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Artiste, artisan, architecte aéronautique

Léonard de Vinci (1452-1519) est le maître incontesté de l'innovation de la Renaissance. Adoré par ses contemporains pour ses talents visionnaires, sa curiosité sans limites et son caractère flamboyant, Léonard de Vinci est aujourd'hui encore reconnu et honoré à juste titre pour son ingéniosité créative. Il a consacré sa vie à explorer et repousser les limites de l'art, de l'anatomie humaine et animale, de la physique et de l'ingénierie, avec une passion, une détermination et un savoir-faire inégalés. Au départ, ce sont ses tableaux, comme la Joconde et La Cène, qui ont rendu célèbre Léonard de Vinci dans le monde entier. Mais sa fascination constante pour le vol humain suscite une admiration tout aussi grande.





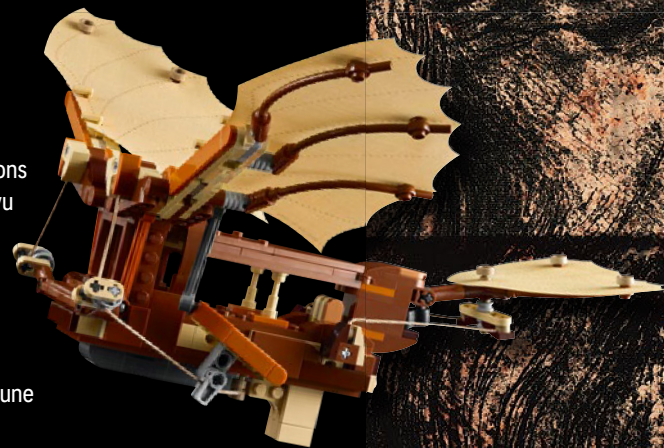
« Le plaisir le plus noble est la
joie de comprendre. »

– *Léonard de Vinci*



Imiter le vol des oiseaux

Bien que, selon certaines informations, les inventions aéronautiques de Léonard de Vinci n'aient jamais vu le jour de son vivant, ses idées, ses conceptions et ses études ont été une source d'inspiration précieuse pour les premiers avions fonctionnels, construits des siècles plus tard. L'ornithoptère est l'une de ses œuvres les plus célèbres, mais toutes ses inventions reposent sur la même idée : celle d'une seule personne pilotant une machine mécanique équipée d'ailes. En utilisant la force de son propre corps, le pilote tirait et poussait des manivelles et des cordes qui faisaient battre les ailes de haut en bas.



« **La simplicité est la sophistication ultime.** »

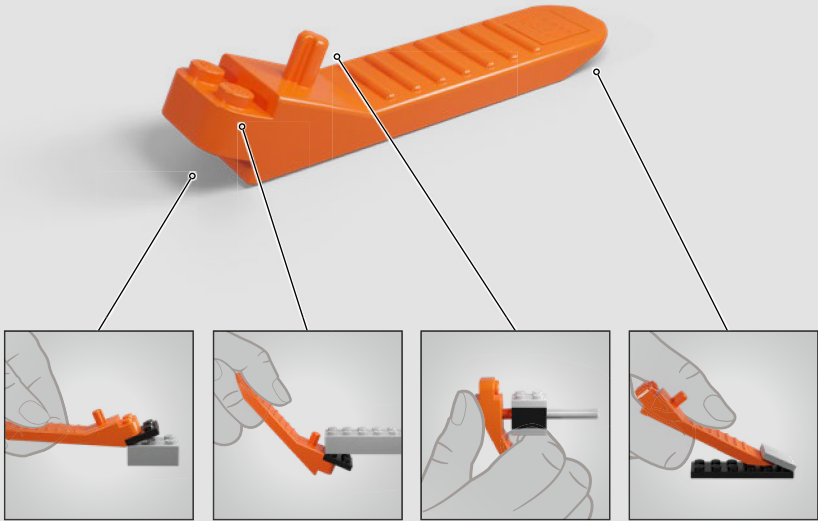
– *Léonard de Vinci*

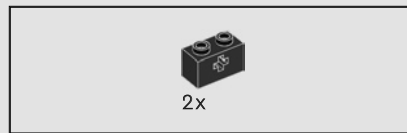


Le message de l'équipe de design LEGO®

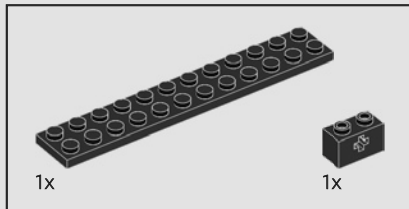
« C'est là que notre travail de conception a commencé : fabriquer une machine équipée de pièces mobiles toutes reliées entre elles et que l'on active en tirant sur des ficelles, ou dans ce cas précis, sur une seule ficelle. Simple à première vue, ce modèle est en réalité un formidable défi d'ingénierie LEGO®. Le modèle semble être fabriqué en bois, en lin et en corde. Le squelette de la queue et des ailes est en briques, tandis que les ailes sont en tissu, orné d'un motif imprimé. Faire de la ficelle en textile la pièce maîtresse du mécanisme de battement des ailes était un défi incroyable ! Les pièces mécaniques du modèle sont exposées afin de mettre en valeur les parties fonctionnelles et la vision de Léonard de Vinci, mais aussi pour laisser notre propre interprétation de la conception d'origine prendre son envol. »

Antica Bracanov
Senior Designer LEGO®

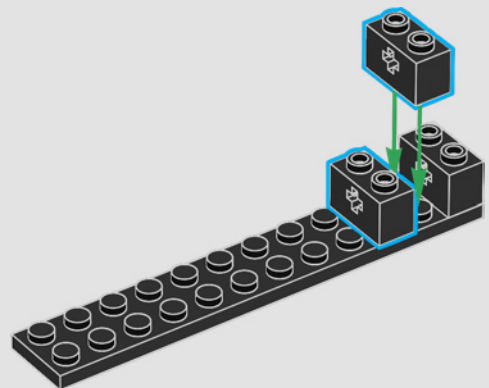
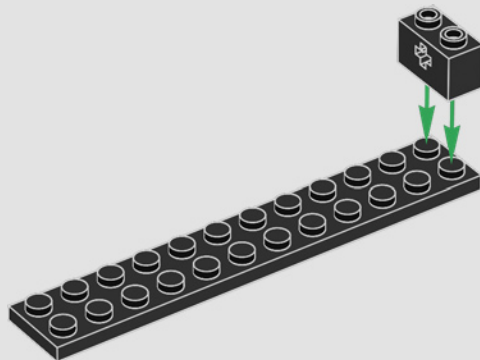


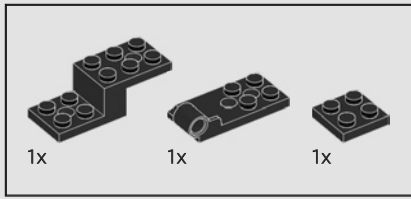


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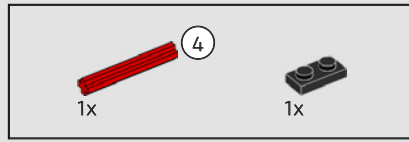
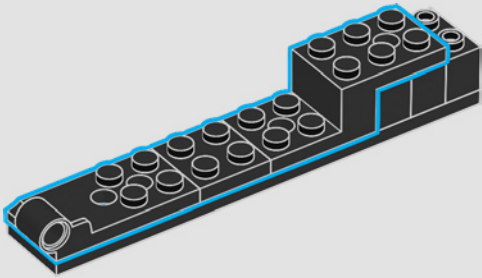


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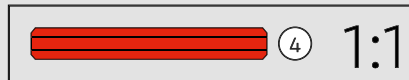
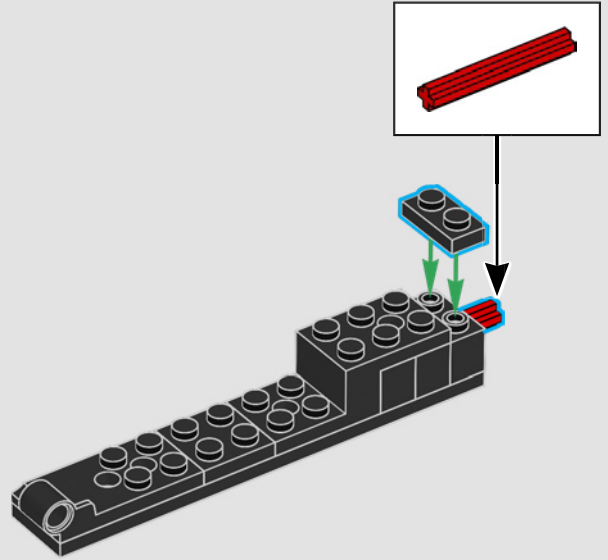


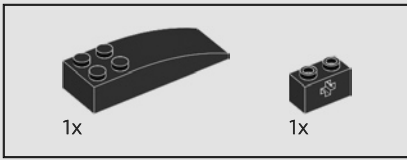


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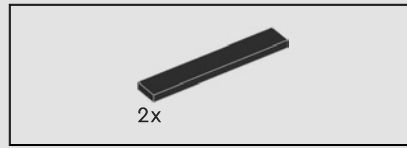
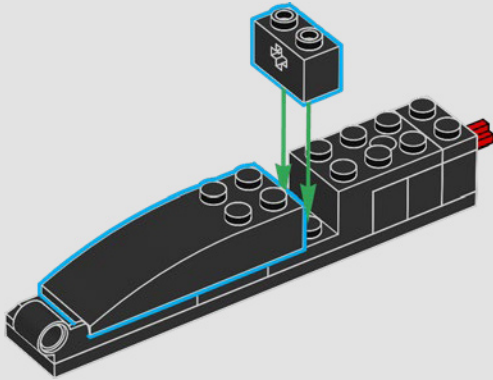


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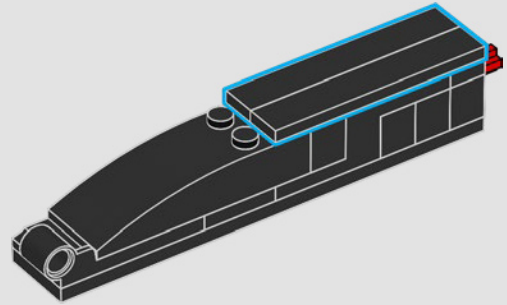


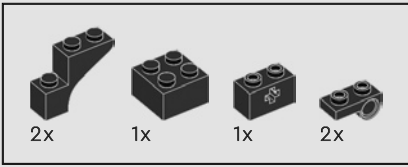


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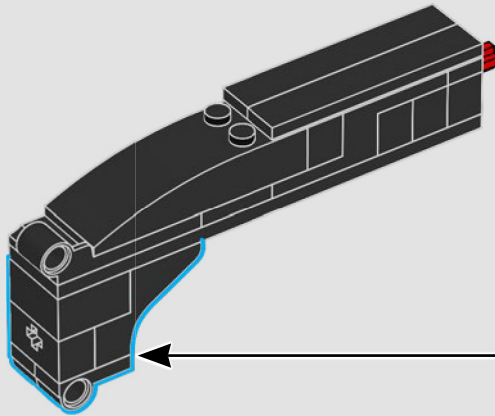
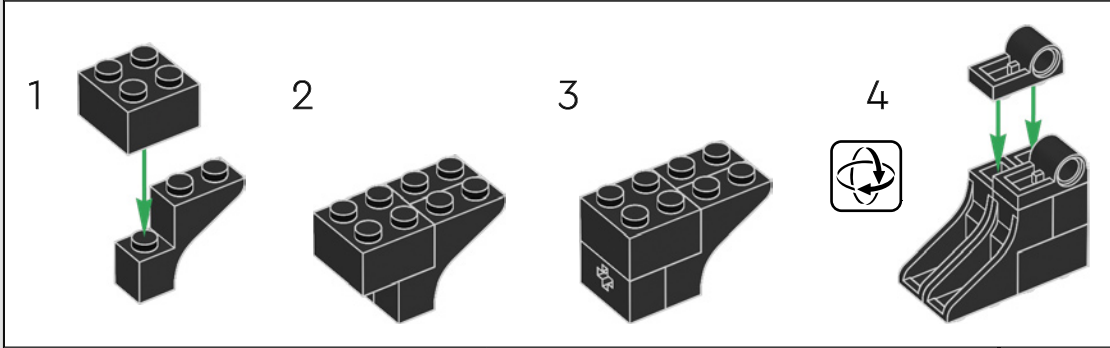


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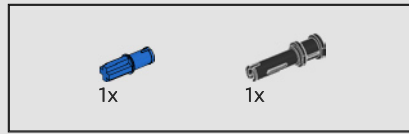
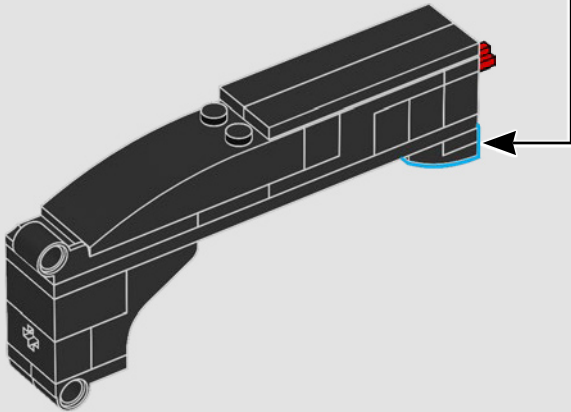
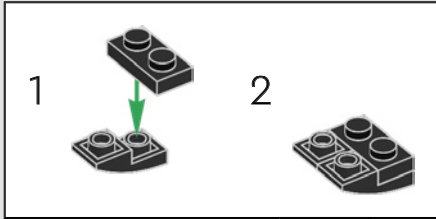


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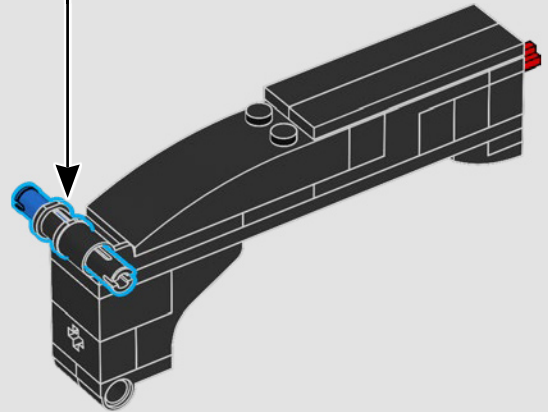
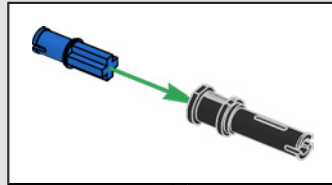


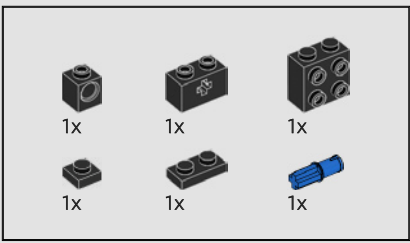


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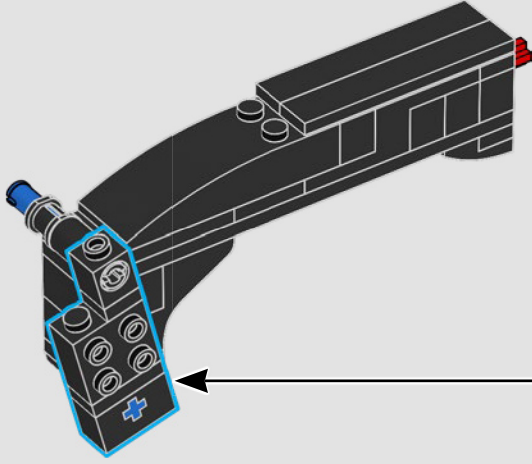
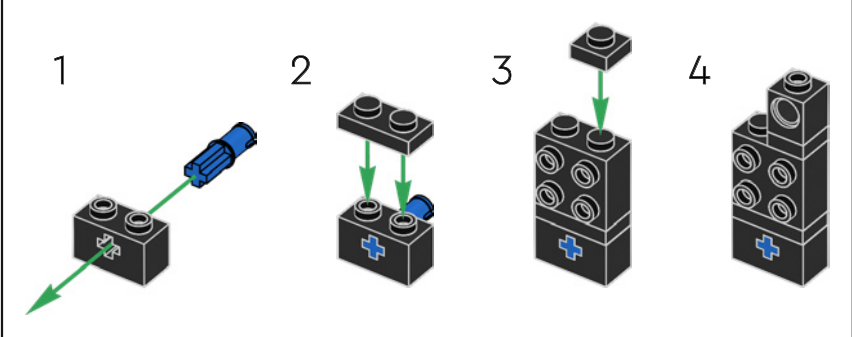


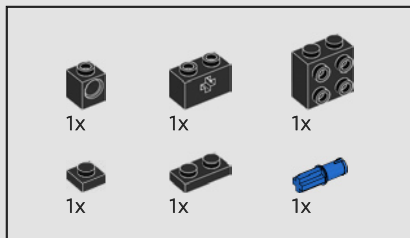
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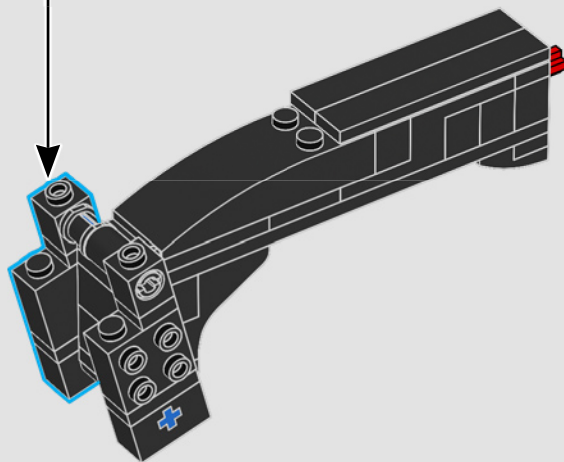
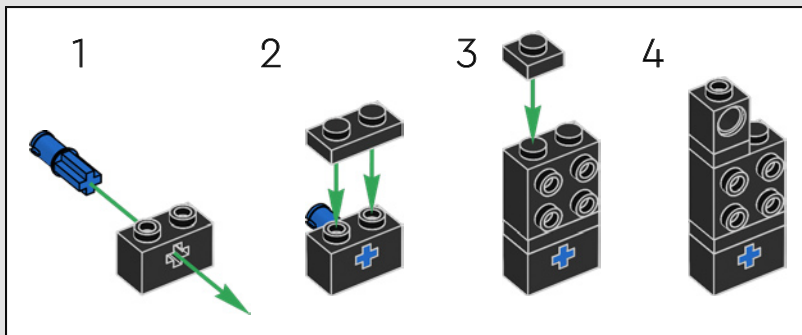


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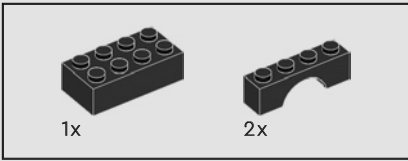




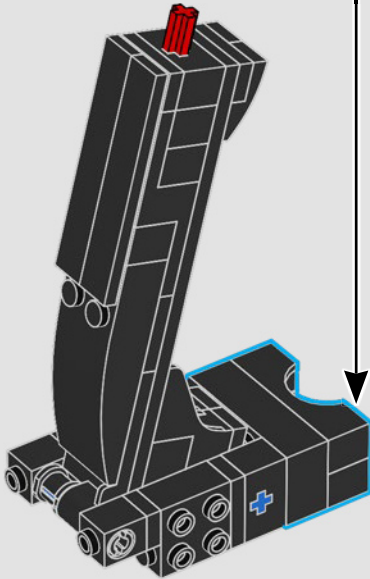
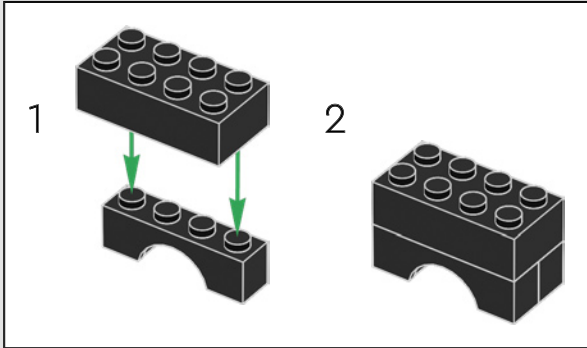
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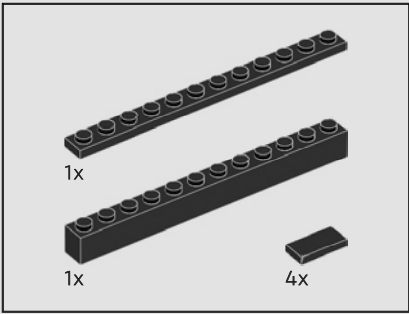


L'une des machines de Léonard de Vinci, connue sous le nom de Il Grande Nibbio, a été inspirée et nommée d'après un oiseau de la famille des Accipitridés : le cerf-volant.

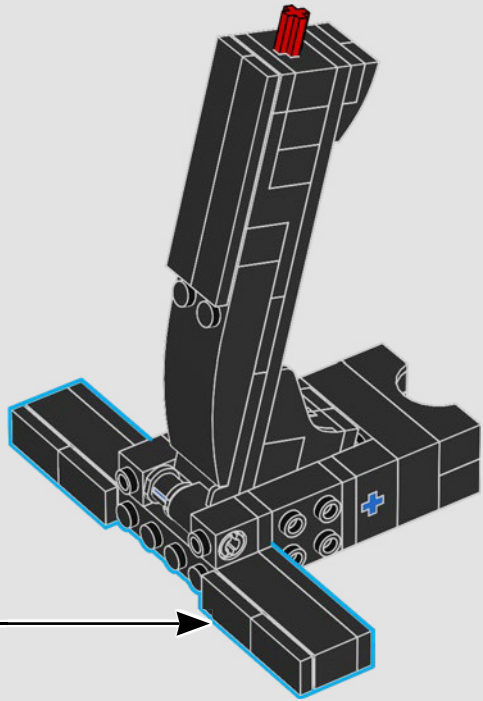
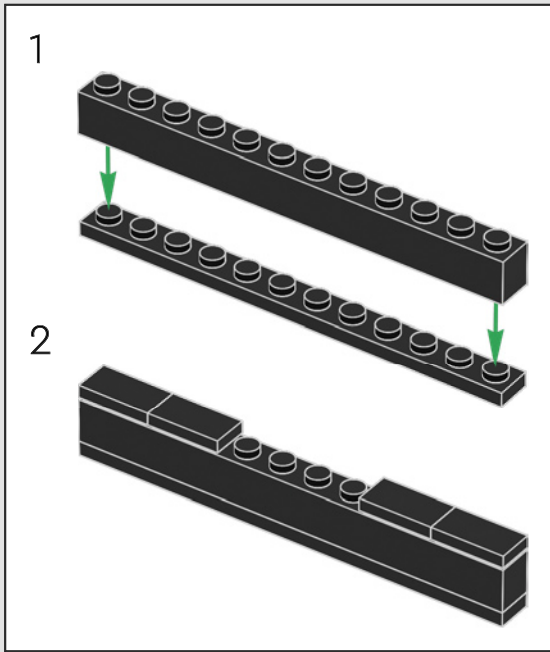


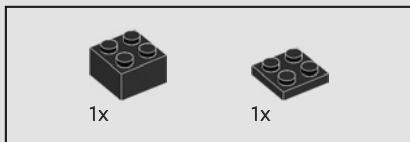
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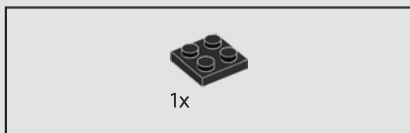
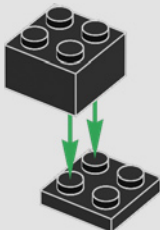


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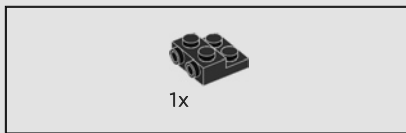
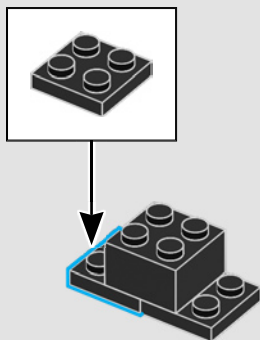




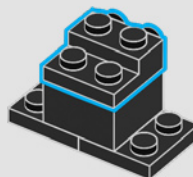
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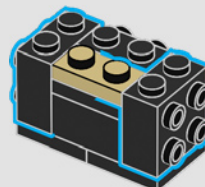
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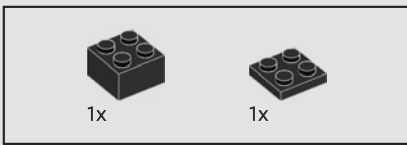


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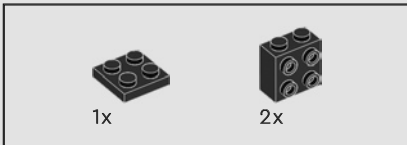
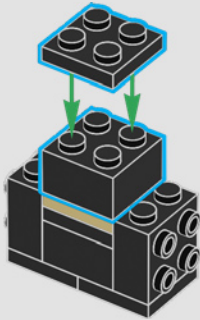


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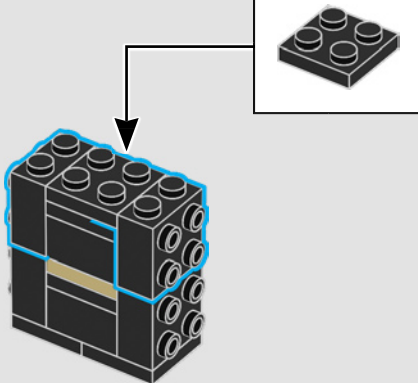




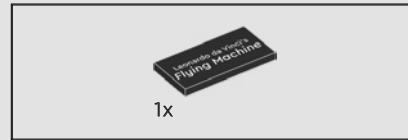
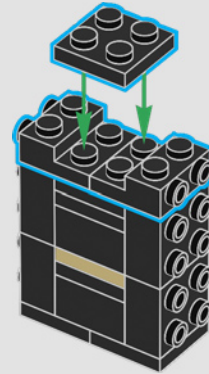
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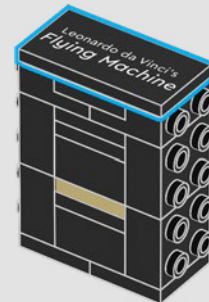
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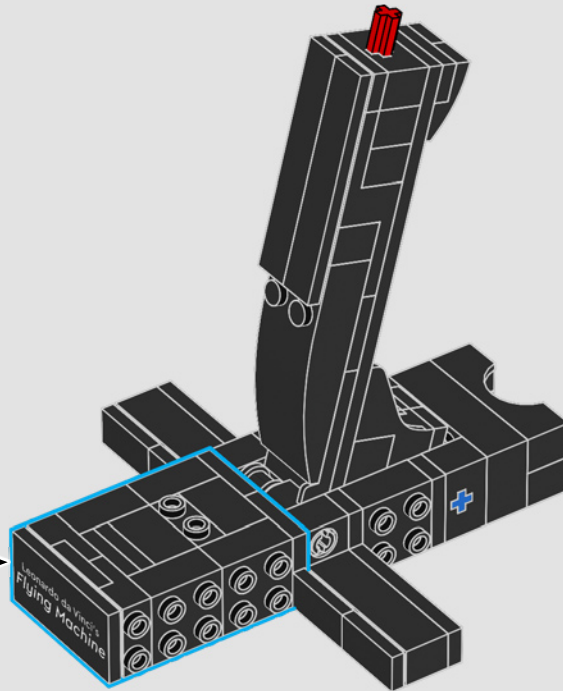
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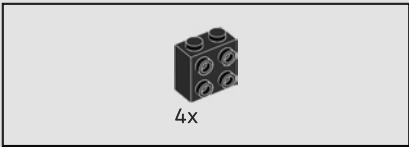




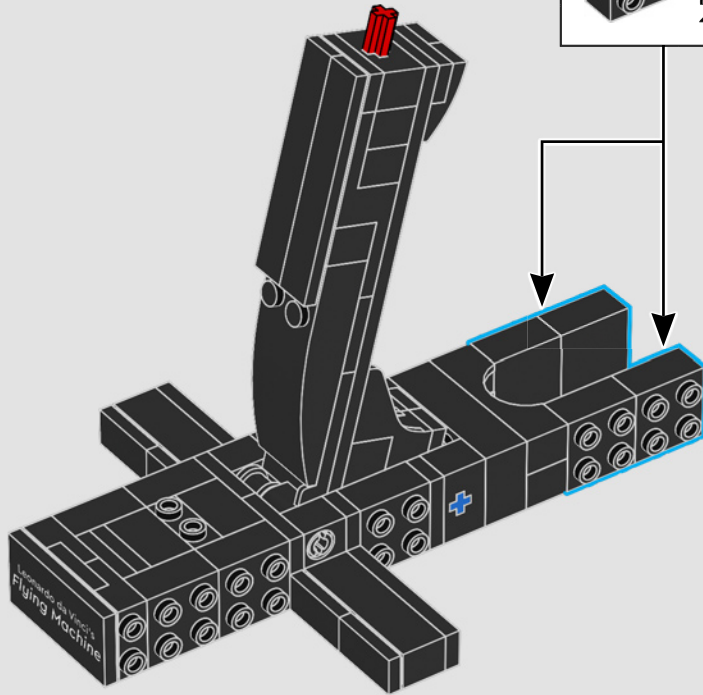
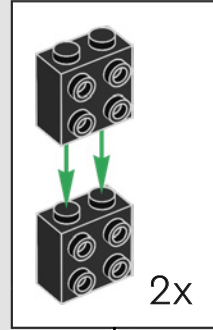
Léonard de Vinci est célèbre pour avoir utilisé l'écriture inversée dans ses carnets. Ses écrits ne pouvaient être lus correctement que s'ils étaient placés devant un miroir.

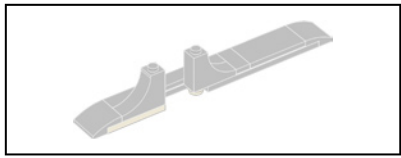
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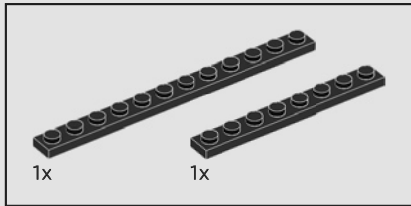


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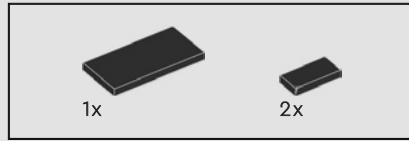
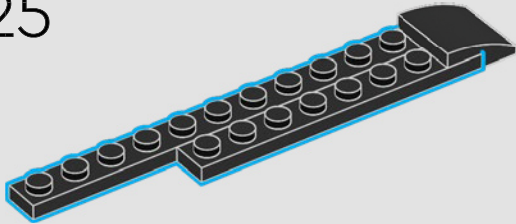




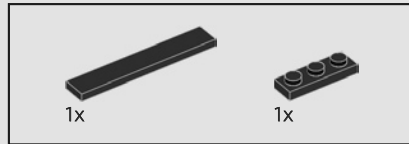
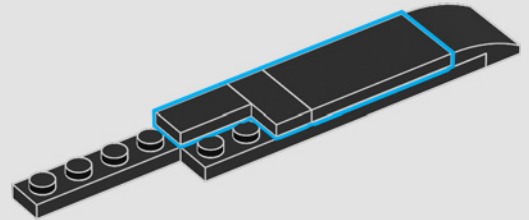
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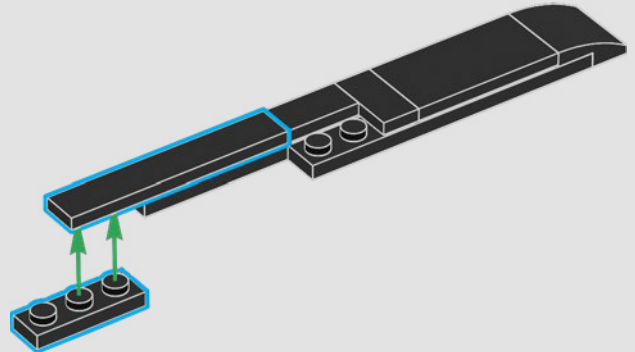
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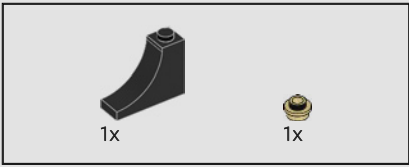


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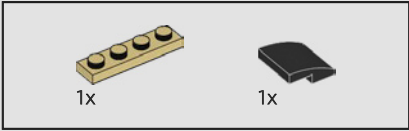
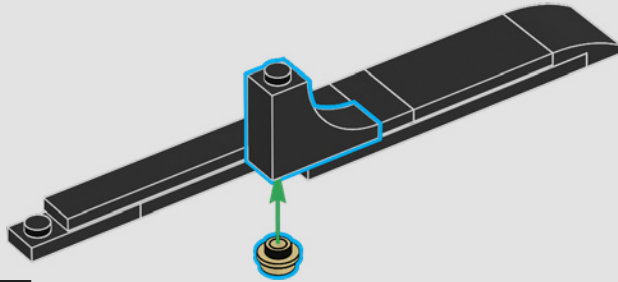


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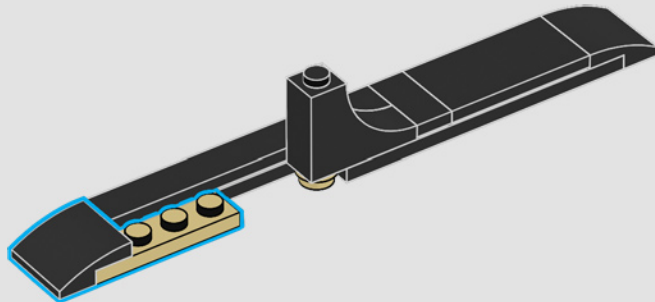


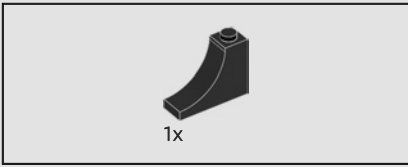


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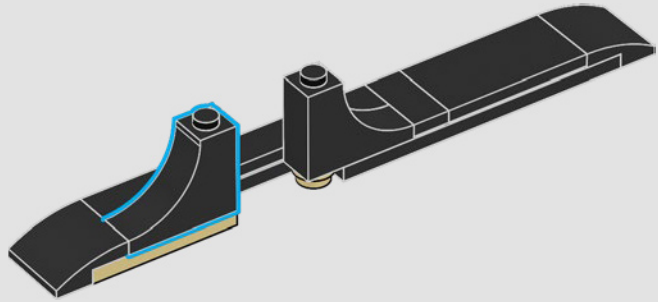


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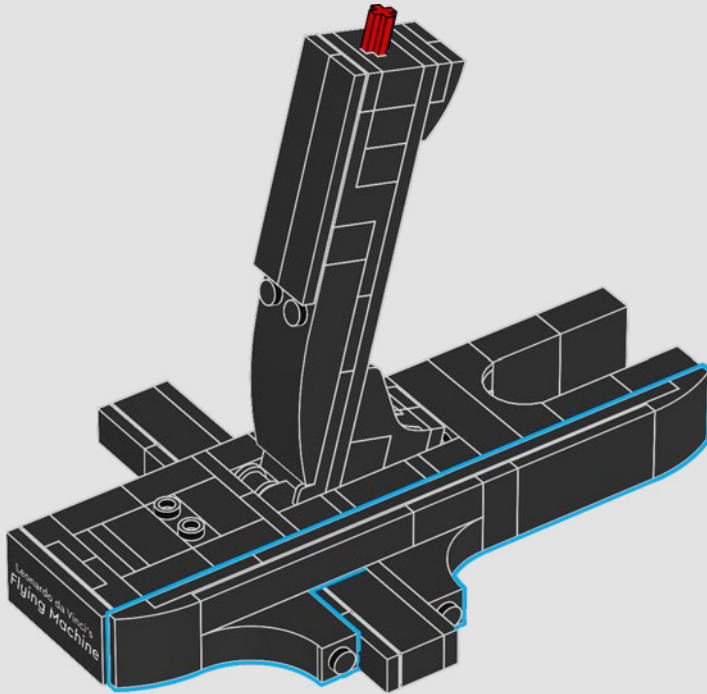


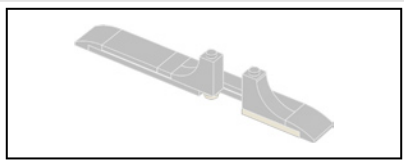


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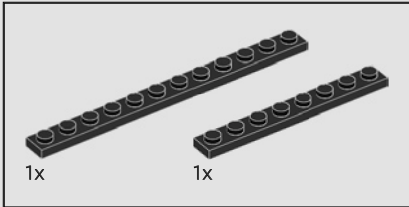


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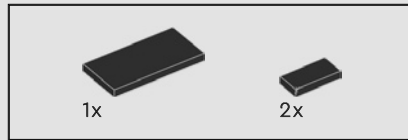
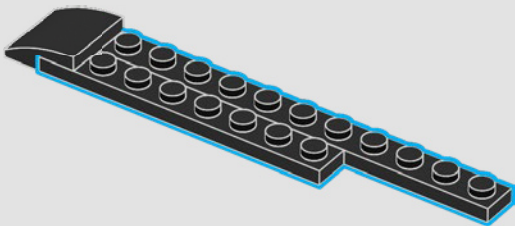




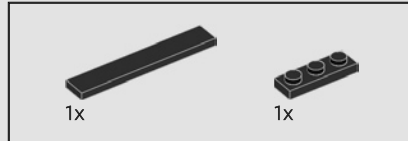
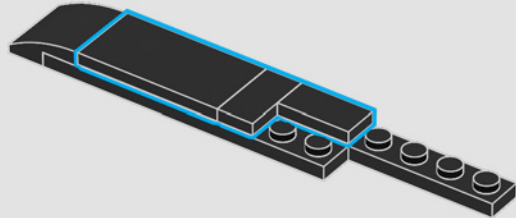
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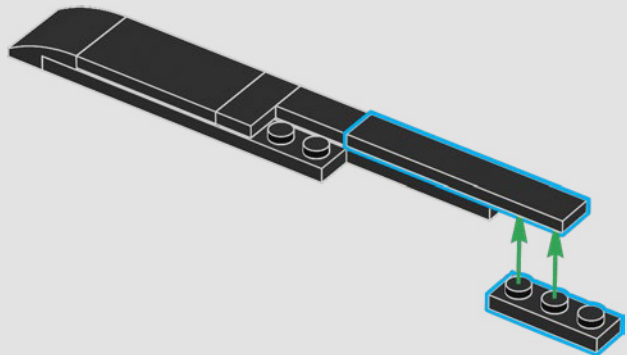
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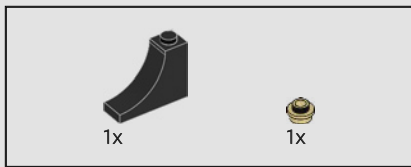


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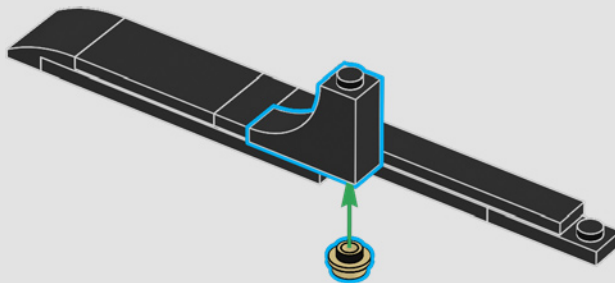


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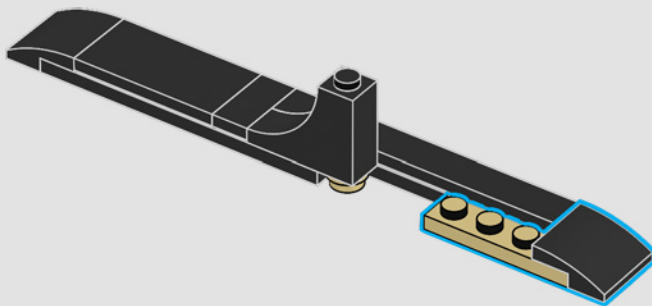


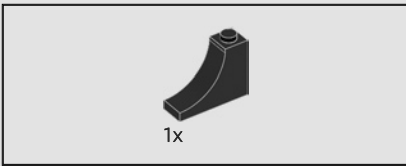


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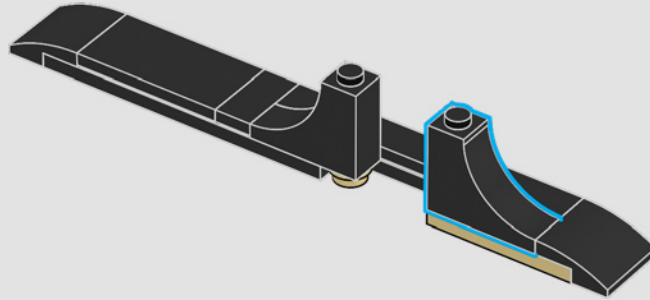


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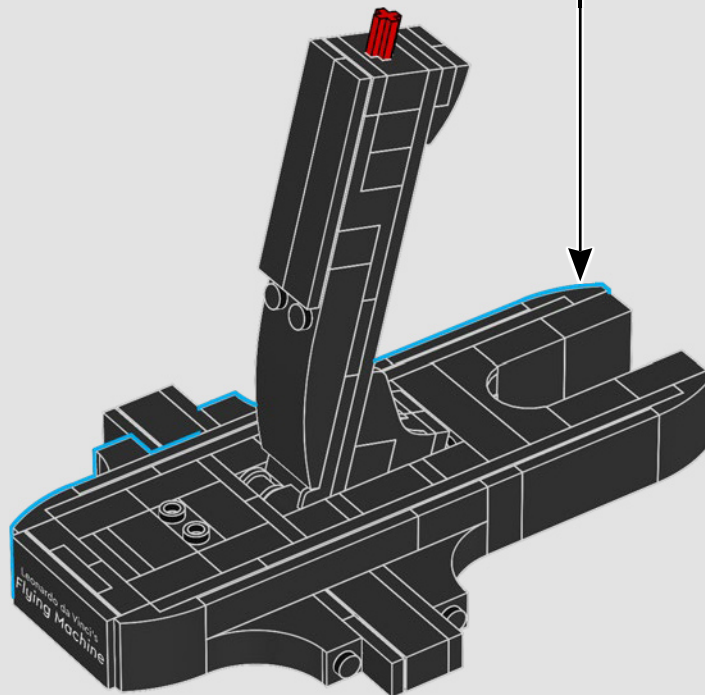




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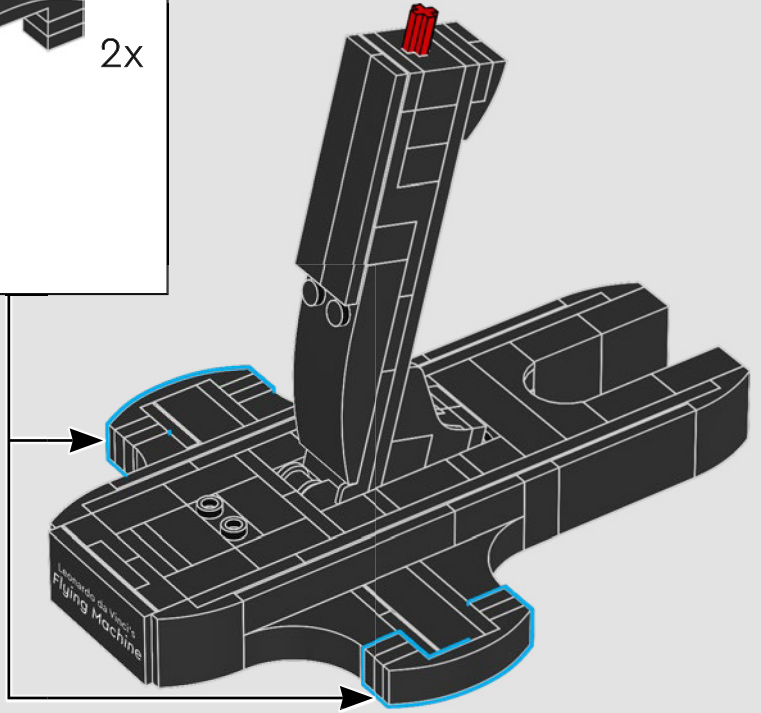
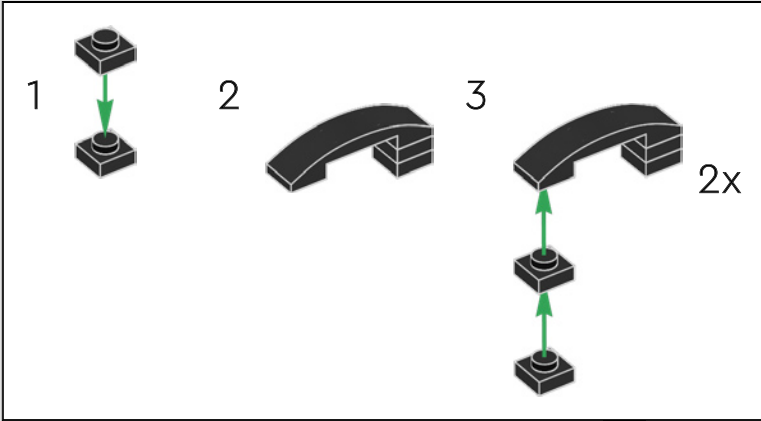




Léonard de Vinci est connu pour avoir rédigé plus de 35 000 mots et effectué plus de 500 croquis sur le vol et les machines volantes !

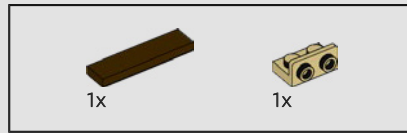
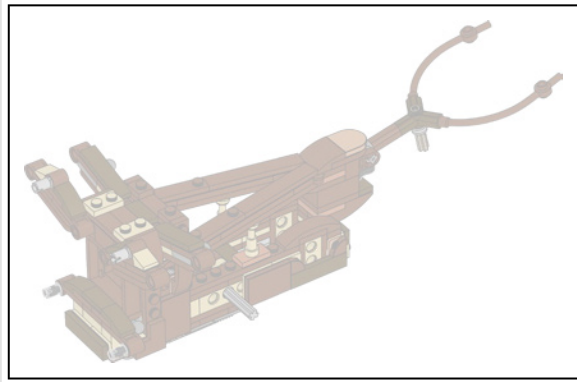
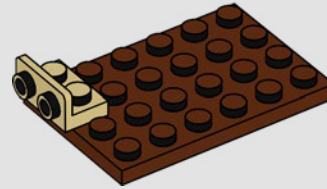


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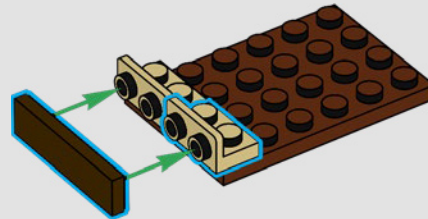


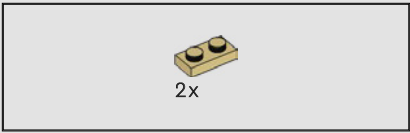


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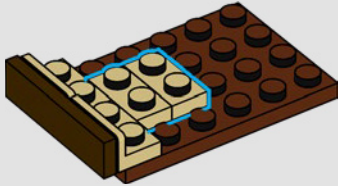


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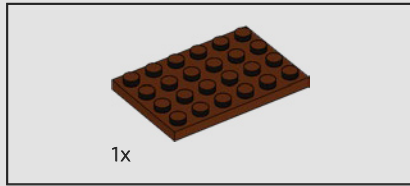
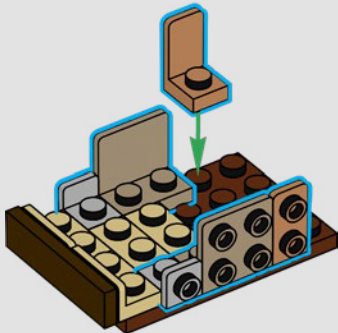




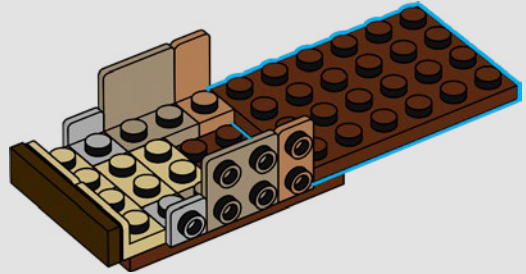
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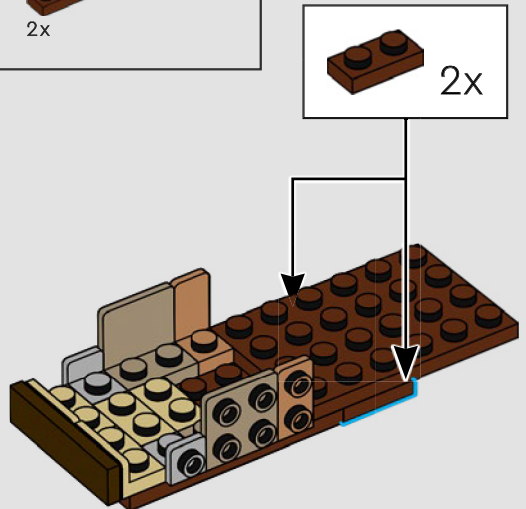
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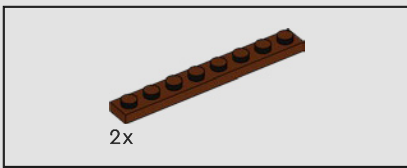


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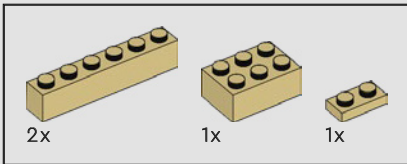
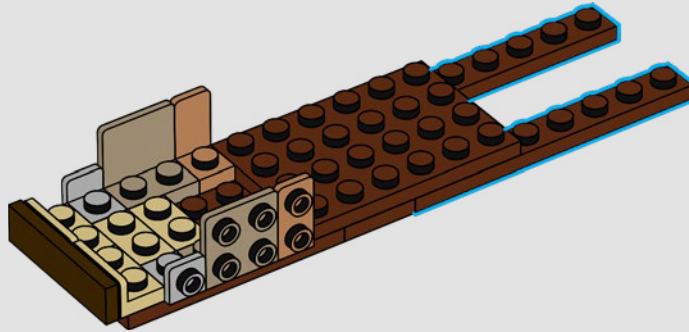


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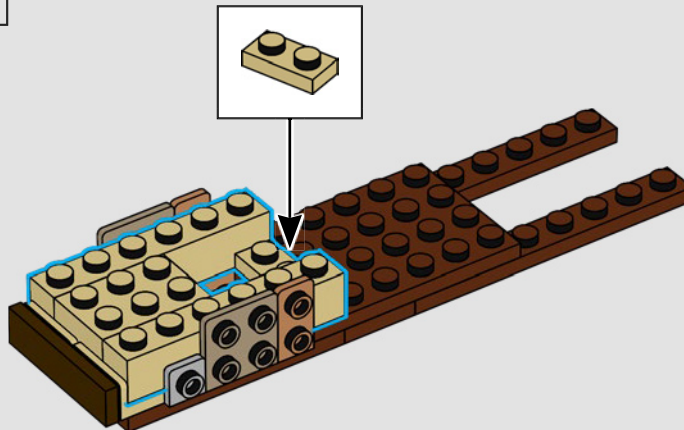


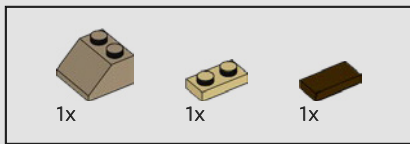


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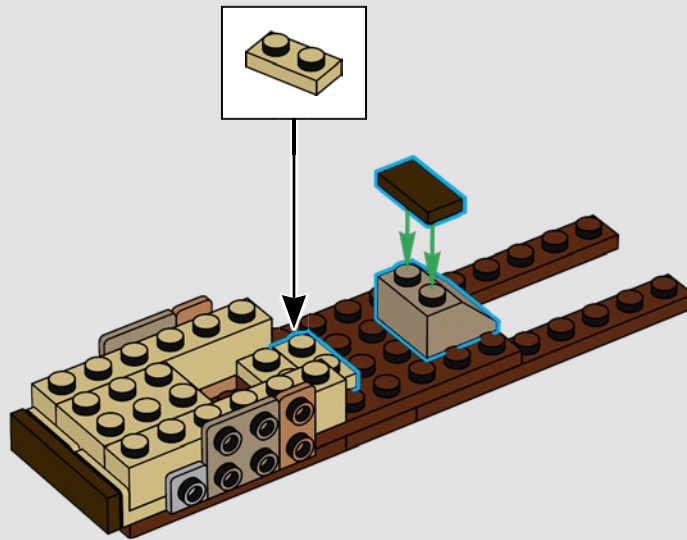


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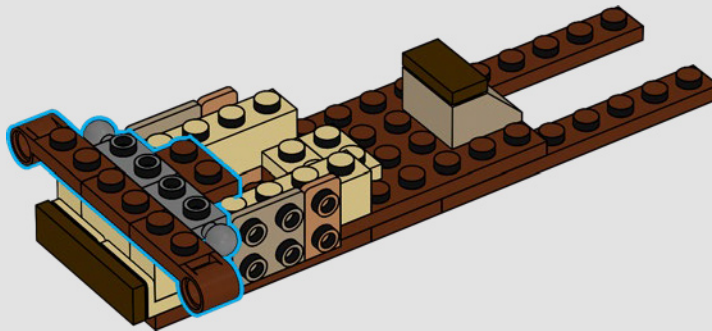


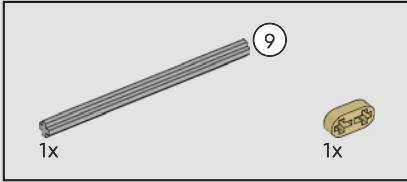
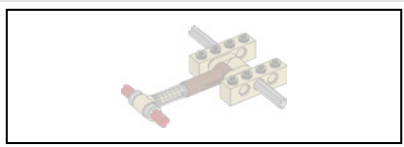


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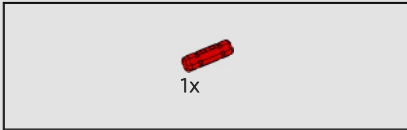
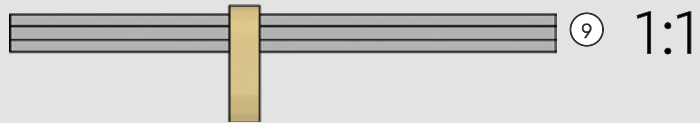


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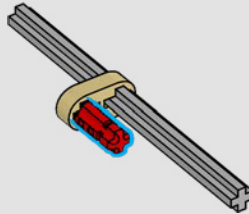




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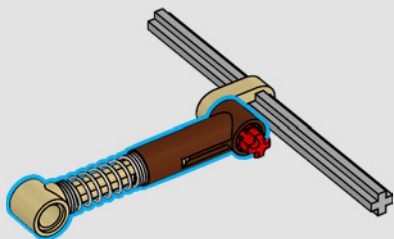


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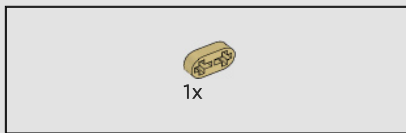
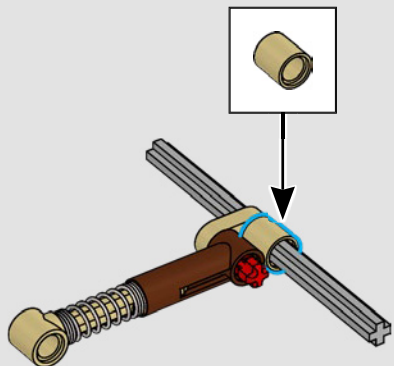




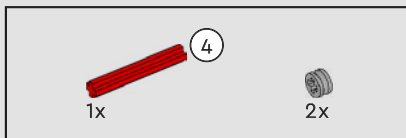
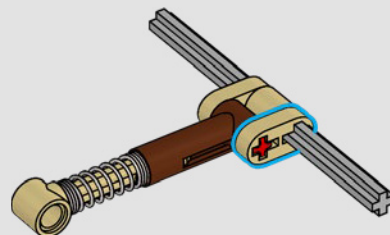
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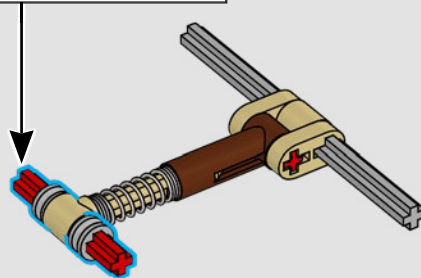
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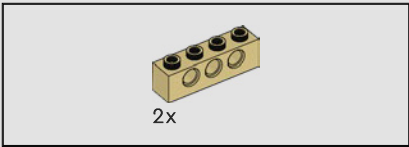


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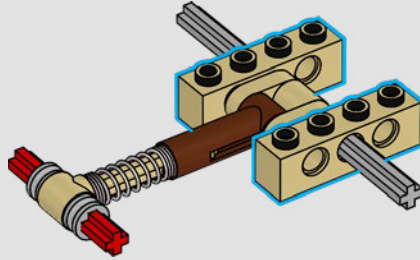


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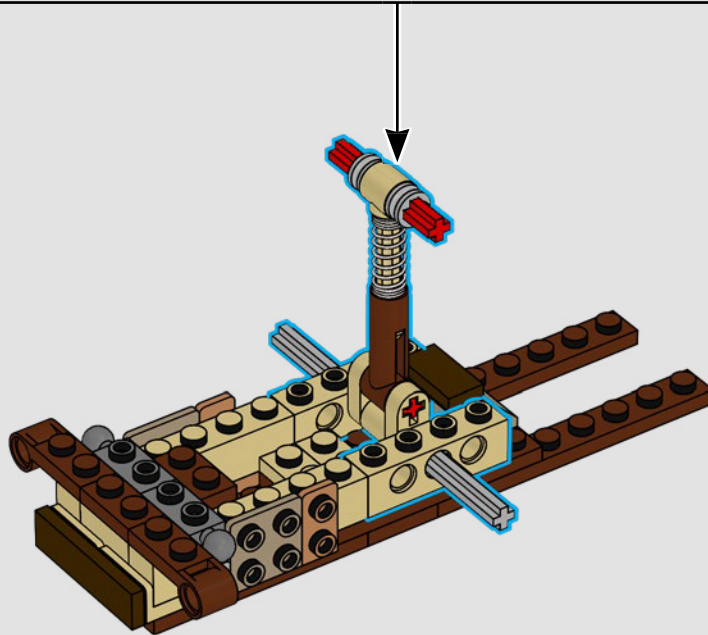




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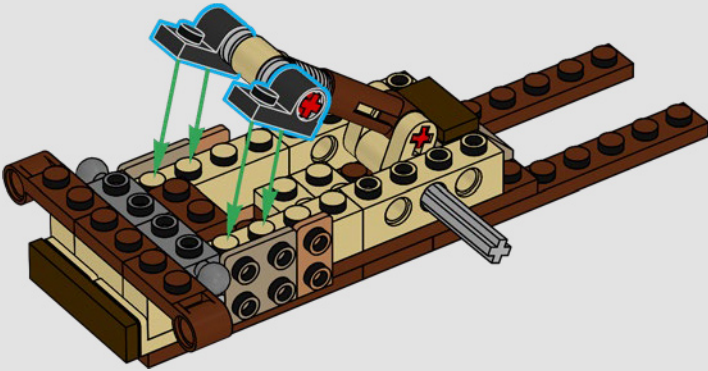


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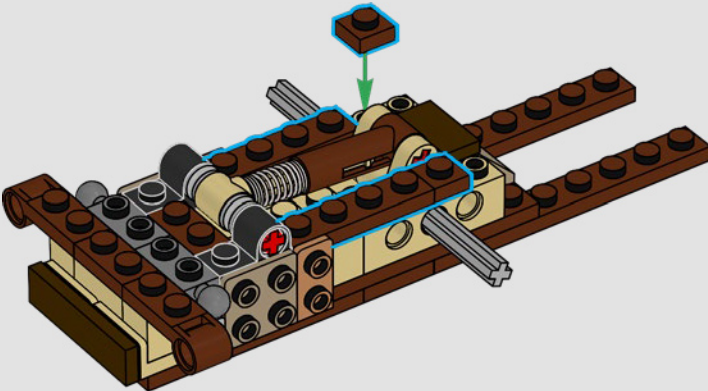


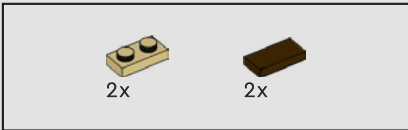


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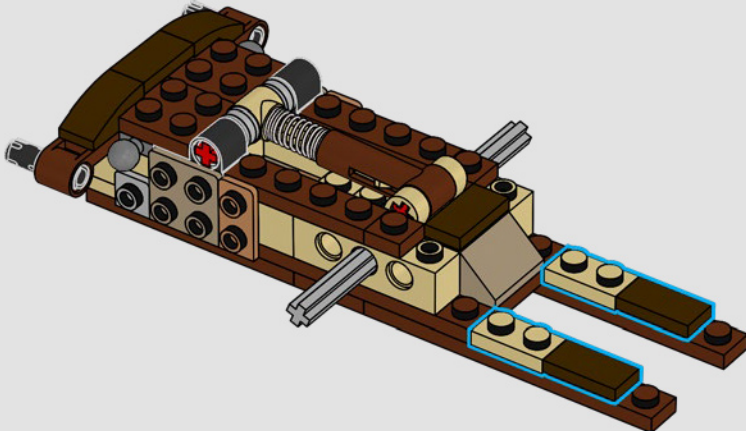


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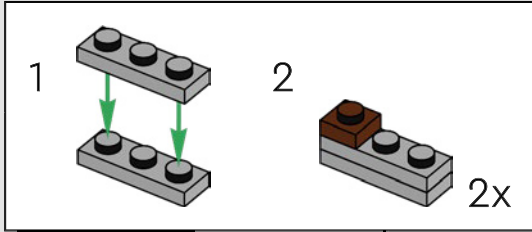
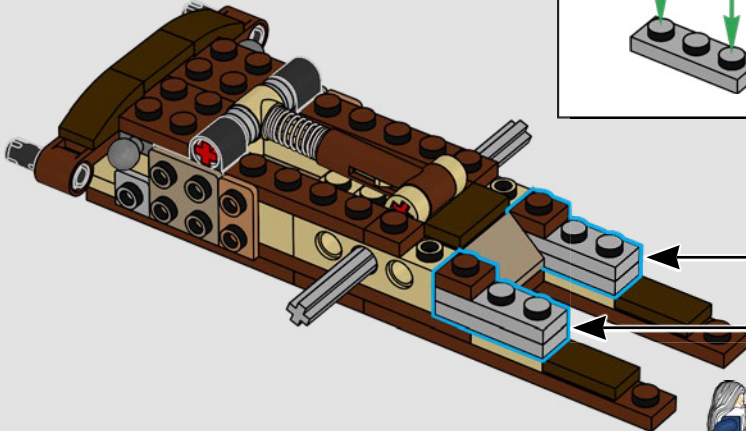


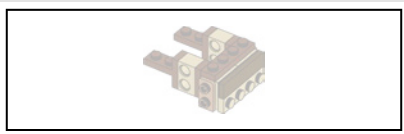


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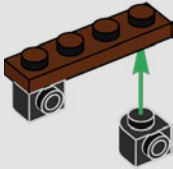


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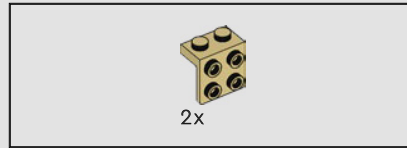
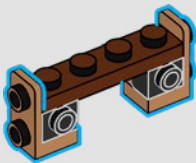




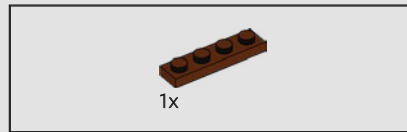
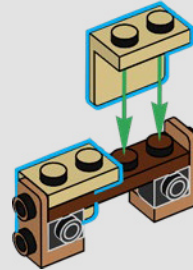
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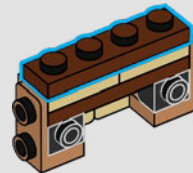
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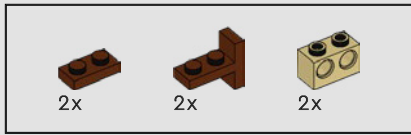


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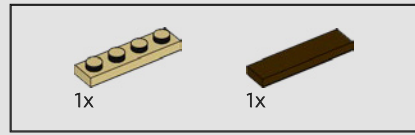
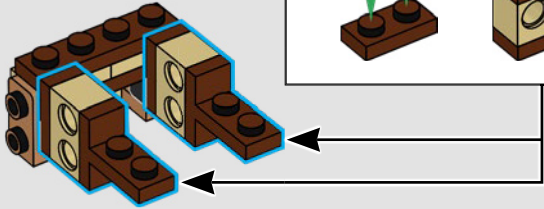
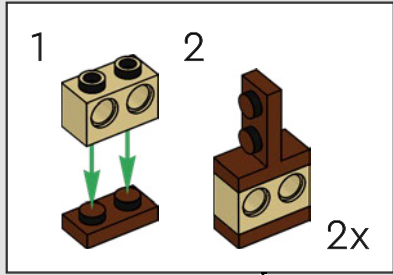


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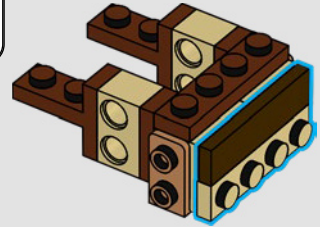




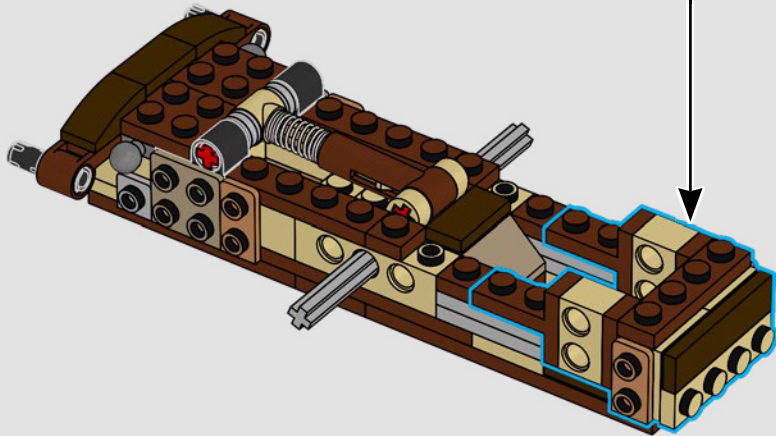
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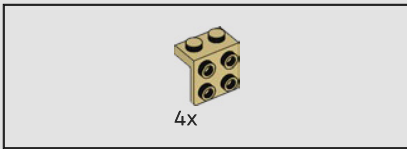


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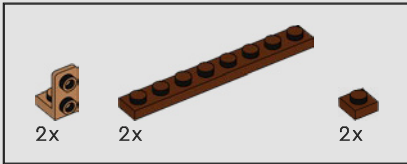
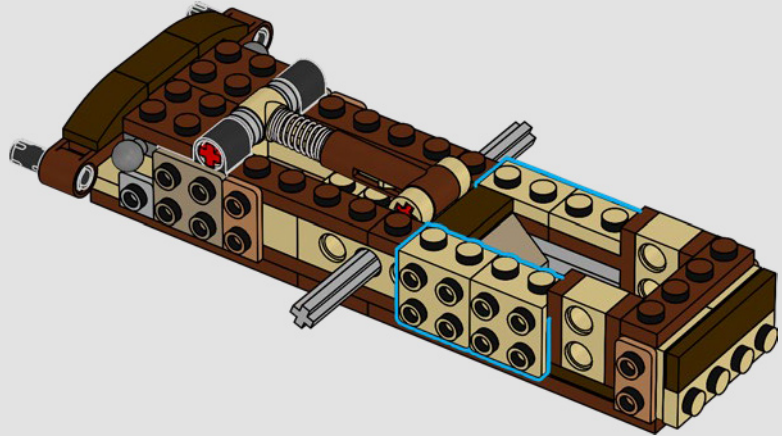


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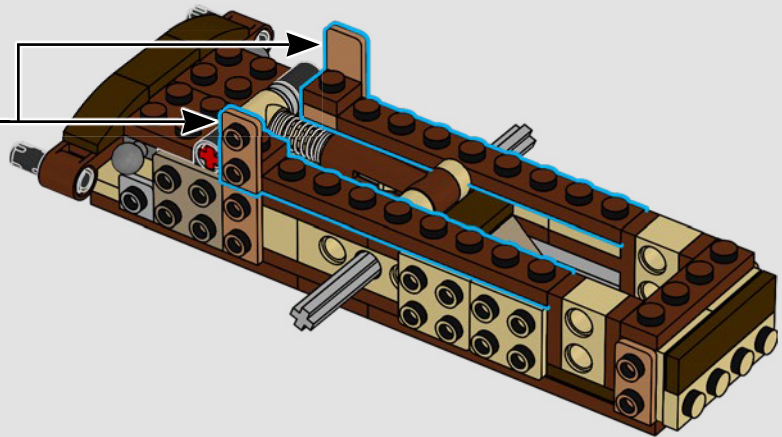
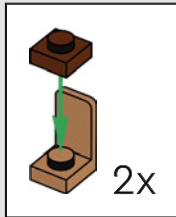


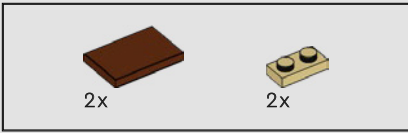


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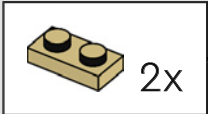
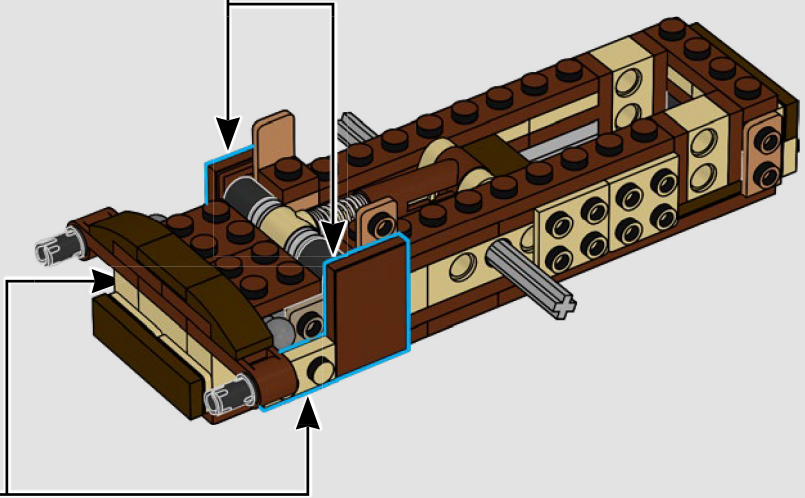
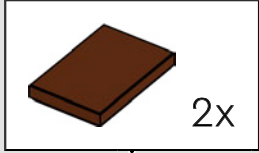


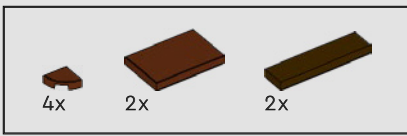
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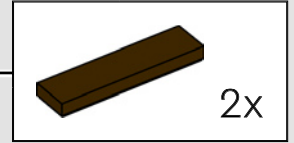
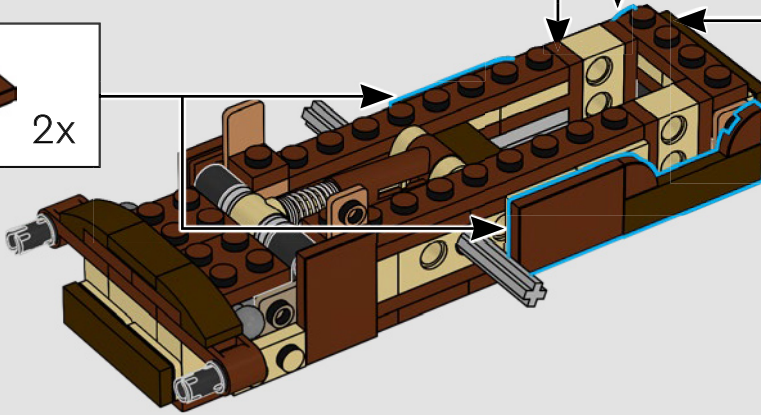
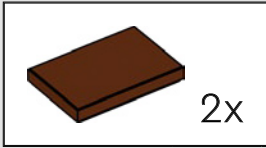


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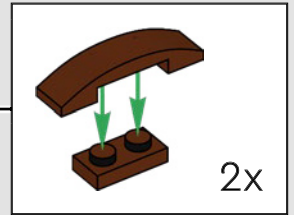
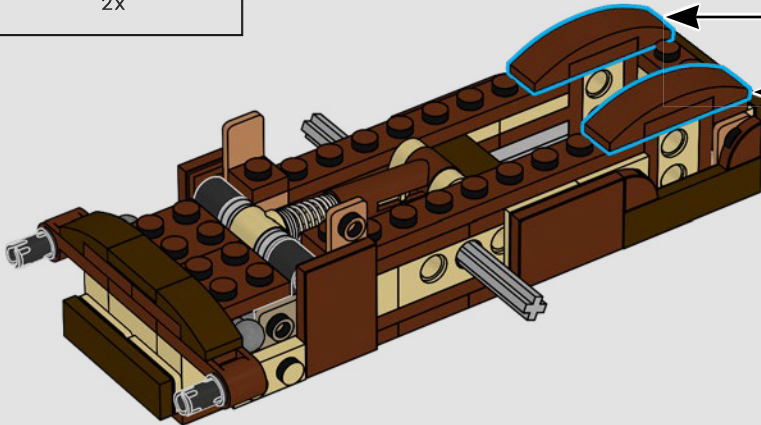




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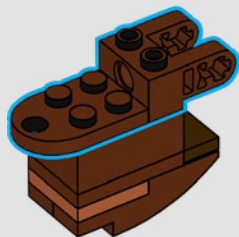
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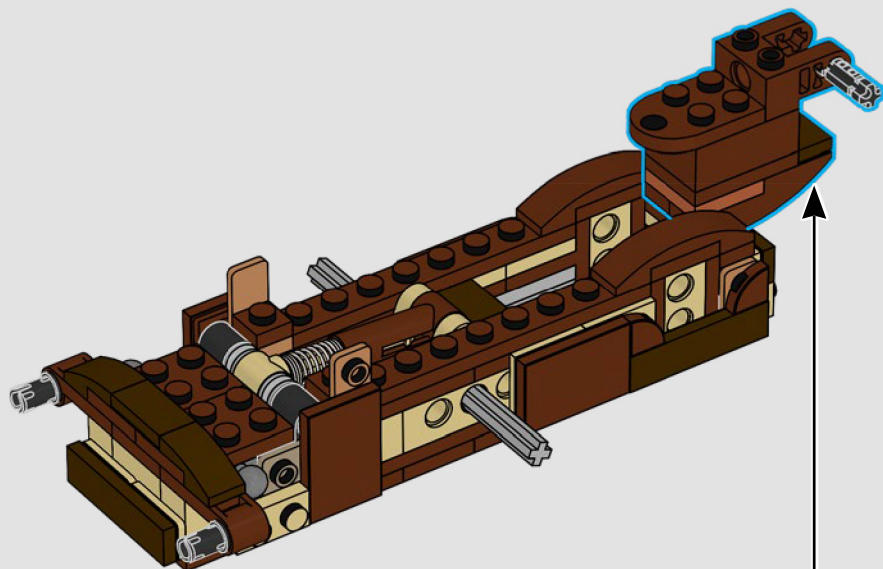


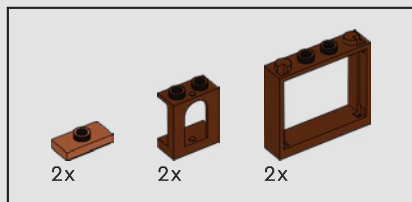
L'ornithoptère de Léonard, construit et testé à basse altitude par un ami de l'artiste, n'a pas été vraiment couronné de succès. La machine s'est écrasée et l'ami de Léonard de Vinci s'est cassé une jambe.

5

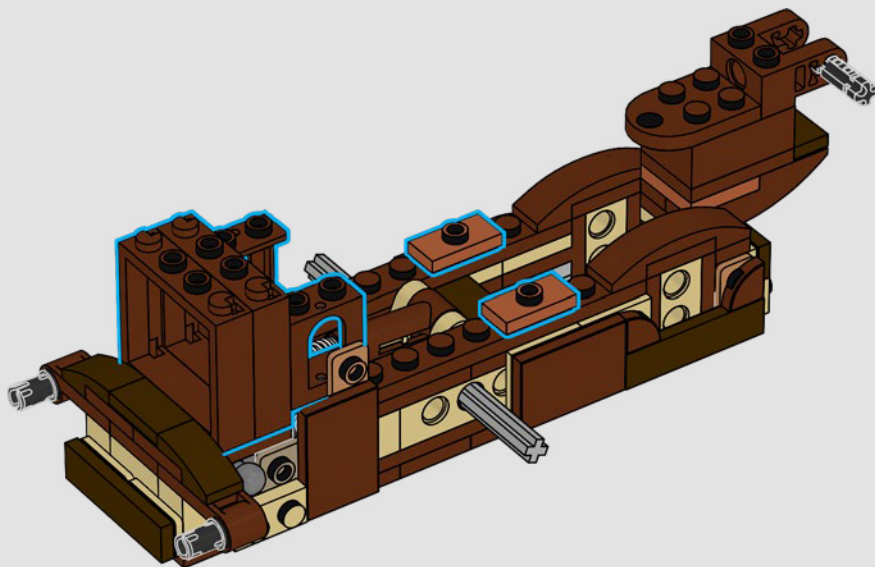


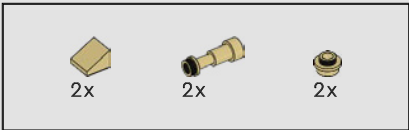
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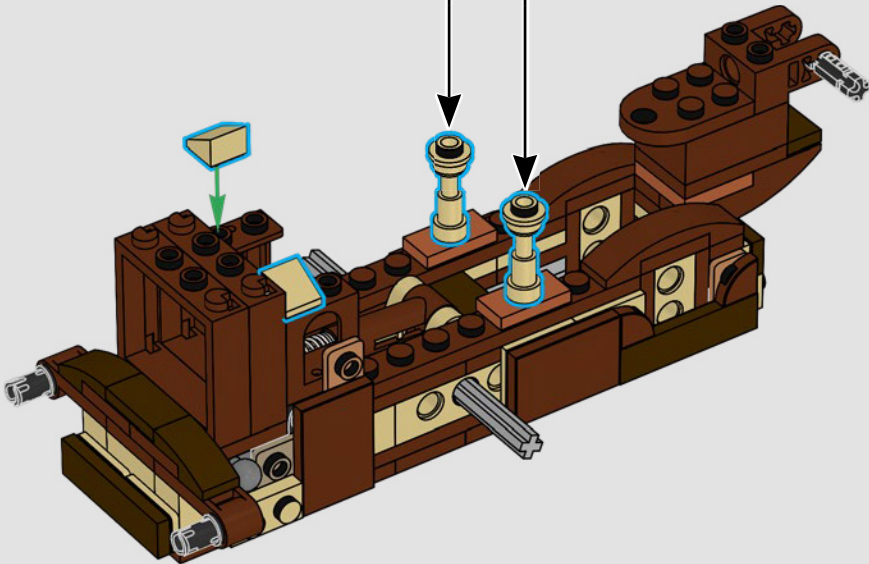
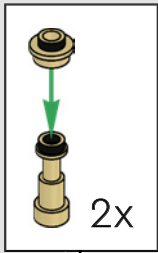


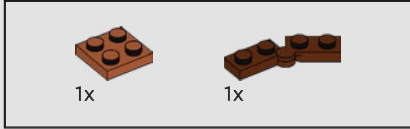
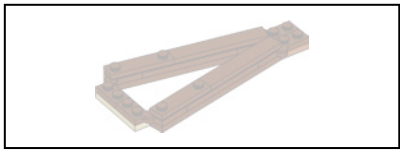
78



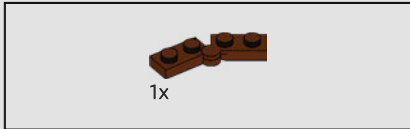
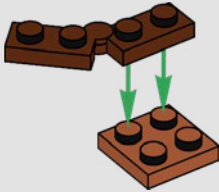


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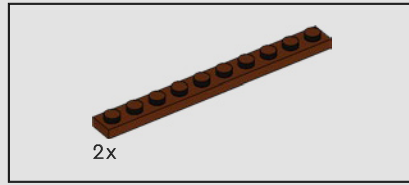
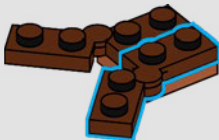




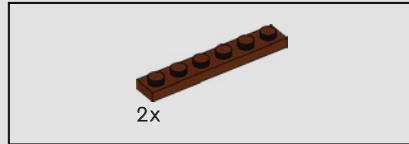
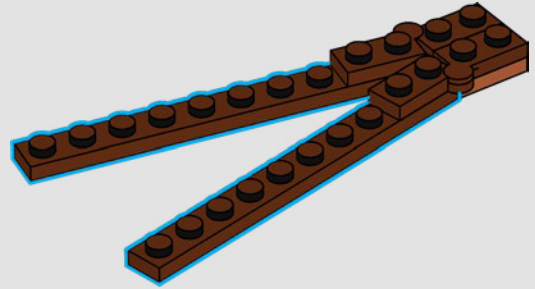
80



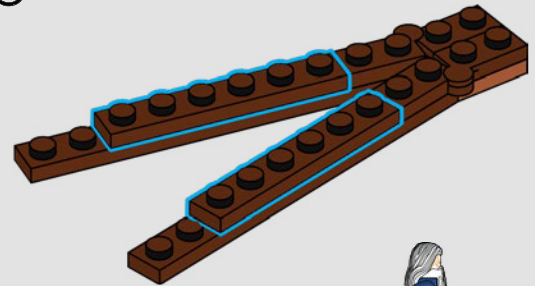
81

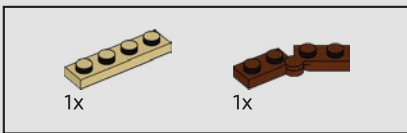


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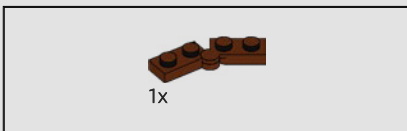
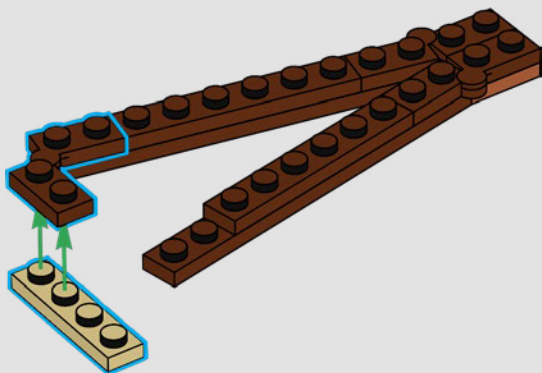


83

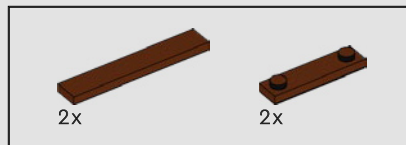
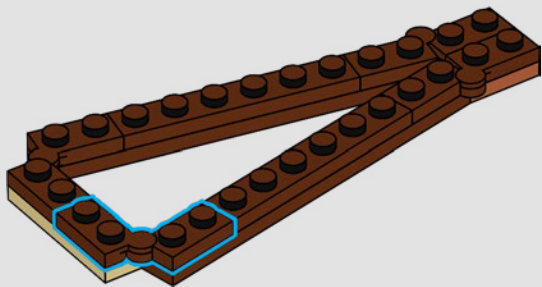




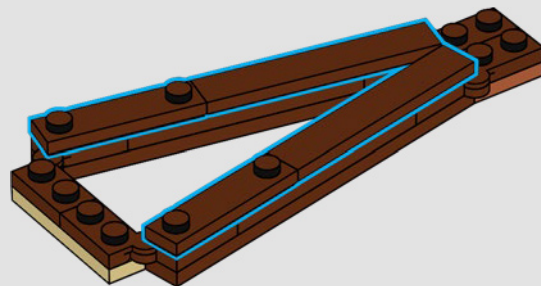
84



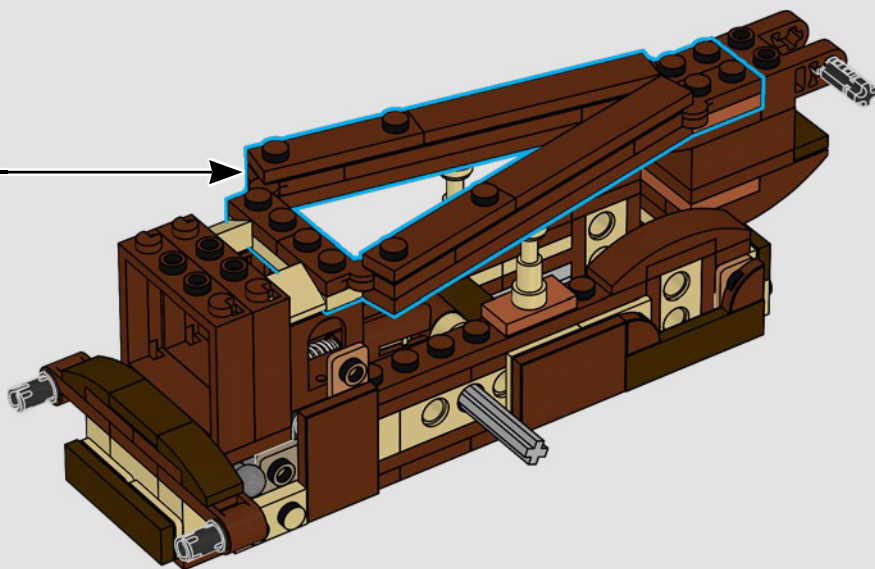
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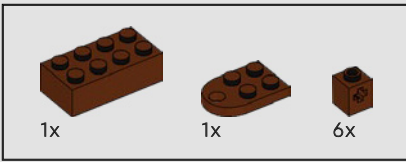


86

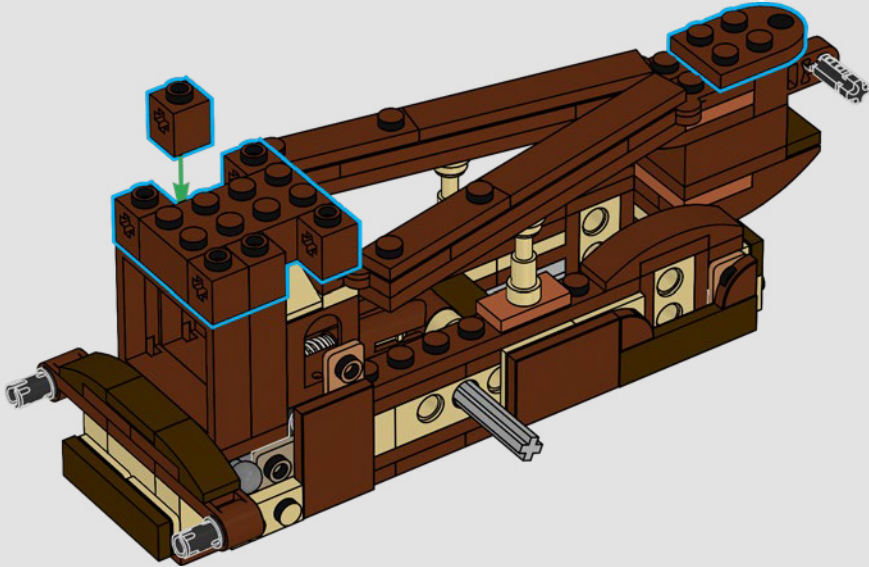
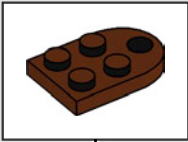


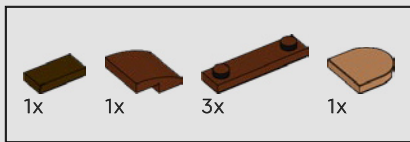
87



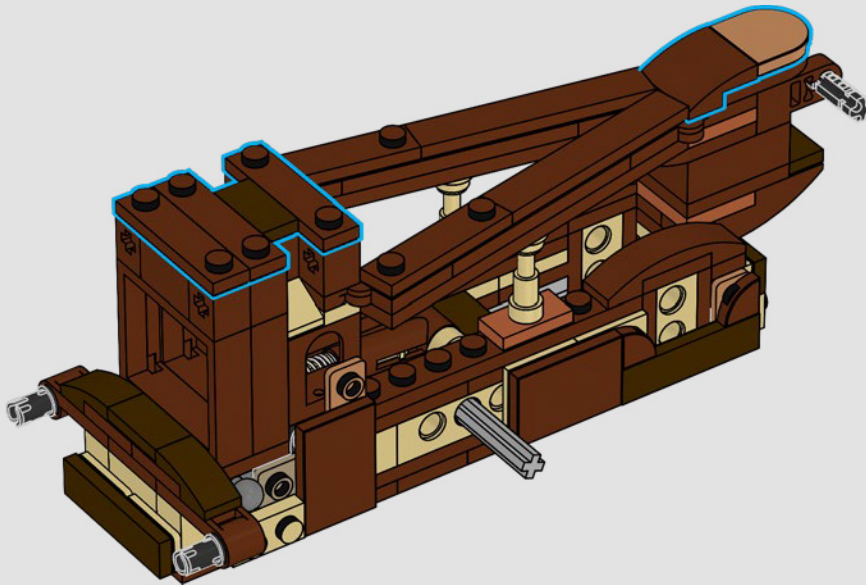


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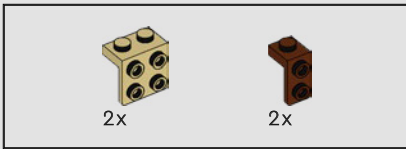


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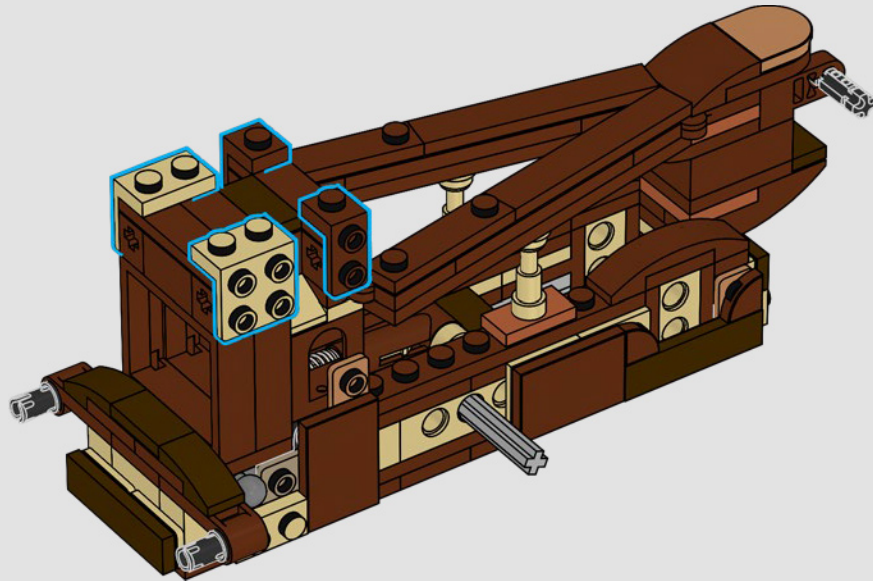


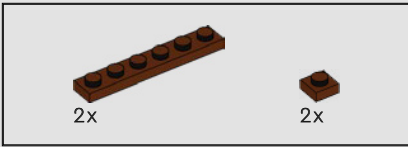


Léonard de Vinci était convaincu que le corps humain pouvait produire suffisamment d'énergie pour alimenter une machine volante.

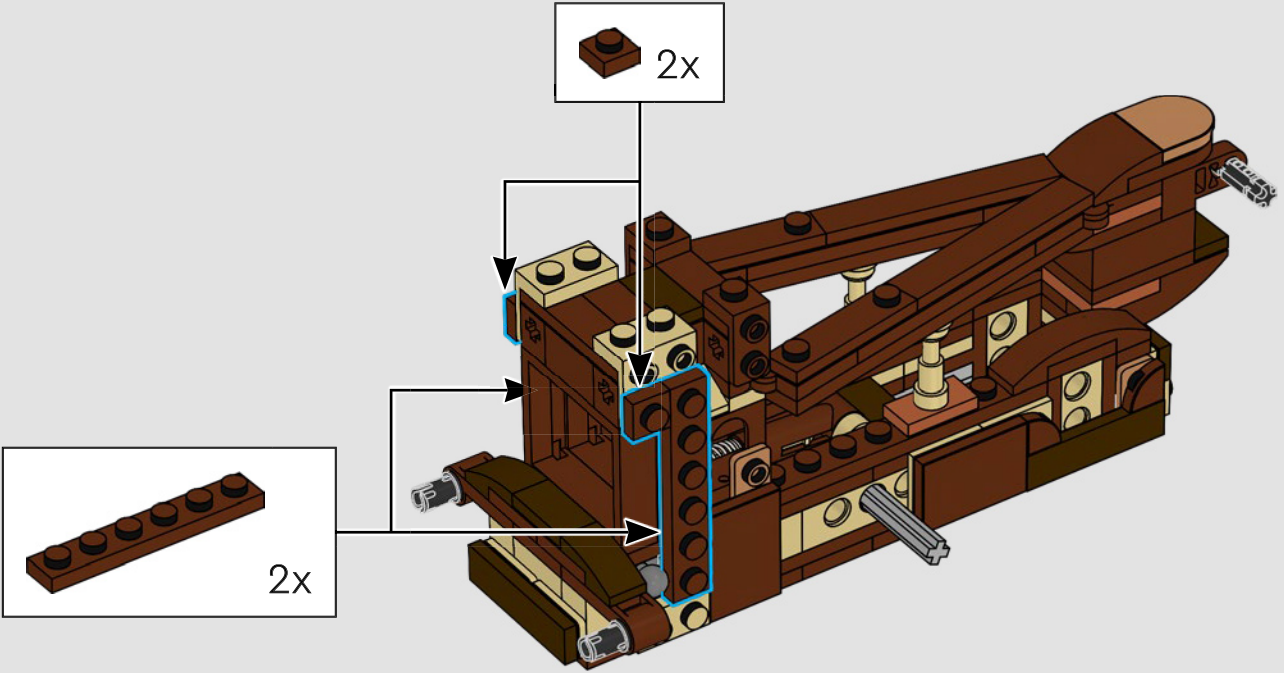


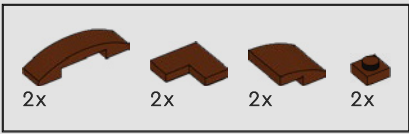
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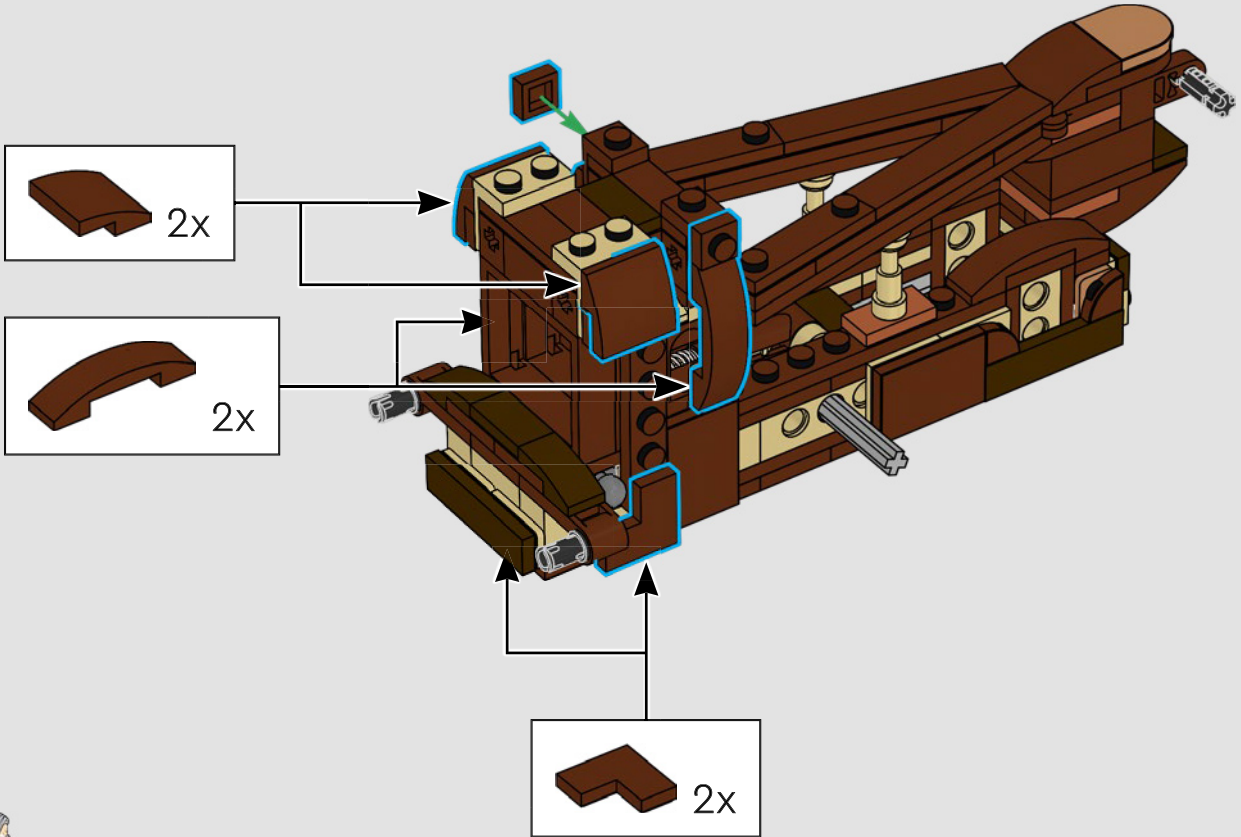


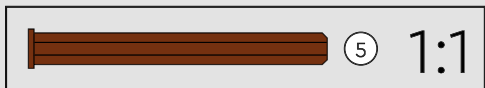
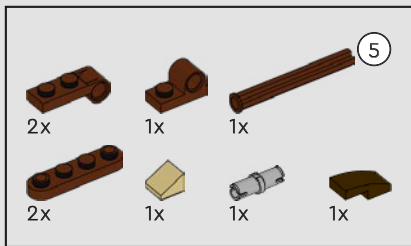
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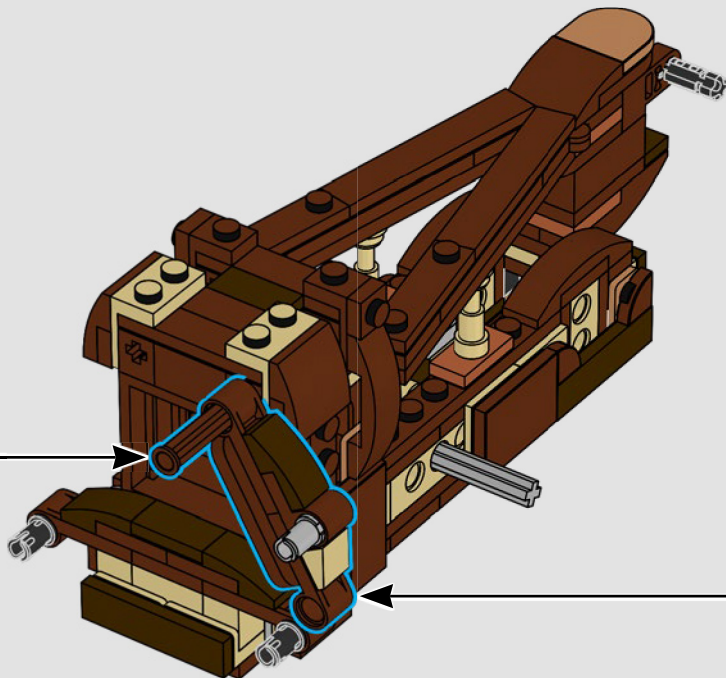
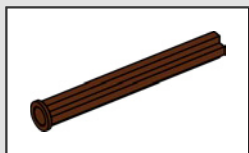
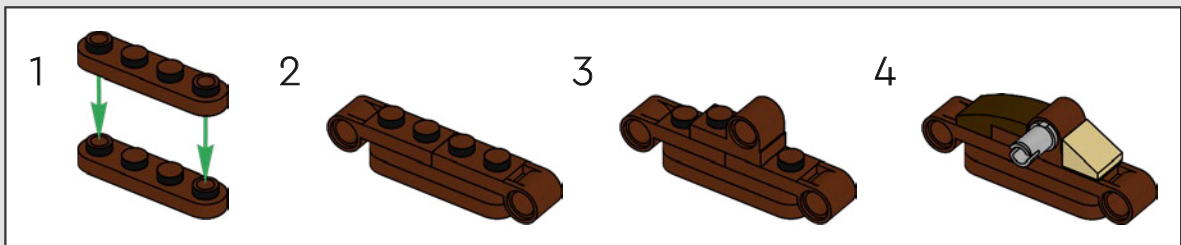


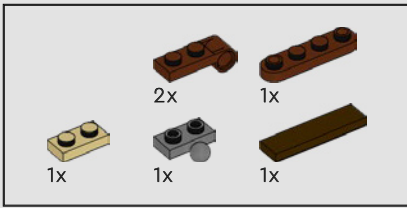
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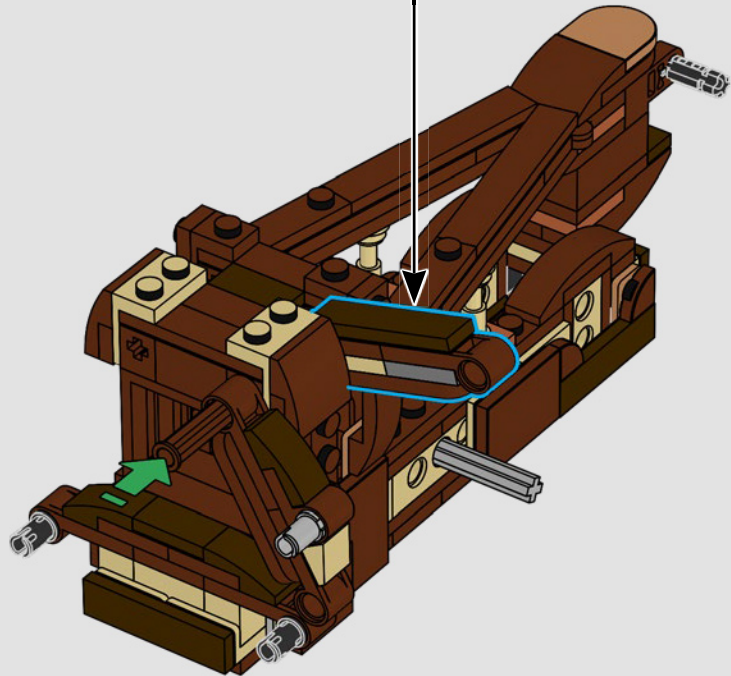
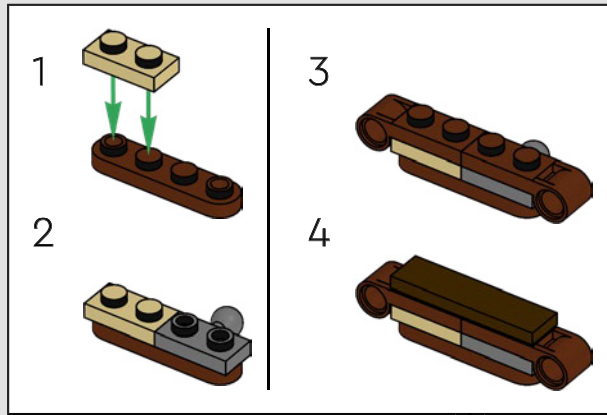


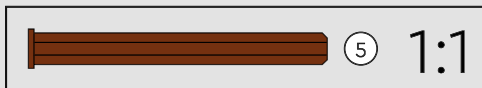
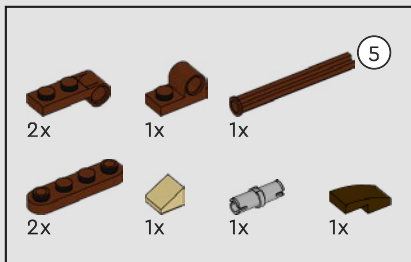
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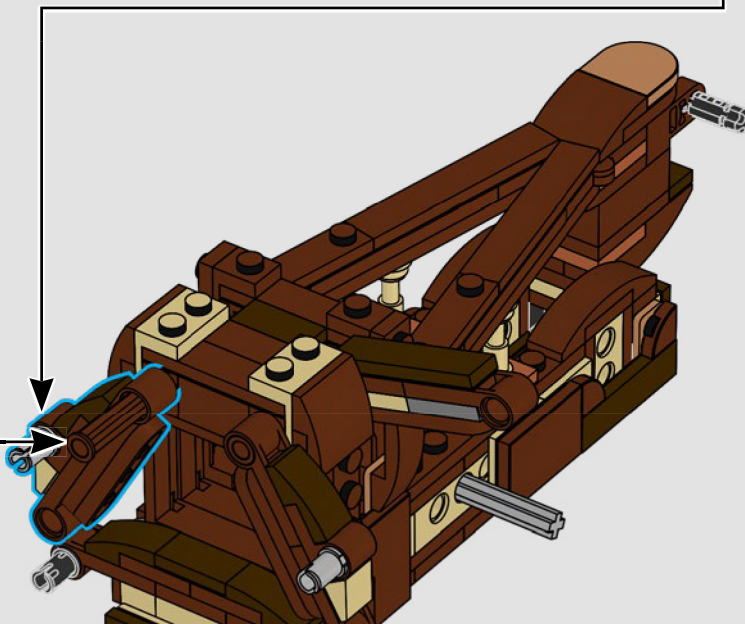
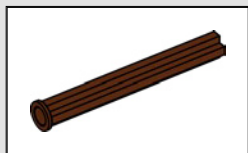
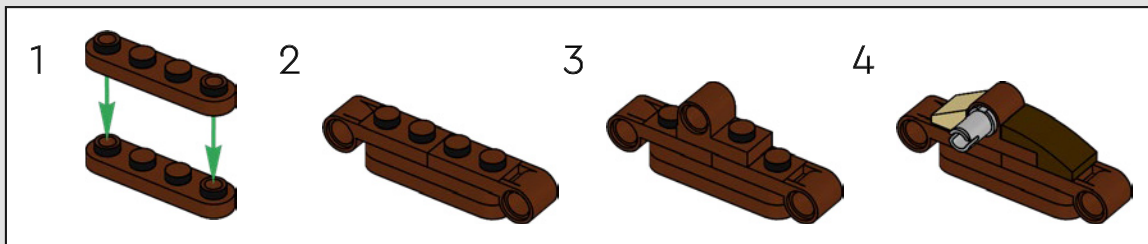


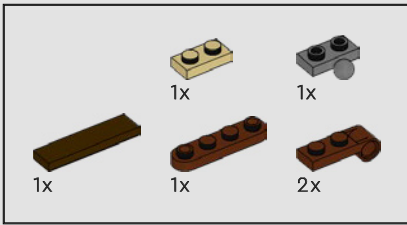
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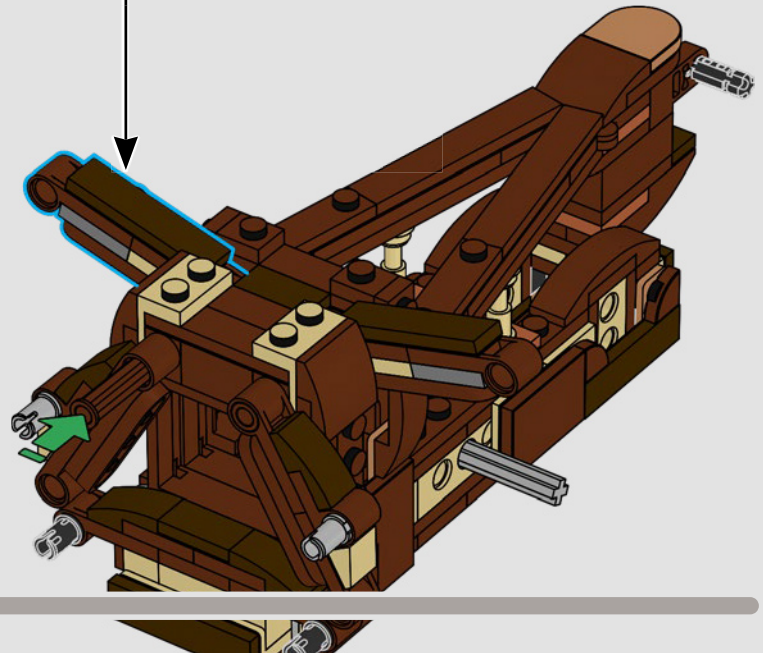
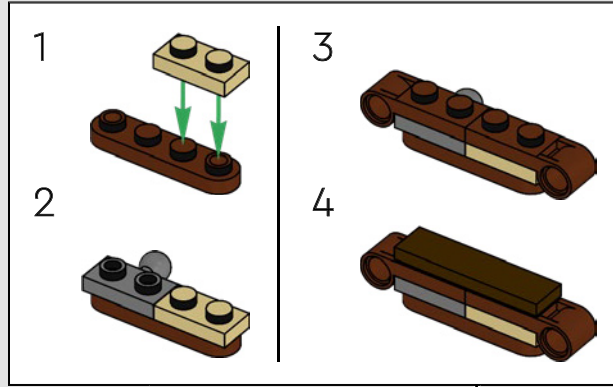


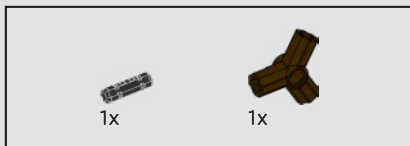
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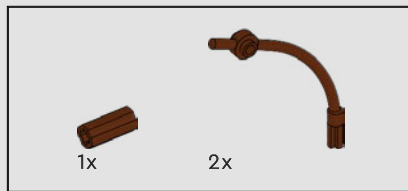
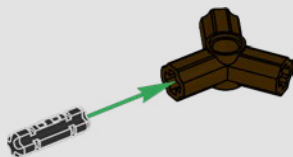


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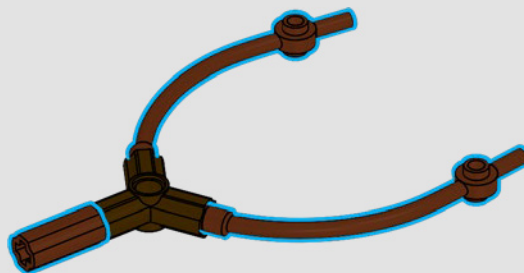




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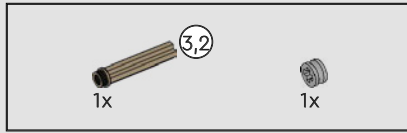
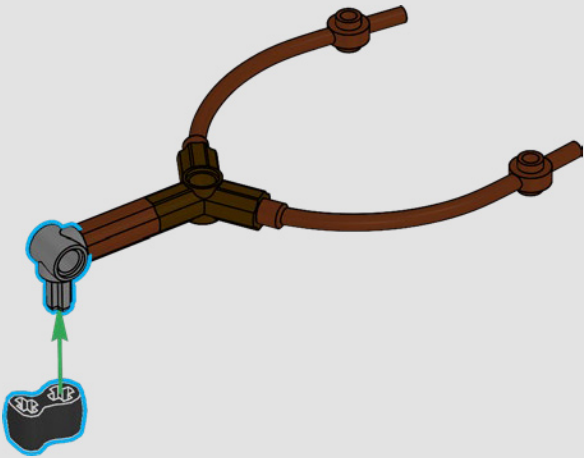
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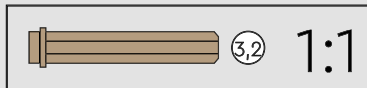
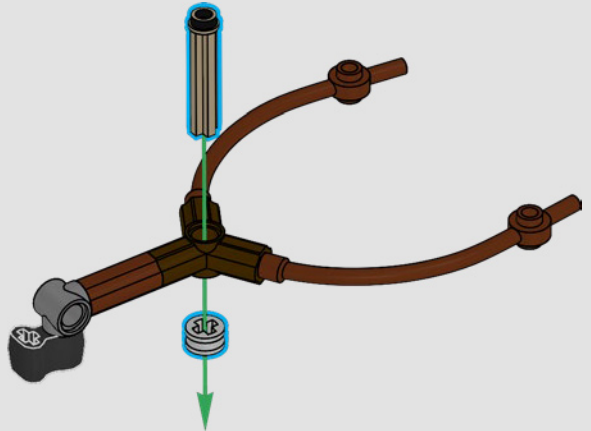
Ses croquis présentent différentes machines volantes pilotées par une personne à l'aide de divers mécanismes de propulsion : certains sont actionnés par les jambes, d'autres par les jambes et les bras, et d'autres encore par des gouvernails reliés à la tête du pilote.



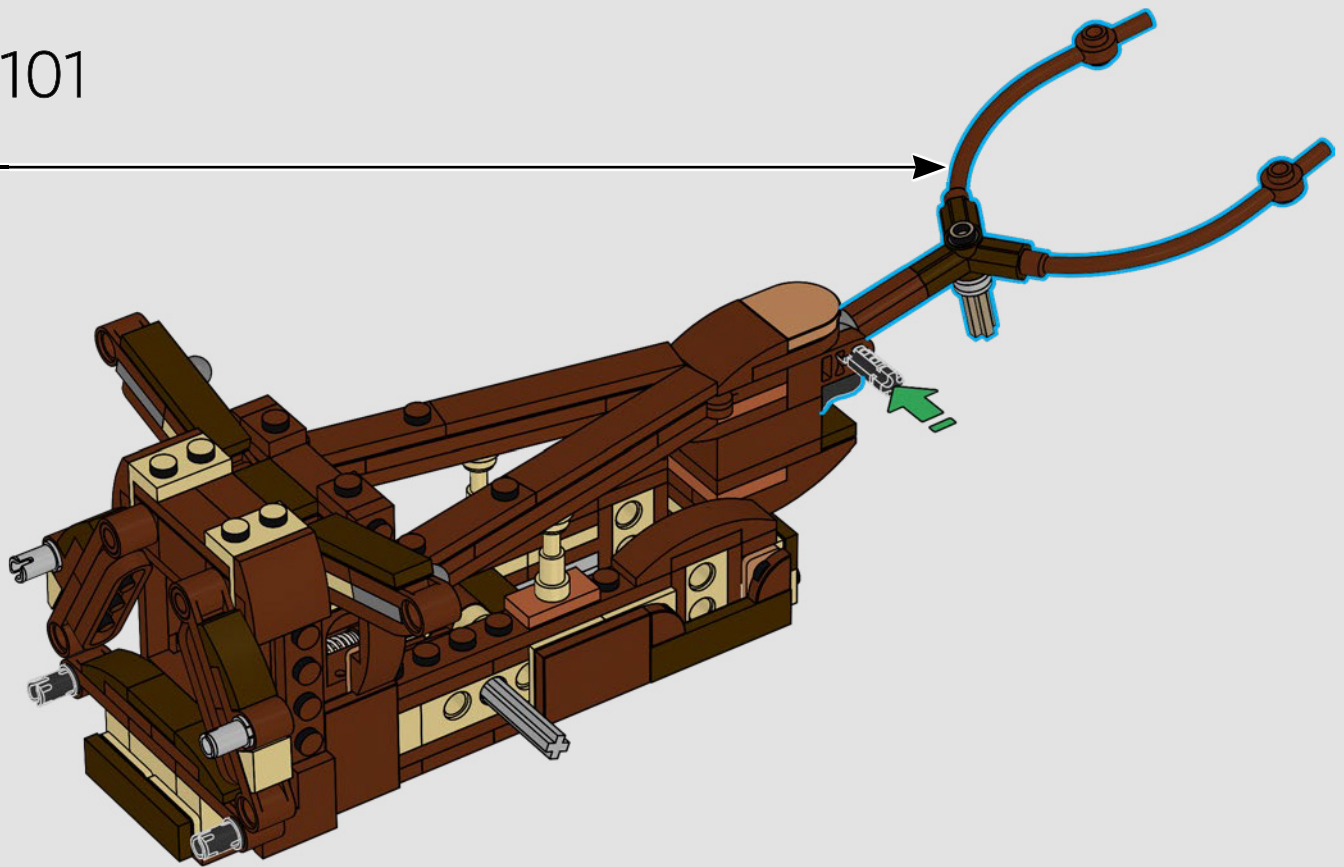
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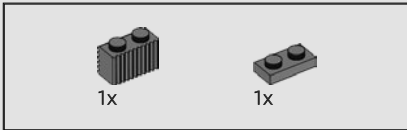
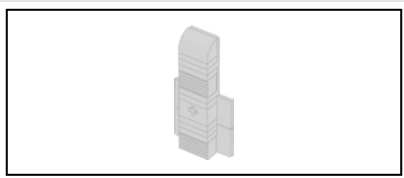


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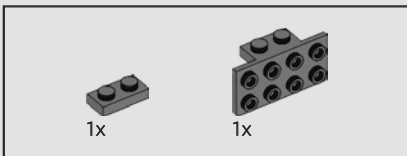
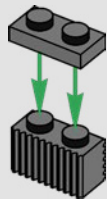


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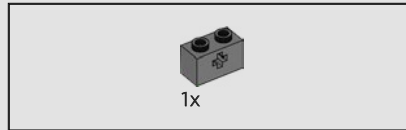
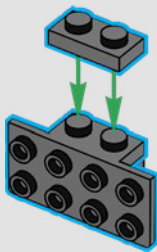




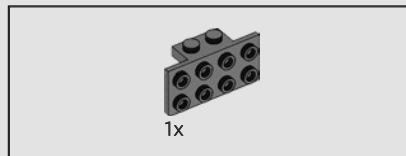
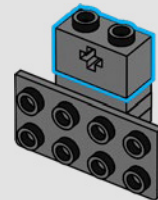
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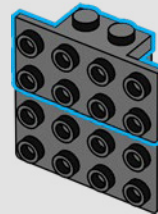
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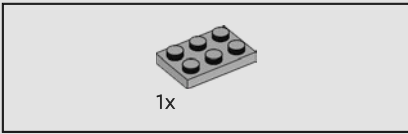


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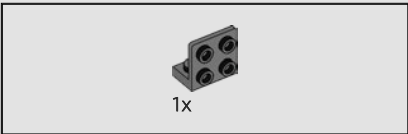
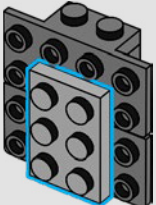


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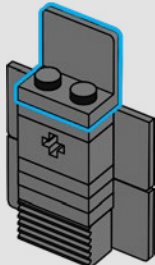


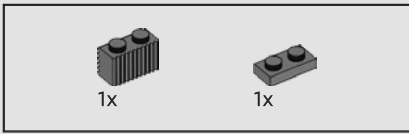


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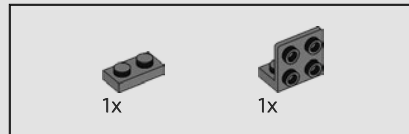
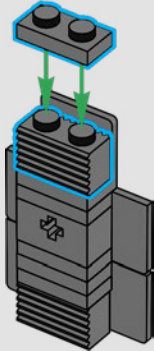


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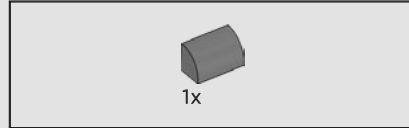
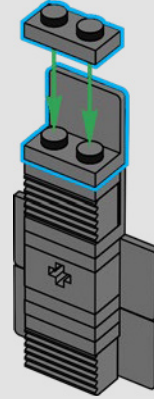




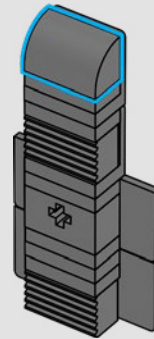
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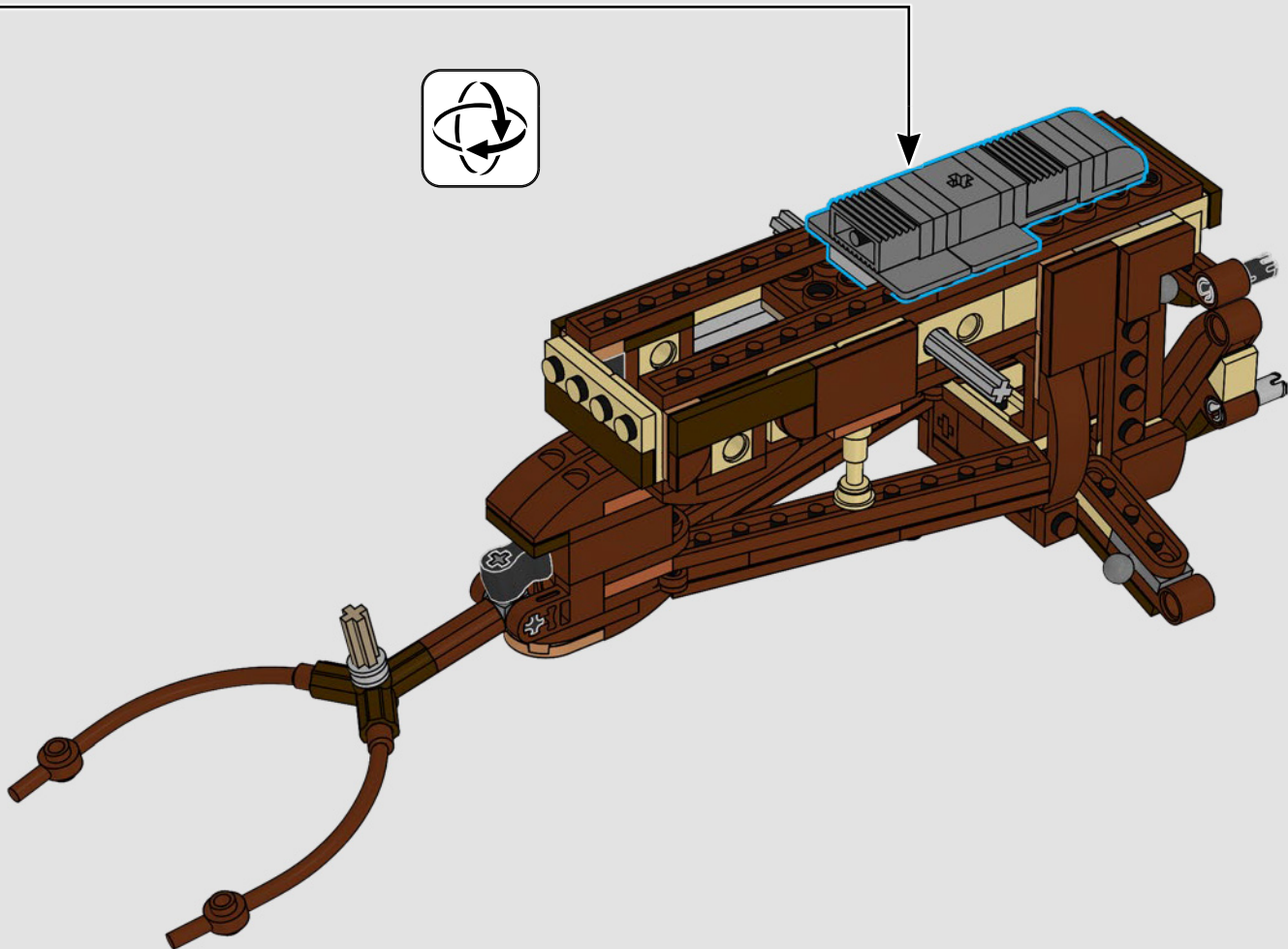


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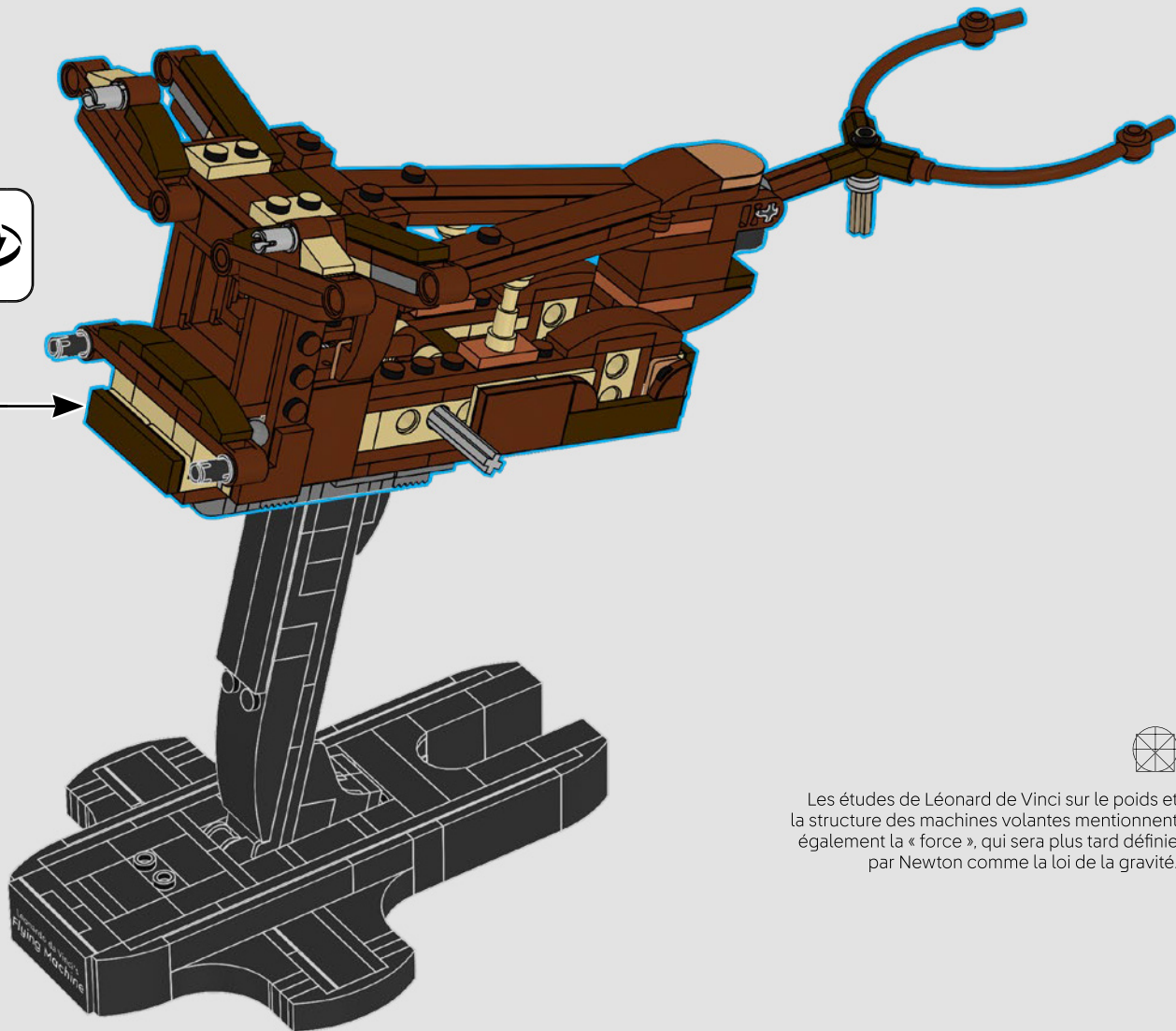
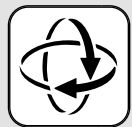


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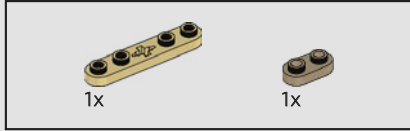
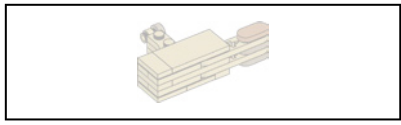


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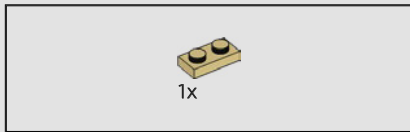
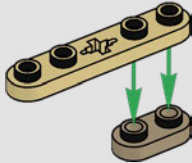


Les études de Léonard de Vinci sur le poids et la structure des machines volantes mentionnent également la « force », qui sera plus tard définie par Newton comme la loi de la gravité.

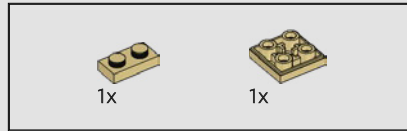
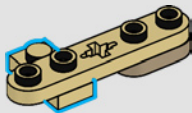




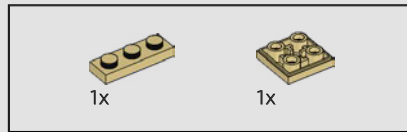
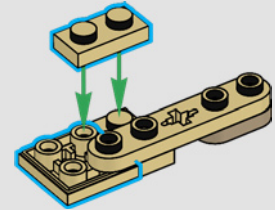
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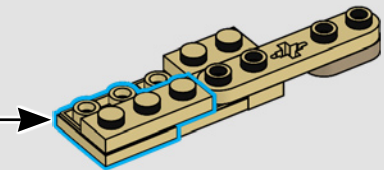
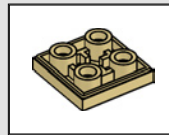
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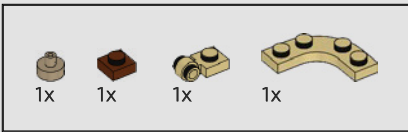


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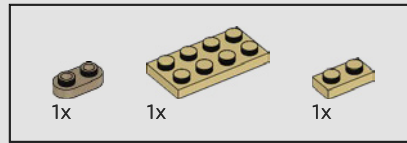
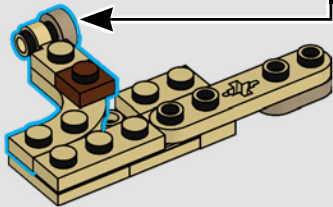
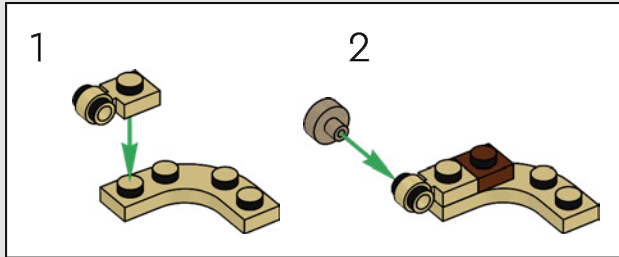


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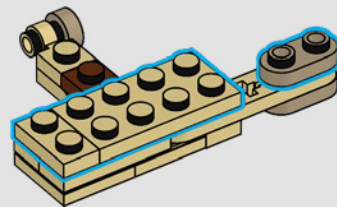


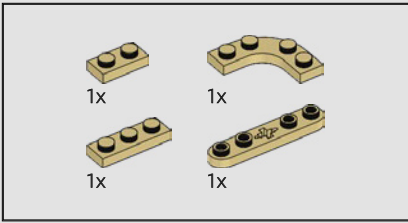


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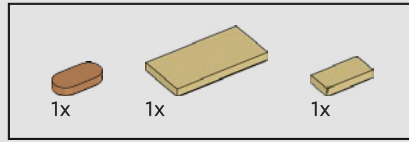
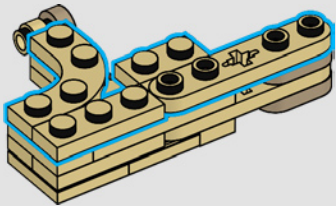


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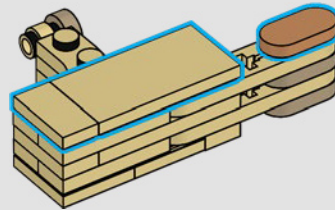


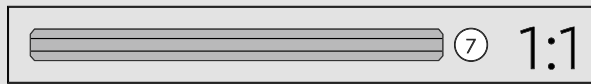
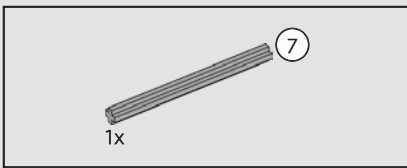


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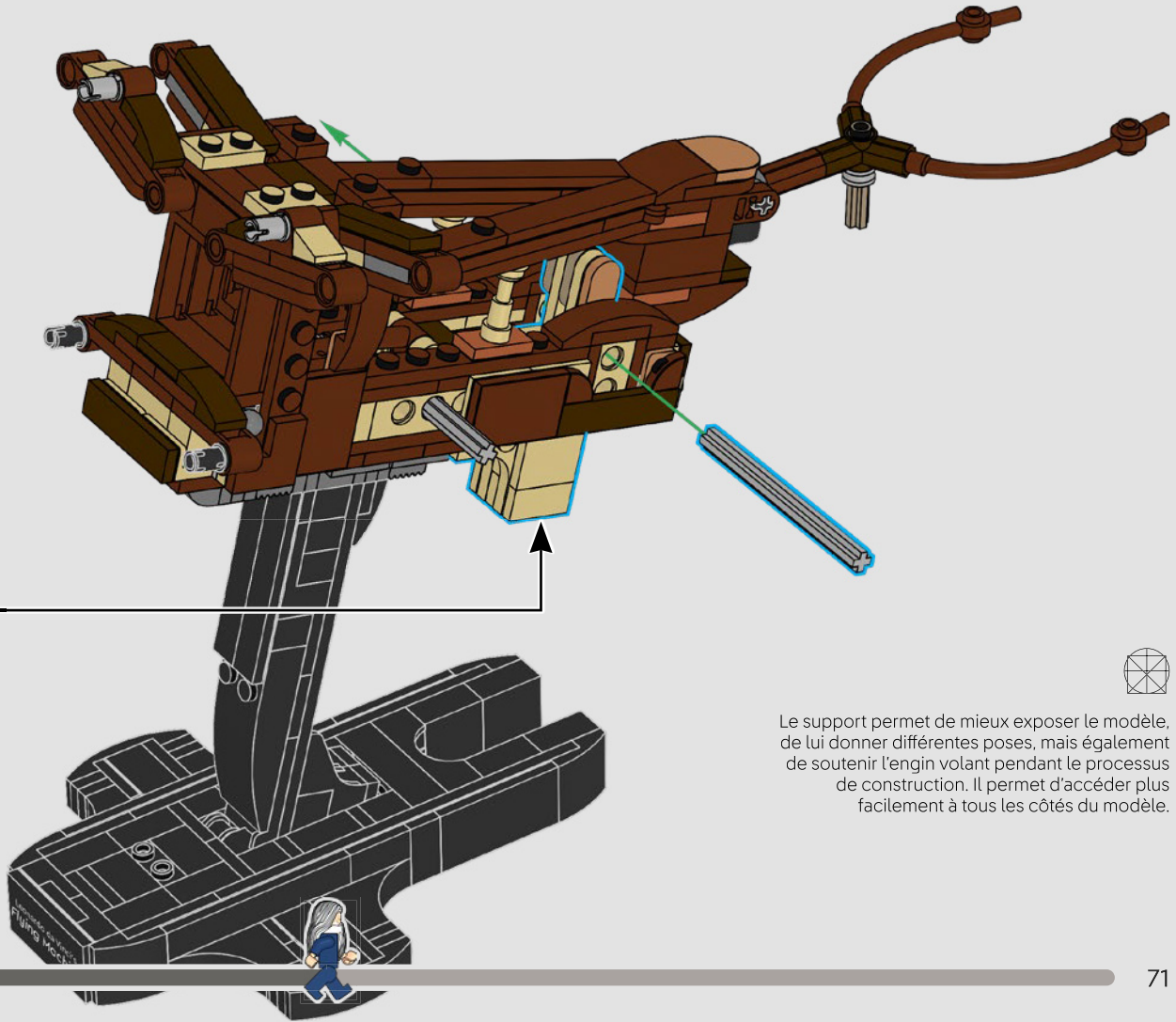


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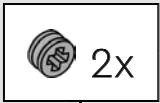
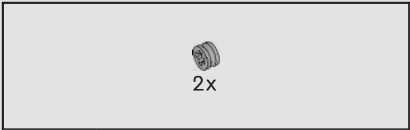




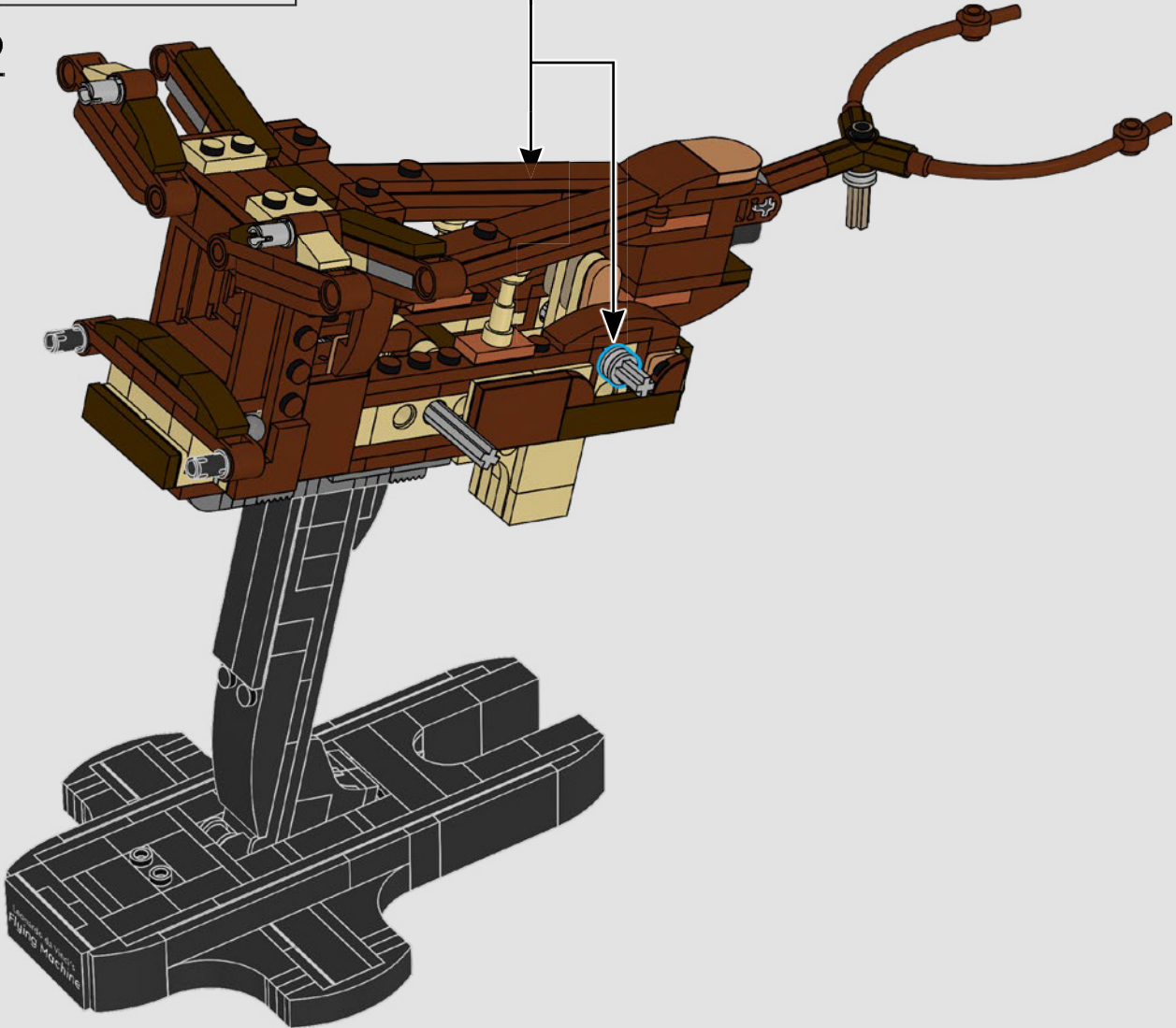
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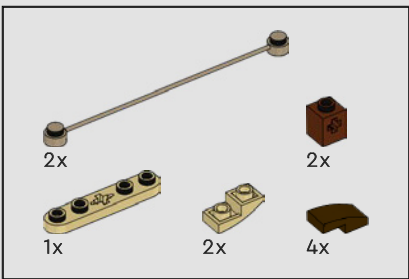


Le support permet de mieux exposer le modèle, de lui donner différentes poses, mais également de soutenir l'engin volant pendant le processus de construction. Il permet d'accéder plus facilement à tous les côtés du modèle.



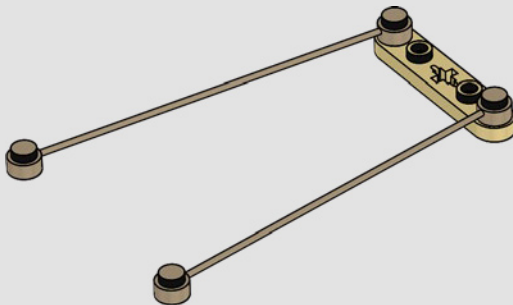
122



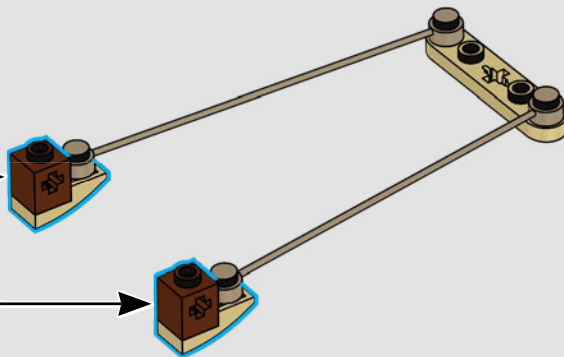
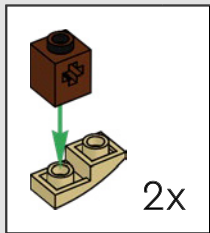


123

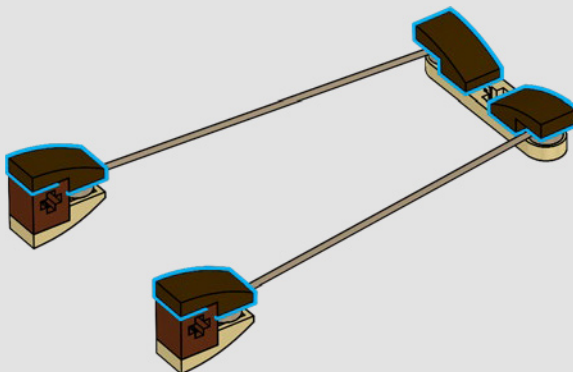
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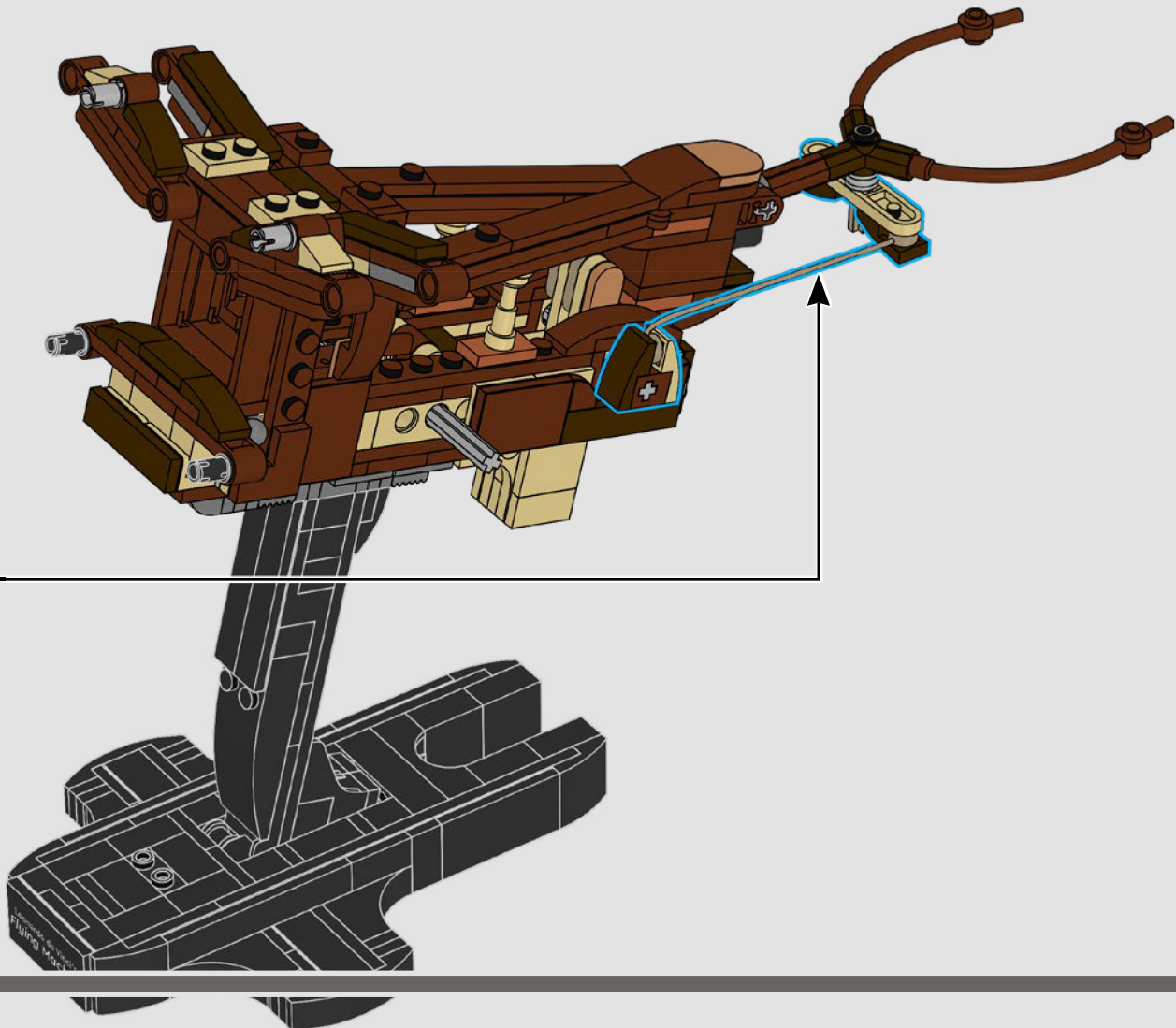


2



3

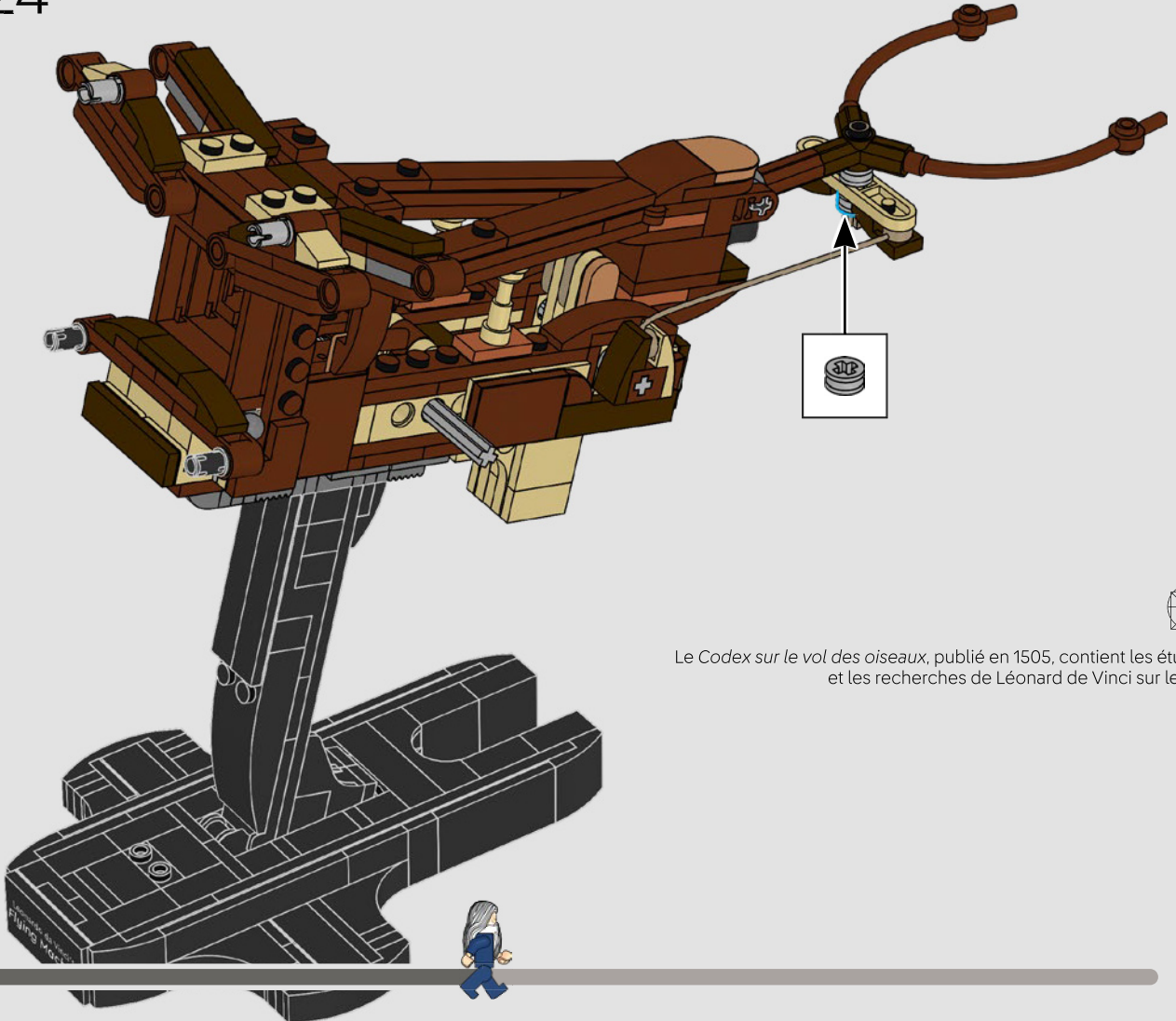




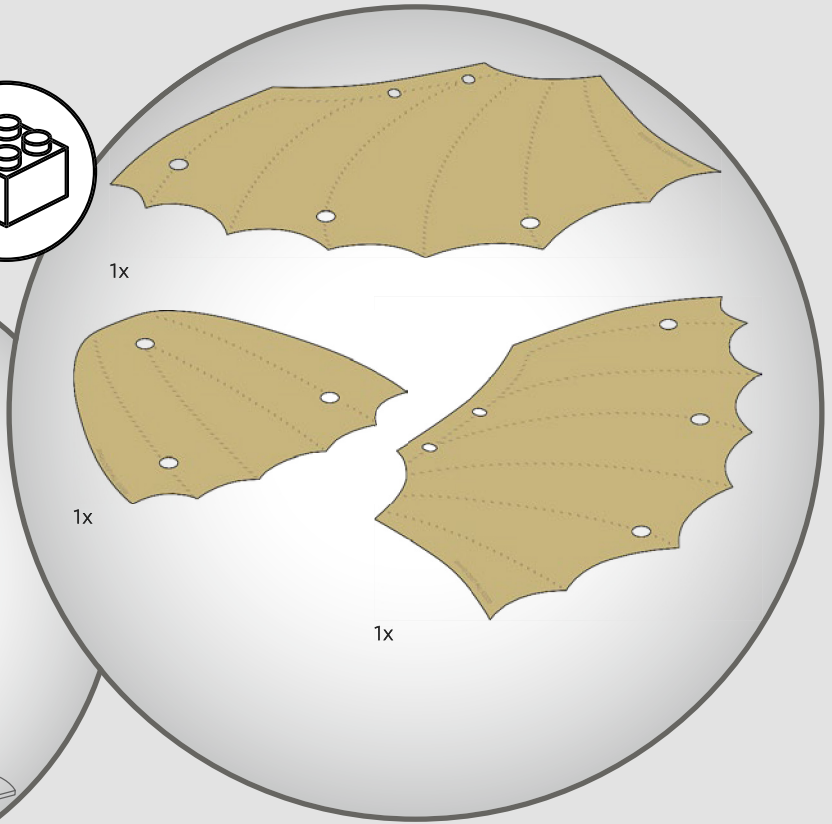
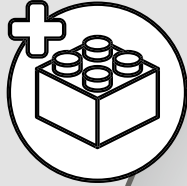
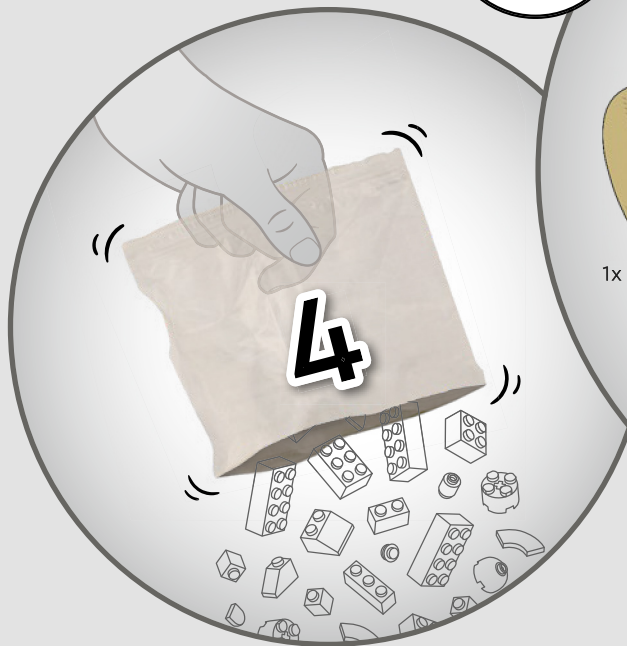


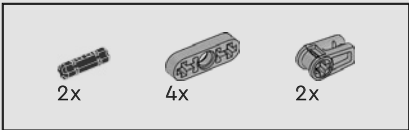
1x

124

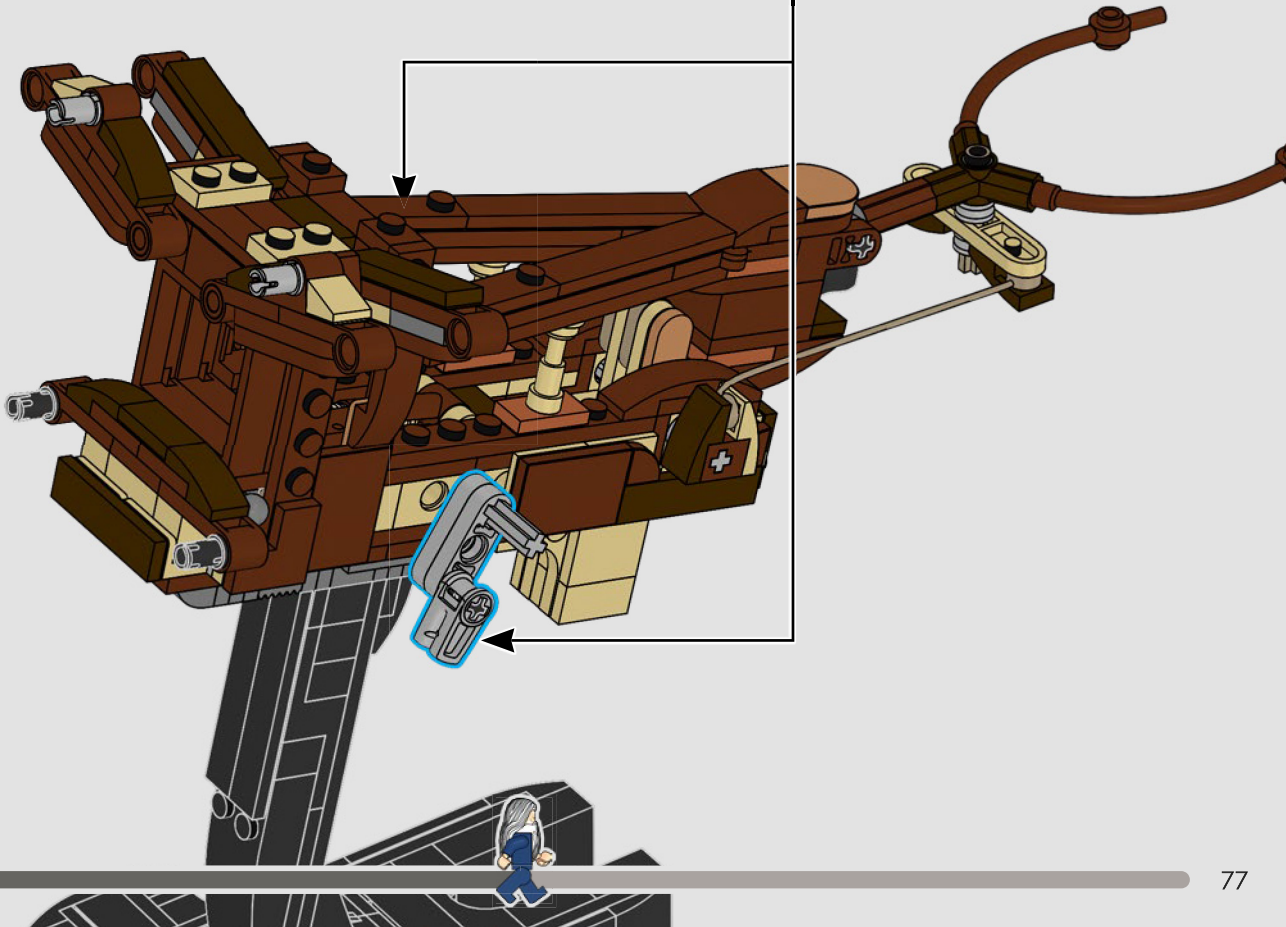
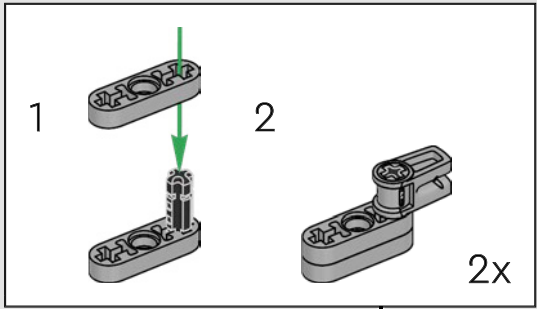


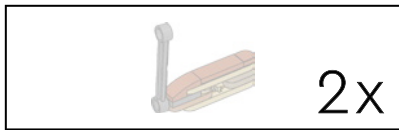
Le *Codex sur le vol des oiseaux*, publié en 1505, contient les études et les recherches de Léonard de Vinci sur le vol.



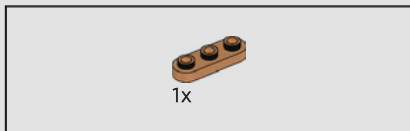
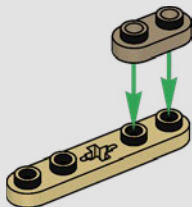


125

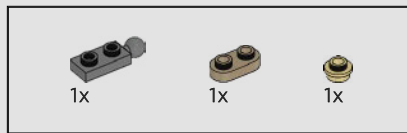
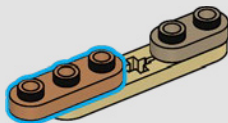




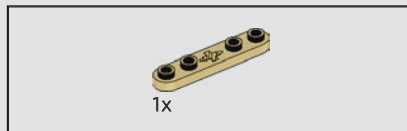
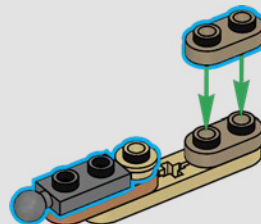
126



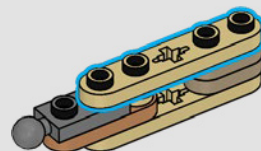
127

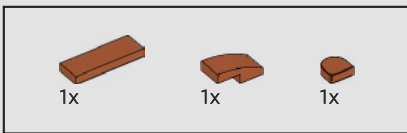


128

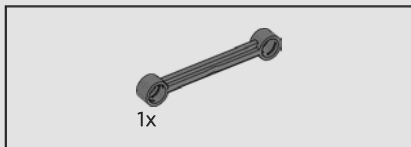
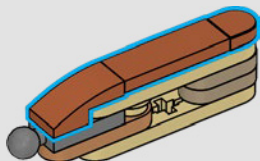


129

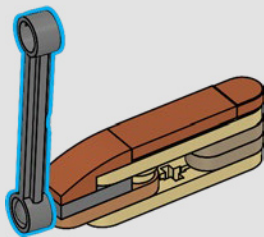




130

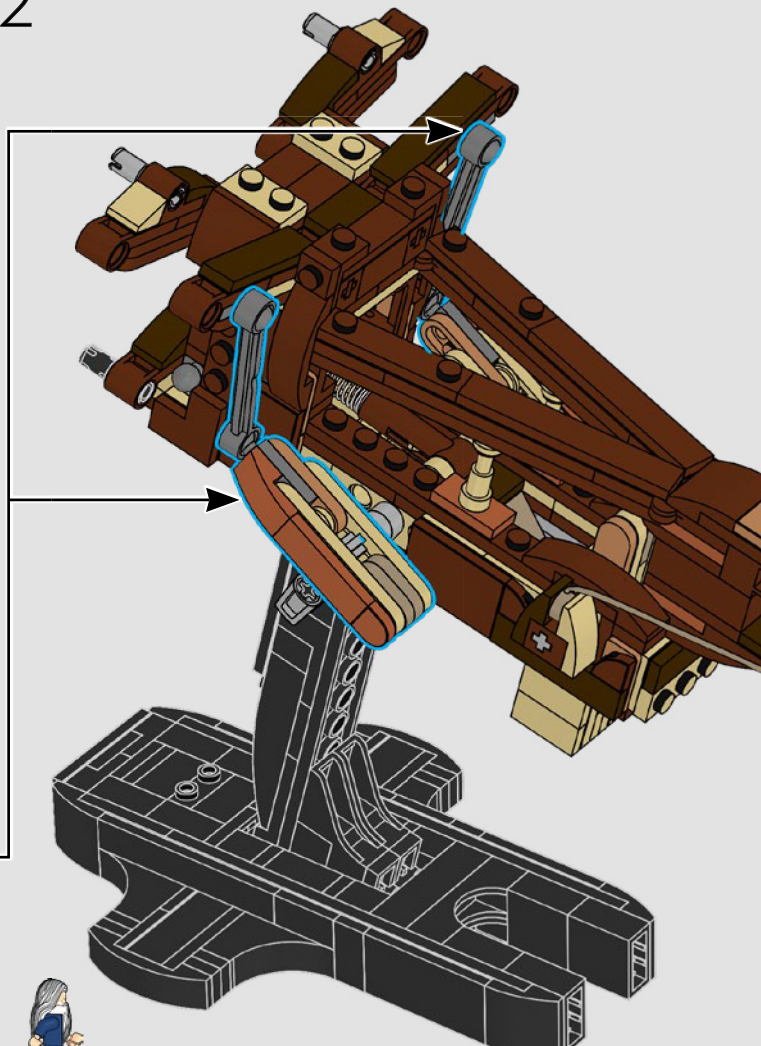


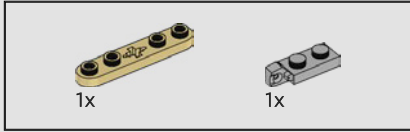
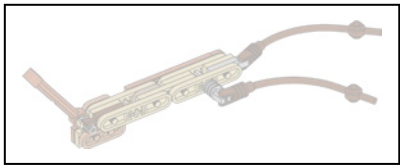
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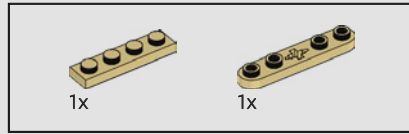
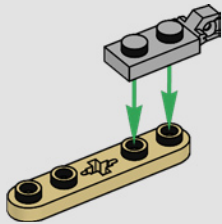
2x

132

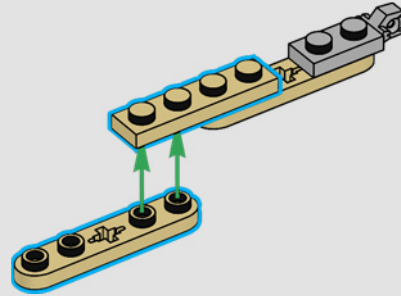




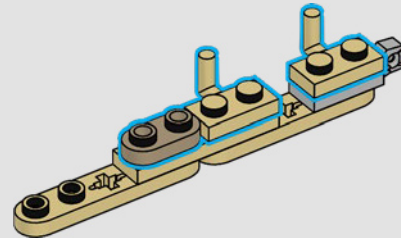
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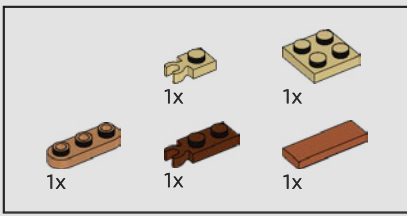


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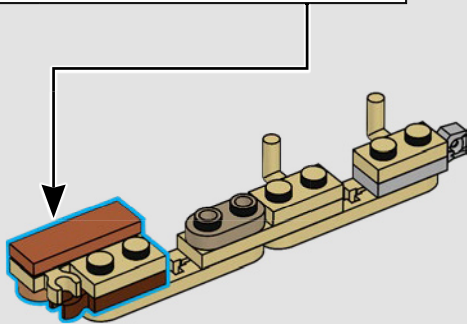
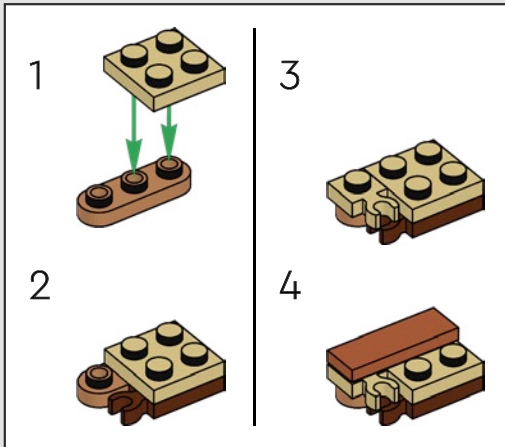


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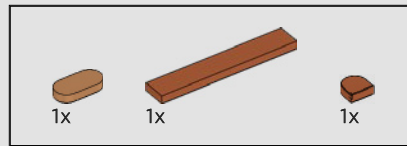
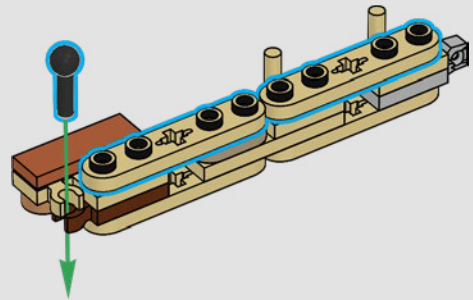




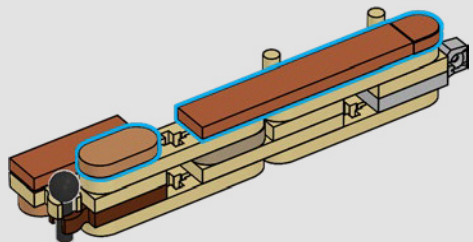
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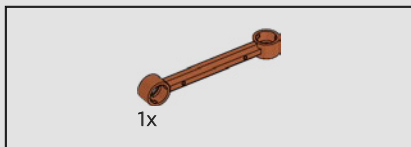


137

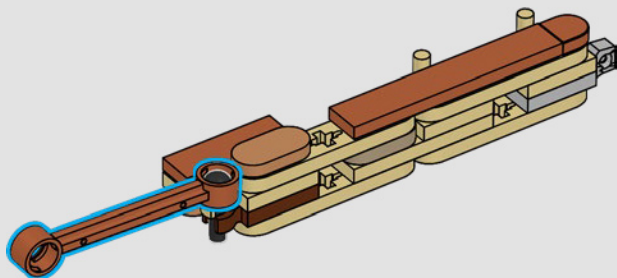


138

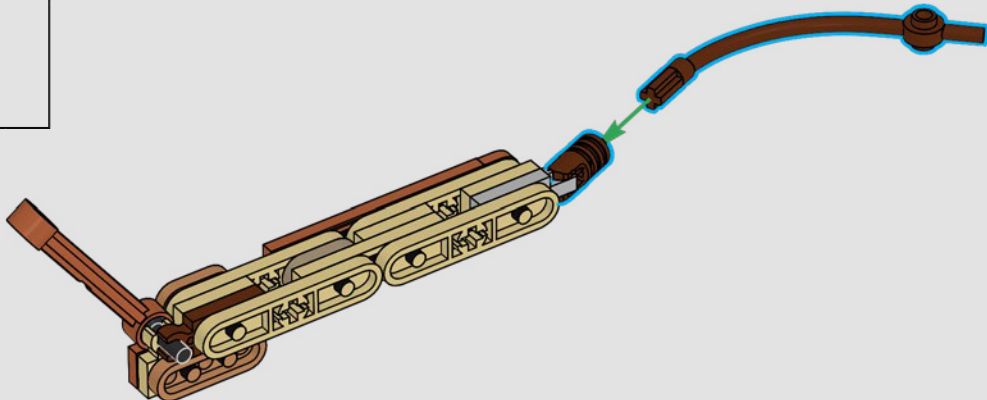
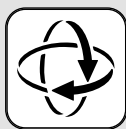


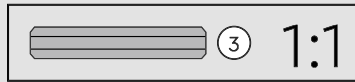
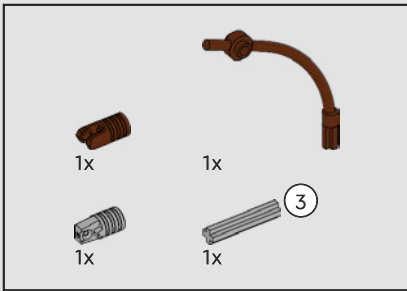


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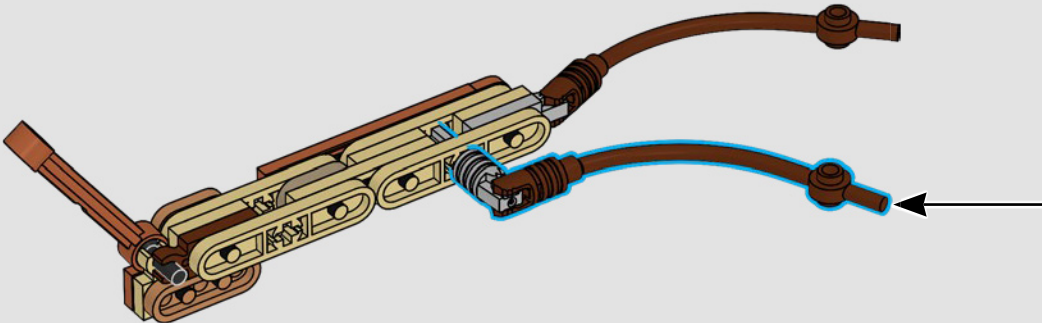
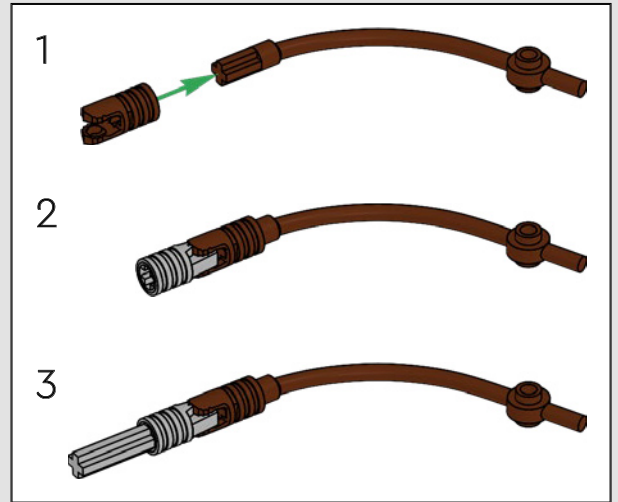


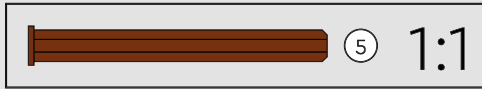
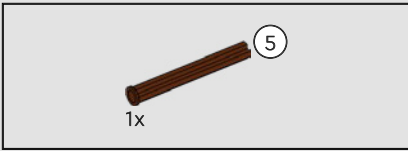
140



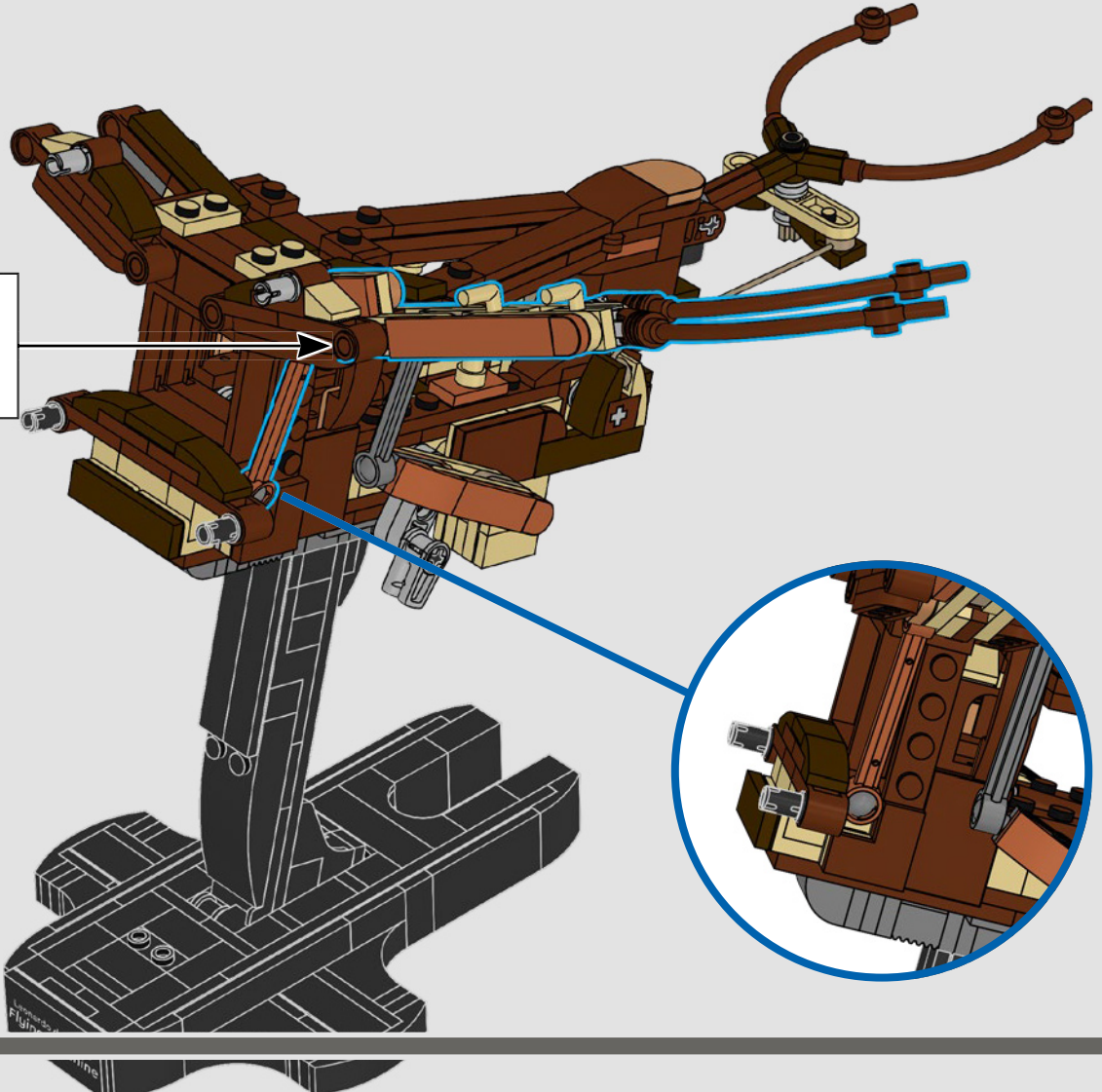
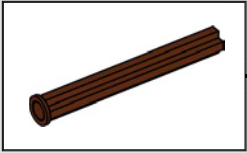


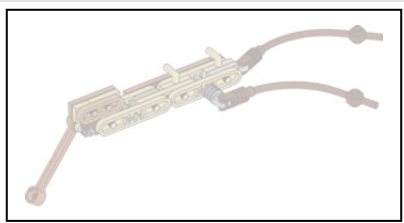
141



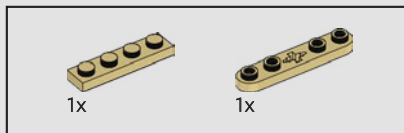
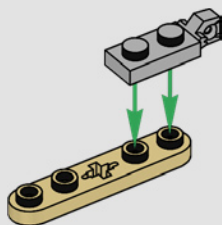


142

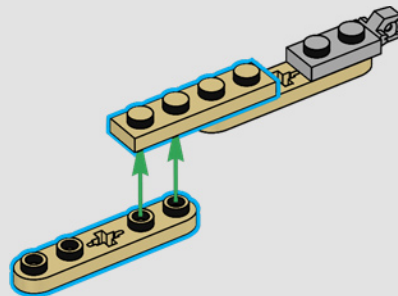




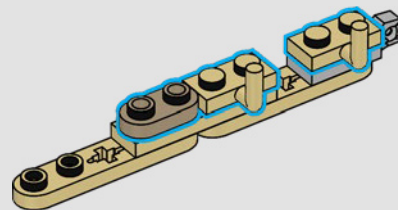
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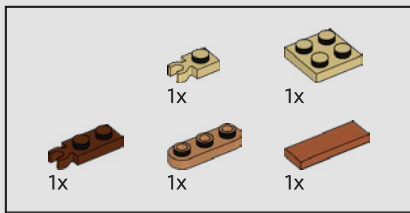


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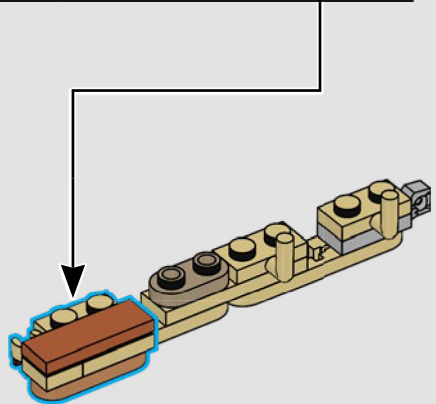
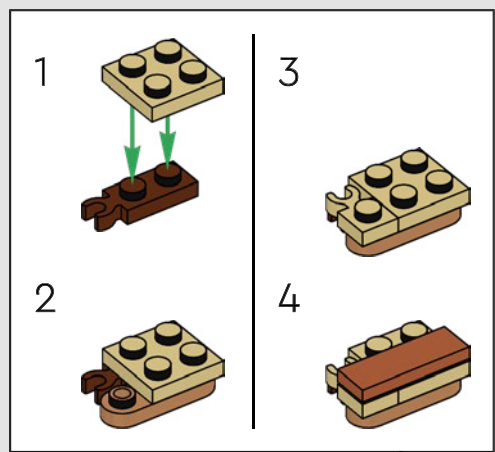


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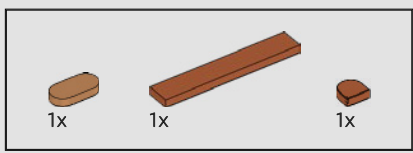
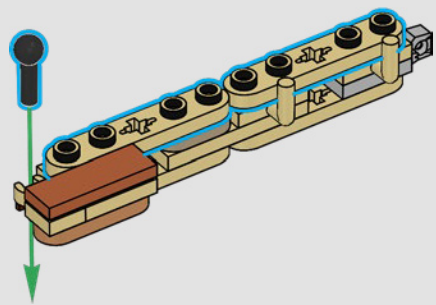




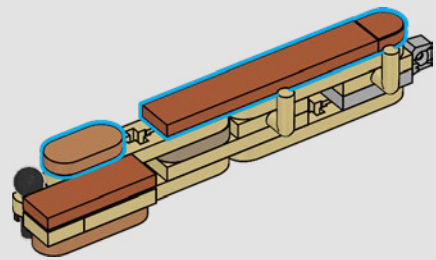
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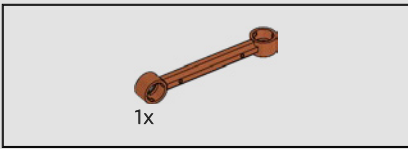


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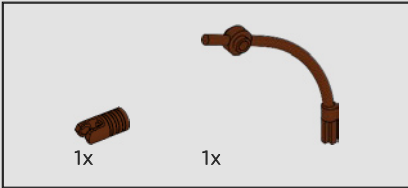
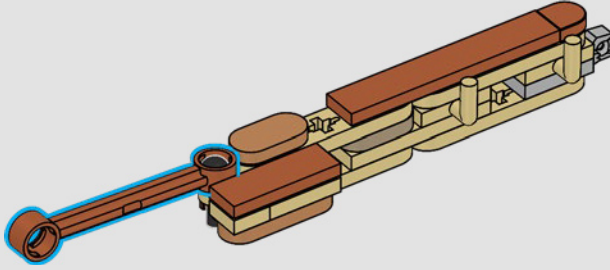


148

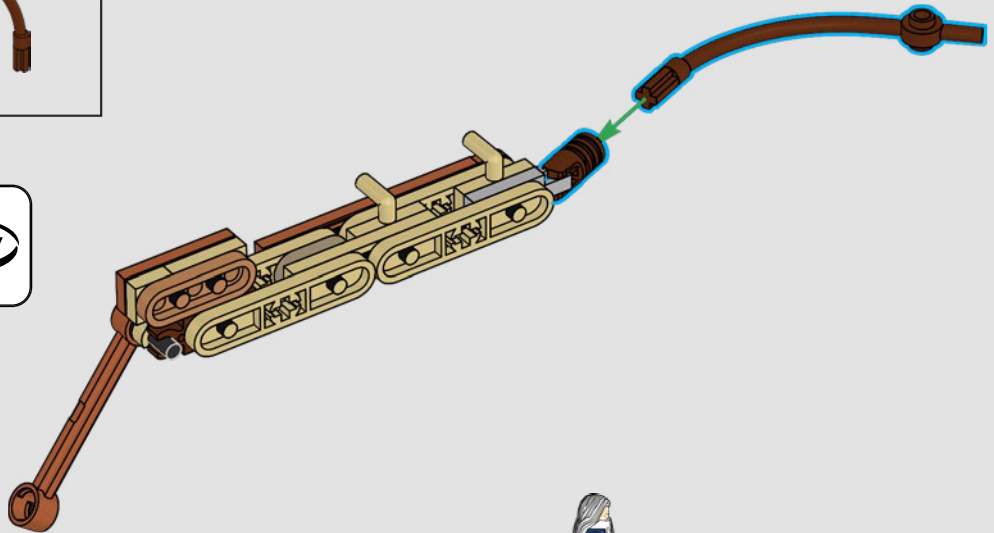


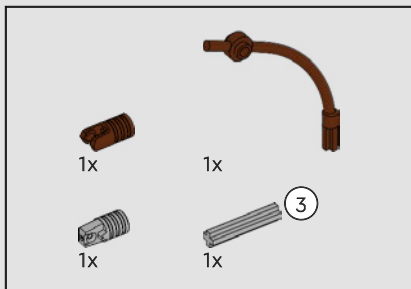


149

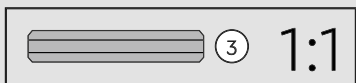
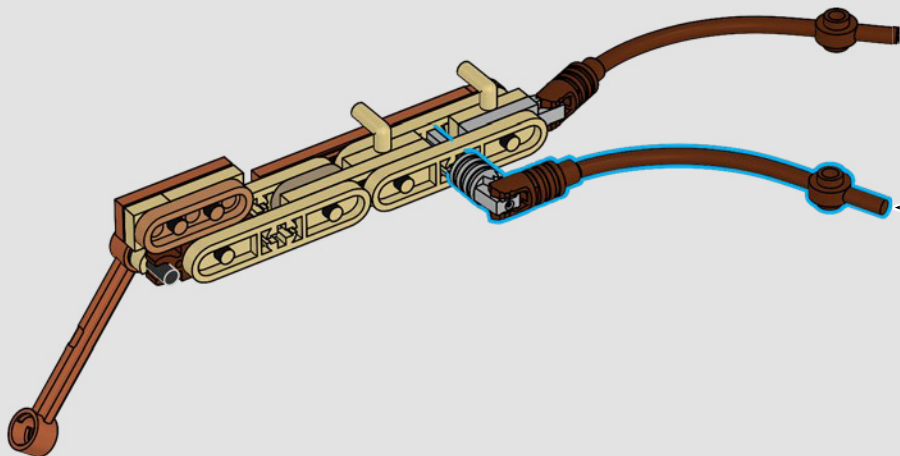
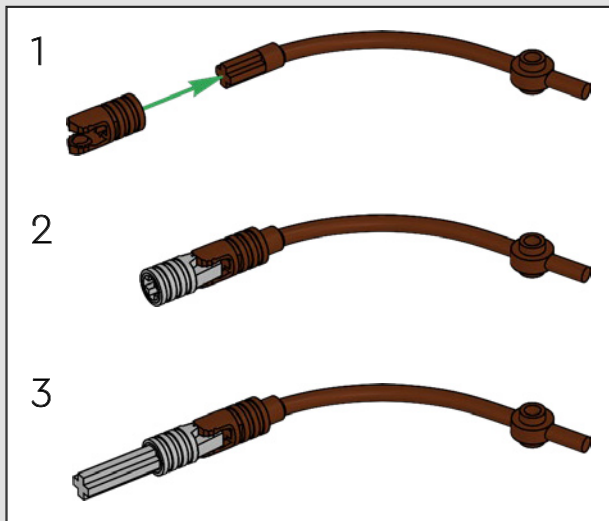


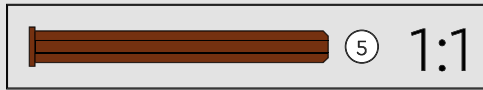
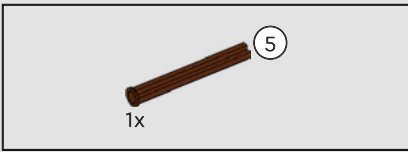
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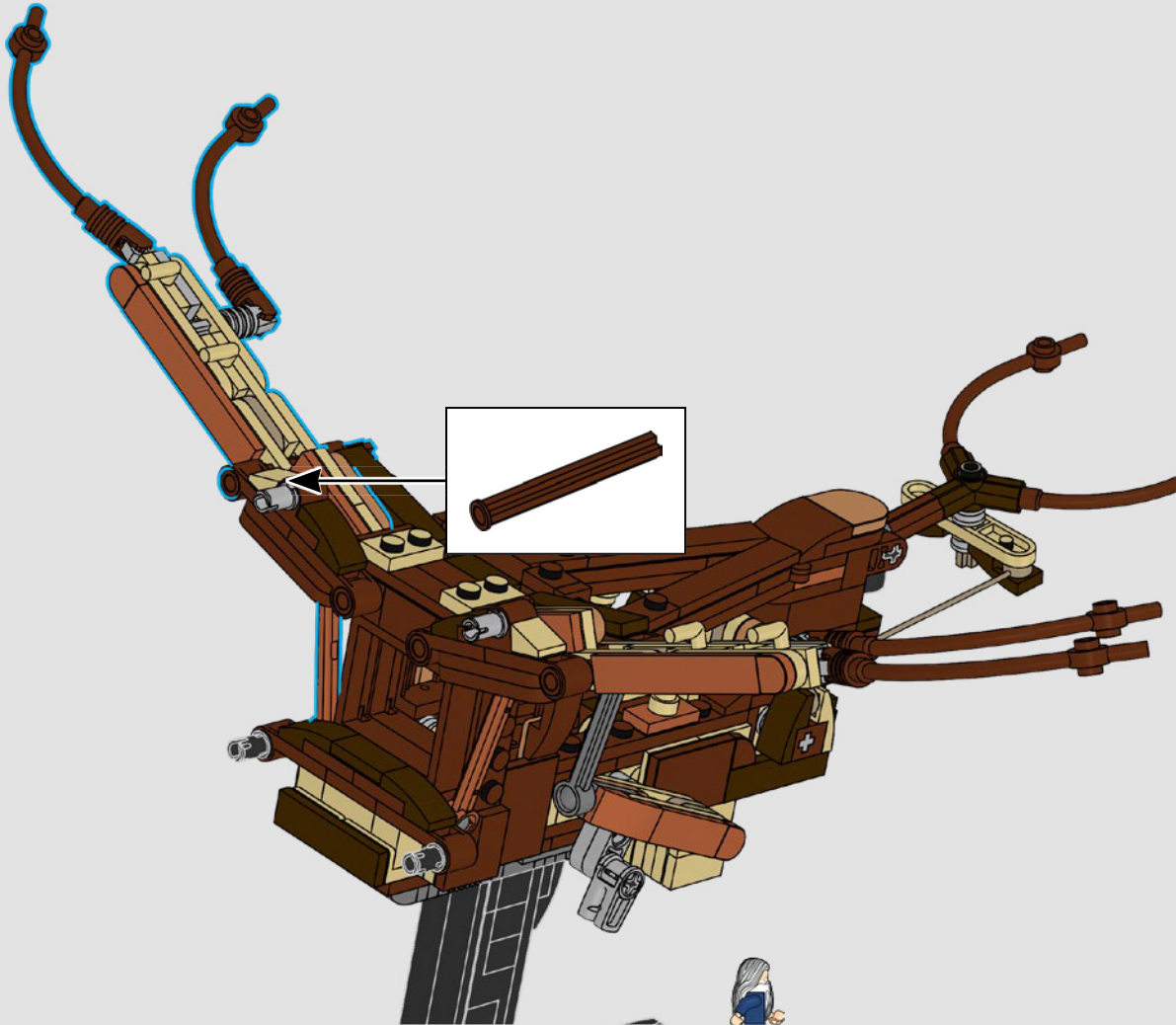


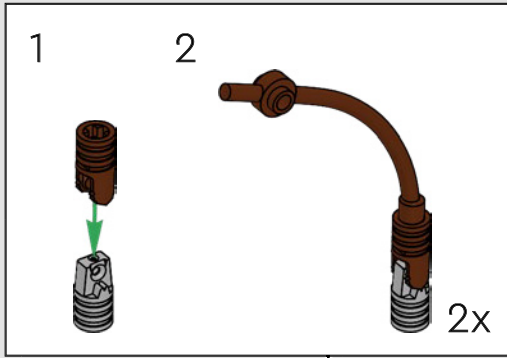
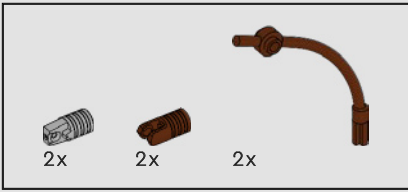
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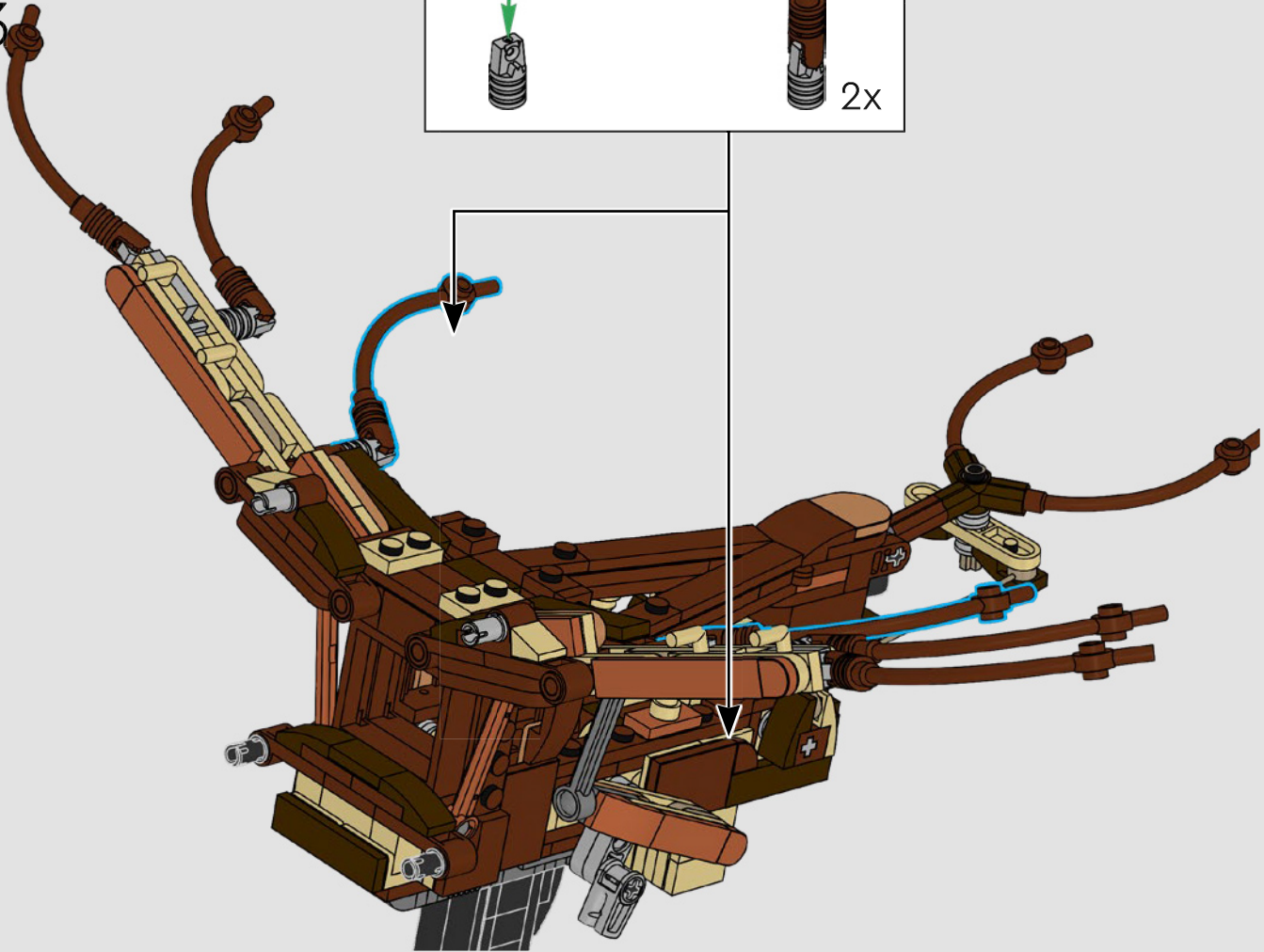


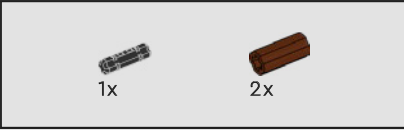
152



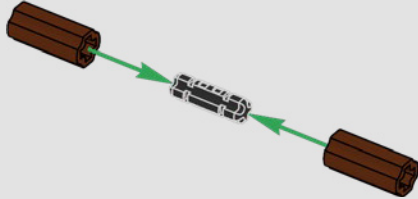


153





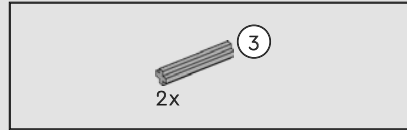
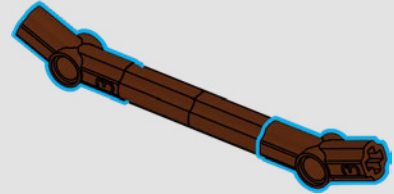
154



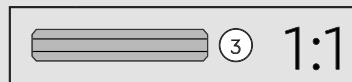
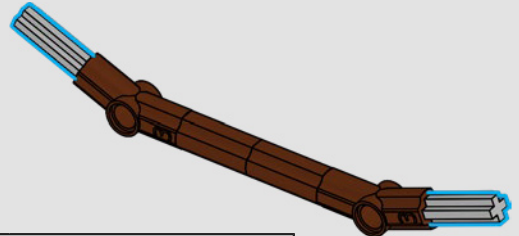
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156

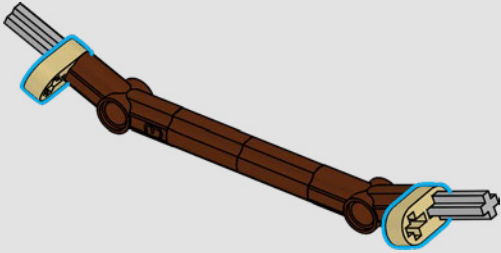


157

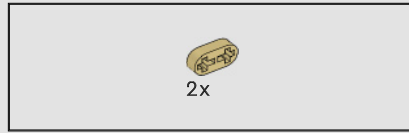
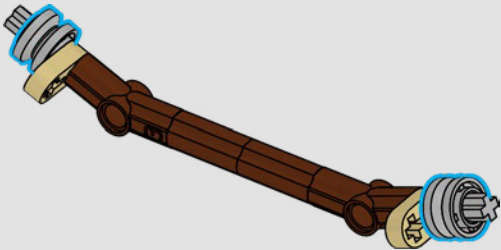




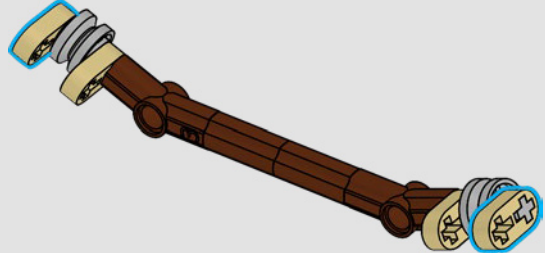
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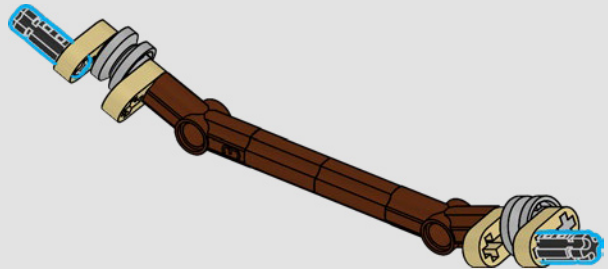
159



160



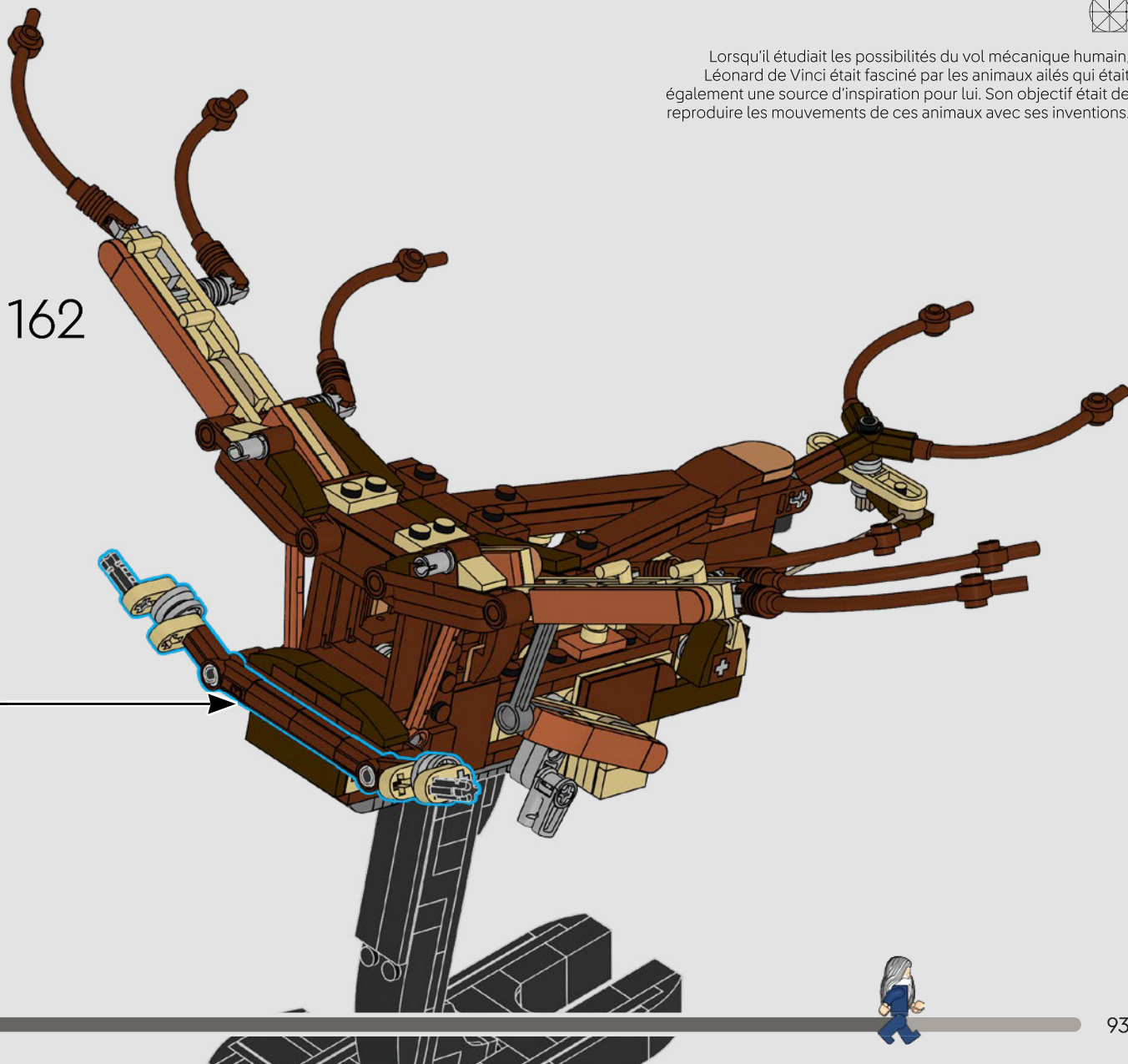
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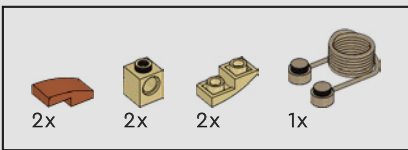




Lorsqu'il étudiait les possibilités du vol mécanique humain, Léonard de Vinci était fasciné par les animaux ailés qui étaient également une source d'inspiration pour lui. Son objectif était de reproduire les mouvements de ces animaux avec ses inventions.

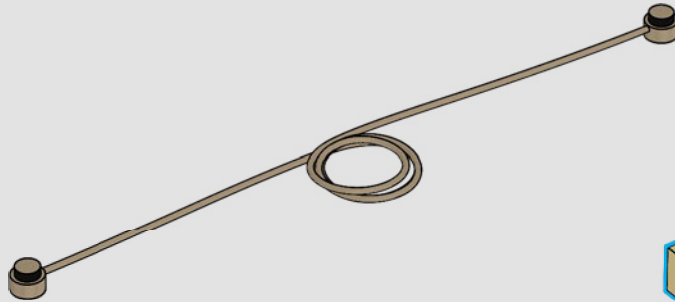
162



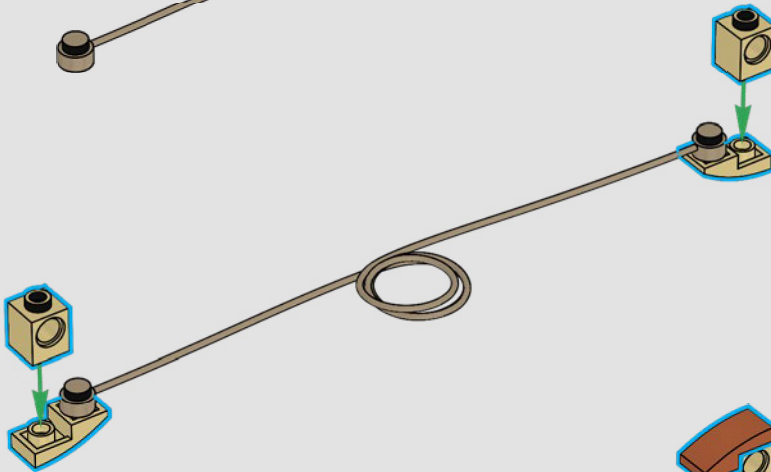


163

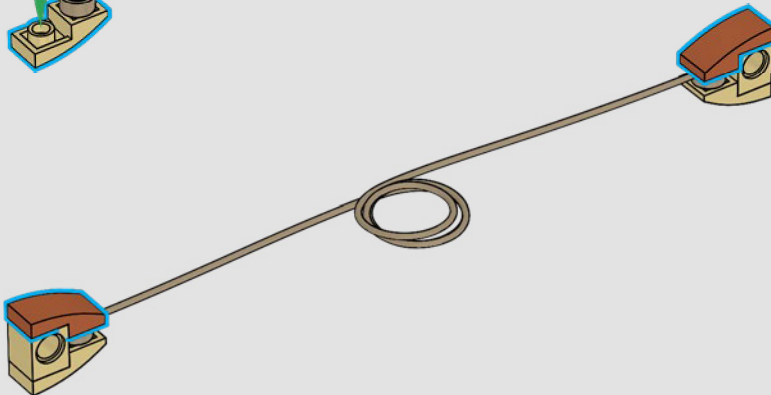
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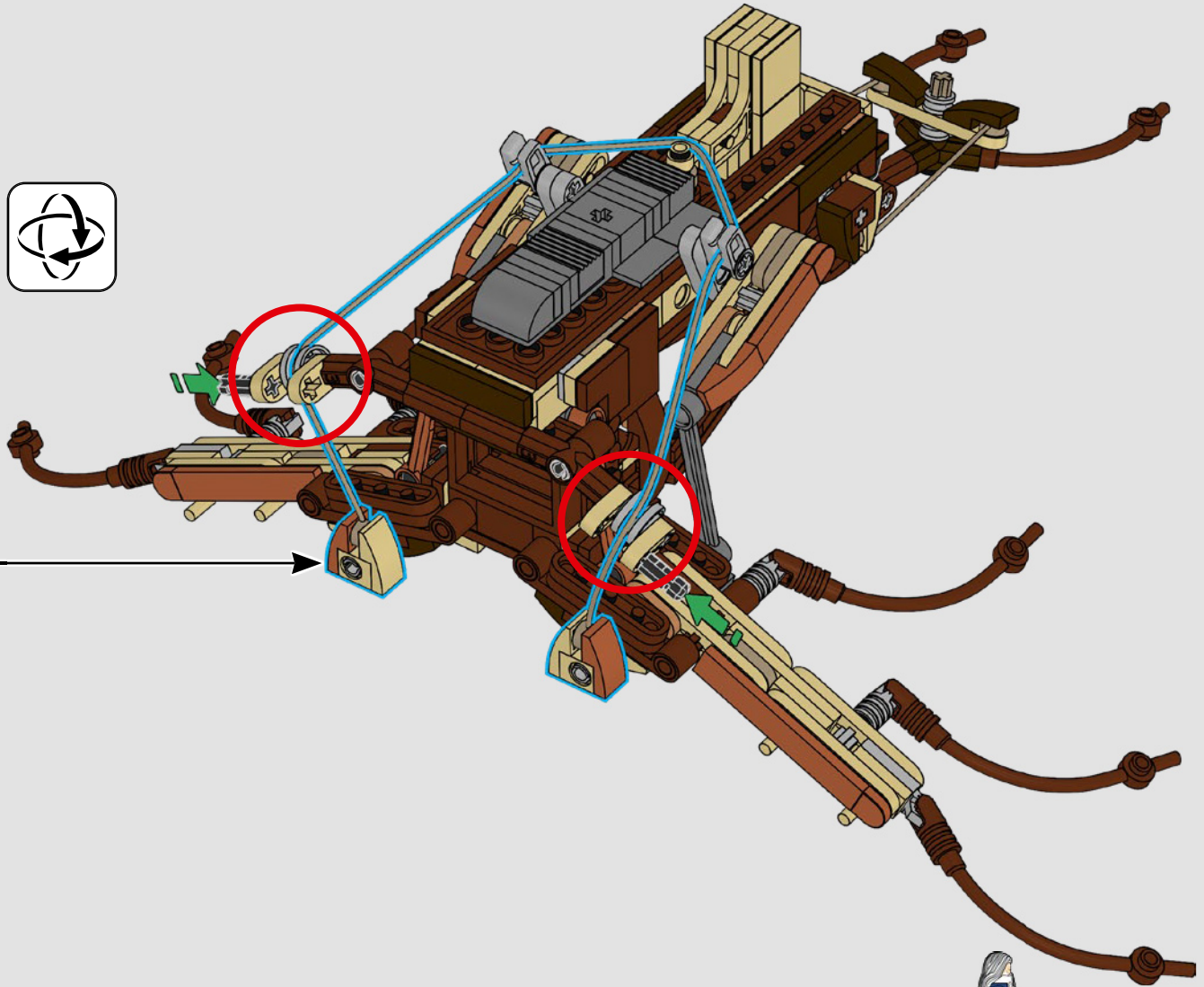


2



3

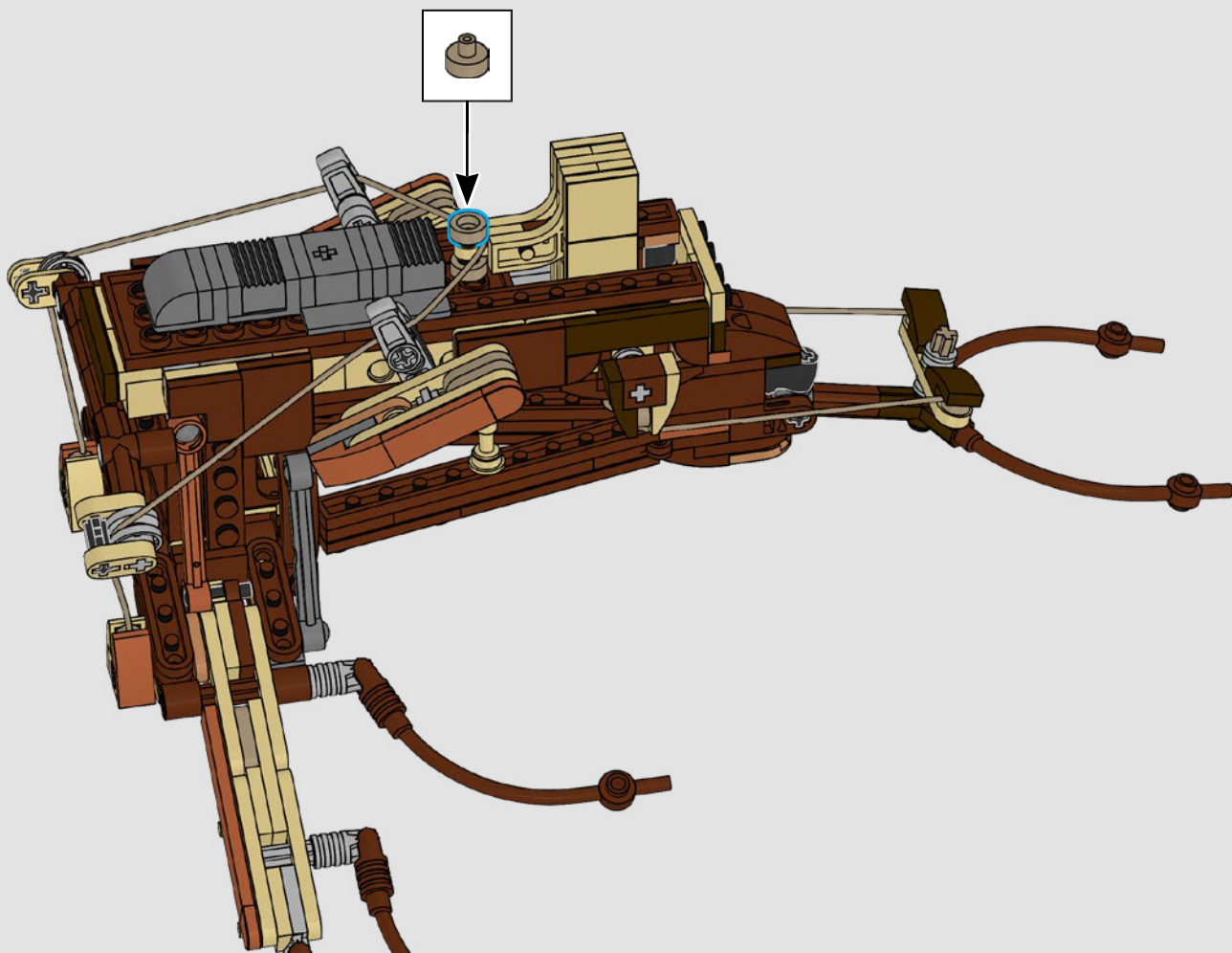




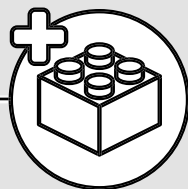
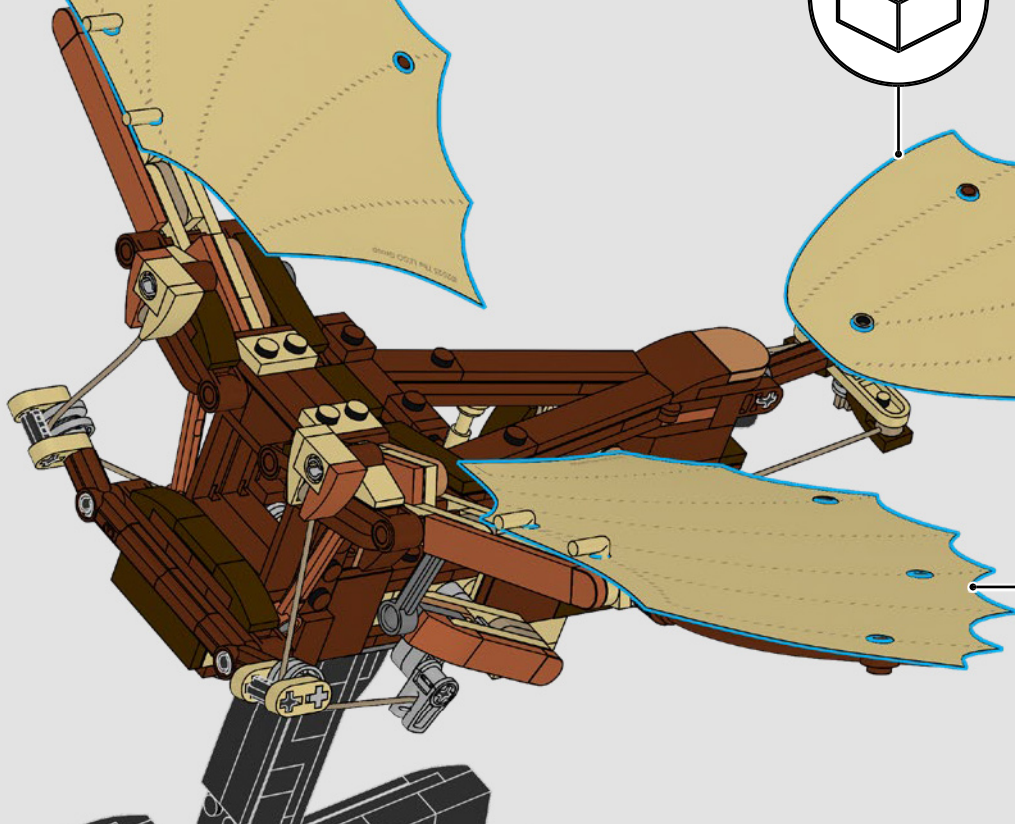
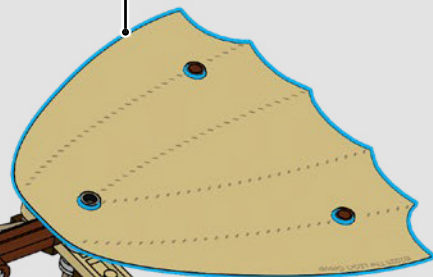
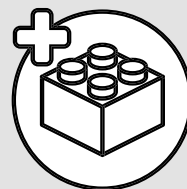
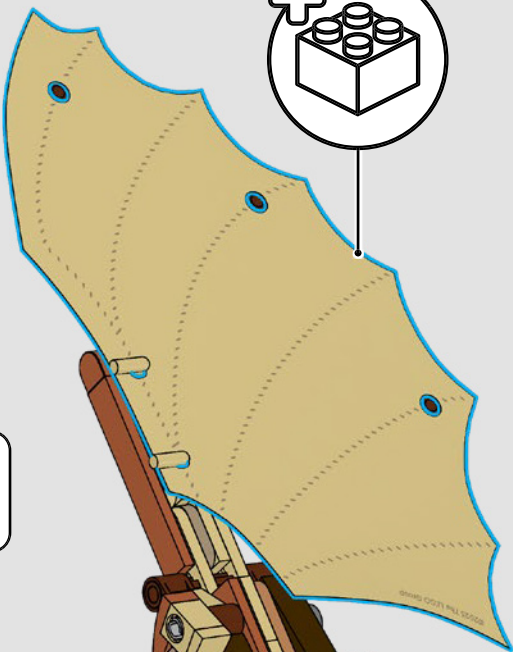
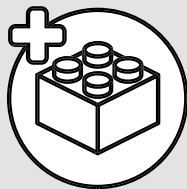


1x

164



165



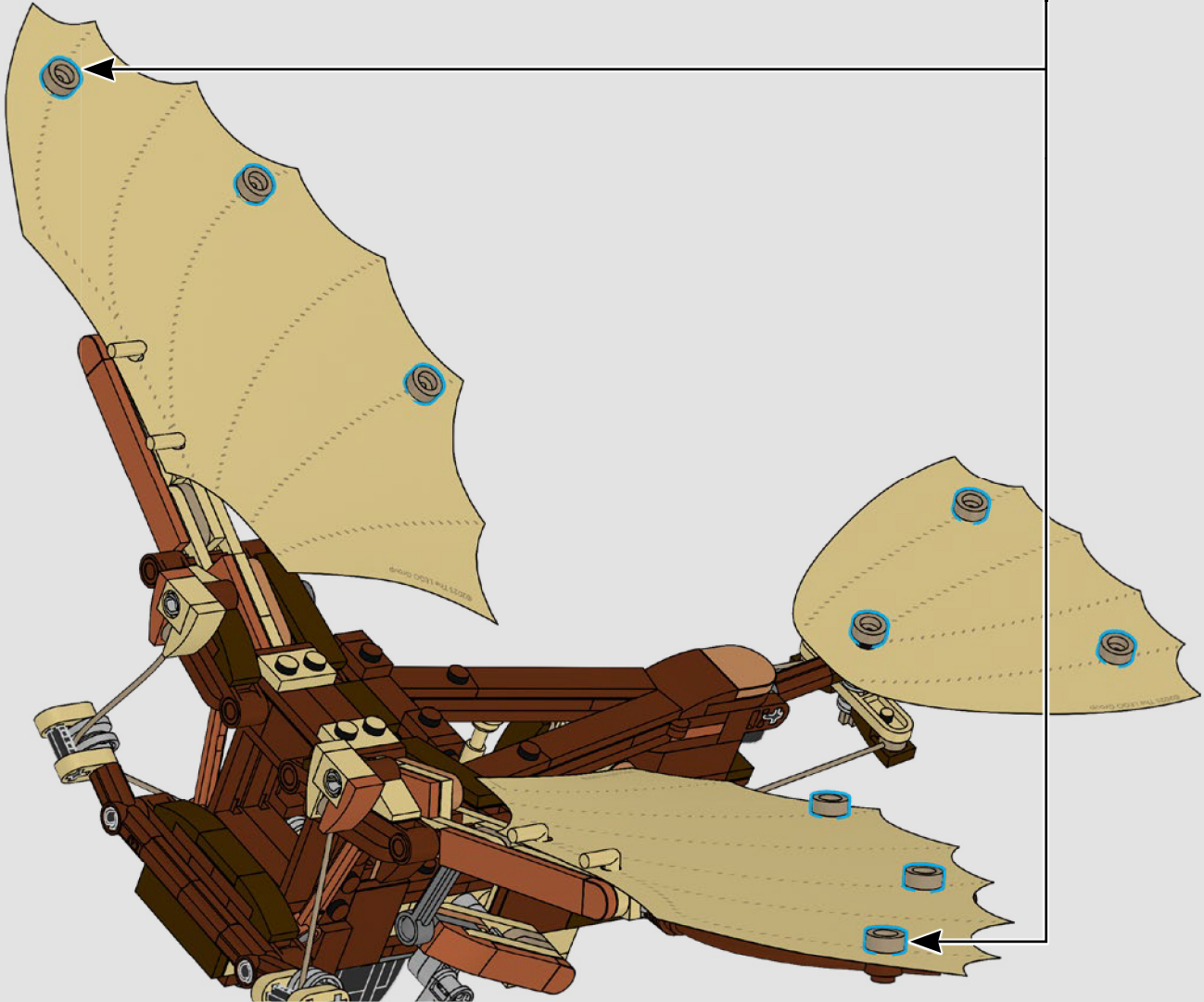


9x



9x

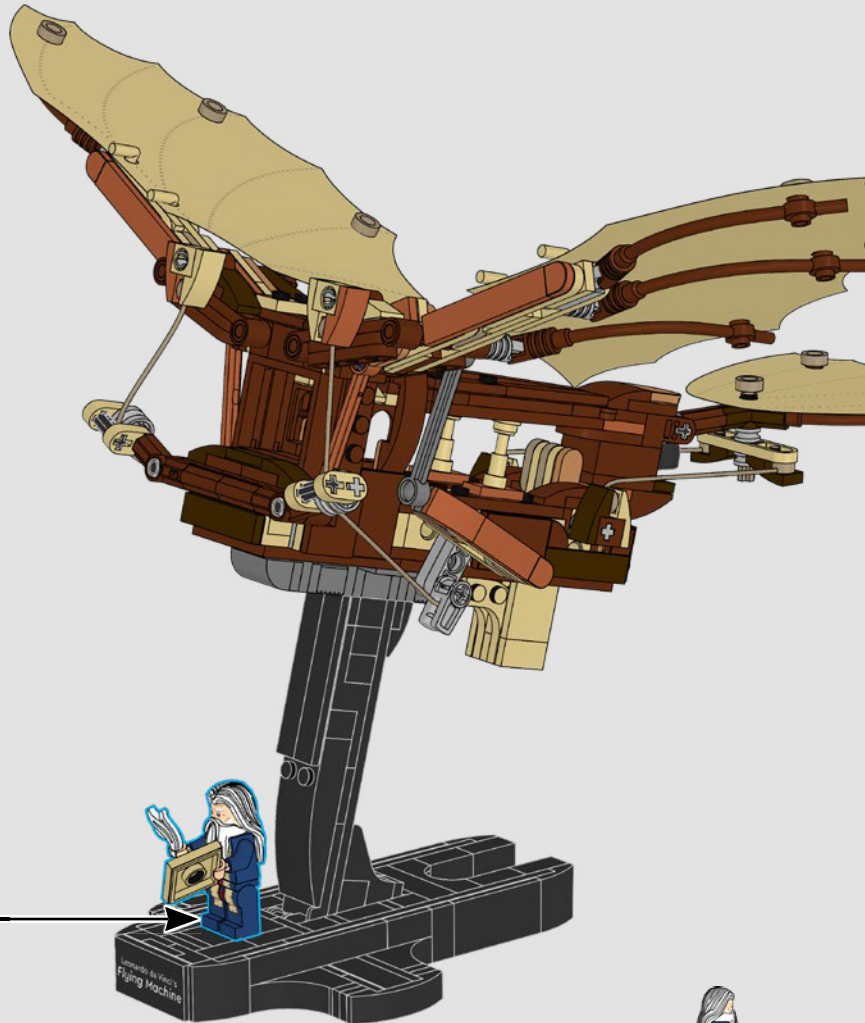
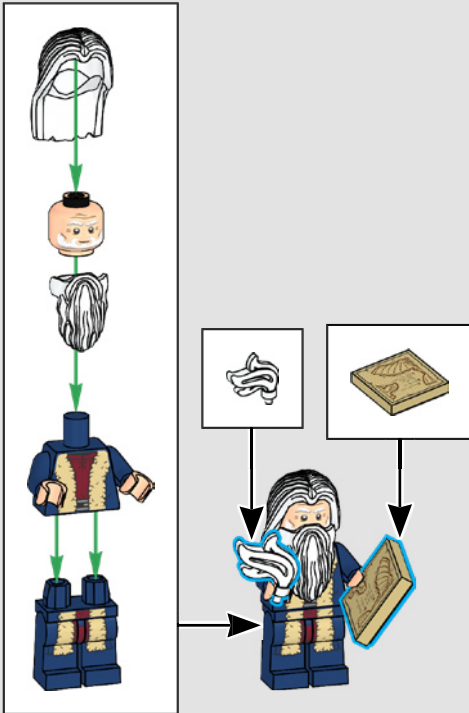
166





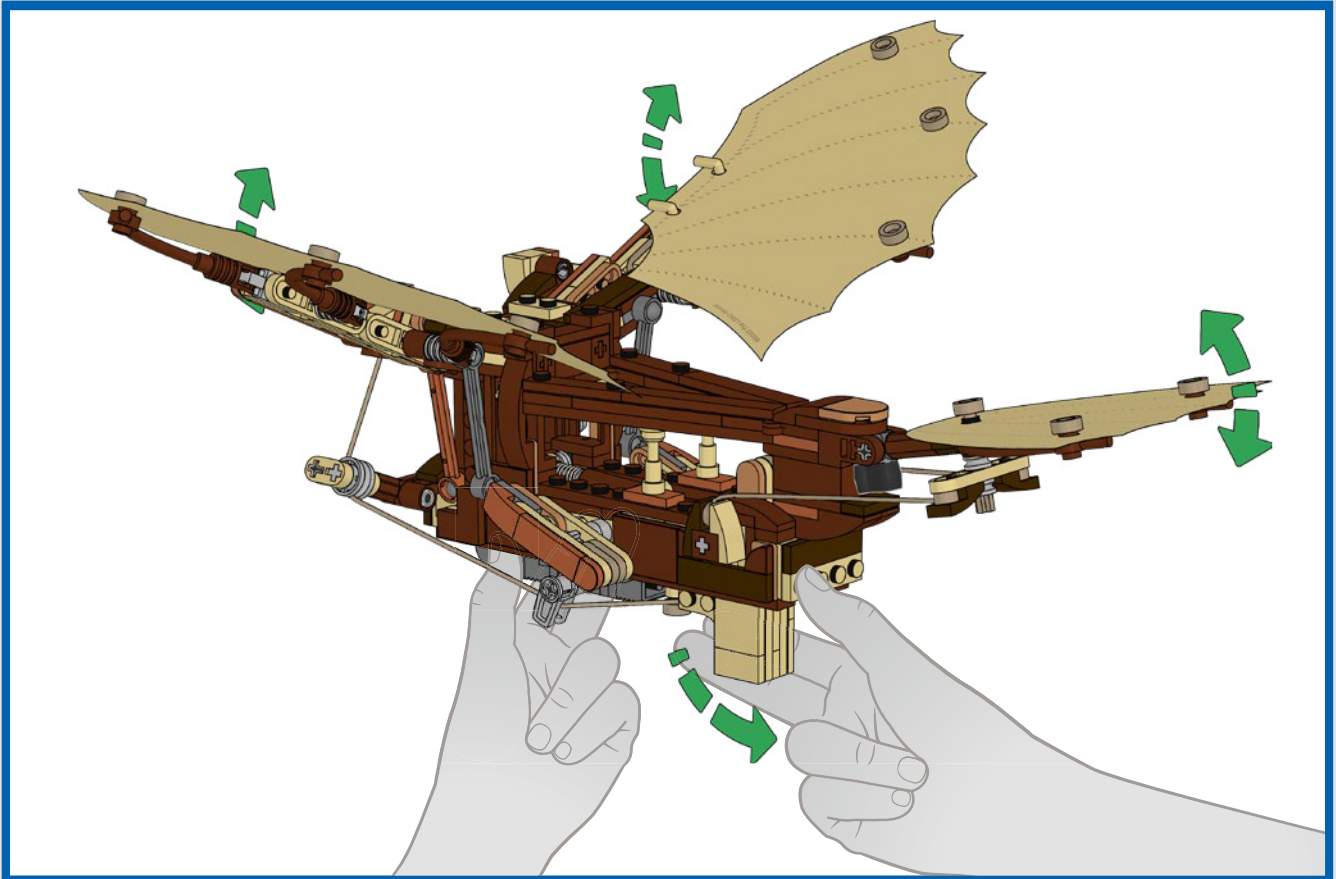
Le modèle a été conçu de manière à ce que le déclencheur puisse être actionné de trois façons différentes : lorsque le modèle est posé sur le support, tenu d'une main et tenu à deux mains (l'une sur le déclencheur, l'autre sur le modèle).

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Lors de la conception, l'un des défis a été de déterminer l'emplacement du déclencheur pour la fonction de battement, pour éviter que les mains des constructeurs gênent les pièces du mécanisme ou les ficelles.



2x 6424674
2x 654126
10x 302426
2x 6509664
9x 4109810
2x 6279875
1x 4198367
2x 6114987
7x 6178922
4x 302326
8x 306926
10x 6275806
2x 6192309
2x 6147050

6x 302226
3x 300326
4x 6053077
3x 6469445
1x 6321745
2x 4581280
4x 6154860
2x 365926
2x 4613153
1x 6258904
1x 300126
2x 4560182

2x 362326
1x 6562781
1x 6533639
4x 663626
1x 4180548
2x 346026
3x 4514845
1x 611226
1x 244526
1x 6523326
1x 6530674

6x 6380634
3x 6507790
1x 6513939
4x 6492538
3x 4206482
1x 4142865
2x 6129995
6x 6443061
1x 6167923
4x 4516055
2x 4179771
6x 6376461
2x 6352222
1x 6281995
15x 4113917
2x 4523145

4

4x 6261357
4x 6251252
1x 4114026
2x 6060850
2x 6313611
8x 6117975
2x 4114084
2x 6013081
1x 6523327
2x 4121921
1x 4159739
2x 4234365
6x 4113233

2x 6397561
15x 6311104
1x 4114309
1x 6122047
2x 4112982
1x 6519042
1x 6522105
1x 6522103
1x 6522097

- 4x 6359273
- 2x 6092602
- 4x 6186009
- 2x 4615606
- 4x 6340118
- 2x 6523583
- 2x 6359696
- 1x 6315564
- 1x 6289366
- 1x 6353972
- 11x 6300320
- 8x 6231386
- 2x 6330148
- 1x 6184880
- 1x 6031821
- 1x 6532367
- 2x 6533185
- 1x 6240515

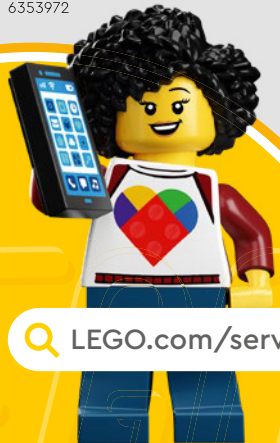
- 11x 4221744
- 4x 6149677
- 8x 6397610
- 2x 6472546
- 6x 6503738
- 3x 4531751
- 8x 4211150
- 2x 6138664
- 2x 6063447
- 2x 6502370
- 2x 6459597
- 2x 6221608
- 3x 6146858

- 2x 6261388
- 10x 6415991
- 1x 6534905
- 2x 6172636
- 6x 6463591
- 4x 6311441
- 3x 4211189
- 1x 4216668
- 4x 4211190
- 4x 4658005
- 5x 6257604
- 2x 4595889

- 2x 6092566
- 4x 6416695
- 1x 4211201
- 4x 6159763
- 8x 6516553
- 4x 4221590
- 2x 4211204
- 4x 4629920
- 4x 4216945
- 2x 4271874
- 2x 4223683

- 1x 6005331
- 2x 4210636
- 4x 4211063
- 1x 6302690
- 1x 6178919
- 2x 6039479
- 2x 6308045
- 4x 6123814
- 2x 6118832
- 2x 4629920
- 6x 4566688
- 8x 6046943
- 1x 6273219
- 6x 6313874

- 1x 6523324
- 6x 6271165
- 2x 6335328
- 2x 4211758
- 4x 6265704
- 2x 4211807
- 2x 6471951
- 4x 6360043
- 2x 6266231
- 4x 4211815
- 4x 4211429
- 1x 4211396
- 1x 4211805
- 1x 4535768



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3

7

9



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