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# BUiLDER



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# 艺术家、工匠、 航空设计师

列奥纳多·达·芬奇 (1452-1519 年) 是文艺复兴时期无可争议的创新大师。达·芬奇因其富有远见的才华、无限的好奇心和张扬的性格而受到同时代人的崇拜，还因其独特的创造力而备受赞誉。他以无与伦比的热情、决心和工匠精神毕生致力于探索和突破艺术、人体和动物解剖学、物理学和工程学的界限。虽然是《蒙娜丽莎》、《最后的晚餐》等绘画杰作让他一举成名，但他一生对人类飞行的痴迷也同样让人为之敬畏。





“最高的快乐是理解的快乐。”

- 列奥纳多·达·芬奇



# 模仿鸟类的飞行

尽管据报道，列奥纳多·达·芬奇的航空发明在他的时代从未面世，但他的想法、设计和研究为几个世纪后第一架可以飞行的飞机提供了宝贵的灵感。扑翼机是他最著名的作品之一，但它们都建立在同一个想法上，即一个人驾驶着一台带有翅膀的机器。飞行员利用自身的力量，拉动和推动曲柄和绳索，使机翼上下拍打。



**“大道至简。”**

- 列奥纳多·达·芬奇

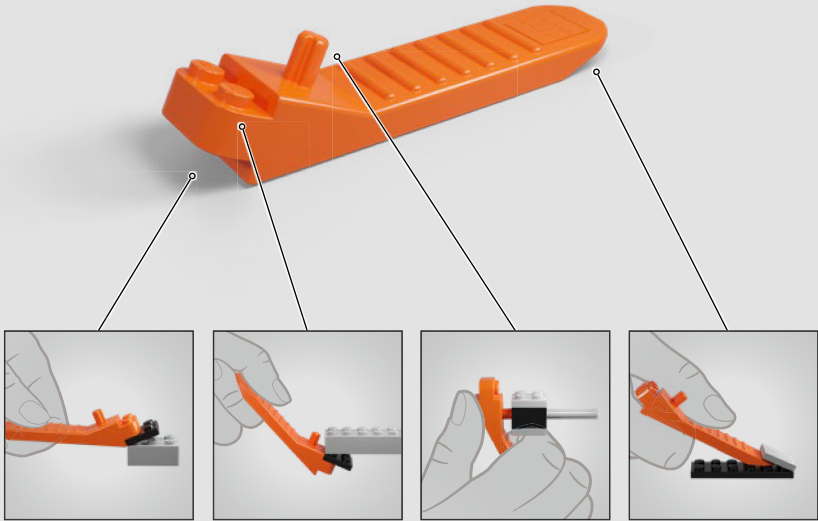


## 乐高®设计 团队感言

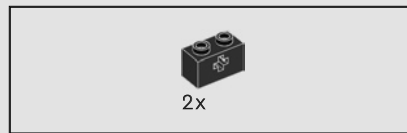
“这就是我们创意的起点——制造一台带有活动部件的机器，所有这些部件都连接在一起，并在拉动绳索时启动，或者在本套装情况下，通过一根绳子启动。这是一款看似简单的模型，实际上却是一项很棒的乐高®工程挑战。该模型看起来像是由木头、亚麻布和绳子制成。它的尾部和机翼带有积木拼搭的骨架，织物机翼上印有图案。将纺线作为机翼拍打机构的主要组成部分是一项巨大的挑战！模型的机械部件暴露在外，以展现功能部件和列奥纳多的愿景，并让我们对原始设计的乐高诠释版拍打飞行。”

**Antica Bracanov**

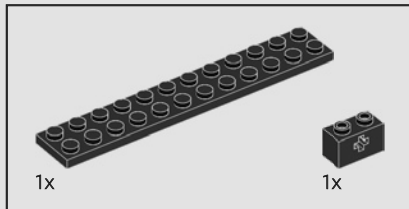
乐高®高级设计师



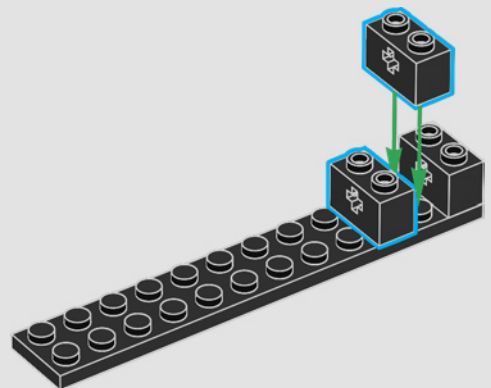
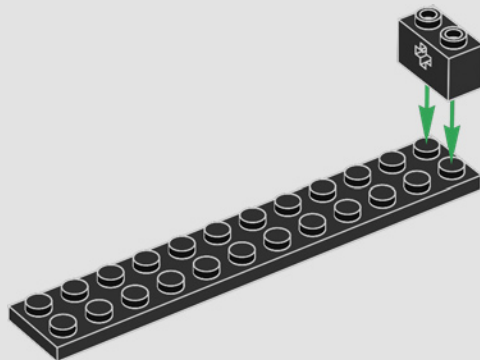


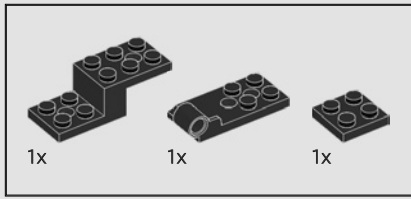


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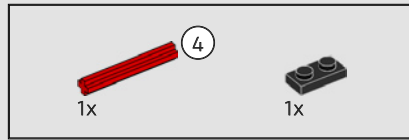
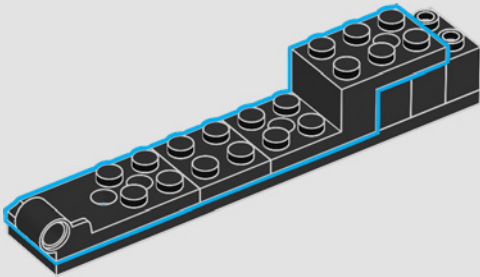


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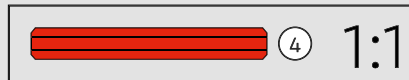
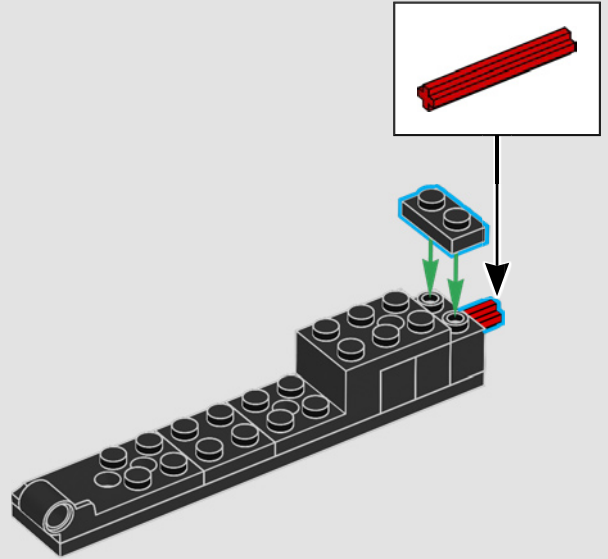


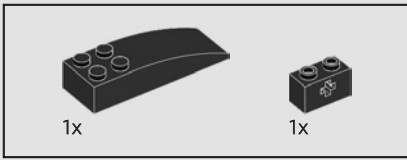


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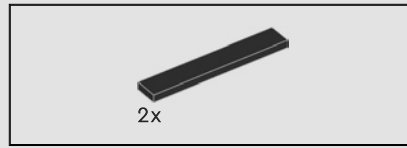
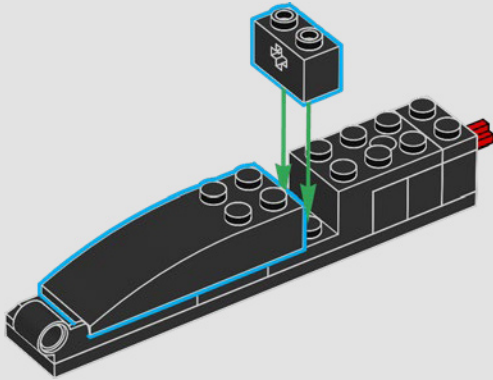


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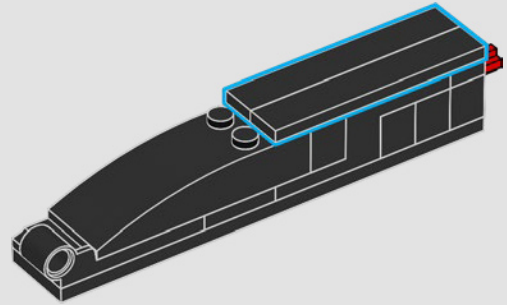


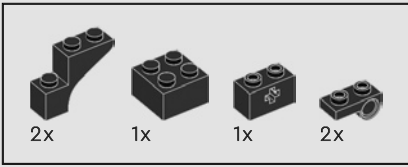


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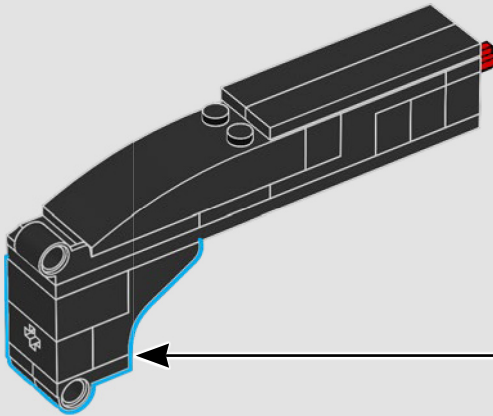
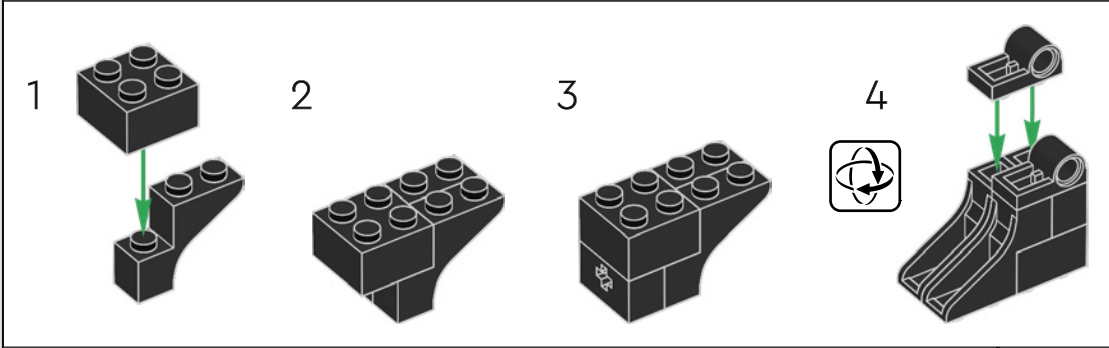


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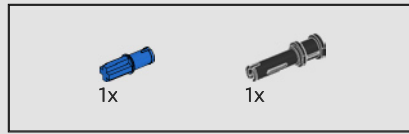
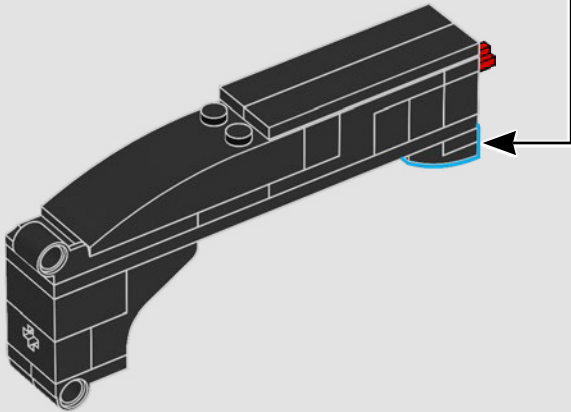
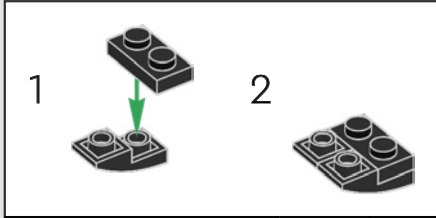


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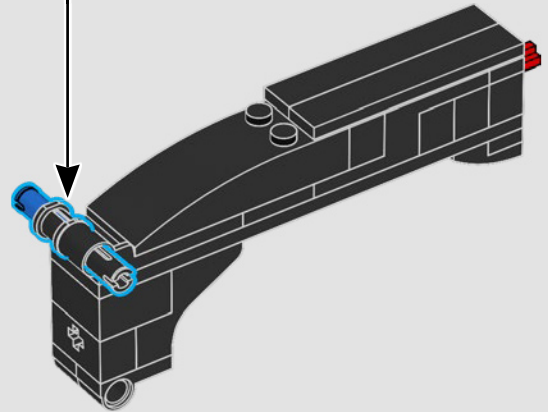
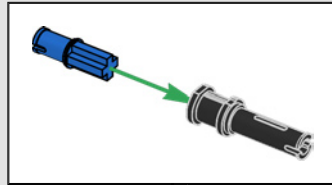


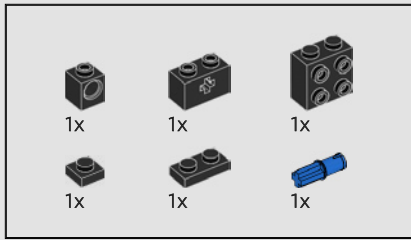


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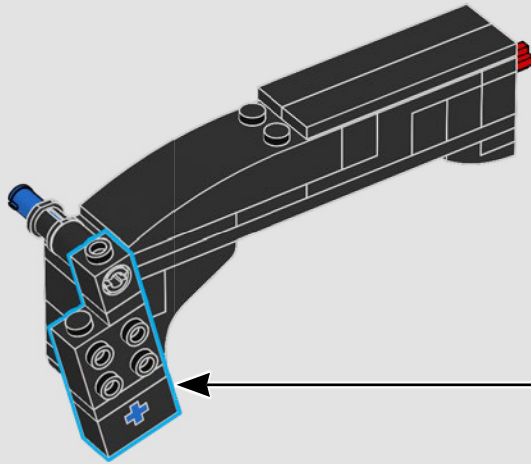
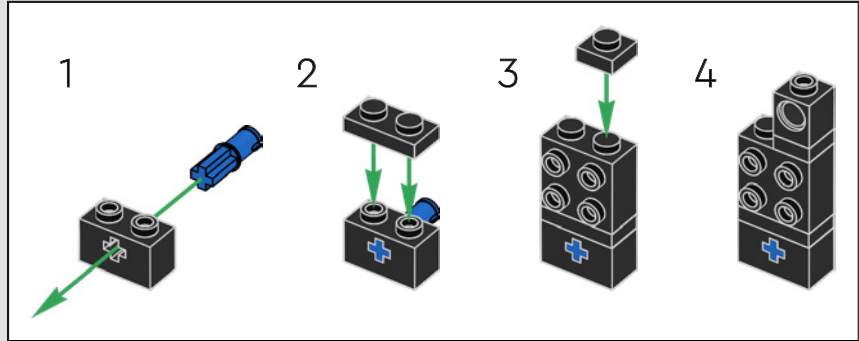


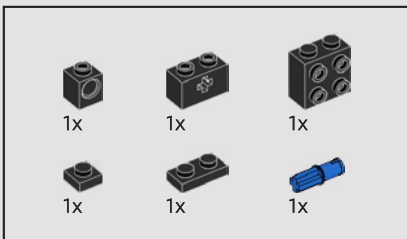
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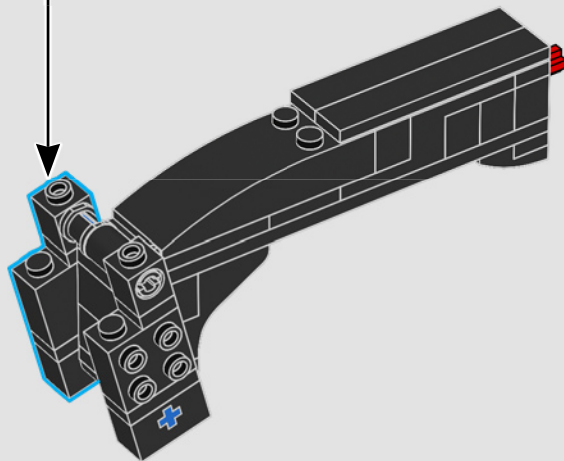
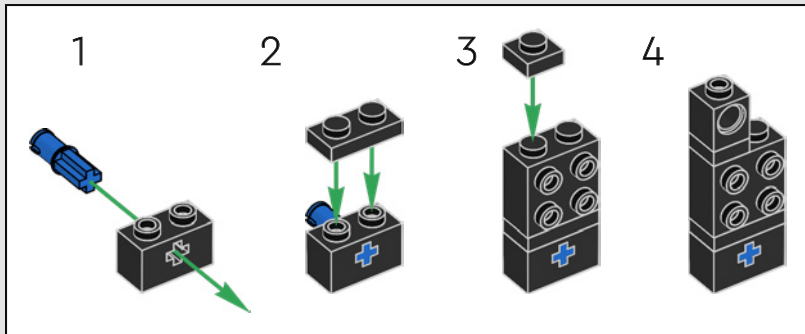


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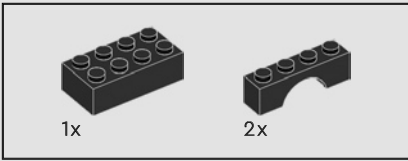




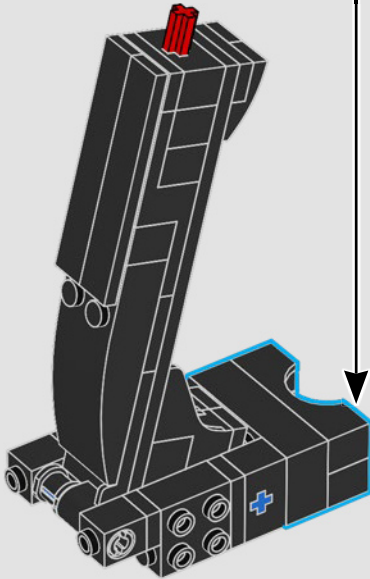
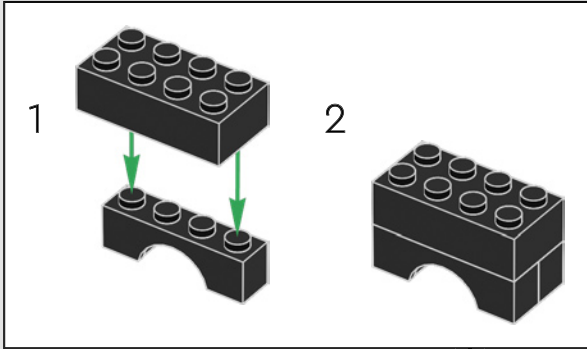
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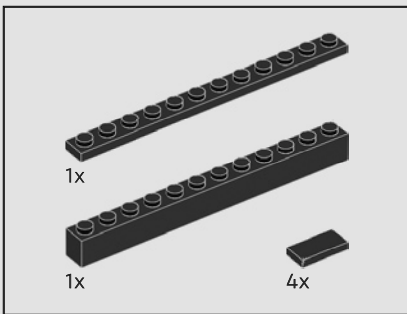
达芬奇的其中一架飞行器被称为 Il Grande Nibbio, 其设计灵感来自鹰科的一种鸟: 鸢, 并以此命名。



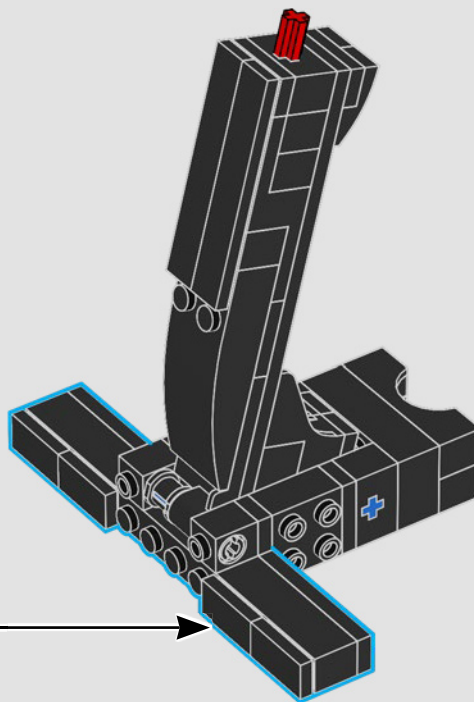
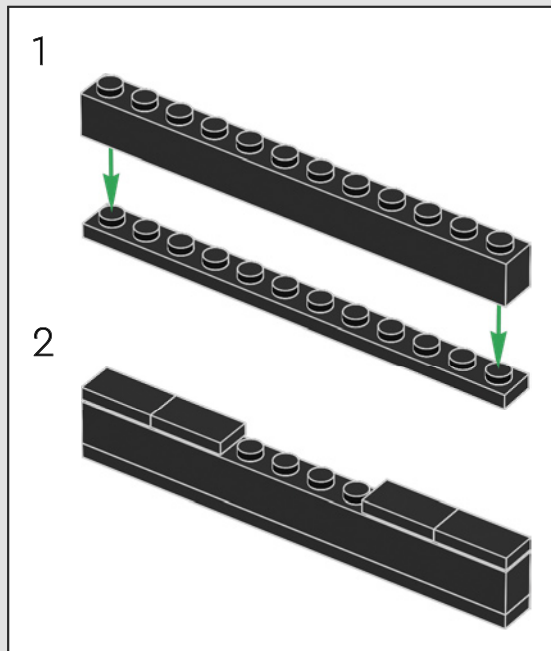
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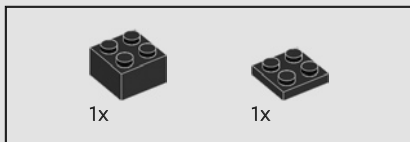




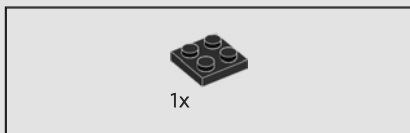
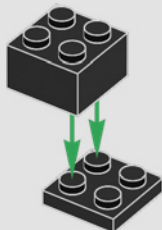


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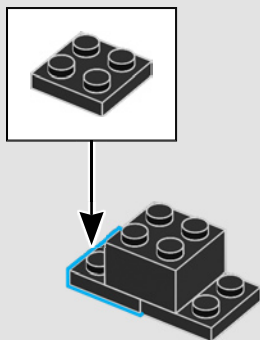




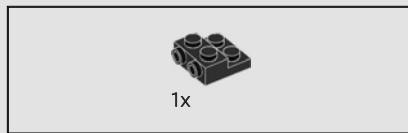
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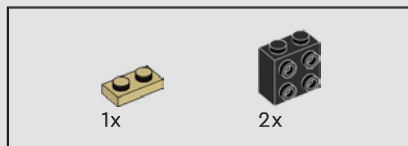
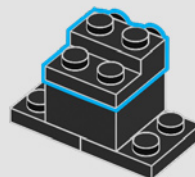
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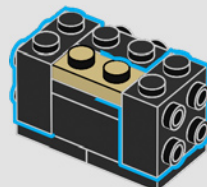
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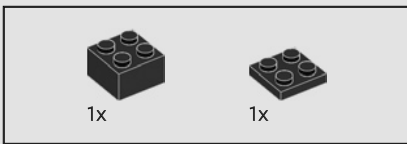


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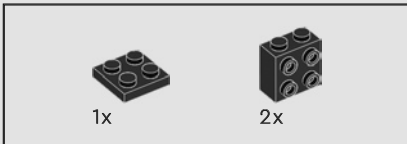
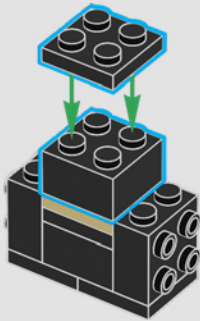


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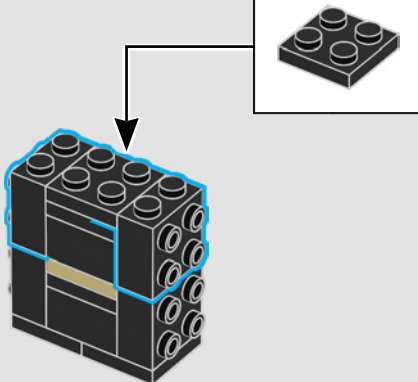




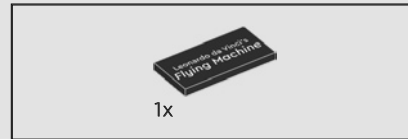
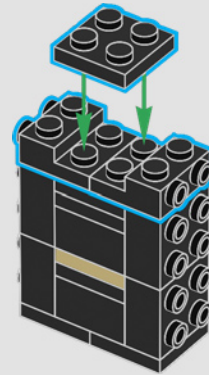
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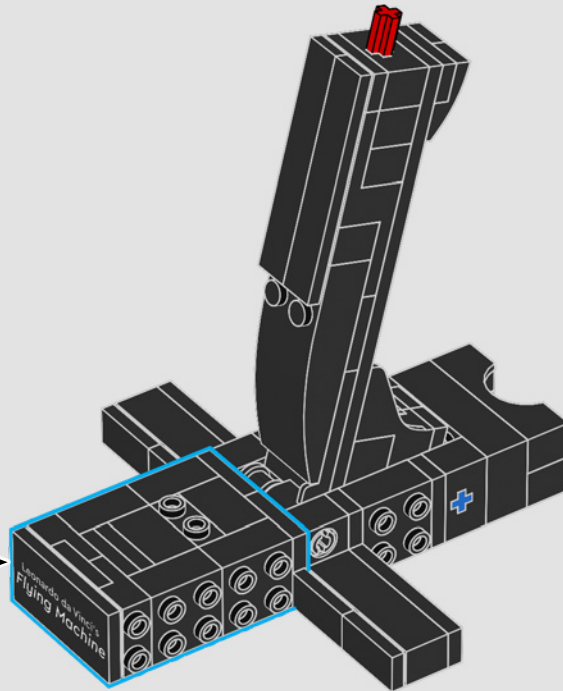
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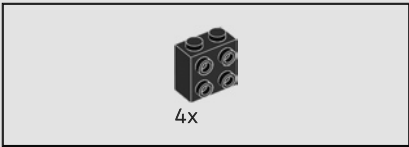




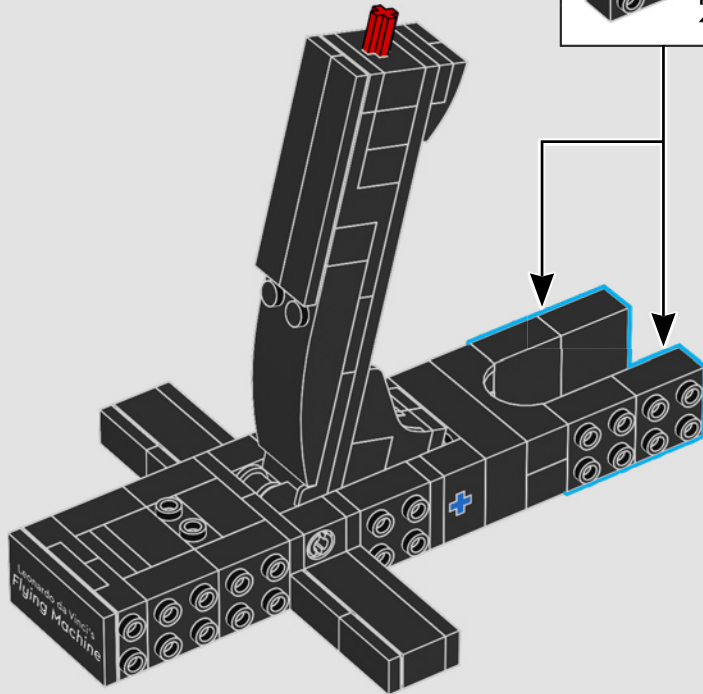
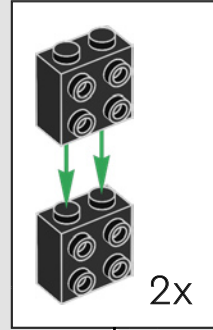
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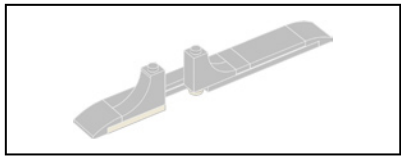
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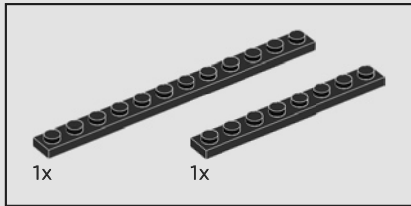


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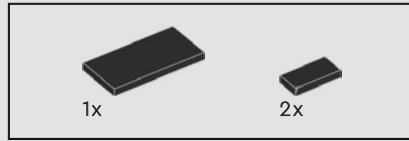
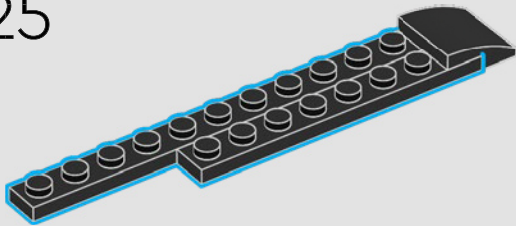




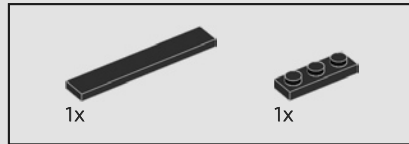
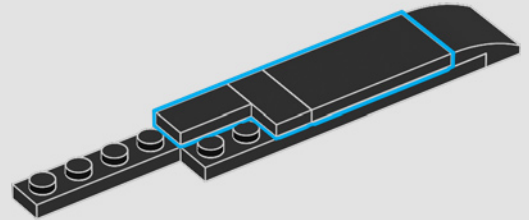
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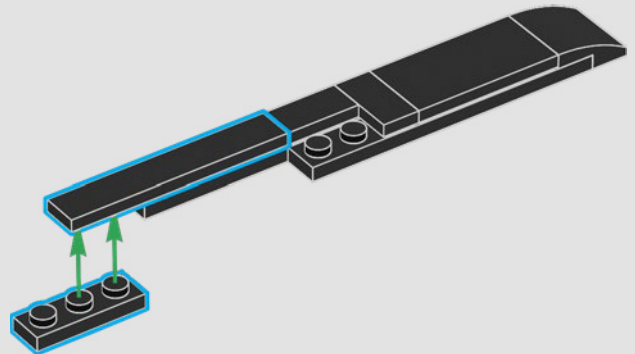
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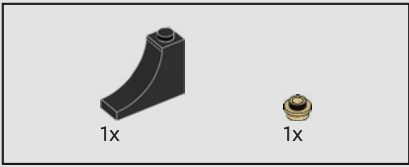


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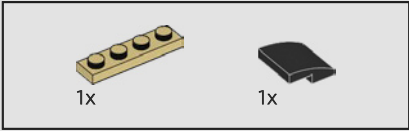
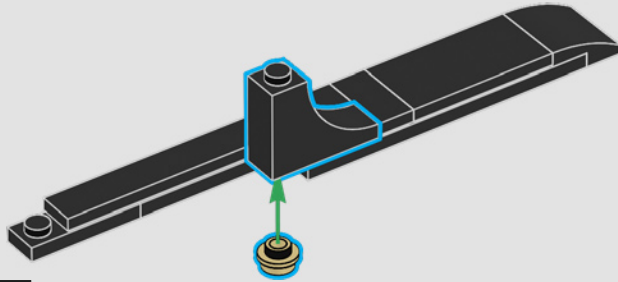


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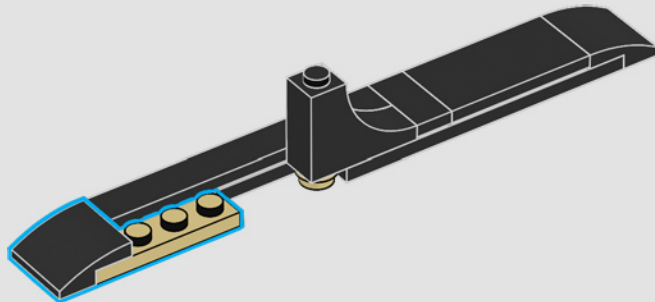


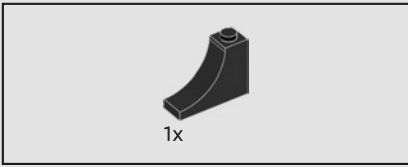


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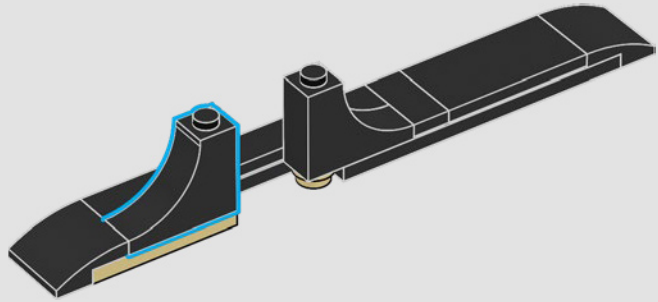


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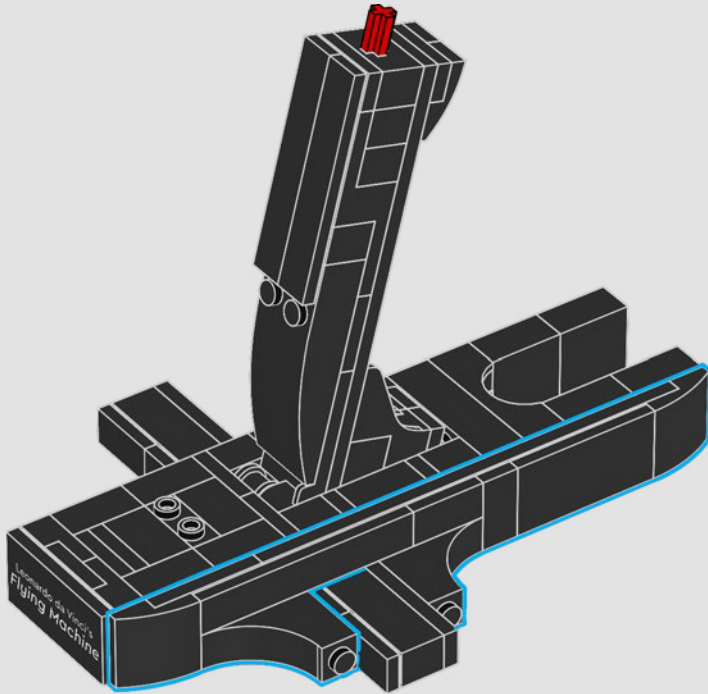




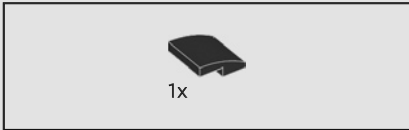
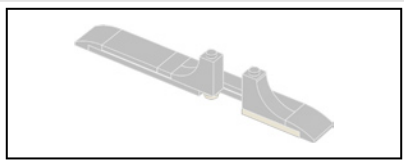
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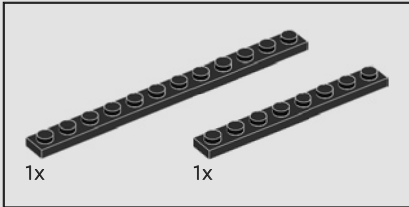
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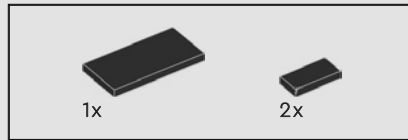
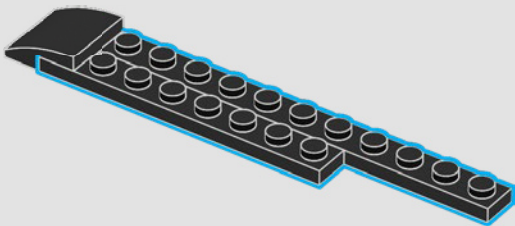




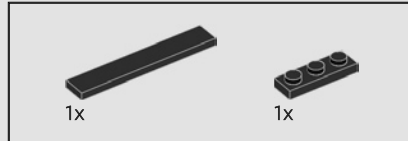
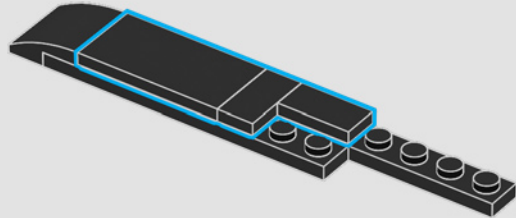
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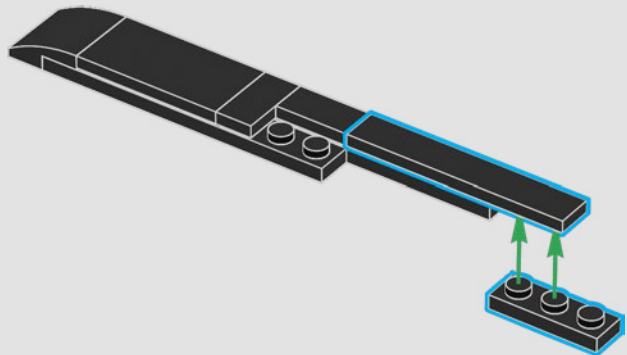
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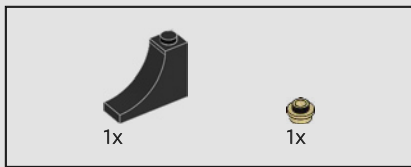


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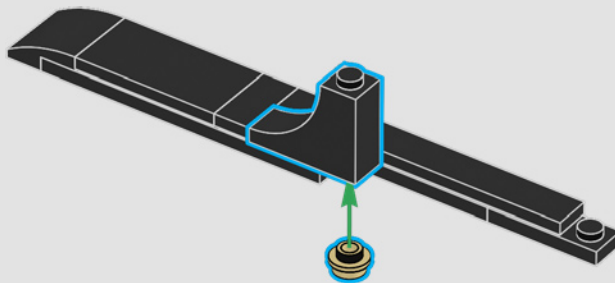


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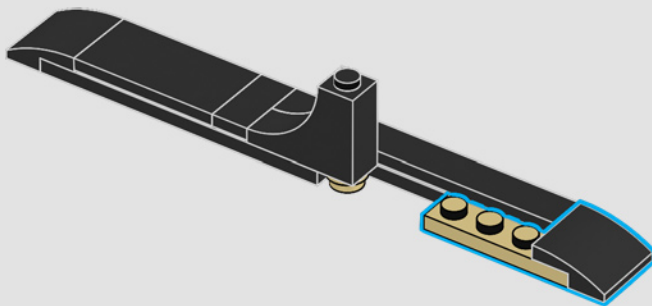


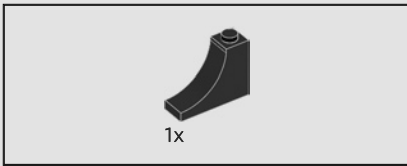


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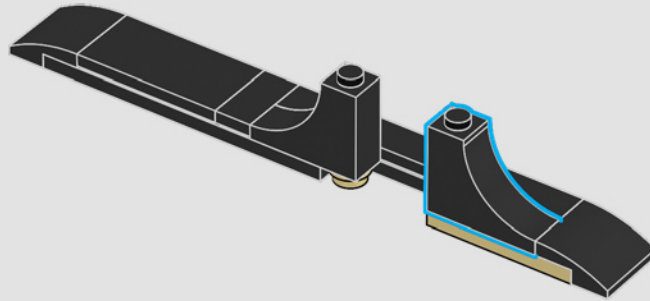


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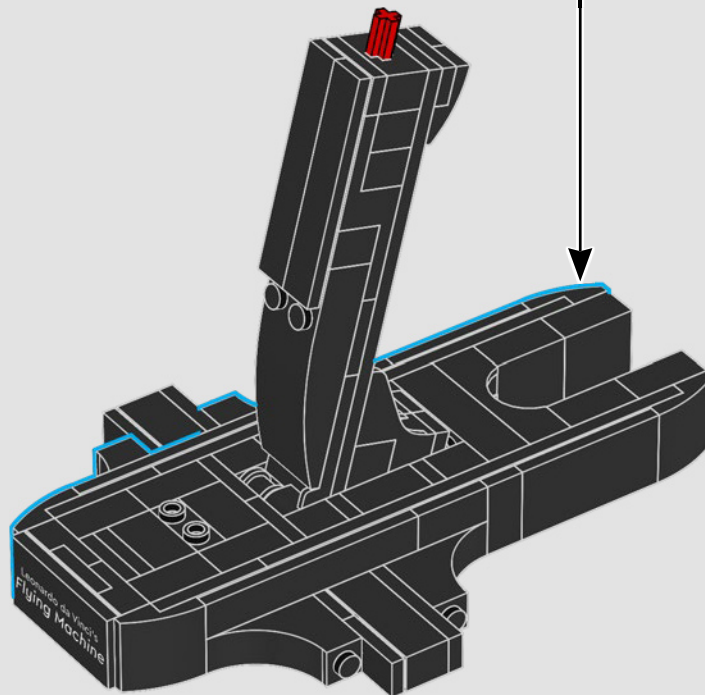




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39

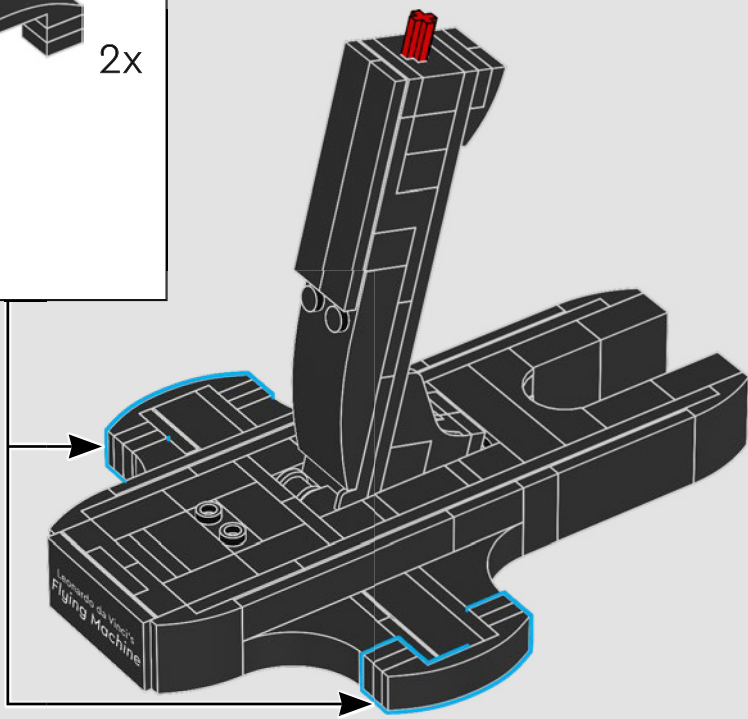
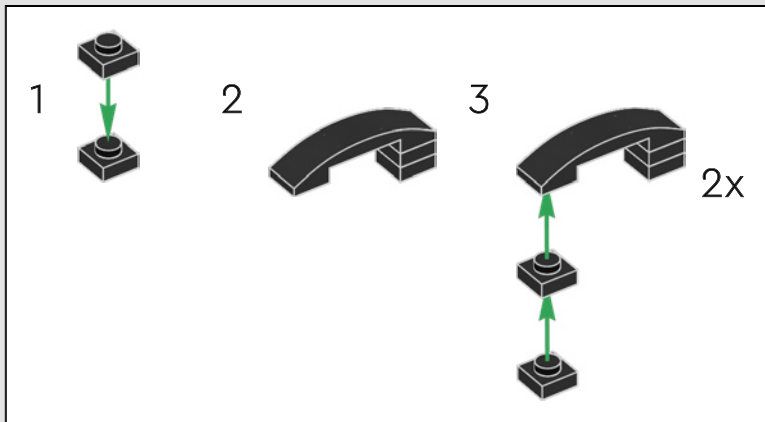




众所周知，列奥纳多·达·芬奇为飞行和飞行器创作了超过35000字的设计说明和500幅草图！

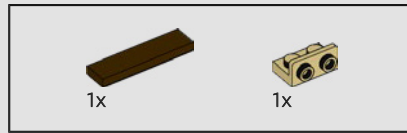
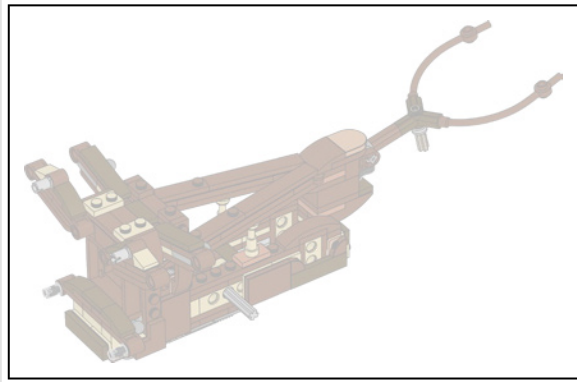
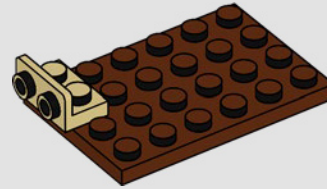


40

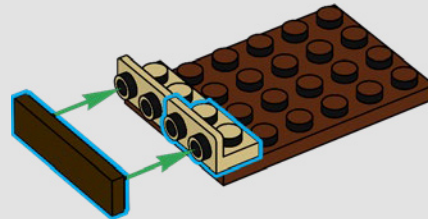


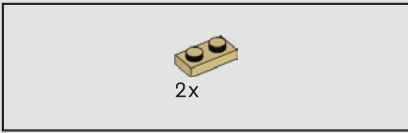


41

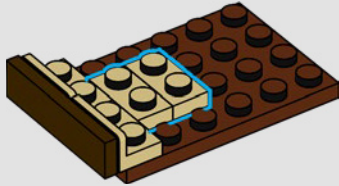


42

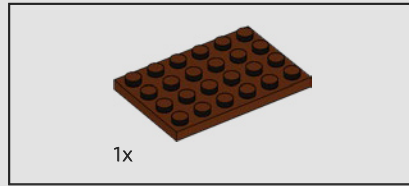
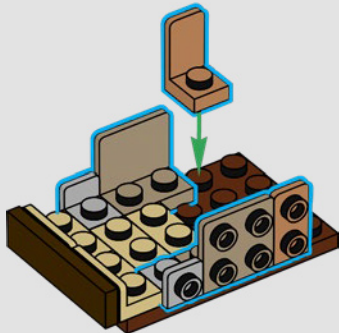




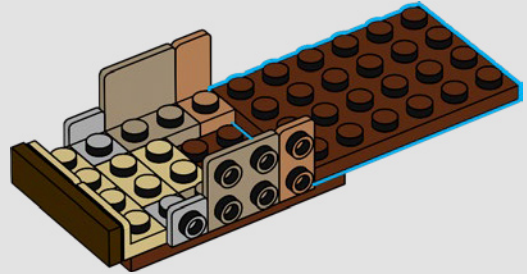
43



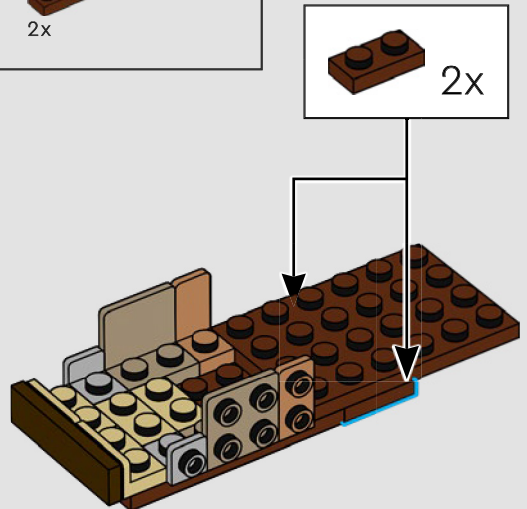
44

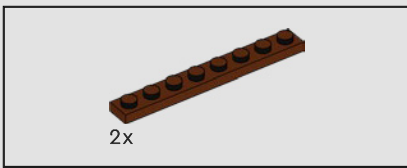


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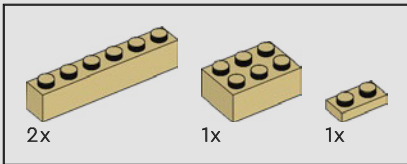
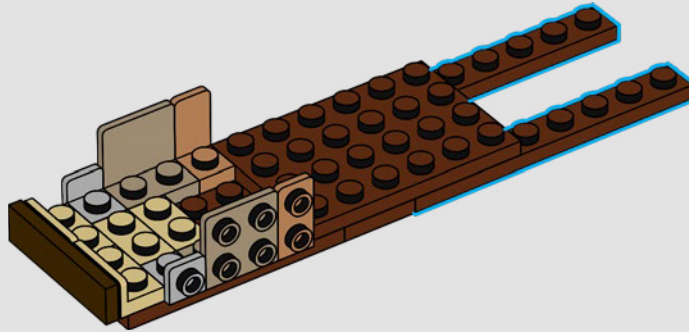


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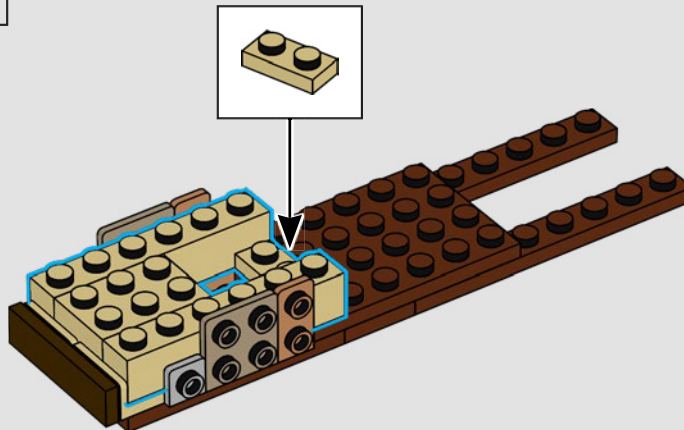




47

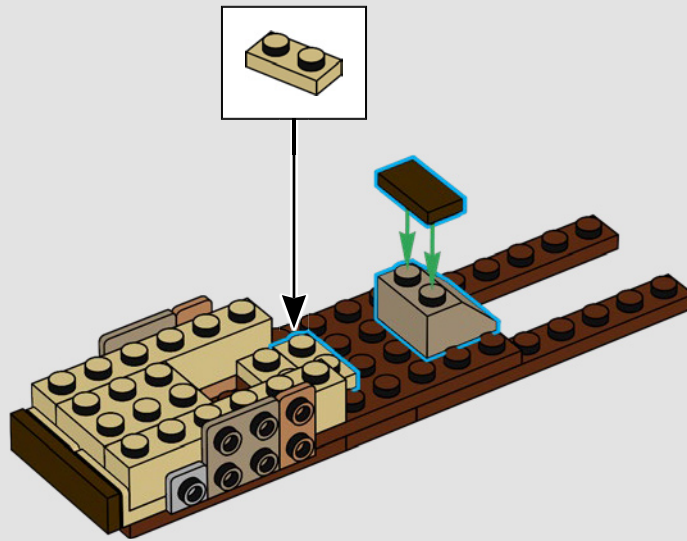


48

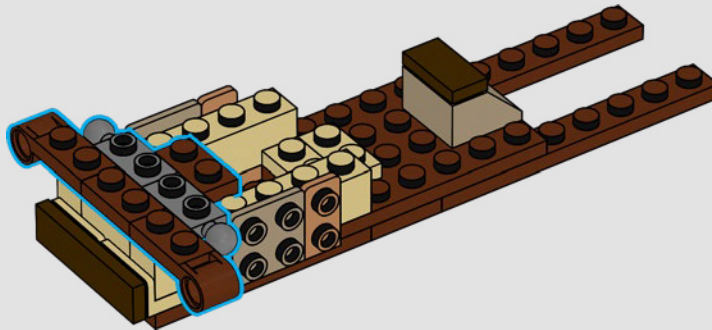




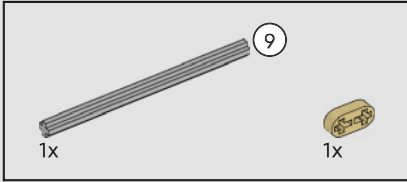
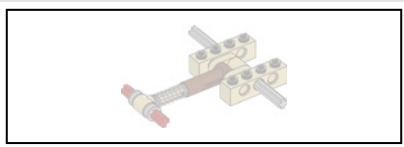
49



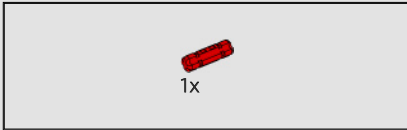
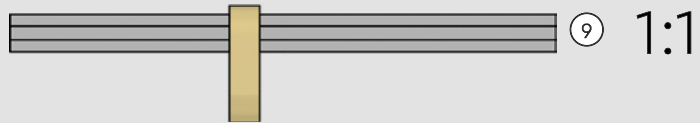
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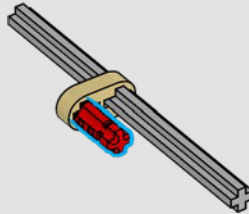




51

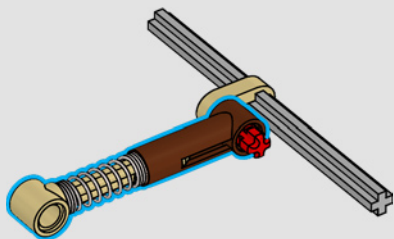


52

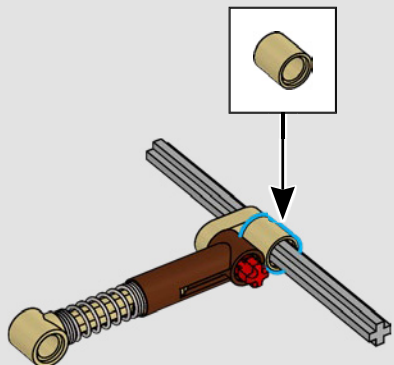




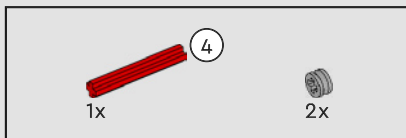
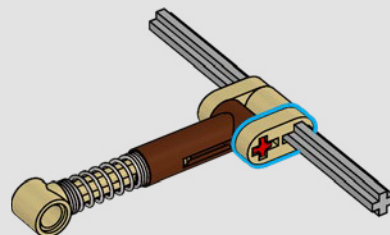
53



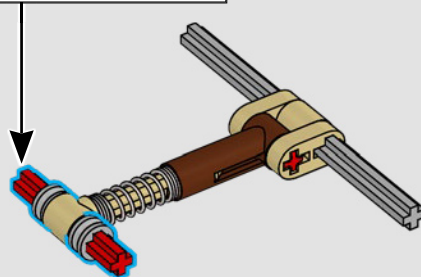
54

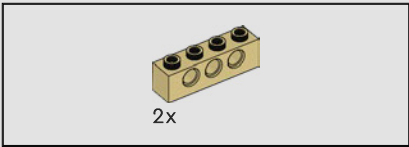


55

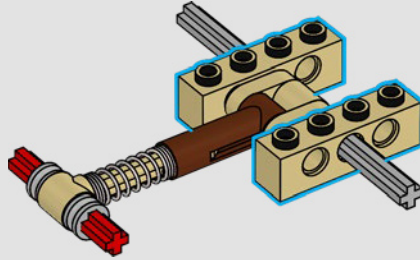


56

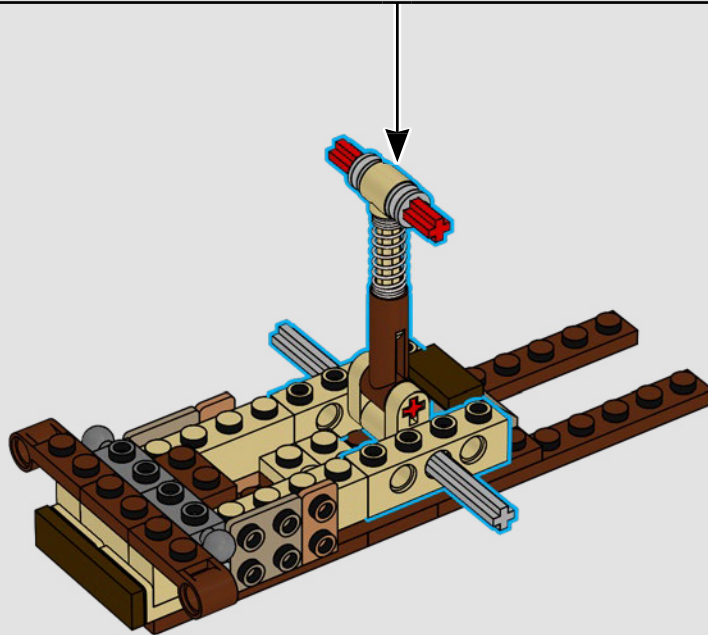




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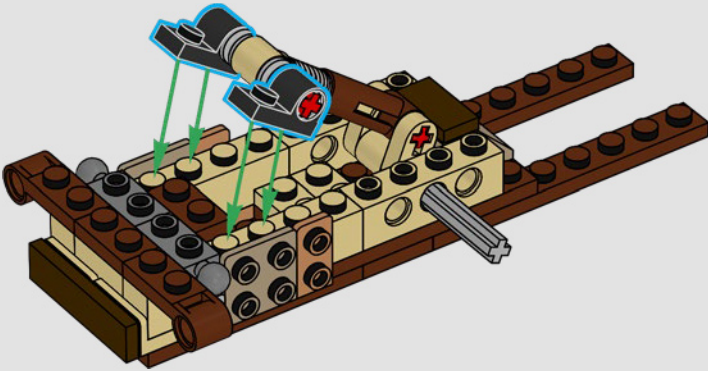


58

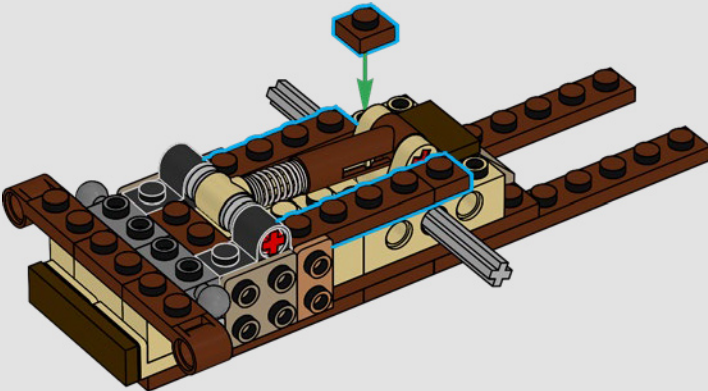


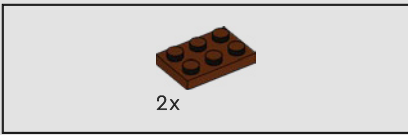


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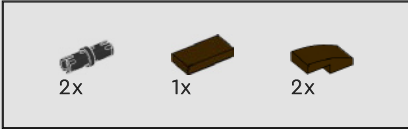
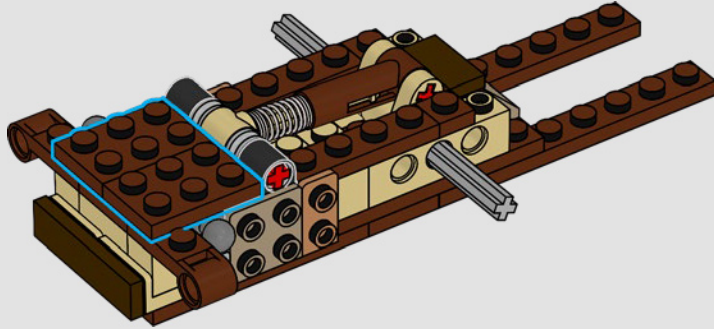


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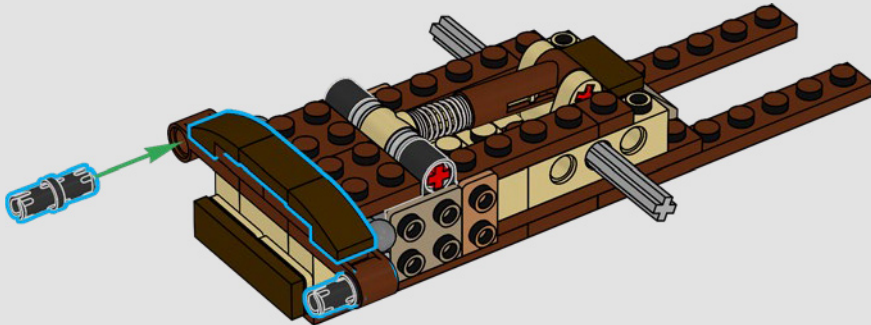


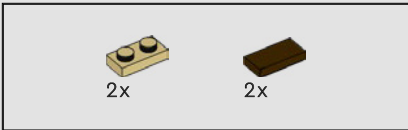


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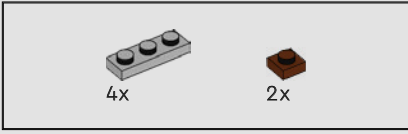
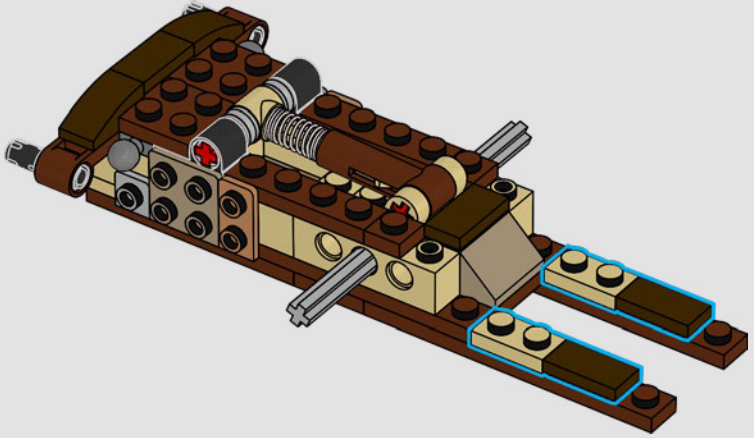


62

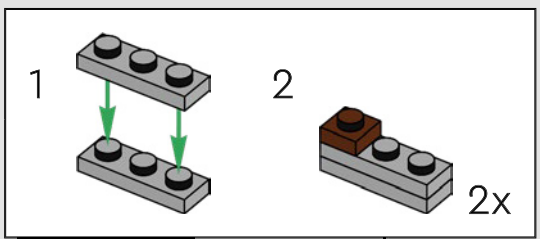
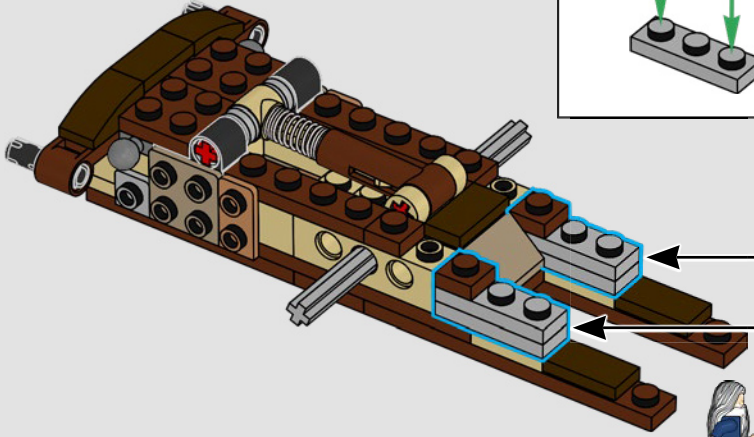


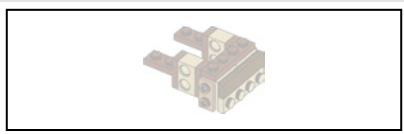


63

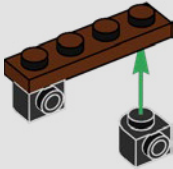


64

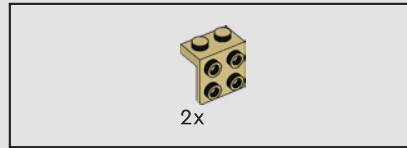
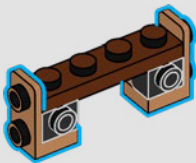




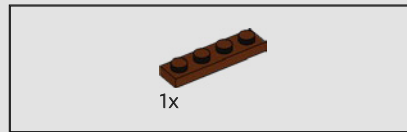
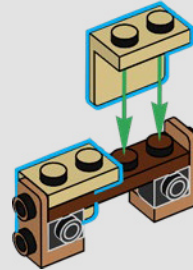
65



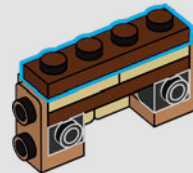
66

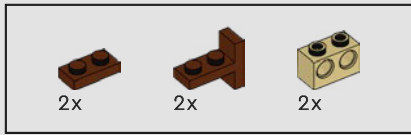


67

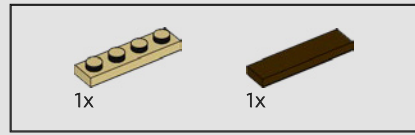
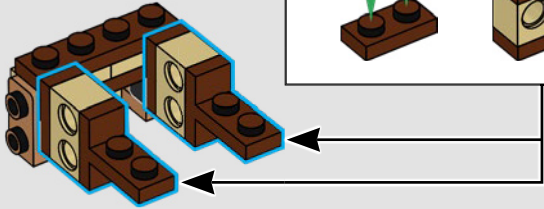
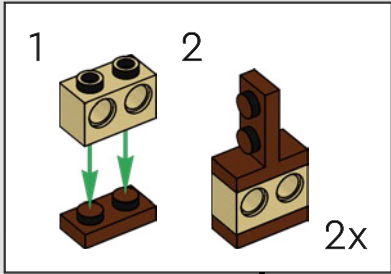


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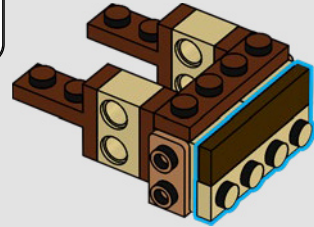




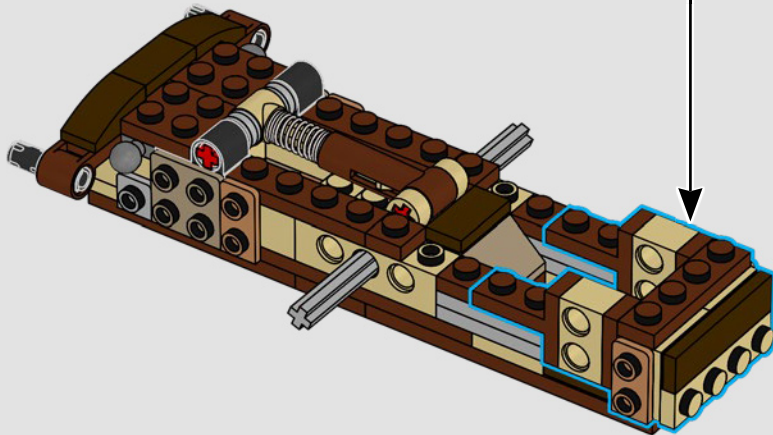
69



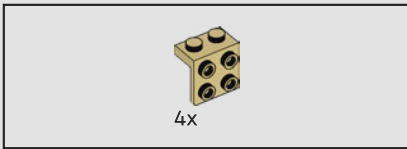
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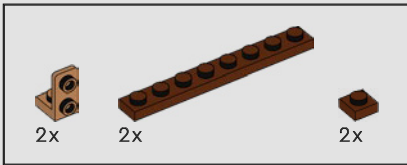
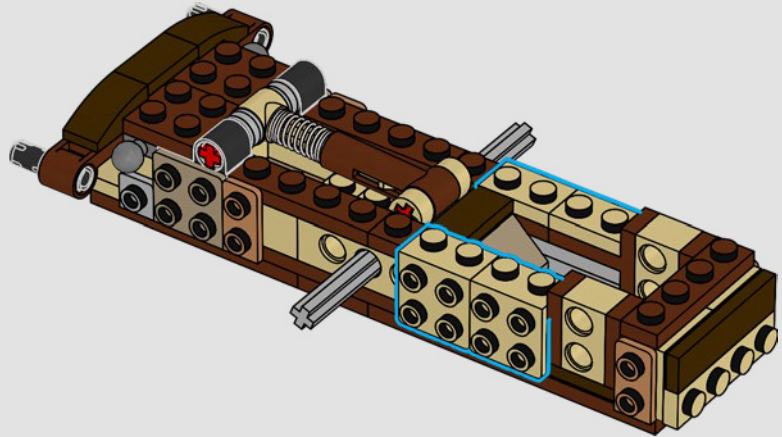
71



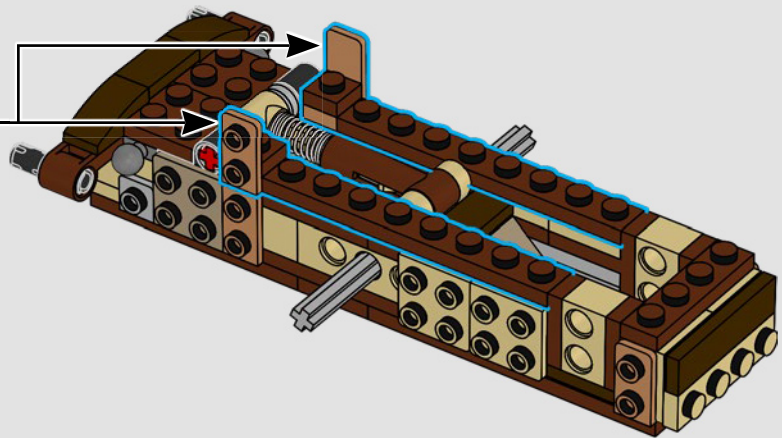
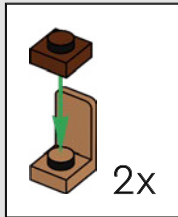


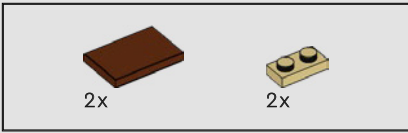


72

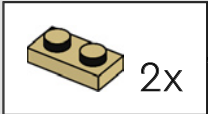
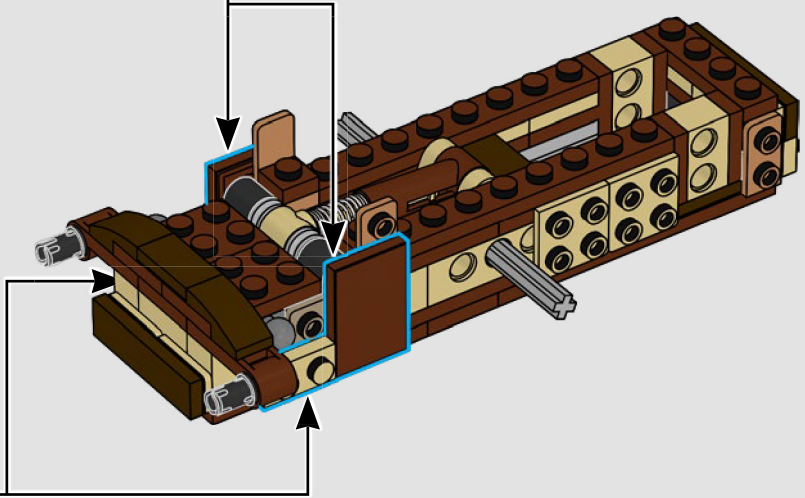
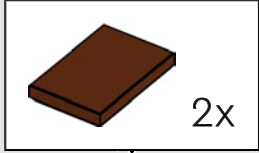


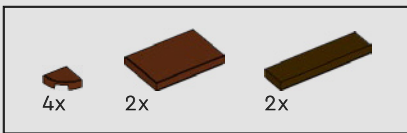
73



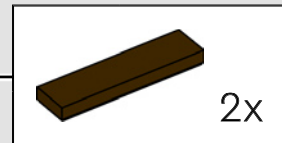
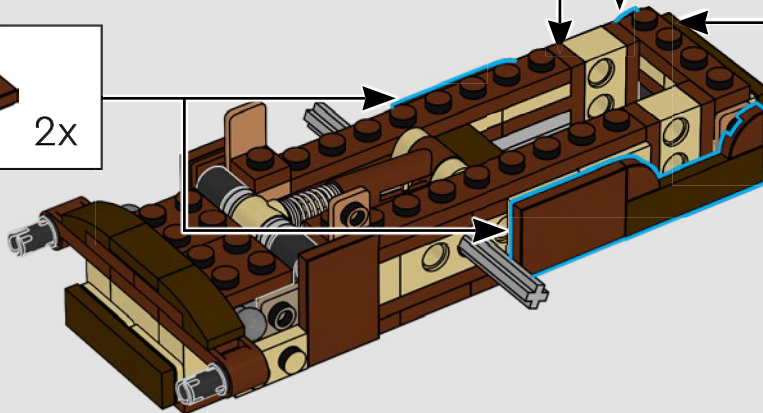


74

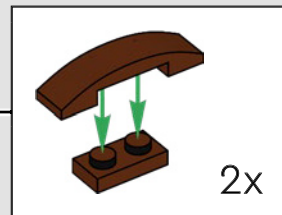
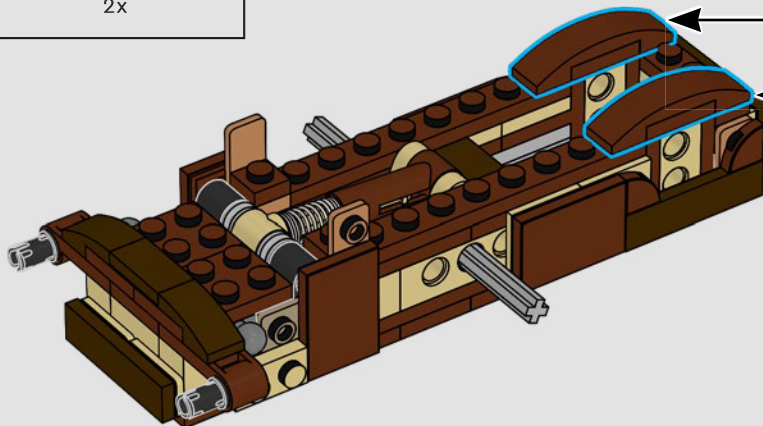


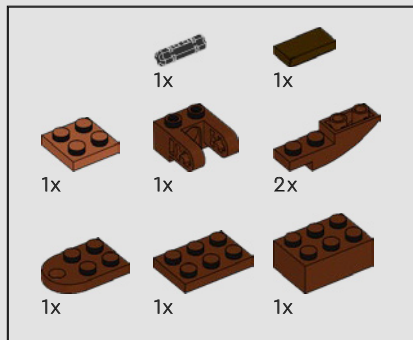


75



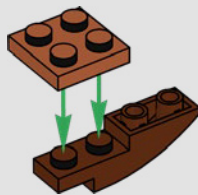
76



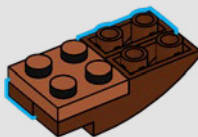


77

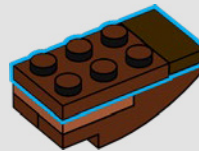
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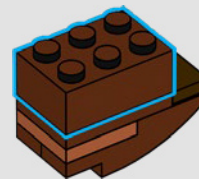
2



3



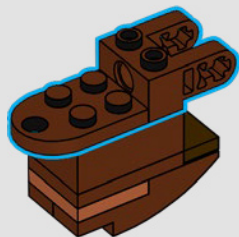
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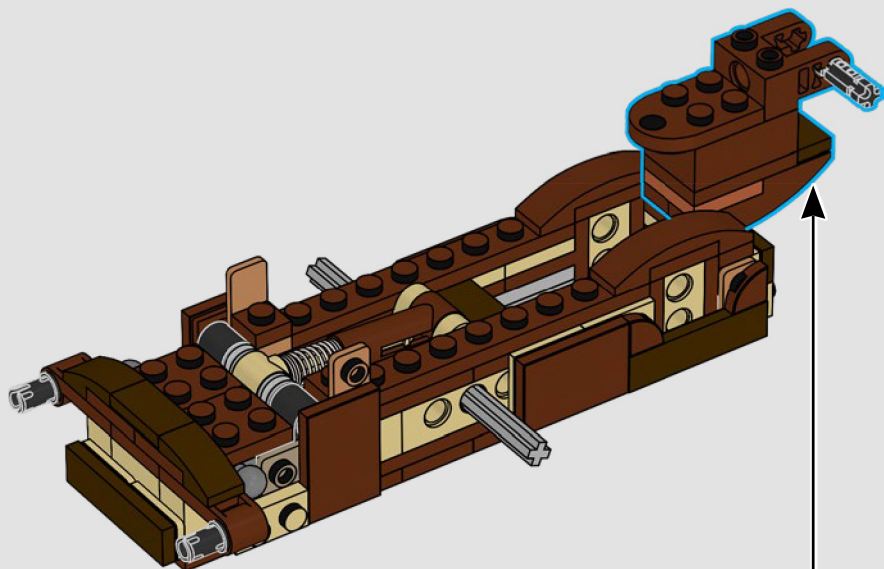


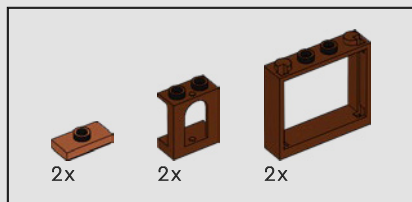
达芬奇的一位朋友建造他设计的扑翼机并进行了低空试飞，但并不完全成功。这架飞行器坠毁了，达芬奇的朋友摔断了一条腿。

5

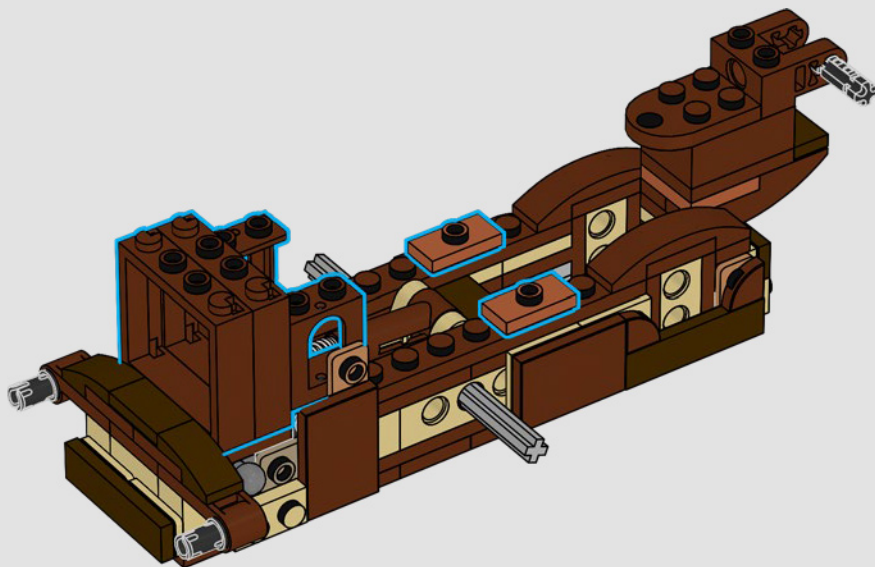


6

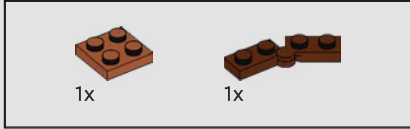
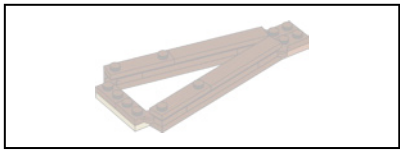




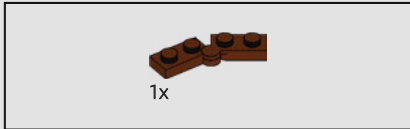
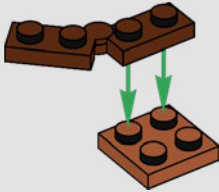
78



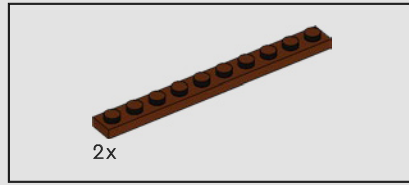
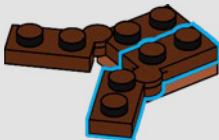




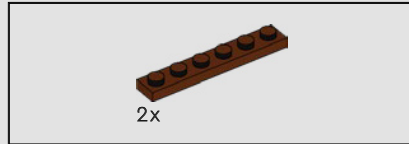
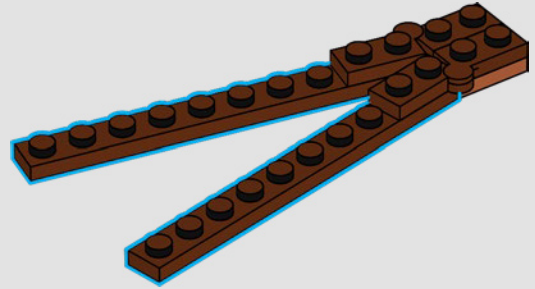
80



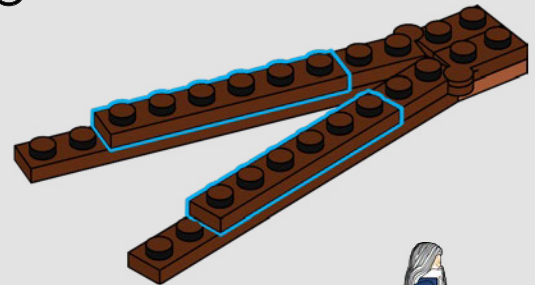
81



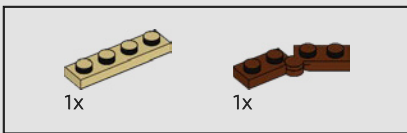
82



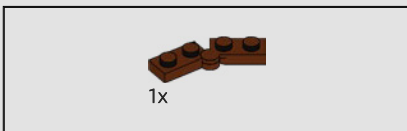
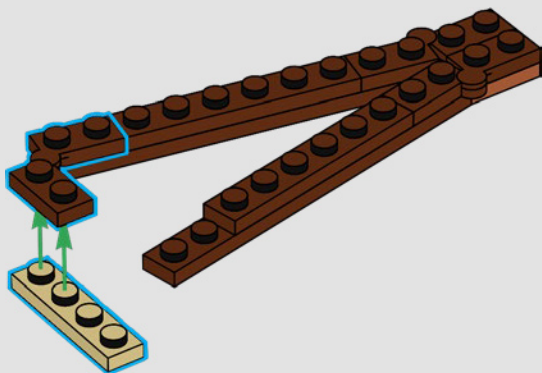
83



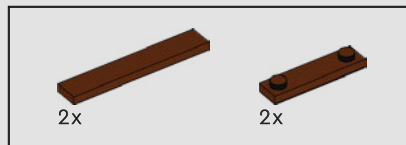
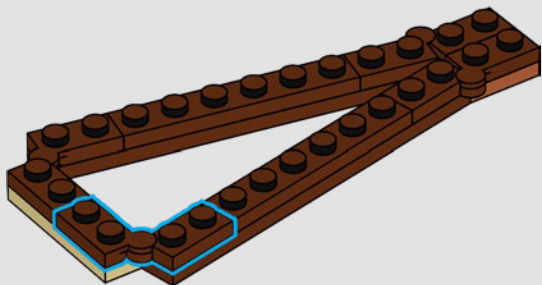




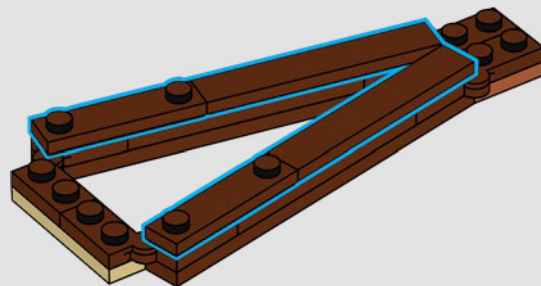
84



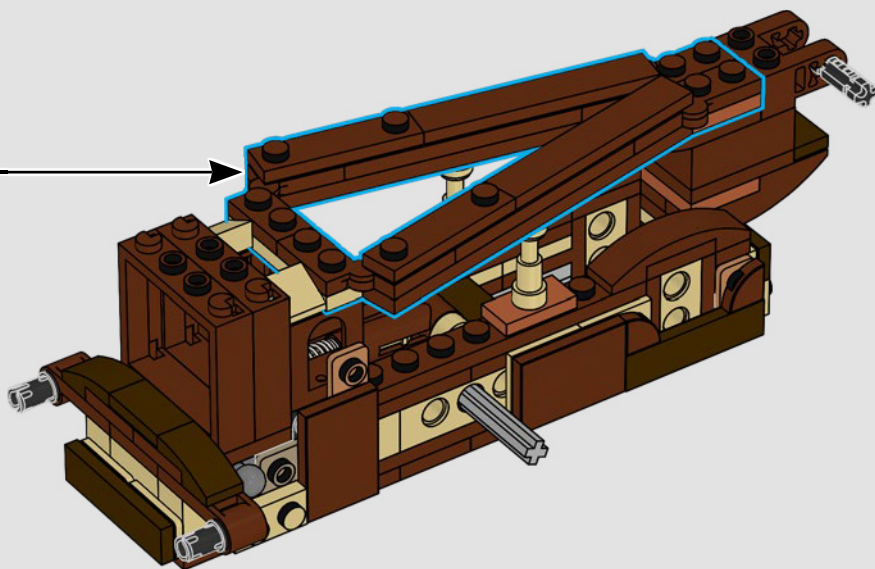
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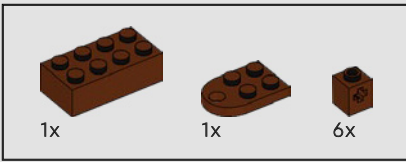


86

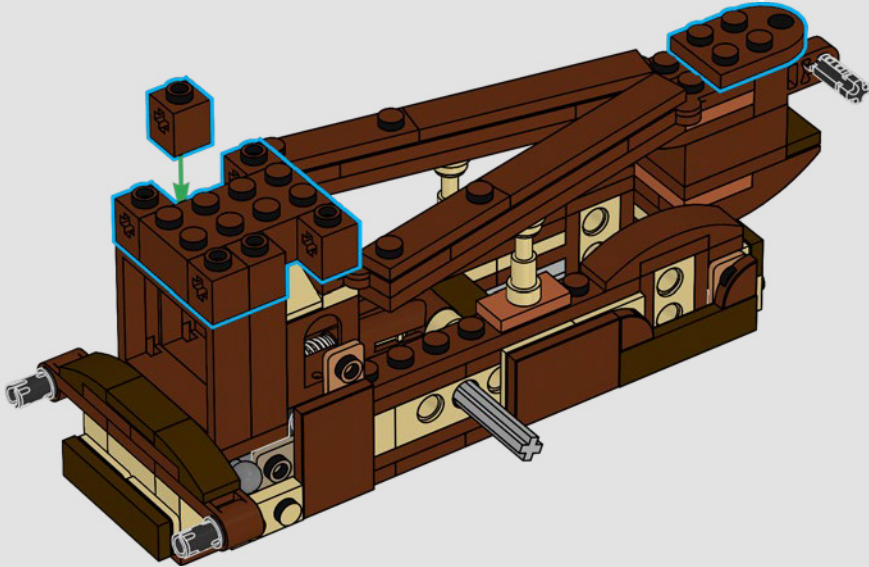
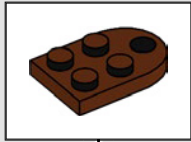


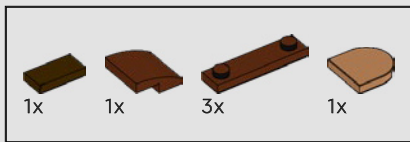
87



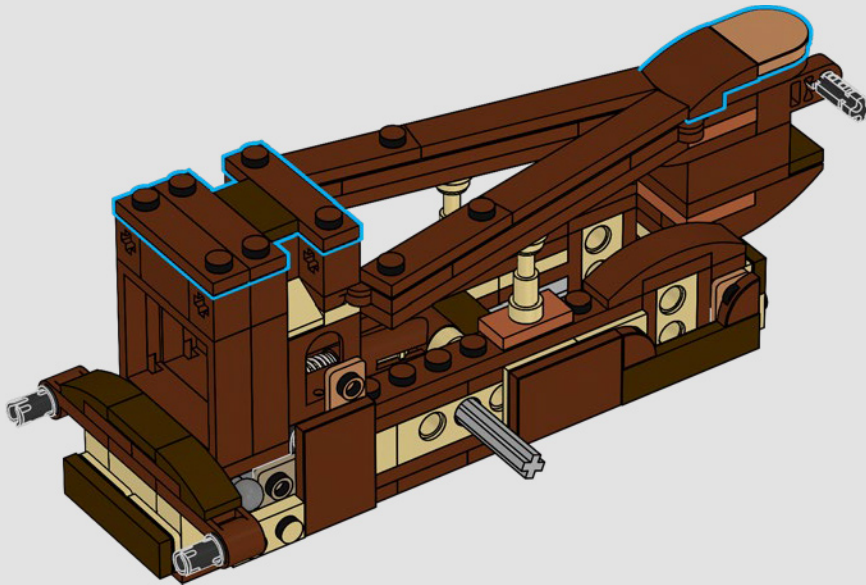


88





89





列奥纳多·达·芬奇坚持认为人体产生的能量足以为飞行器提供动力。

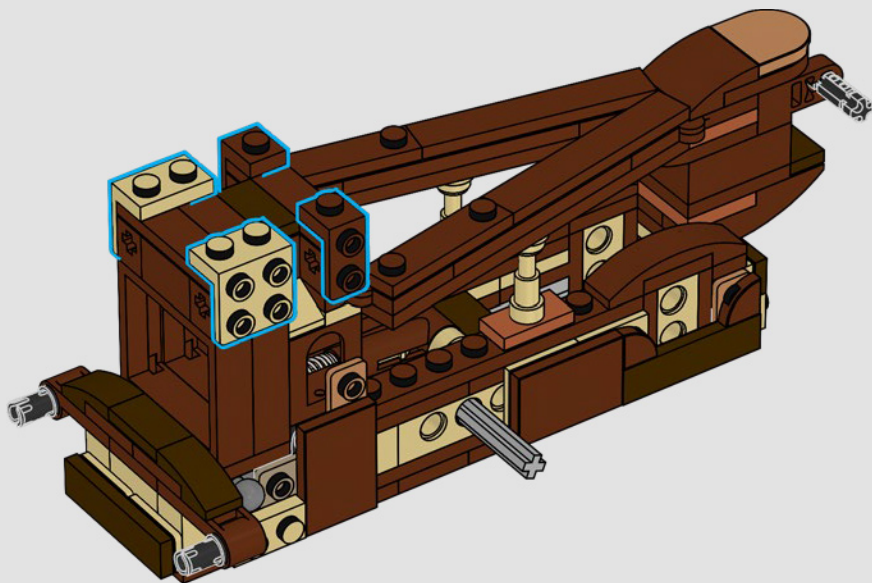


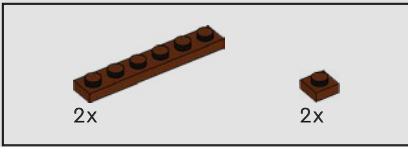
2x



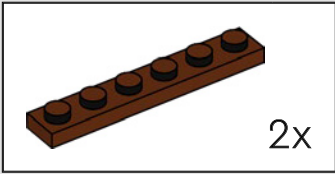
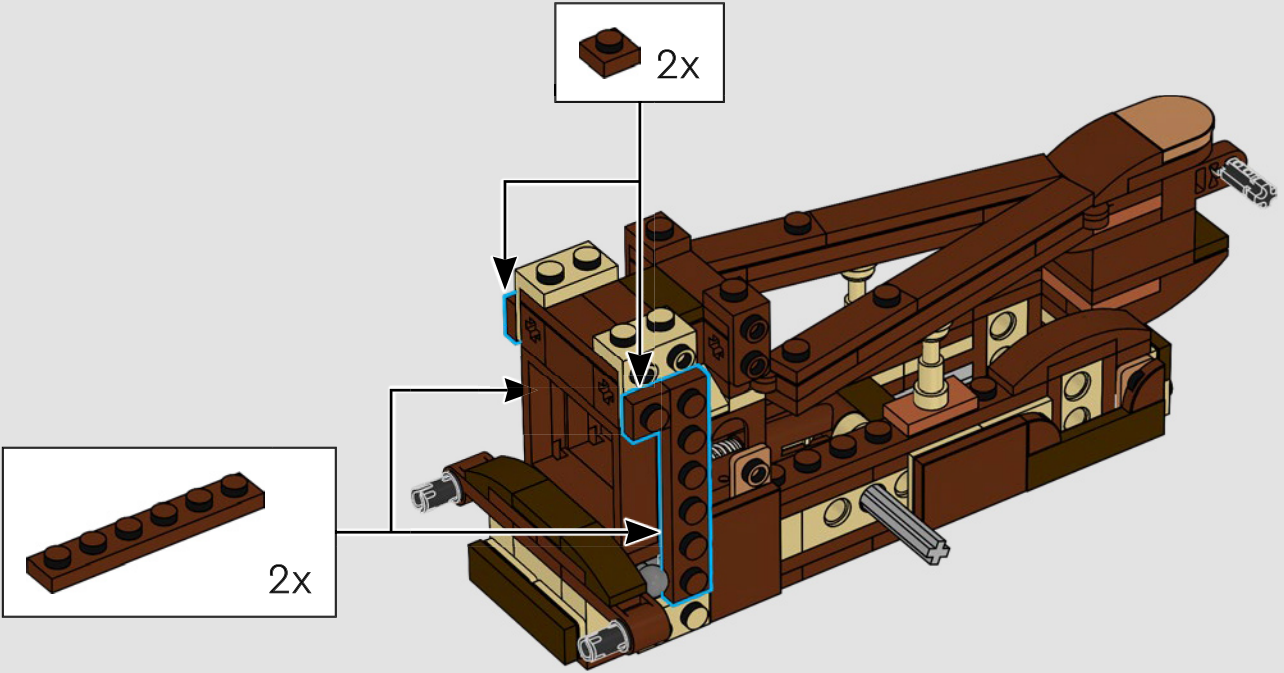
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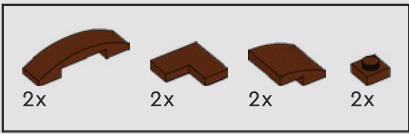
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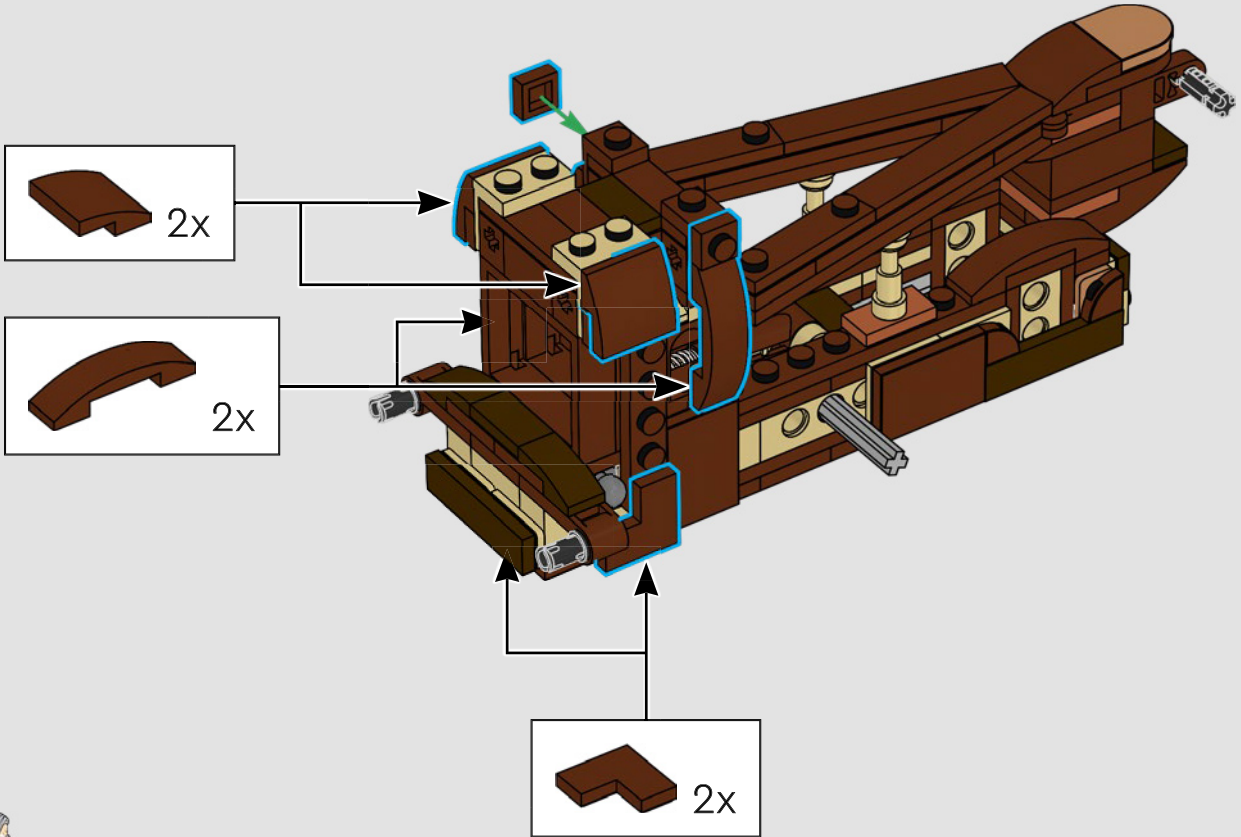


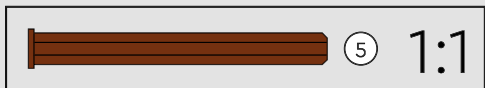
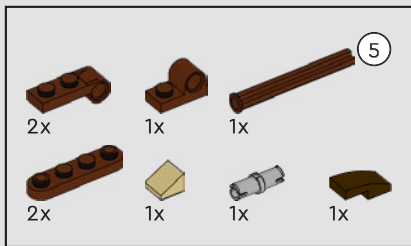
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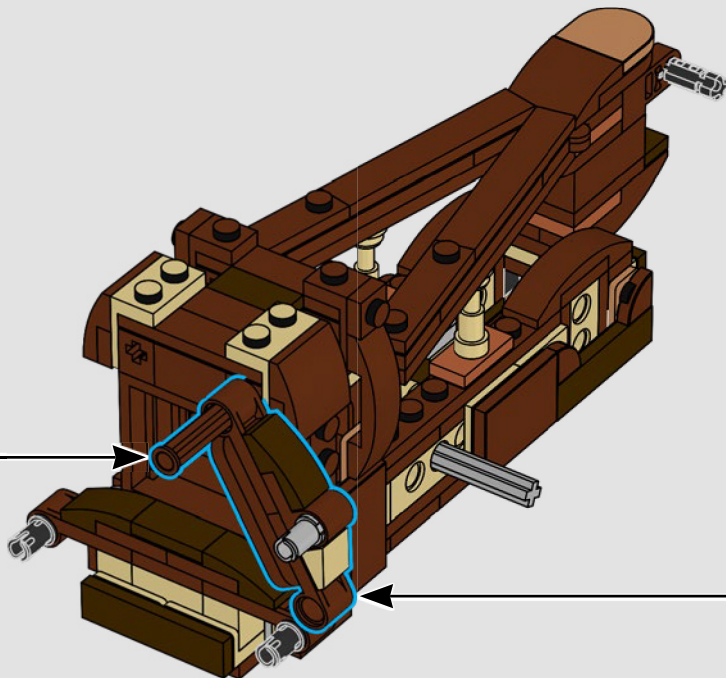
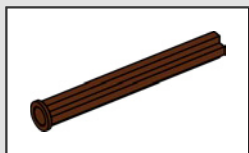
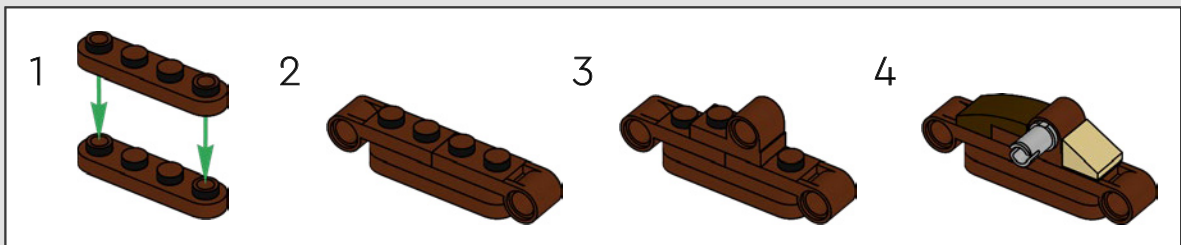


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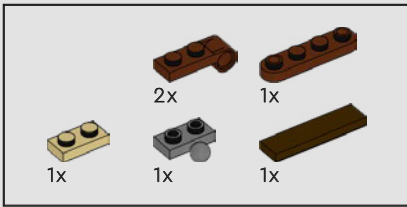




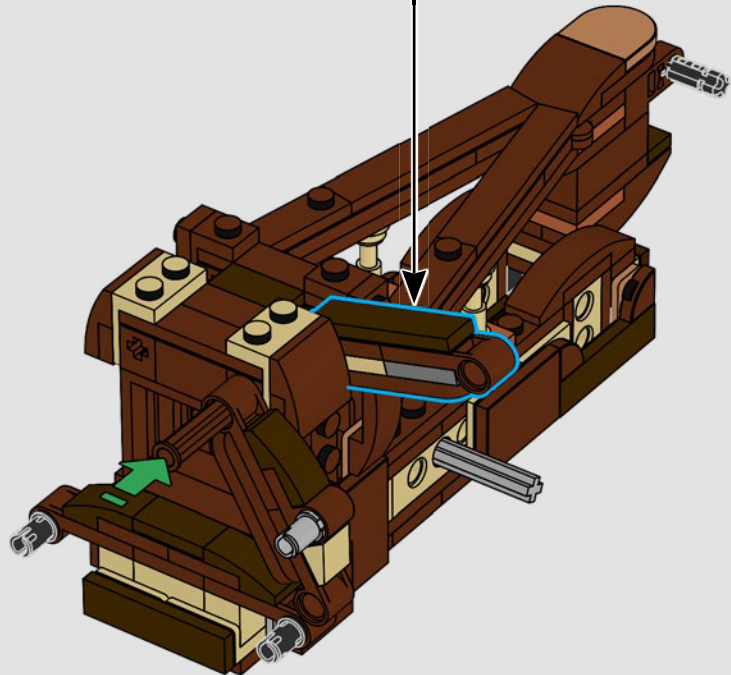
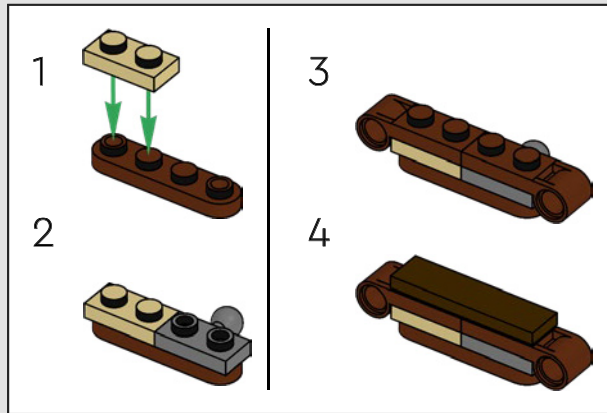
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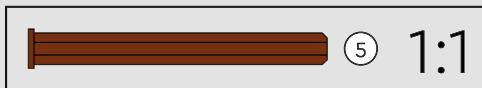
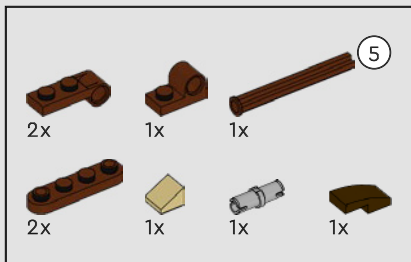




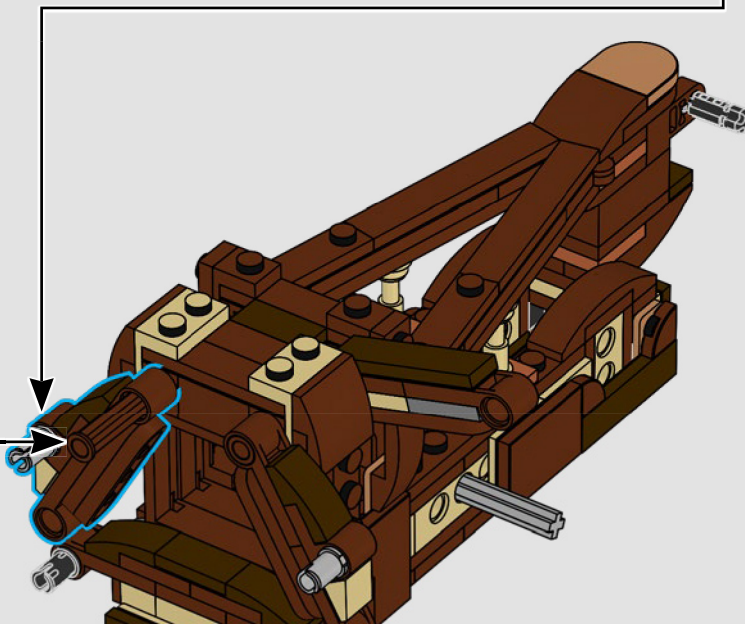
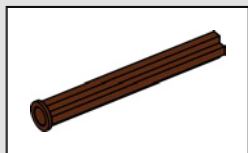
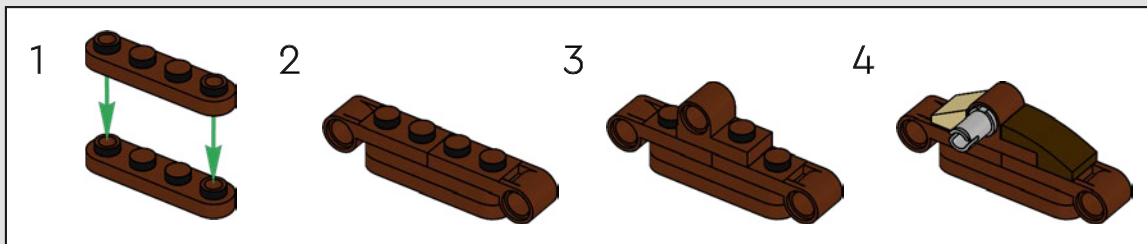


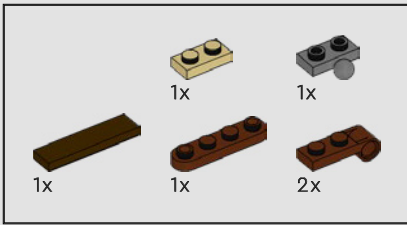
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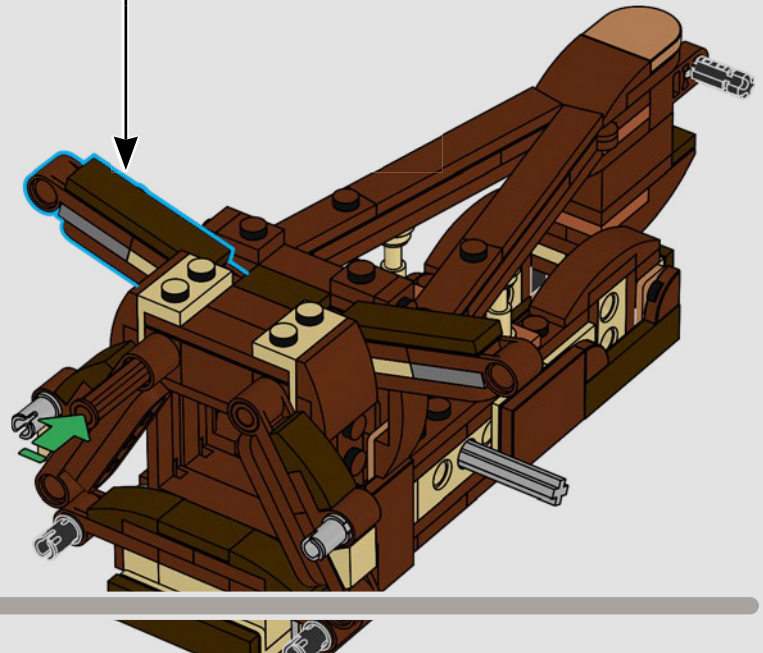
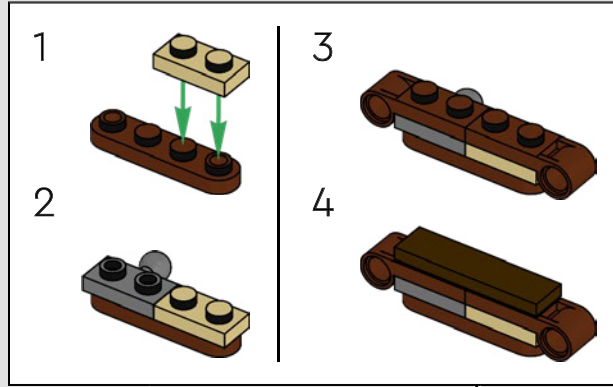


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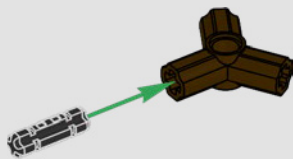


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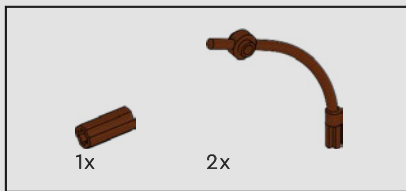




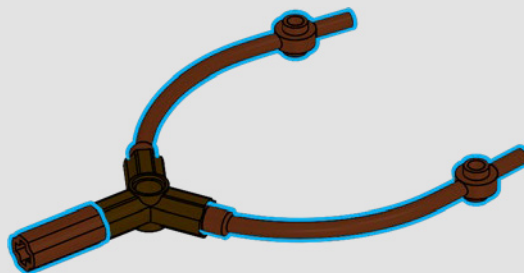
97



达芬奇的素描展示了不同的飞行器，其由飞行员利用各式各样的动力机械装置进行操作，有些由腿提供动力，有些由腿和手臂提供动力，有些甚至带有连接到飞行员头部的方向舵。

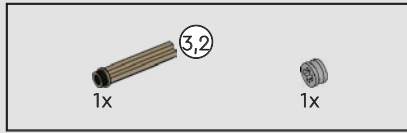
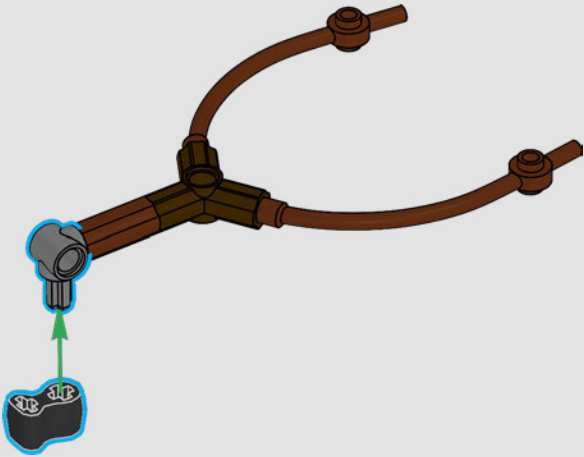


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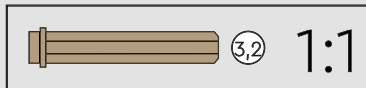
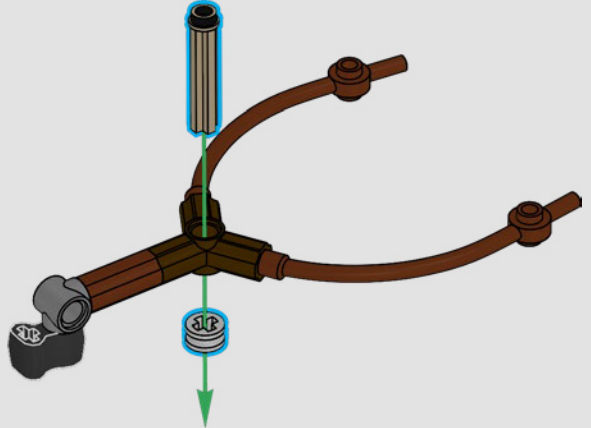




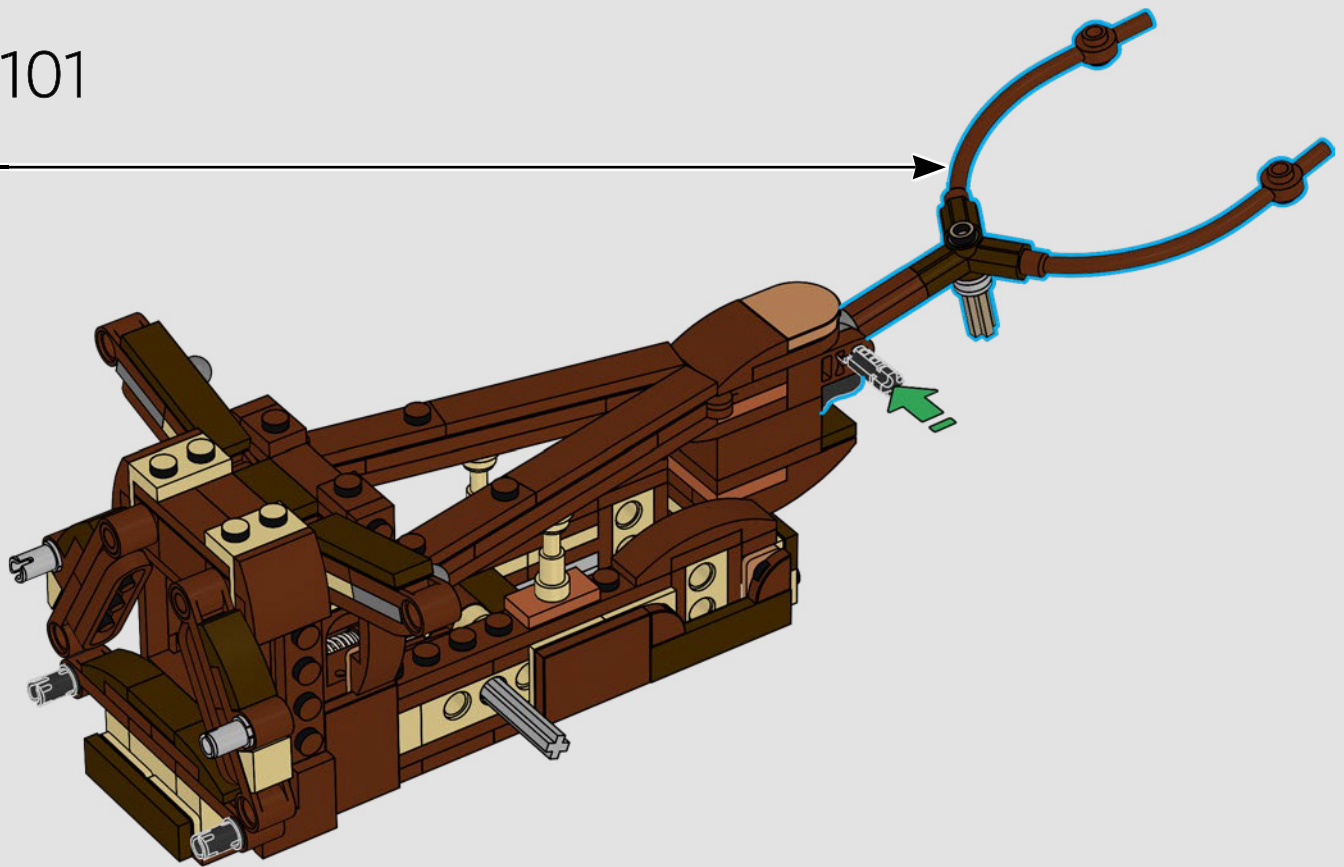
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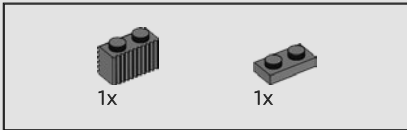
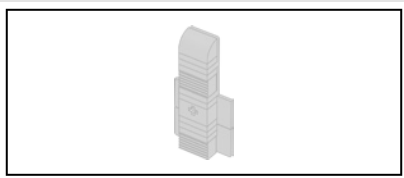


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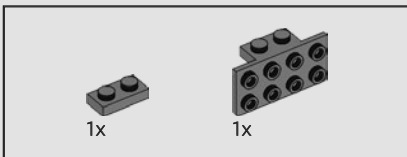
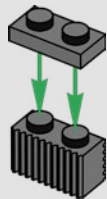


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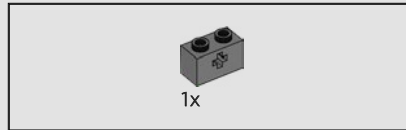
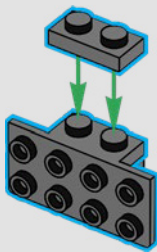




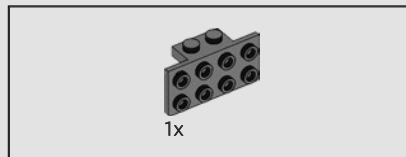
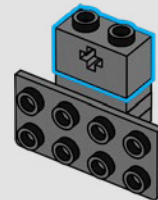
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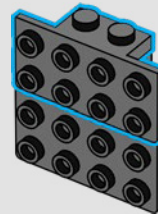
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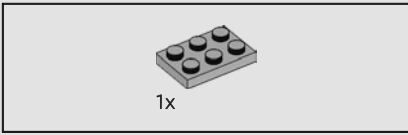


104

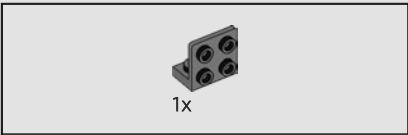
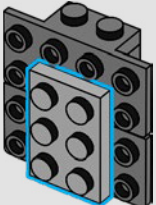


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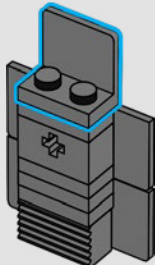




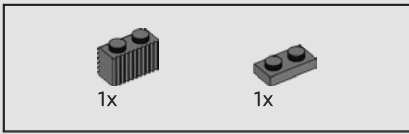
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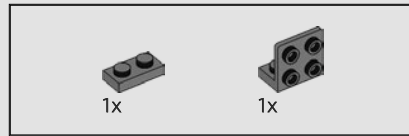
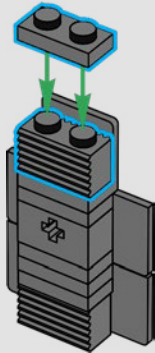
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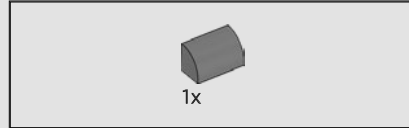
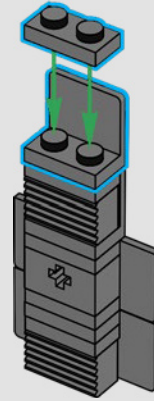




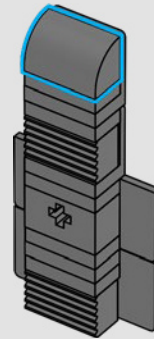
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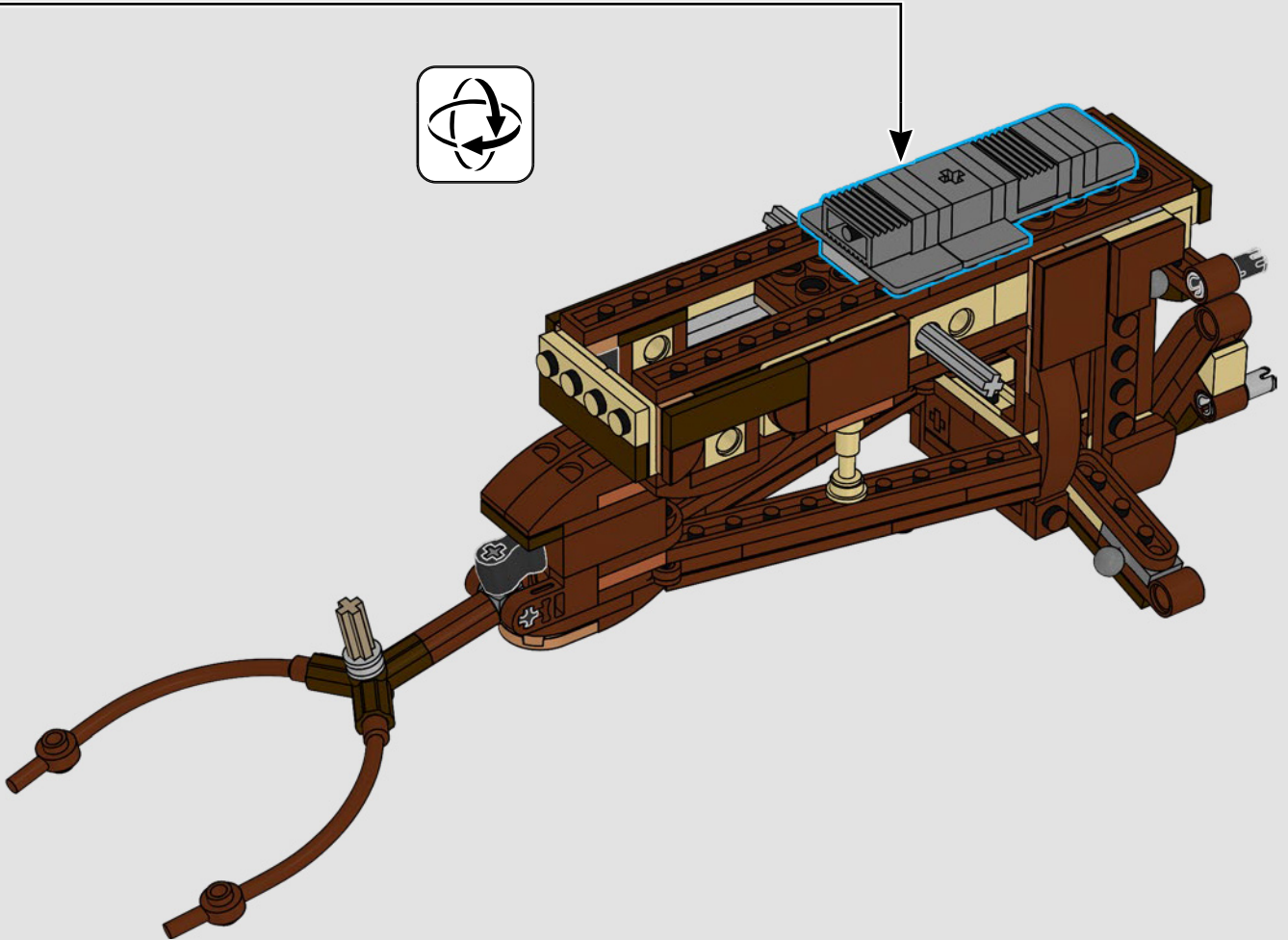


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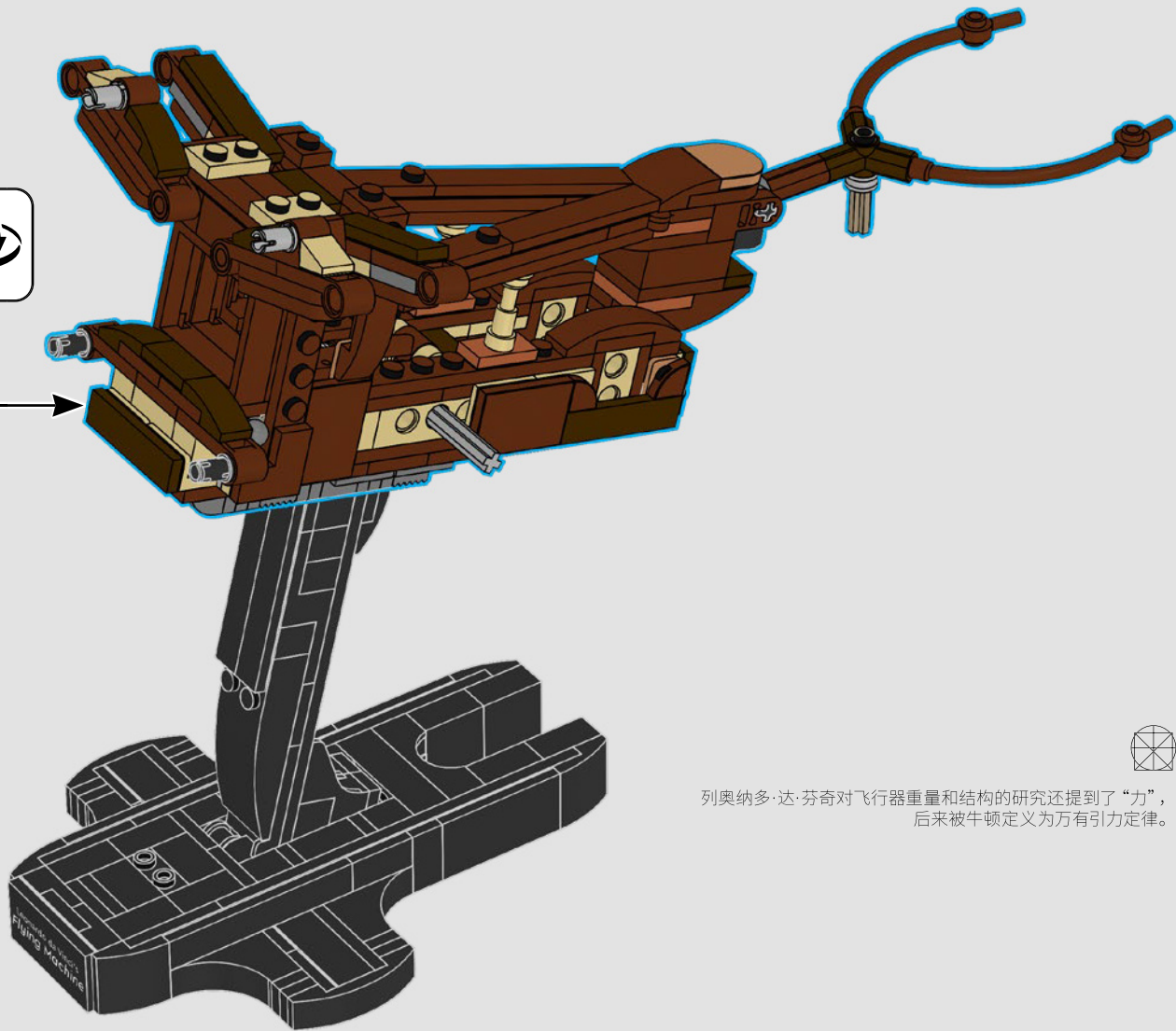


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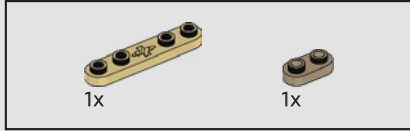
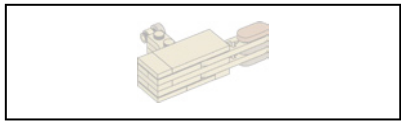


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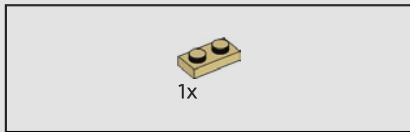
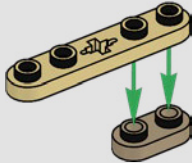


列奥纳多·达·芬奇对飞行器重量和结构的研究还提到了“力”，后来被牛顿定义为万有引力定律。

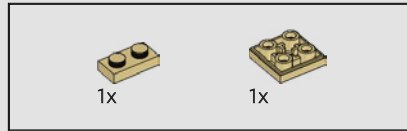
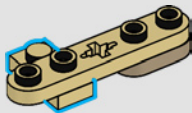




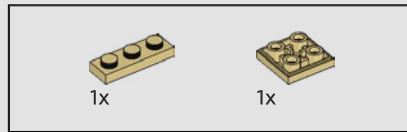
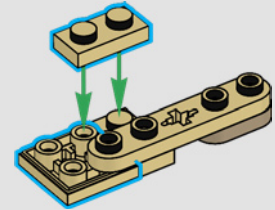
113



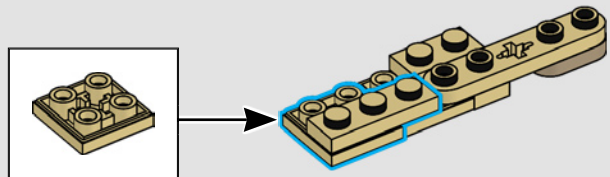
114

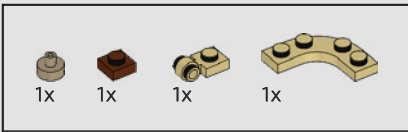


115

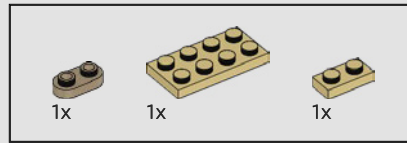
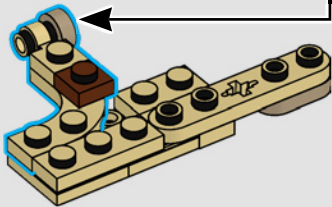
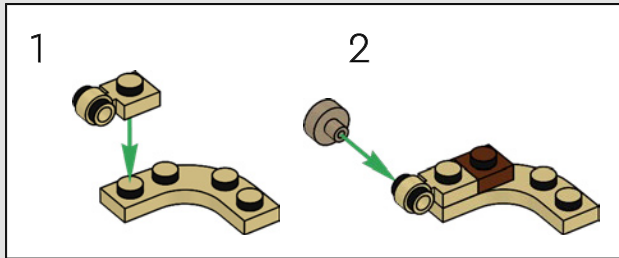


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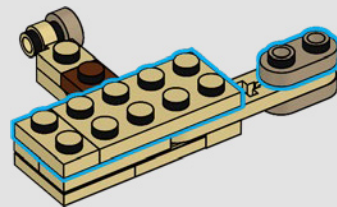


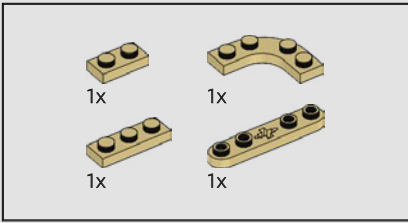


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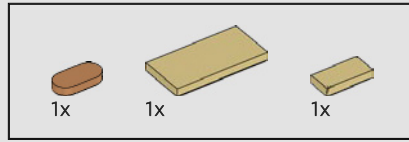
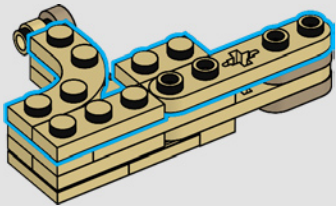


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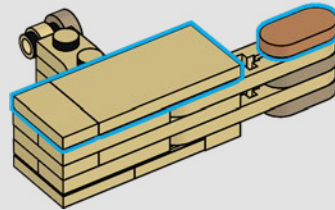


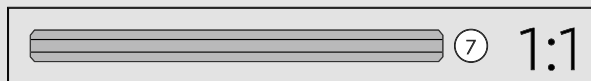
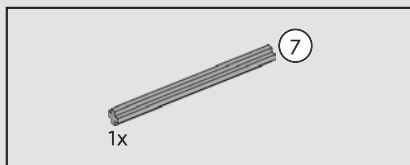


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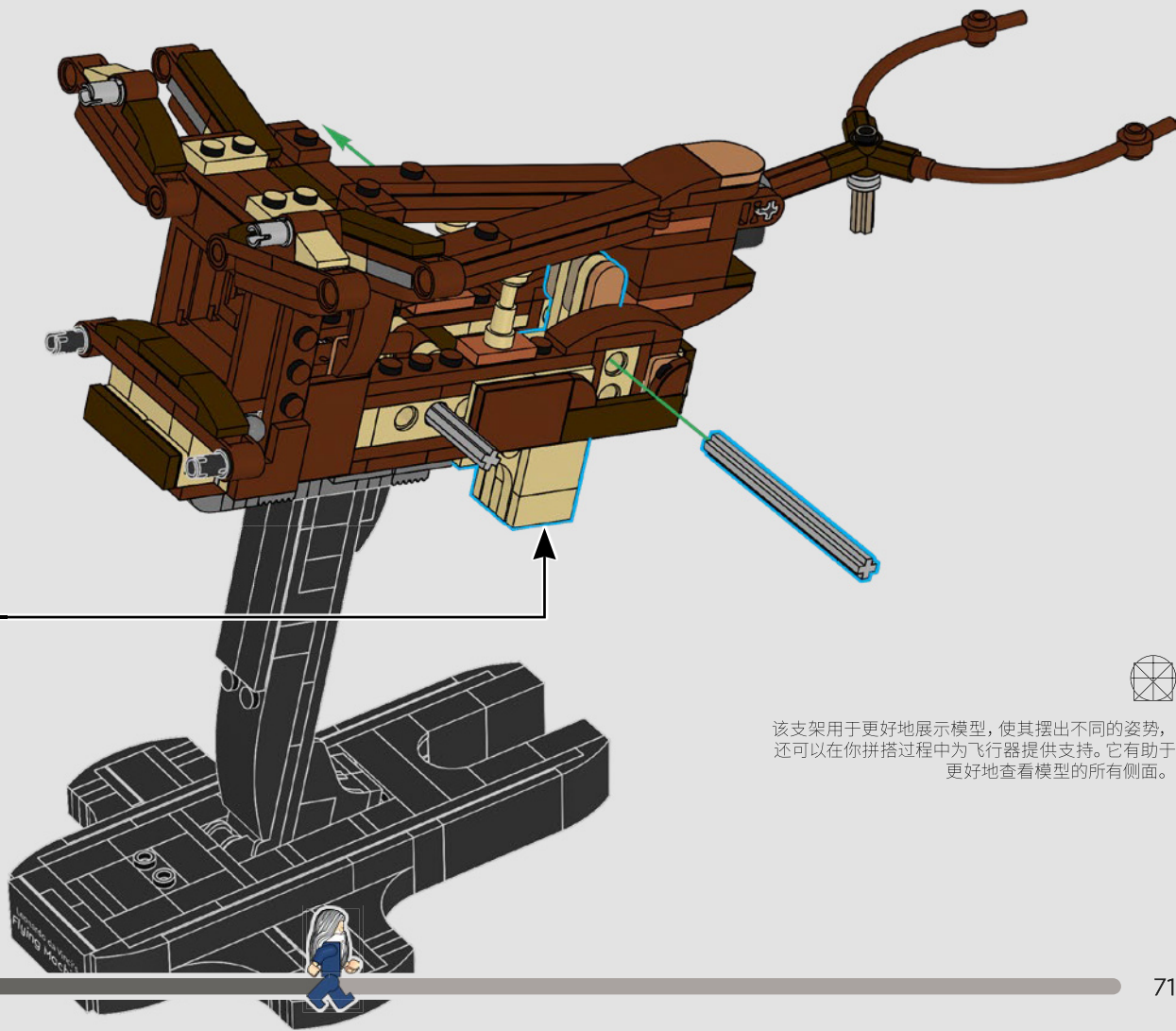


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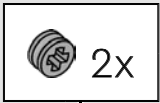
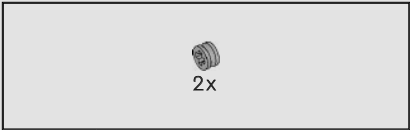




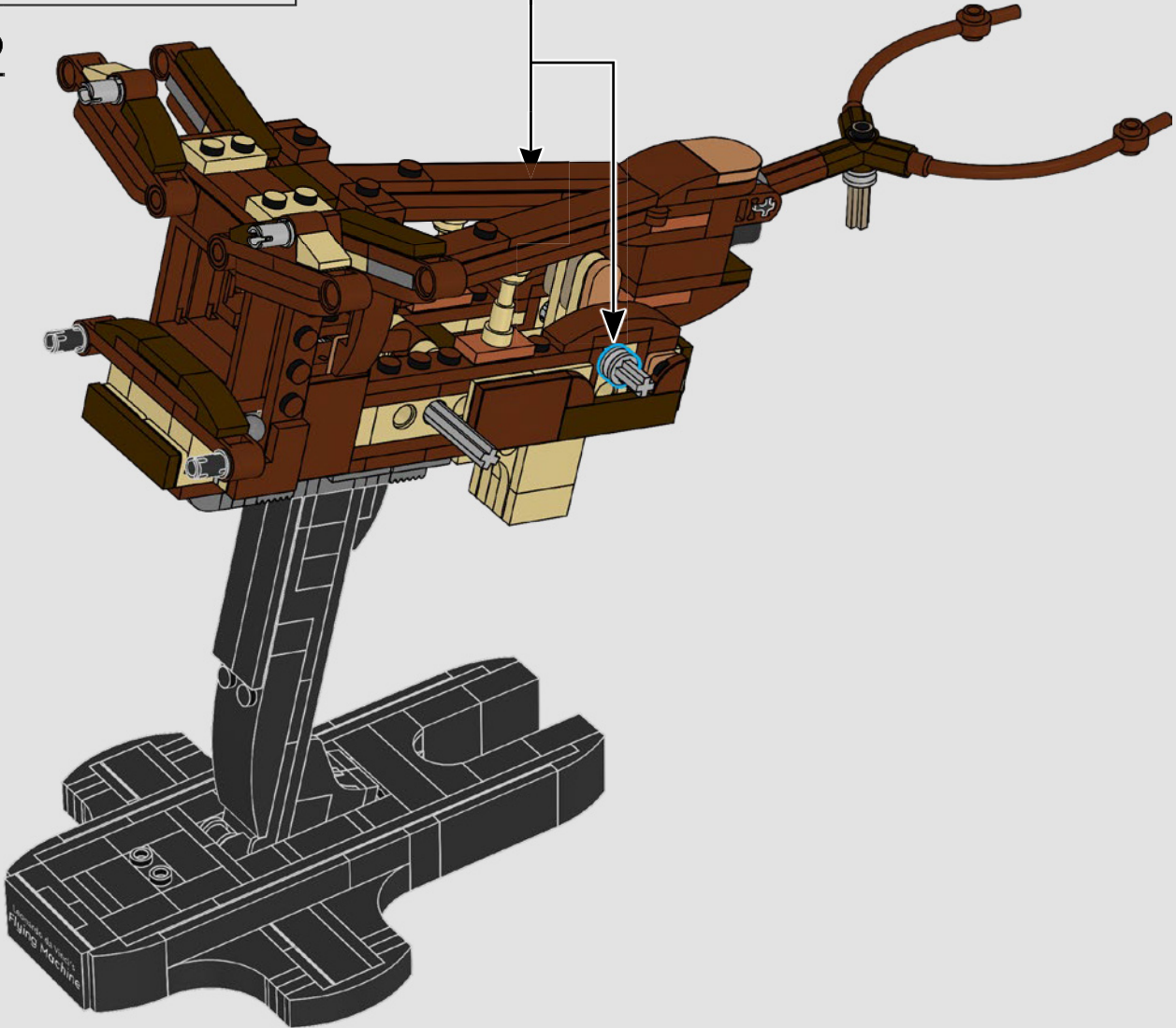
121



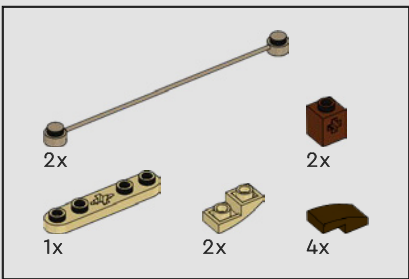
该支架用于更好地展示模型，使其摆出不同的姿势，还可以在你拼搭过程中为飞行器提供支持。它有助于更好地查看模型的所有侧面。



122

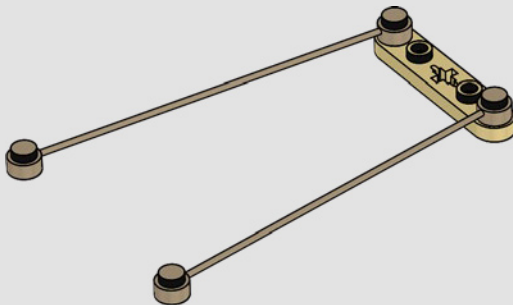




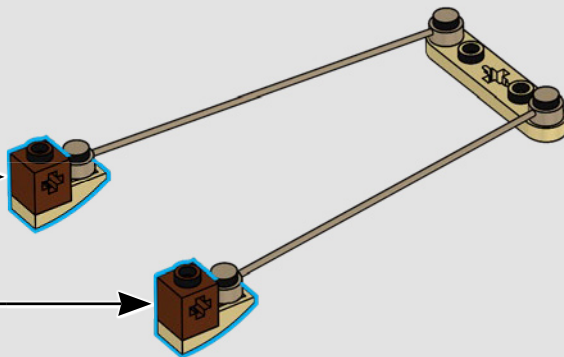
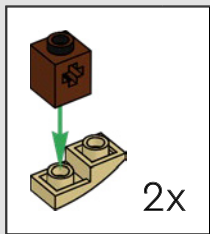


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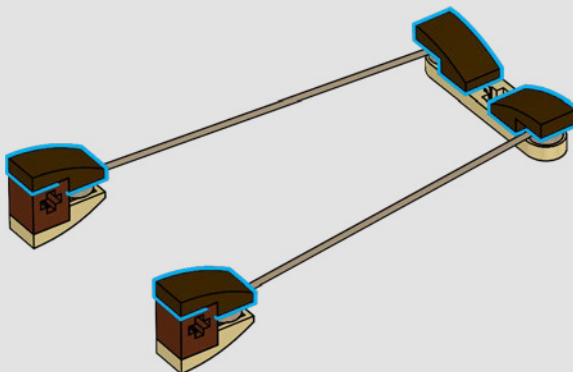
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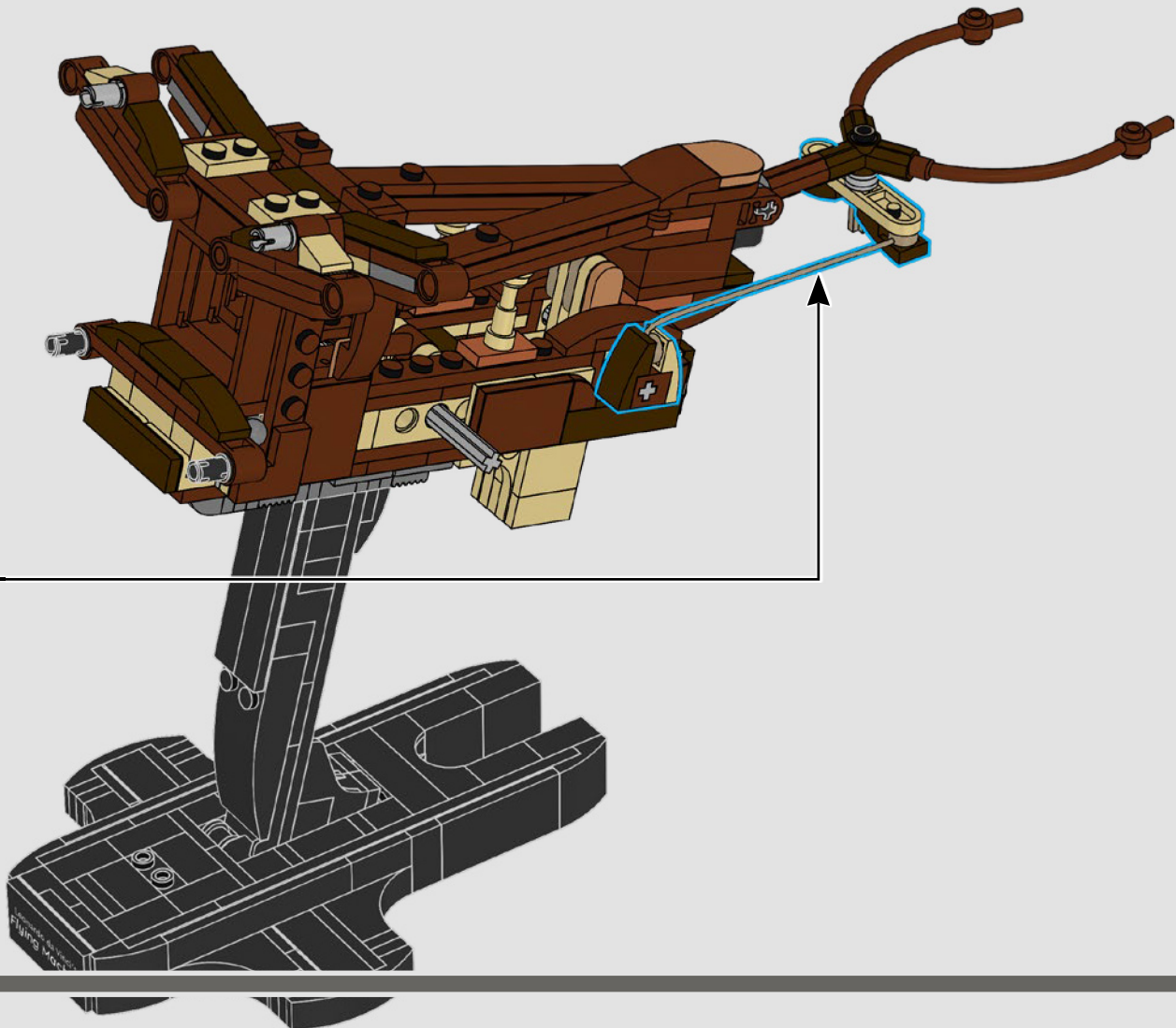


2



3

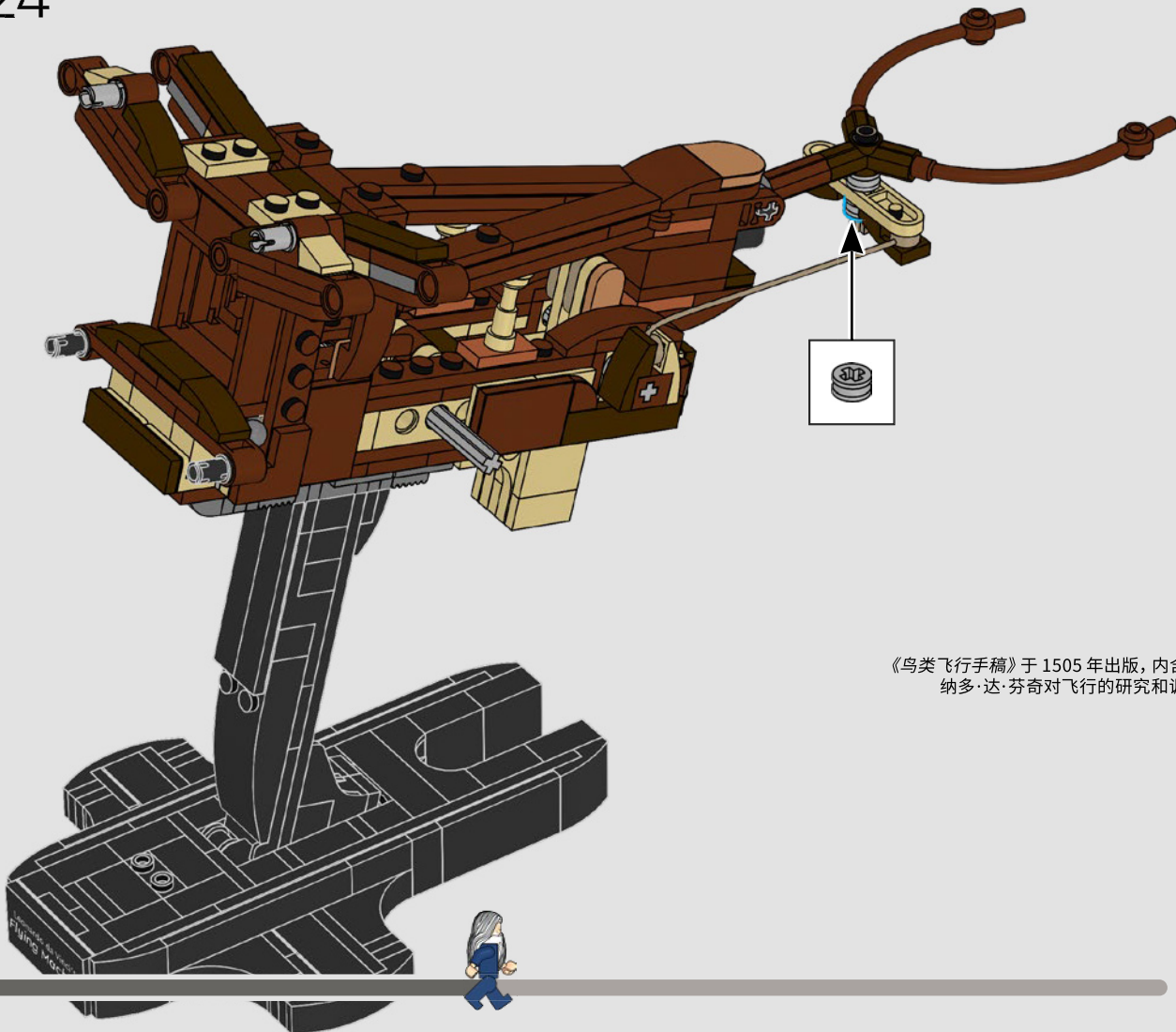




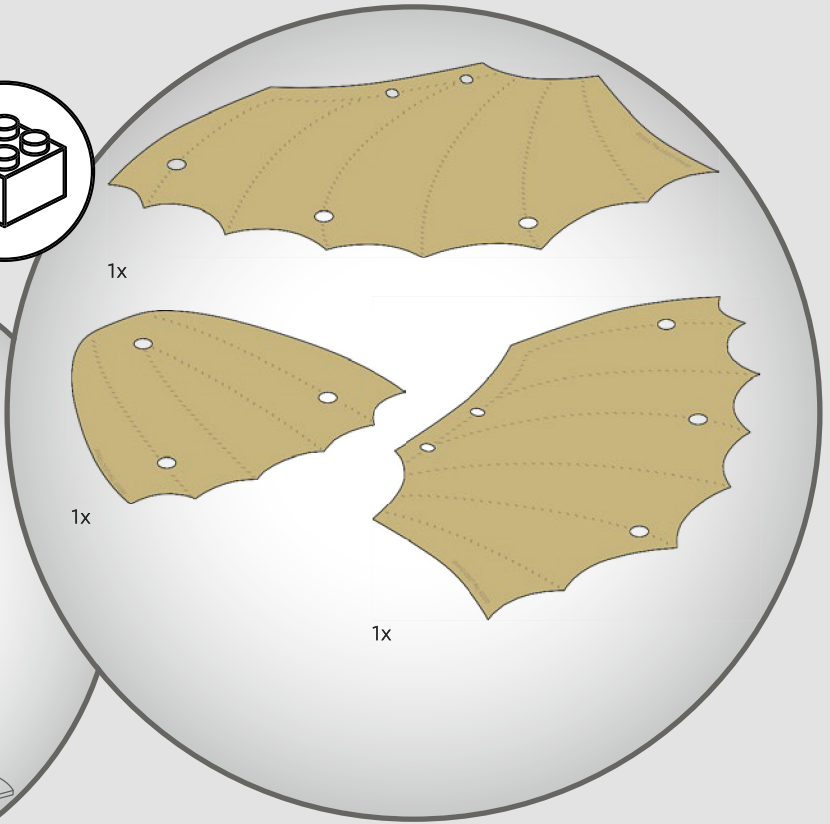
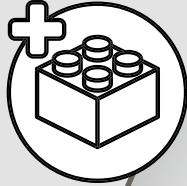
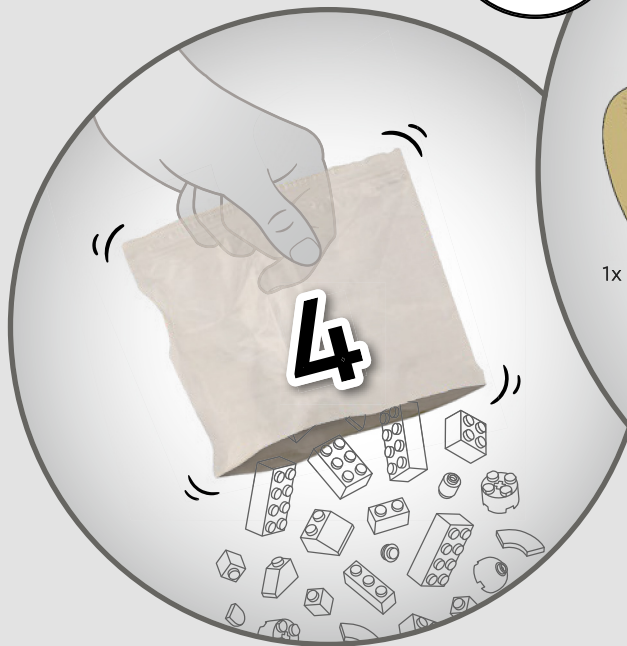


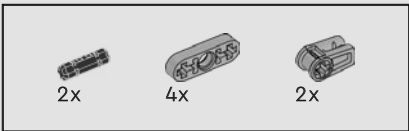
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124

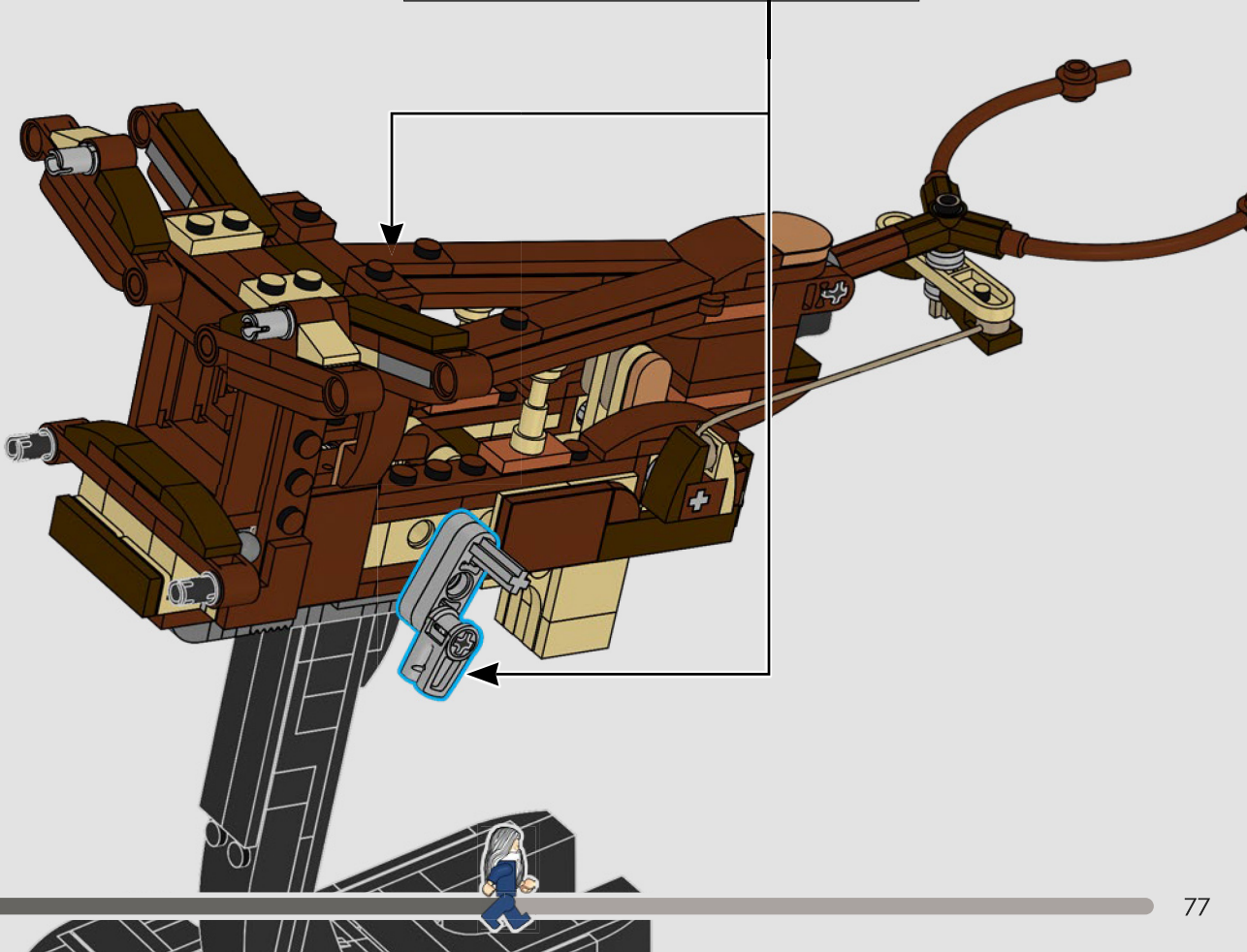
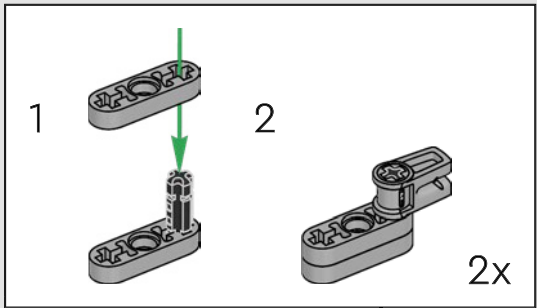


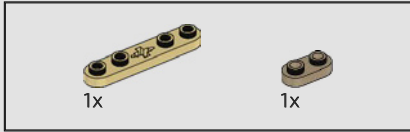
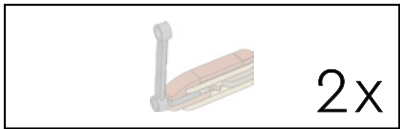
《鸟类飞行手稿》于 1505 年出版，内含列奥纳多·达·芬奇对飞行的研究和调查。



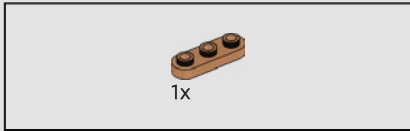
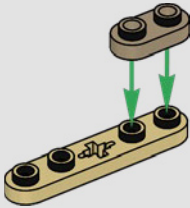


125

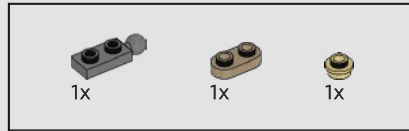
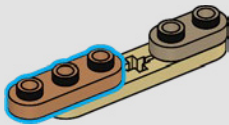




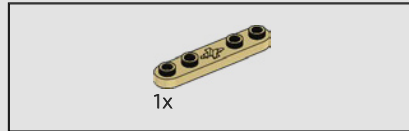
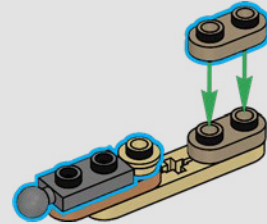
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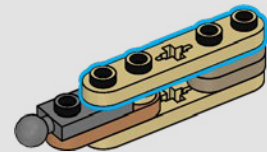
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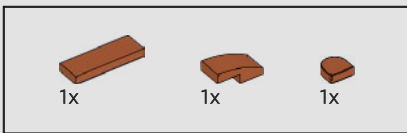


128

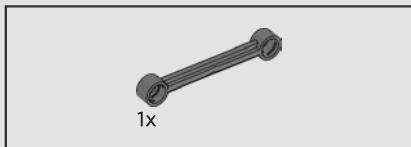
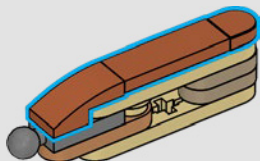


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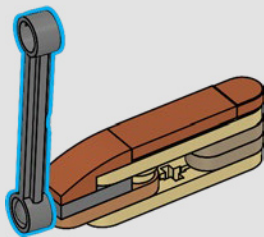




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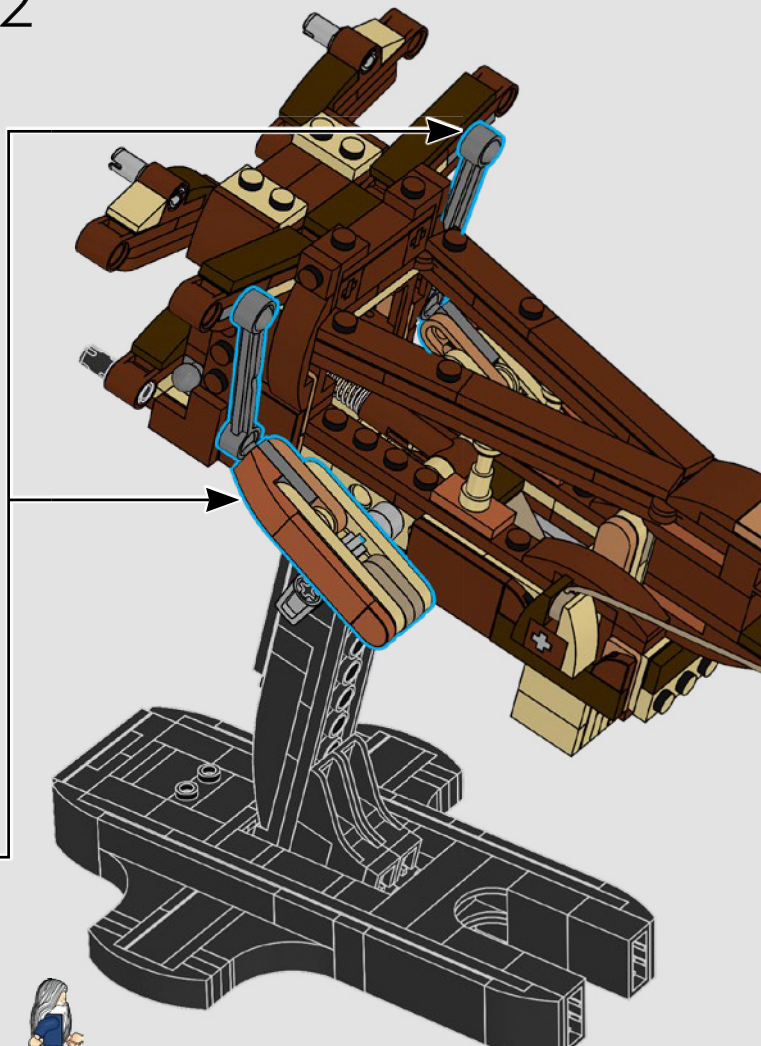


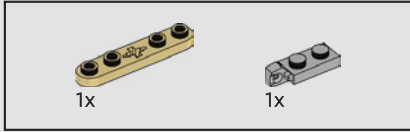
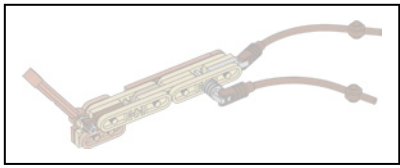
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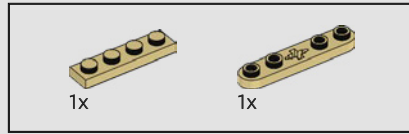
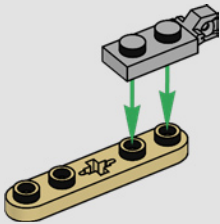
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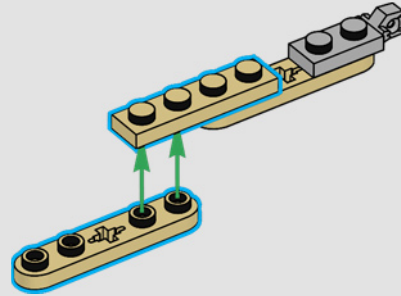




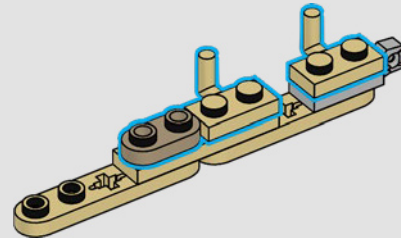
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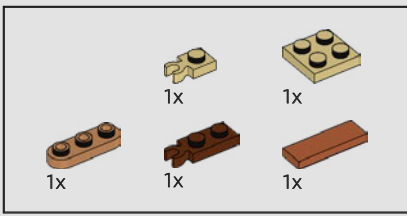
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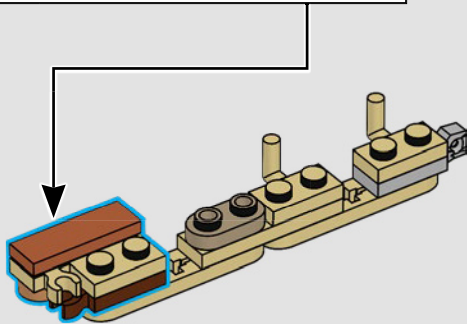
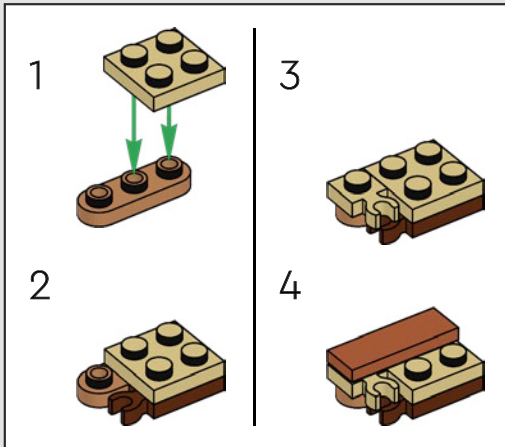
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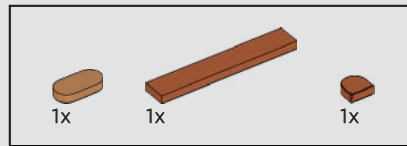
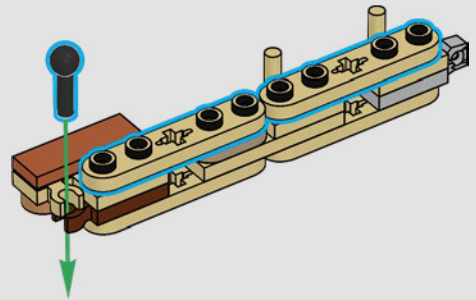




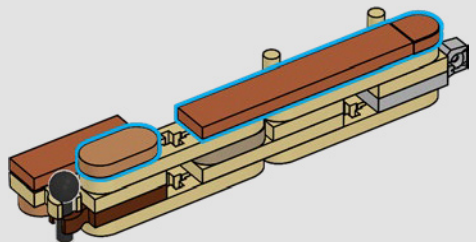
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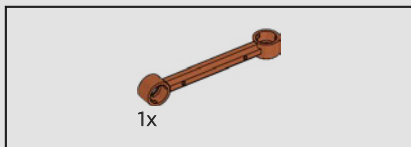


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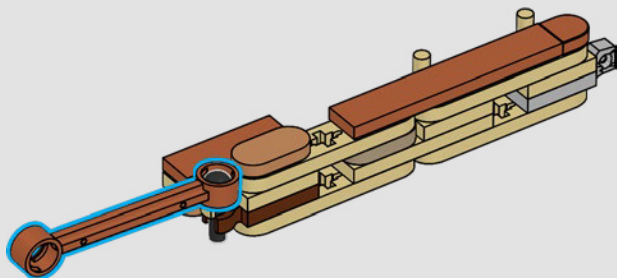


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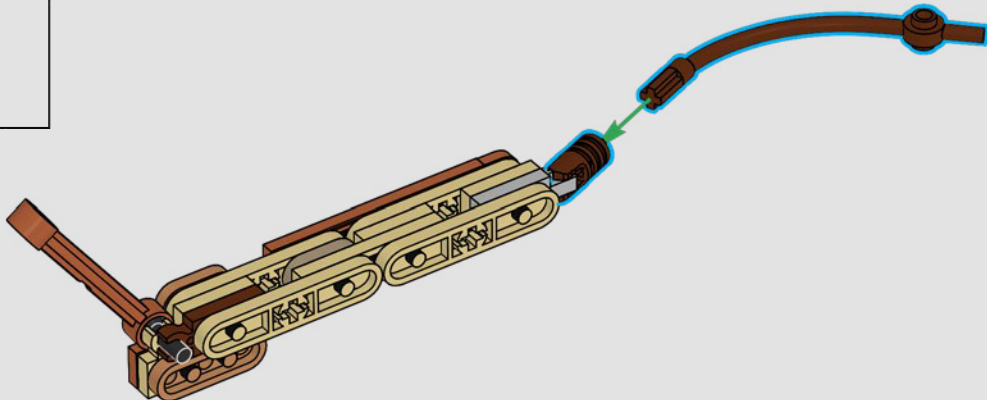
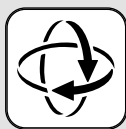


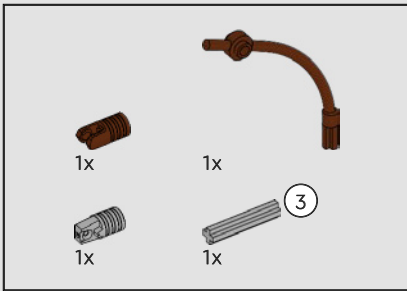


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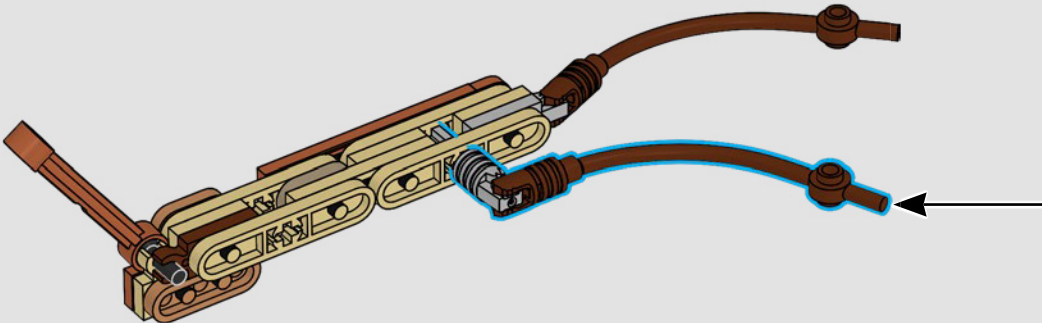
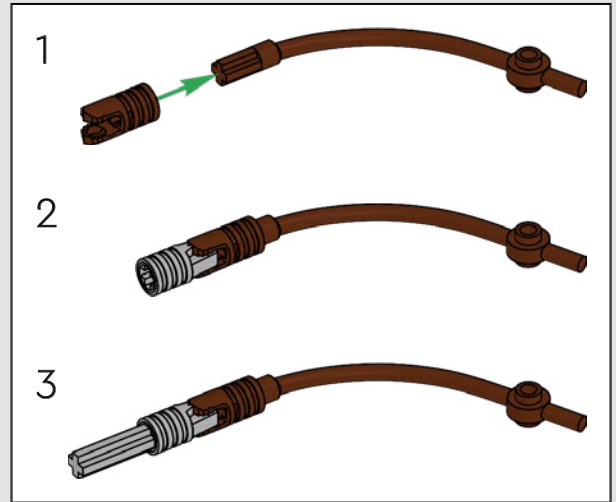


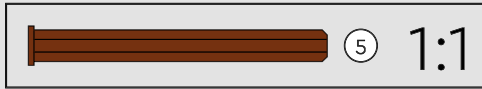
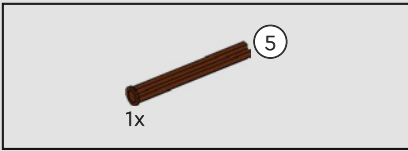
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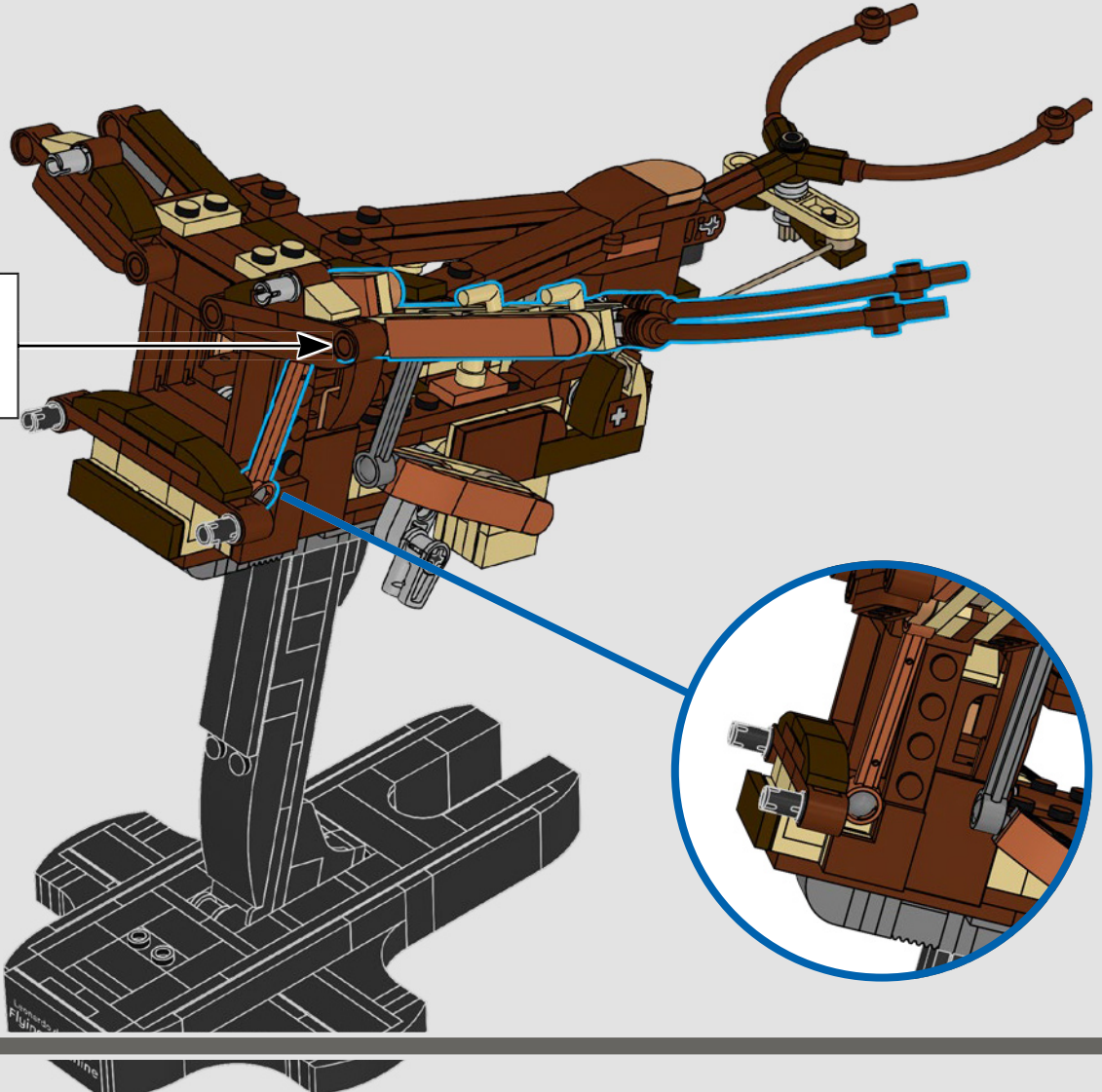
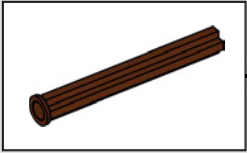


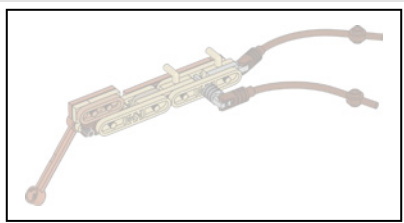
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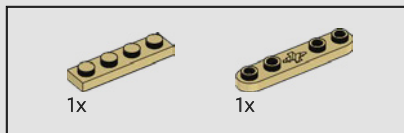
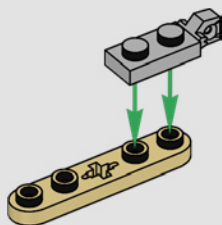


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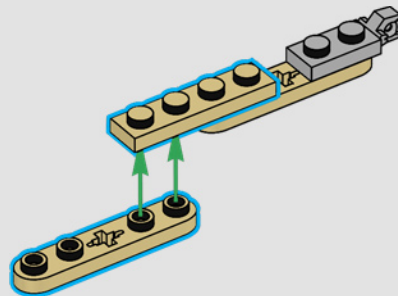




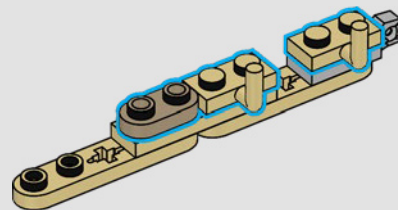
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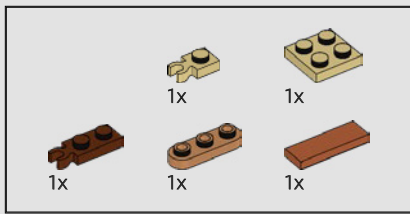


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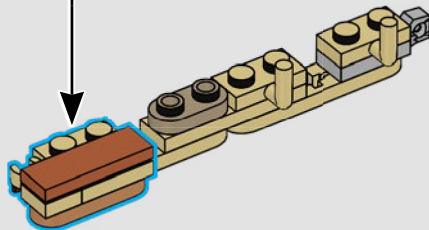
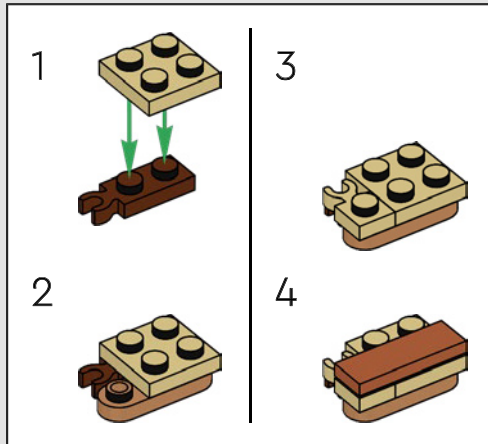


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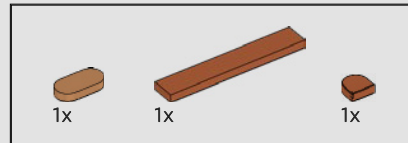
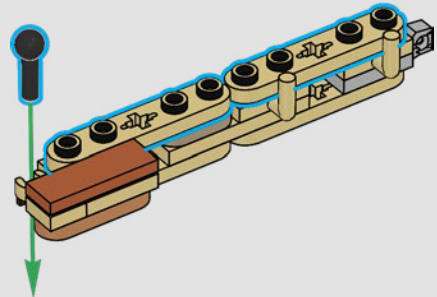




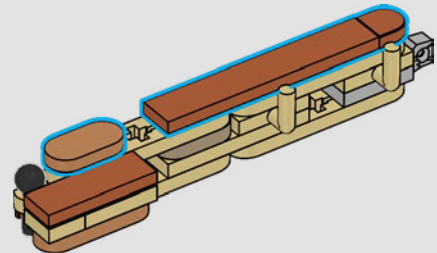
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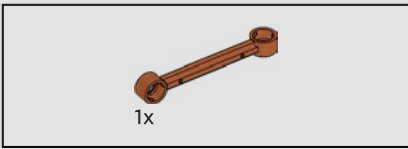


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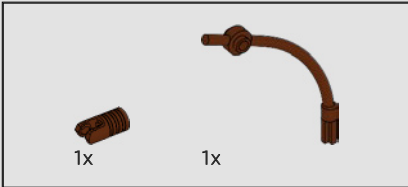
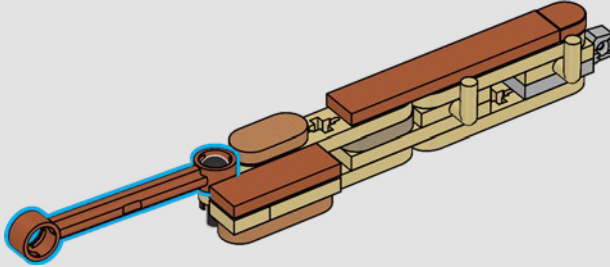


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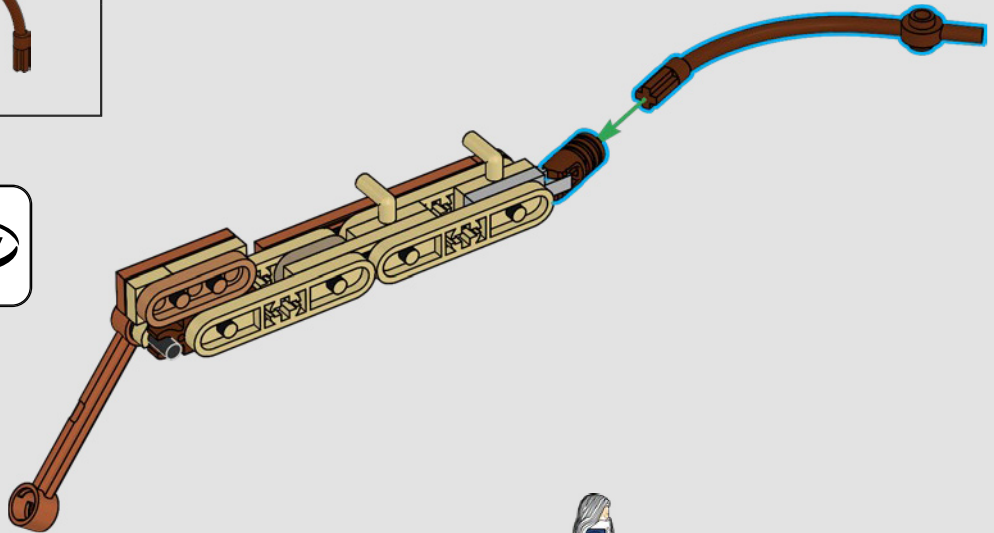


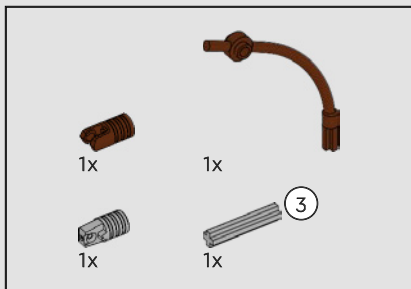


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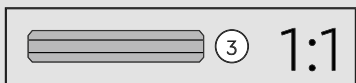
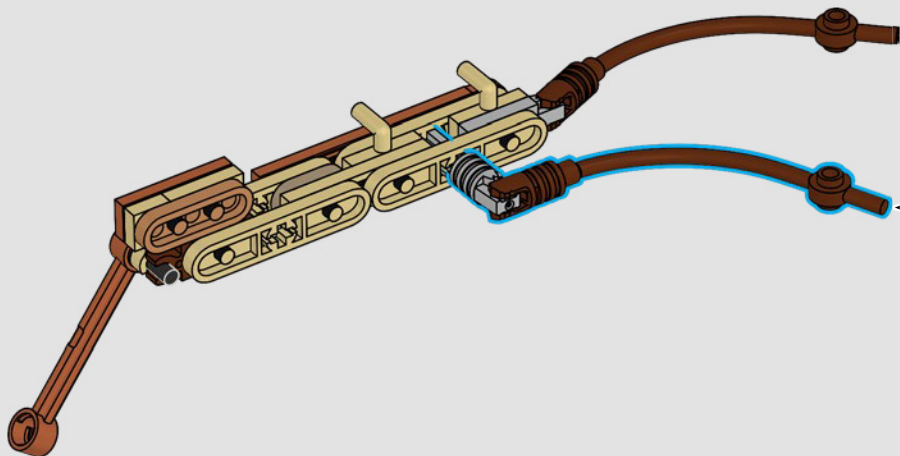
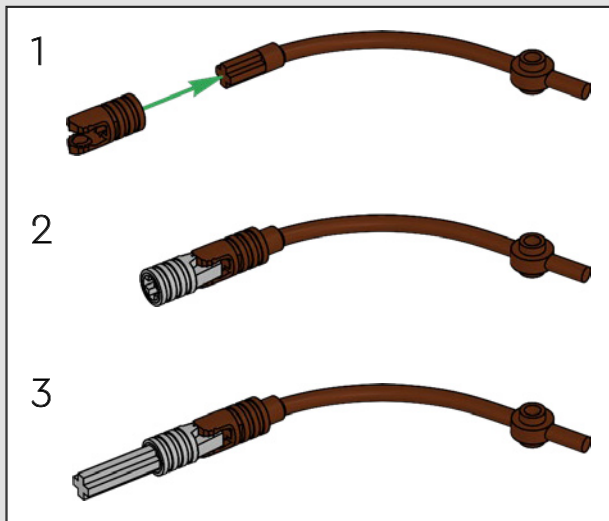


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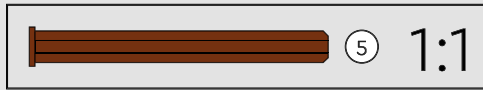
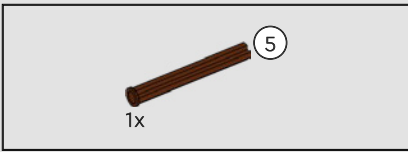




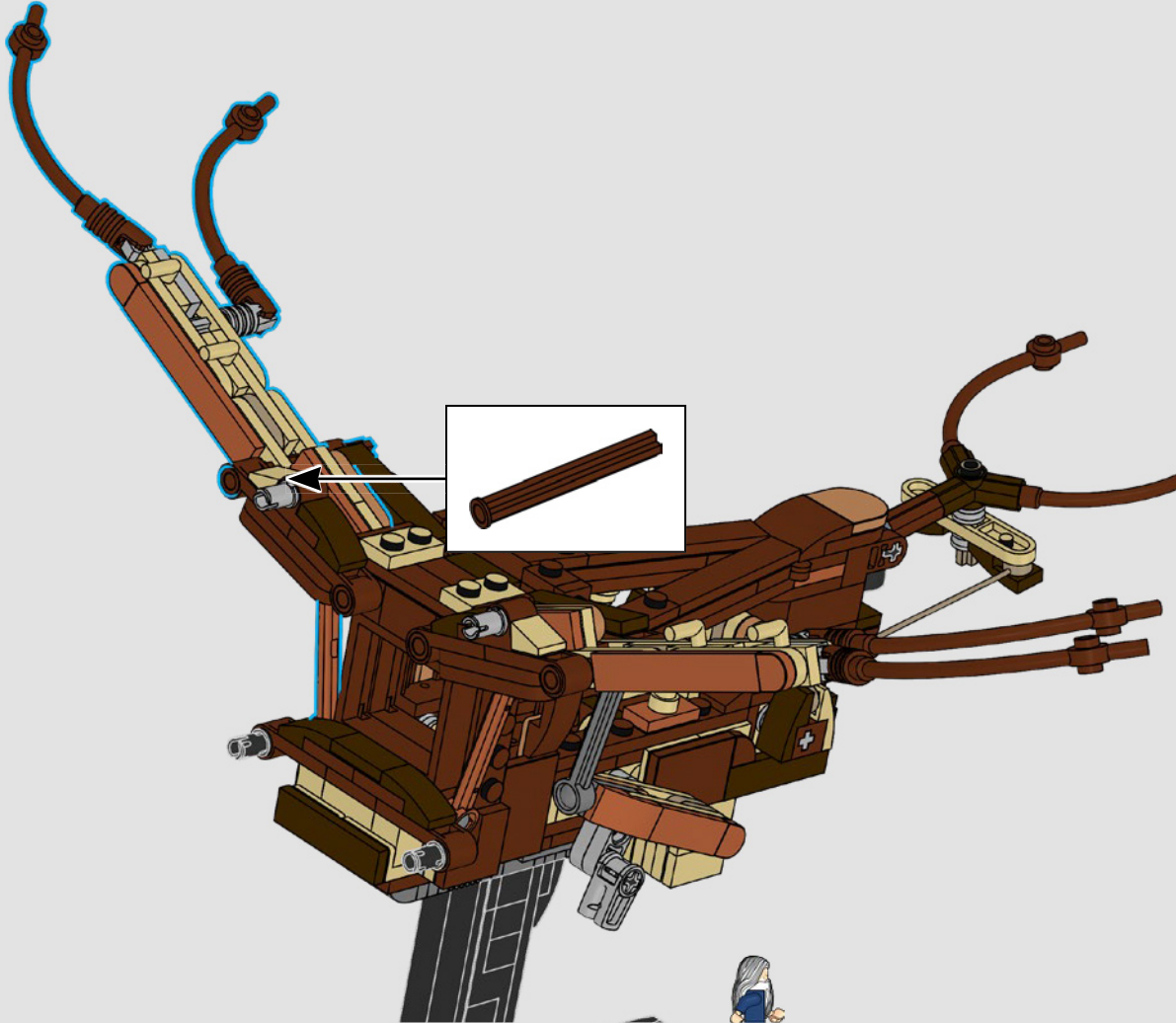
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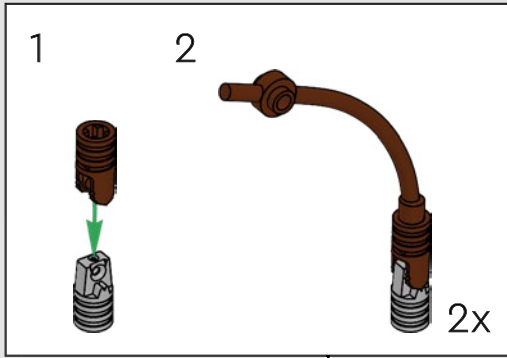
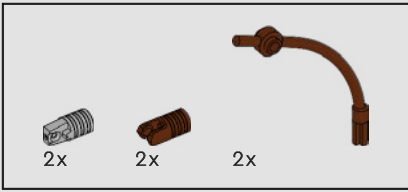




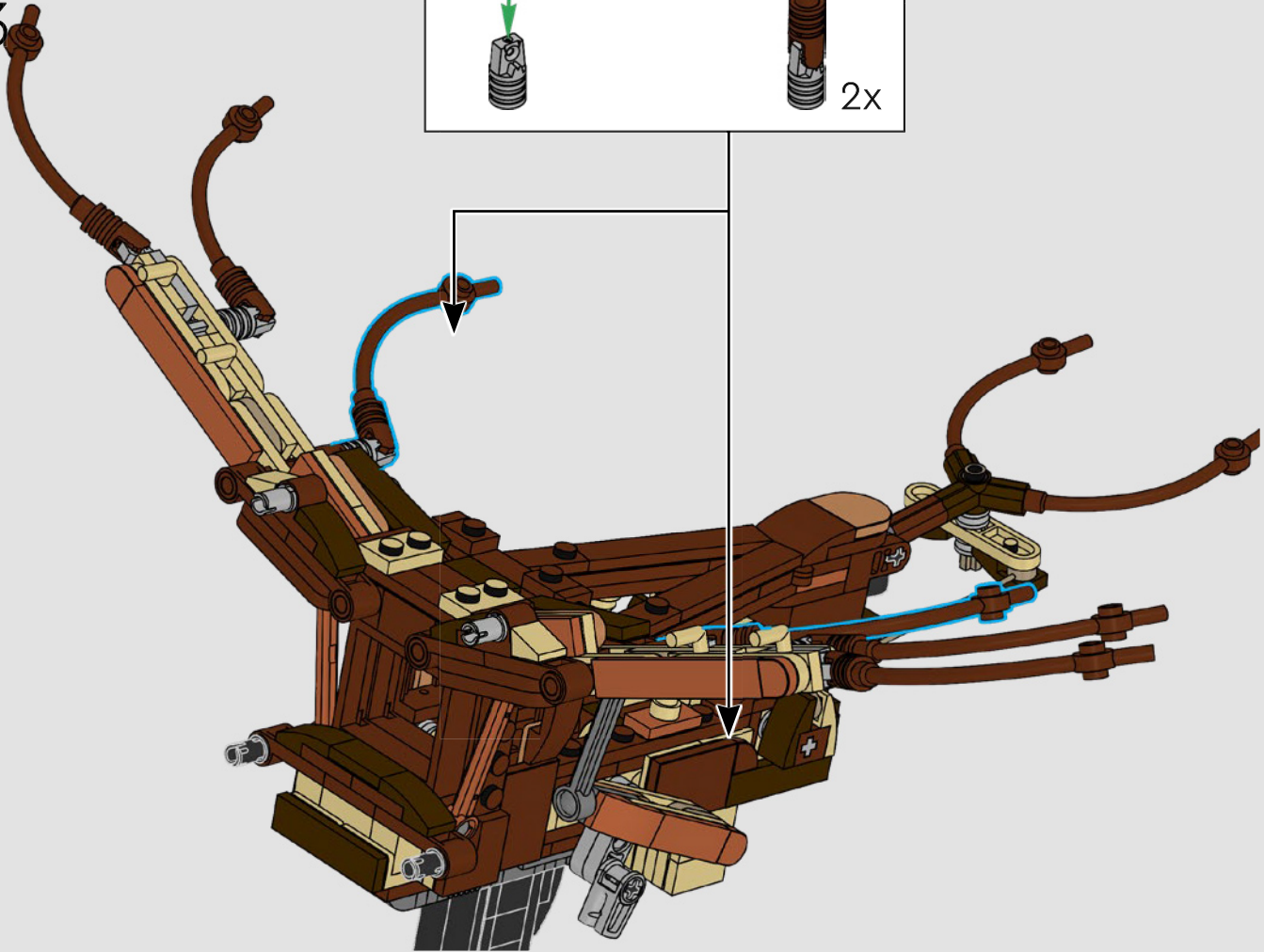


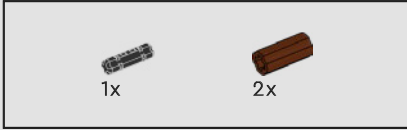
152



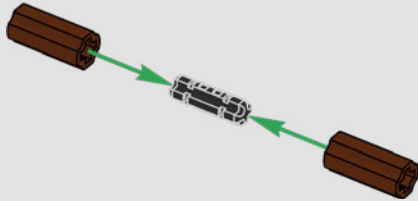


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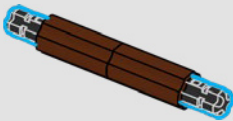




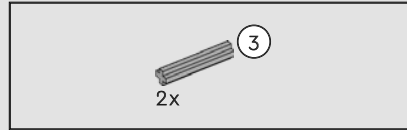
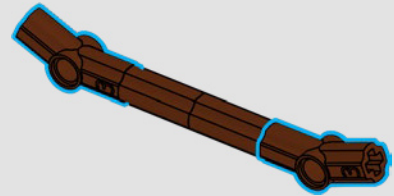
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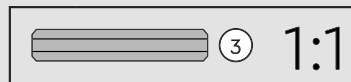
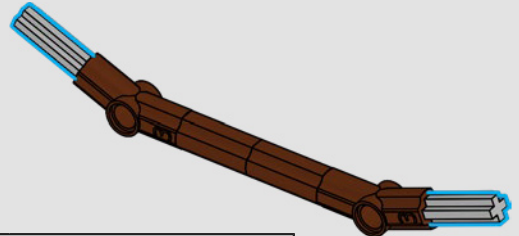
155



156

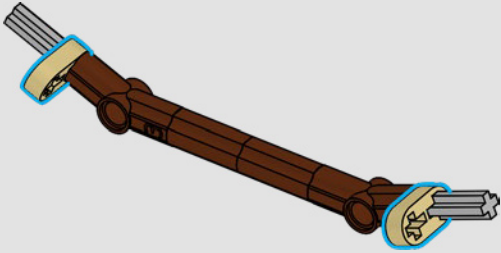


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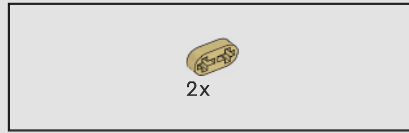
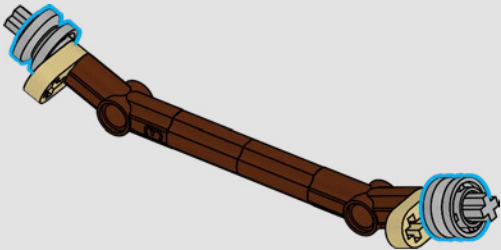




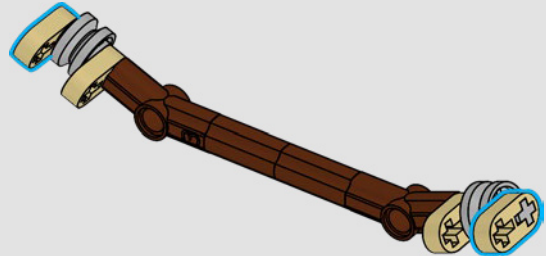
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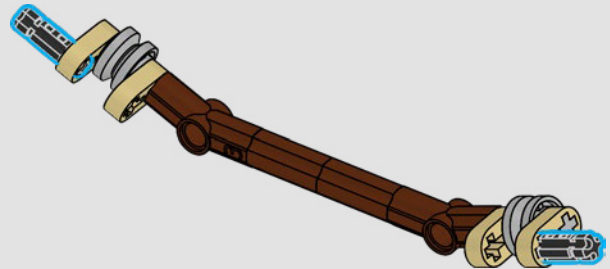
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160



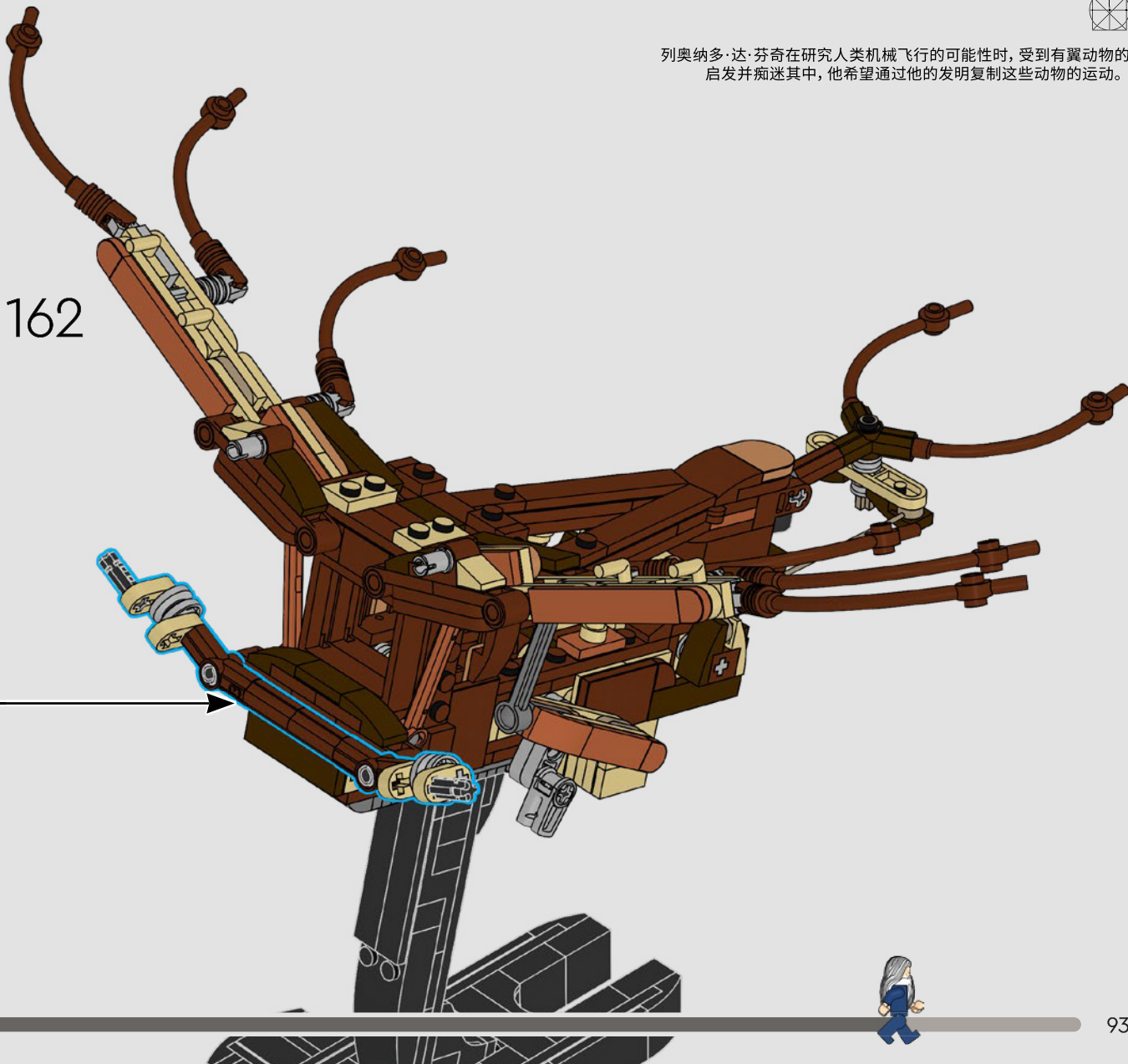
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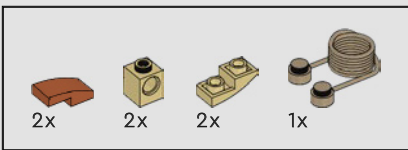




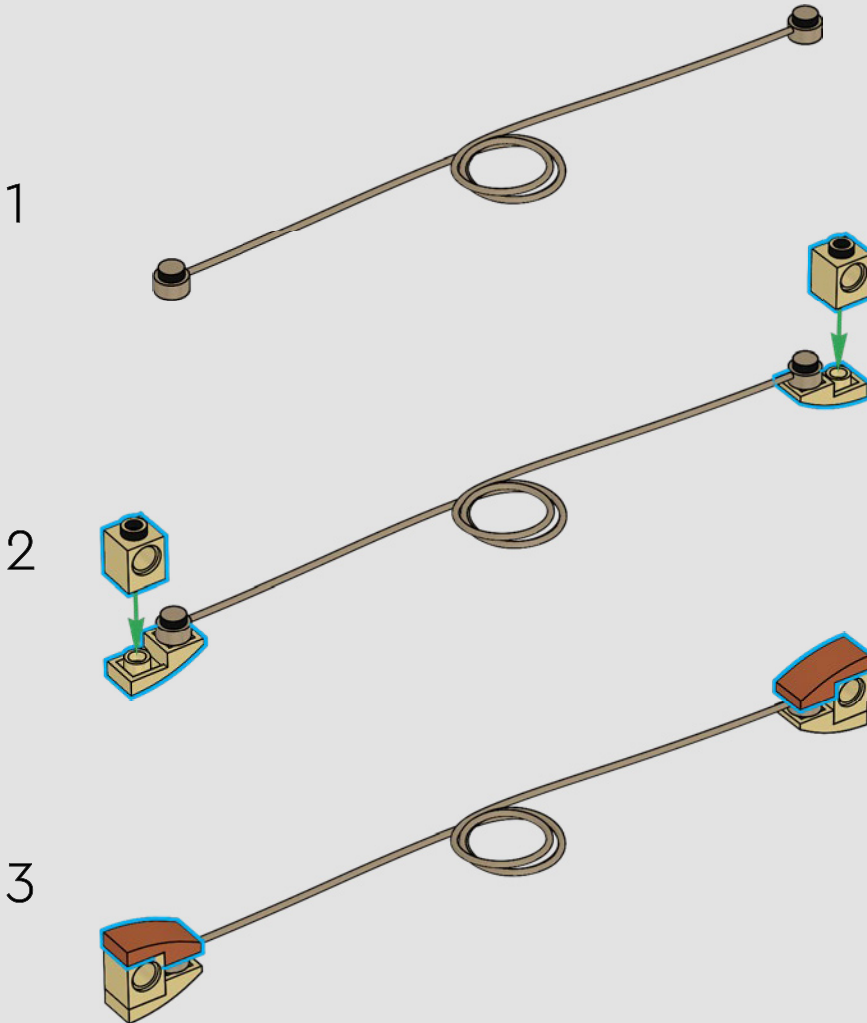
列奥纳多·达·芬奇在研究人类机械飞行的可能性时，受到有翼动物的启发并痴迷其中，他希望通过他的发明复制这些动物的运动。

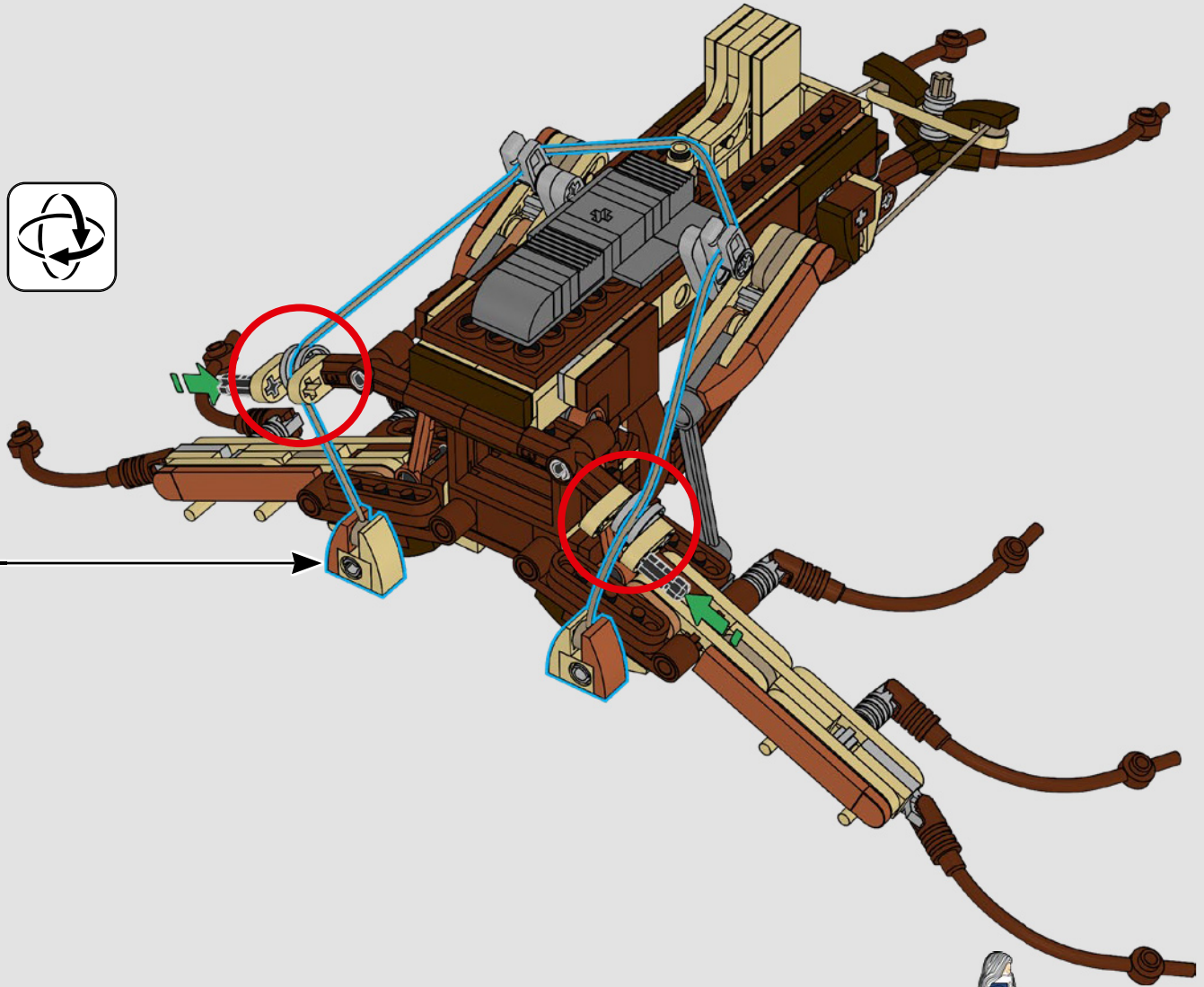
162





163

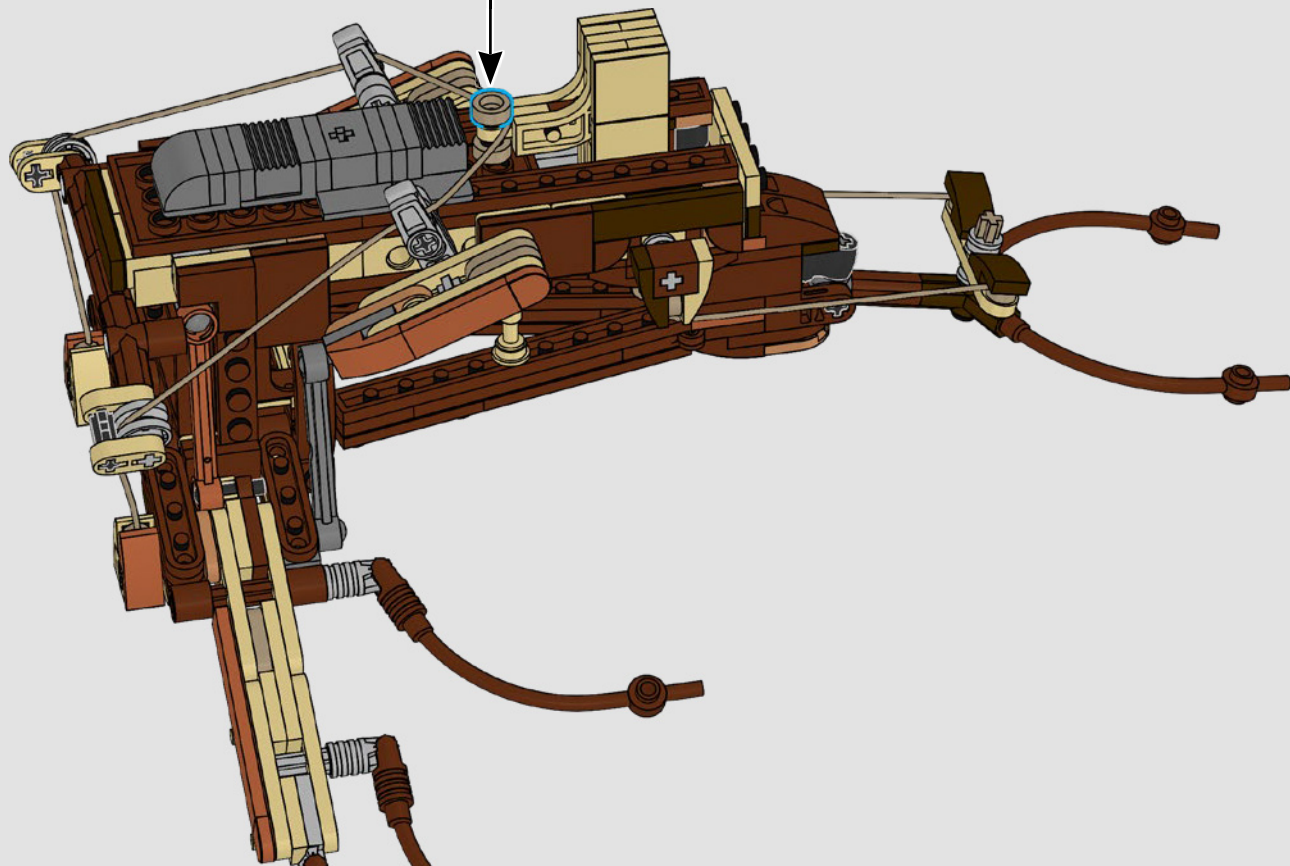






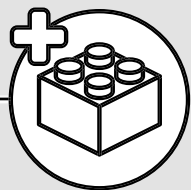
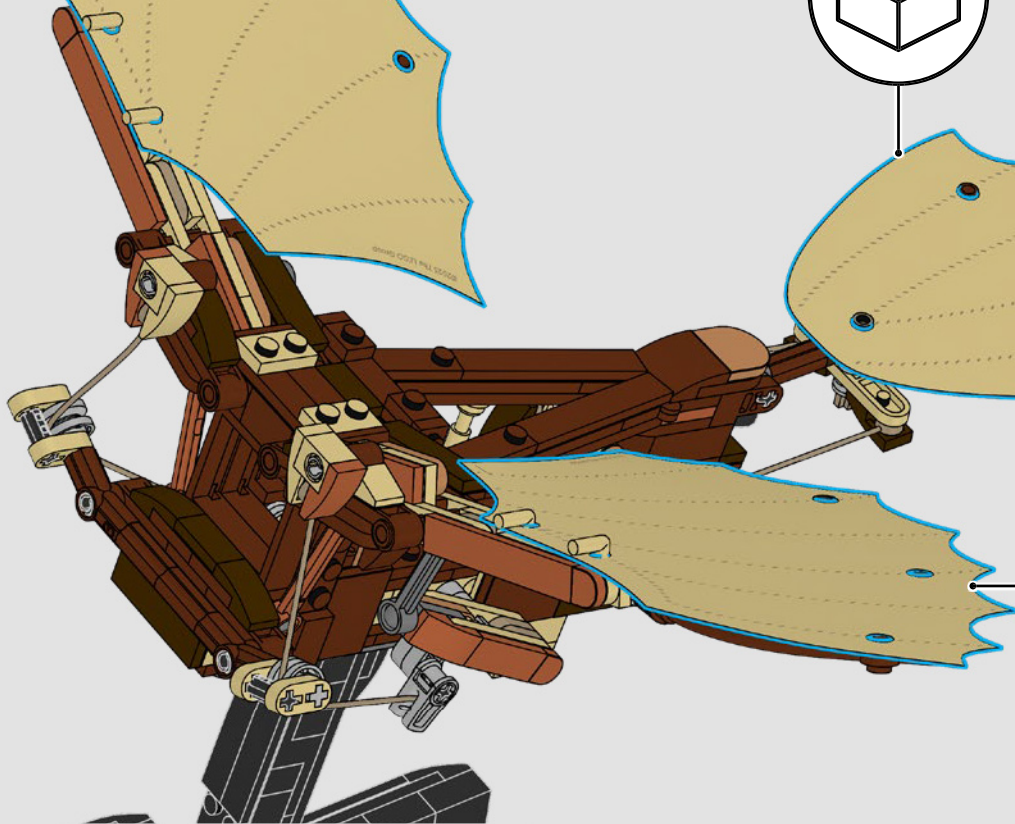
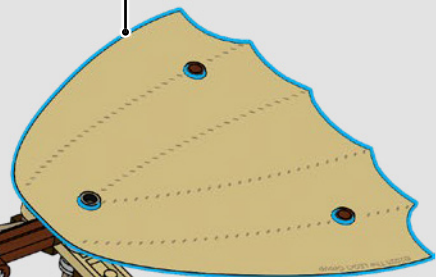
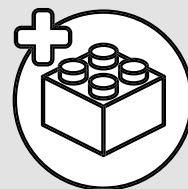
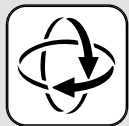
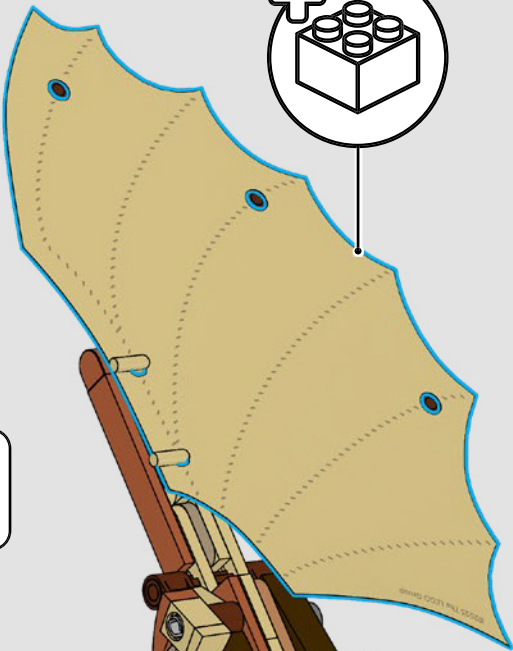
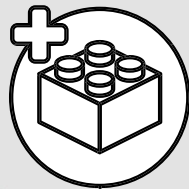
1x

164





165



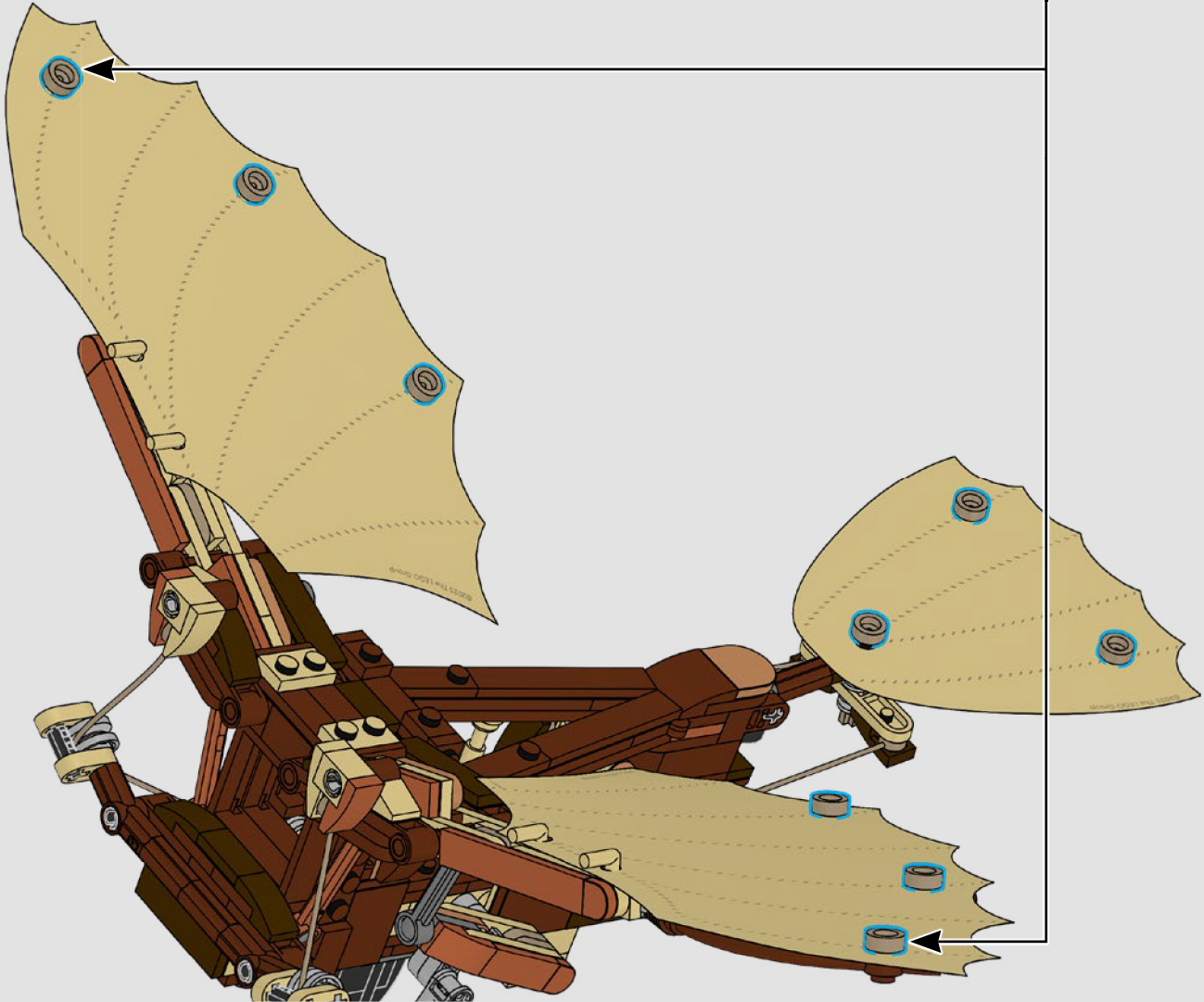


9x



9x

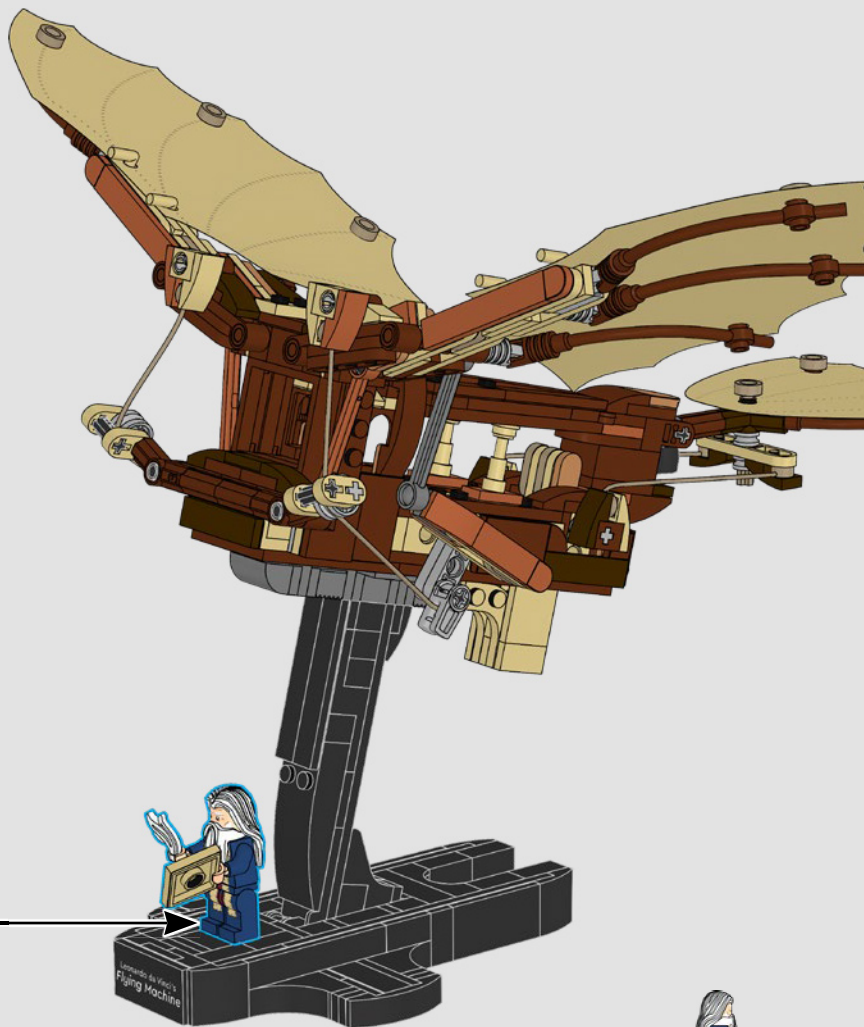
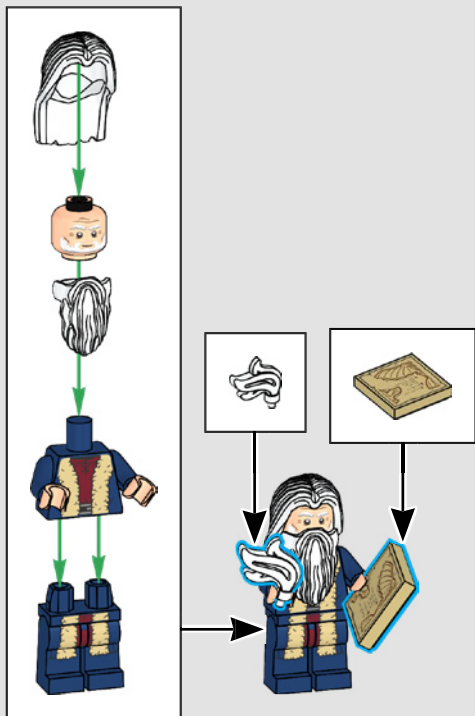
166





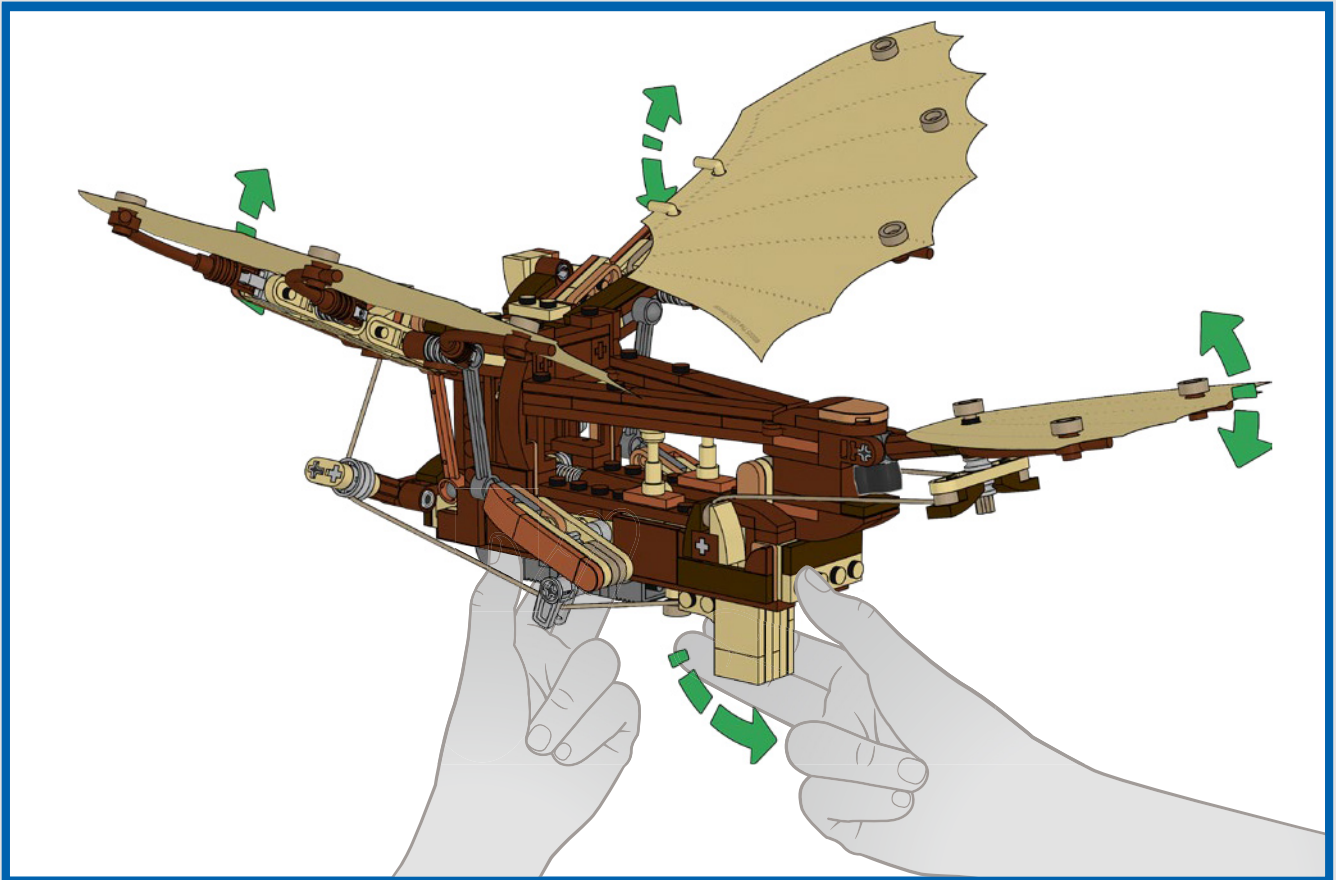
本模型经过精心设计，现至少可通过三种不同的方式启动触发器——在展示架上、一只手握住和用两只手握住（一只手在触发器上，另一只手拿着模型）。

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其中一项设计挑战是弄清楚将拍打功能的触发器放置在哪里，以便拼搭者的手不会干扰机构或绳索的任何部分。



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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