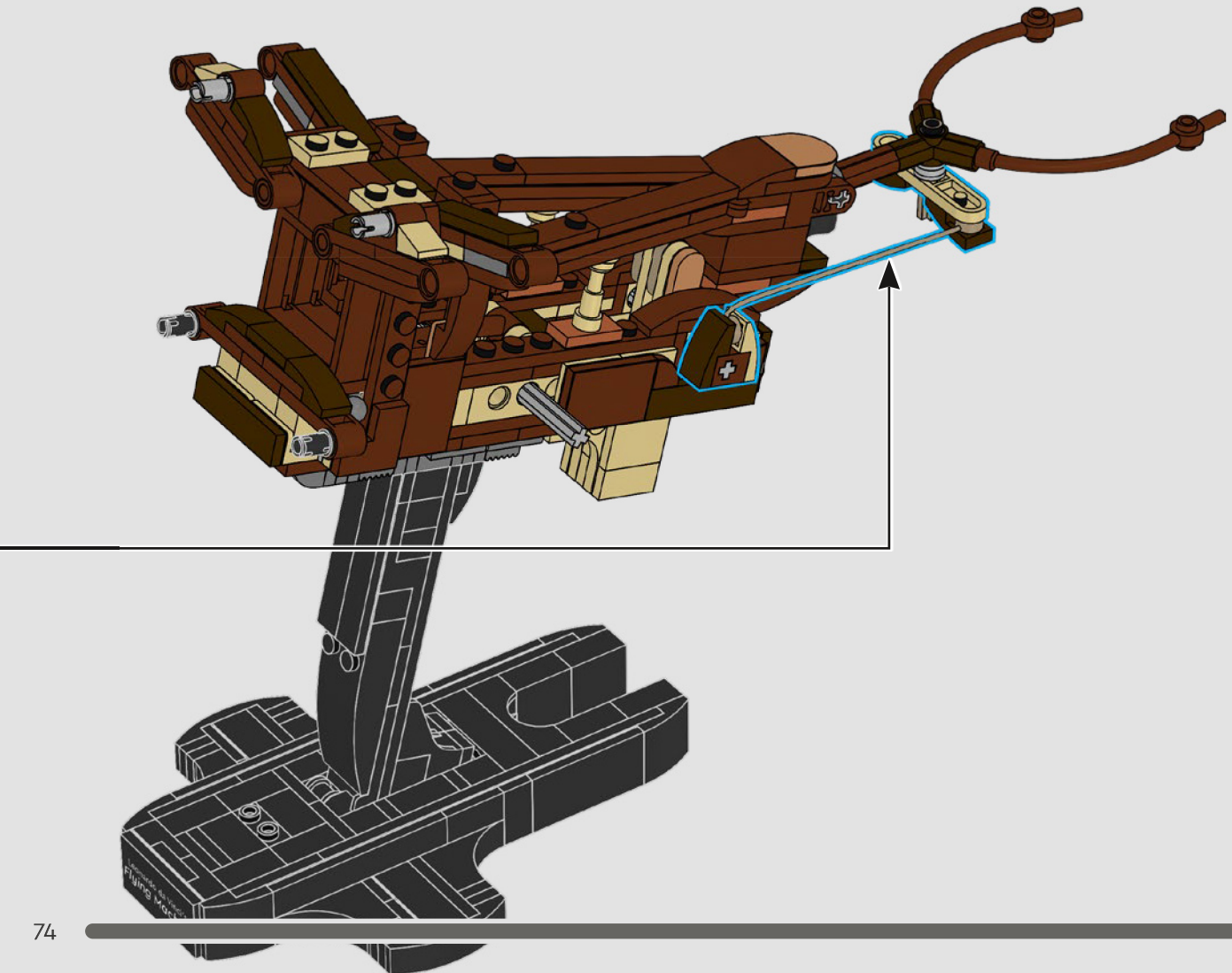
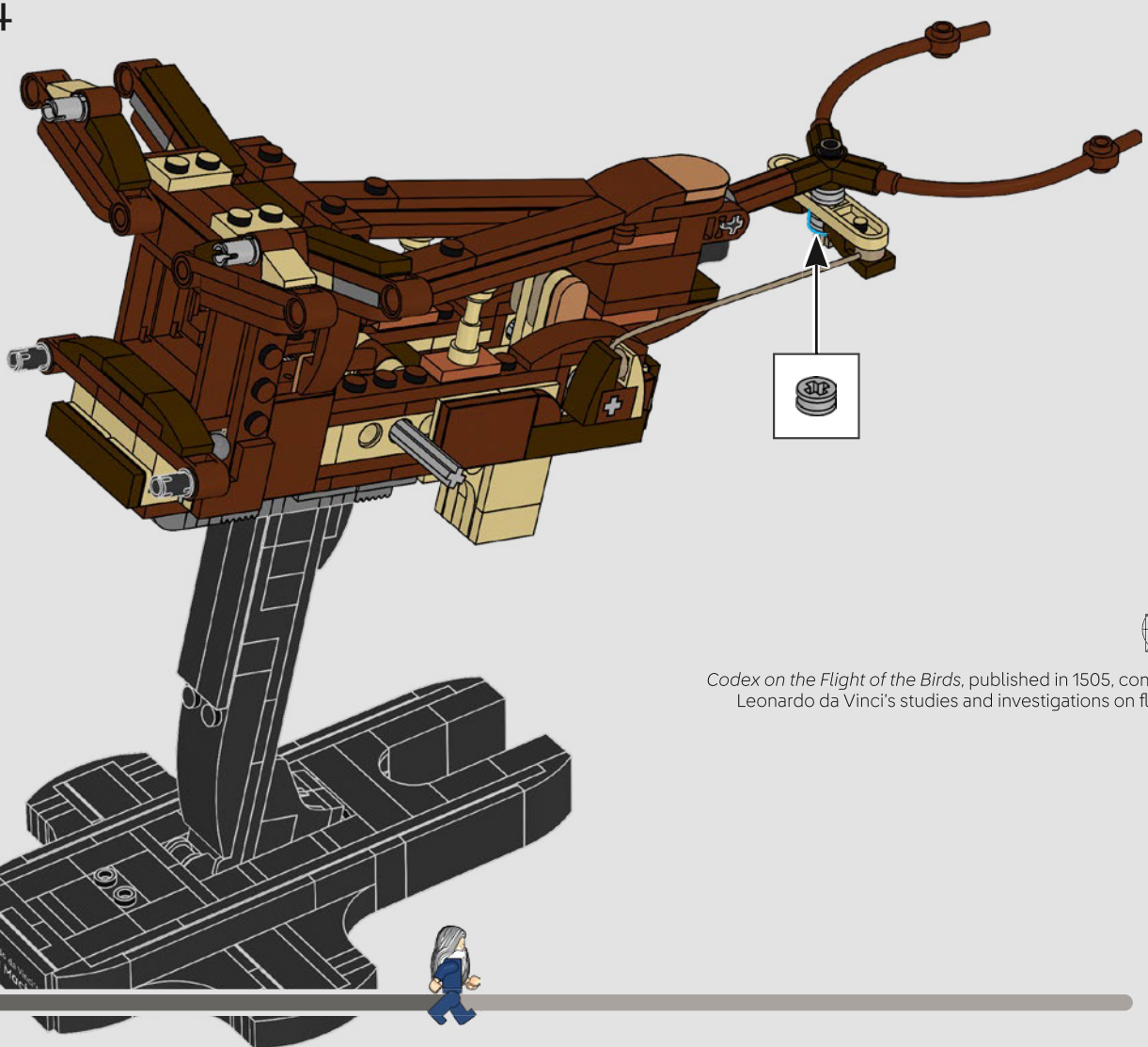


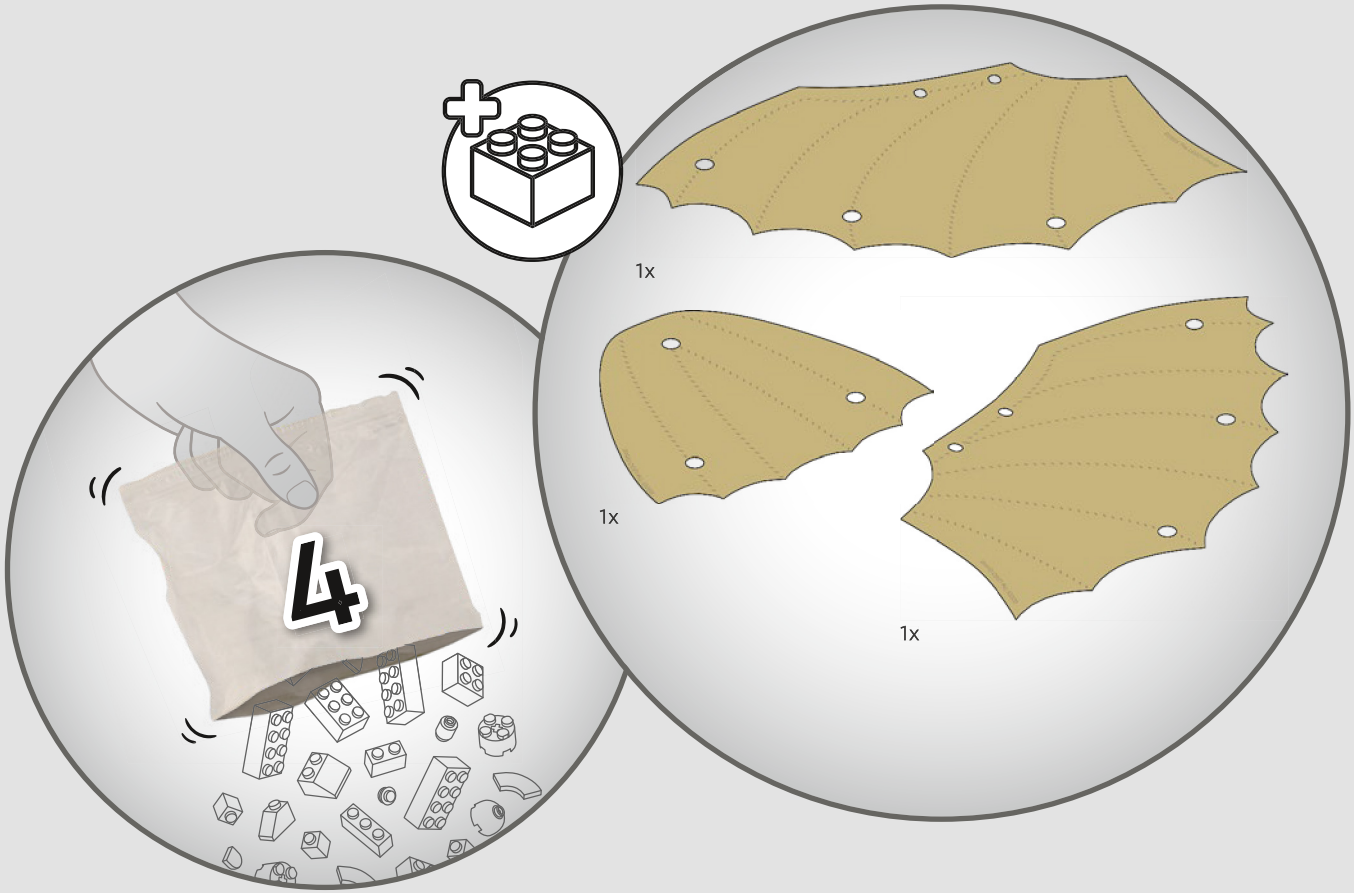


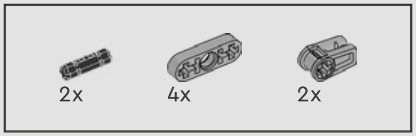
1x

124



Codex on the Flight of the Birds, published in 1505, contains Leonardo da Vinci's studies and investigations on flying.


4
1x
1x
1x



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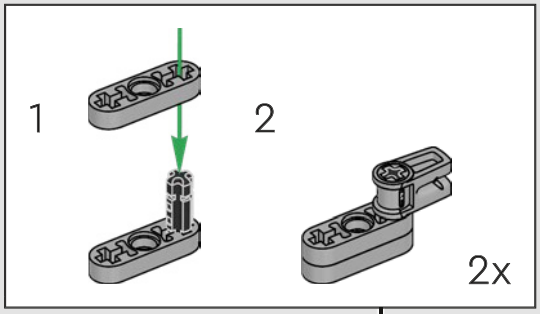

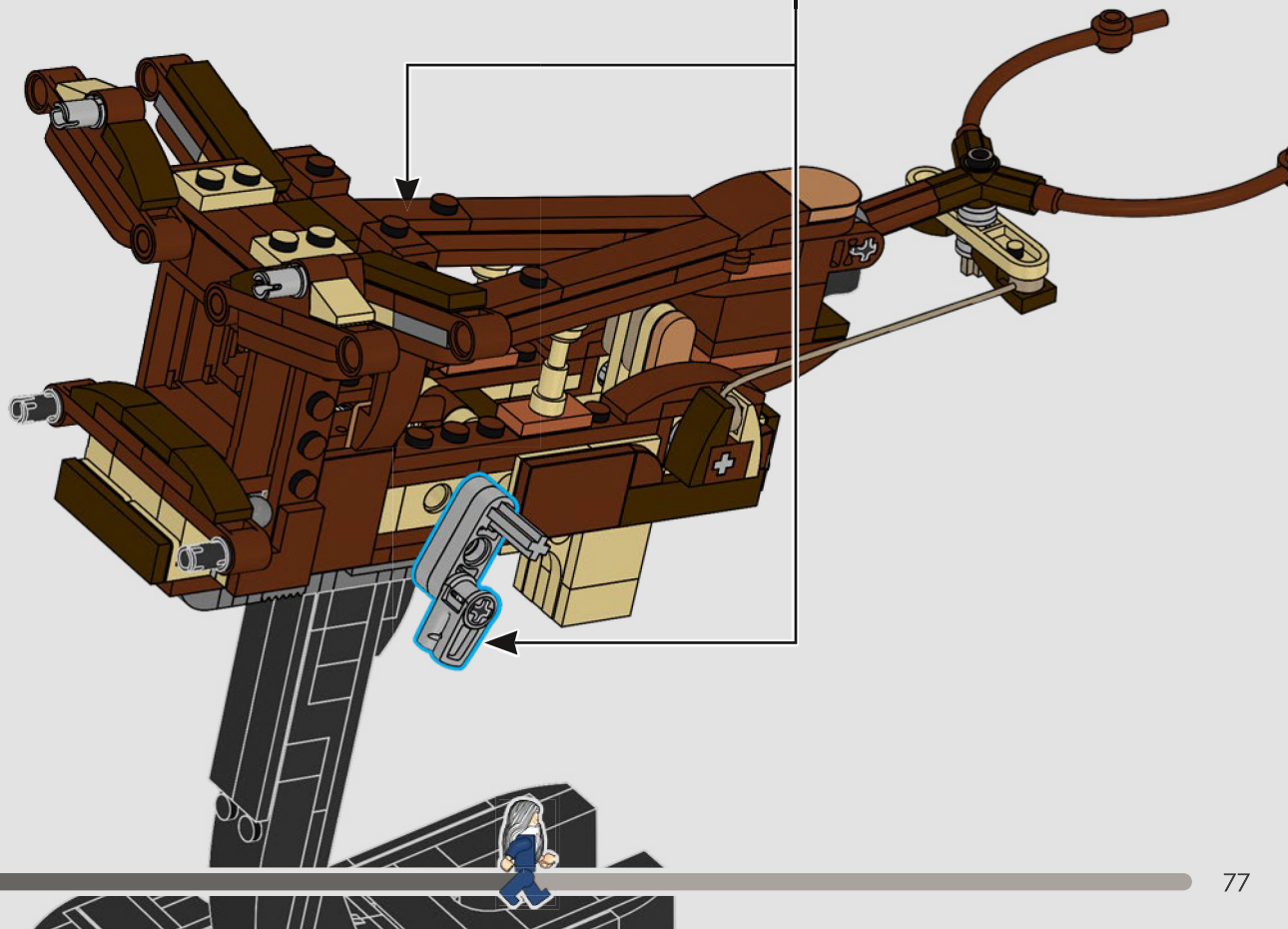

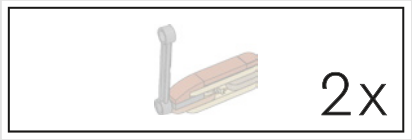

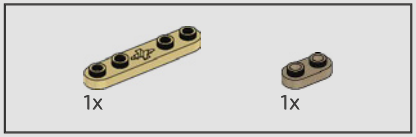

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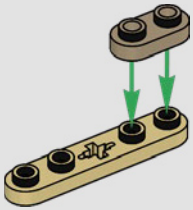

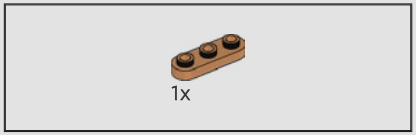

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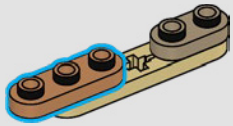

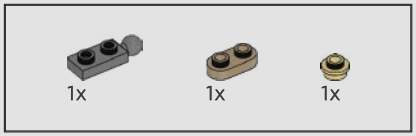

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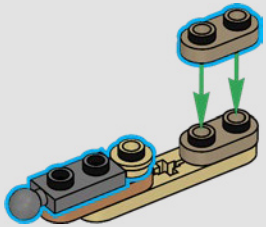

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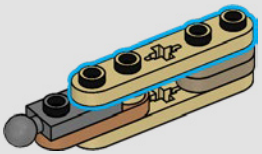

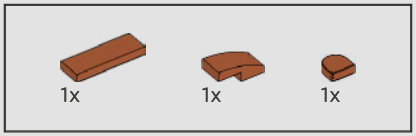

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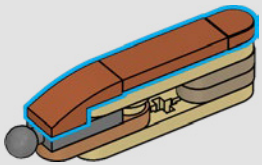

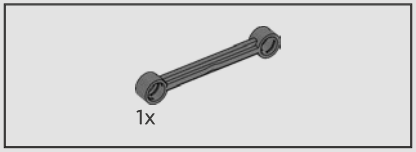

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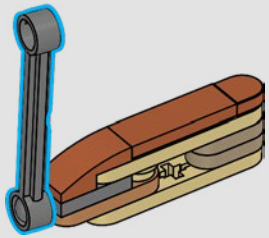

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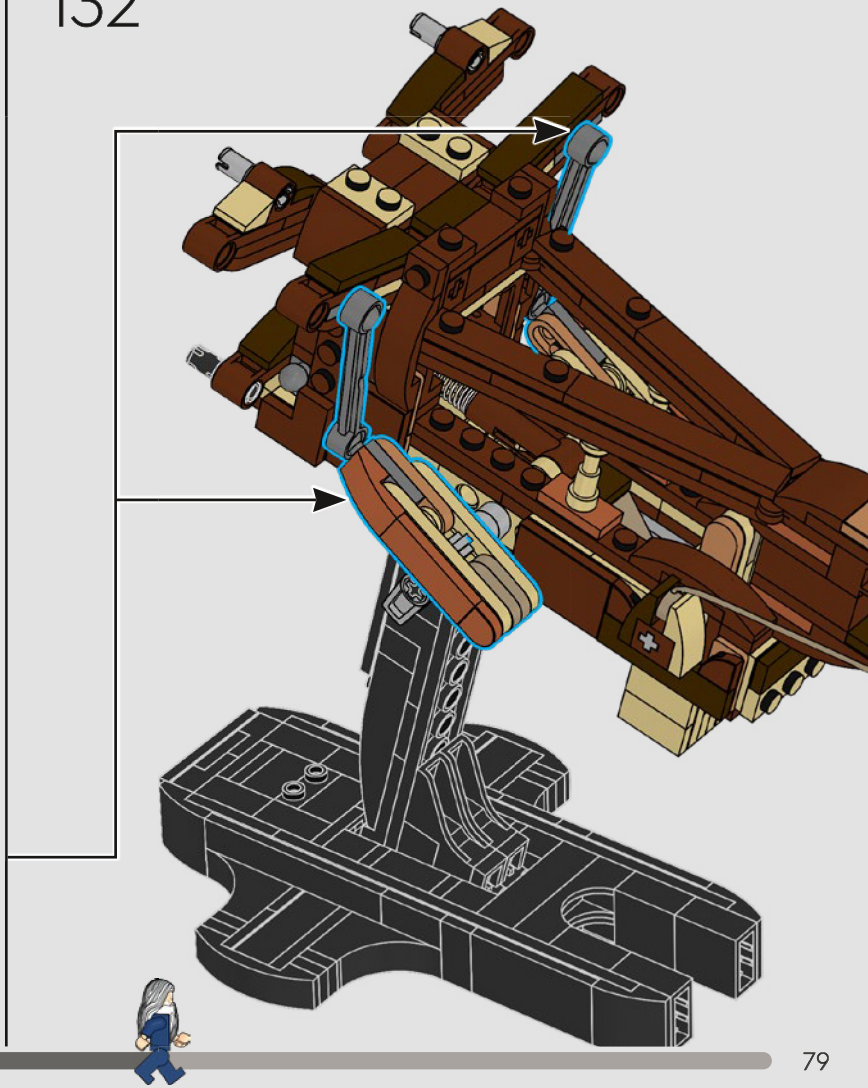

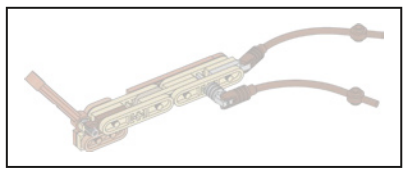

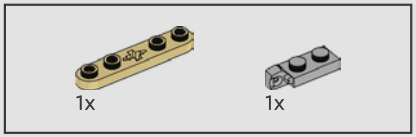

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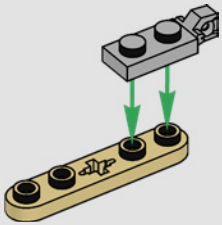

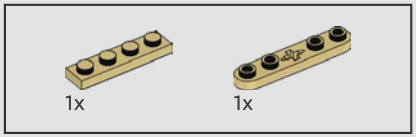

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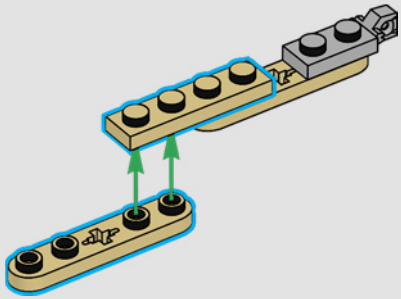

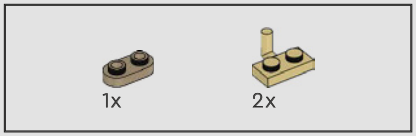

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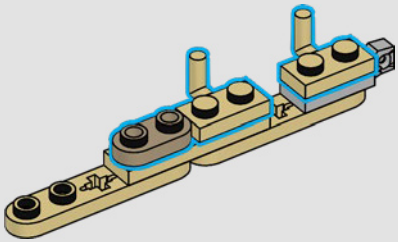

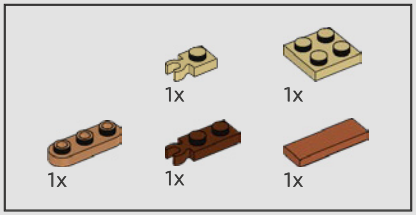

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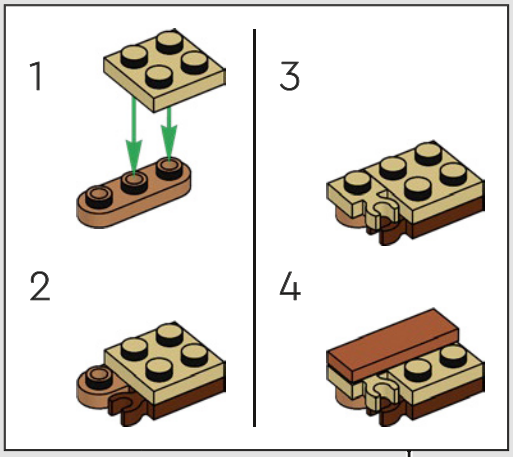

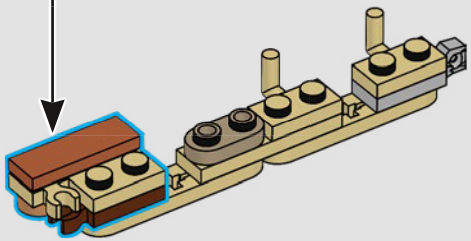

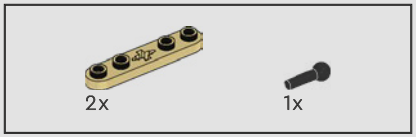

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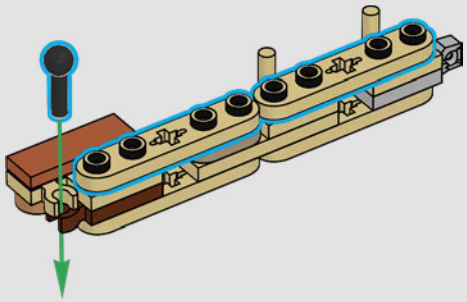

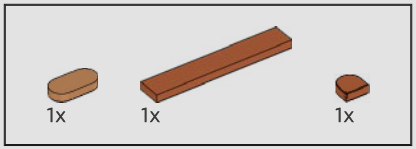

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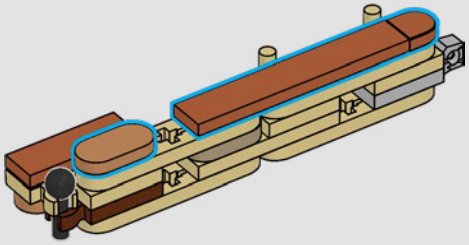

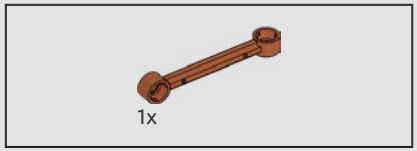

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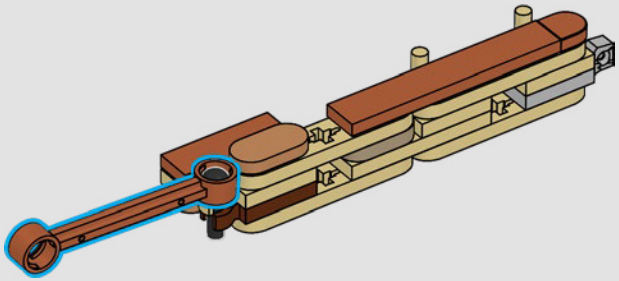

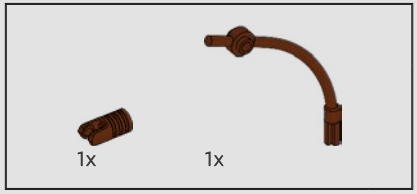

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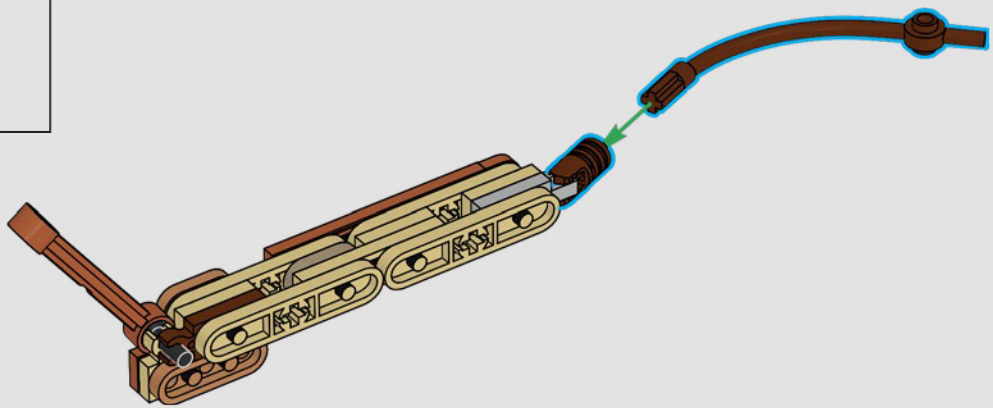

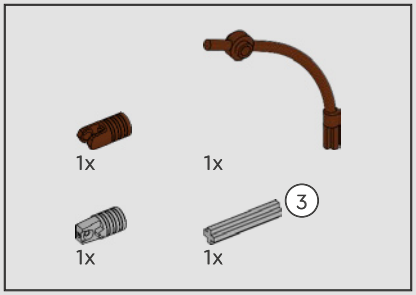

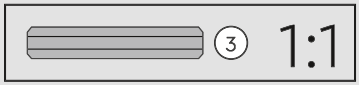

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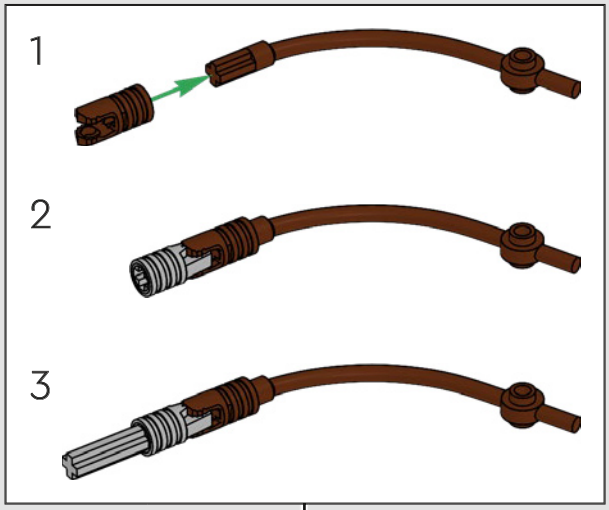

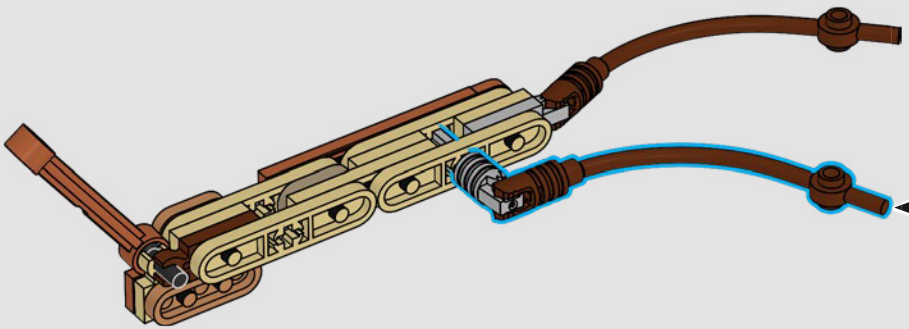

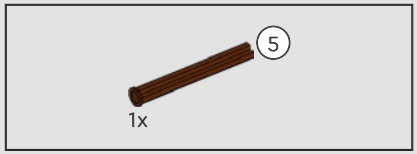

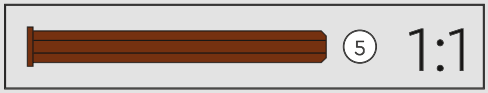

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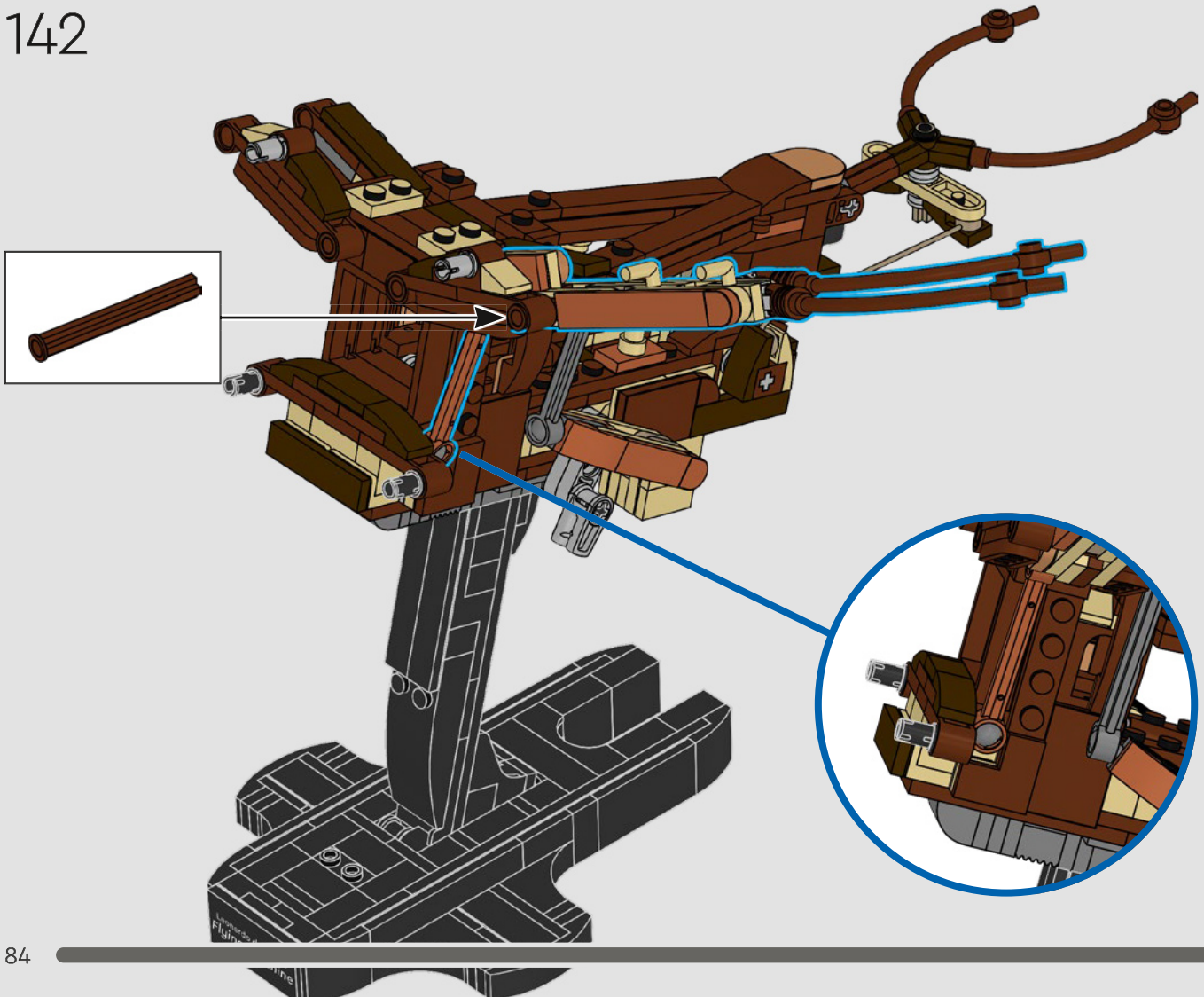

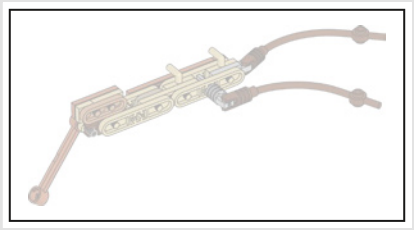

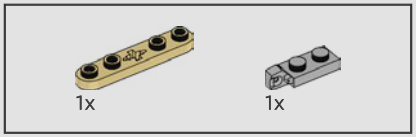

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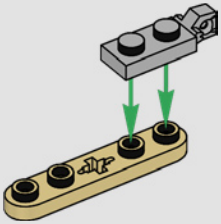

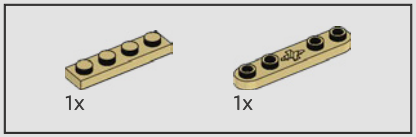

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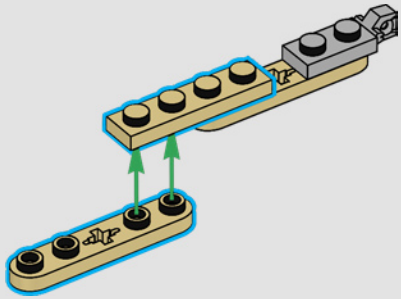

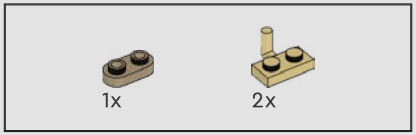

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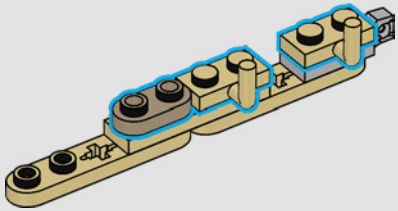

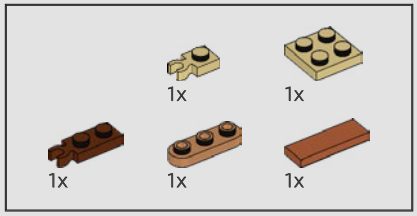

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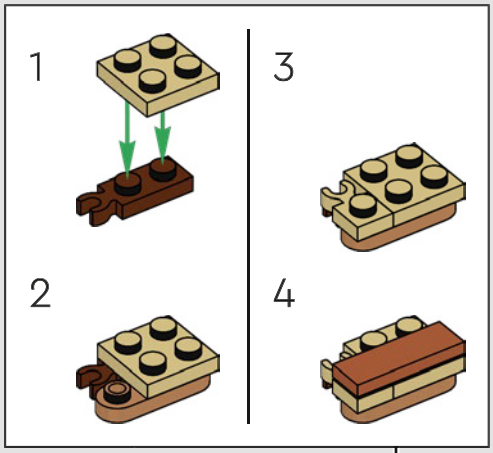

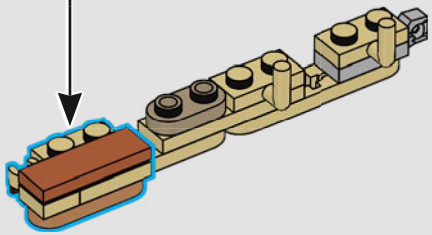

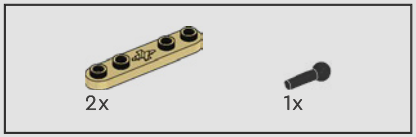

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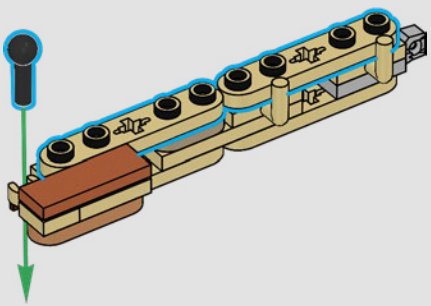

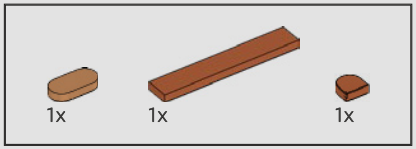

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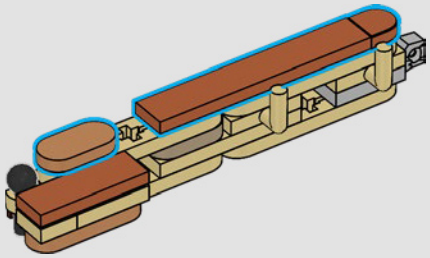

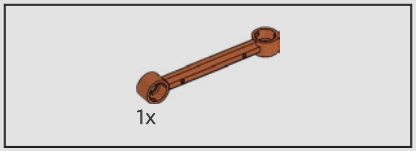

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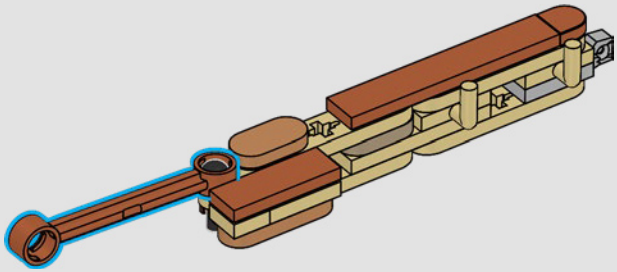

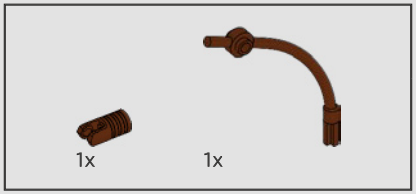

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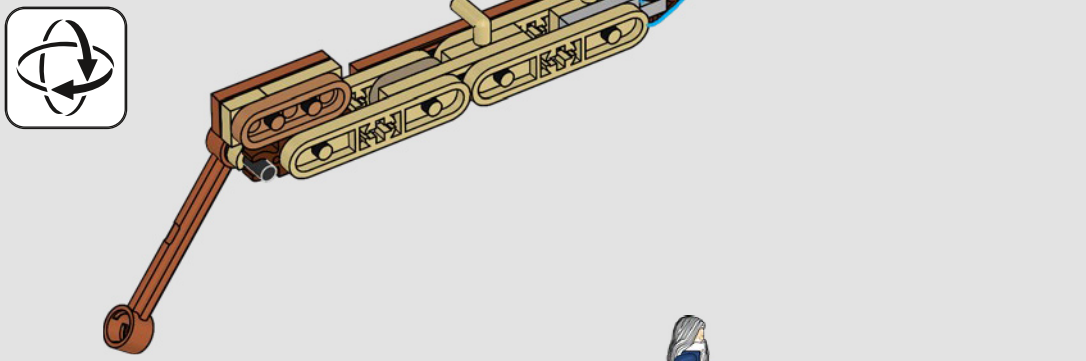

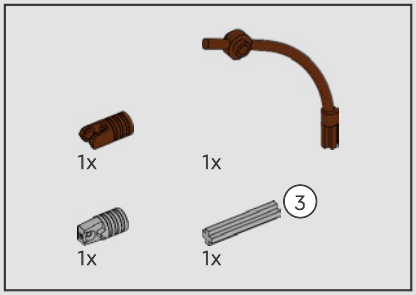

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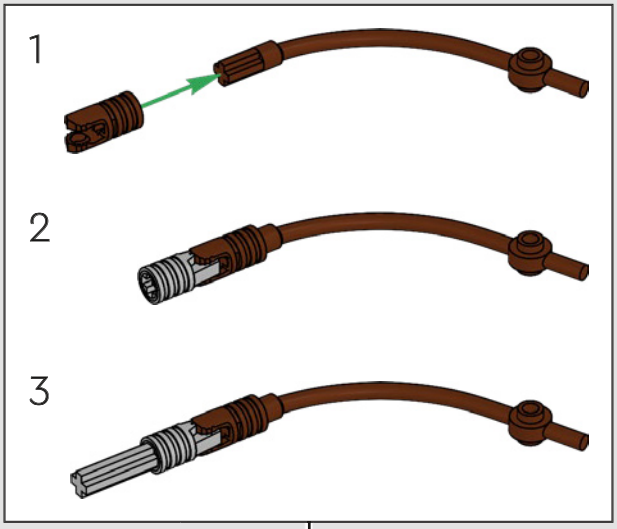

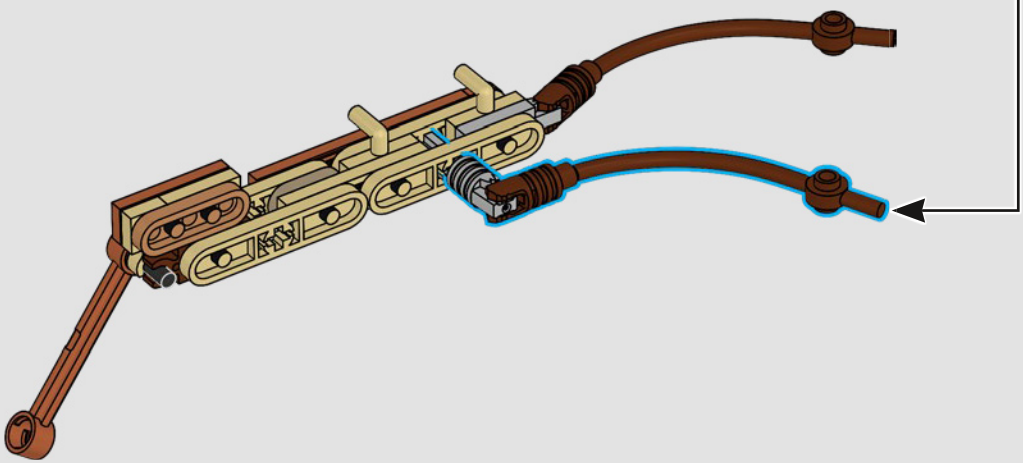

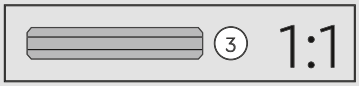

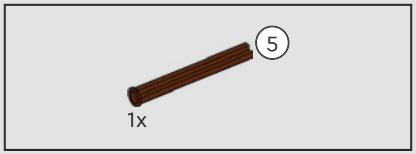

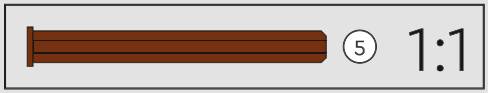

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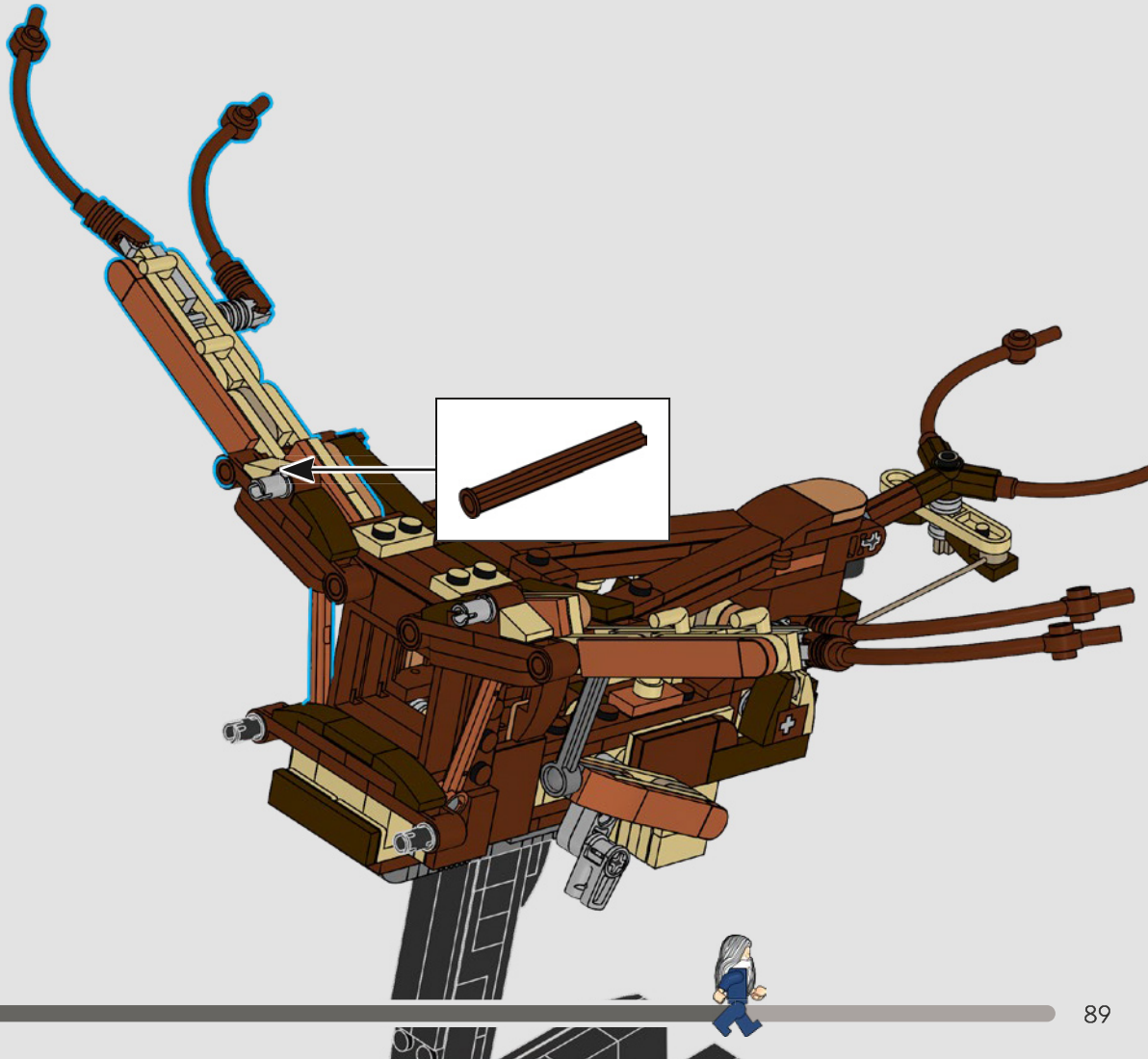

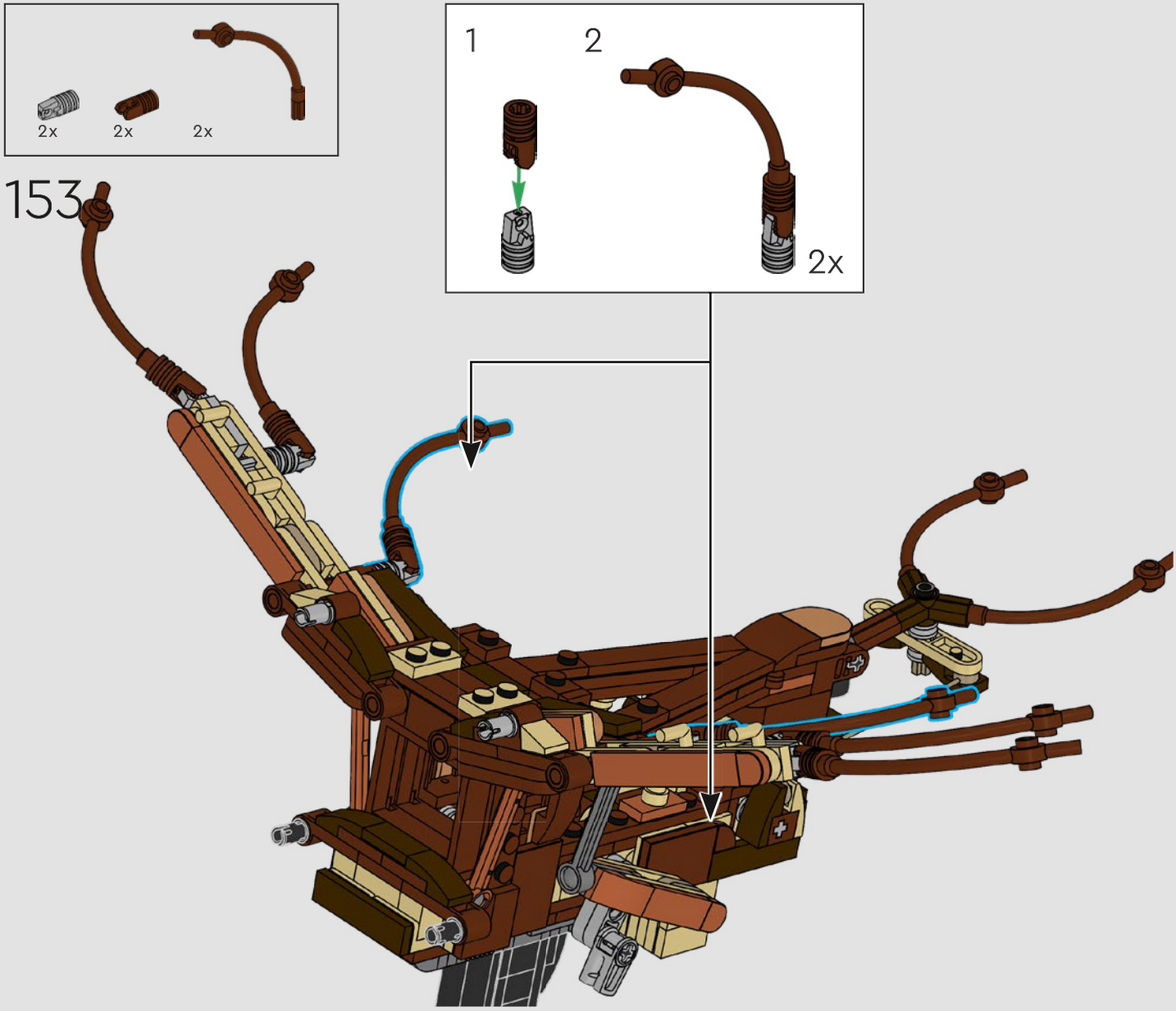
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2x

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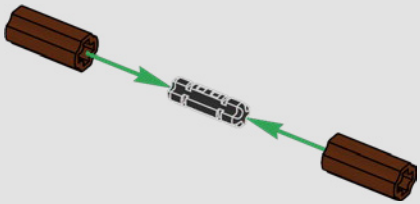

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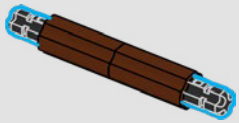

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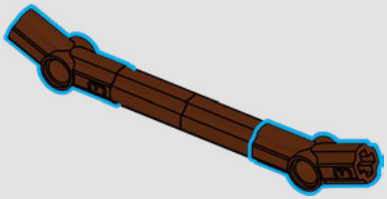

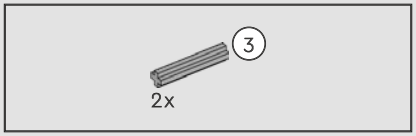

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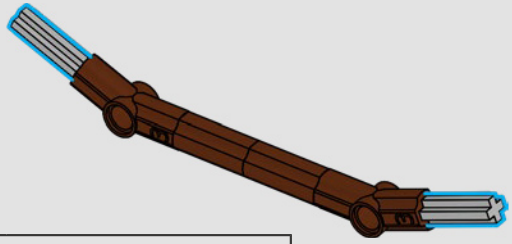

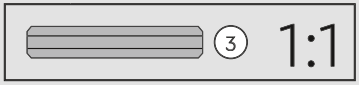

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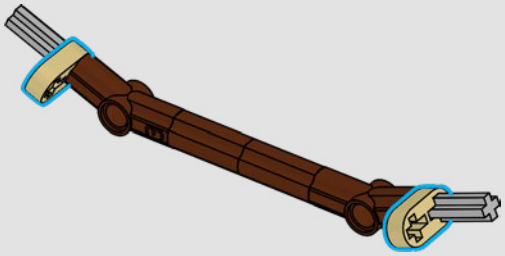

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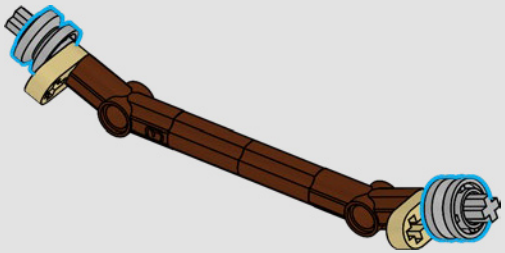

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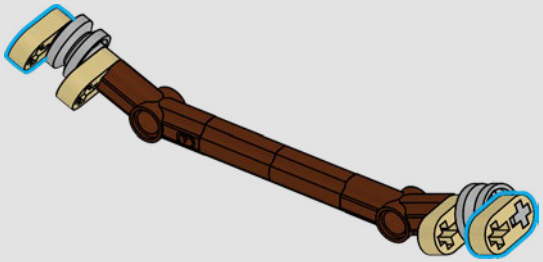

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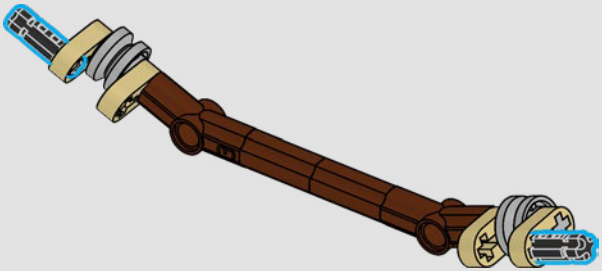
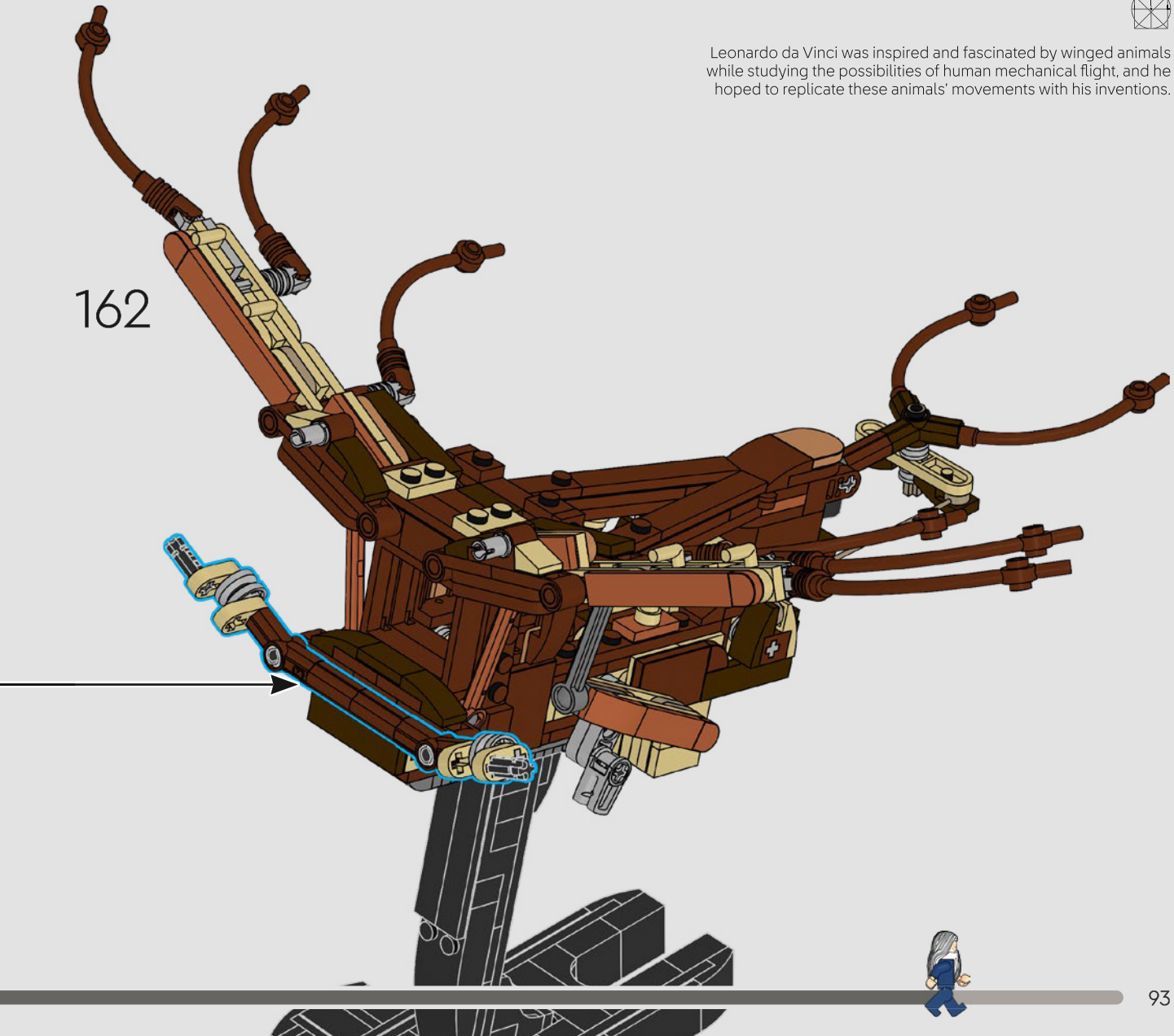
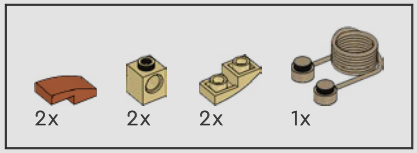


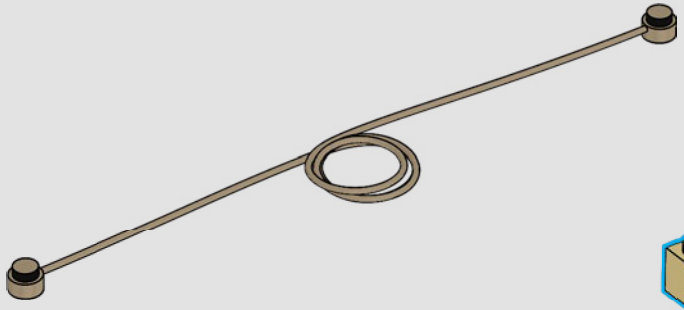
Leonardo da Vinci was inspired and fascinated by winged animals while studying the possibilities of human mechanical flight, and he hoped to replicate these animals' movements with his inventions.





163

1



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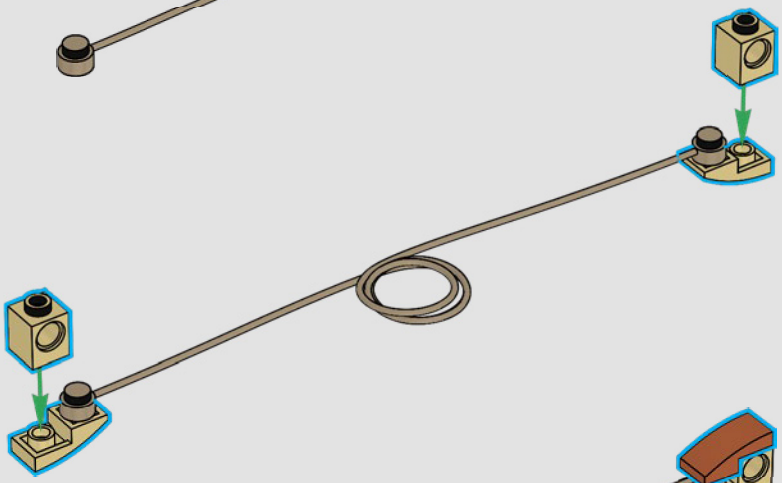

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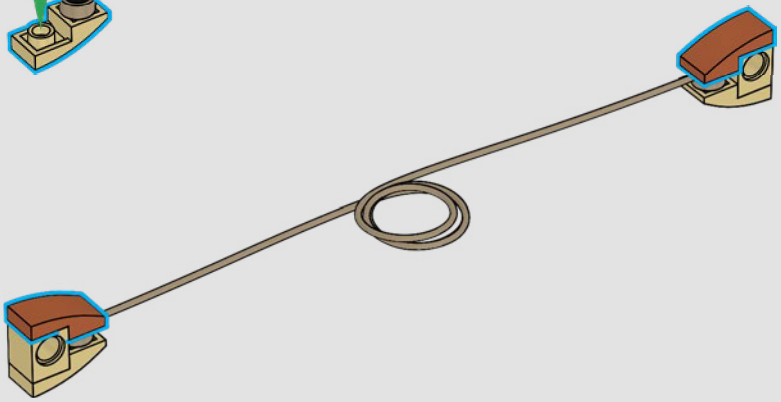

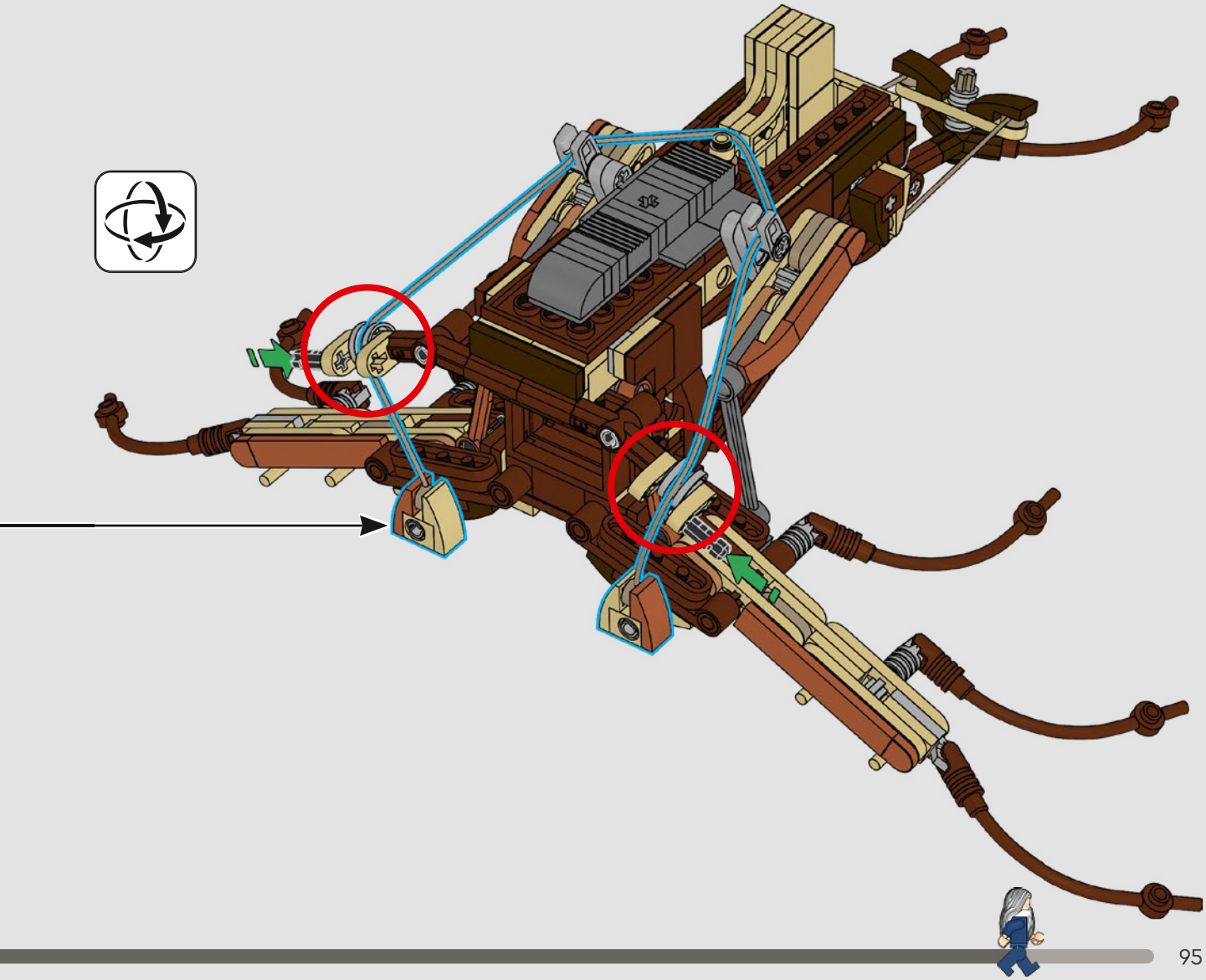

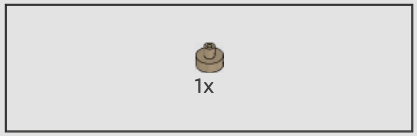

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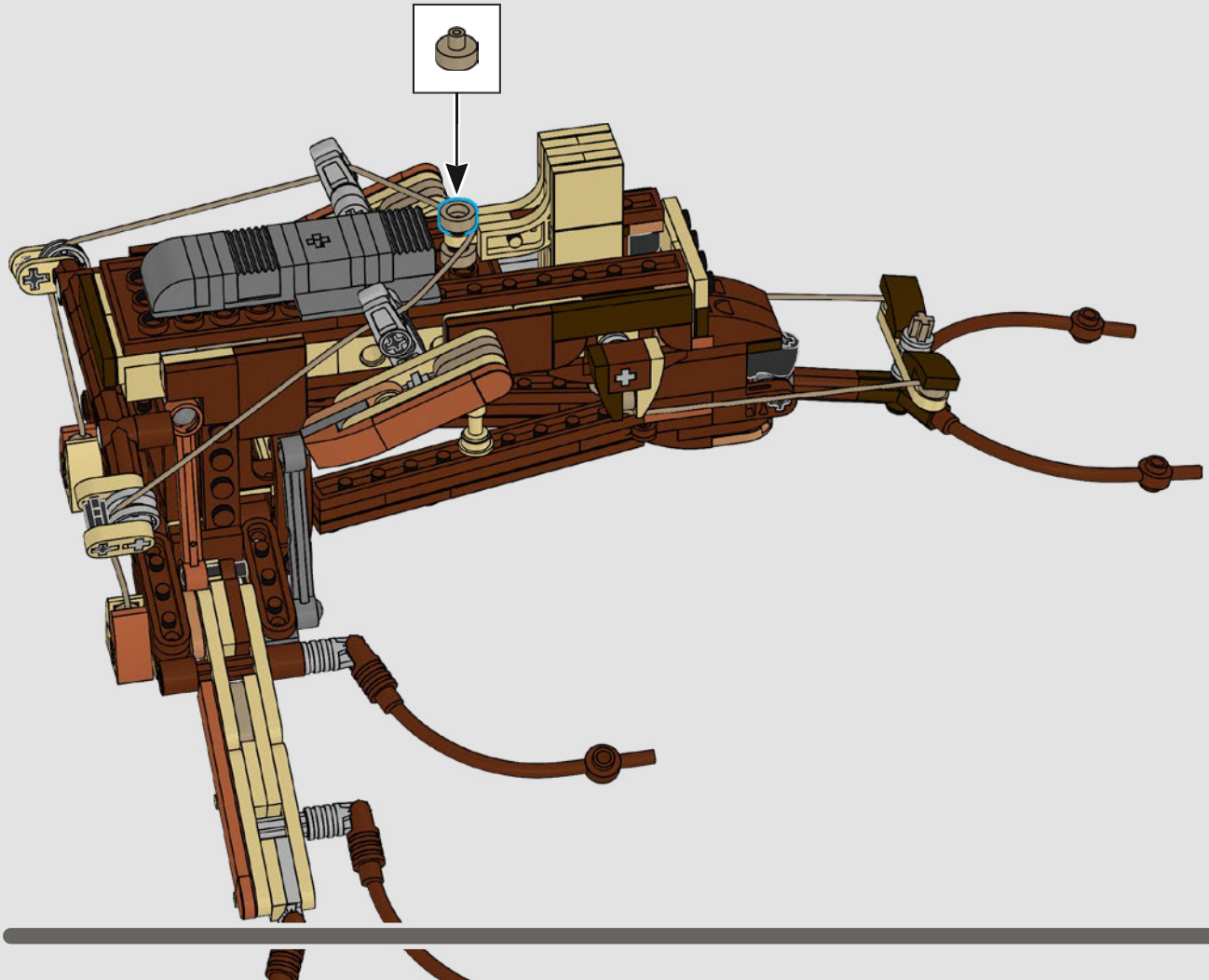

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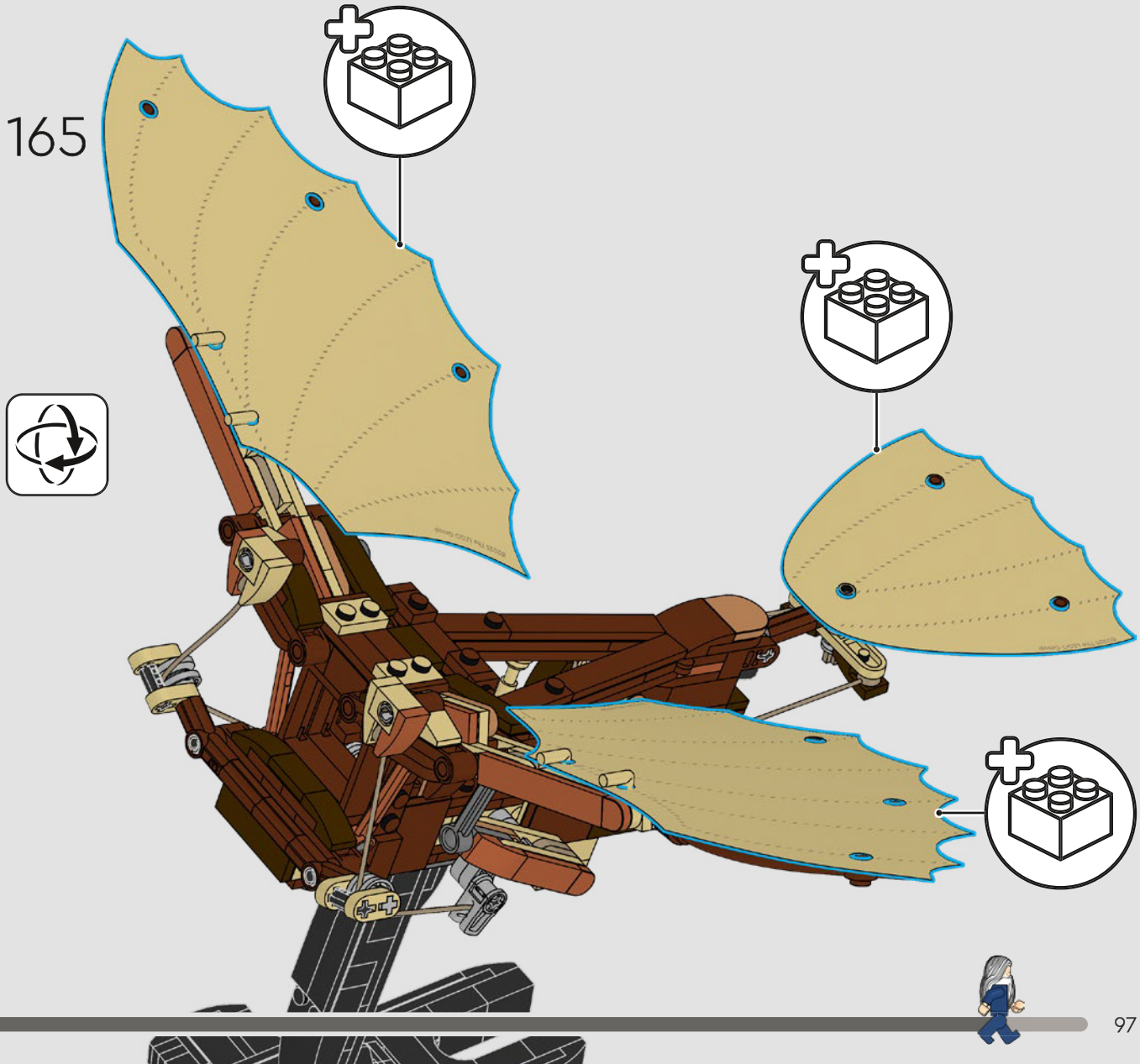
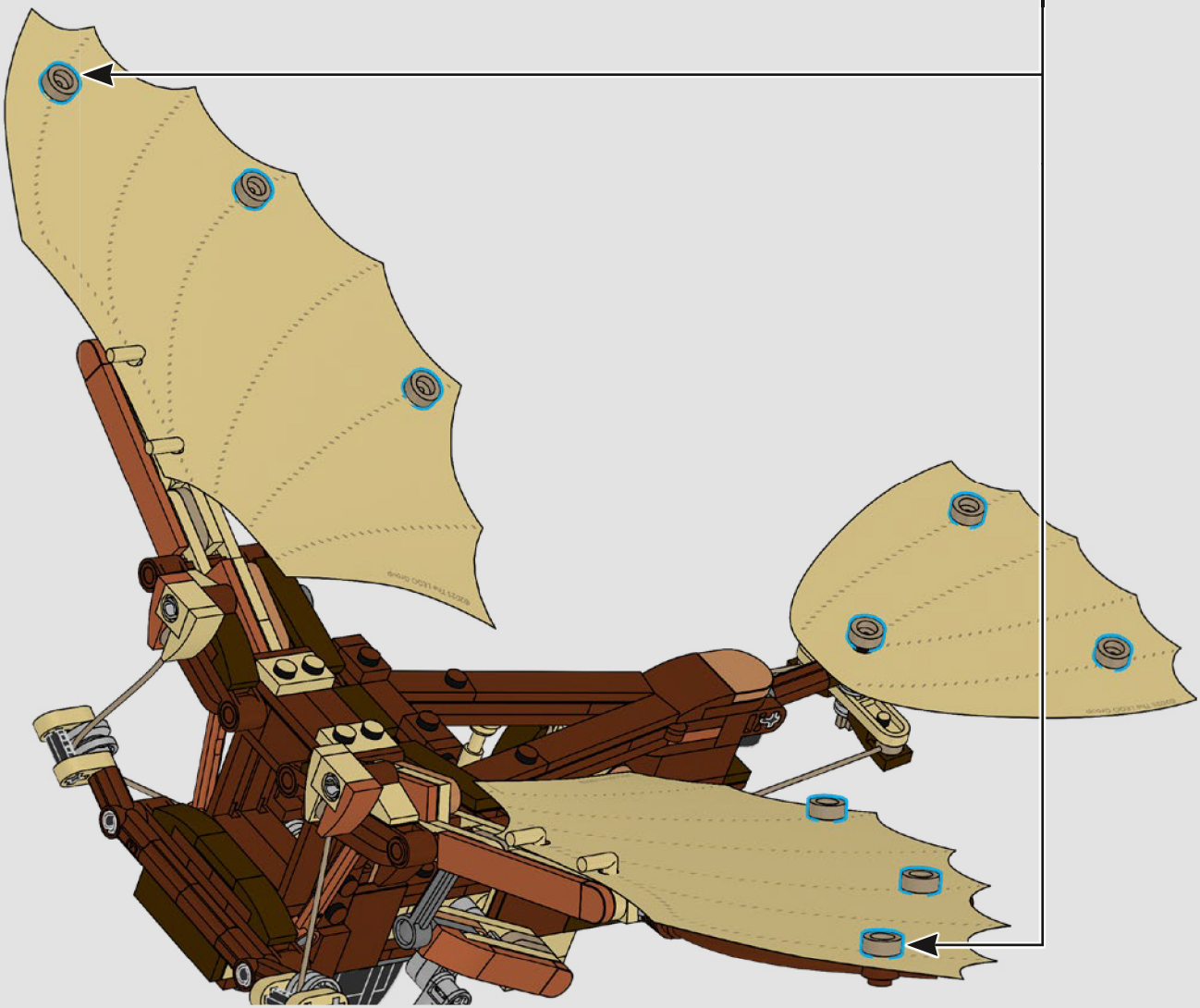


9x

9x

166



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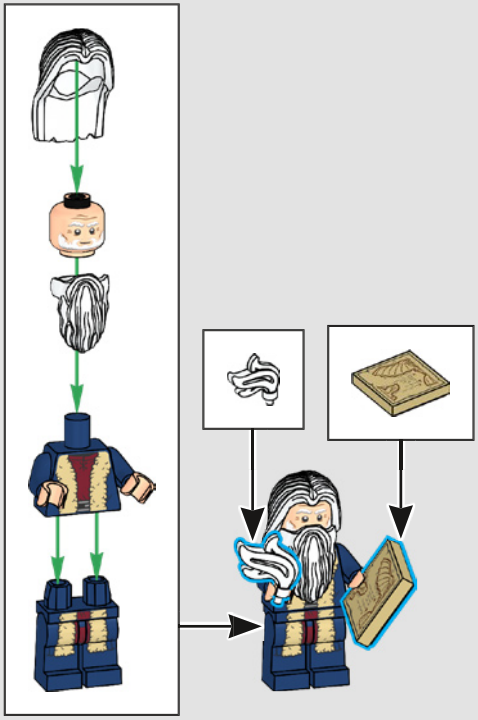
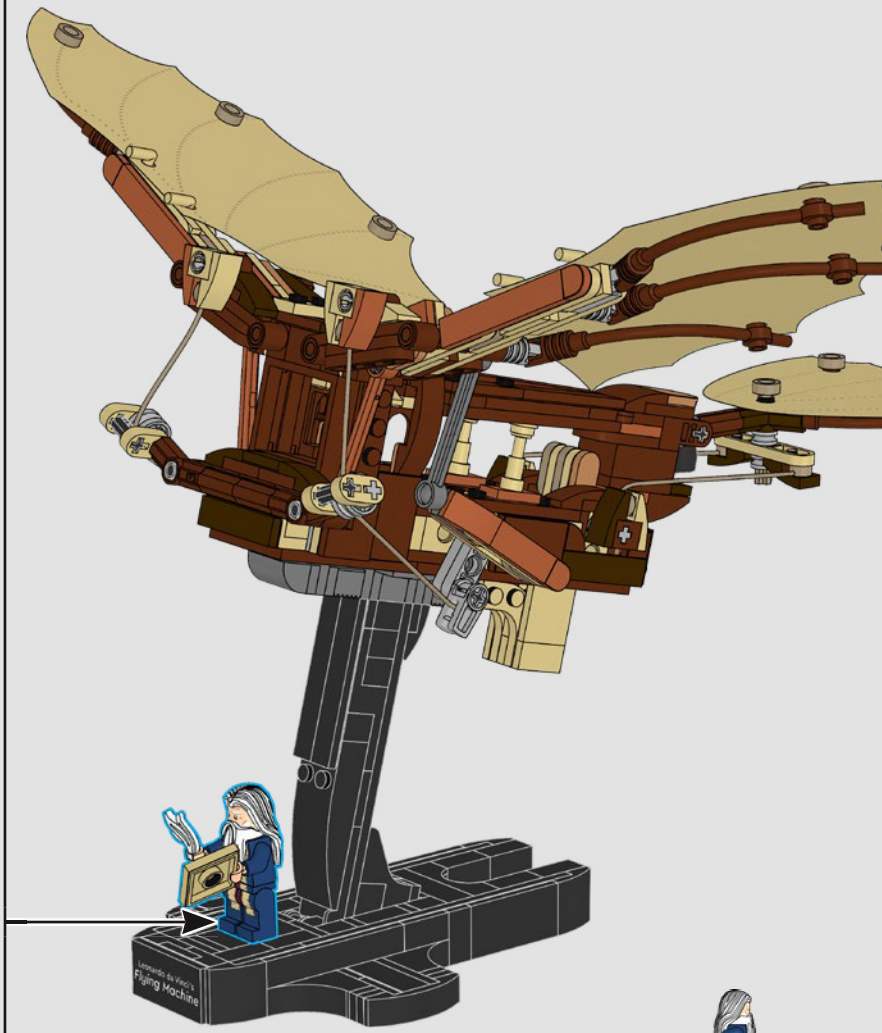
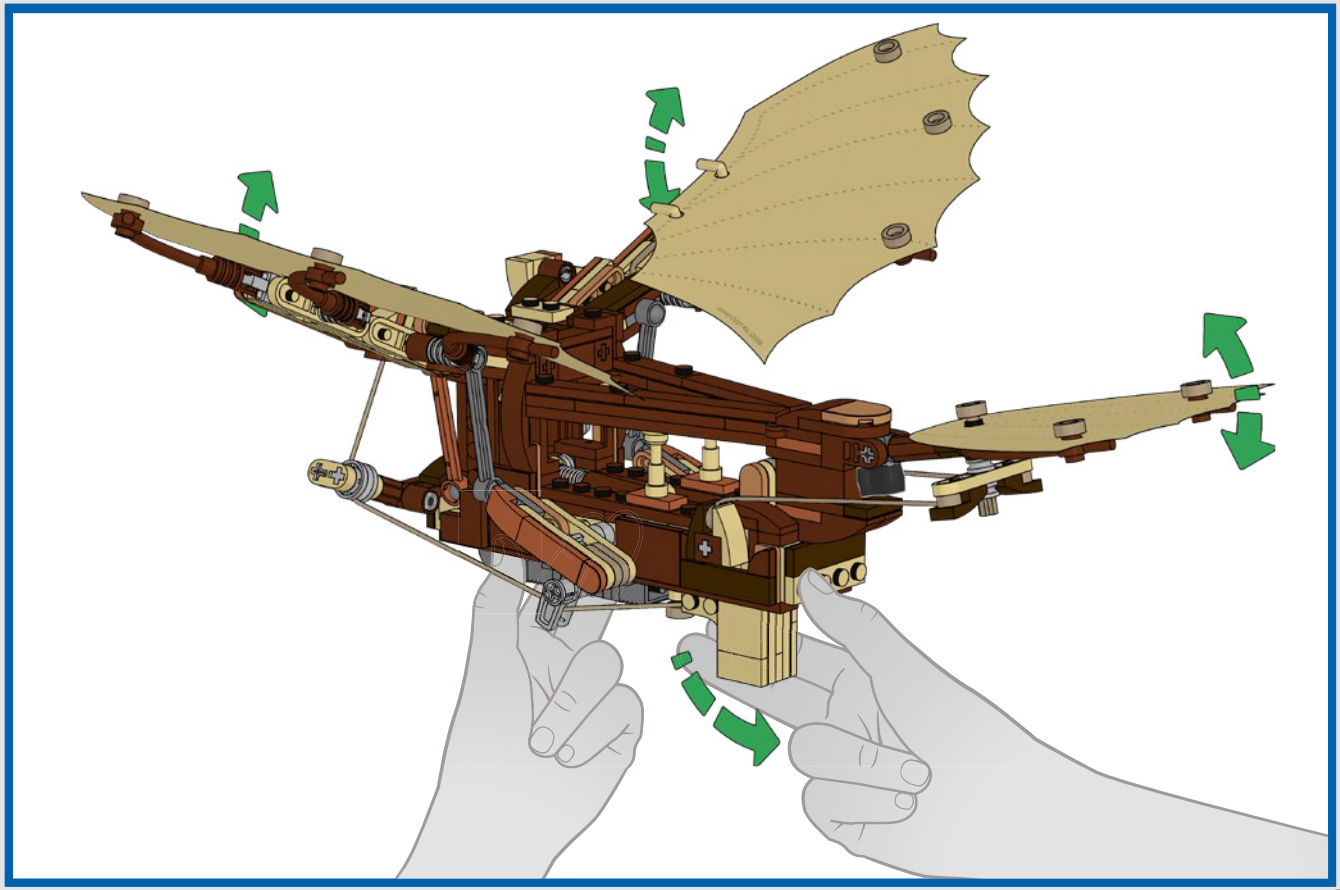


The model was designed so that the trigger can be activated in at least three different ways – on the stand, while held in one hand, and while held with two hands (one on the trigger, the other one holding the model).



One of the design challenges was to figure out where to place the trigger for the flapping function so that builders' hands don't interfere with any parts of the mechanism or strings.



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6279875

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6114987

7x
6178922

4x
302326

8x
306926

10x
6275806

2x
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3x
300326

4x
6053077

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6154860

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365926

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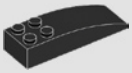
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4x
6492538

3x
4206482

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6129995

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1x
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4x
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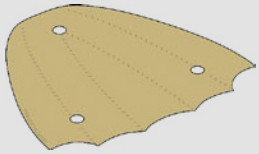
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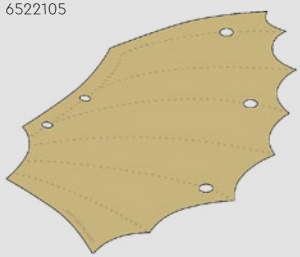
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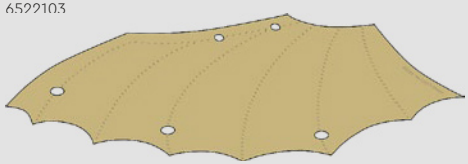
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6118832

2x
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8x
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3

4x
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7

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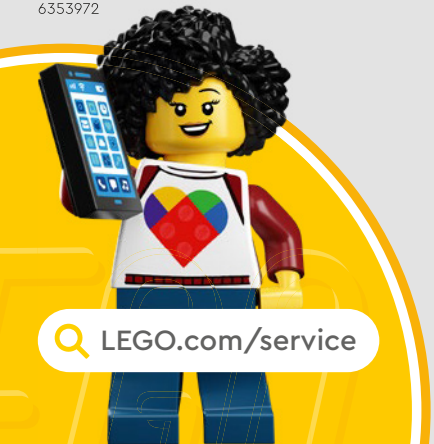
9



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