



**Bauanleitung
Trägerraketen der USA
für bemannte Flüge**

Maßstab
Januar
Kontakt

1:510
2024
bricks@hwlk.de

**Building Instructions
US launcher vehicles
for manned flights**

Scale
January
Contact

© Ralf Hupertz + Harald Kränzel

Allgemeine Bemerkungen

- An erster Stelle sollen die Größenverhältnisse einigermaßen nachempfunden werden, was mit den vorhandenen LEGO-Steinen im vorgegebenen Maßstab nicht immer einfach und manchmal unmöglich ist.
- Weiterhin ist die Grundform wichtig, dass also Rundungen oder andere Formen umgesetzt werden. Bei einem solchen Maßstab ist es auch durchaus sinnvoll auf Details zu verzichten,
- Wenn möglich sollen auch Farben des Originals übernommen werden.

In der vorliegenden Bauanleitung machen wir Vorschläge wie die Trägerraketen der USA mit LEGO-Steinen gebaut werden können.

**Eigene Ideen können
jederzeit implementiert
werden.**

**DAS ist das
was LEGO ausmacht.**

General remarks

- First of all, the proportions should be modeled to some extent, which is not always easy with the existing LEGO bricks at the given scale and sometimes impossible.
- The basic shape is also important, i.e. curves or other shapes are implemented. With such a scale it makes sense to forego details.
- If possible, colors from the original should also be adopted.

In these building instructions we make suggestions like these US launch vehicles can be built with LEGO bricks.

**Your own ideas can
be implemented
at any time.**

**THAT is what LEGO
is all about.**

Allgemeine Bemerkungen –Fortsetzung–

Darüber hinaus werden die hier verwendeten LEGO-Steine so gezeigt wie man sie kaufen kann.

Auf den folgenden Seiten sind Hinweise zu den Themen Trägerraketen, Farben und Markierungen zu finden.

General remarks –continued–

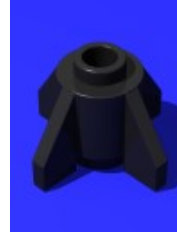
In addition, the LEGO bricks used here are shown as they can be purchased.

On the following pages you will find information on the topics of launch vehicles, colors and markings.

Farben der Steine

Falcon 9

Die Außenseite des Trunk unterhalb der Dragon-Kapsel ist farblich zweigeteilt: Eine Hälfte weiß und die andere Hälfte schwarz.
Der ausgewählte LEGO-Stein (4588) ist schwarz.



Colors of bricks

Falcon 9

The outside of the trunk below the Dragon capsule is divided into two colors: one half white and the half other is black. The selected LEGO brick (4588) is black.

Atlas V Starliner

Die erste Stufe ist mit gelben LEGO-Steinen erstellt, da nicht alle nötigen Steine in Orange verfügbar sind.

Atlas V Starliner

The first stage is made with yellow LEGO bricks because not all of the necessary bricks are available in orange.

Super Heavy Starship HLS

Das Starship HLS soll nach heutiger Planung weiß sein. Die Spitze des LEGO-Modells wurde in der Farbe Tan verwendet, da dieser LEGO-Stein(1744) nicht in Weiß verfügbar ist.



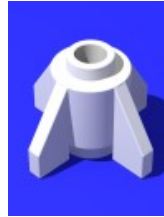
Super Heavy Starship HL

According to current plans, the Starship HLS should be white. The color tan was used for the top of the LEGO model as this LEGO brick (1744) is not available in white.

Farben der Steine –Fortsetzung–

Lunar Module

Die komplette Unterstufe wurde mit Goldfolie vor Hitze geschützt. Der ausgewählte LEGO-Stein (4588) ist weiß da eine passende Farbe nicht verfügbar ist.



Skylab

Für die Sonnenzellenflächen (am Labor und am ATM -Apollo Telescope Mount-) des LEGO-Modells sollte blau verwendet werden. Da aber die 1x2 ovalen Fliesen nicht in dieser Farbe verfügbar sind wurde Light Bluish Grey genommen.



Colors of bricks –continued–

Lunar Module

The entire lower stage was protected from heat with gold foil. The selected LEGO brick (4588) is white because a matching color is not available.

Skylab

Blue should be used for the solar cell surfaces (at the laboratory and at the ATM -Apollo Telescope Mount-) of the LEGO model. However, since the 1x2 oval tiles are not available in this color, Light Bluish Gray was used.

Trägerraketen

Mercury-Redstone

Obwohl nicht maßstabsgetreu dient der Stein 4588 „Brick round 1 x 1 with Fins“ zur Erkennung der Trägerrakete.

Mercury-Atlas

Obwohl nicht maßstabsgetreu werden die Triebwerke und der Triebwerksbereich zur Erkennung der Trägerrakete herangezogen.

Gemini-Titan II

Wie bei Mercury-Atlas dienen die Triebwerke der Erkennung der Trägerrakete.
Zwischen der ersten und zweiten Stufe wird eine 1 x 1 Rundplatte in Farbe Transclear verwendet, die den Bereich für das Hotstaging darstellen soll.

Launch vehicles

Mercury-Redstone

Although not to scale, the stone 4588 “Brick round 1 x 1 with Fins” is used to identify the launch vehicle.

Mercury-Atlas

Although not to scale, the engines and engine area are used to identify the launch vehicle.

Gemini-Titan II

As with Mercury-Atlas, the engines are used to detect the launch vehicle. A 1 x 1 round plate in transclear color is used between the first and second stages to represent the area for hot staging.

Trägerraketen -Fortsetzung-

Saturn 1B

Obwohl runde 1 x 1-Platten die acht Triebwerke unten in der ersten Stufe darstellen, sind die vier äußeren Triebwerke nicht richtig angeordnet, da Steine fehlen, um sie an die richtige Stelle zu drehen, die 45 Grad weiter wäre als sie ist. Obwohl nicht maßstabsgetreu, dienen die Motoren und der Motorraum zur Erkennung der Trägerrakete. Die erste Stufe der echten Trägerrakete besteht aus vier weißen und vier schwarzen Treibstofftanks. Aufgrund der Größe können nur jeweils zwei davon aus LEGO-Steinen hergestellt werden. Gleiches gilt für die Flossen, die ebenfalls nicht maßstabsgetreu sind.

Saturn V (Apollo + Skylab)

Da jedes der fünf F-1-Triebwerke durch einen eigenen LEGO-Stein repräsentiert werden soll, ist der Durchmesser des unteren Teils der ersten Stufe (S-IC) etwas größer als es laut Maßstab erforderlich wäre. Die Motoren, der Motorraum und die Leitwerke (alle nicht maßstabsgetreu) dienen zur Erkennung der Trägerrakete.

Launch vehicles -continued-

Saturn 1B

Although 1 x 1 round plates represent the eight engines at the bottom of the first stage, the four outer engines are not positioned correctly due to missing bricks to rotate them into place, which would be 45 degrees further than they are. Although not to scale, the engines and engine compartment are used to identify the launch vehicle.

The first stage of the real launch vehicle consists of four white and four black fuel tanks. Due to their size, only two of them can be made from LEGO bricks at a time. The same applies to the fins, which are also not to scale.

Saturn V (Apollo + Skylab)

Because each of the five F-1 engines is intended to be represented by its own LEGO brick, the diameter of the lower part of the first stage (S-IC) is slightly larger than required by scale. The engines, engine compartment and tail units (all not to scale) are used to identify the launch vehicle.

Trägerraketen -Fortsetzung-

STS – Space Transportation System

Fast alle Komponenten wurden angepasst bzw. erweitert, sodass das MOD/MOC dem echten Space Shuttle sehr nahe kommt.

Einige Komponenten sind nicht maßstabsgetreu, aber ausreichend, um sie zu erkennen.

SLS – Space Launch System

(Crew Block 1 + Block 1B)

Einige Komponenten sind nicht maßstabsgetreu, aber ausreichend, um sie zu erkennen.

Falcon 9 – Crew Dragon

Während die Landefüße von der Startposition in eine Landeposition bewegt werden können, sind die Fins der ersten Stufe aufgrund des Maßstabs nicht beweglich. Oben ließ sich der Trunk recht gut darstellen.

Launch vehicles -continued-

STS – Space Transportation System

Almost all components have been adapted or expanded, so that the MOD/MOC is very close to the real Space Shuttle. Some components are not to scale but sufficient to recognize them.

SLS – Space Launch System

(Crew Block 1 + Block 1B)

Some components are not to scale but sufficient to recognize them.

Falcon 9 – Crew Dragon

While the landing feet can be moved from the take-off position to a landing position, the fins of the first stage are not movable due to the scale. At the top the trunk could be represented quite well.

Trägerraketen -Fortsetzung-

Falcon Heavy – Gateway
Keine Hinweise

Atlas V – Starliner
Keine Hinweise

Super Heavy Starship HLS
Die wirkliche Super Heavy-Stufe wird von 33
Triebwerken angetrieben. Wegen des kleinen
Maßstabs und des verwendeten LEGO-Steins haben
nur 12 1x1 Rundplatten Platz, die diese große Zahl
der Triebwerke repräsentieren.

Launch vehicles -continued-

Falcon Heavy – Gateway
No Notes

Atlas V – Starliner
No Notes

Super Heavy Starship HLS
The true Super Heavy stage is powered by 33
engines. Due to the small scale and the LEGO brick
used, there is only room for 12 1x1 round plates to
represent this large number of engines.

Markierungen und Texte auf den Trägerraketen

Wo es möglich ist sind Markierungen durch LEGO-Steine realisiert. In folgender Beschreibung werden verwendete Texte und Markierungen erklärt. Um Markierungen am Original sehen zu können sind entsprechende Links zu Bildern angegeben.

Mercury-Redstone

Roter Text „UNITED STATES“ auf der Außenhülle der Stufe. Markierungen (schwarze Flächen) am oberen Ende der Außenhülle der Stufe.

Link:

<https://www.nasa.gov/image-detail/this-week-nasa-history-alan-shepard-becomes-first-american-space-may-5-1961>

Mercury-Atlas

Dunkler Text „UNITED STATES“ auf der Außenhülle der Stufe.

Link:

https://www.nasa.gov/image-detail/aurora_7_8_moment_of_ignition_s62-05531

Markings and texts on the launch vehicles

Where possible, markings are made using LEGO bricks. The text and markings used are explained in the following description. In order to be able to see markings on the original, corresponding links to images are provided.

Mercury-Redstone

Red text “UNITED STATES” on the outer shell of the stage. Markings (black areas) at the top of the outer shell of the stage.

Mercury-Atlas

Dark text “UNITED STATES” on the outer shell of the stage.

Markierungen -Fortsetzung-

Gemini Titan II

Dunkler Text „UNITED STATES“ auf der Außenhülle.
Markierungen (schwarze Flächen) an beiden Stufen.

Markings -continued-

Gemini Titan II

Dark text “UNITED STATES” on the outer cover.
Markings (black areas) on both stages.

Link:

<https://www.nasa.gov/image-detail/amf-s65-28694>

Saturn 1B

Weiß unterlegter roter Text „UNITED STATES“ auf
der Außenhülle der schwarzen Tanks. Roter Text
„USA“ auf der Außenhülle der zweiten Stufe.
Markierungen (schwarze Flächen) auf der zweiten
Stufe.

Saturn 1B

White-backed red text “UNITED STATES” on the
outer shell of the black tanks. Red text “USA” on the
outer shell of the second stage. Markings (black
areas) on the second stage.

Link:

<https://www.nasa.gov/image-detail/amf-s68-48787>

Markierungen -Fortsetzung-

Saturn V Apollo

Roter Text „USA“ auf der der Außenhülle der ersten Stufe. Die USA Flagge auf der der Außenhülle der ersten Stufe. Roter Text „UNITED STATES“ auf der Außenhülle der zweiten Stufe. Markierungen (schwarze Flächen) auf allen drei Stufen.

Markings -continued-

Saturn V Apollo

Red text “USA” on the outer shell of the first stage. The USA flag on the outer shell of the first stage. Red text “UNITED STATES” on the outer shell of the second stage. Markings (black areas) on all three stages.

Link:

<https://www.nasa.gov/image-detail/amf-6901001>

Saturn V Skylab

Roter Text „USA“ auf der der Außenhülle der ersten Stufe. Die USA Flagge auf der der Außenhülle der ersten Stufe. Roter Text „UNITED STATES“ auf der Außenhülle der zweiten Stufe. Markierungen (schwarze Flächen) auf den ersten beiden Stufen und der dritten Stufe (Skylab).

Saturn V Skylab

Red text “USA” on the outer shell of the first stage. The USA flag on the outer shell of the first stage. Red text “UNITED STATES” on the outer shell of the second stage. Markings (black areas) on the first two stages and the third stage (Skylab).

Links:

<https://www.nasa.gov/image-detail/amf-7040208>
<https://www.nasa.gov/image-detail/amf-s73-26912>

Markierungen -Fortsetzung-

Space Shuttle

Der blaue Kreis auf der linken Tragfläche stellt das NASA Logo dar während das rote Quadrat auf der rechten Tragfläche die US-Flagge representiert.

Markings -continued-

Space Shuttle

The blue circle on the left wing represents the NASA logo while the red square on the right wing represents the US flag.

Link:

https://www.nasa.gov/image-detail/amf-ksc-20220614-ph-csh01_0044

Space Launch System

Auf den Außenseiten der Feststoffraketen sind rote Texte "NA" und "SA" zu sehen.

Space Launch System

Red texts "NA" and "SA" can be seen on the outside of the solid fuel rockets.

Falcon 9 Crew Dragon

Auf der Außenseite der zweiten Stufe ist der rote Text "NASA" zu sehen. Die erste Stufe trägt in blauer Farbe den Text „SPACEEX“.

Falcon 9 Crew Dragon

The red text "NASA" can be seen on the outside of the second stage. The first stage has the text "SPACEEX" in blue.

Links:

<https://www.nasa.gov/image-detail/amf-nhq202308230007>

<https://www.nasa.gov/image-detail/amf-jsc2023e037683>

Markierungen -Fortsetzung-

Falcon Heavy Gateway

Markings -continued-

Falcon Heavy Gateway

Link:

<https://spacenews.com/psyche-marks-start-of-nasa-use-of-falcon-heavy>

Atlas V Starliner

Atlas V Starliner

Link:

<https://blogs.nasa.gov/commercialcrew/wp-content/uploads/sites/230/2021/07/Boeing-OFT-2-Rollout-Photo-scaled.jpg>

Super Heavy Starship HLS

Super Heavy Starship HLS

Link:

<https://www.nasa.gov/humans-in-space/nasa-awards-spacex-second-contract-option-for-artemis-moon-landing>



Mercury- Redstone	Mercury- Atlas	Gemini- Titan II	Saturn 1B	Saturn V- Apollo	Saturn V- Skylab	Space Transportation System	Space Launch System Crew Block 1	Space Launch System Crew Block 1B	Falcon 9 Crew Dragon	Falcon Heavy Gateway	Atlas V Starliner	Super Heavy Starship HLS
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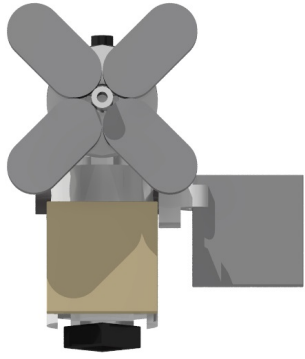
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**Apollo
Command + Service
Module
and
Lunar Module**

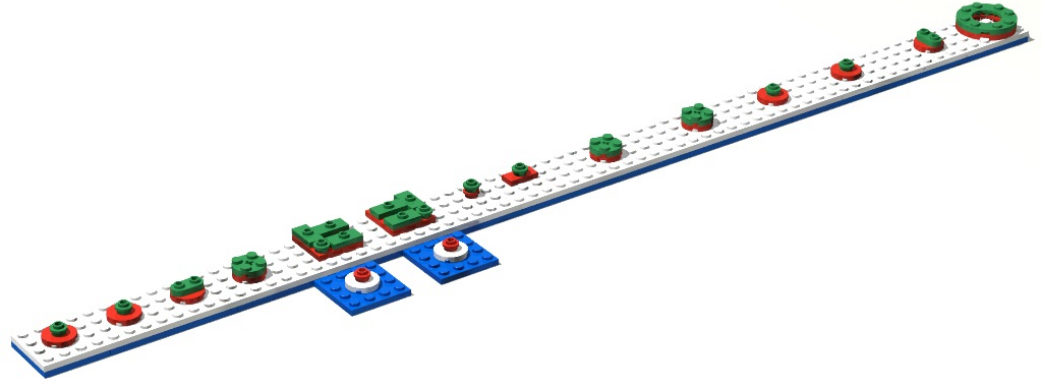
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von Schritt
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to step



Skylab

310
319



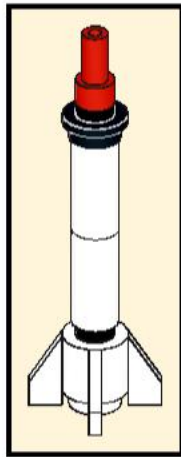
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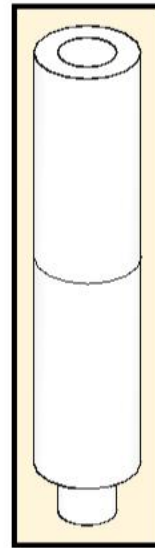
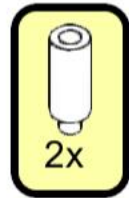


Mercury-Redstone

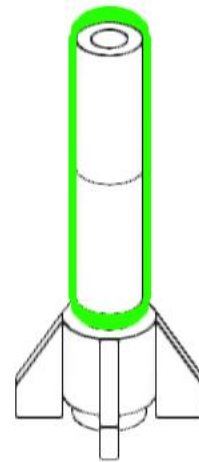
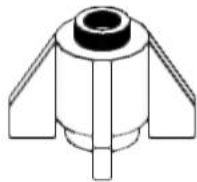
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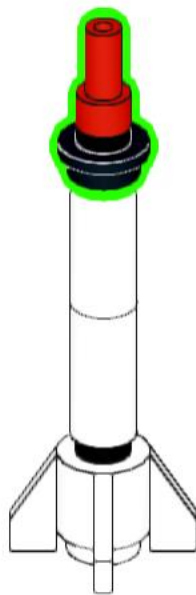
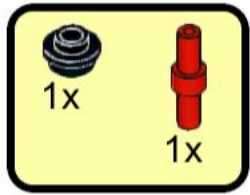
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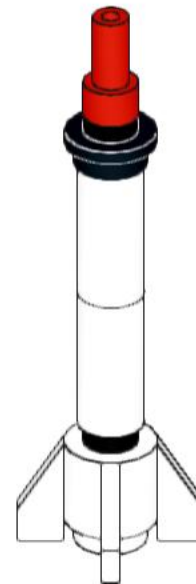
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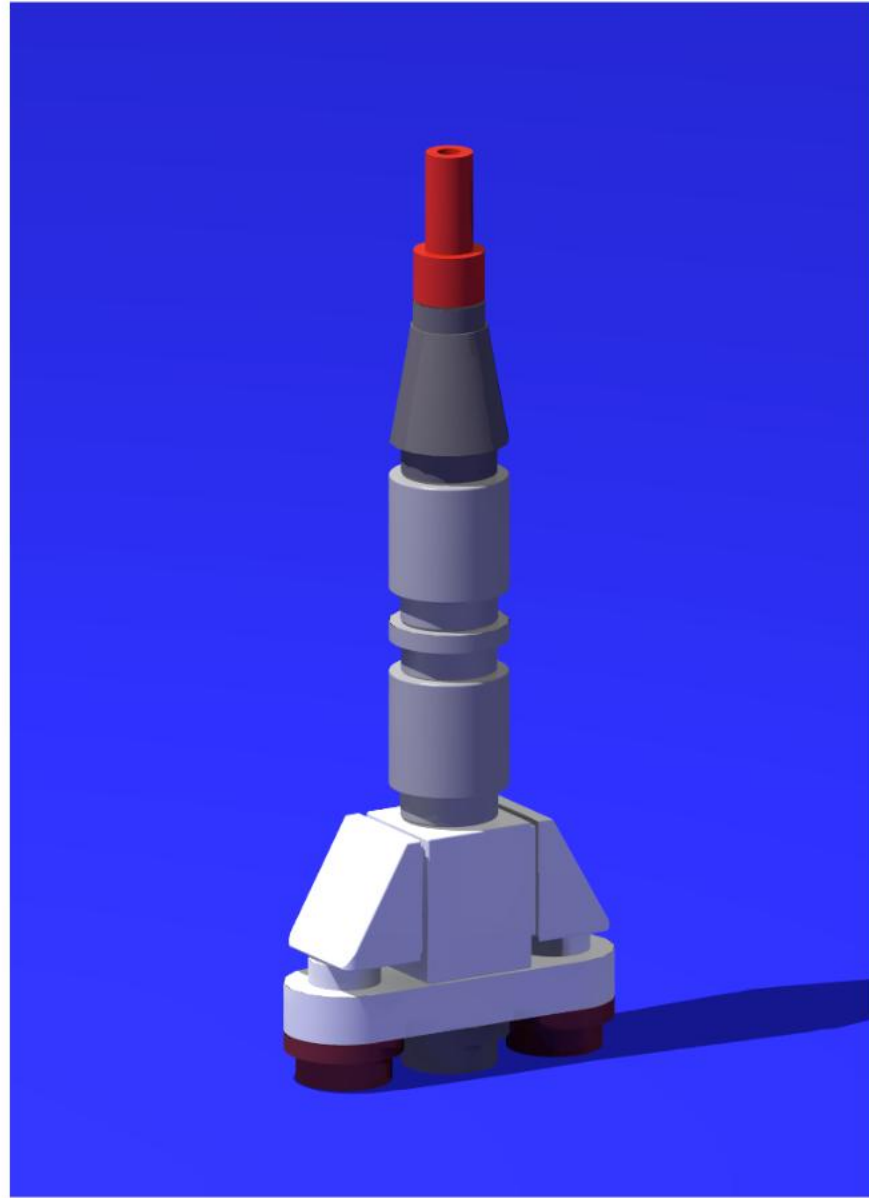


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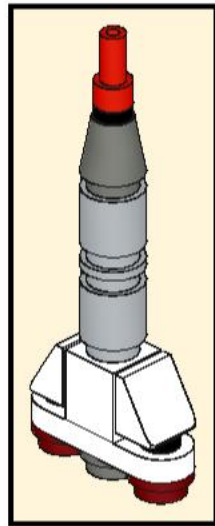
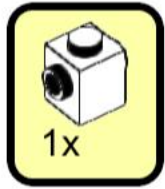
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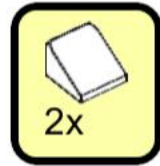


Mercury-Atlas

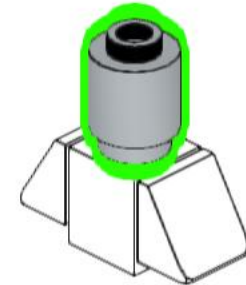
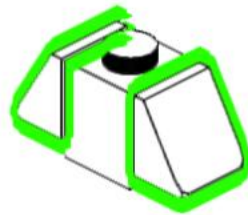
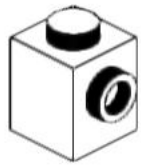
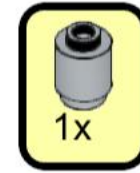
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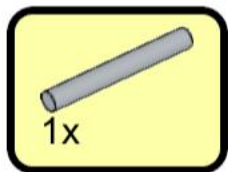
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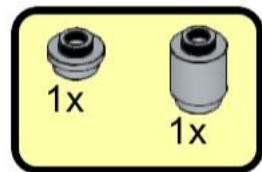
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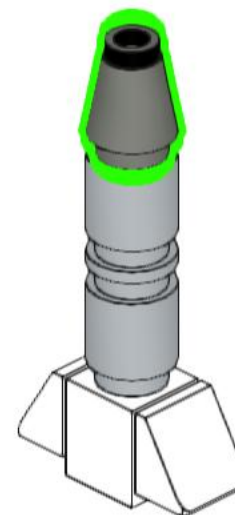
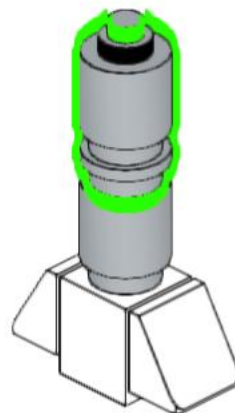
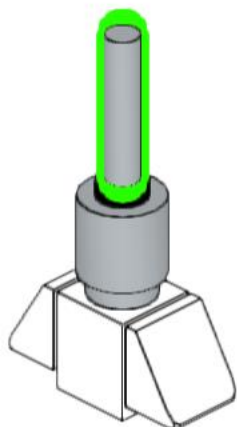
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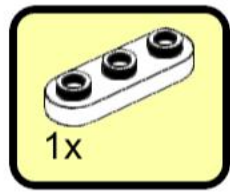
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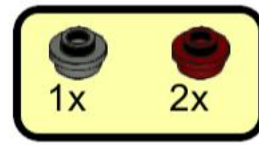
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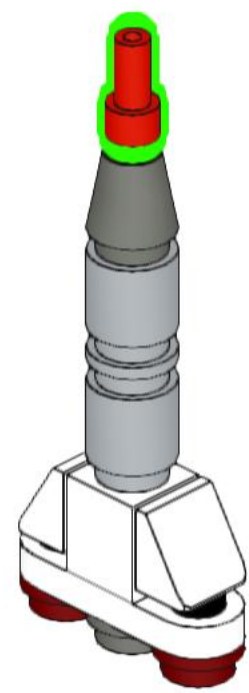
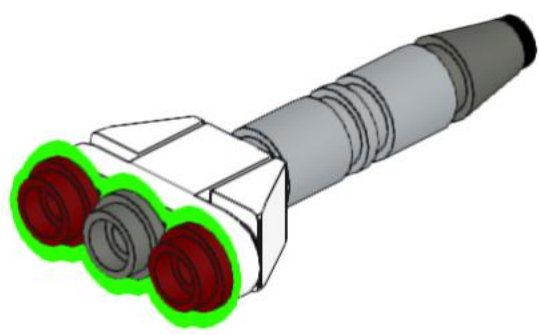
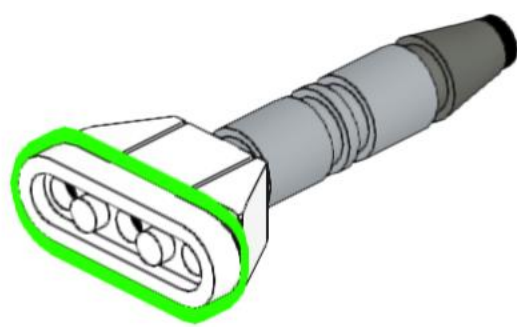
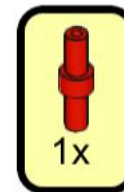
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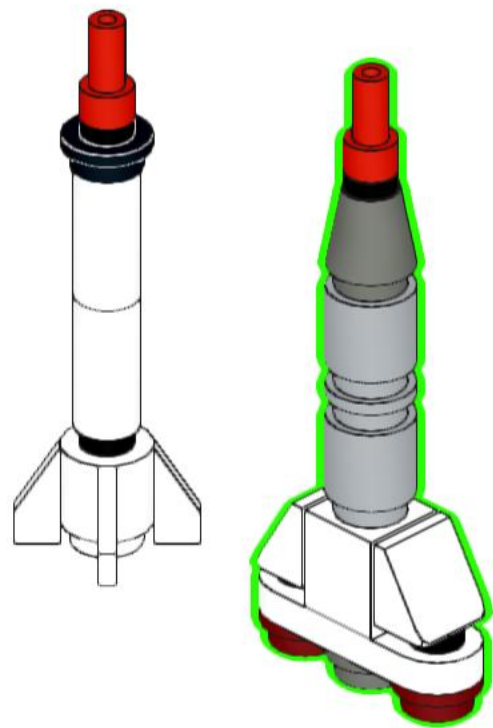
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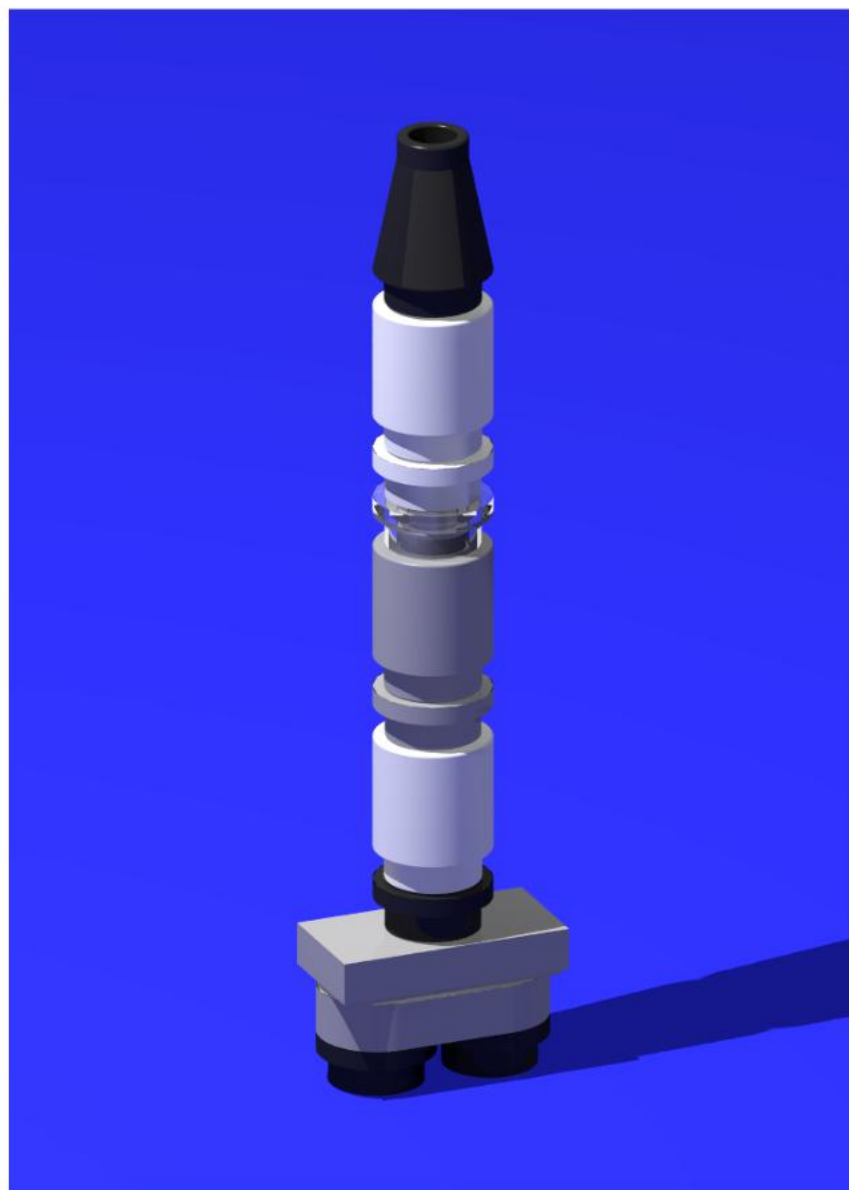


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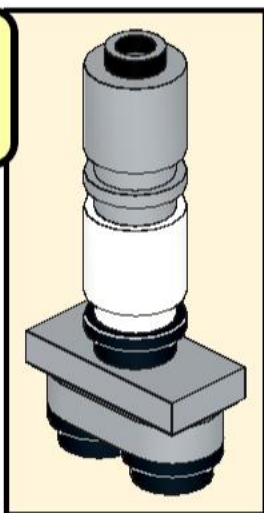
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Gemini Titan II

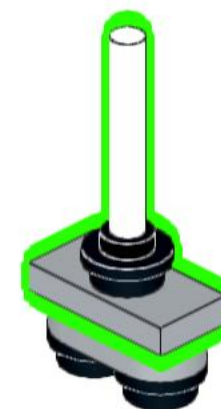
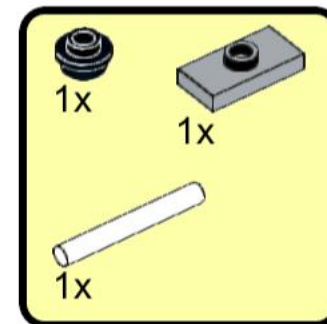
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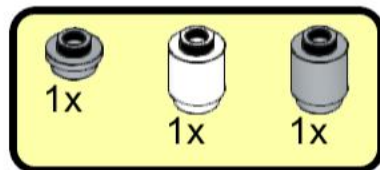
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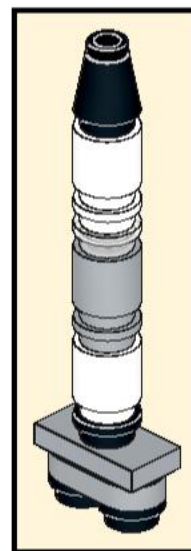
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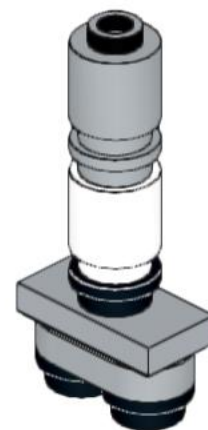
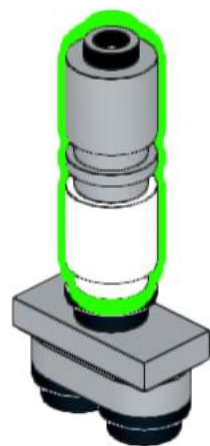
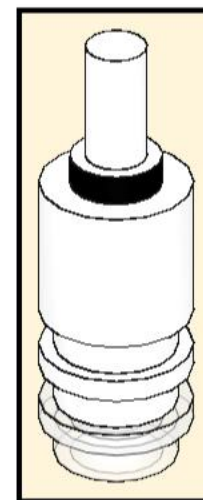
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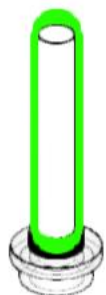
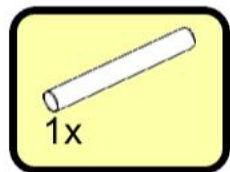
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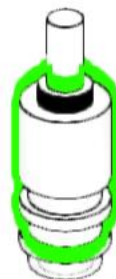
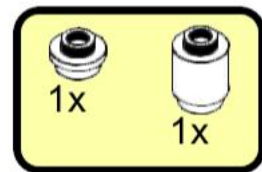
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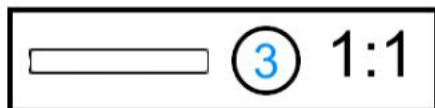
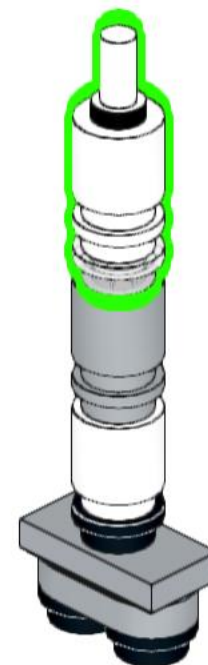
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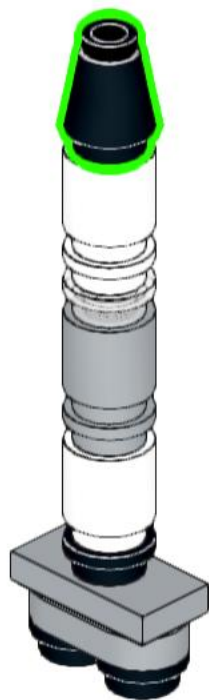
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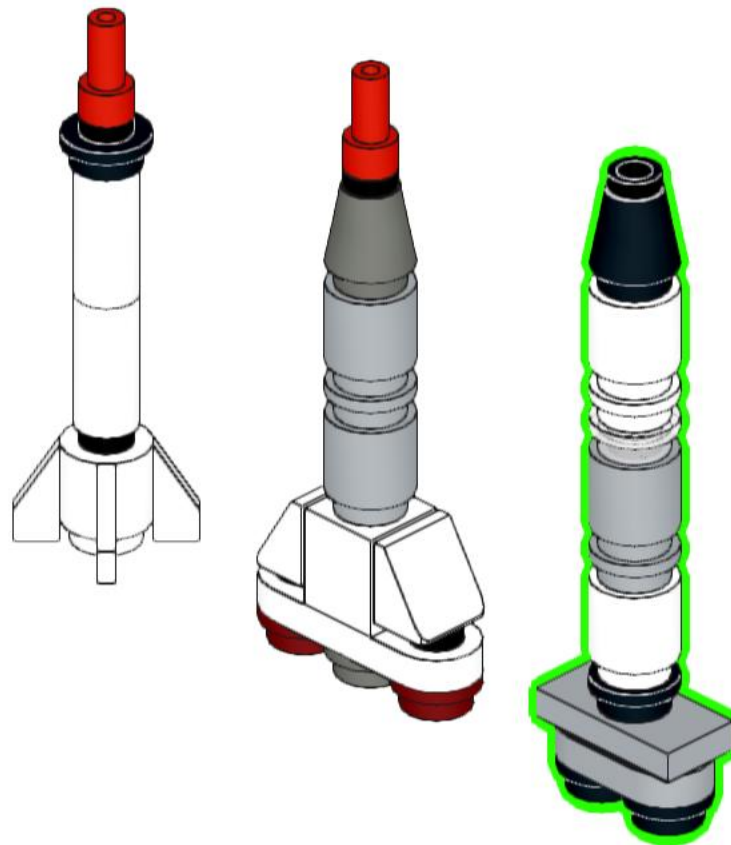
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25



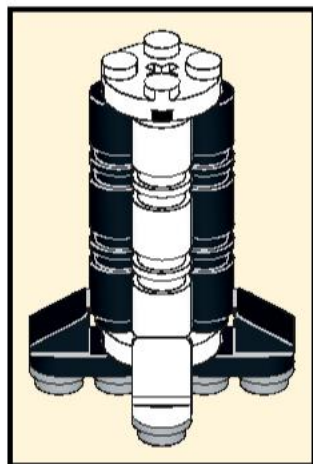
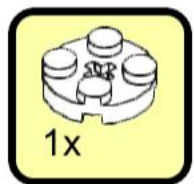
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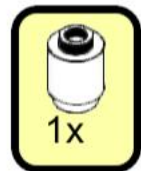


Saturn IB

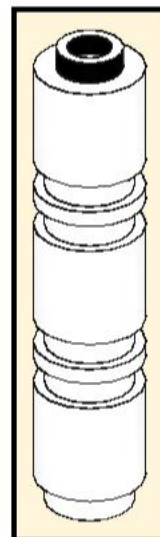
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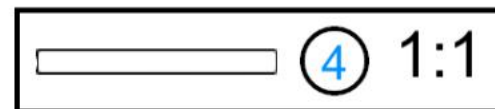
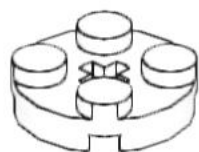
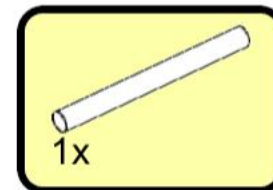
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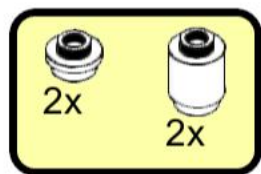
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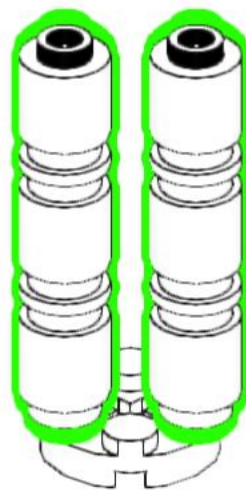
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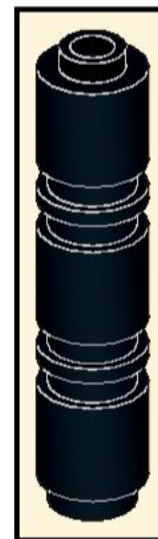
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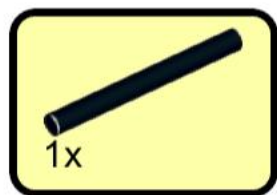
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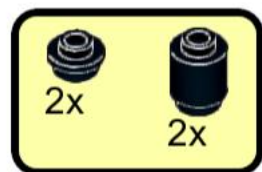
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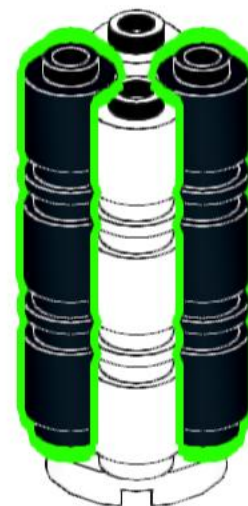
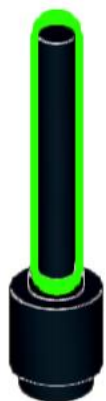
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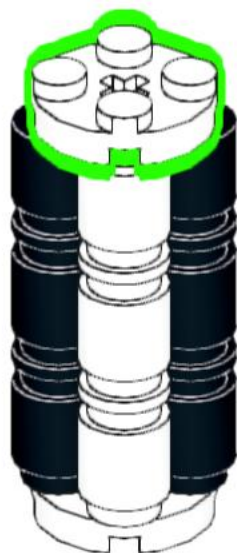
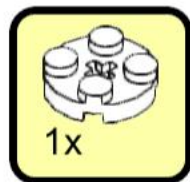
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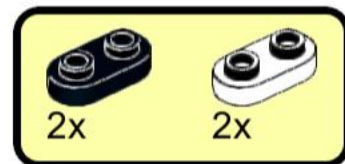
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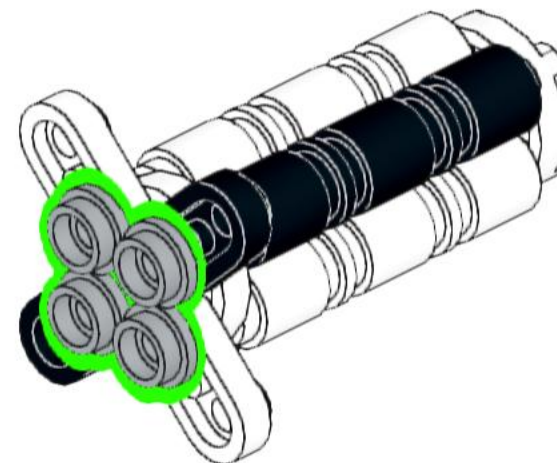
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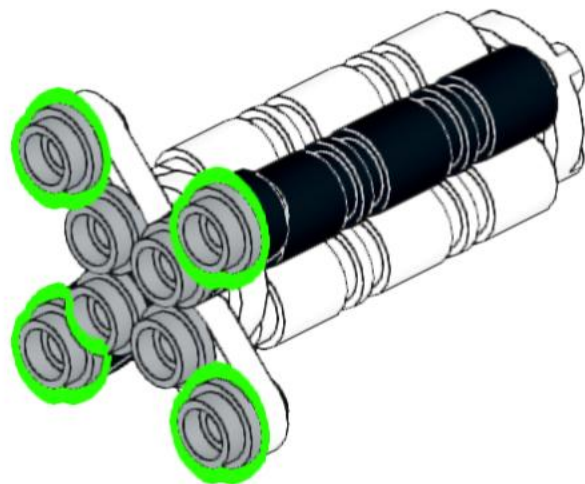
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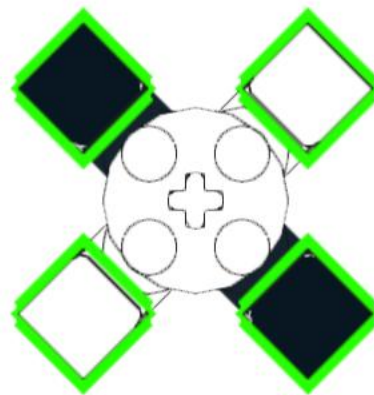
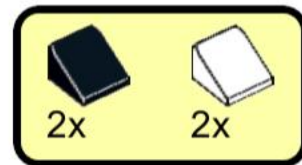
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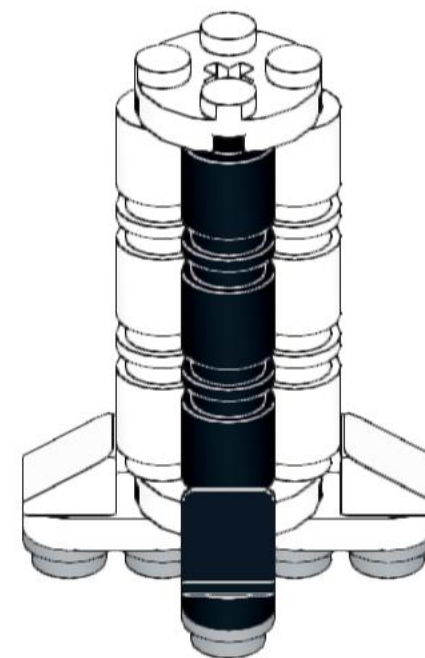
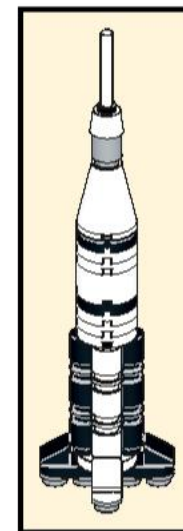
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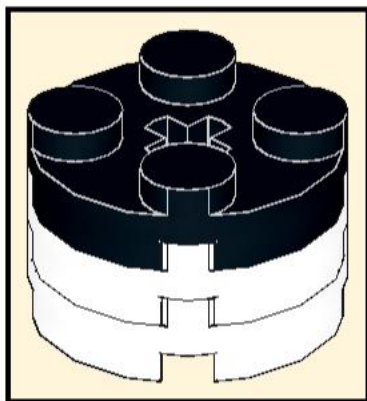
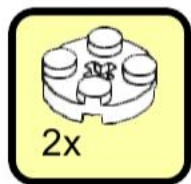
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41



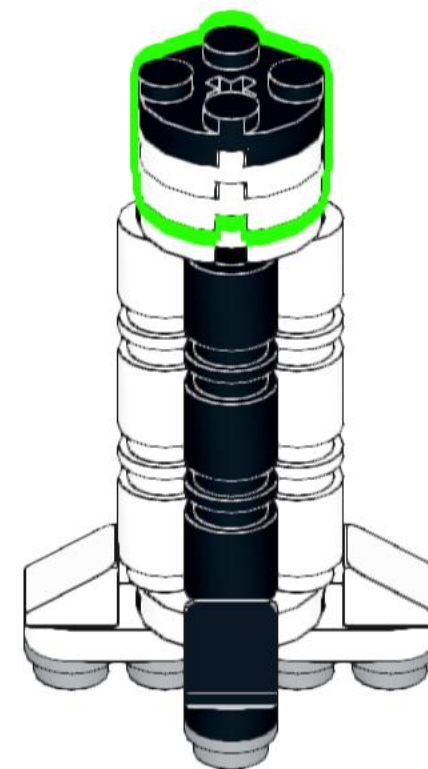
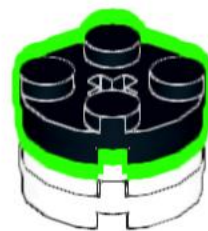
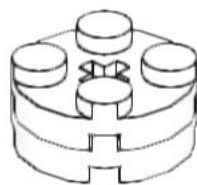
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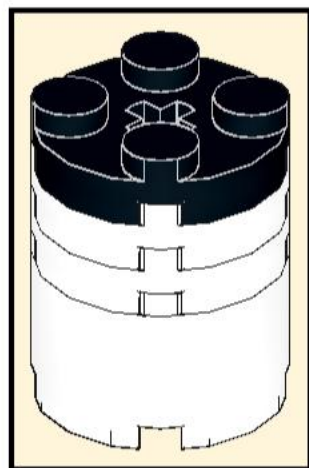
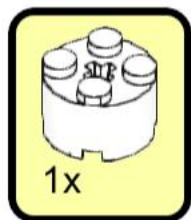
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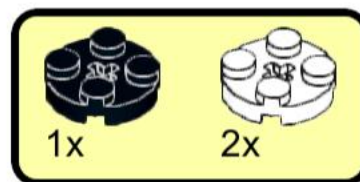
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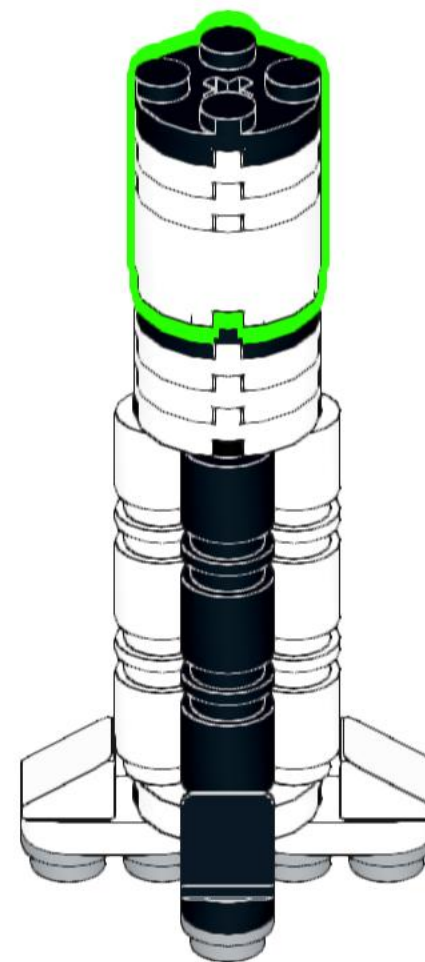
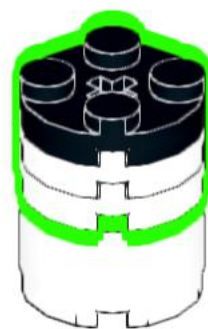
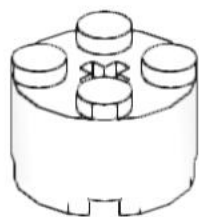
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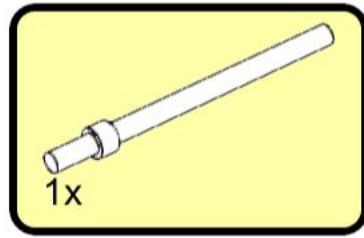
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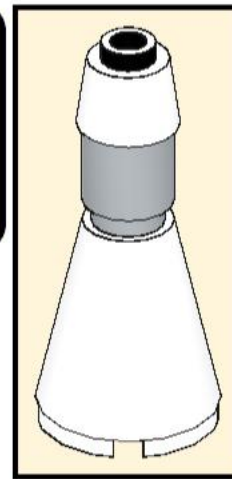
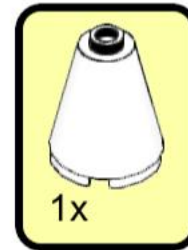
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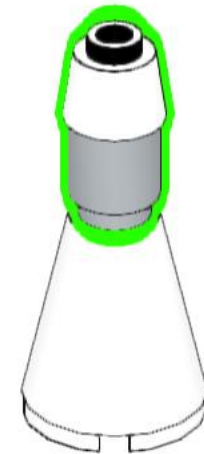
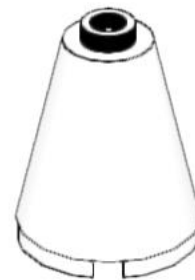
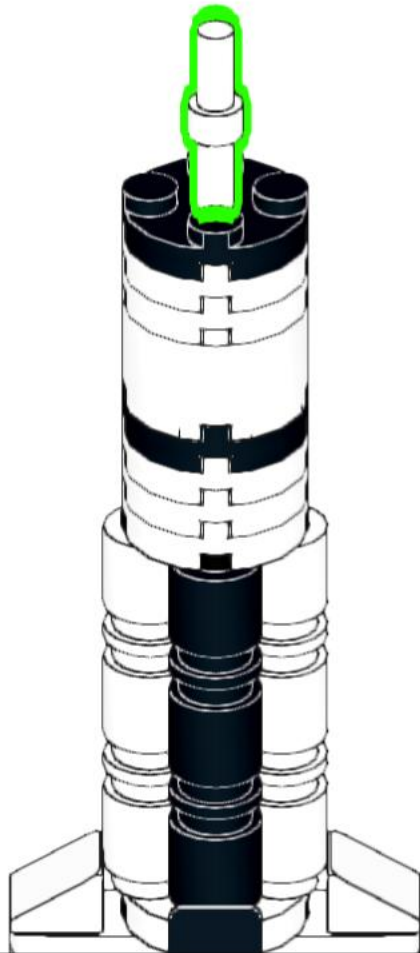
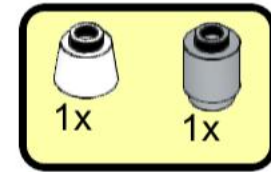
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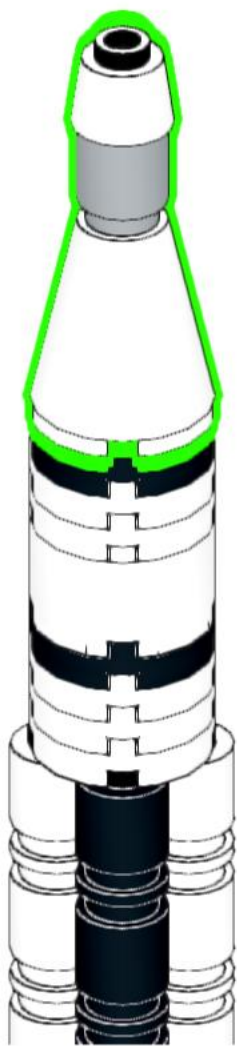
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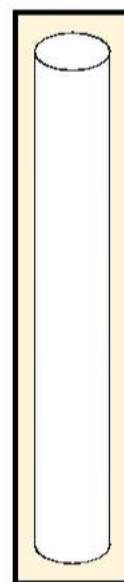
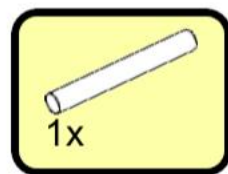
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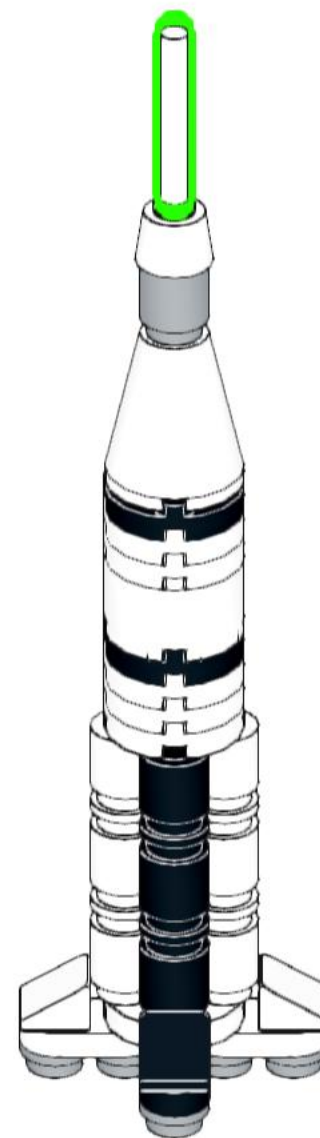
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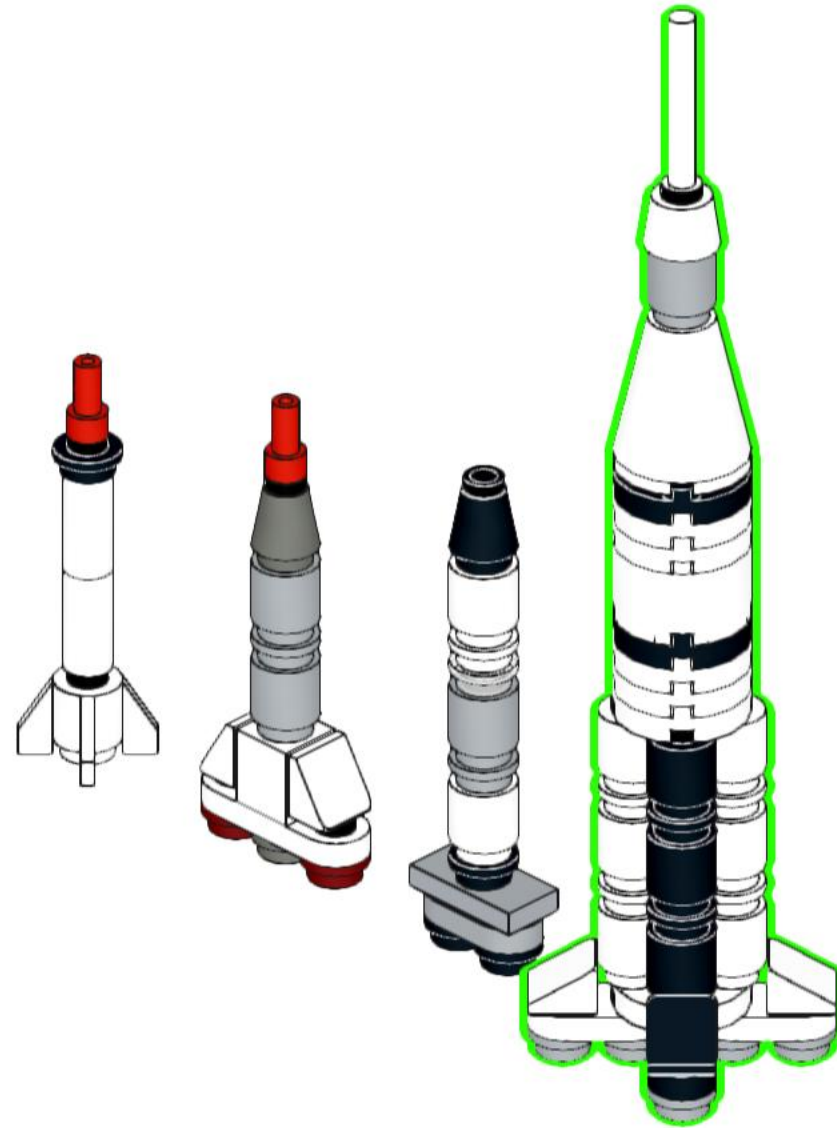
52



53



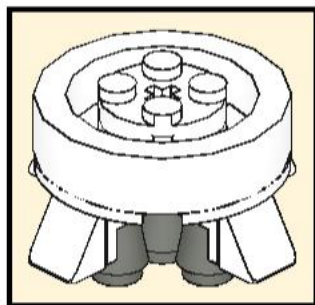
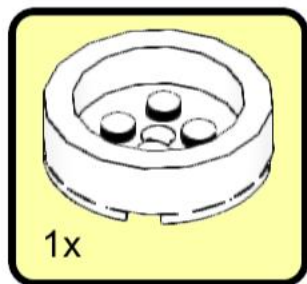
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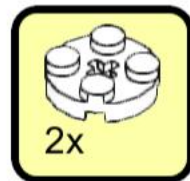


**Saturn V
Apollo**

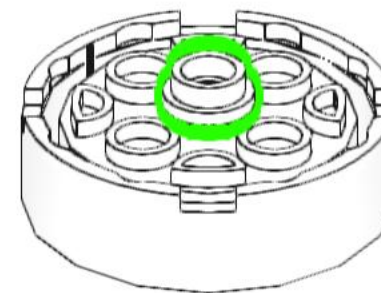
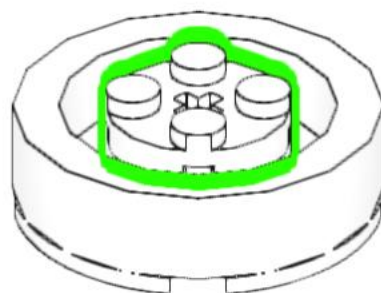
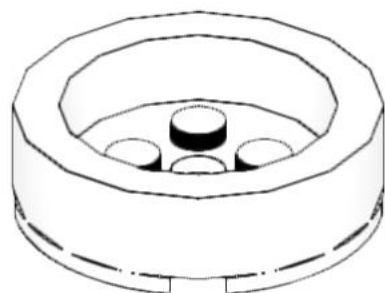
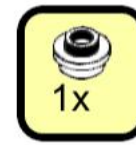
55



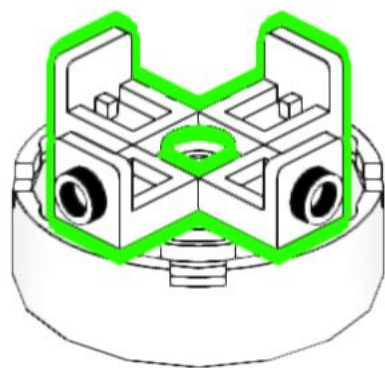
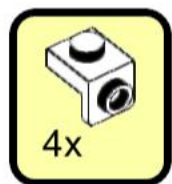
56



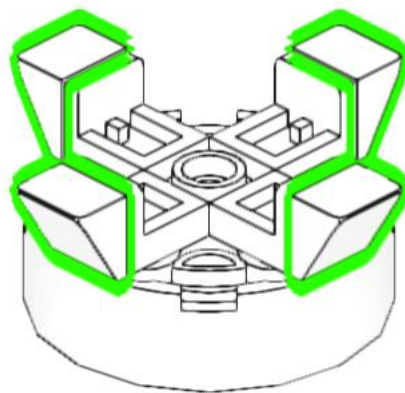
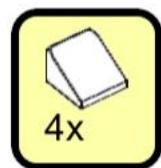
57



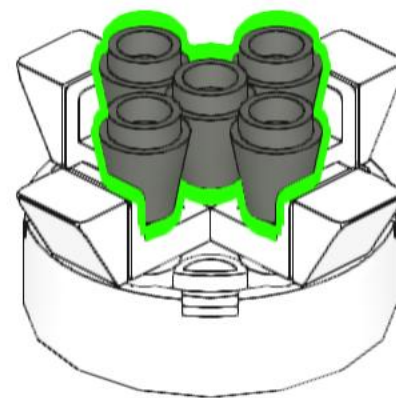
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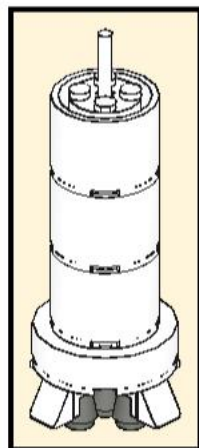
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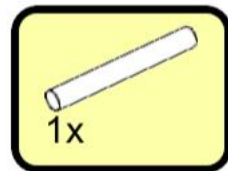
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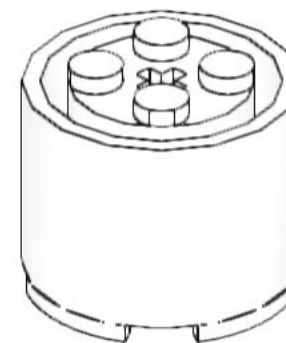
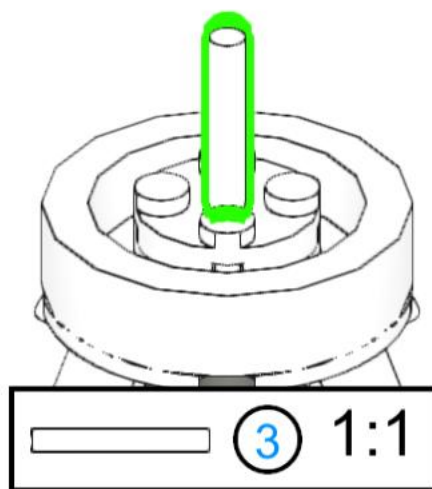
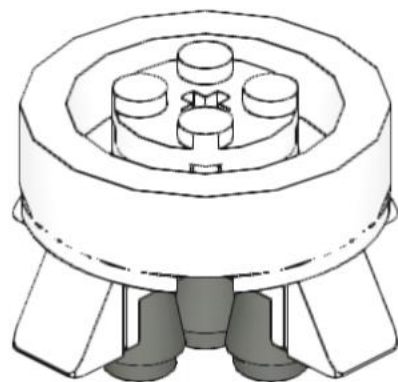
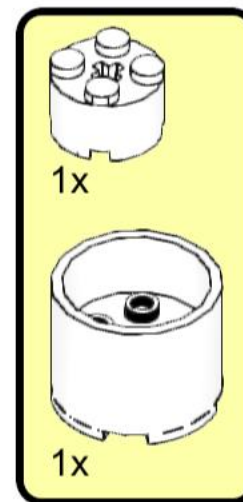
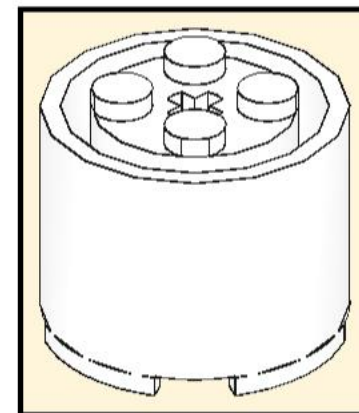
61



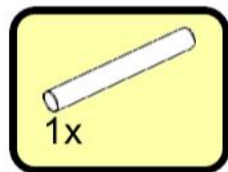
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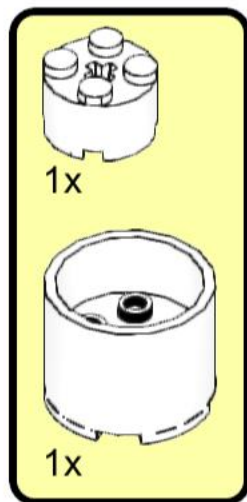
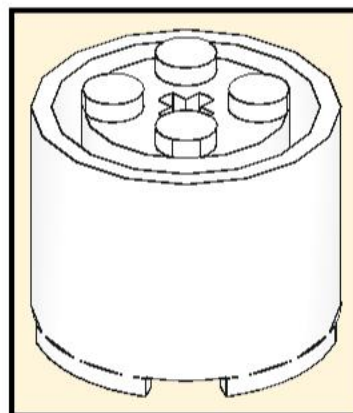
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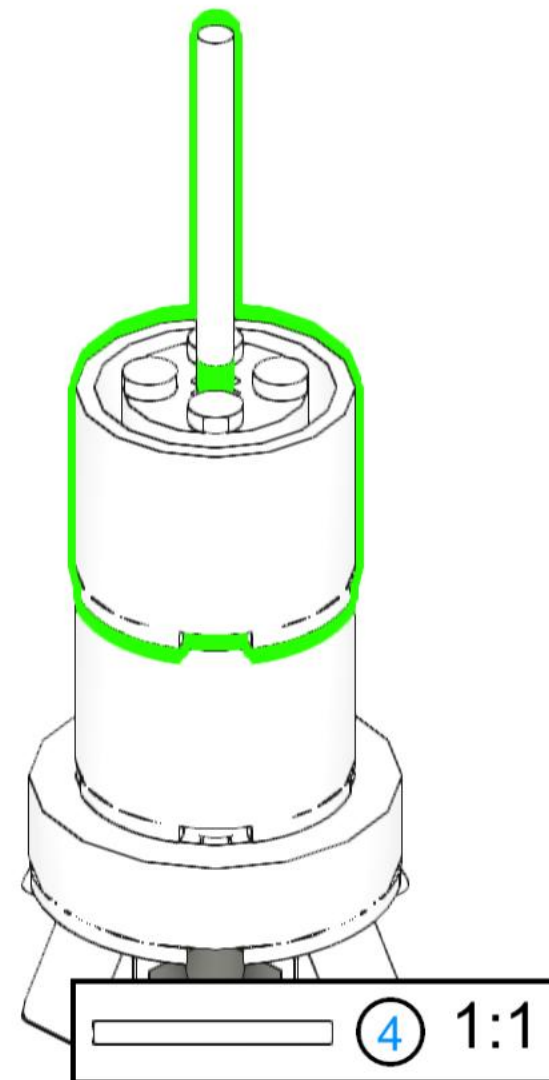
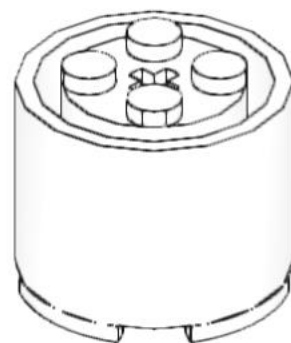
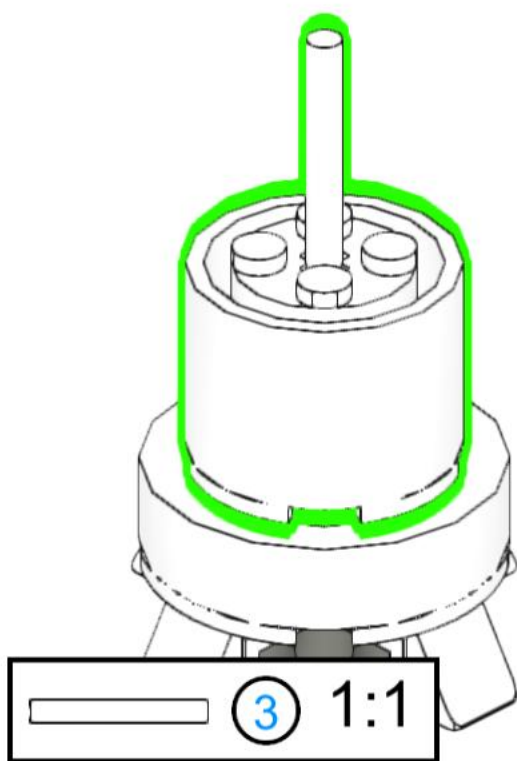
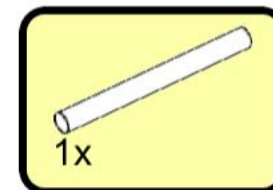
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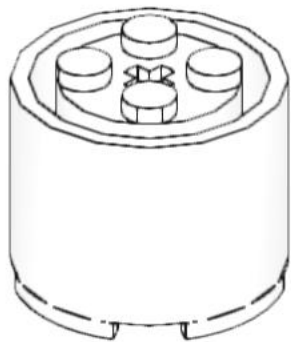
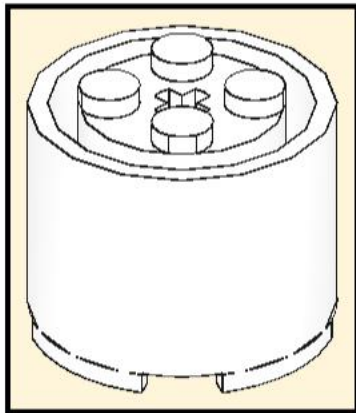
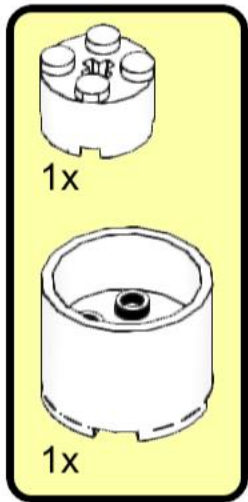
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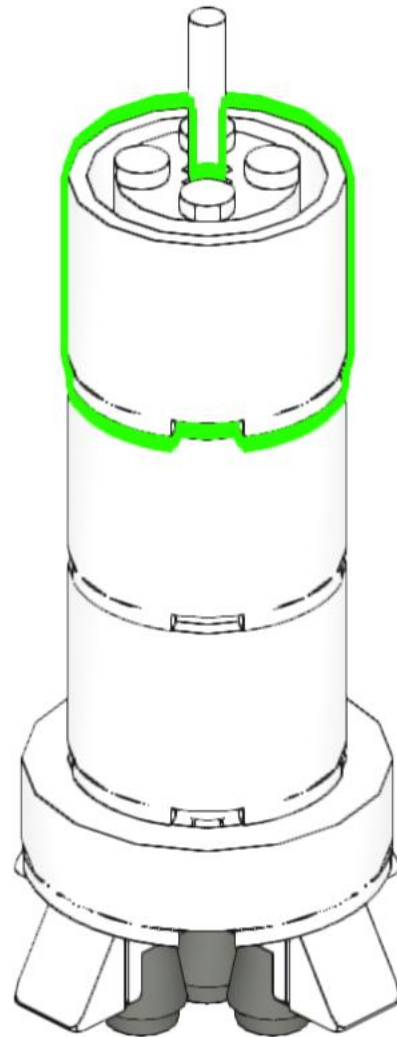
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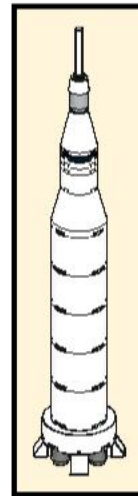
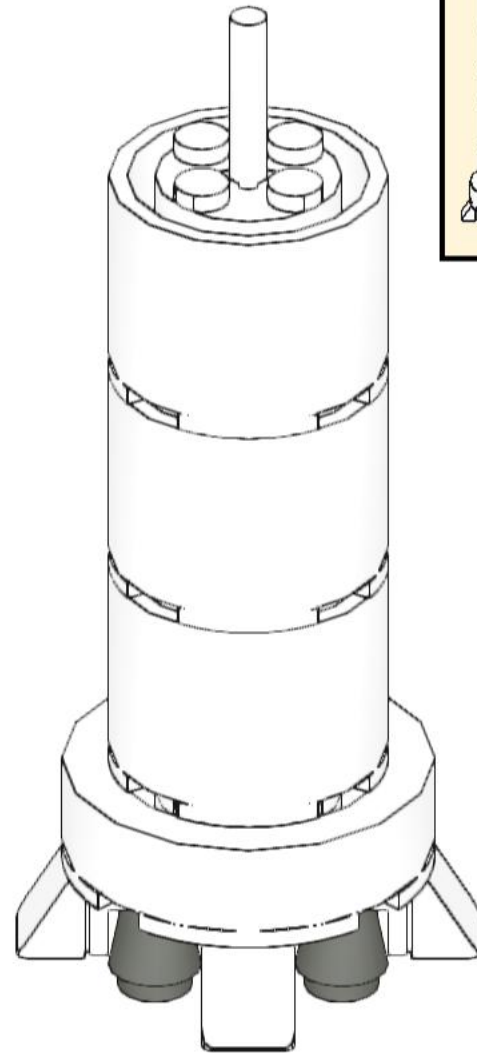
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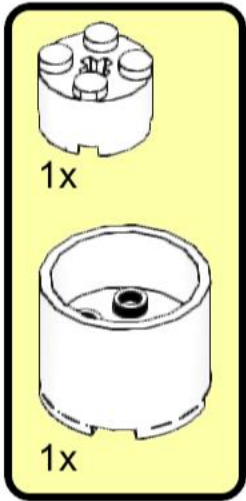
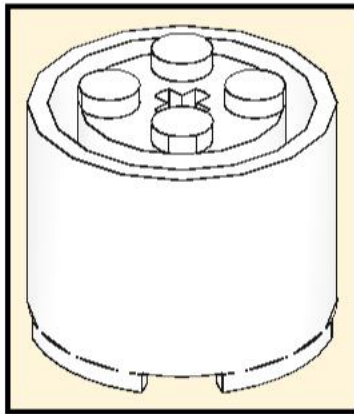
68



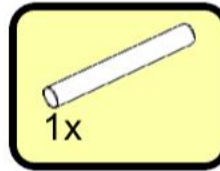
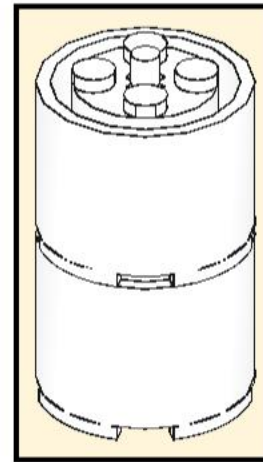
69



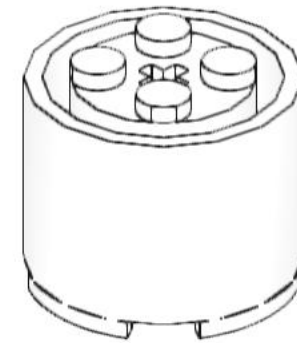
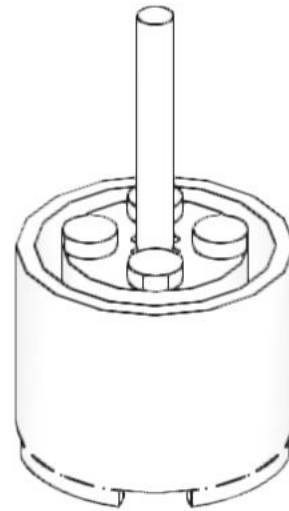
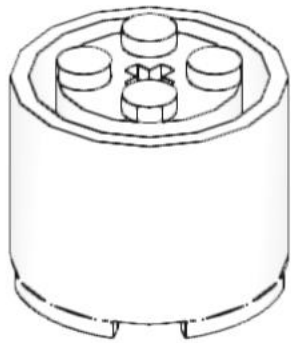
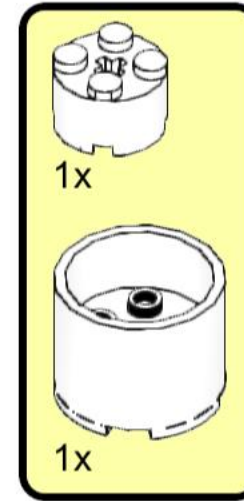
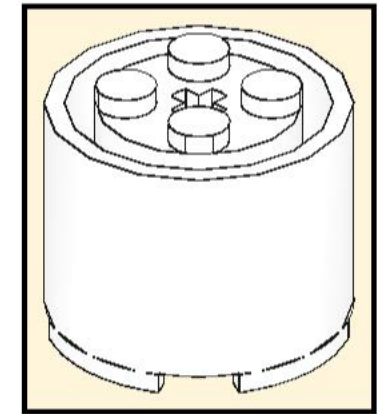
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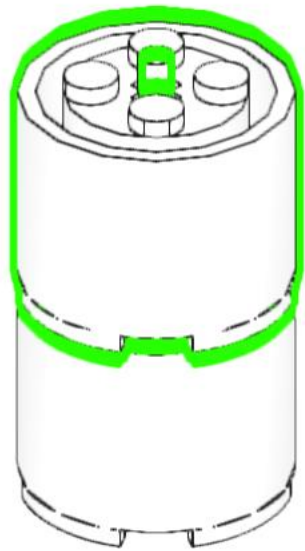
71



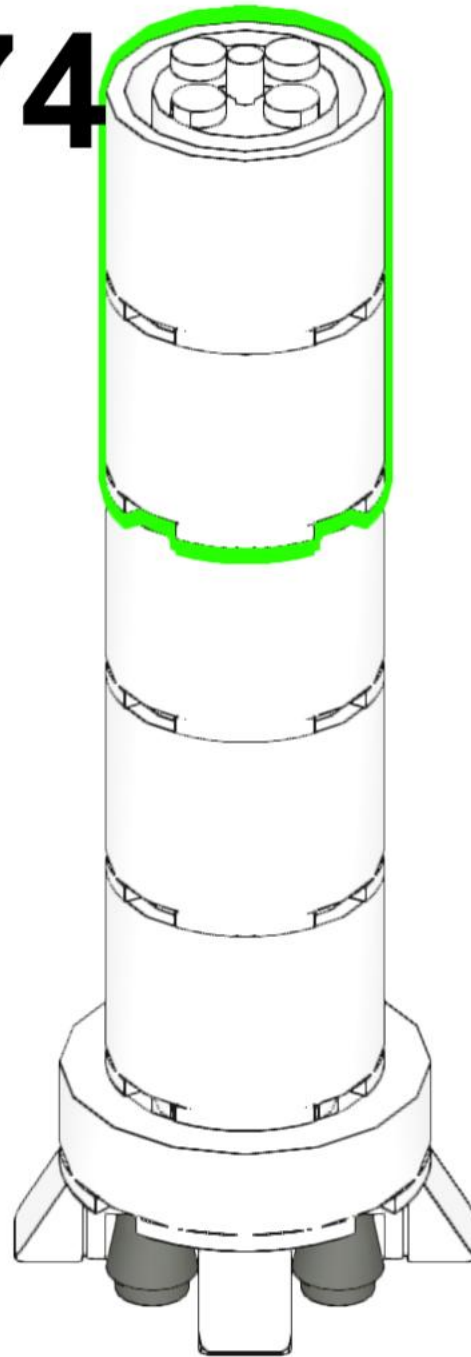
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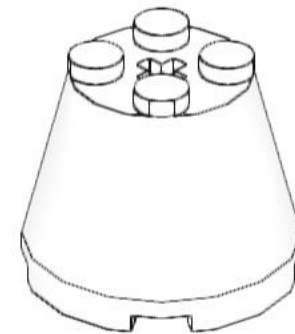
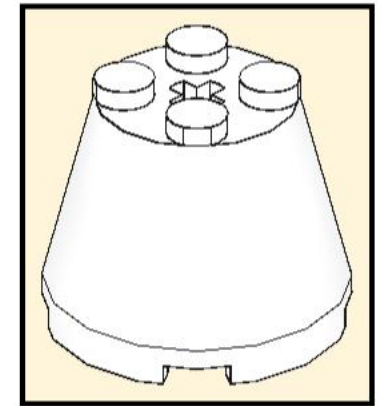
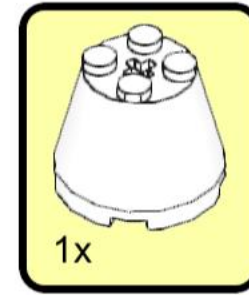
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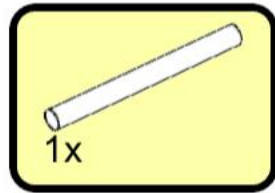
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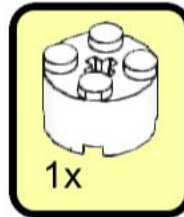
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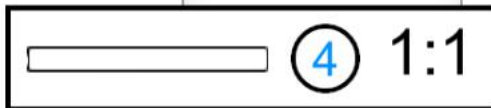
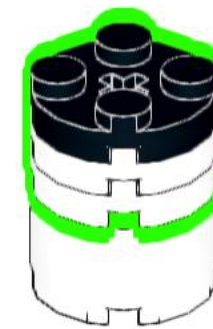
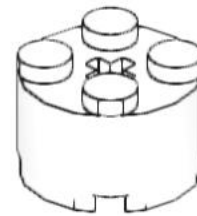
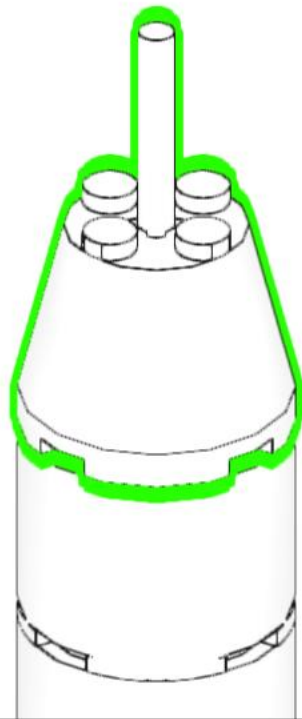
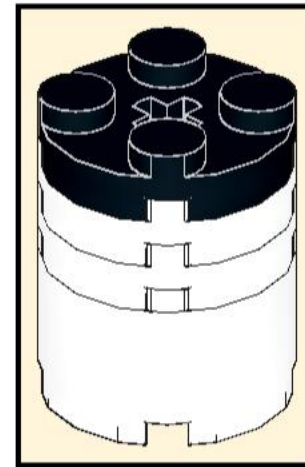
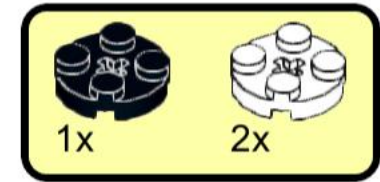
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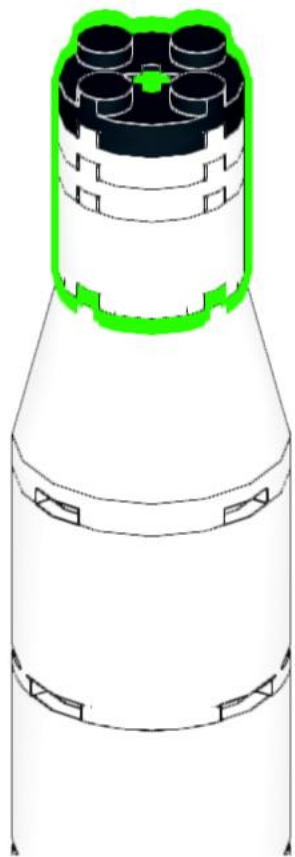
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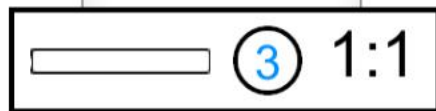
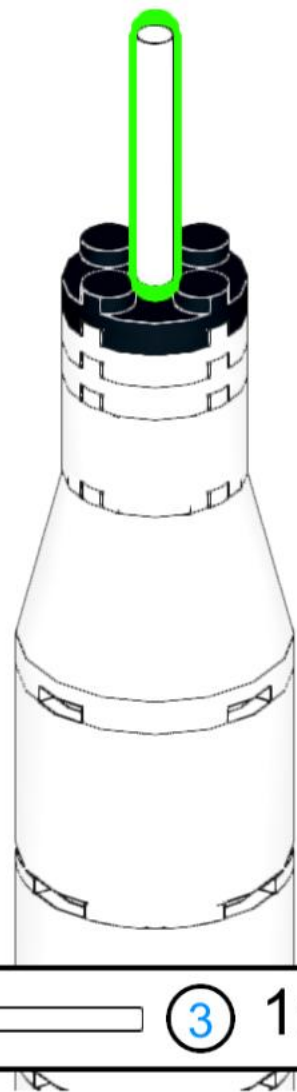
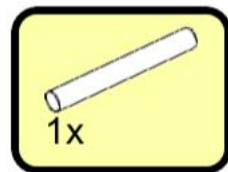
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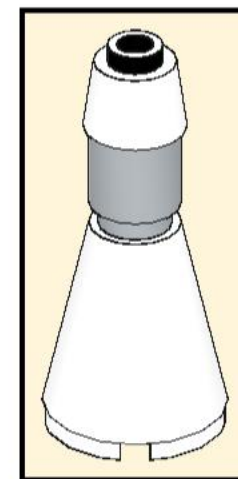
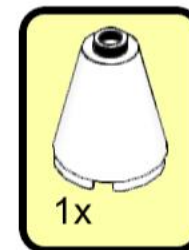
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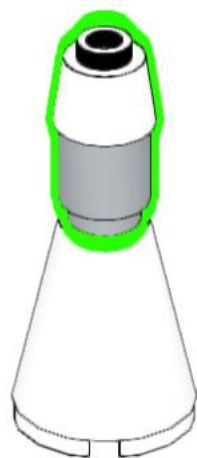
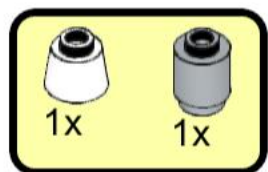
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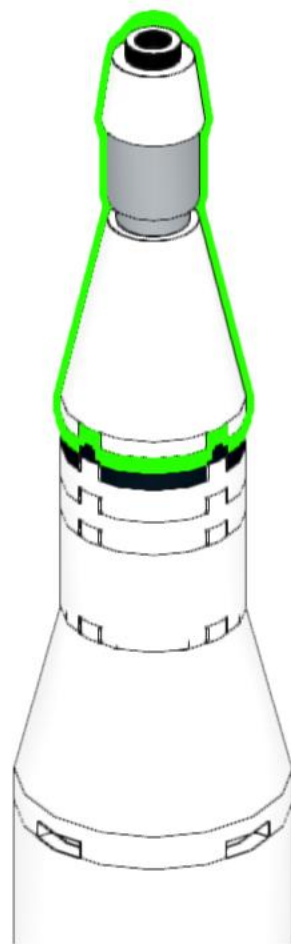
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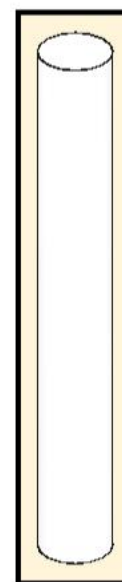
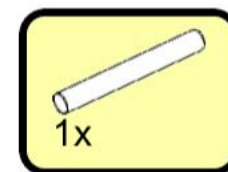
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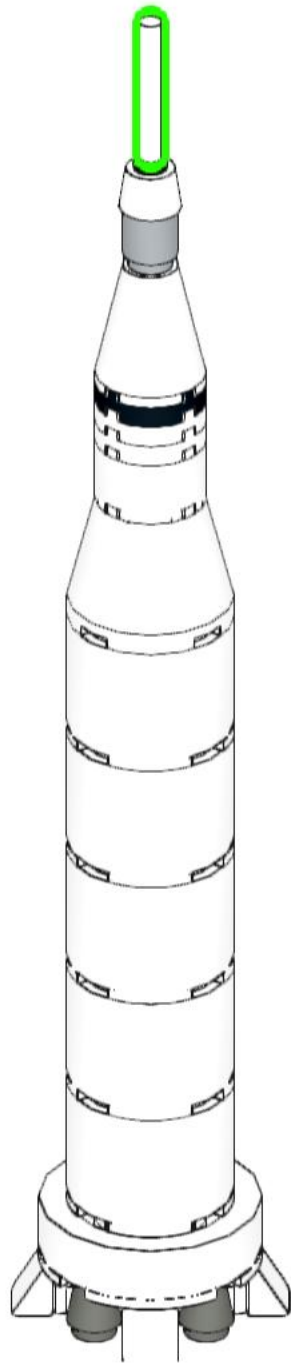
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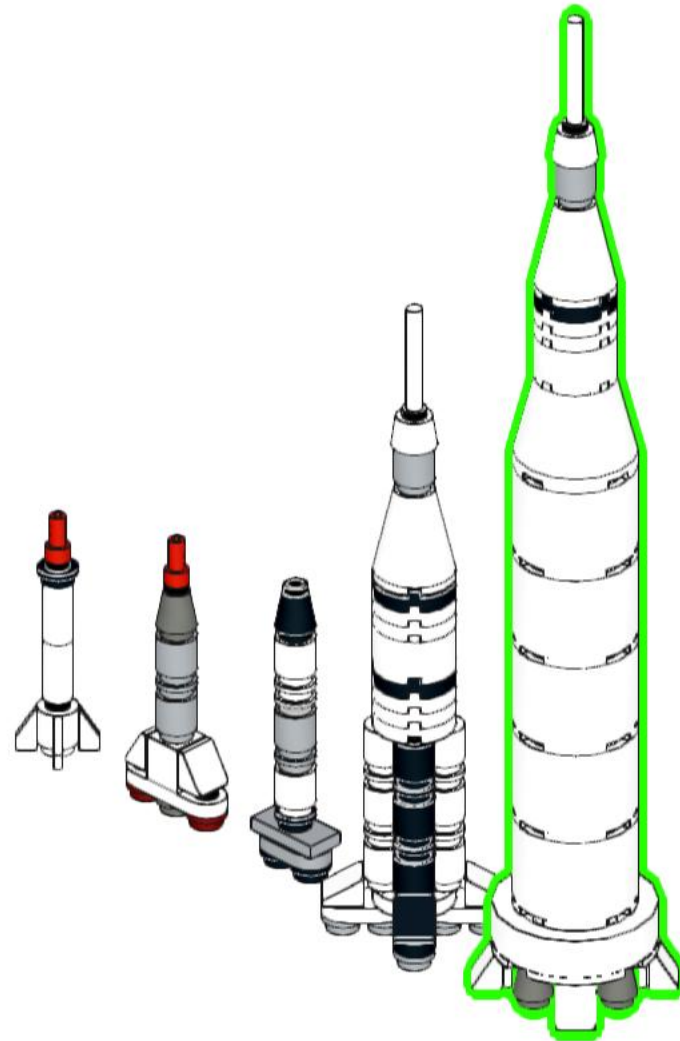
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85



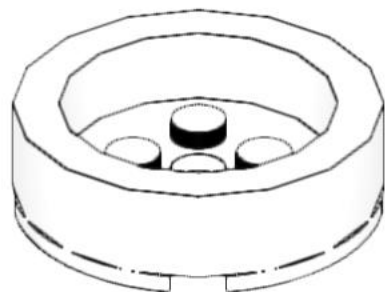
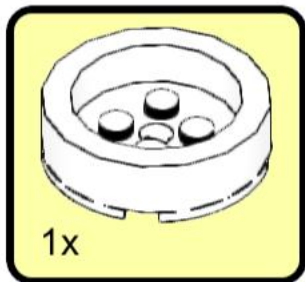
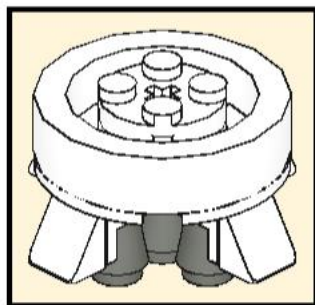
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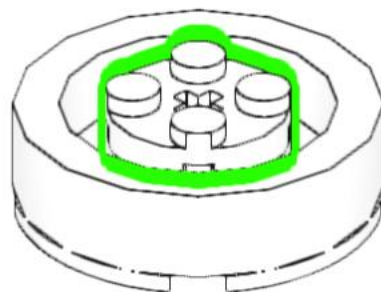
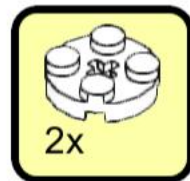


**Saturn V
Skylab**

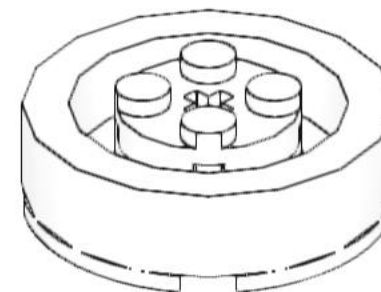
87



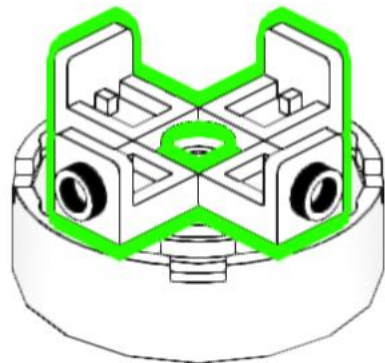
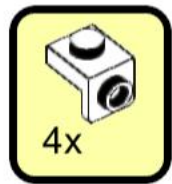
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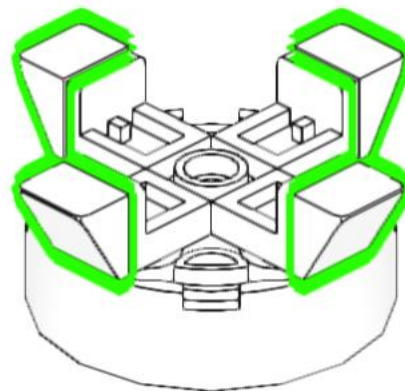
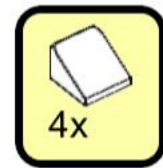
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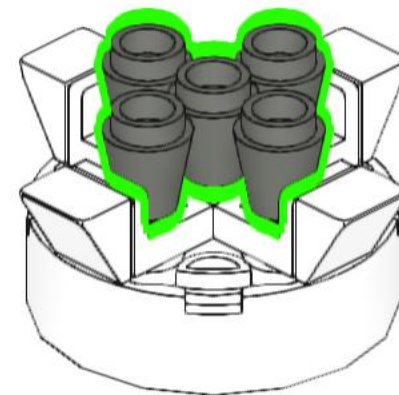
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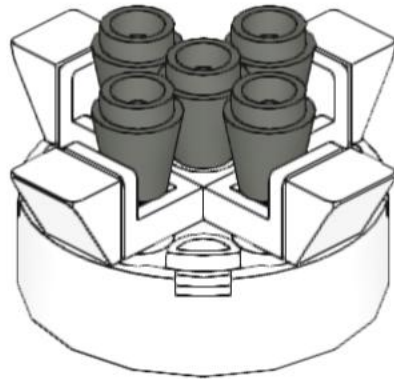
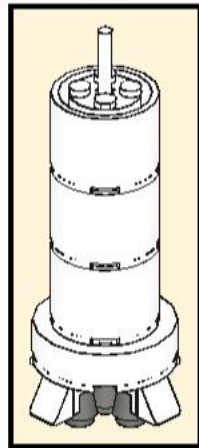
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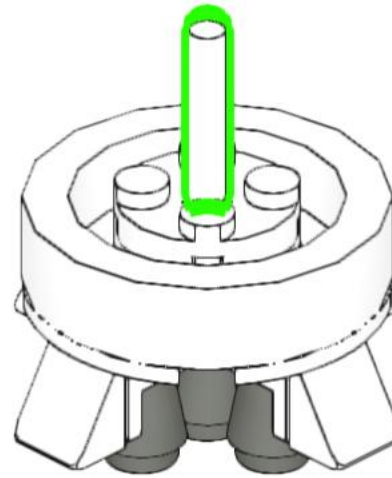
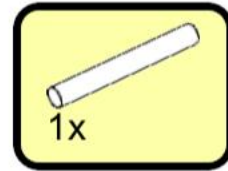
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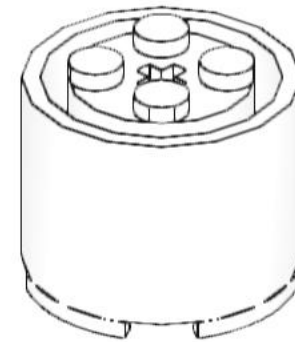
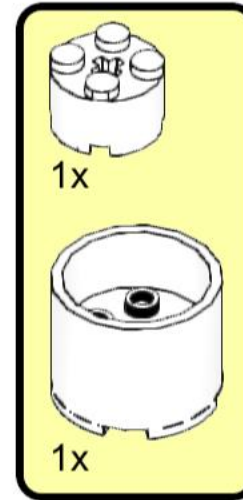
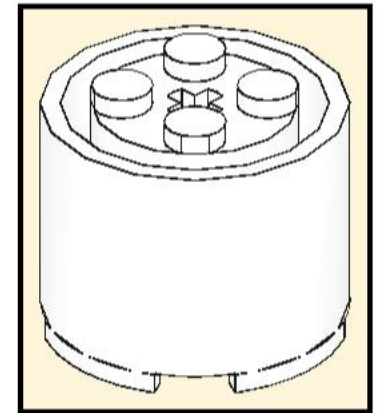
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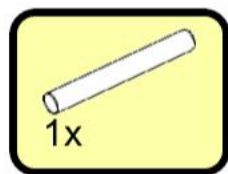
94



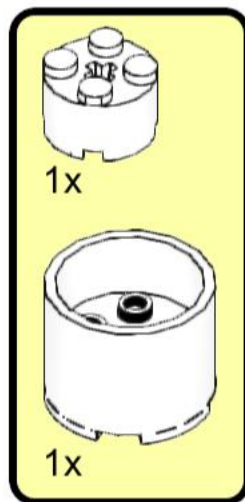
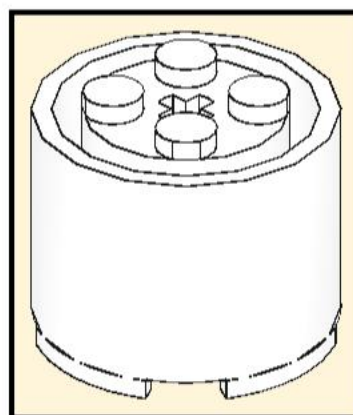
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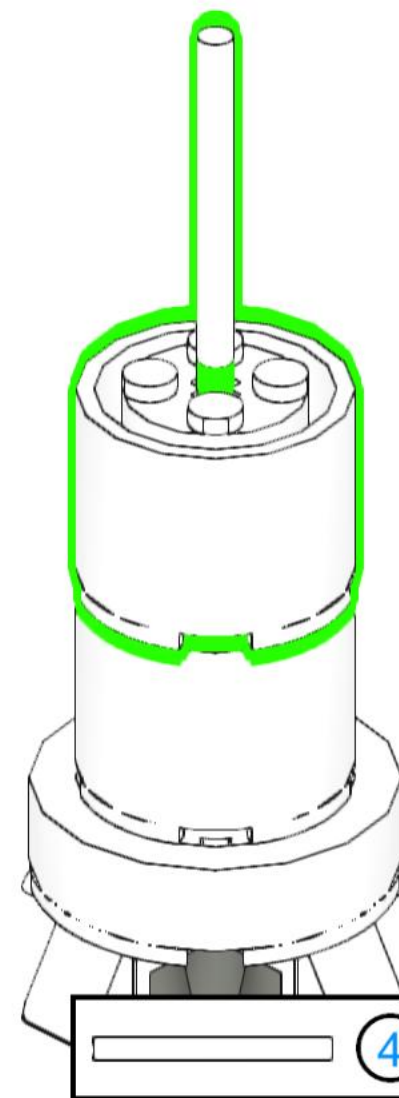
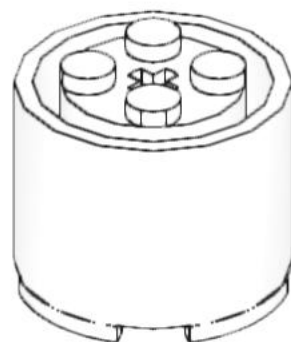
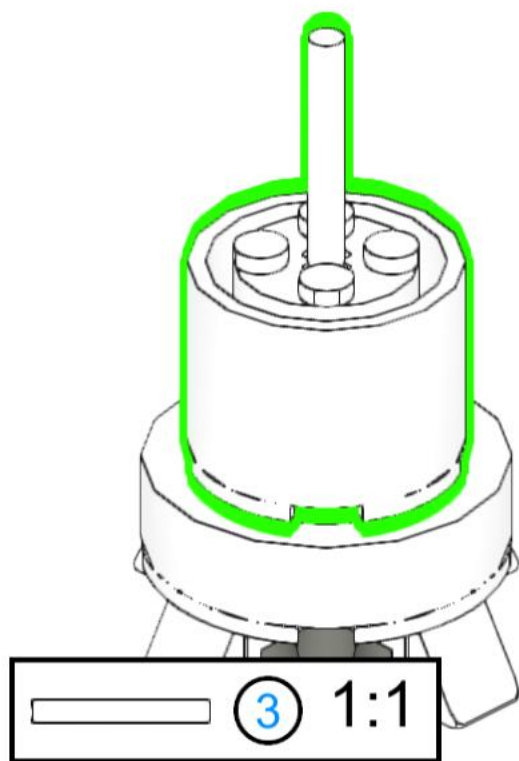
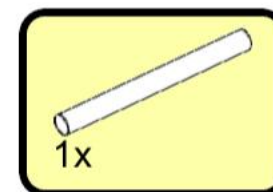
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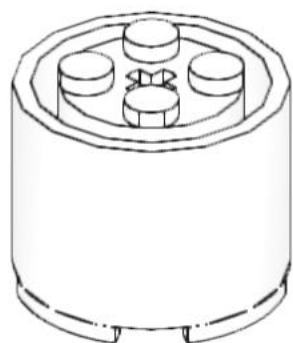
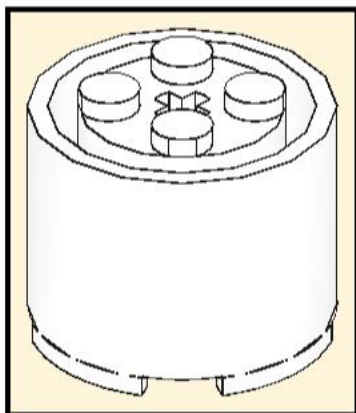
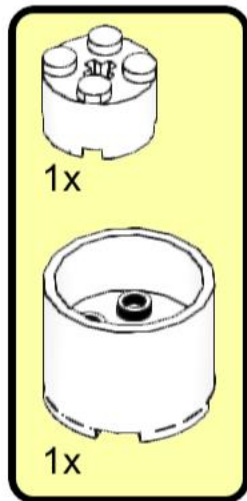
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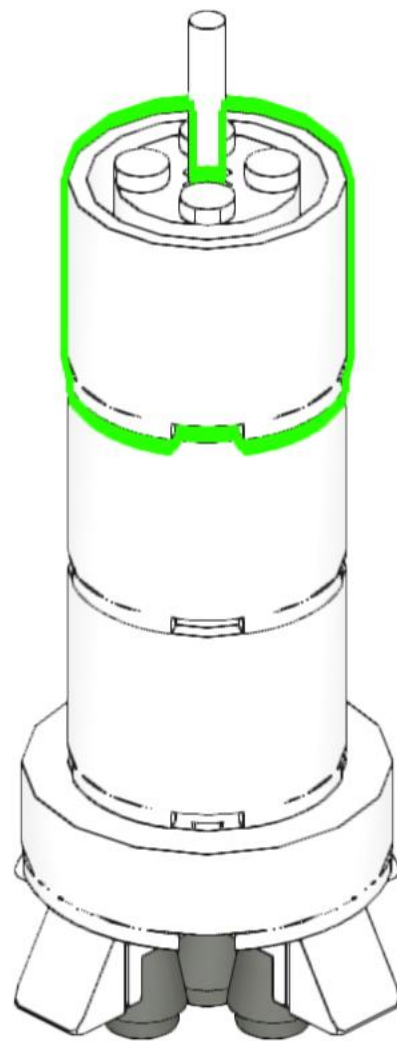
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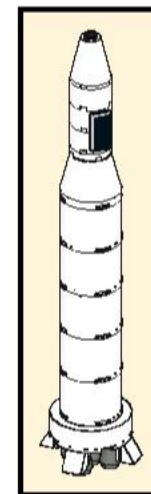
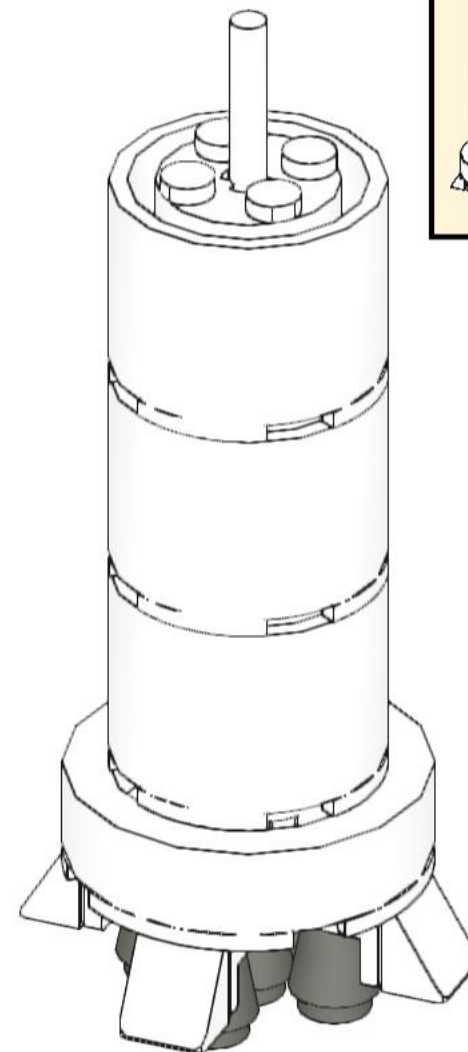
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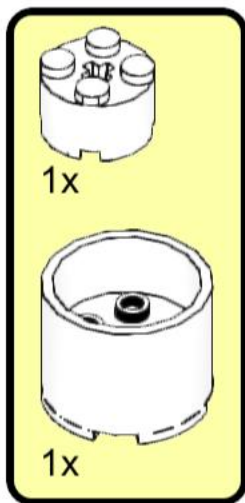
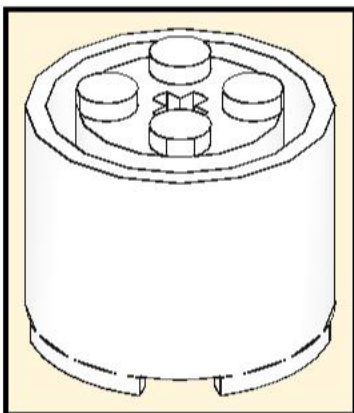
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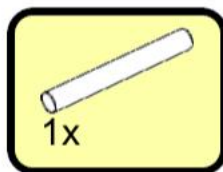
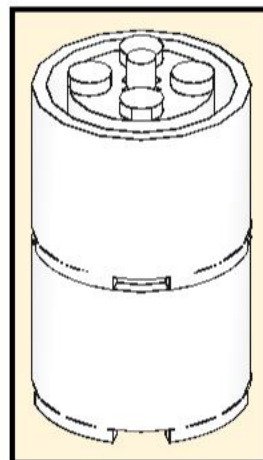
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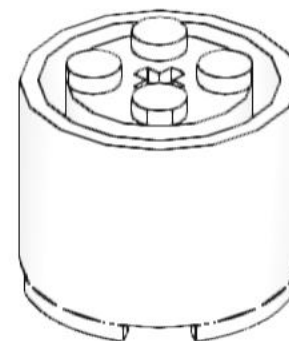
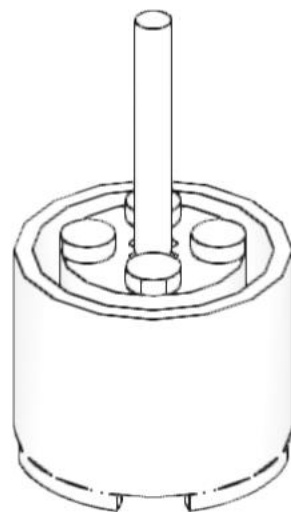
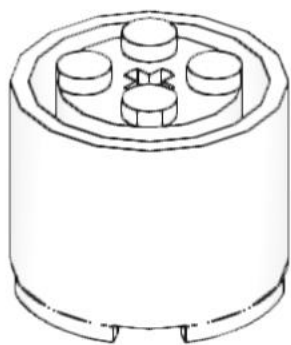
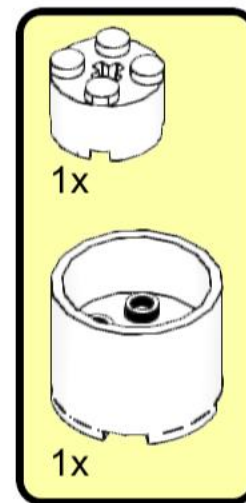
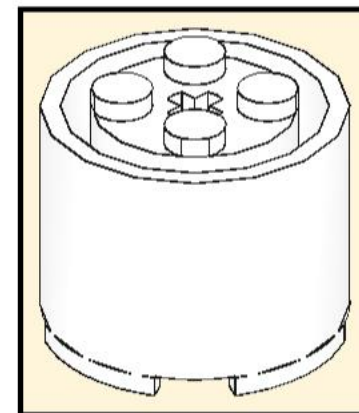
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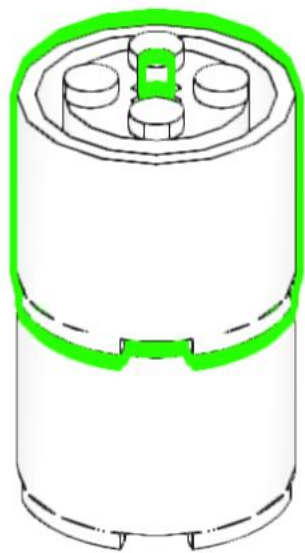
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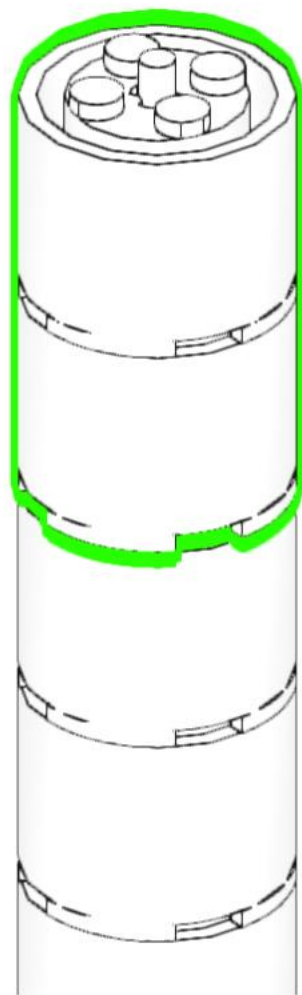
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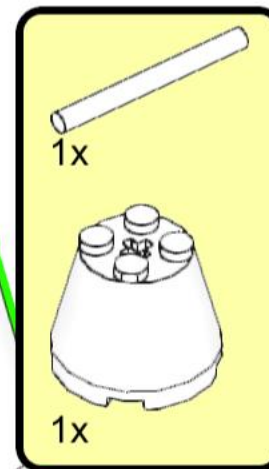
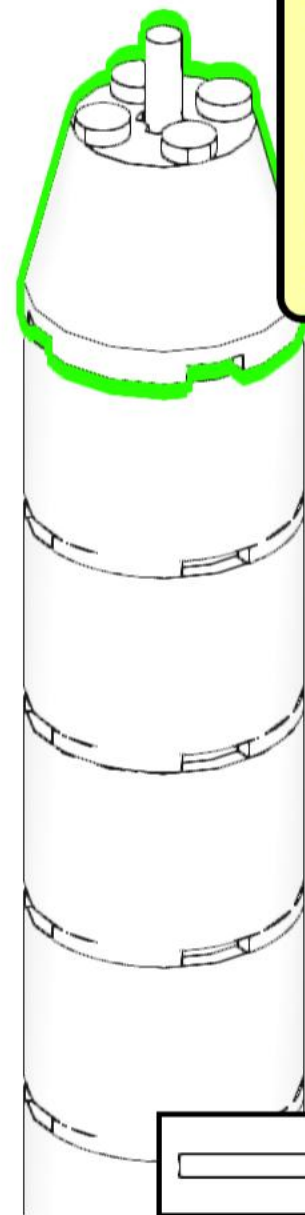
105



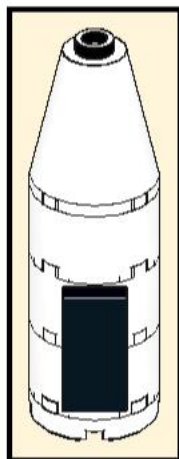
106



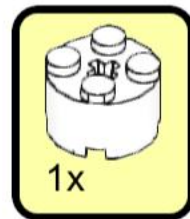
107



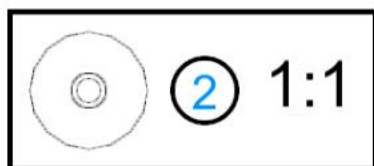
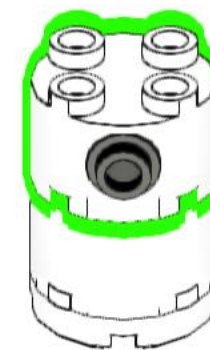
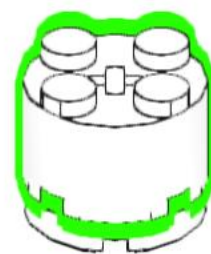
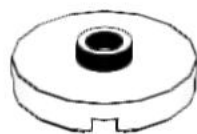
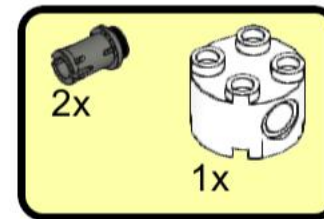
108



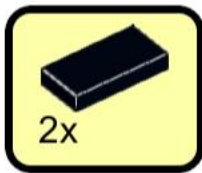
109



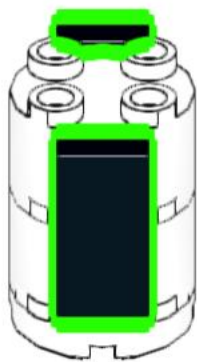
110



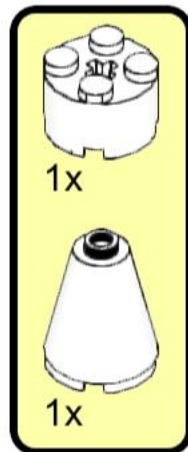
111



2x

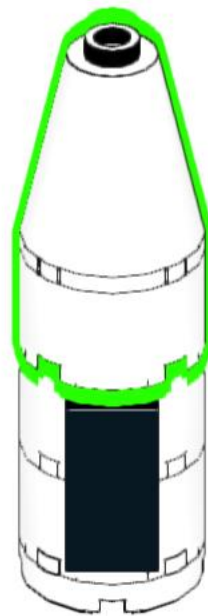


112

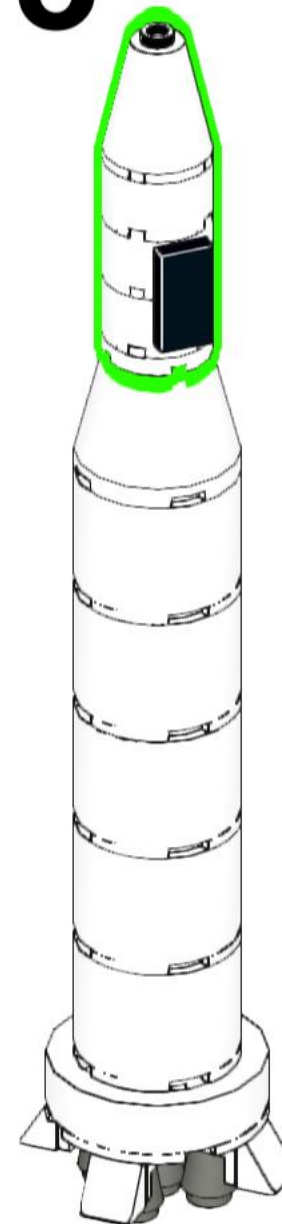


1x

1x



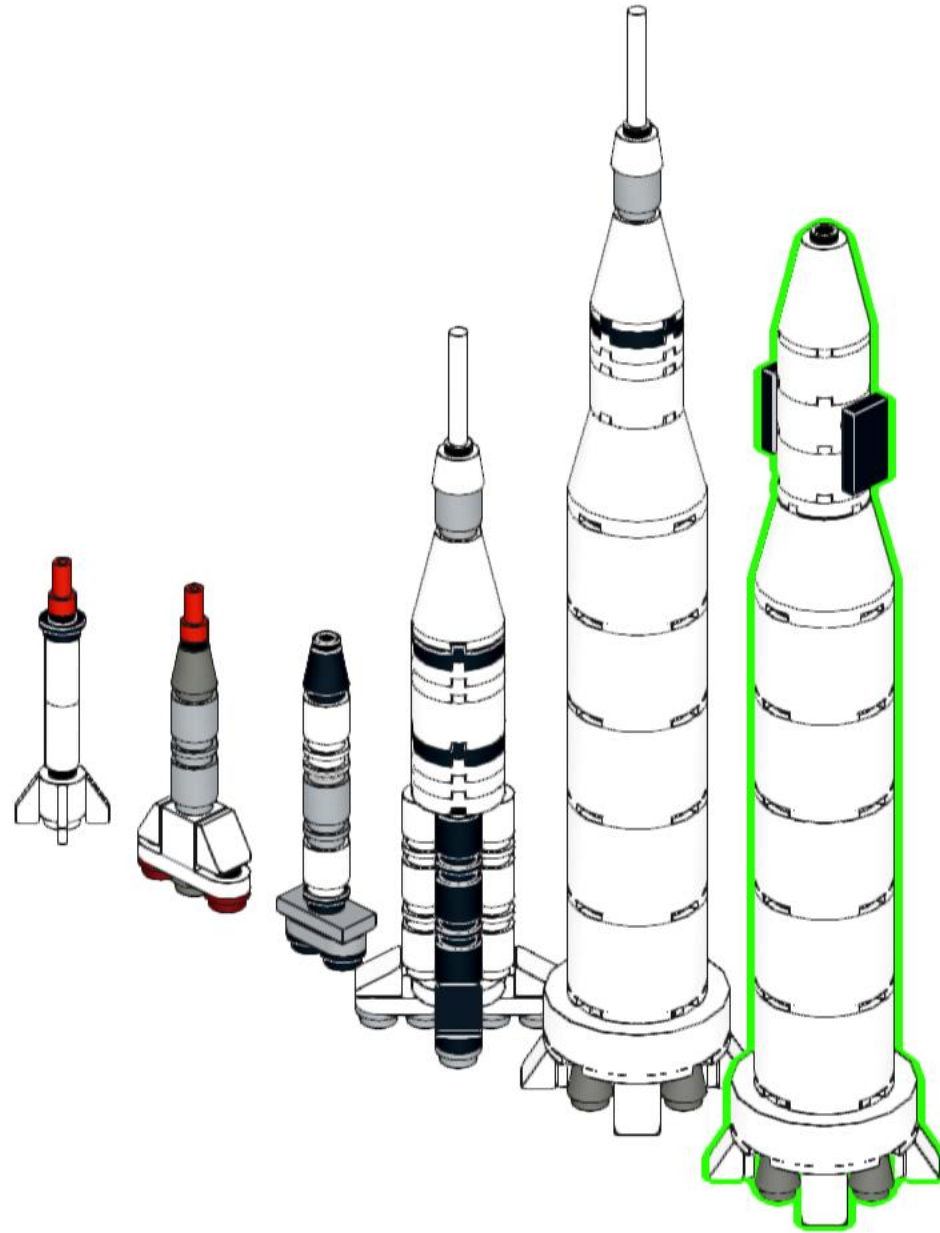
113



2

1:1

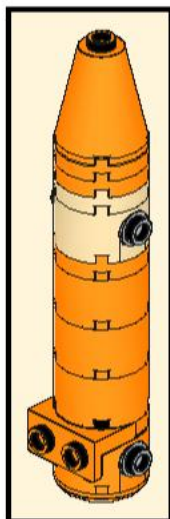
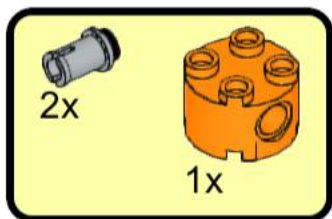
114



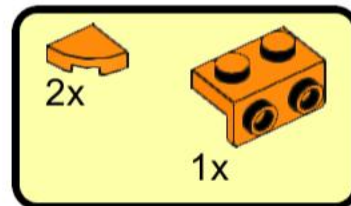


STS
Space Transportation System

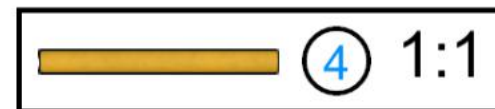
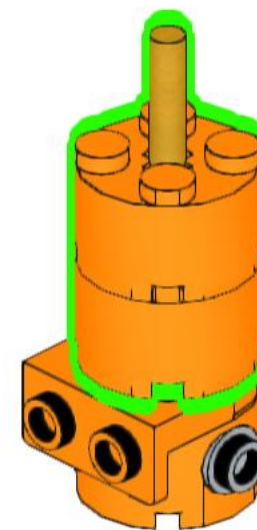
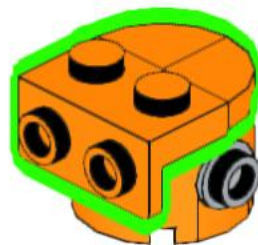
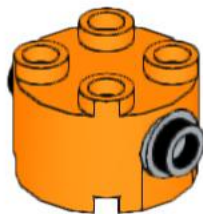
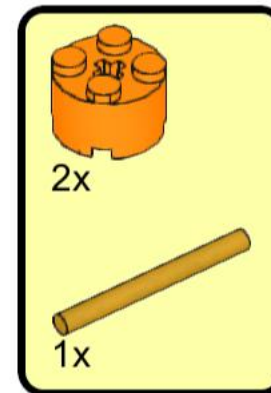
115



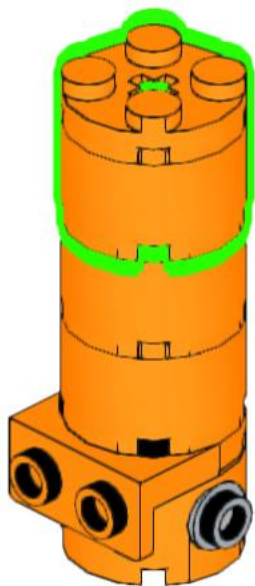
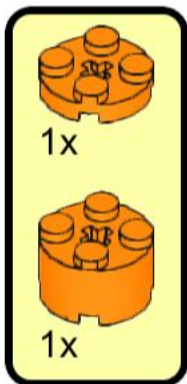
116



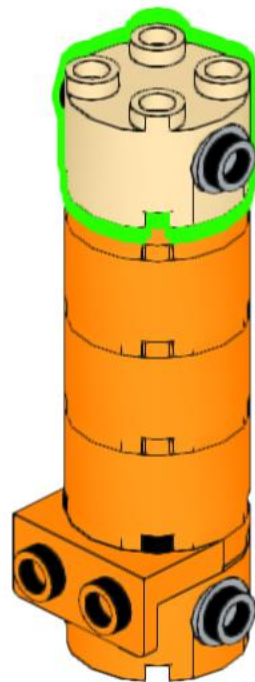
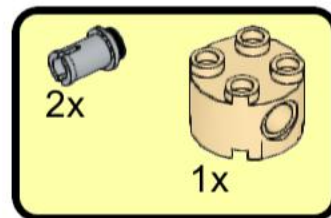
117



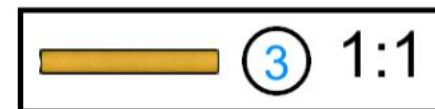
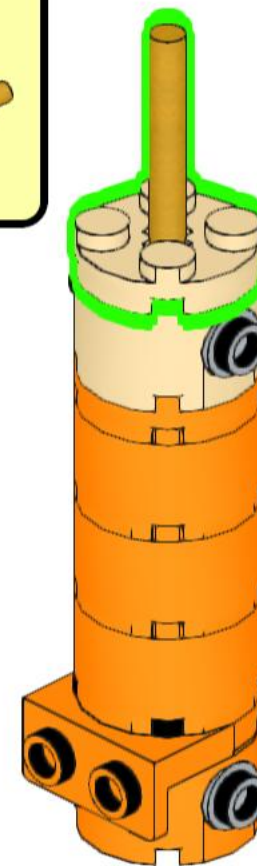
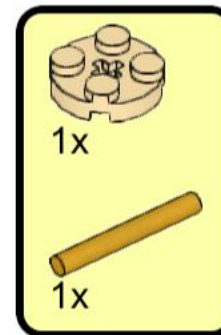
118



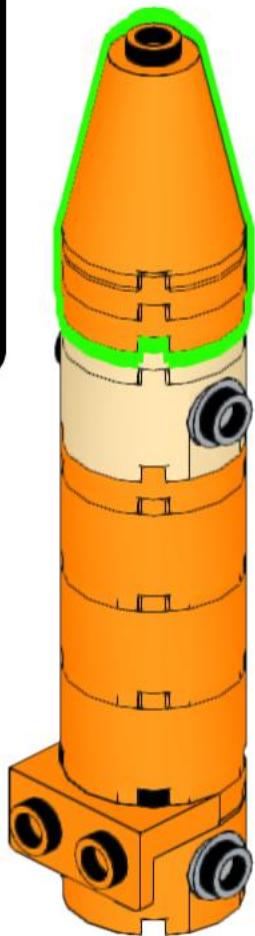
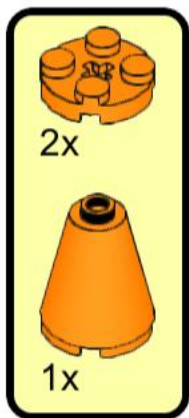
119



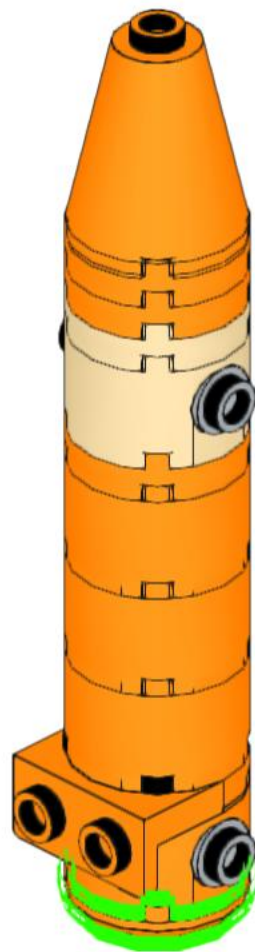
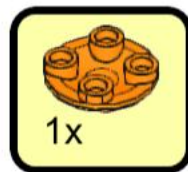
120



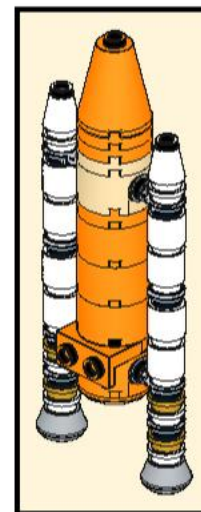
121



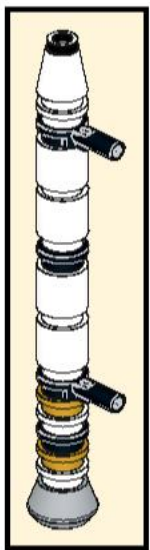
122



123

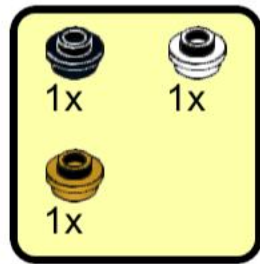


124



2x

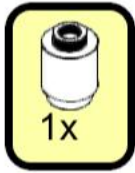
125



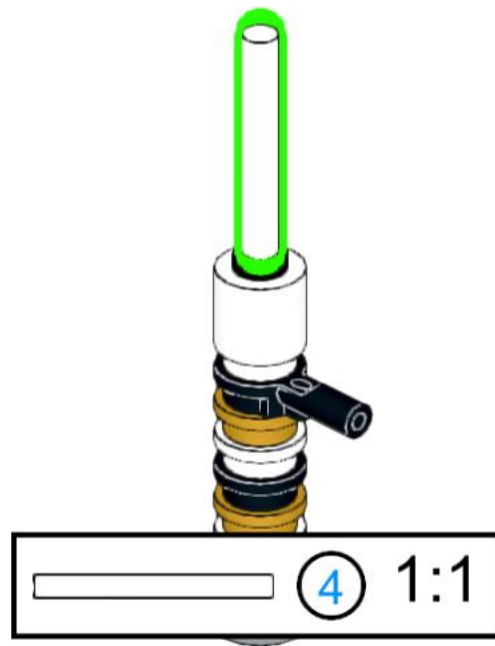
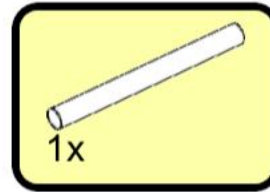
126



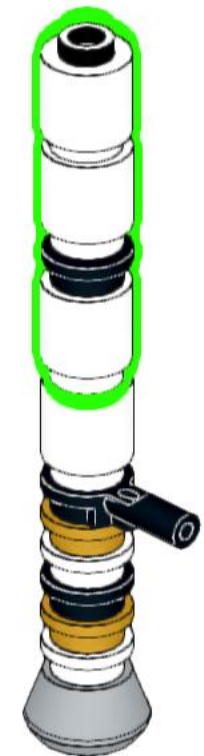
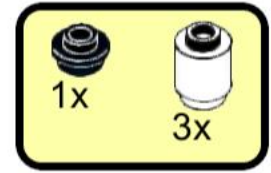
127



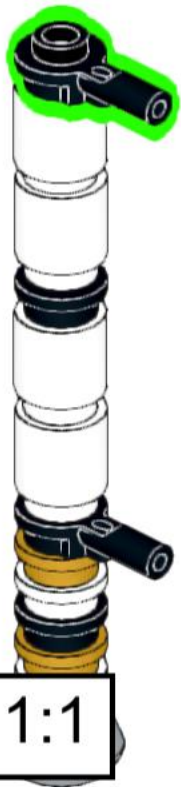
128



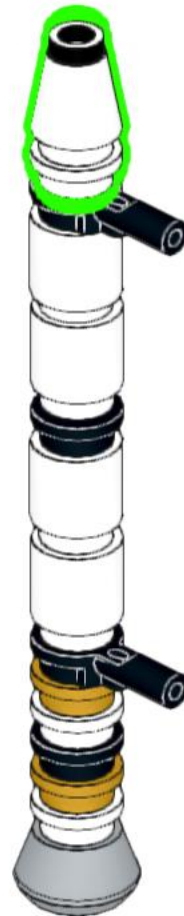
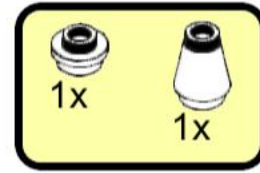
129



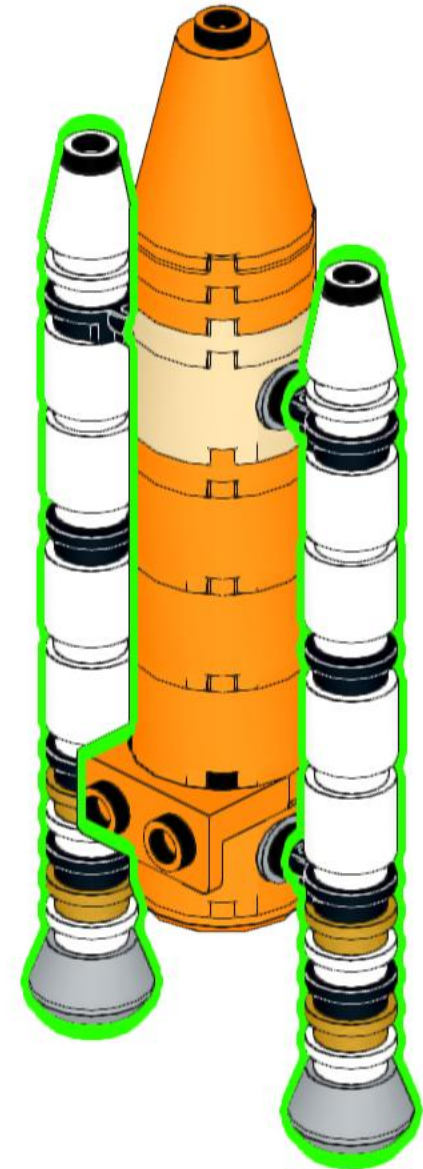
130



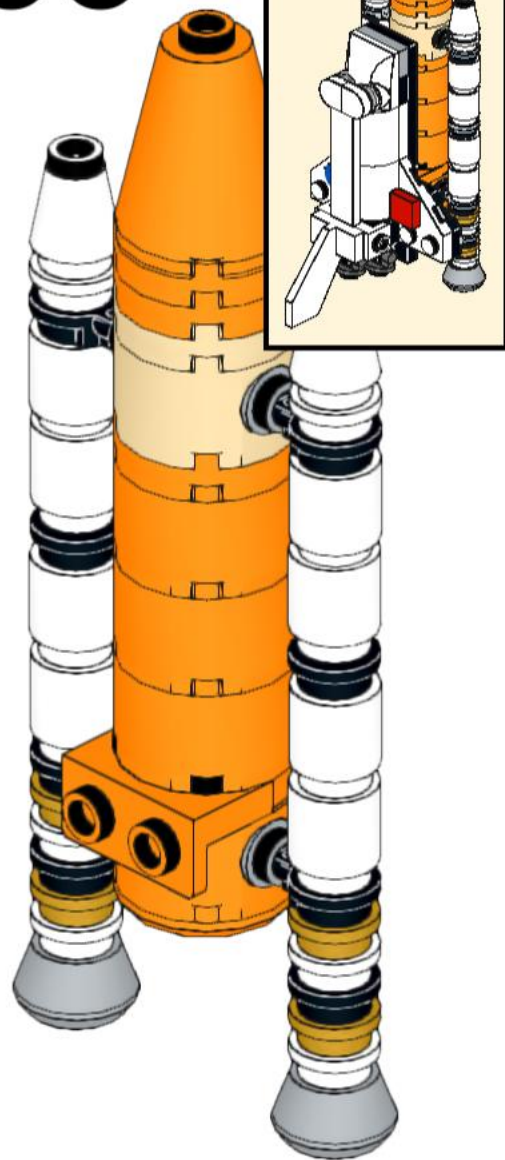
131



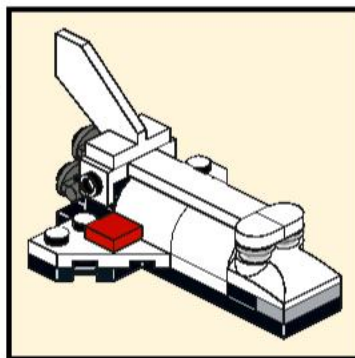
132



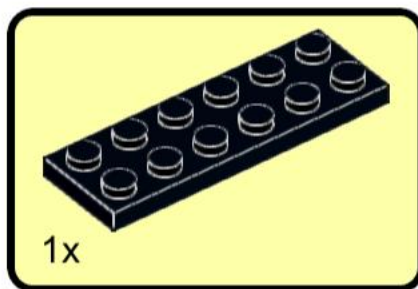
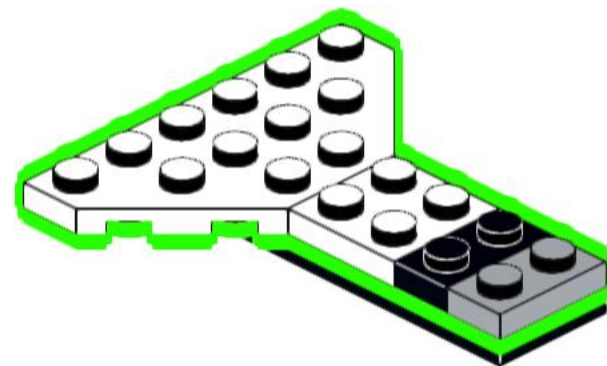
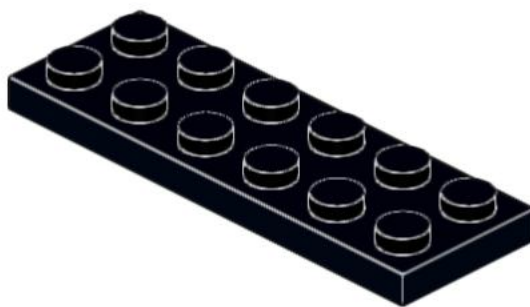
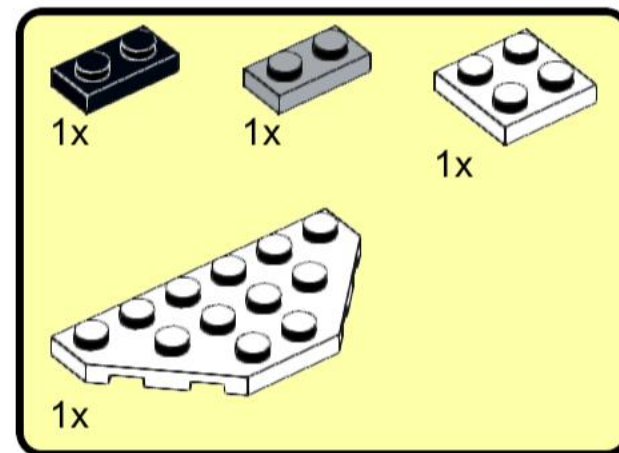
133



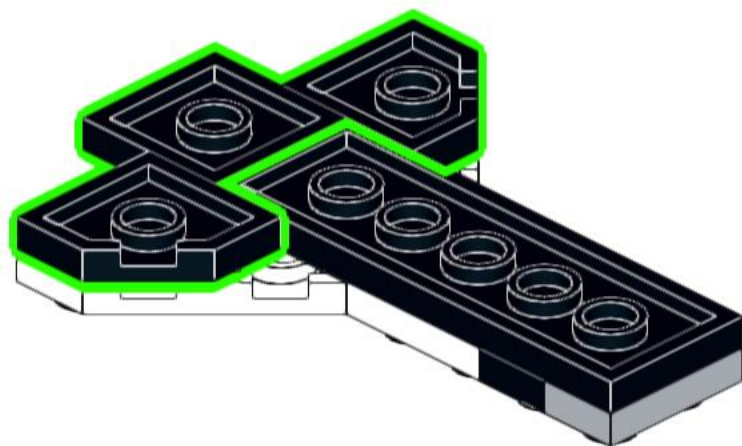
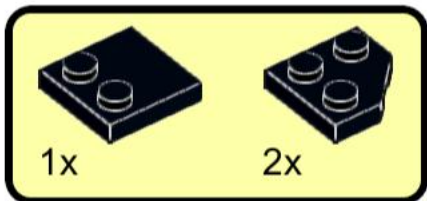
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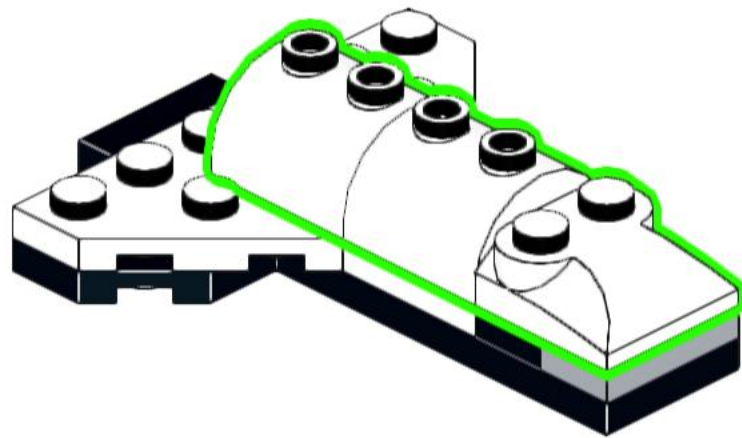
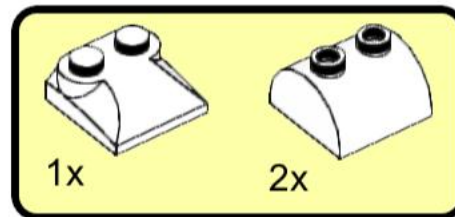
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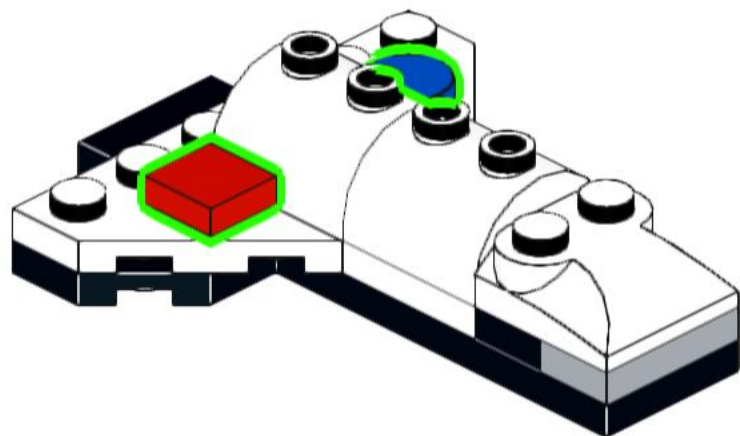
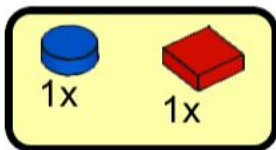
136



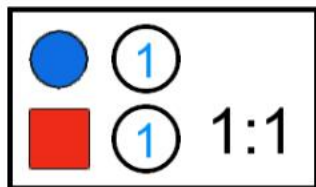
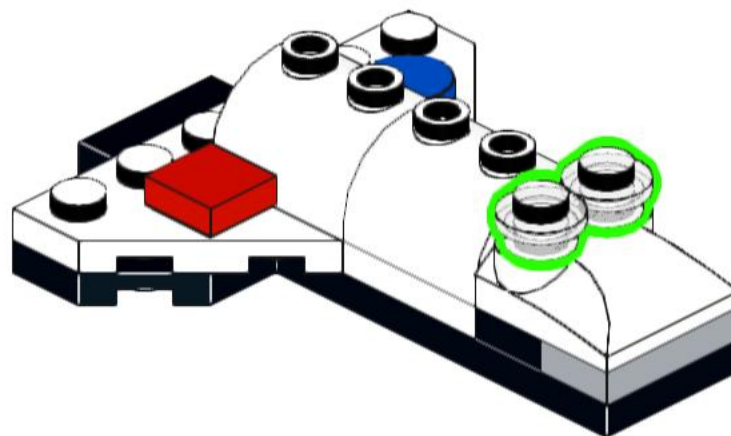
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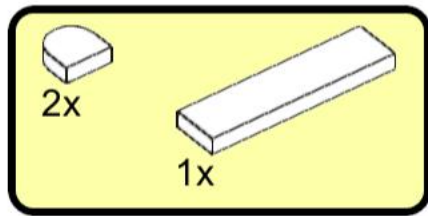
138



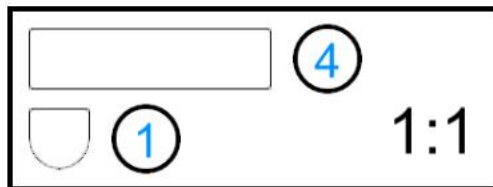
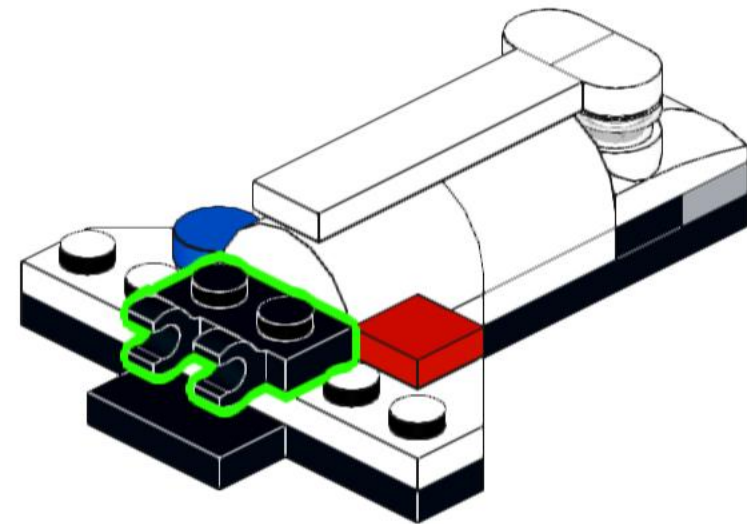
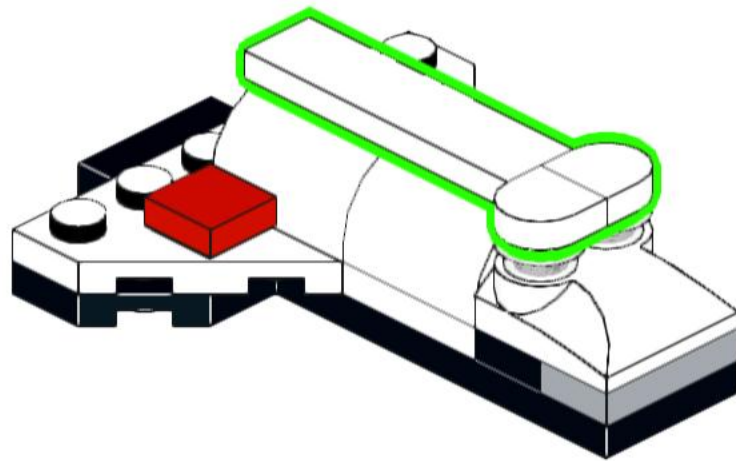
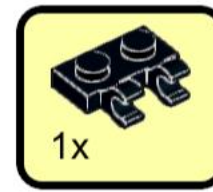
139



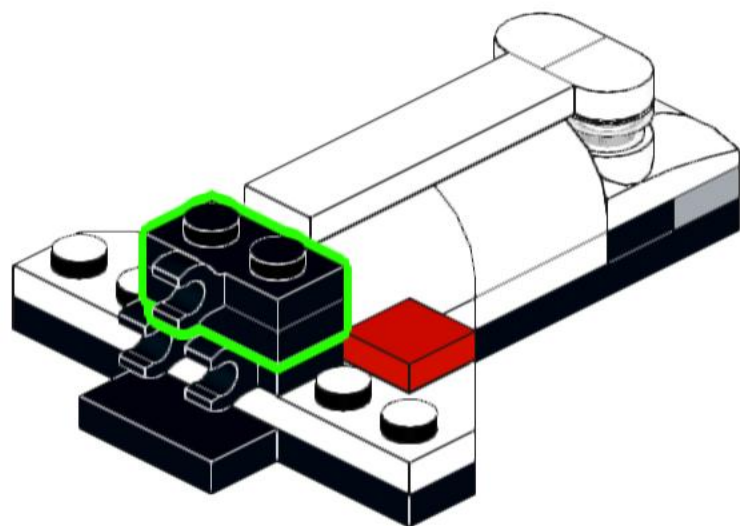
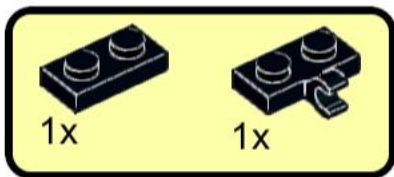
140



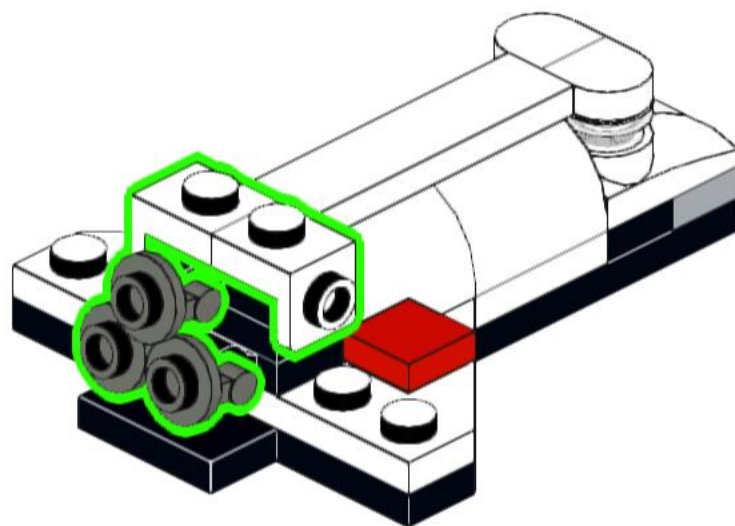
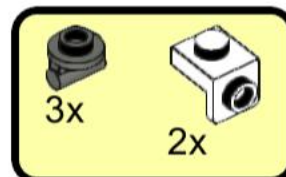
141



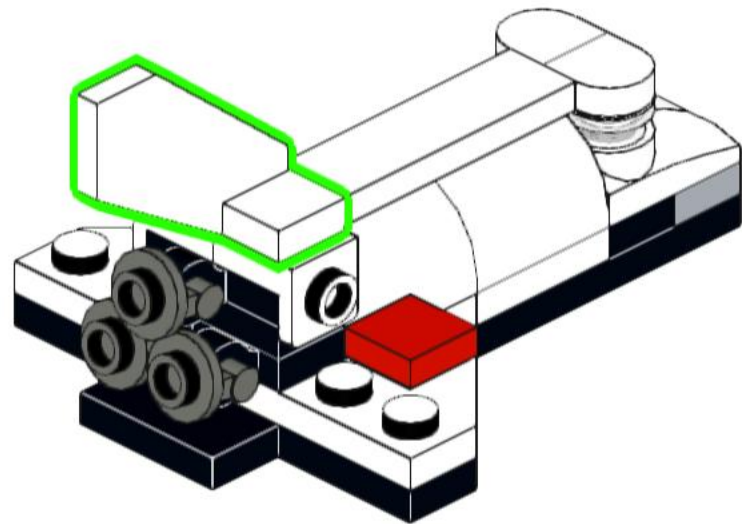
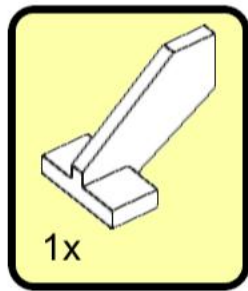
142



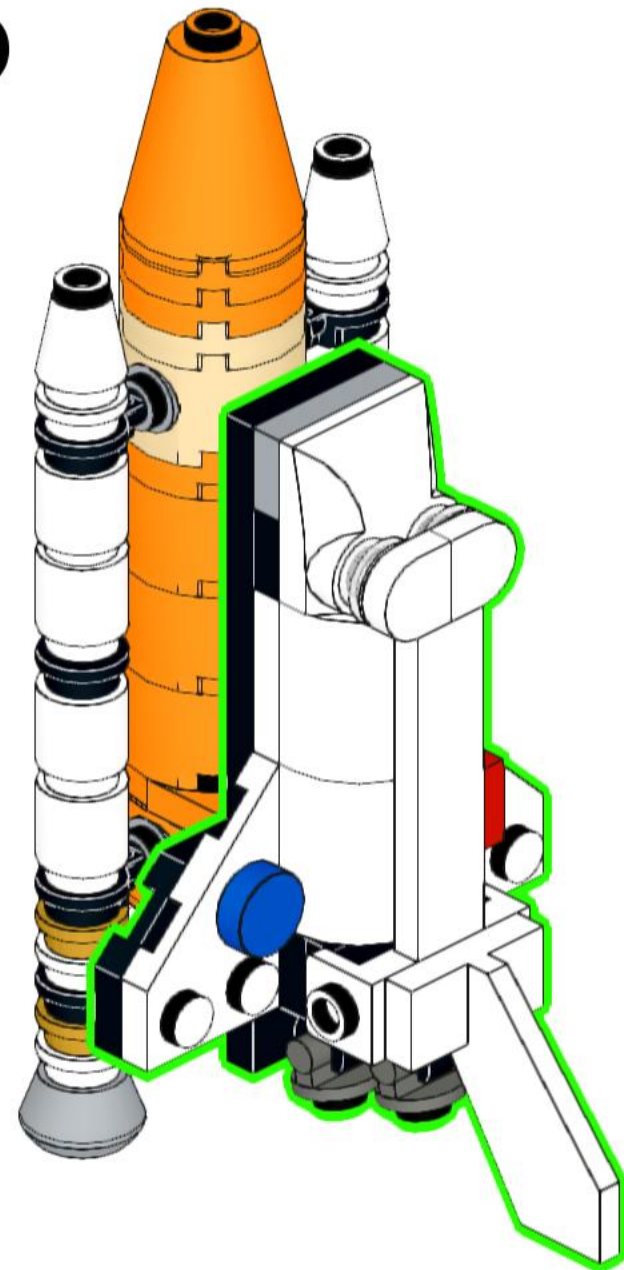
143



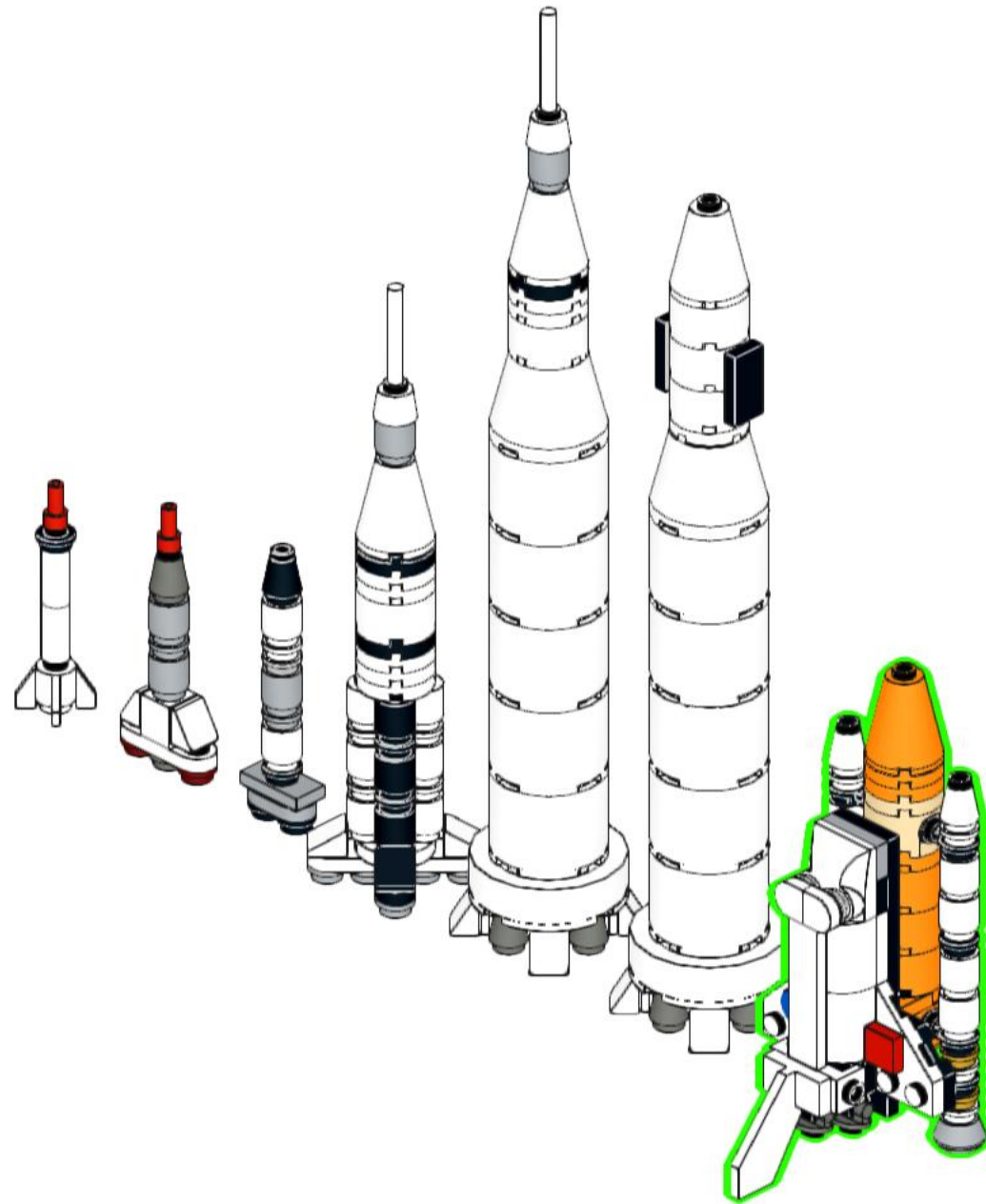
144

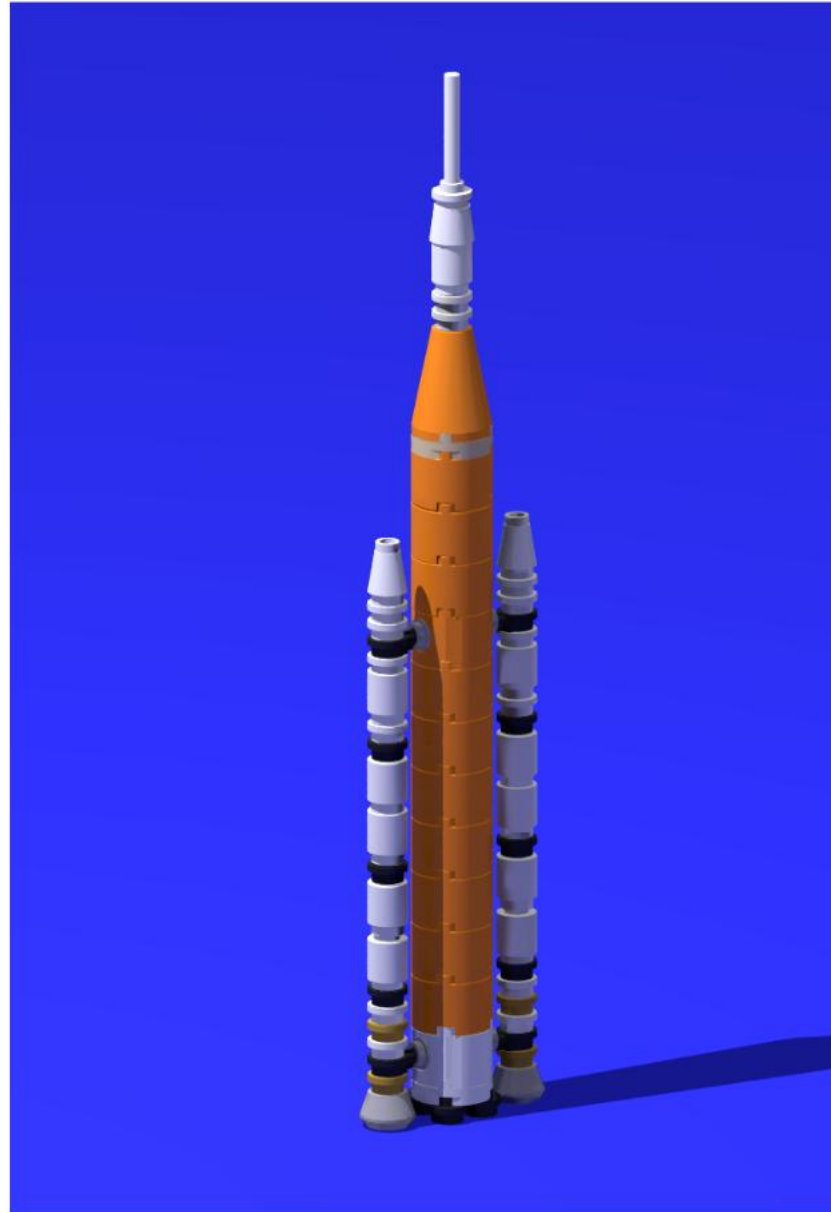


145



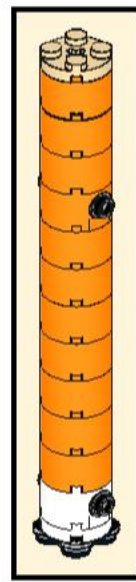
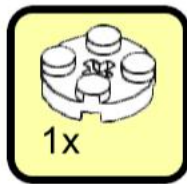
146



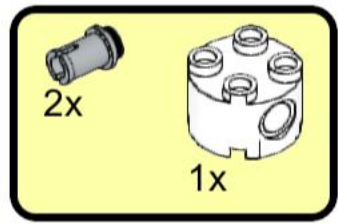


SLS
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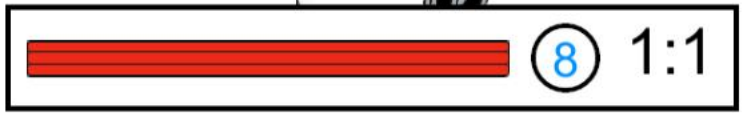
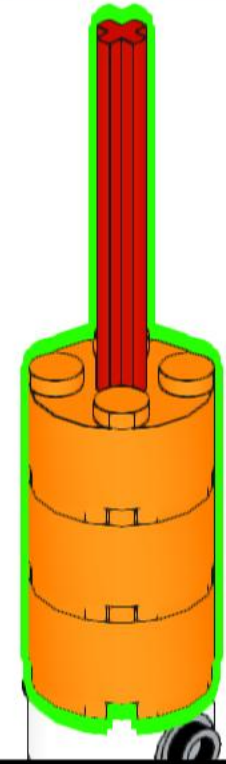
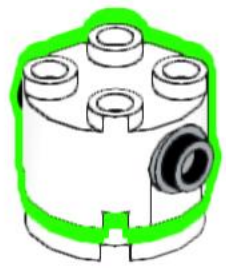
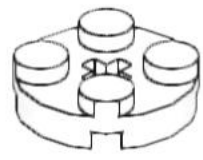
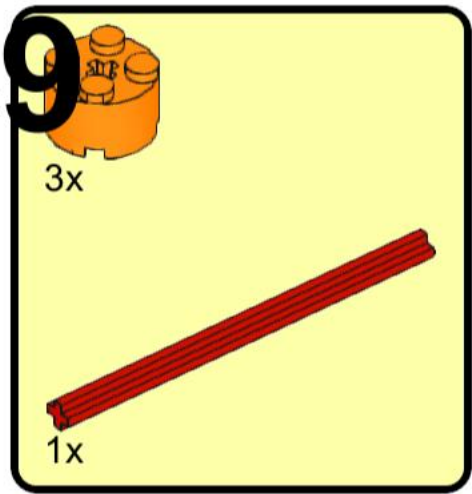
147



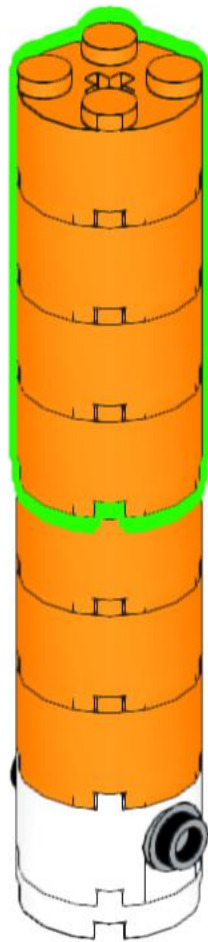
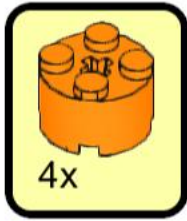
148



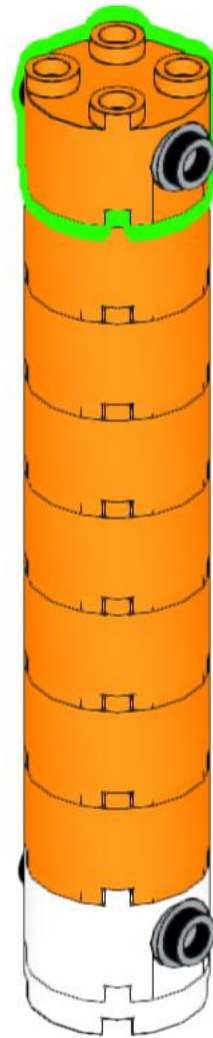
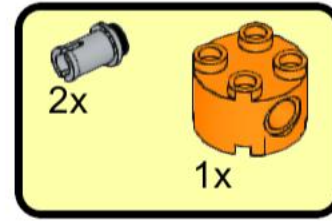
149



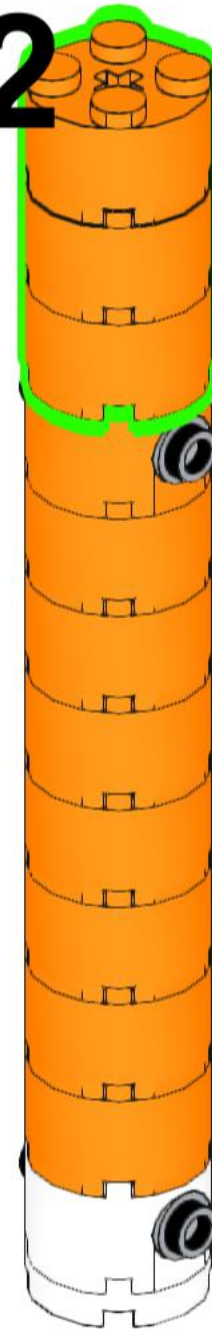
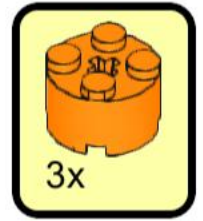
150



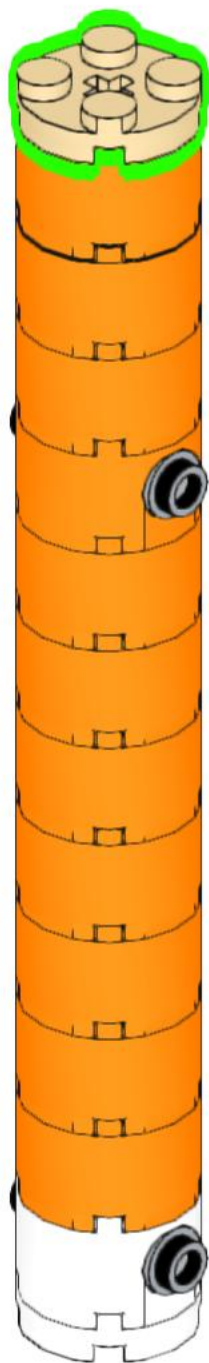
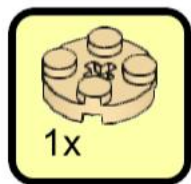
151



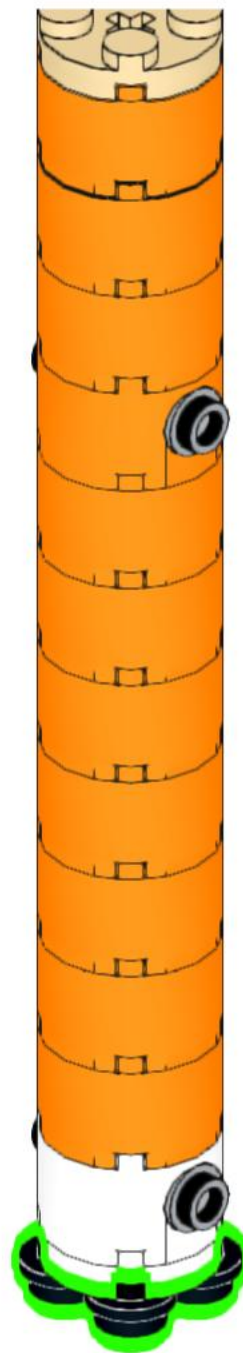
152



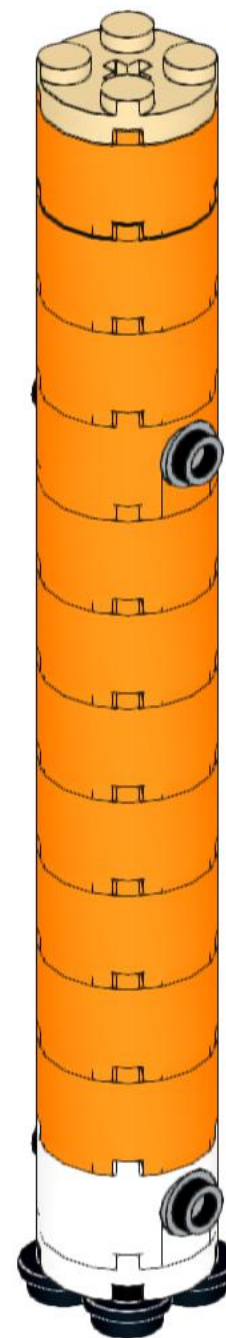
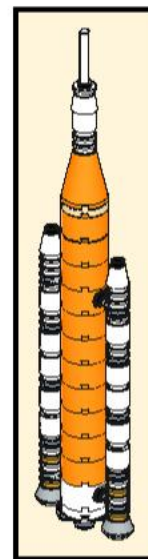
153



154



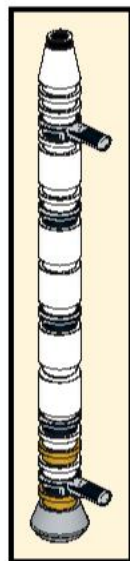
155



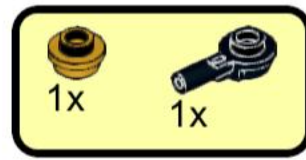
156



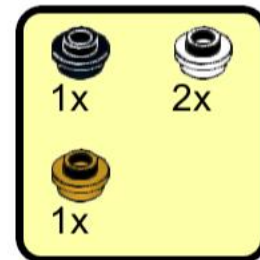
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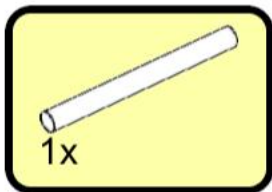
157



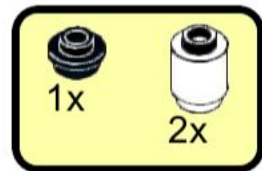
158



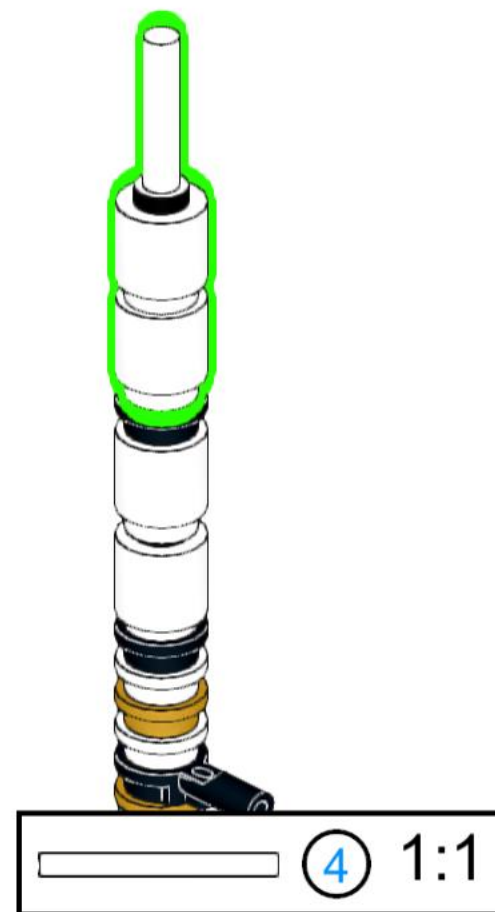
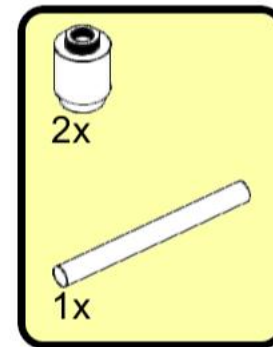
159



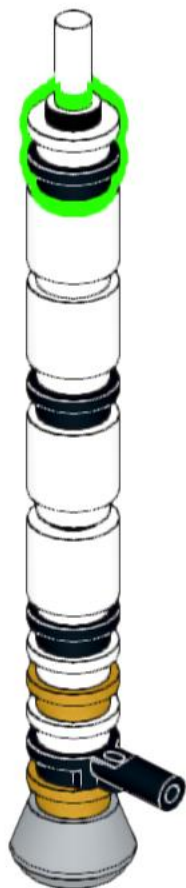
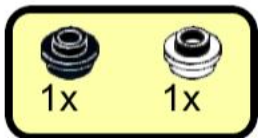
160



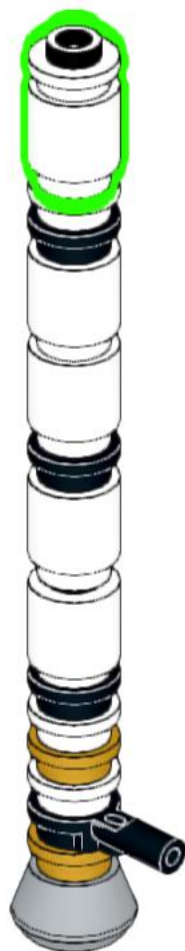
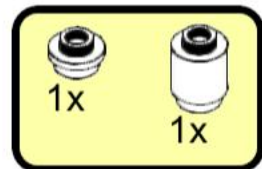
161



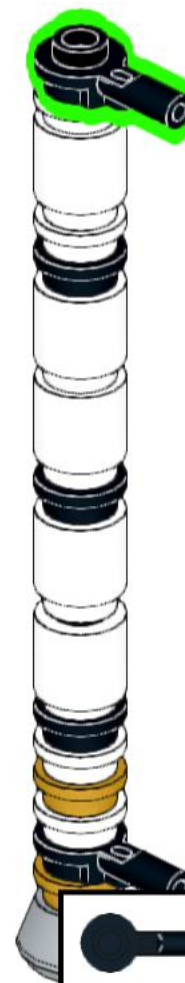
162



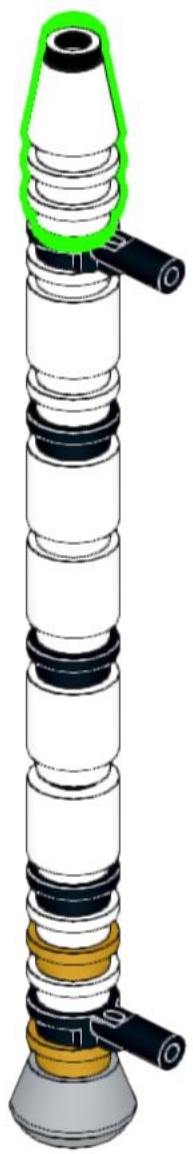
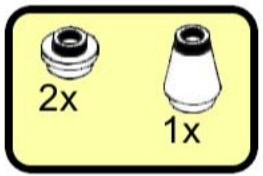
163



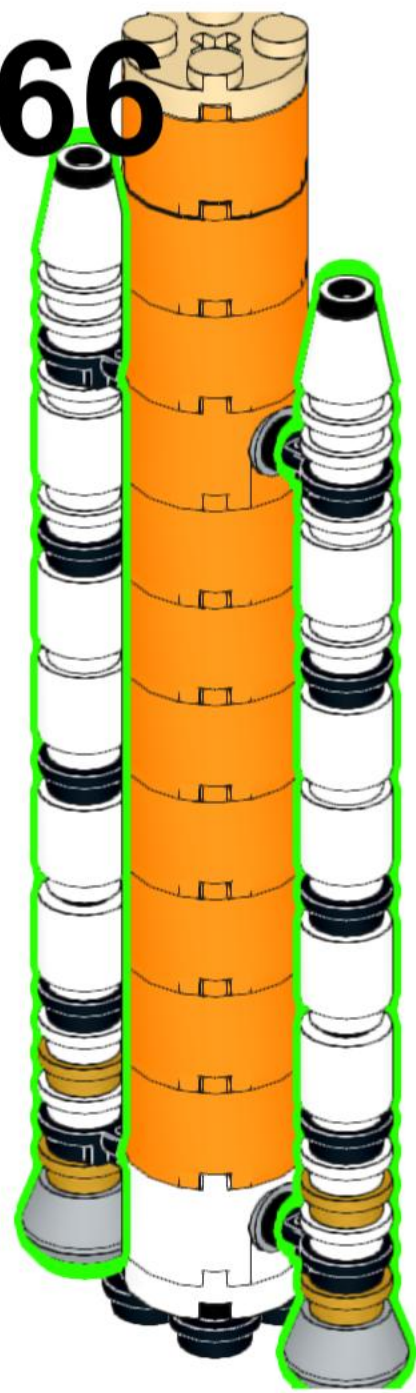
164



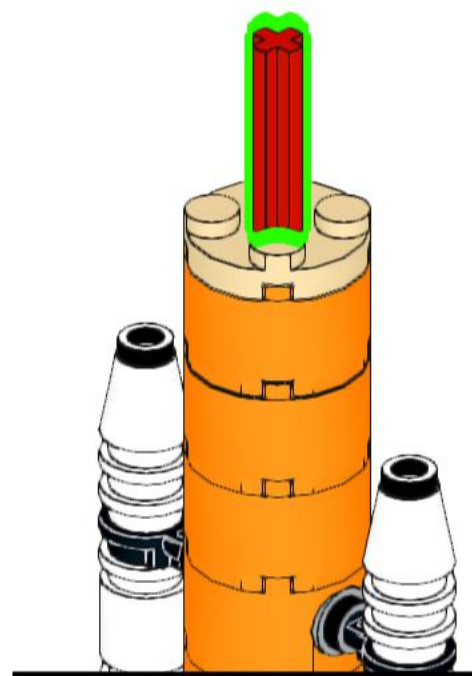
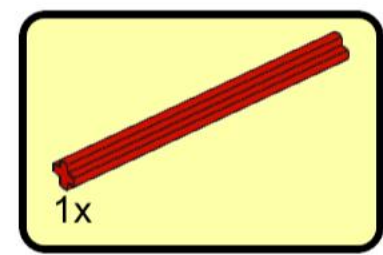
165



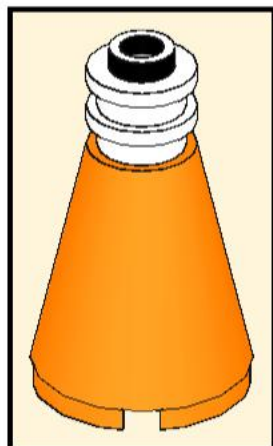
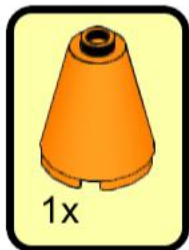
166



167



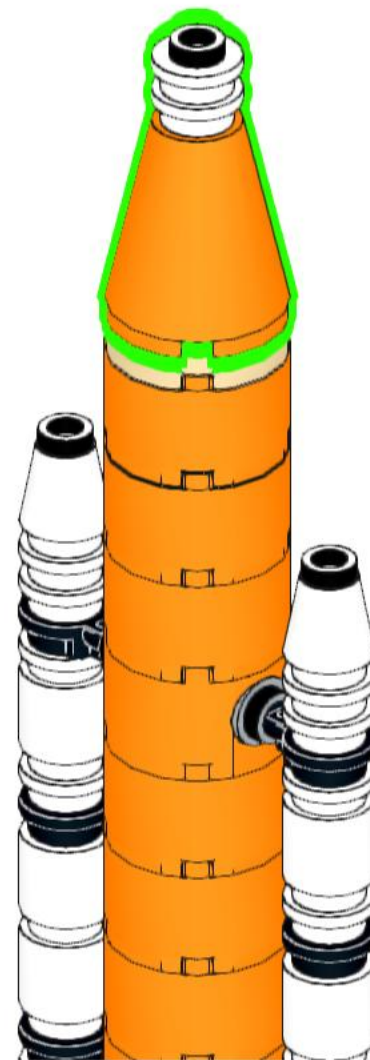
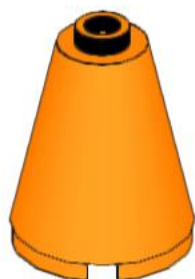
168



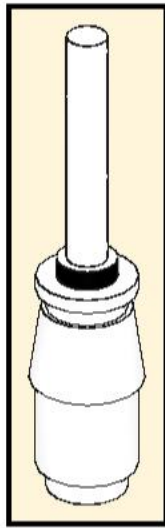
169



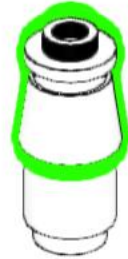
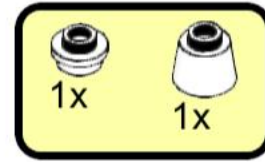
170



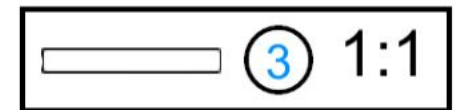
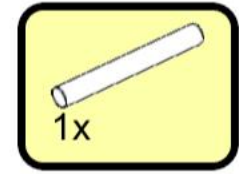
171



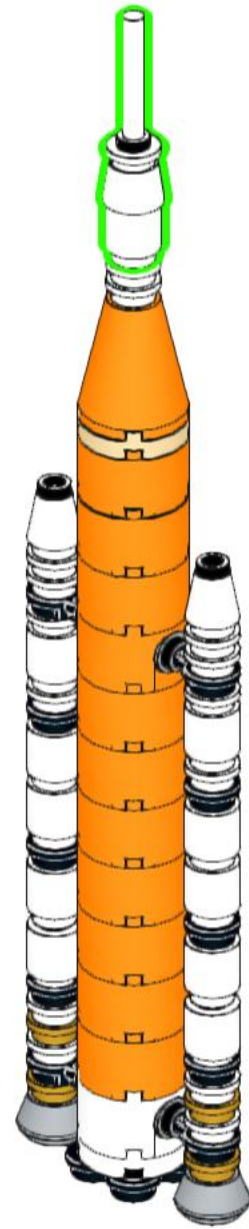
172



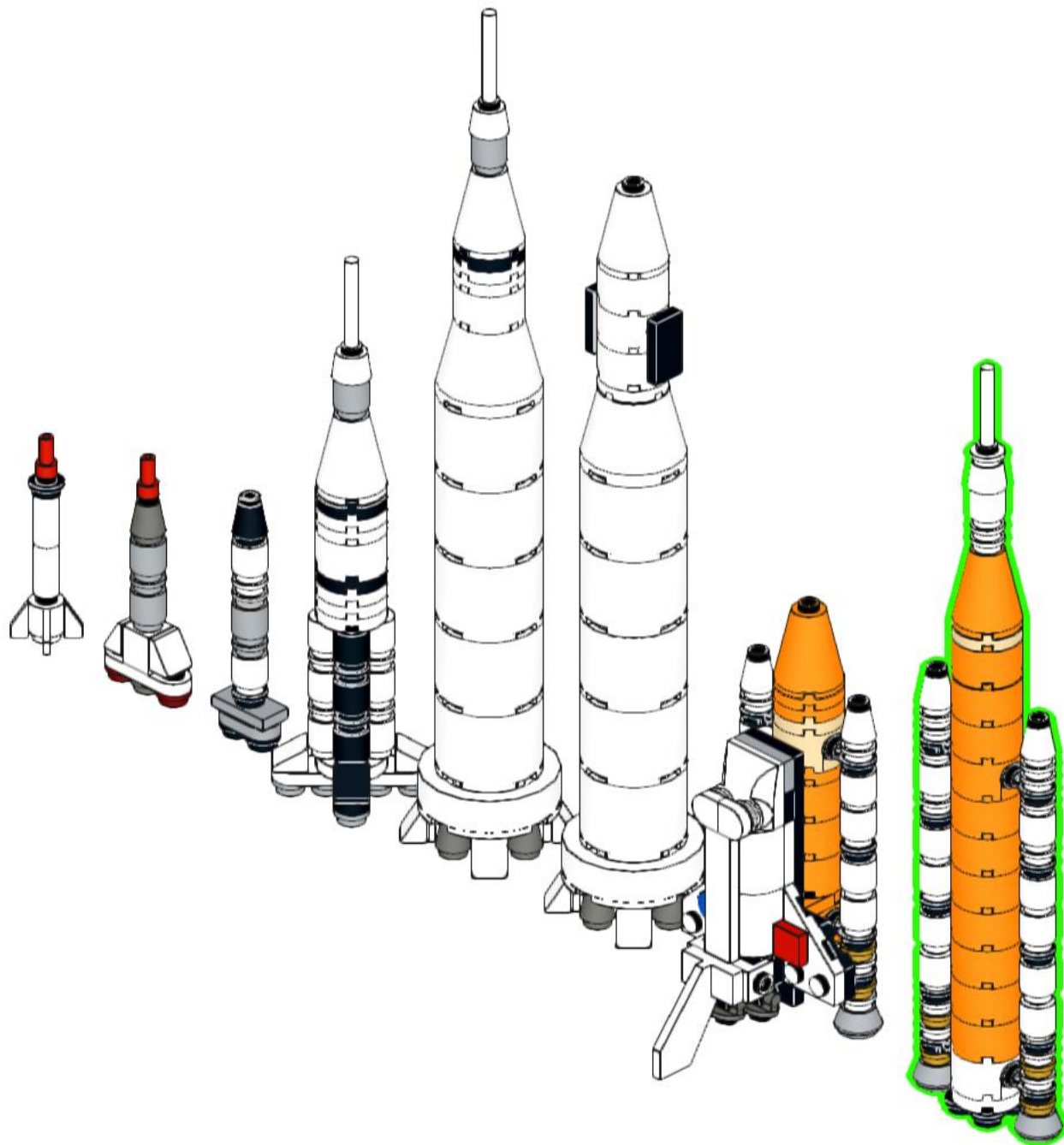
173



174



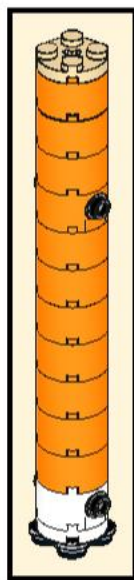
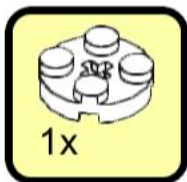
175



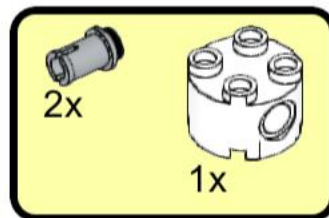


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Crew Block 1B

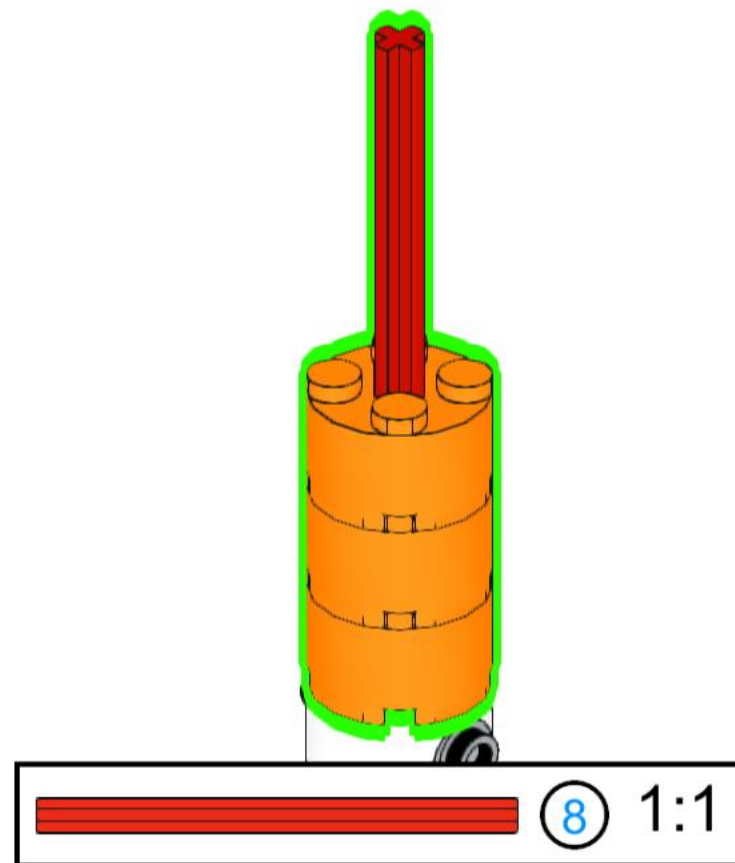
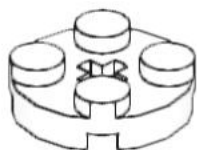
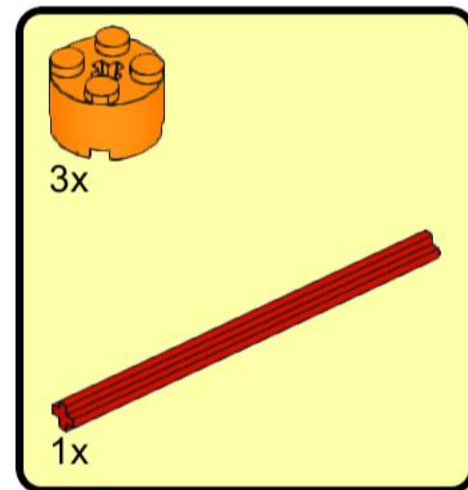
176



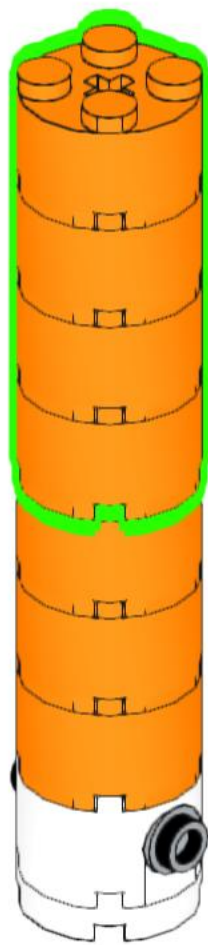
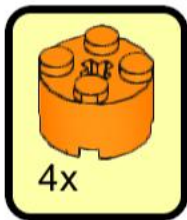
177



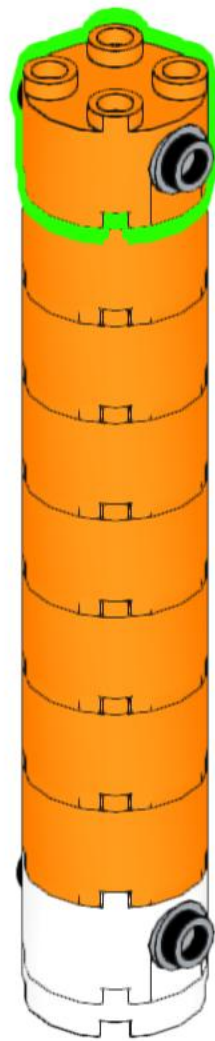
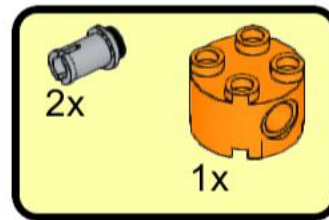
178



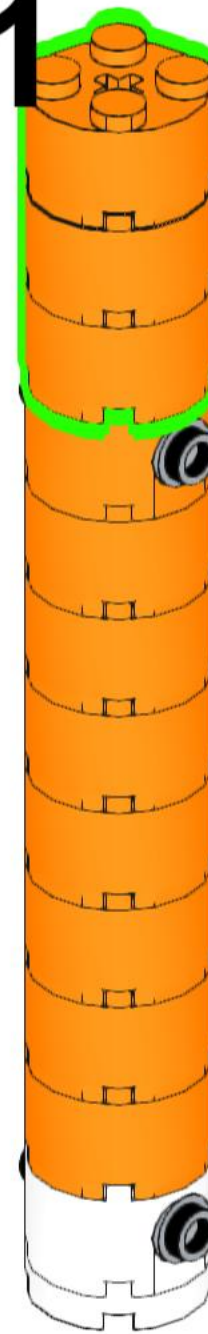
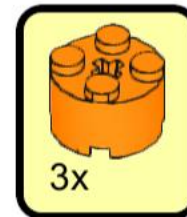
179



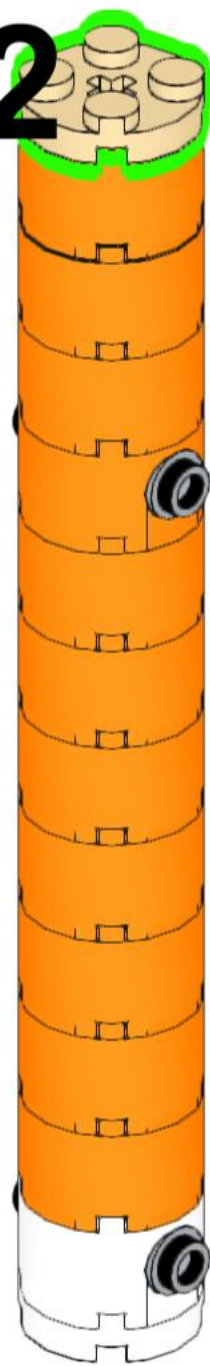
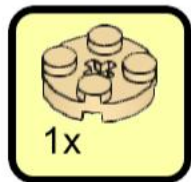
180



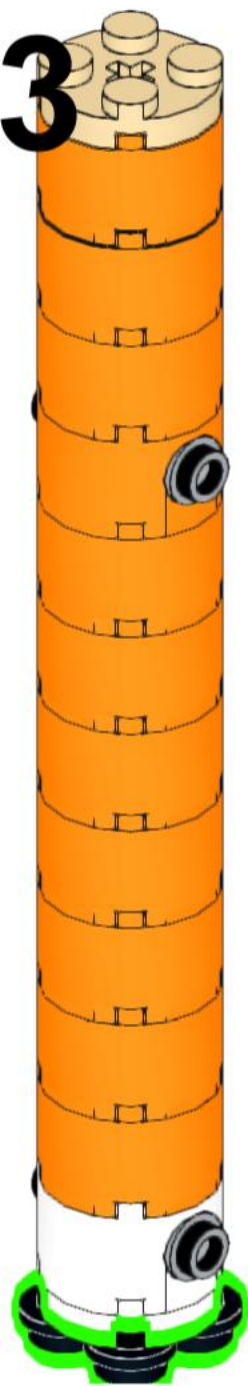
181



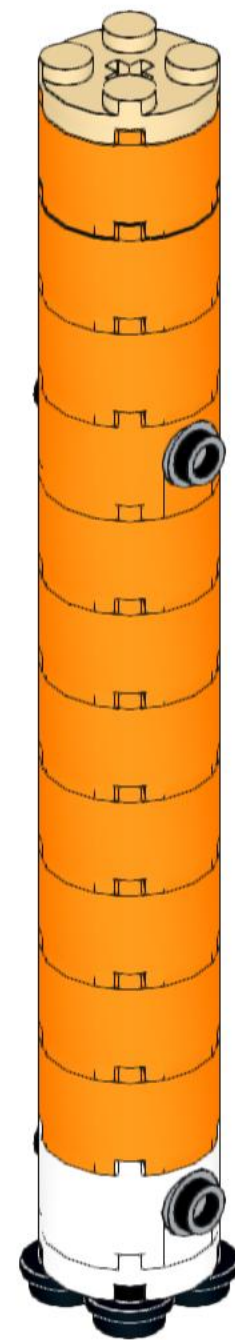
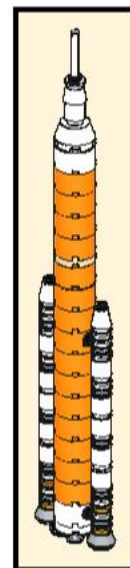
182



183



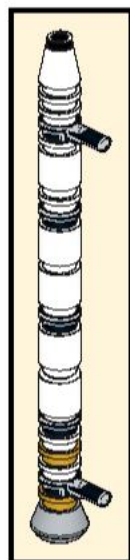
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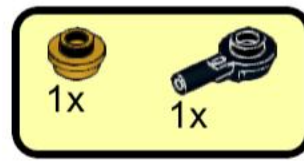
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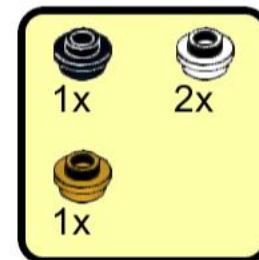
2x



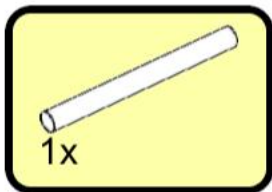
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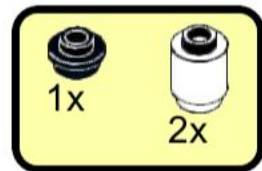
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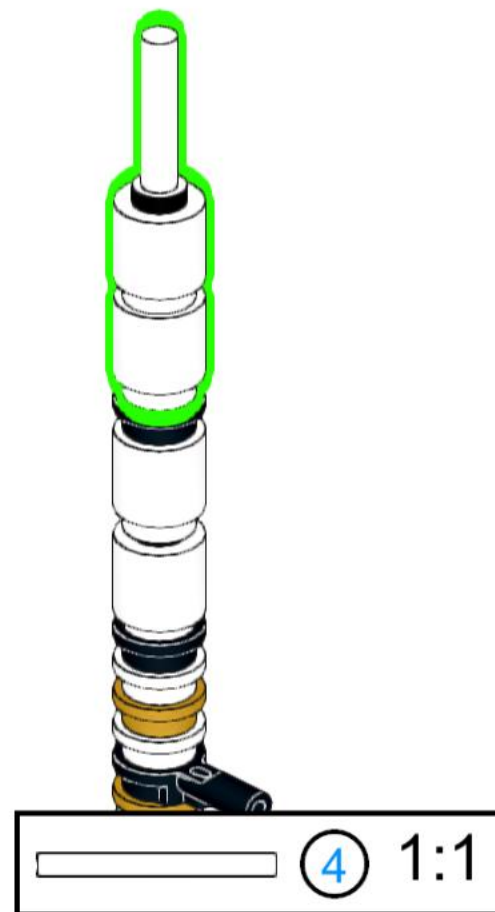
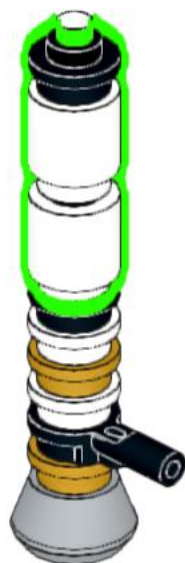
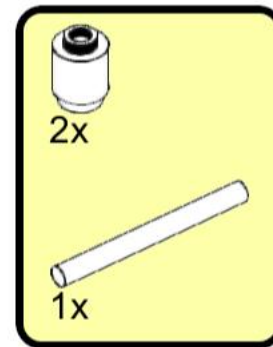
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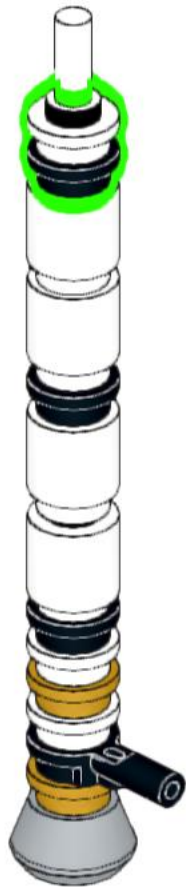
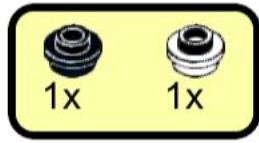
189



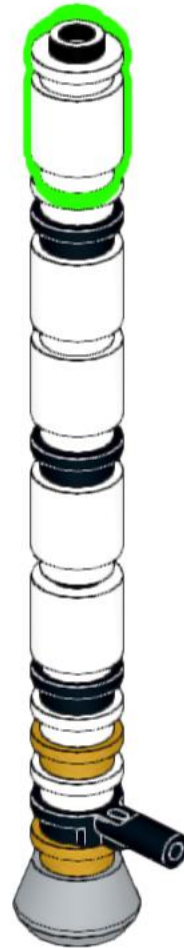
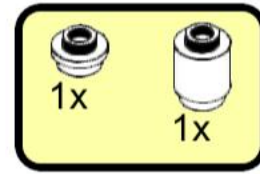
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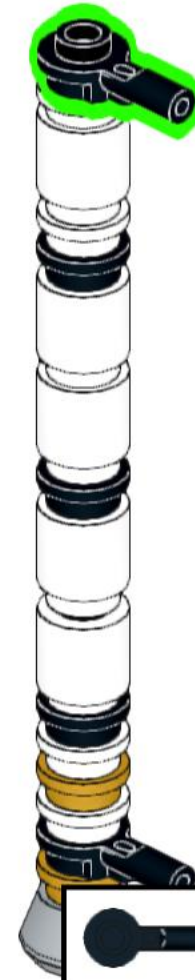
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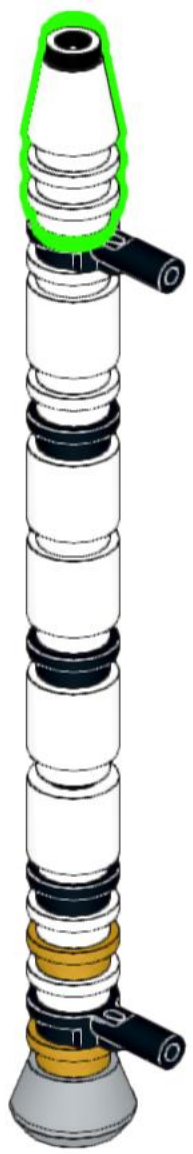
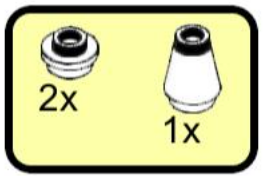
192



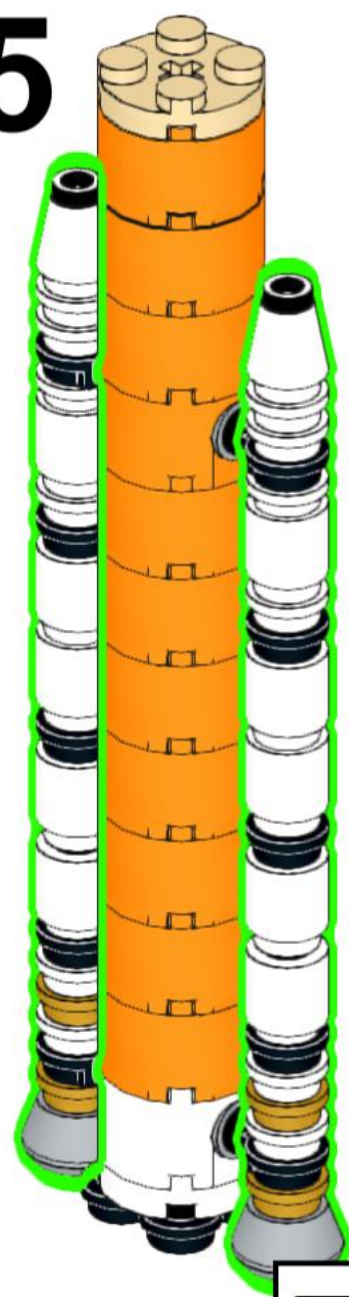
193



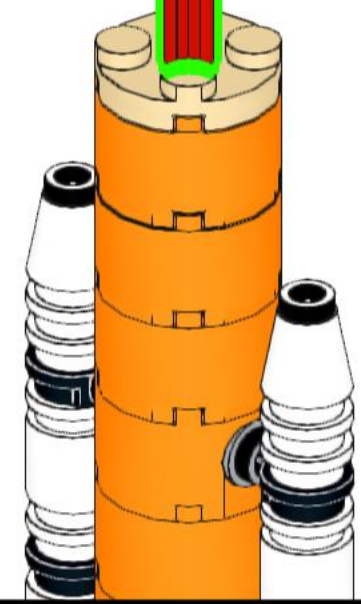
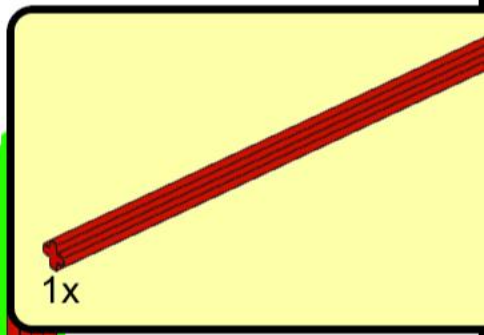
194



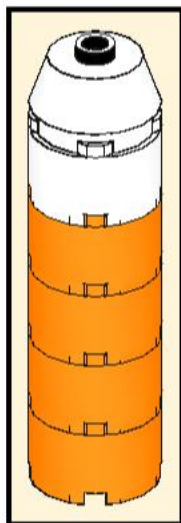
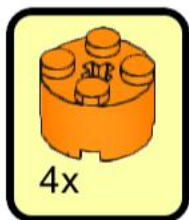
195



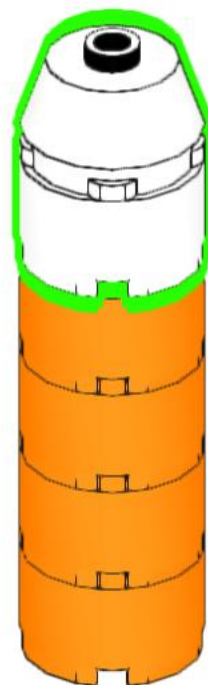
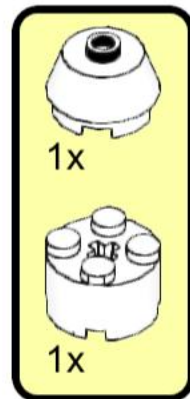
196



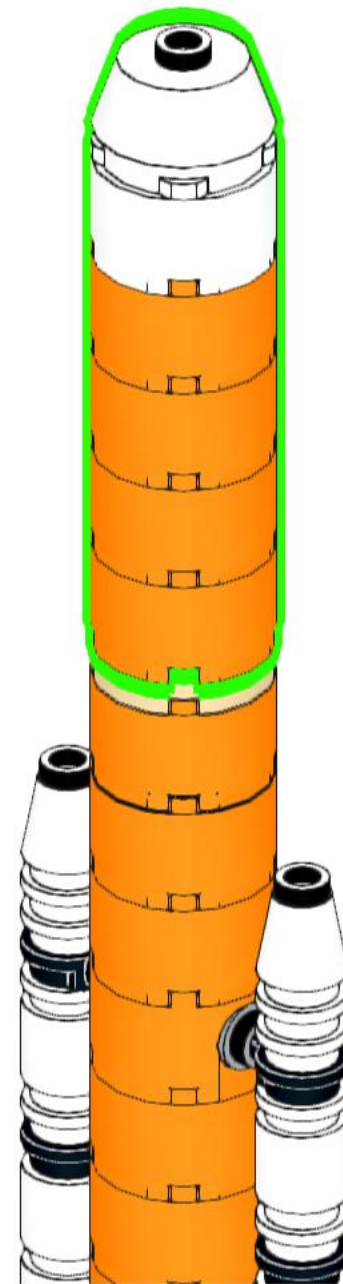
197



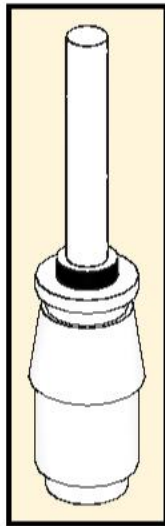
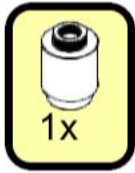
198



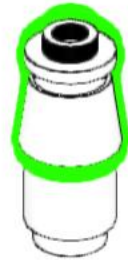
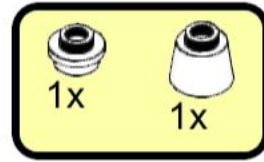
199



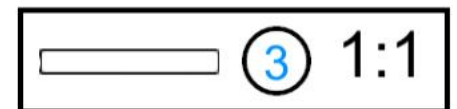
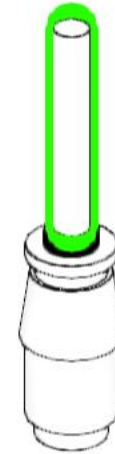
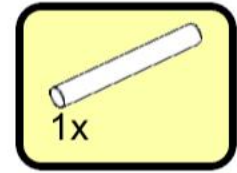
200



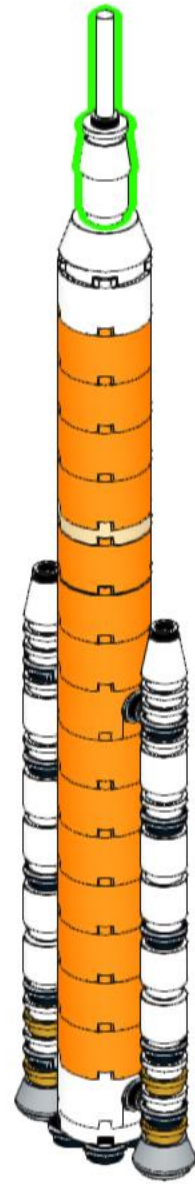
201



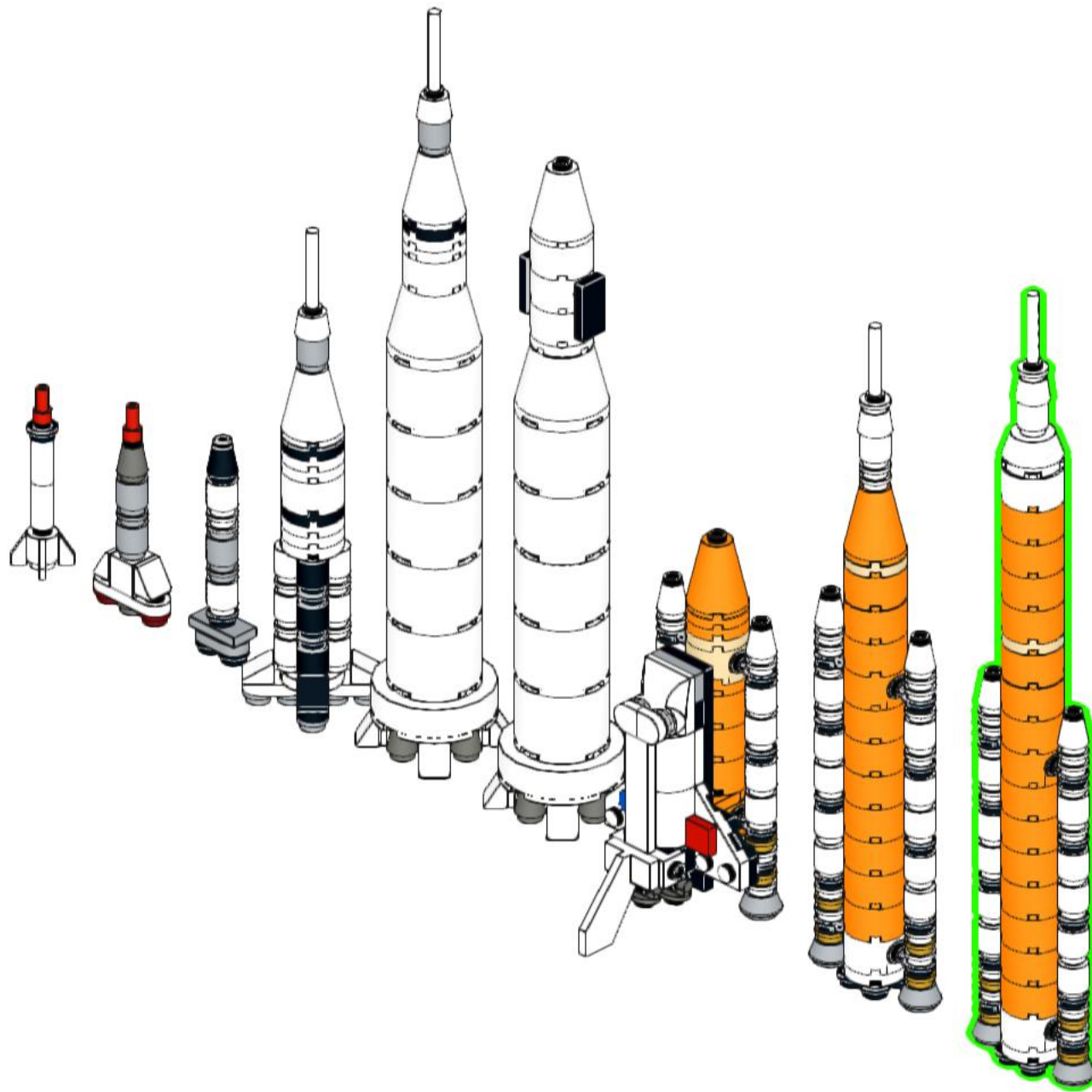
202



203



204



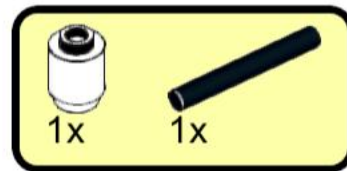


**Falcon 9
Crew Dragon**

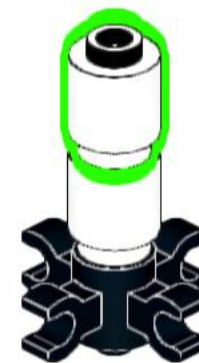
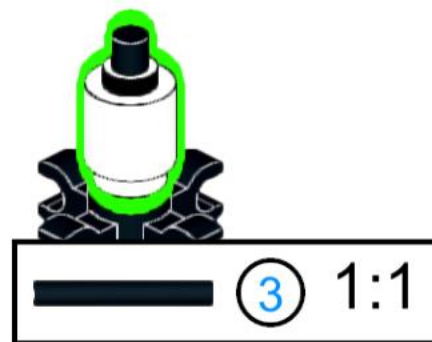
205



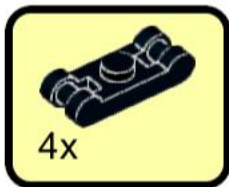
206



207



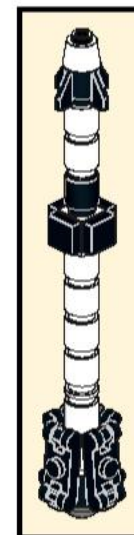
208



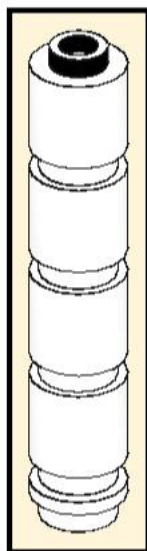
209



210



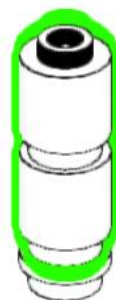
211



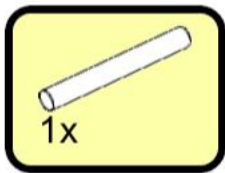
212



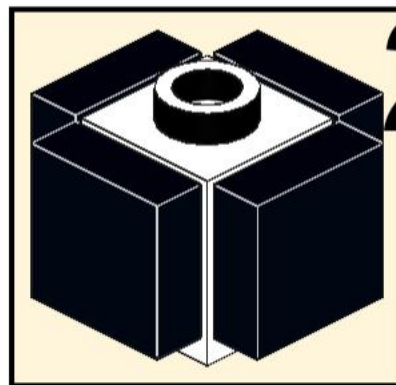
213



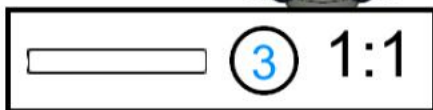
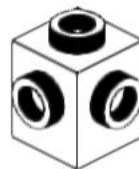
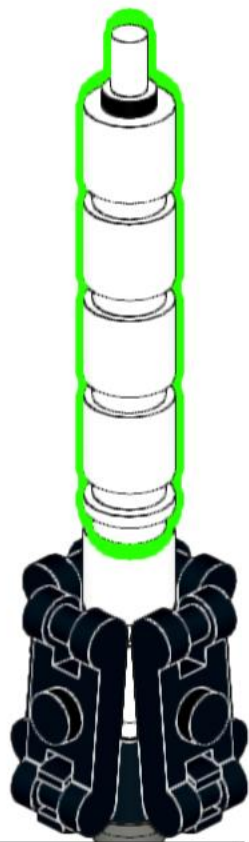
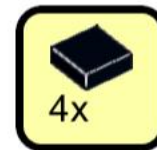
214



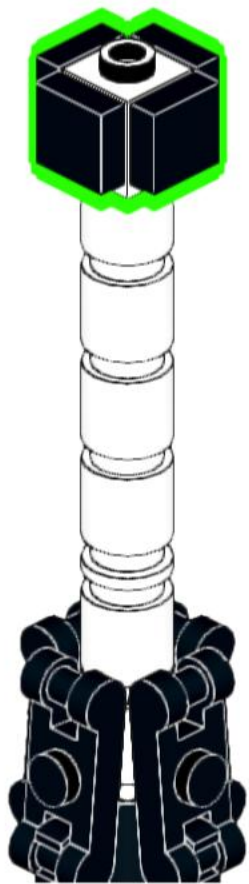
215



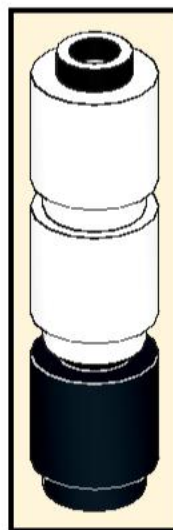
216



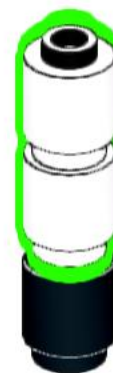
217



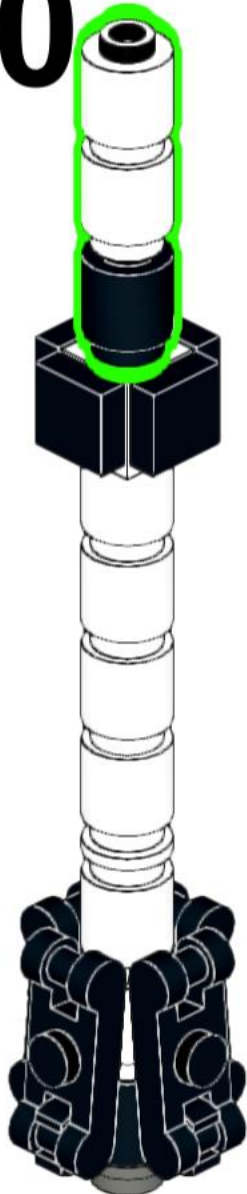
218



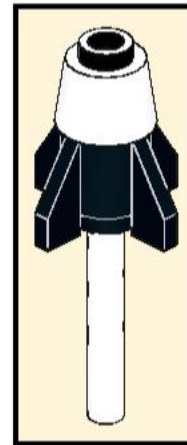
219



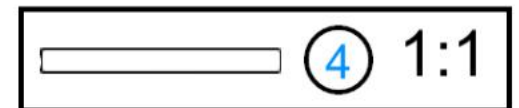
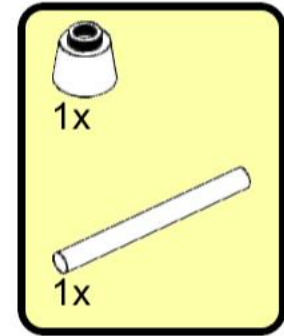
220



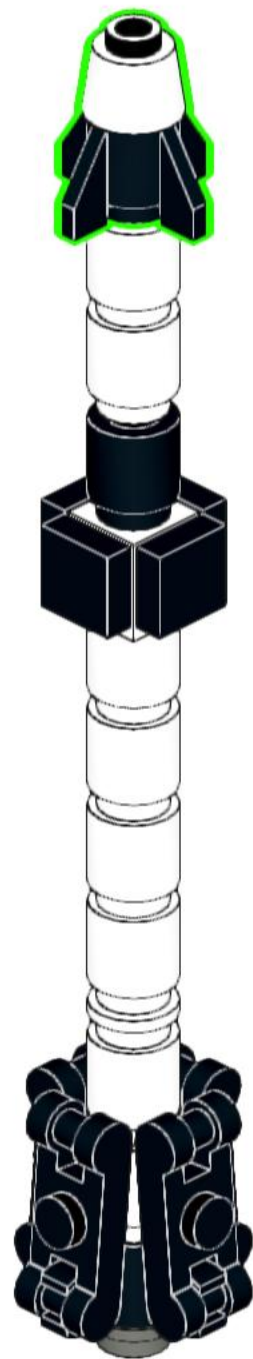
221



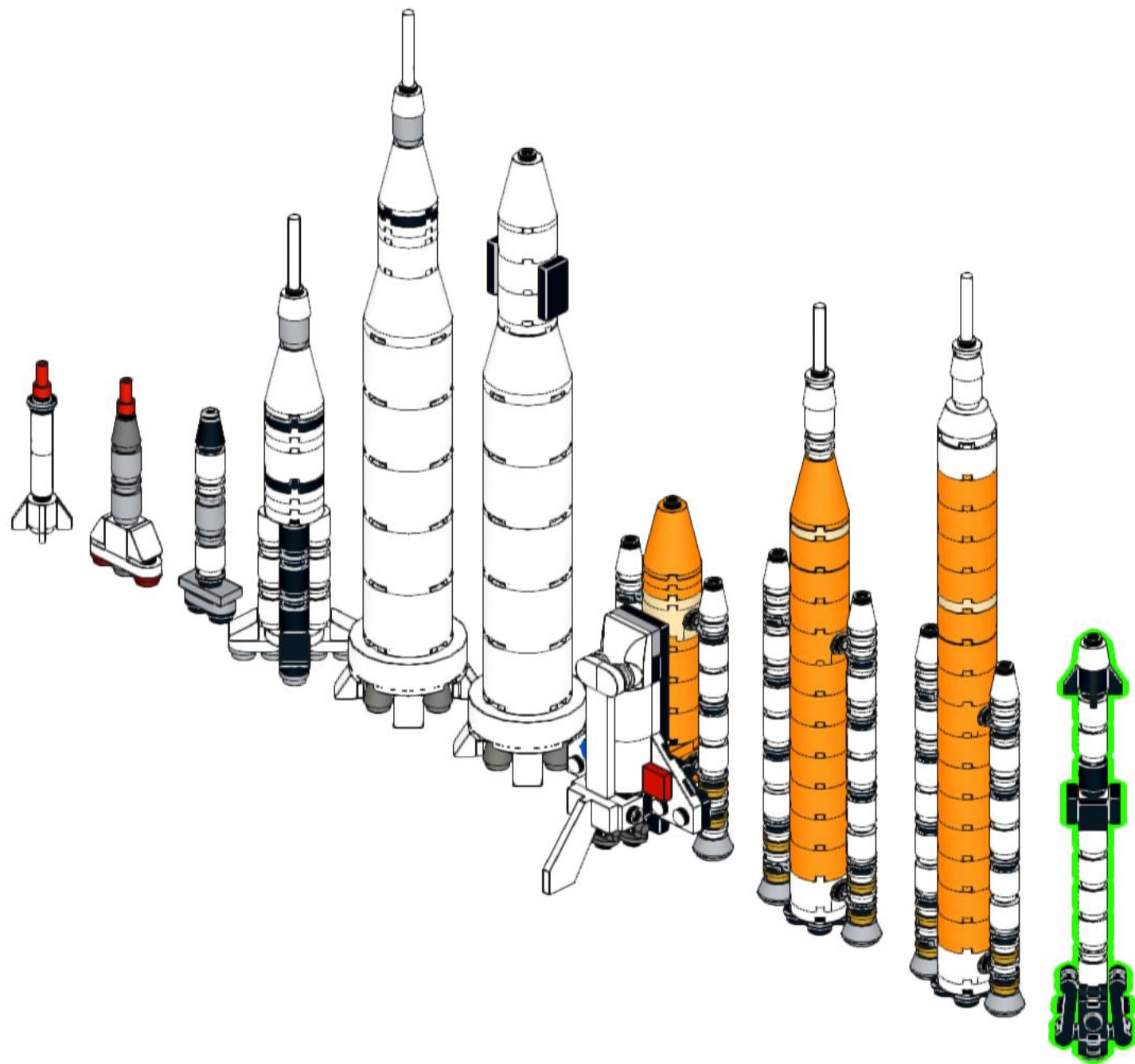
222



223



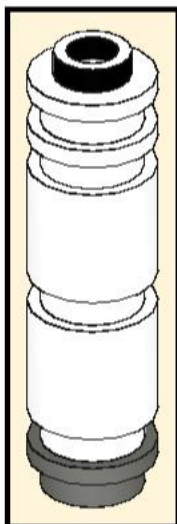
224



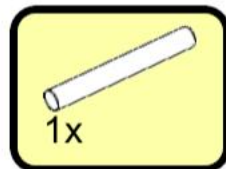


**Falcon Heavy
Gateway**

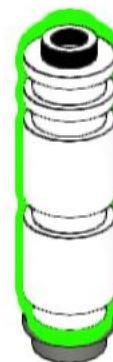
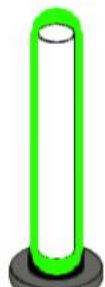
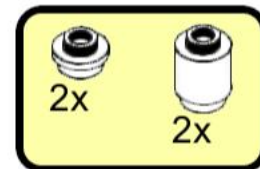
225



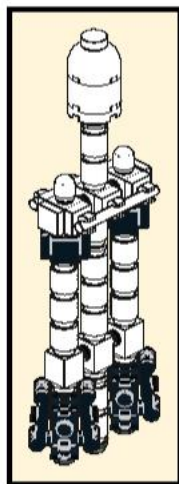
226



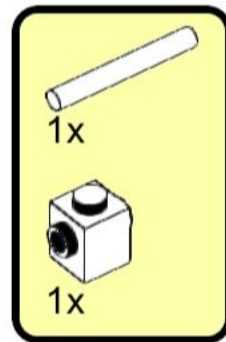
227



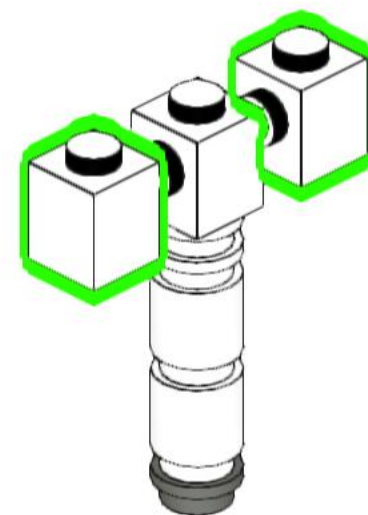
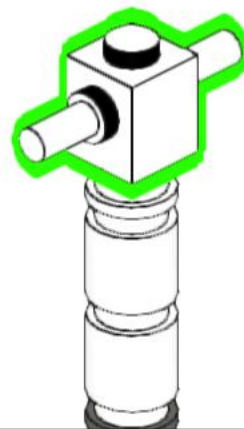
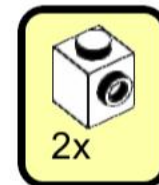
228



229



230



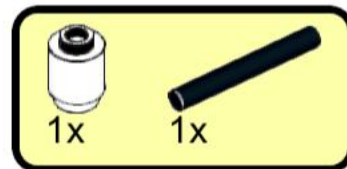
231



2x



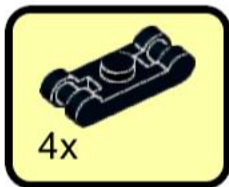
232



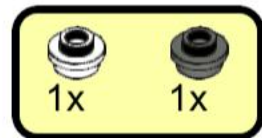
233



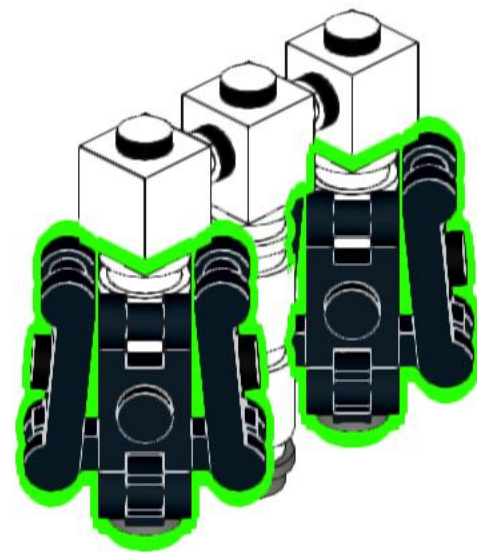
234



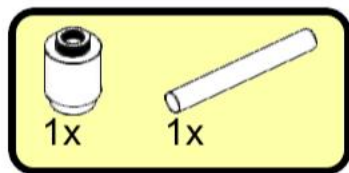
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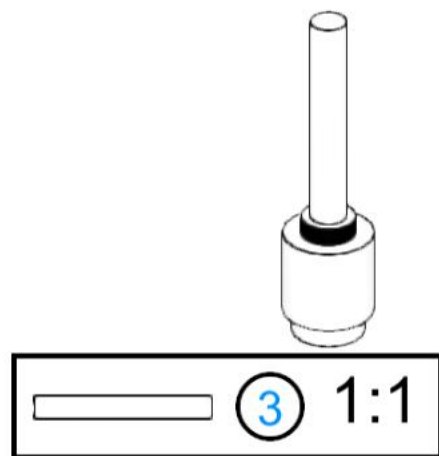
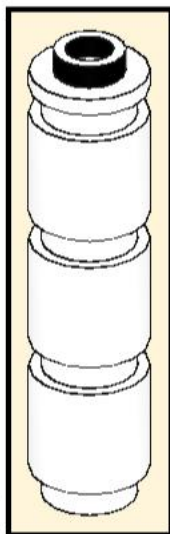
236



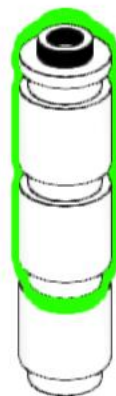
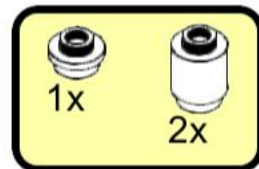
237



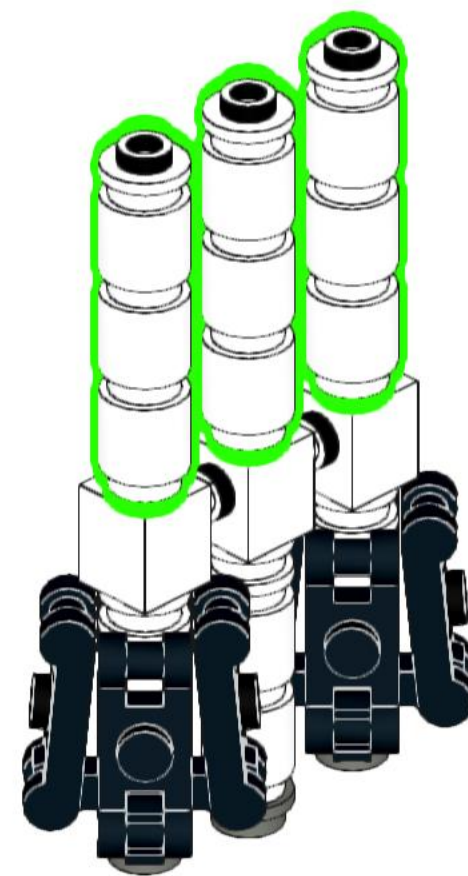
3x



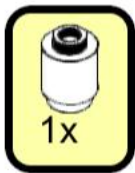
238



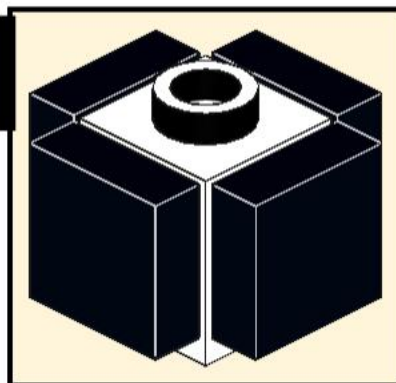
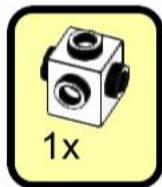
239



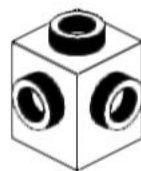
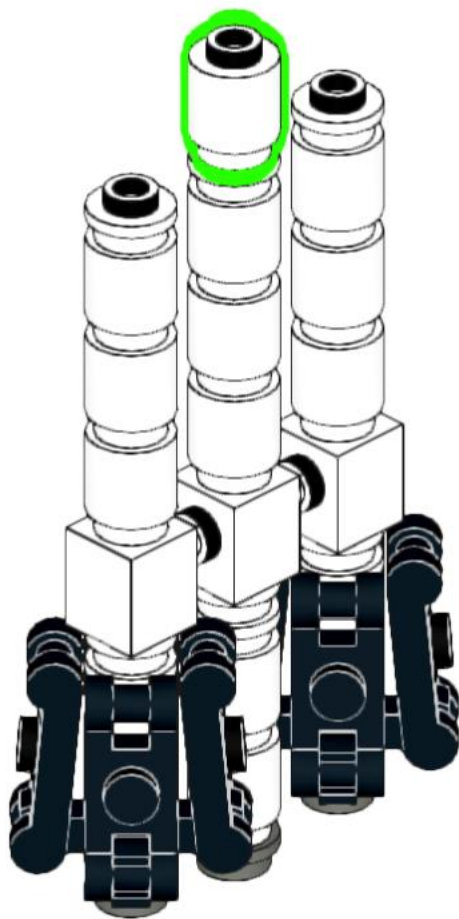
240



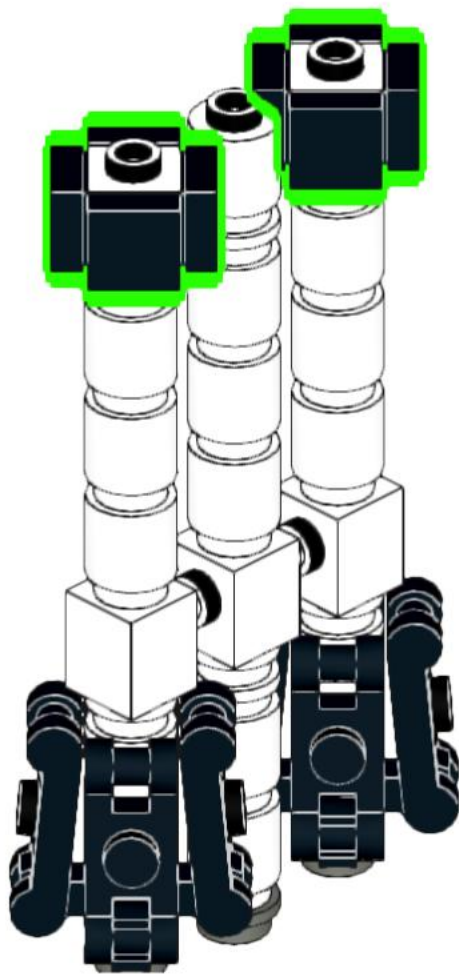
241



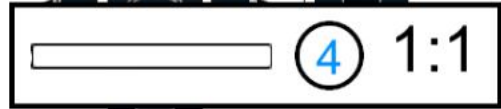
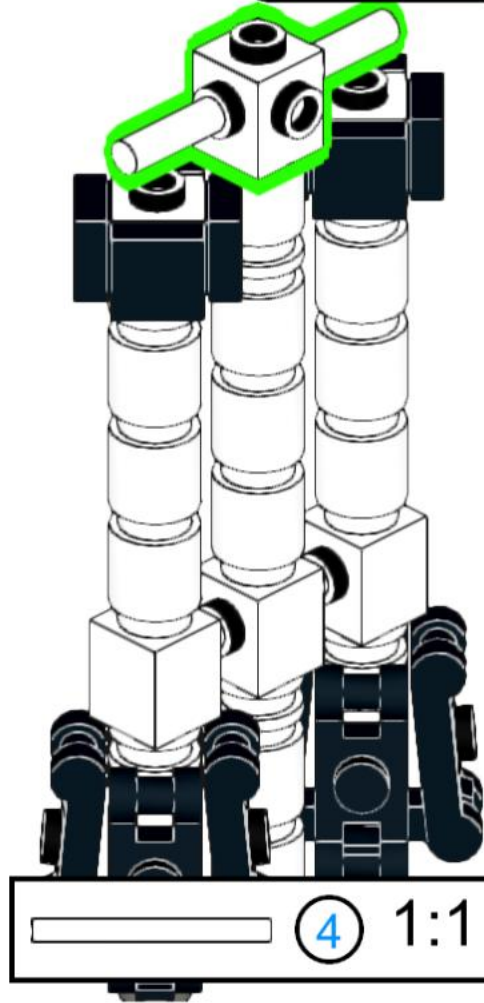
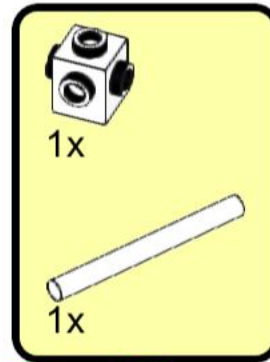
242



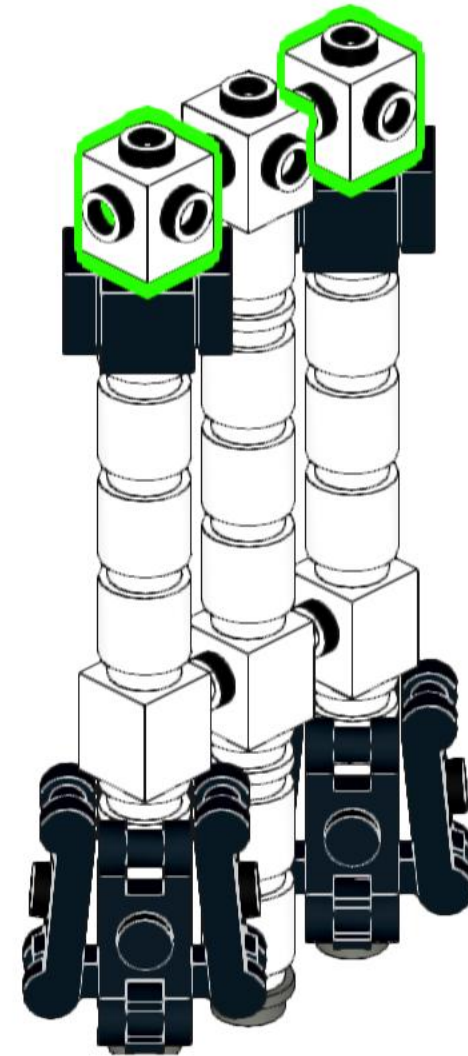
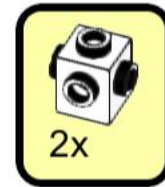
243



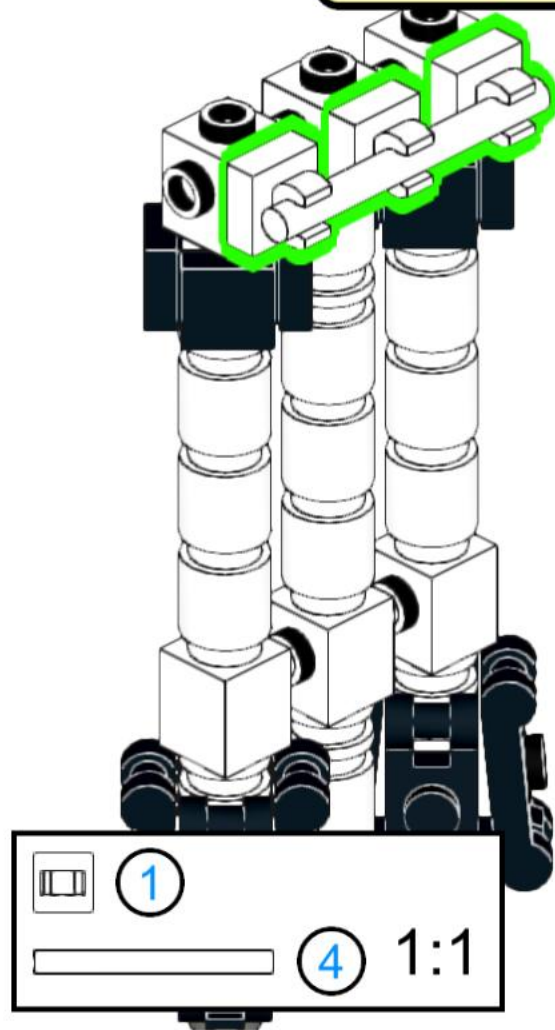
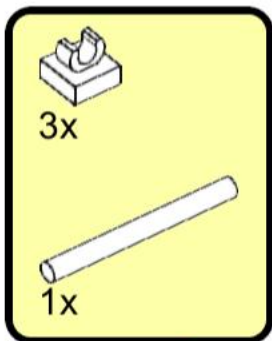
244



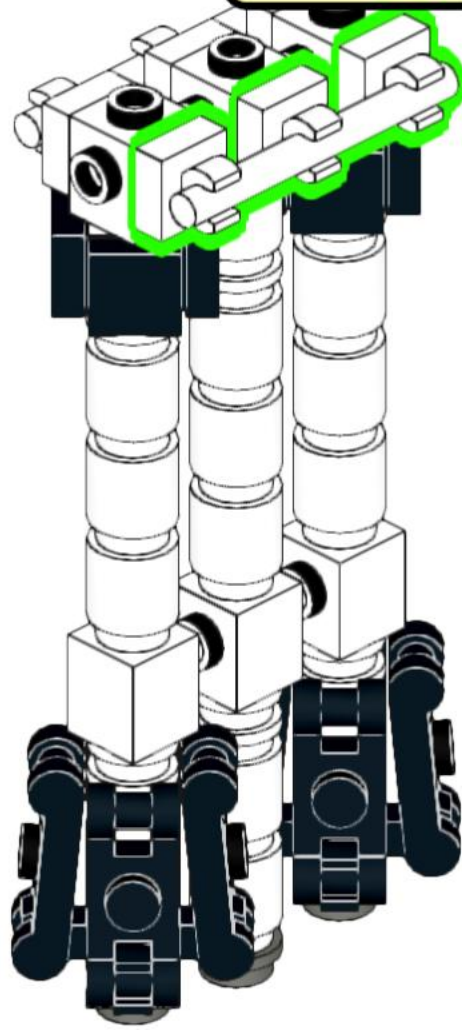
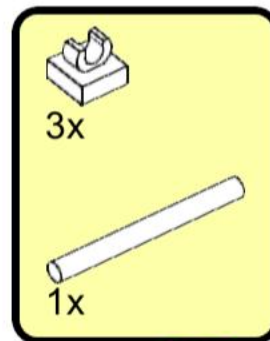
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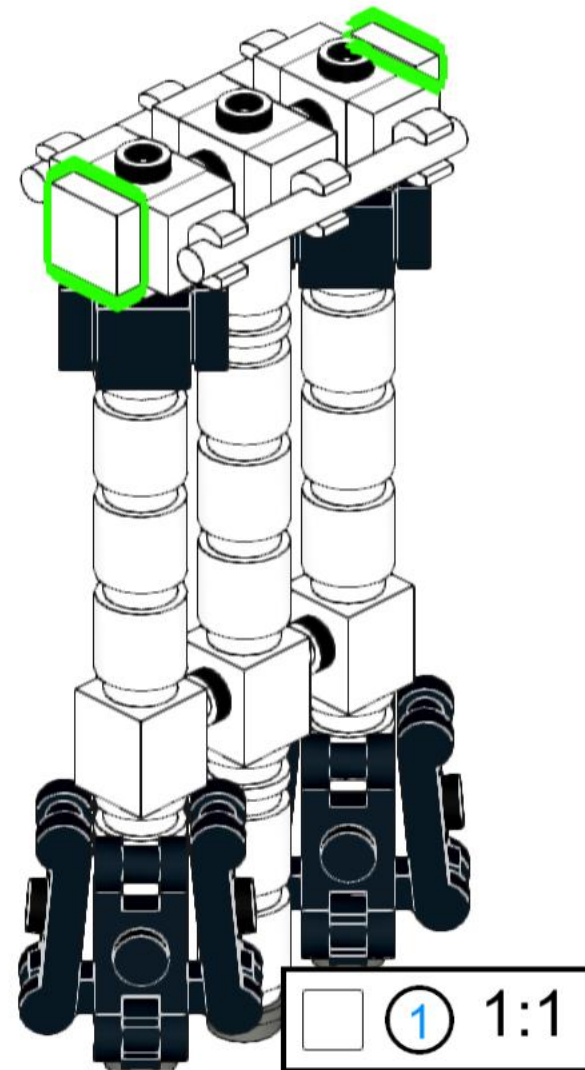
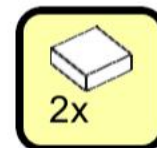
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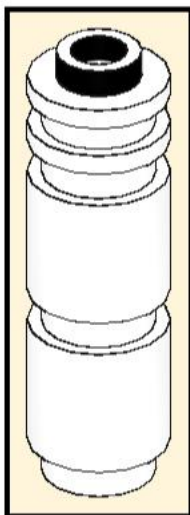
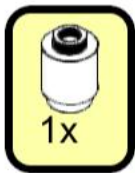
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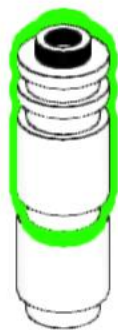
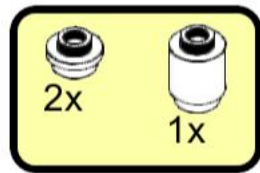
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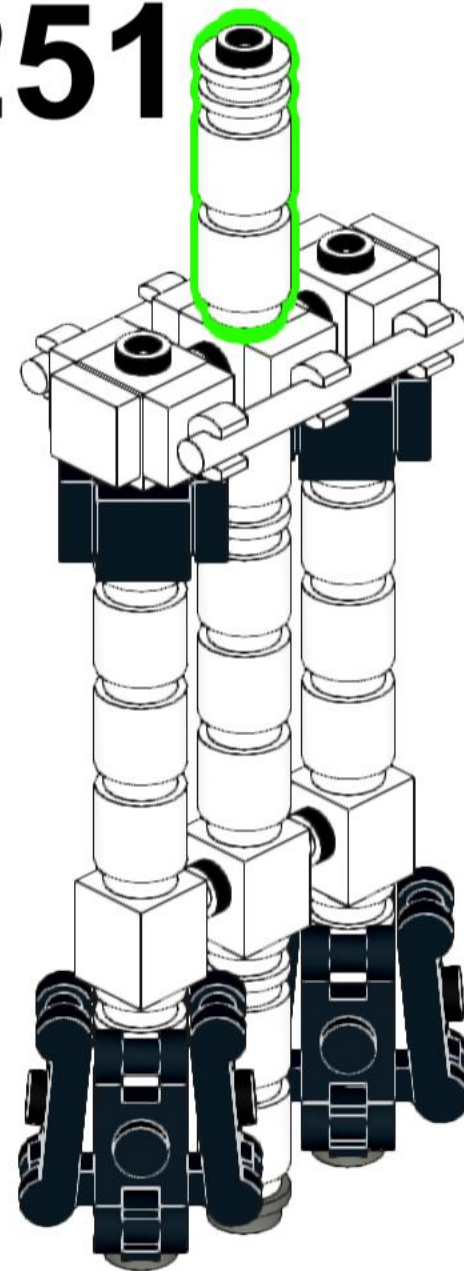
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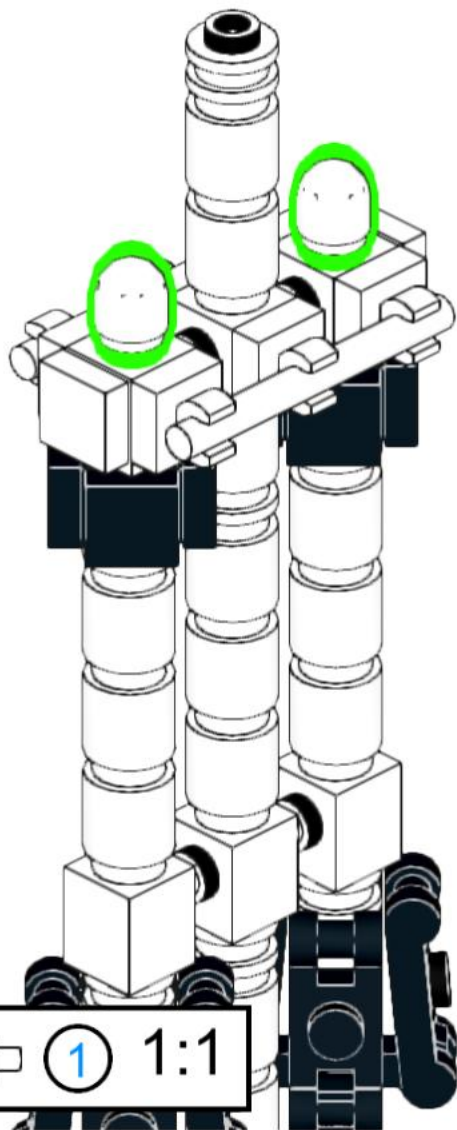
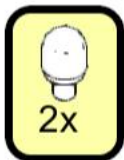
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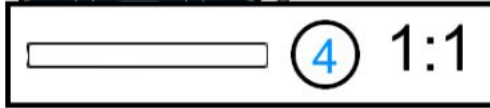
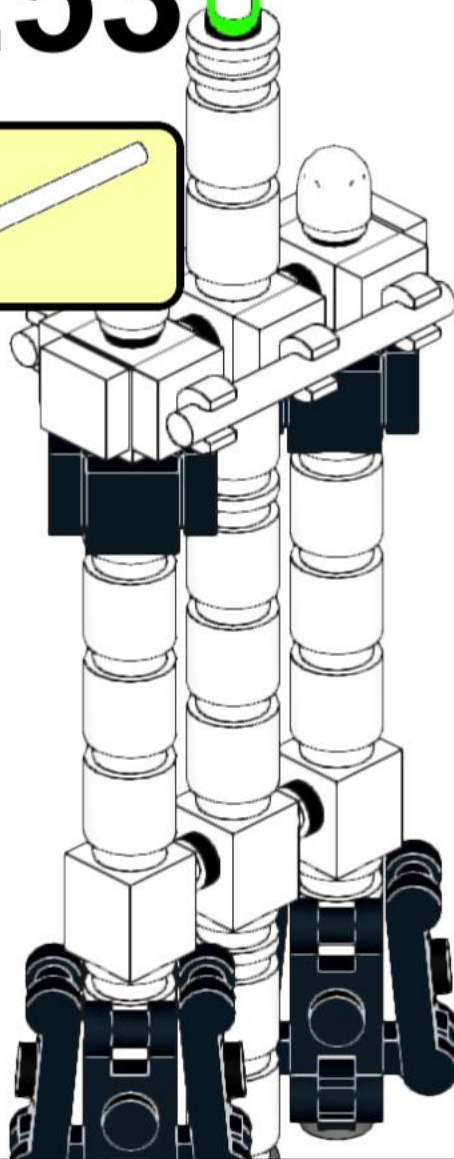
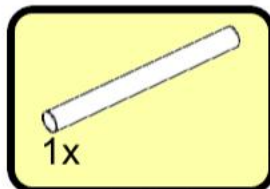
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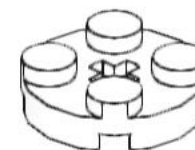
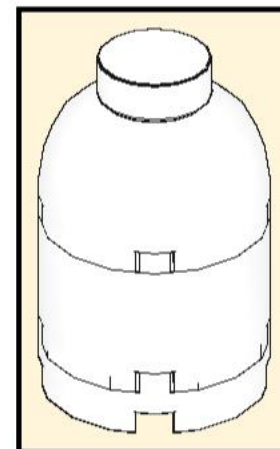
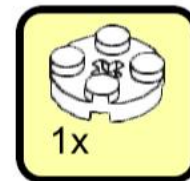
252



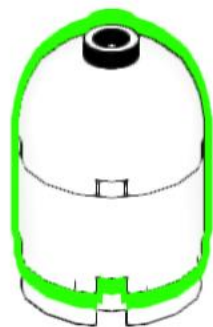
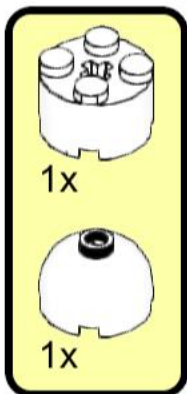
253



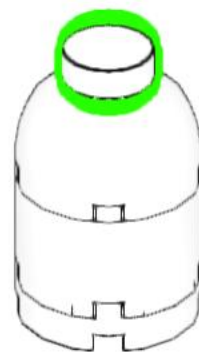
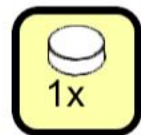
254



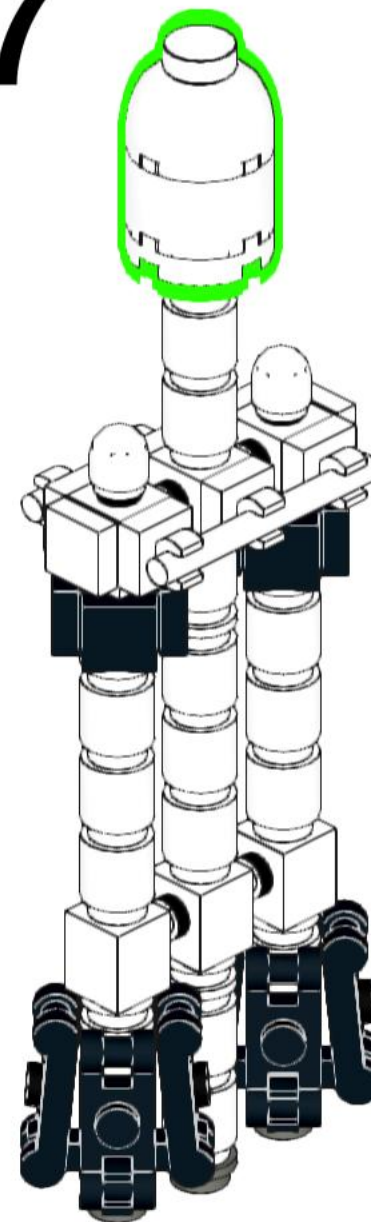
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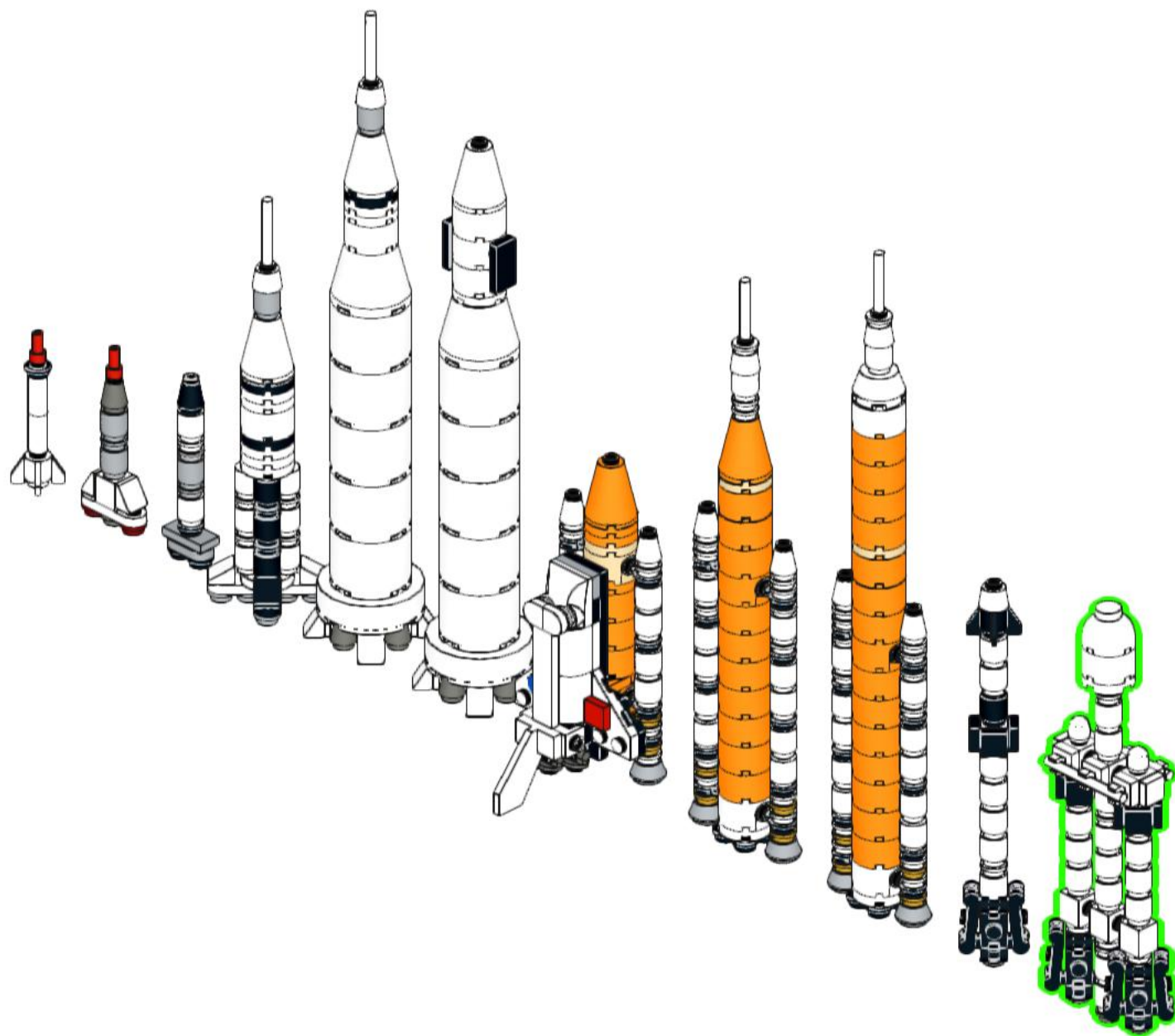
256



257



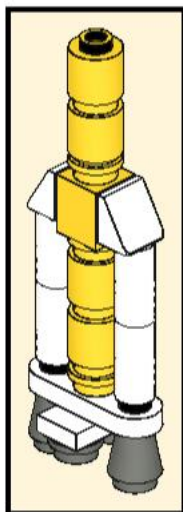
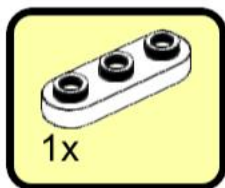
258



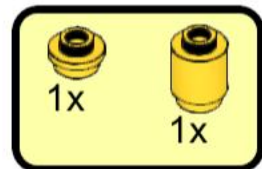


**Atlas V
Starliner**

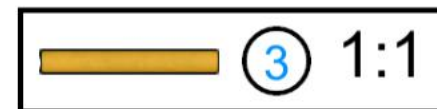
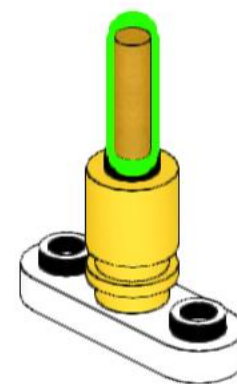
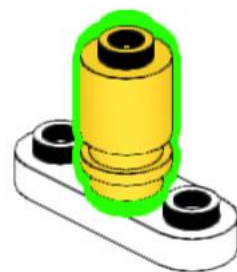
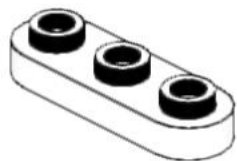
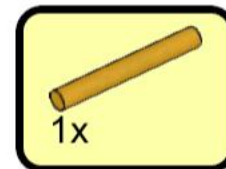
259



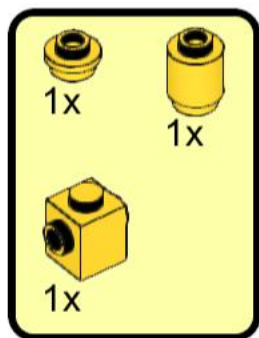
260



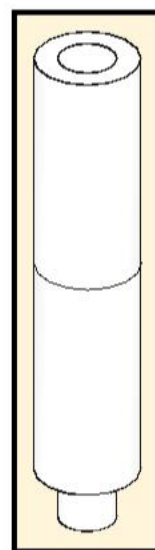
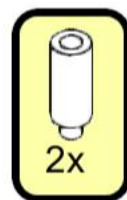
261



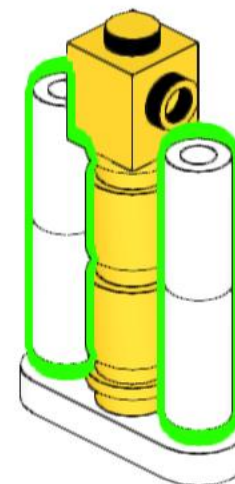
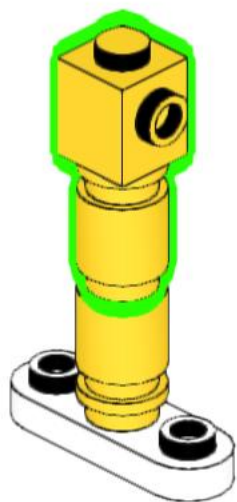
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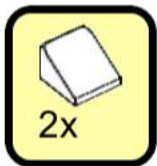
263



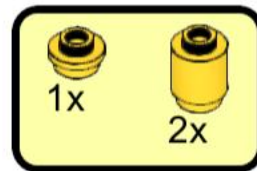
264



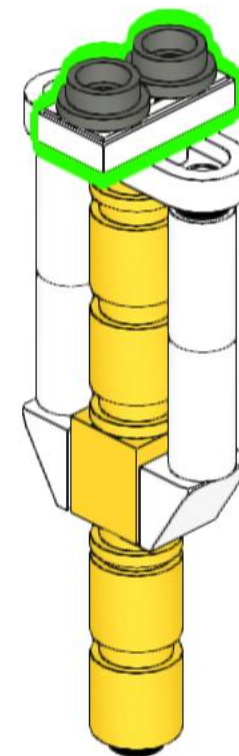
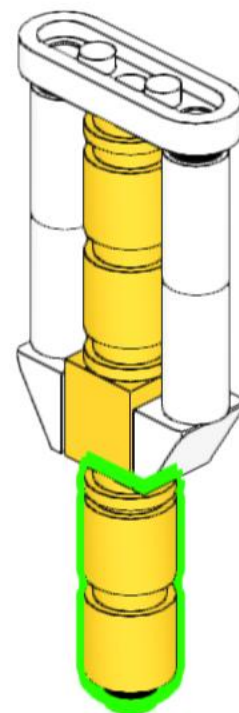
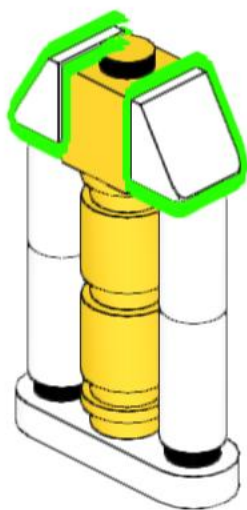
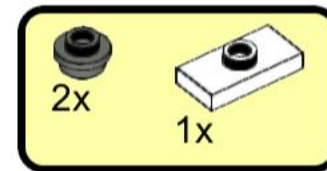
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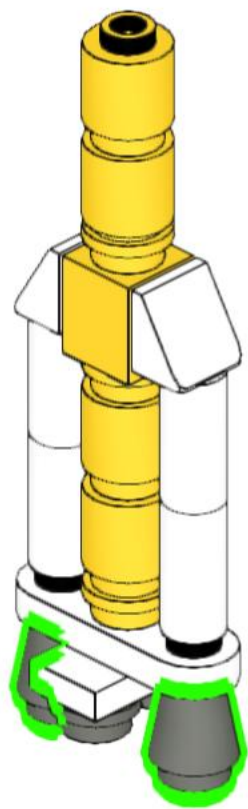
266



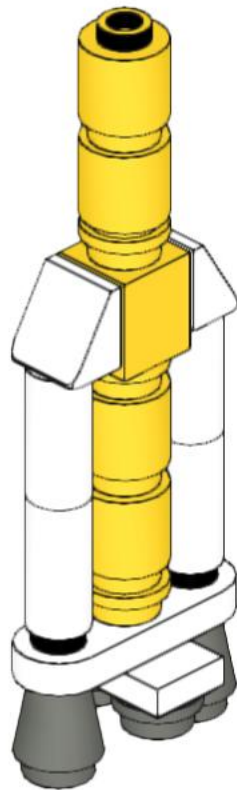
267



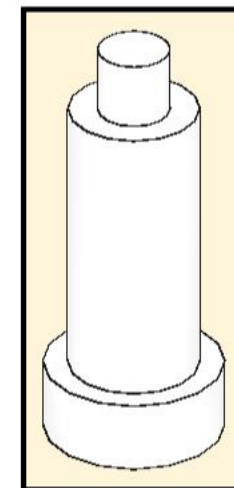
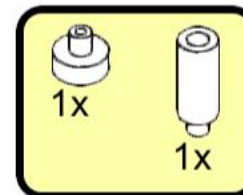
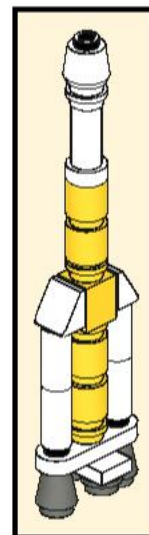
268



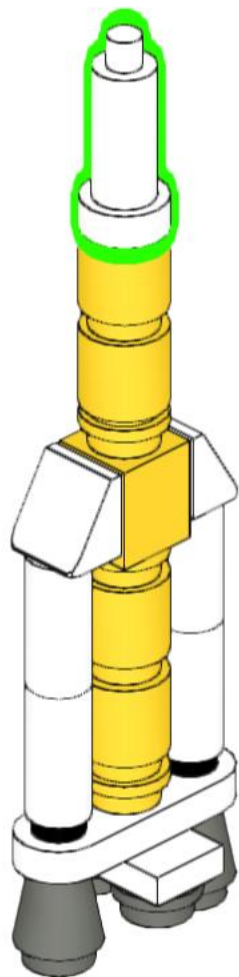
269



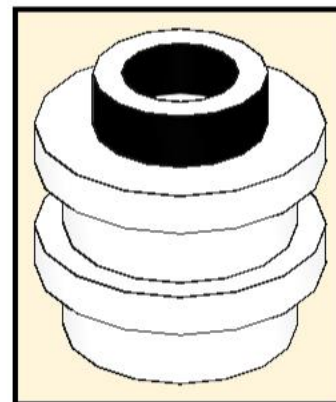
270



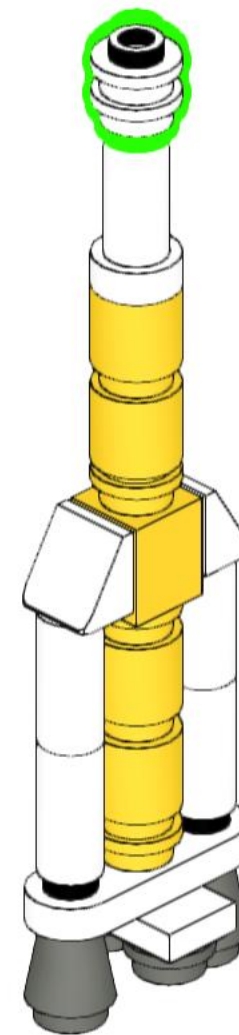
271



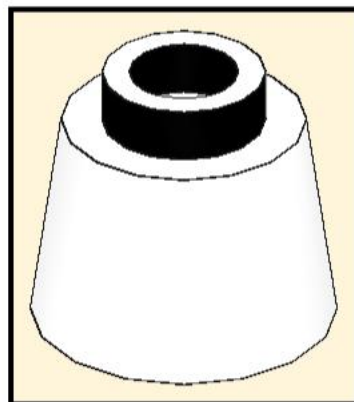
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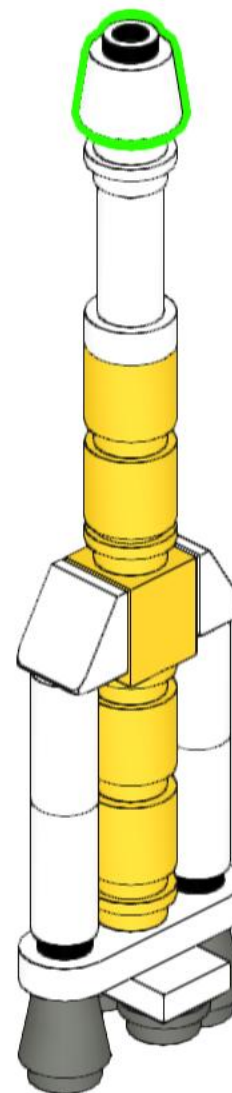
273



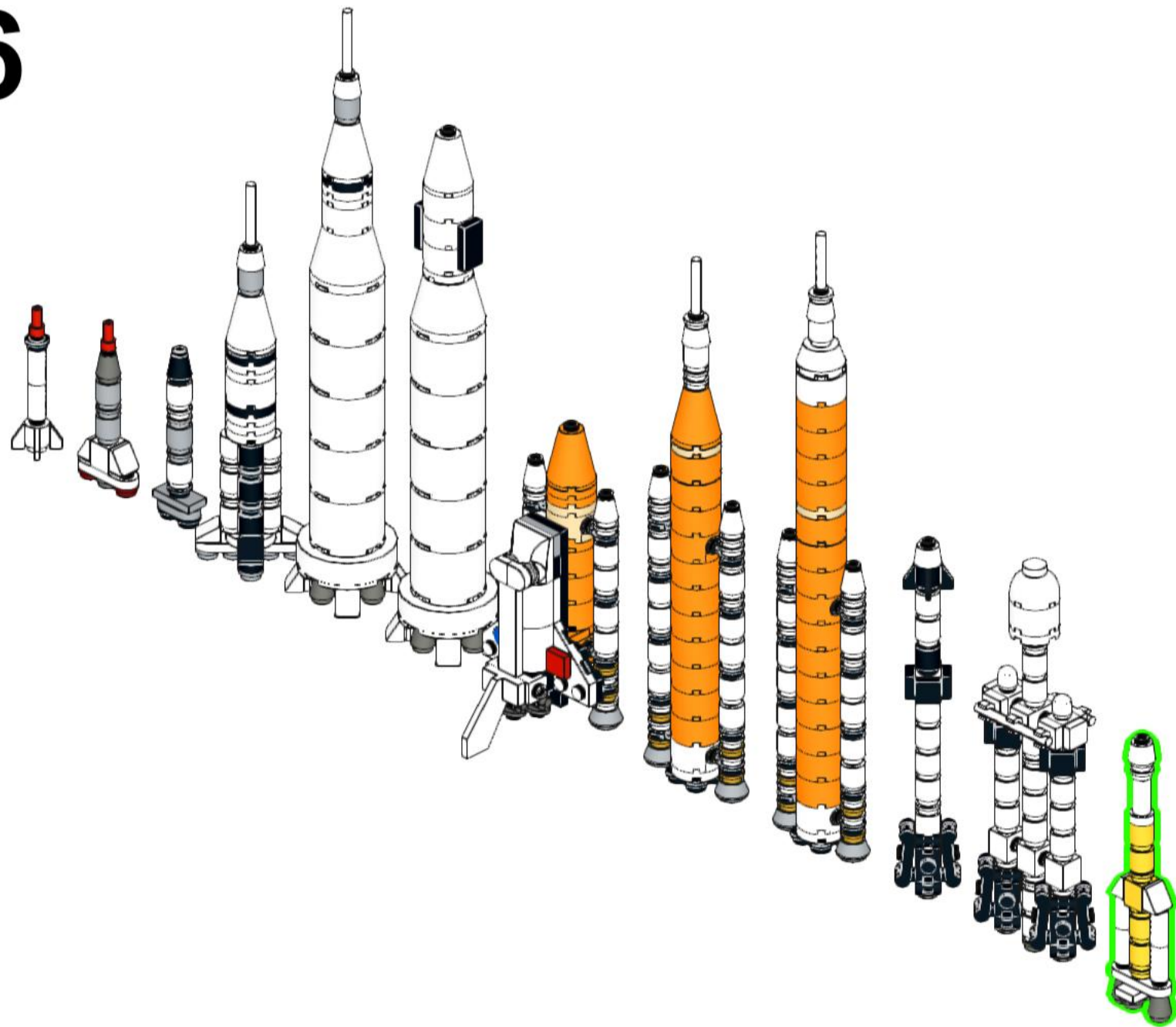
274



275



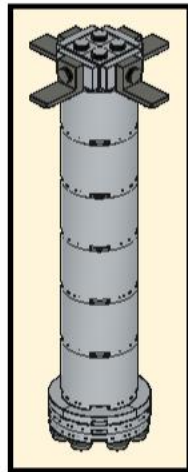
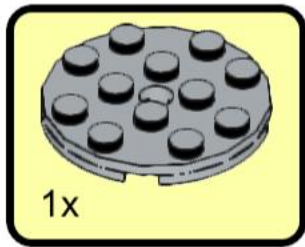
276



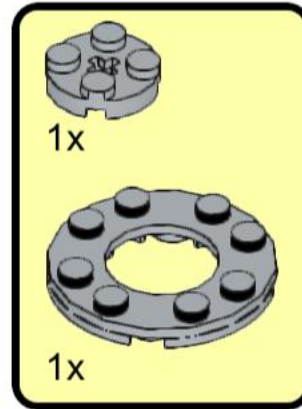


**Super Heavy
Starship HLS**

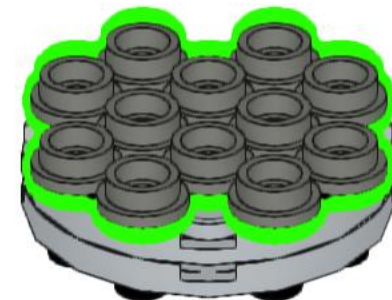
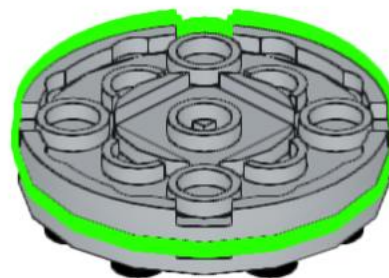
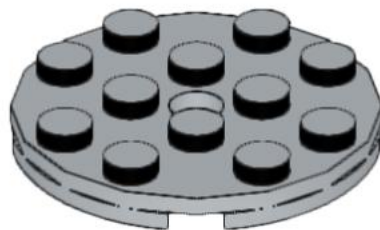
277



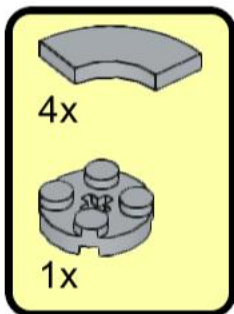
278



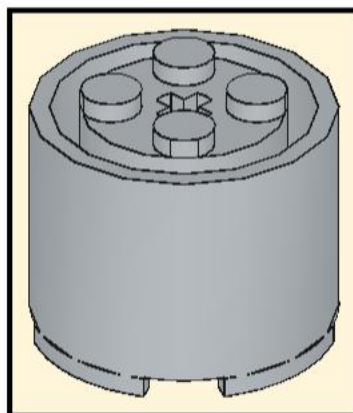
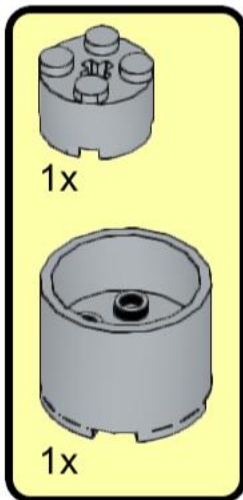
279



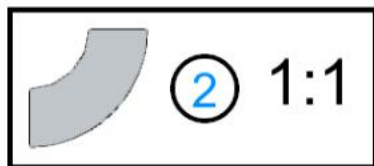
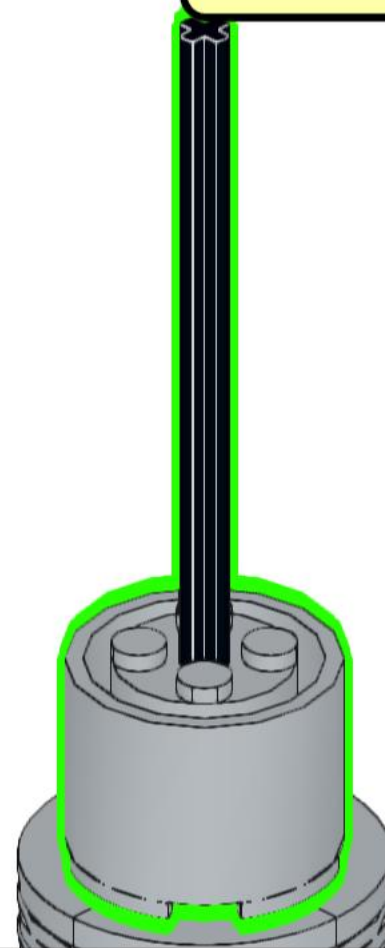
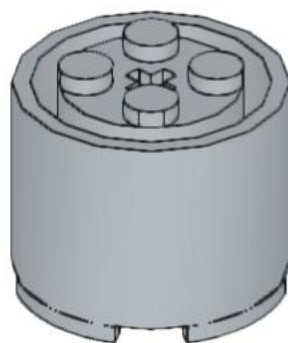
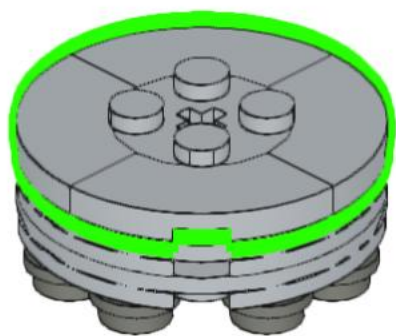
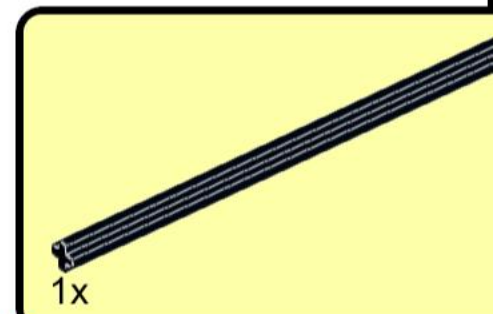
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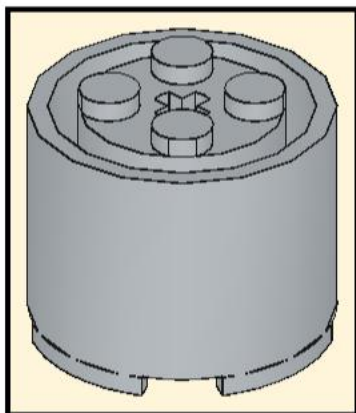
281



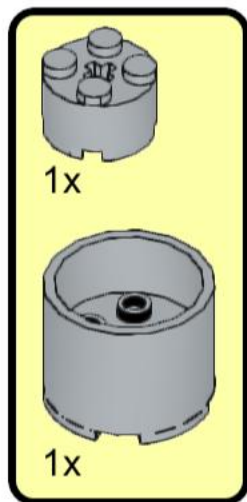
282



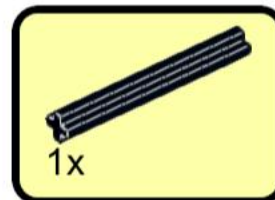
283



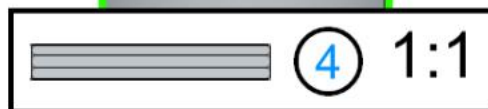
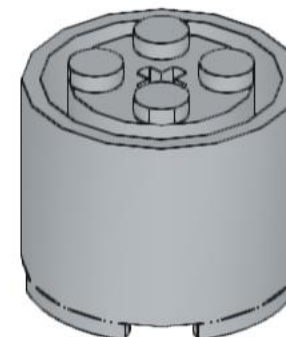
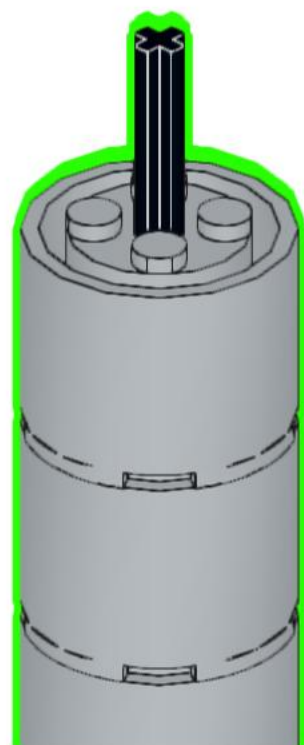
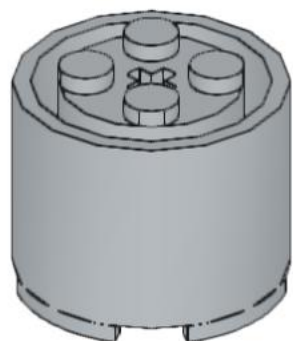
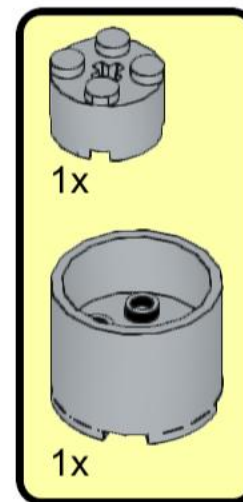
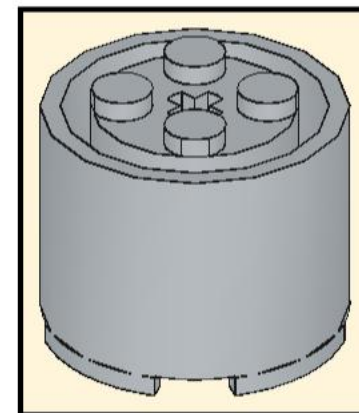
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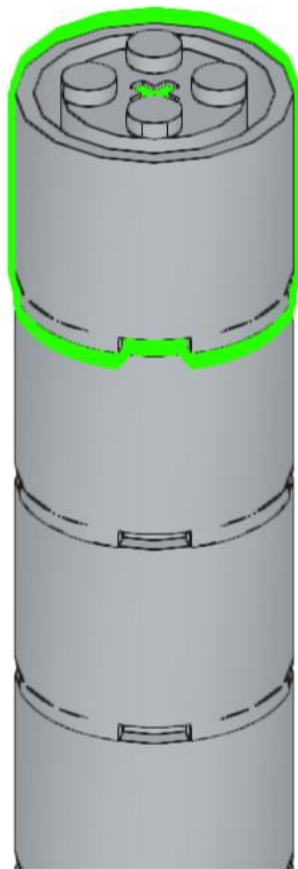
284



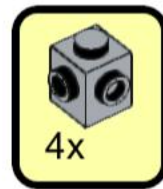
285



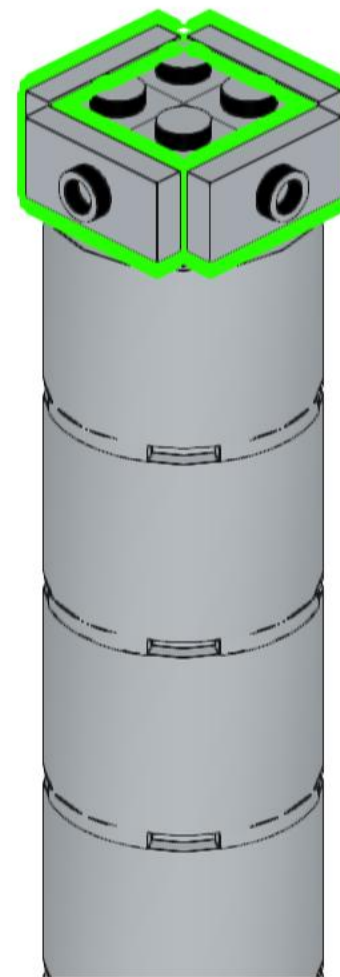
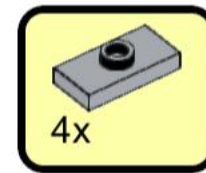
286



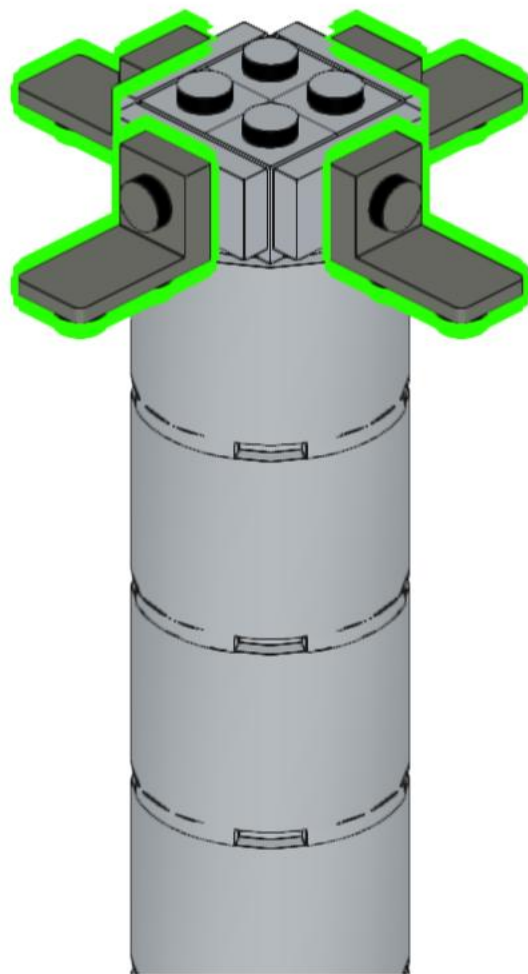
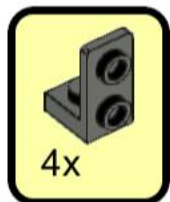
287



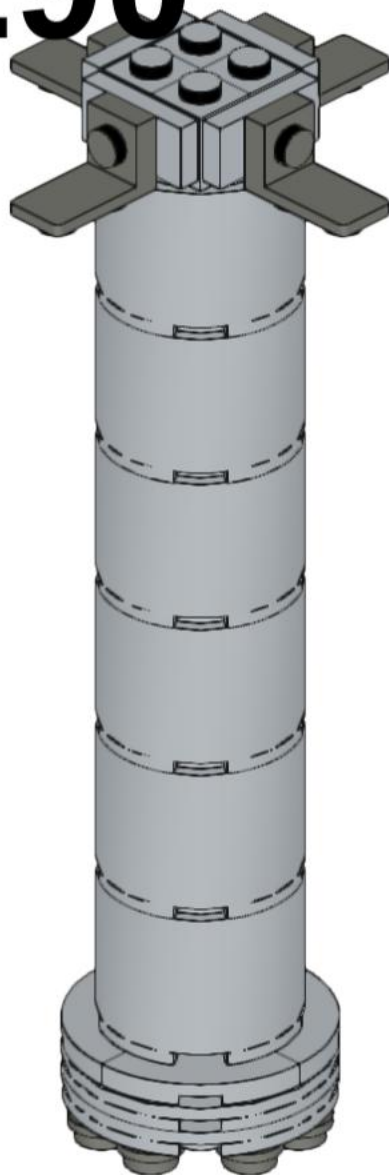
288



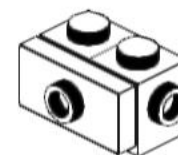
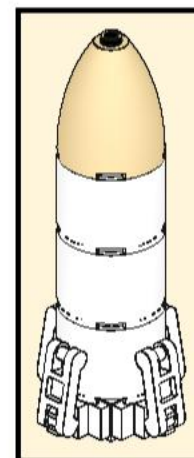
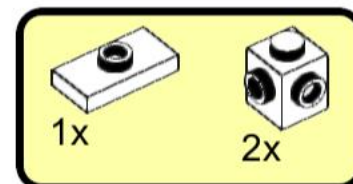
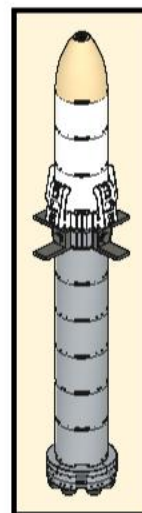
289



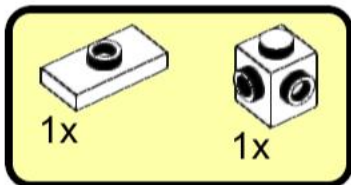
290



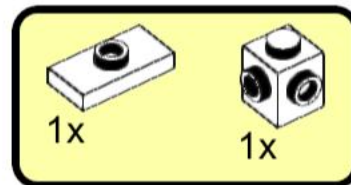
291



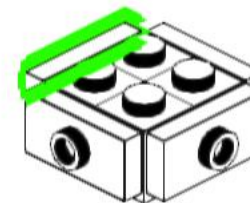
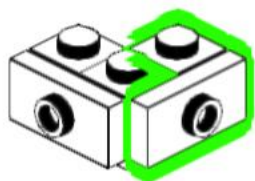
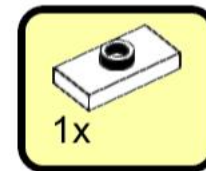
292



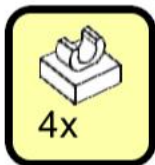
293



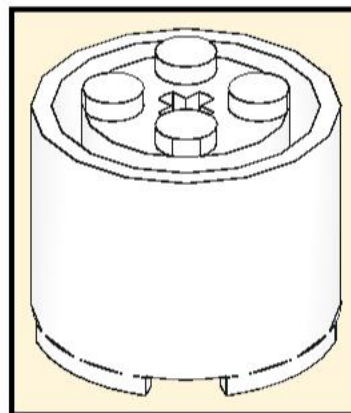
294



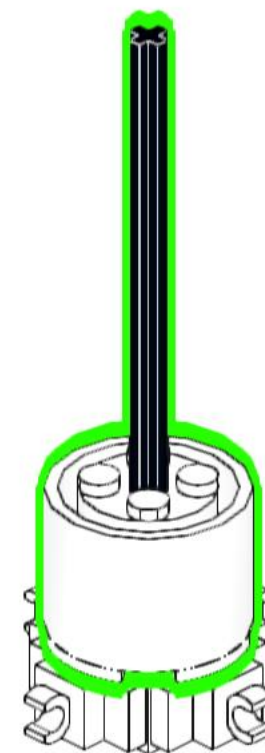
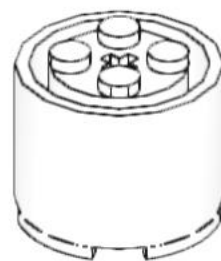
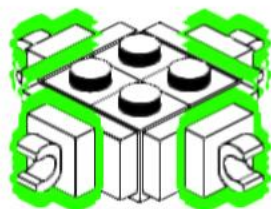
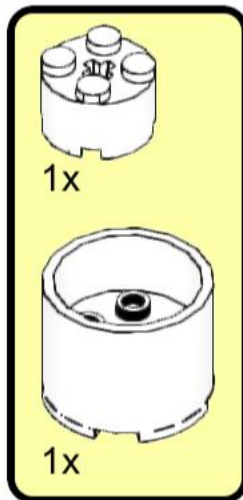
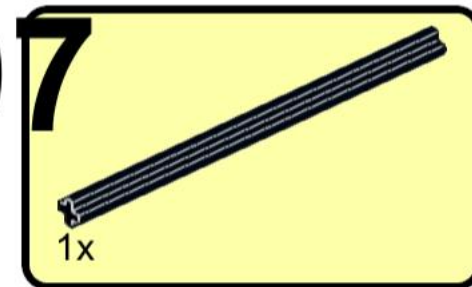
295



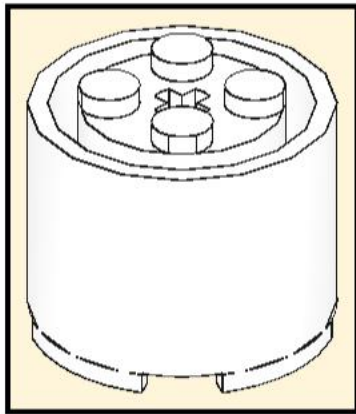
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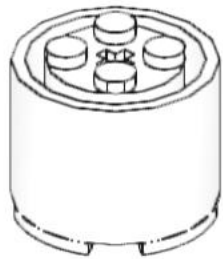
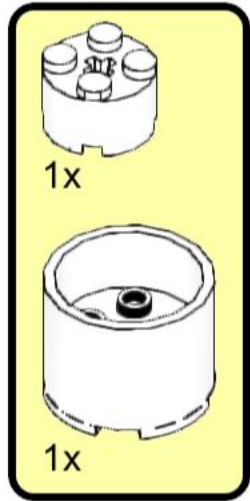
297



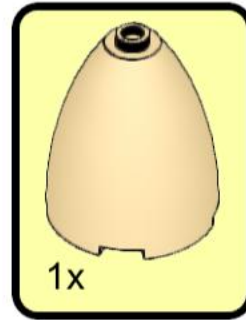
298



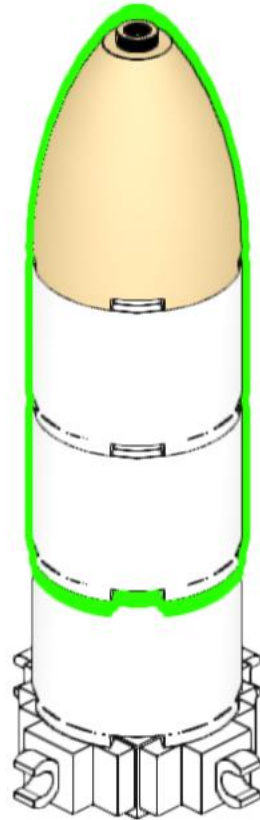
2x



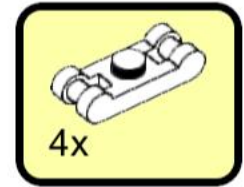
299



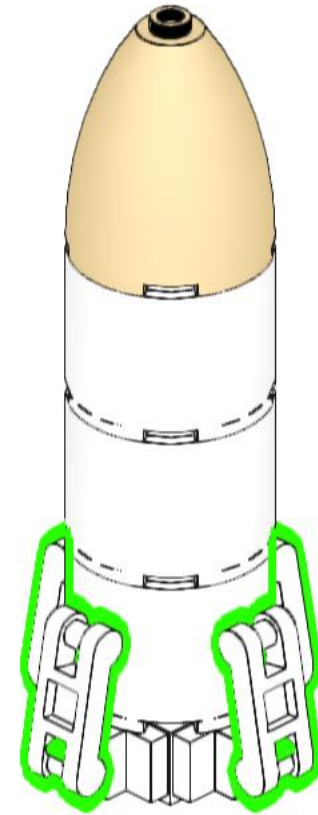
1x



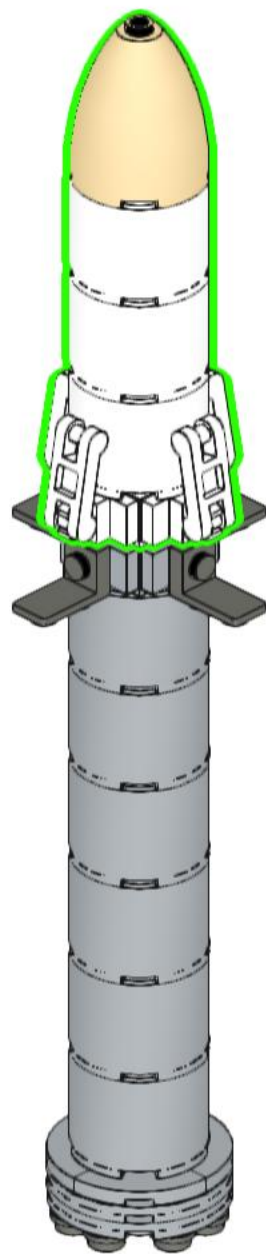
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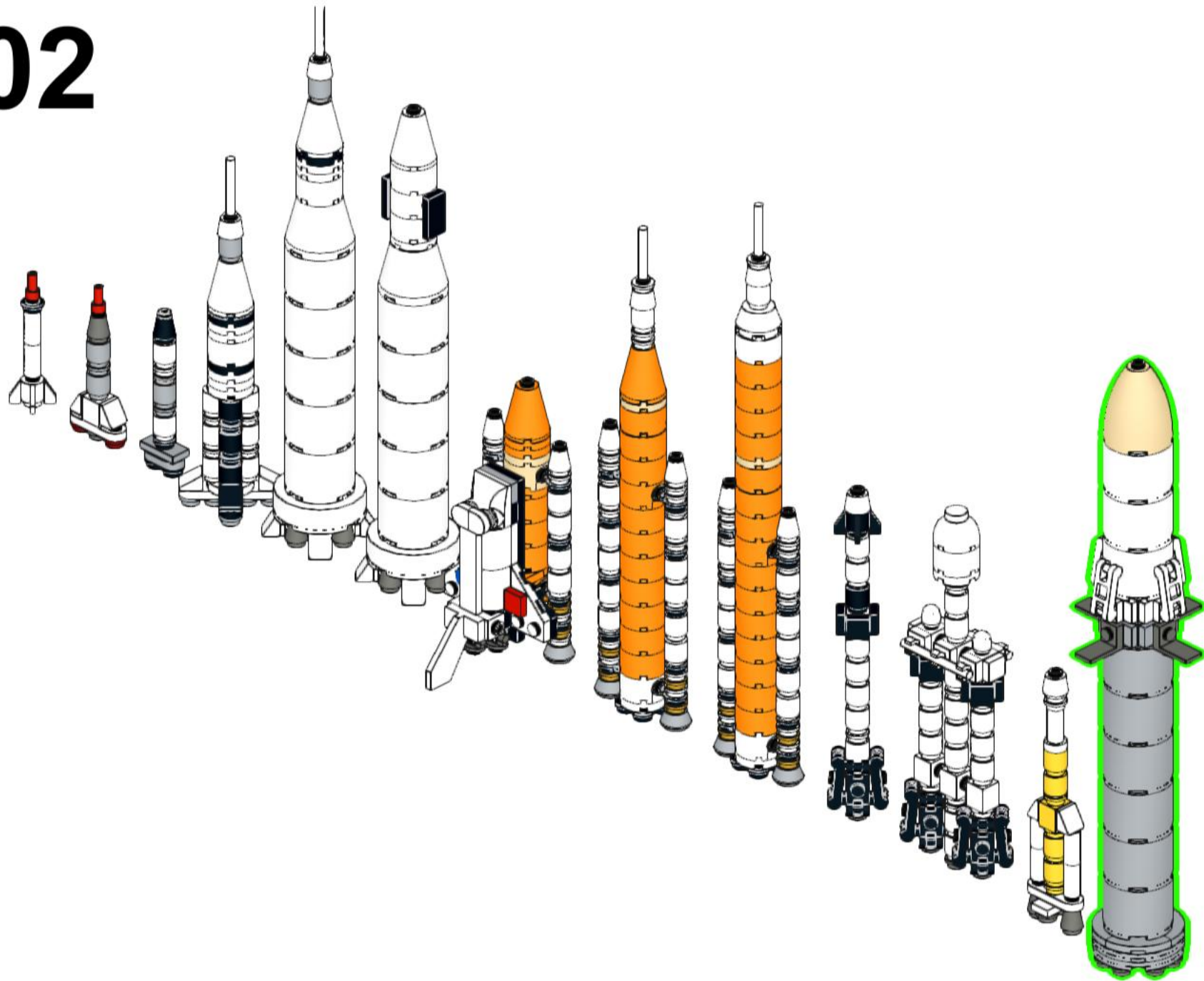
4x

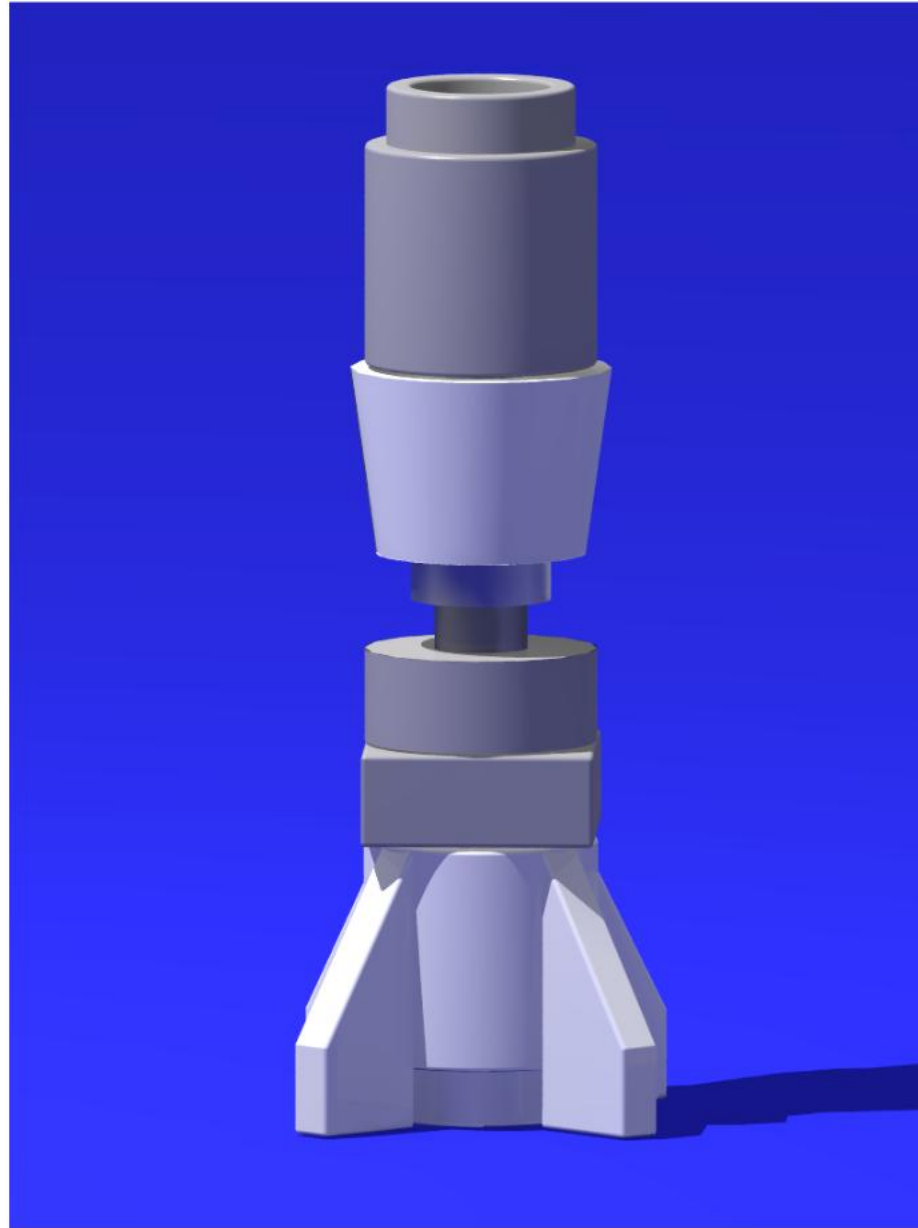


301



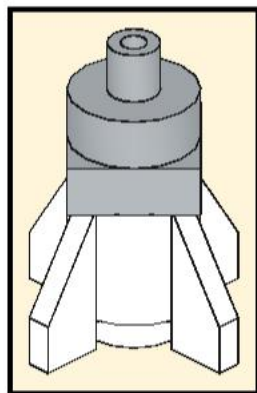
302



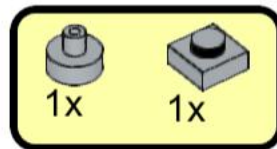


**Apollo
Command + Service Module
+
Lunar Module**

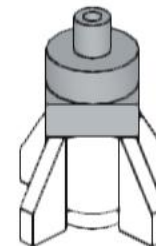
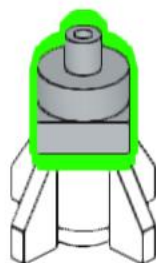
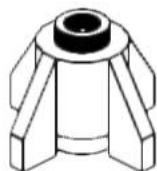
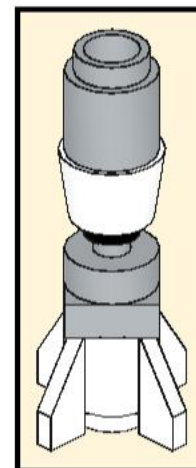
303



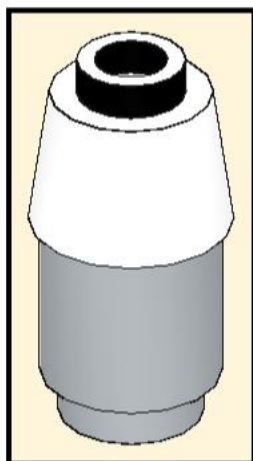
304



305



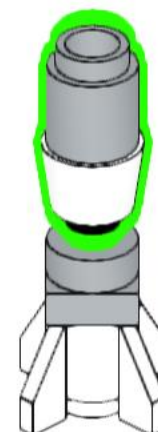
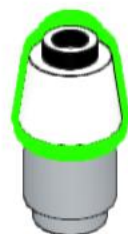
306



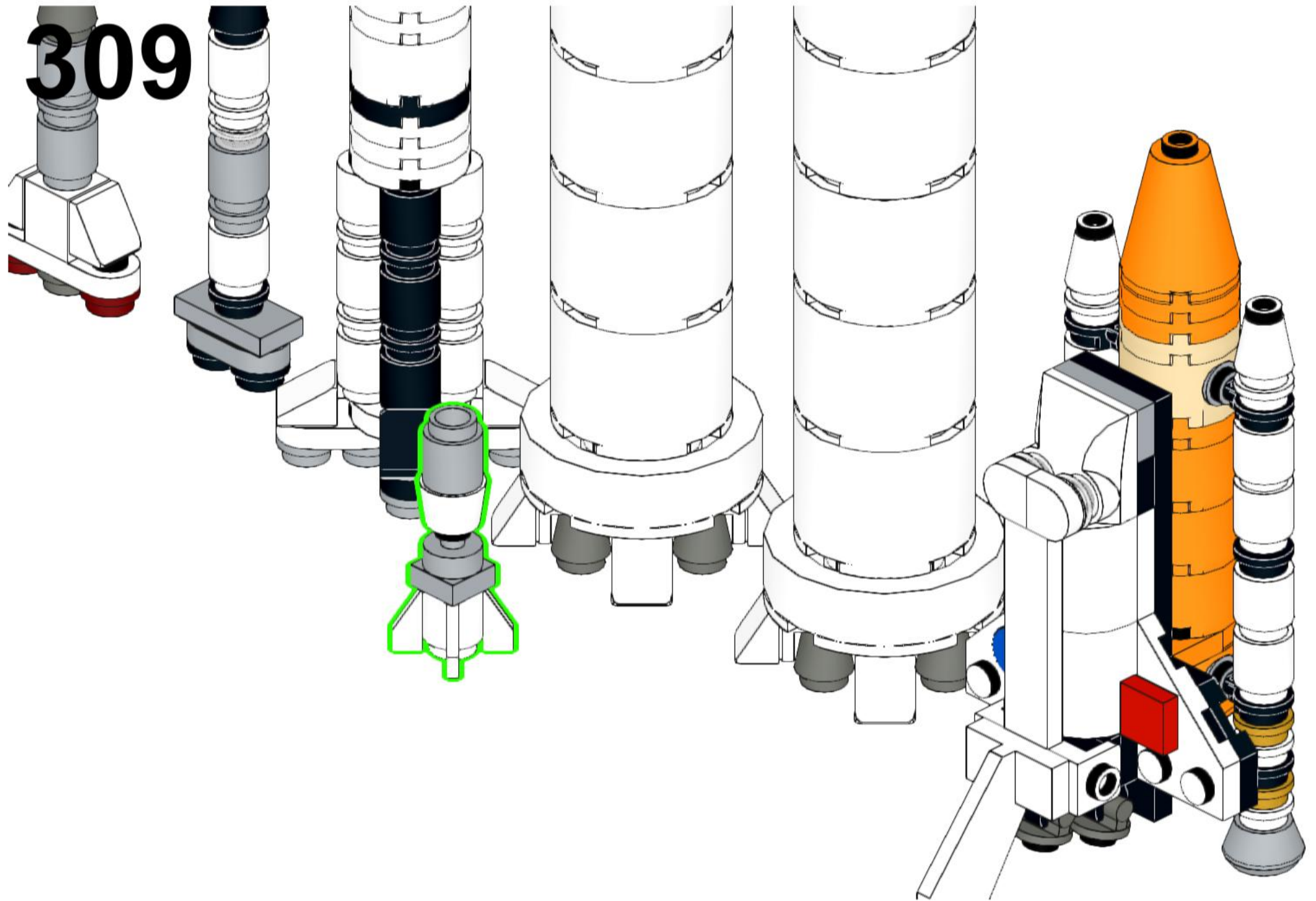
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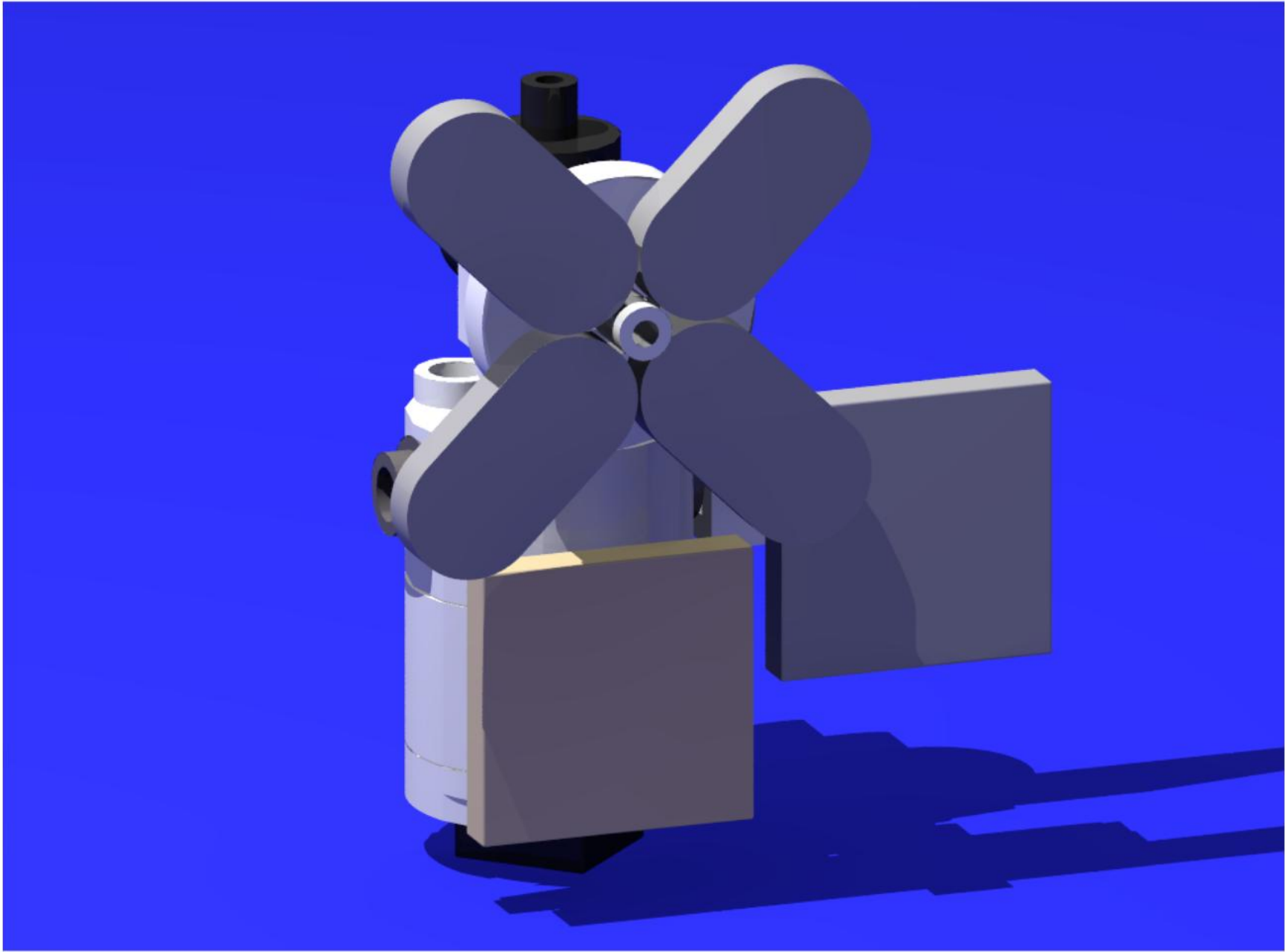


308



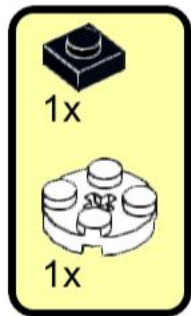
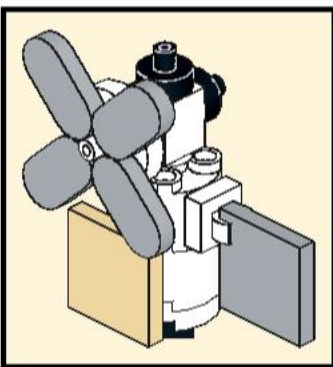
309



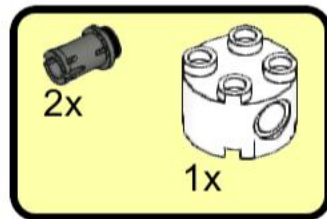


Skylab

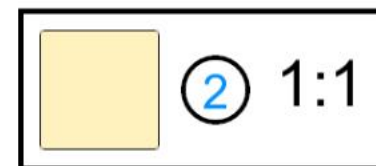
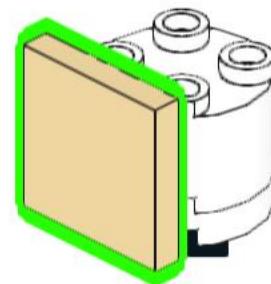
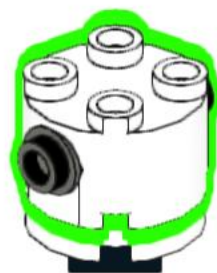
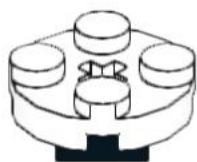
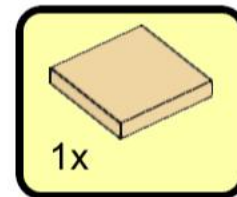
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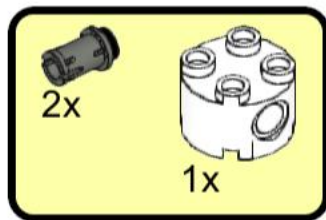
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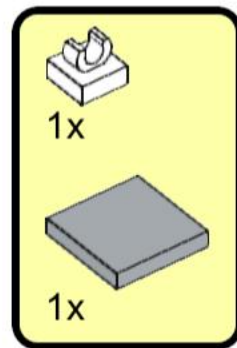
312



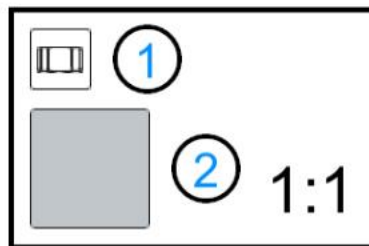
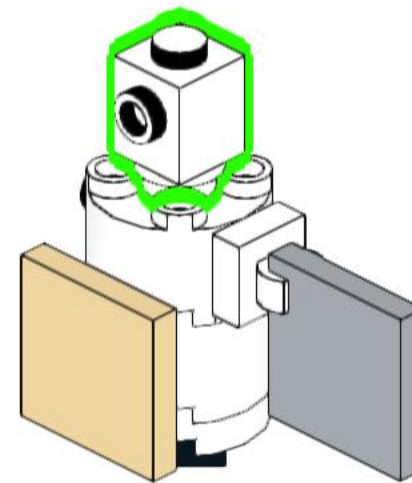
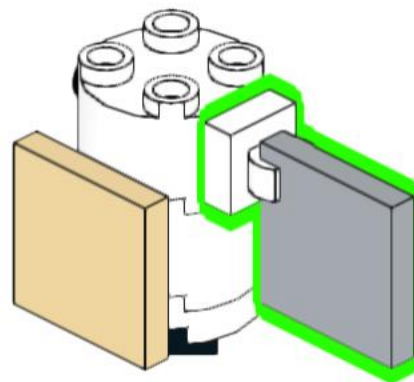
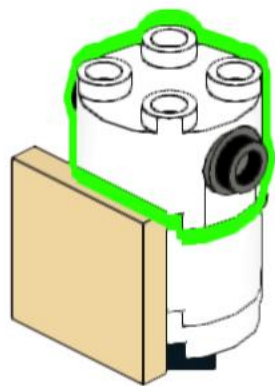
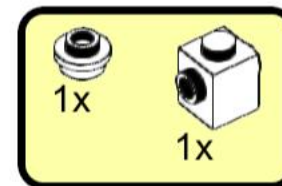
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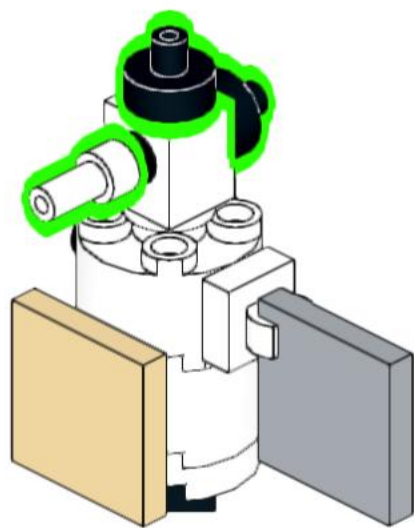
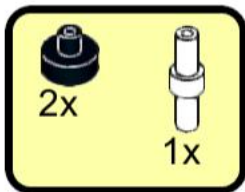
314



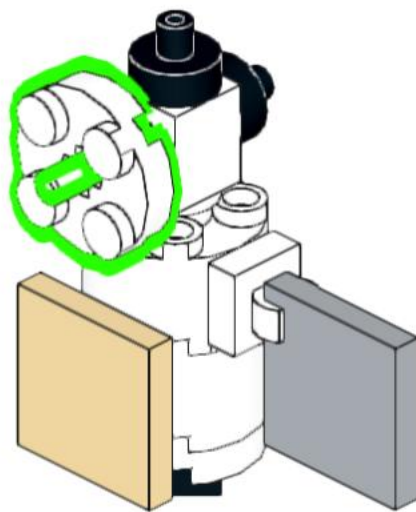
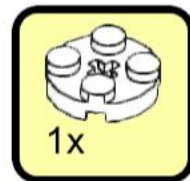
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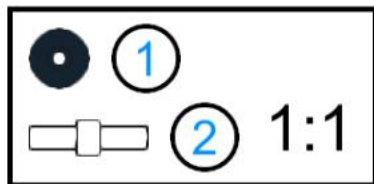
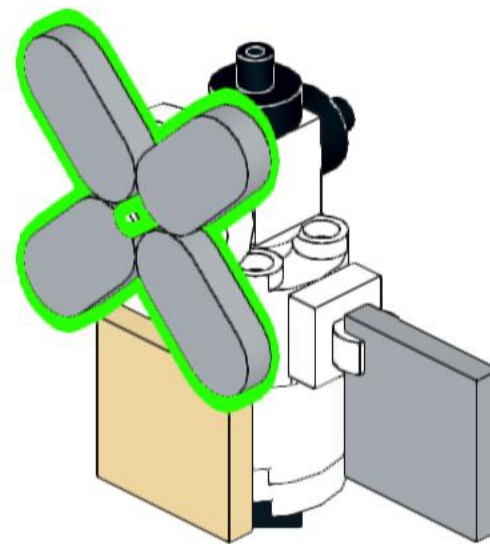
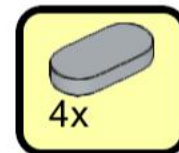
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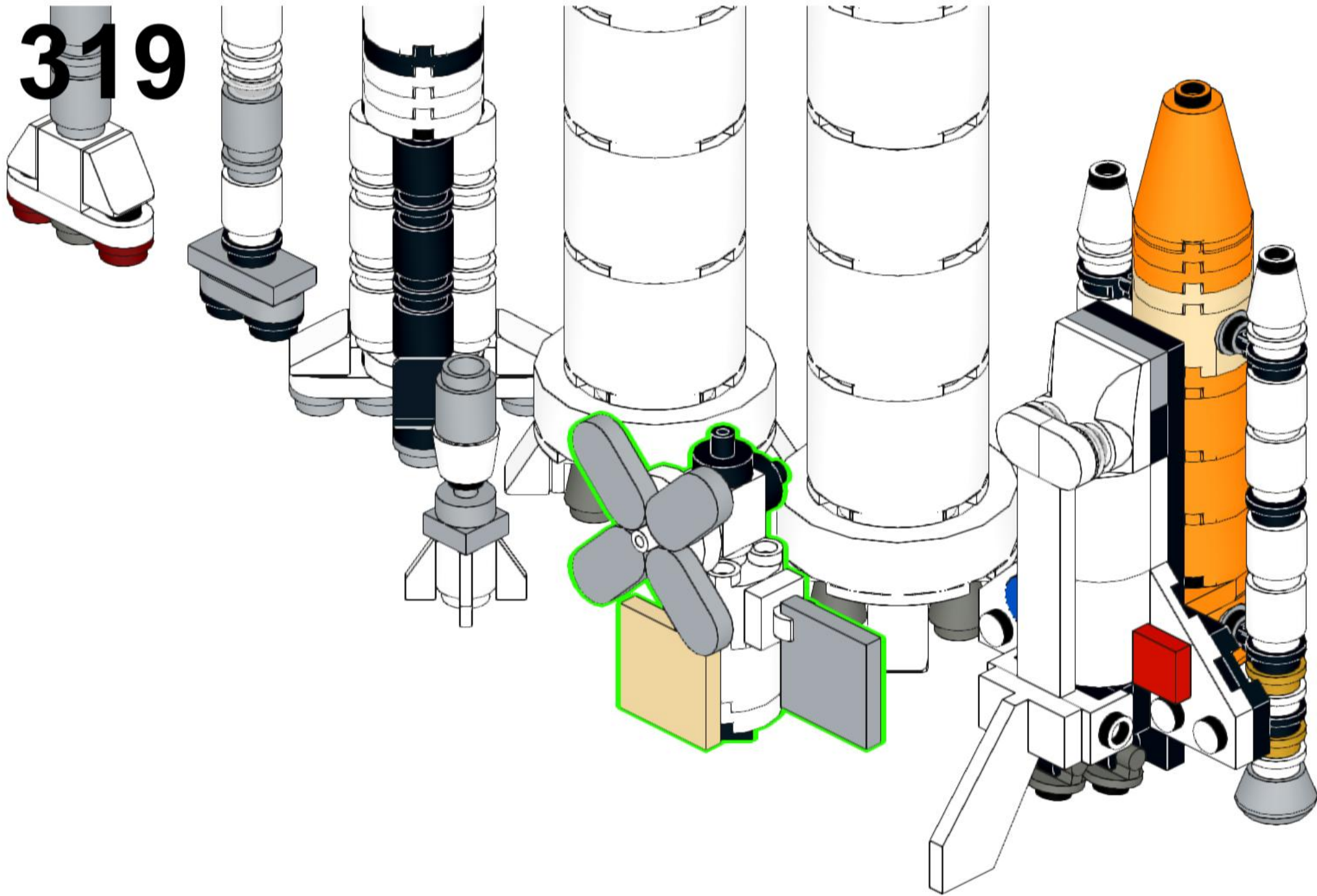
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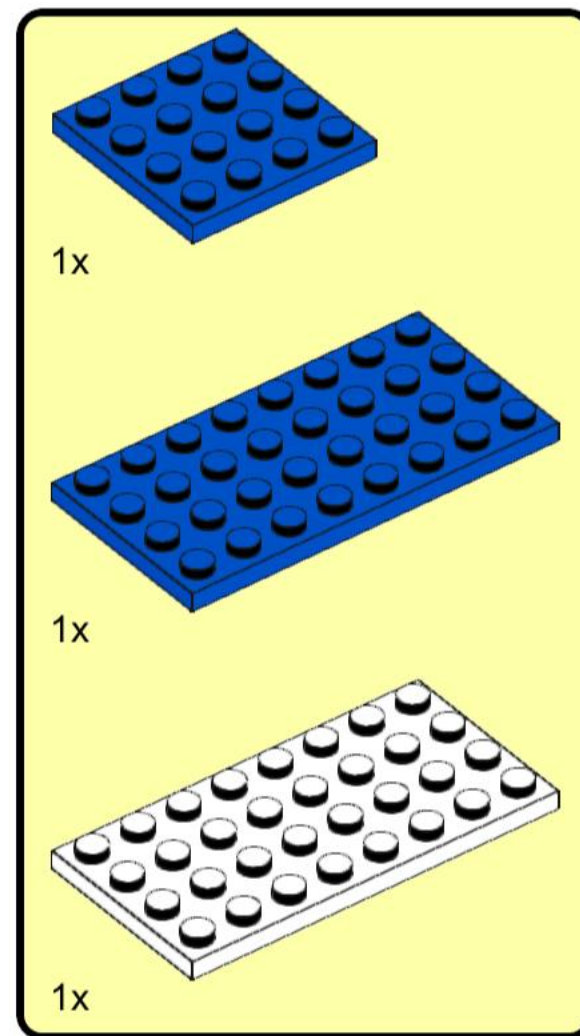
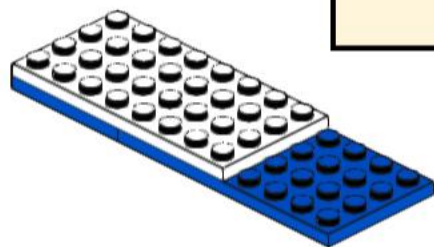
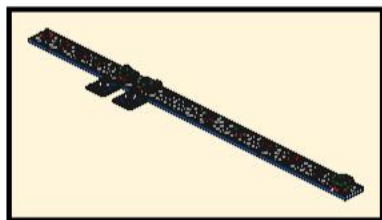
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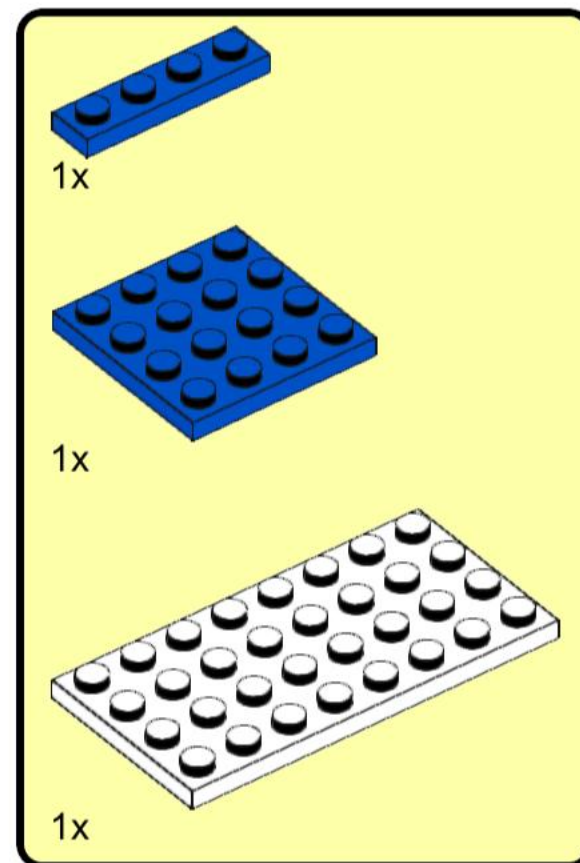
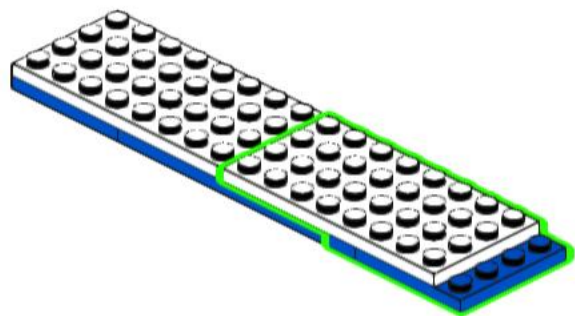
319



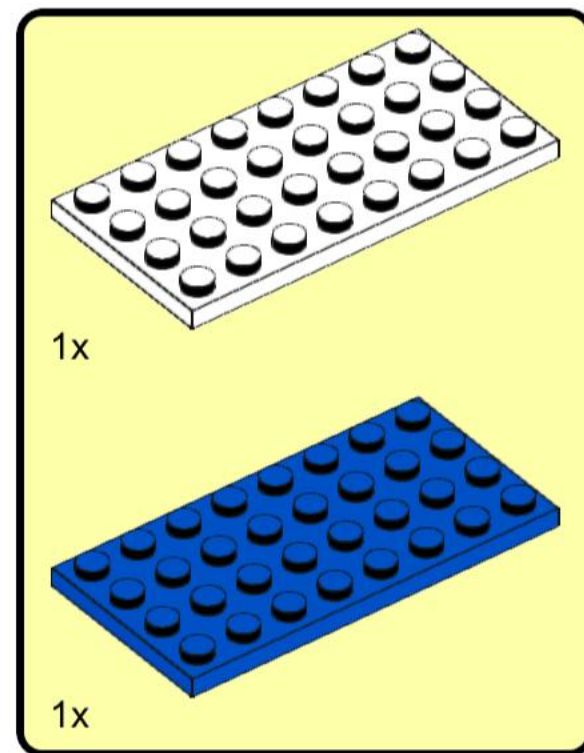
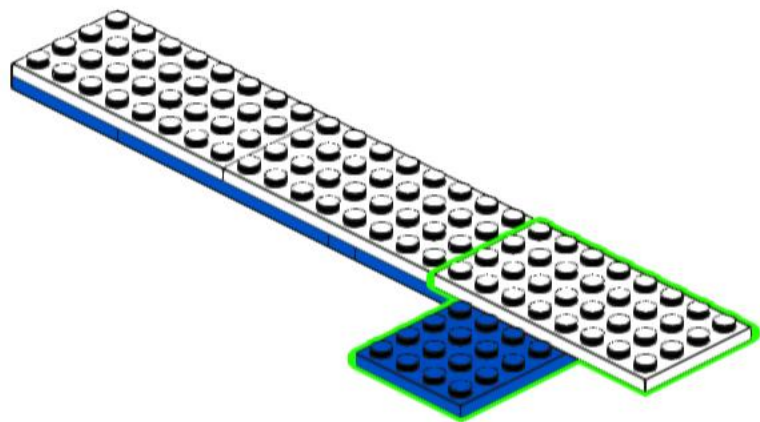
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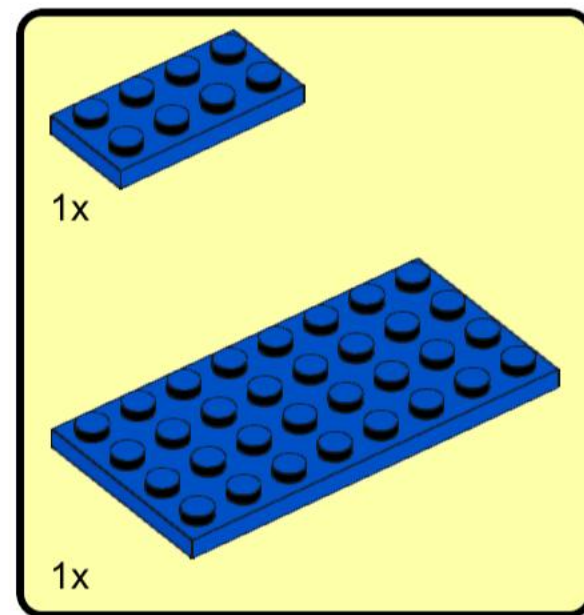
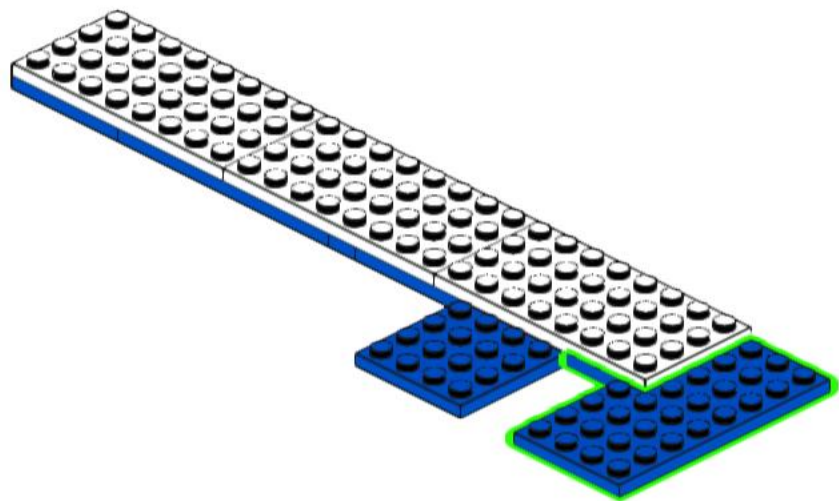
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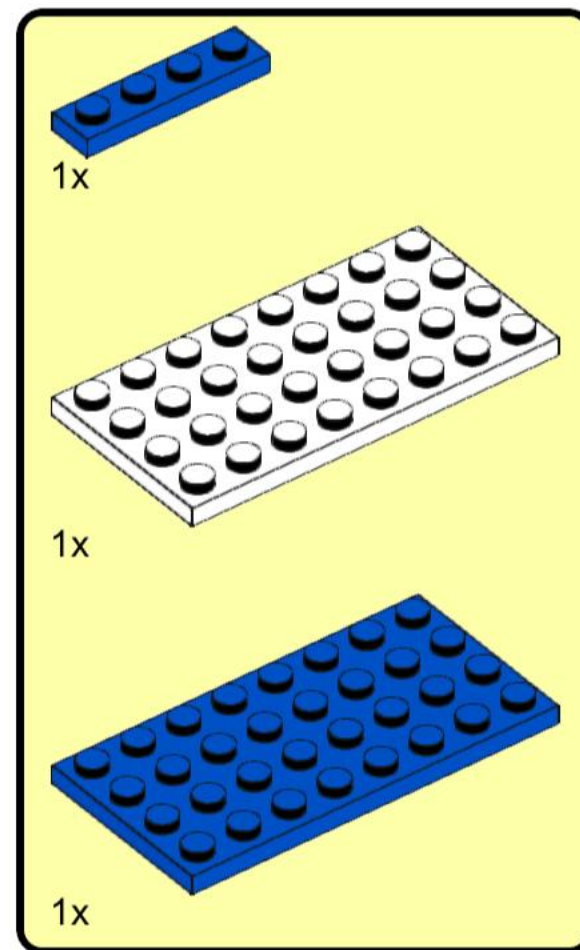
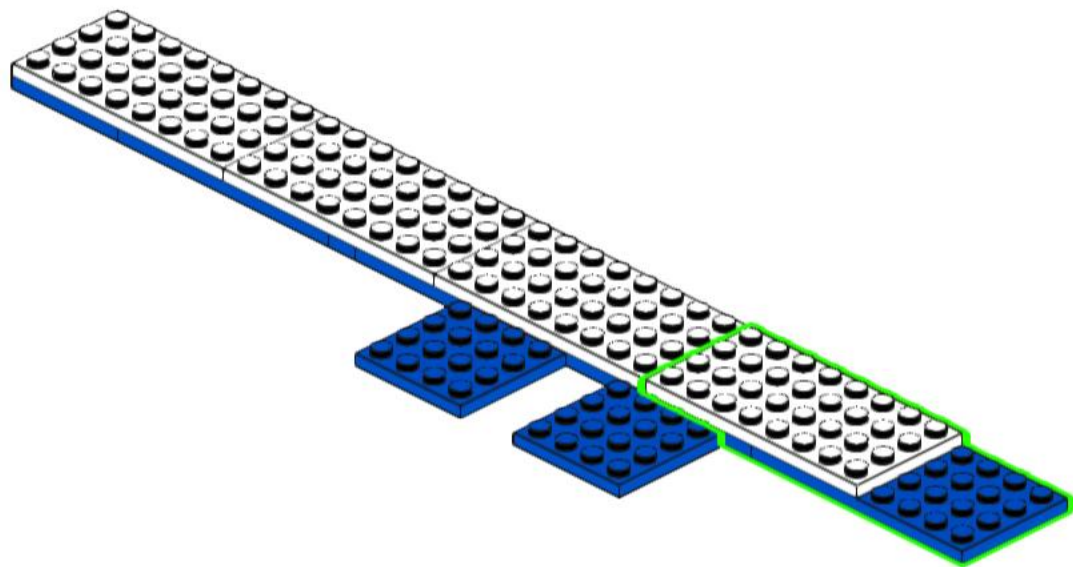
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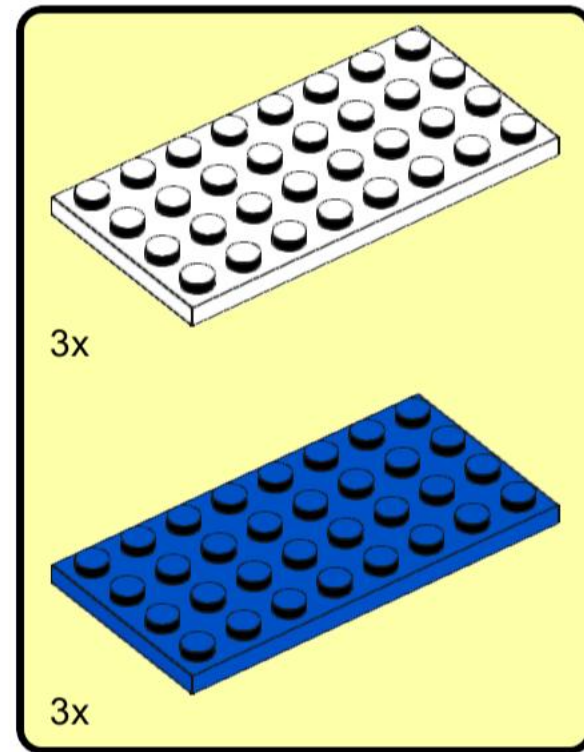
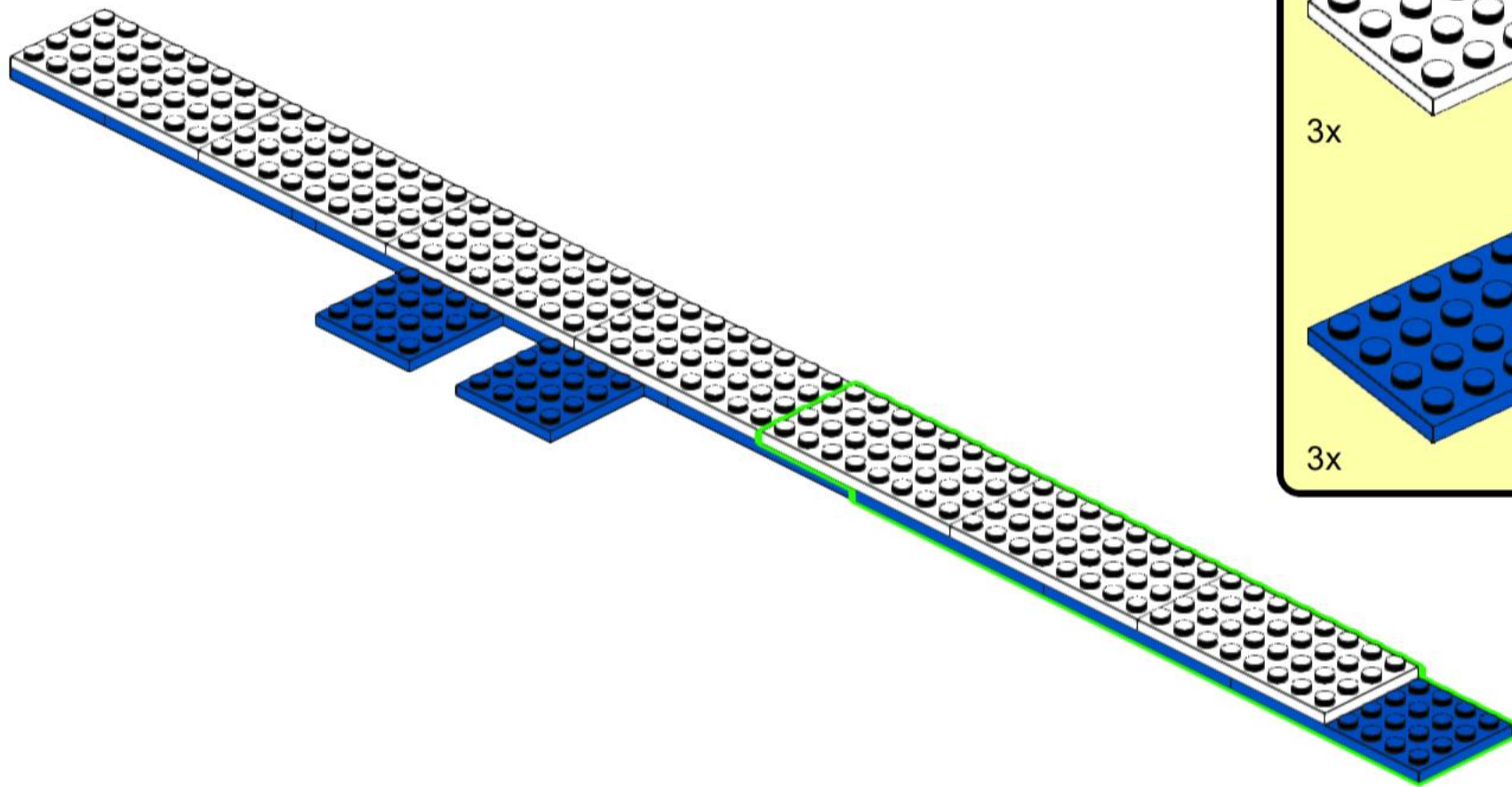
323



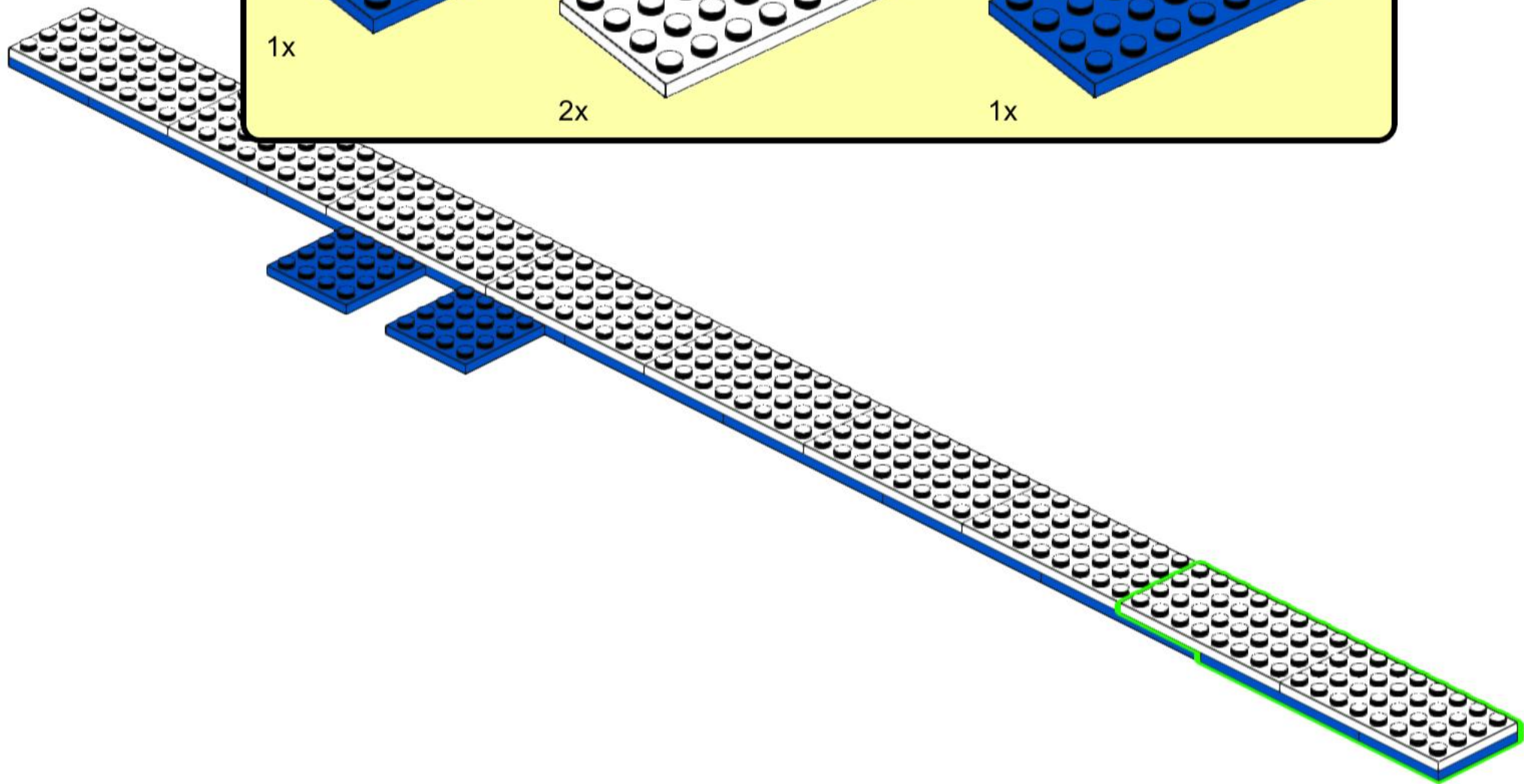
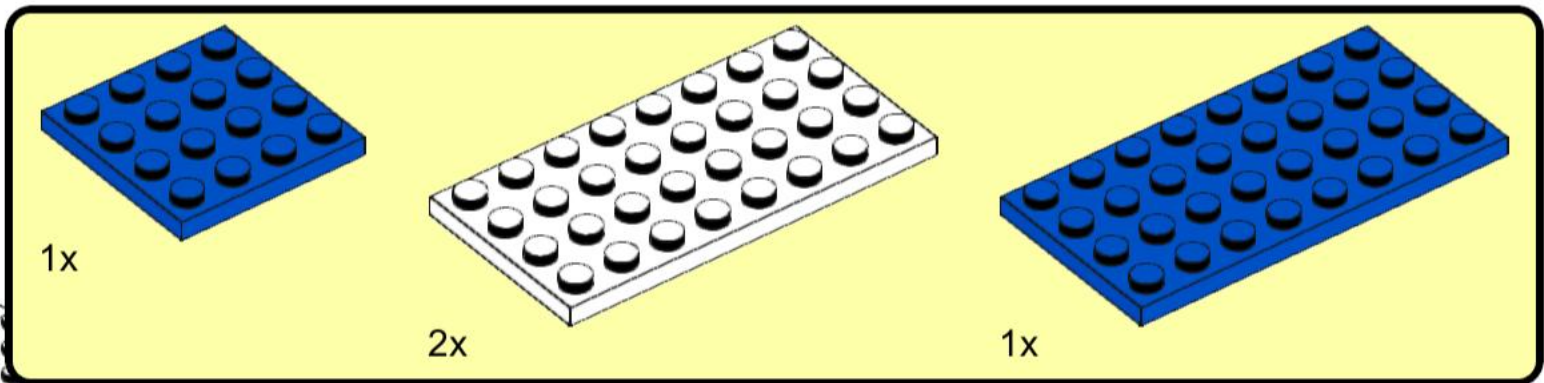
324



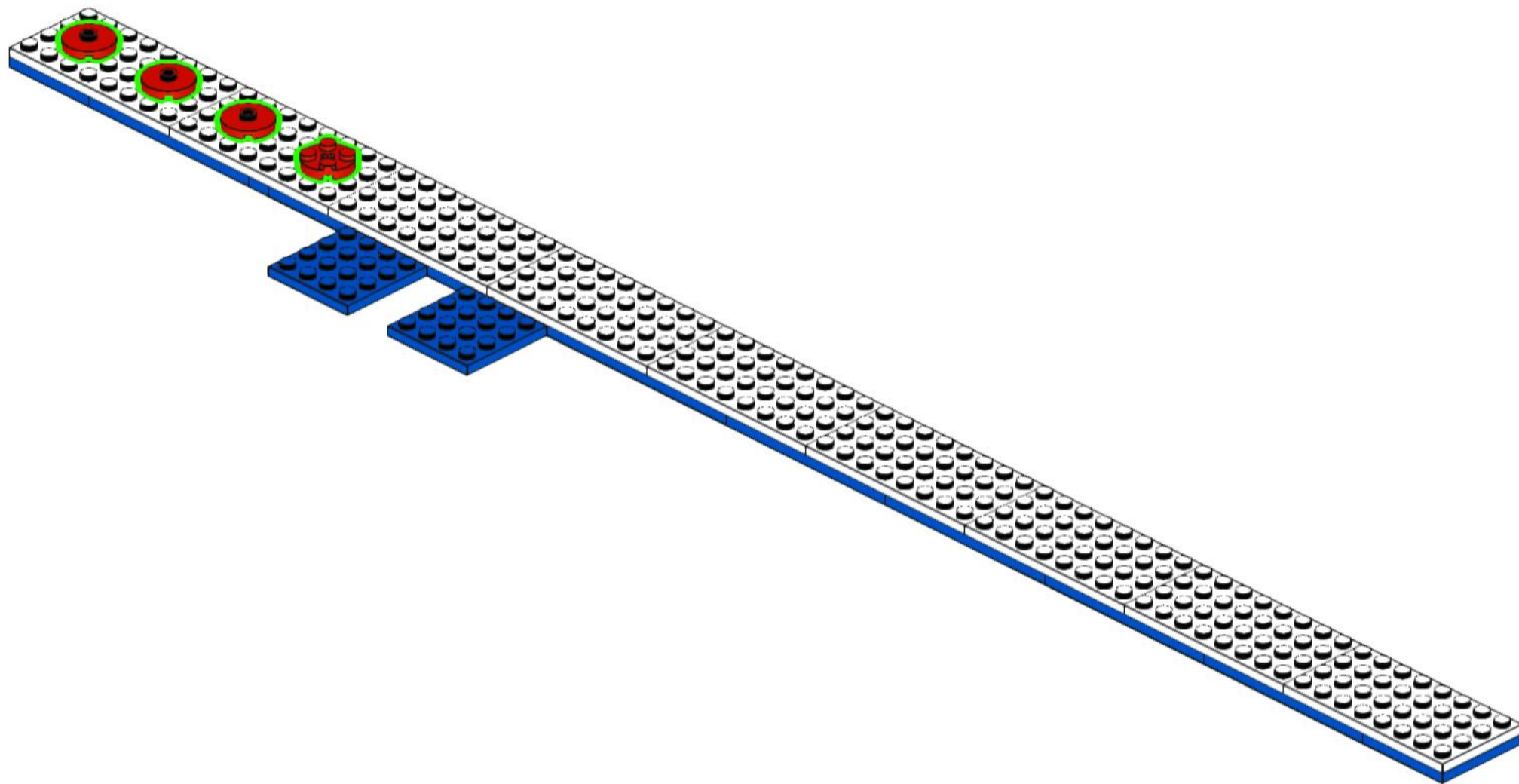
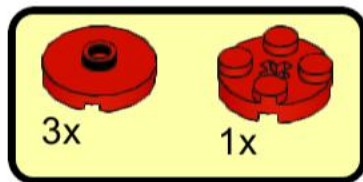
325



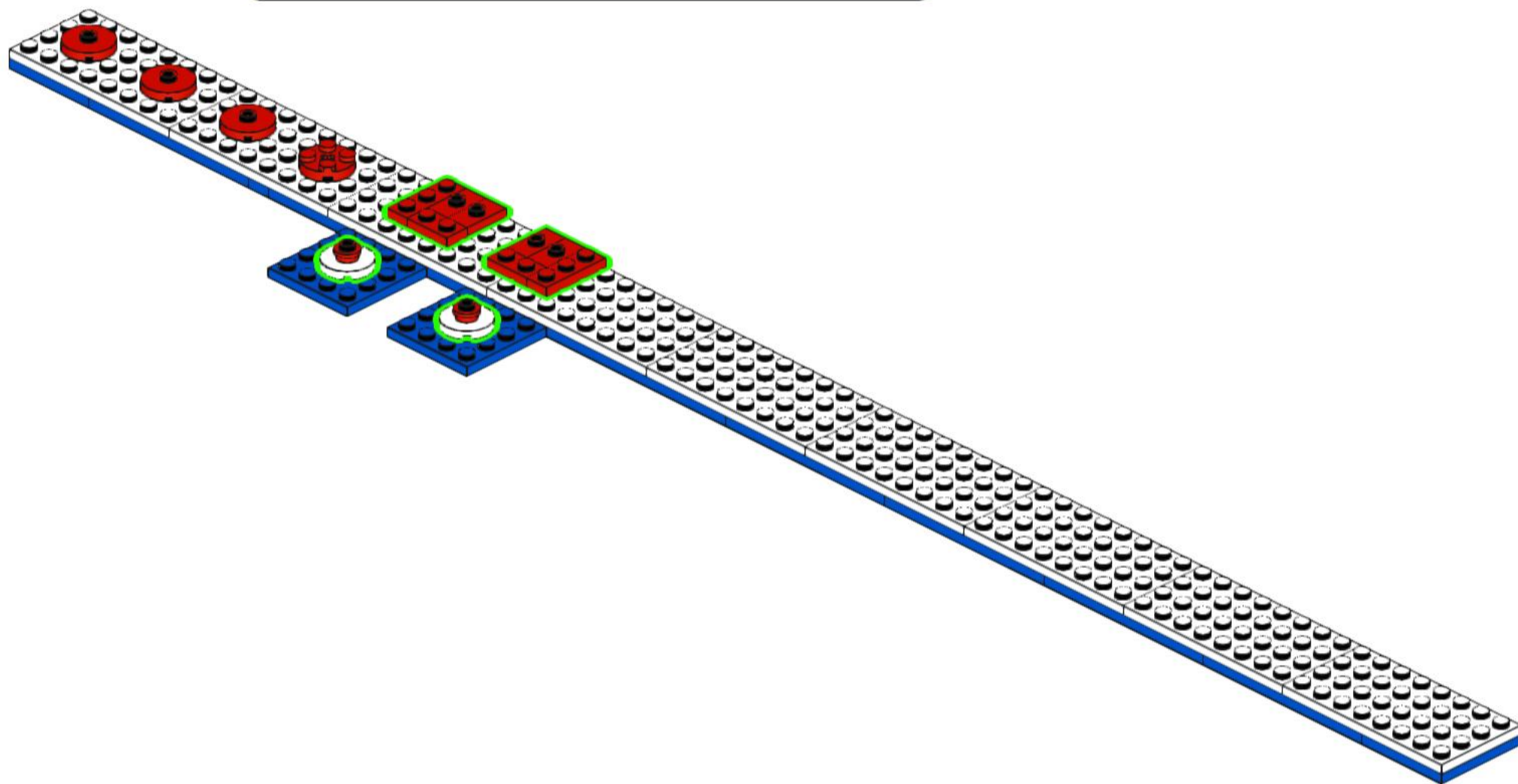
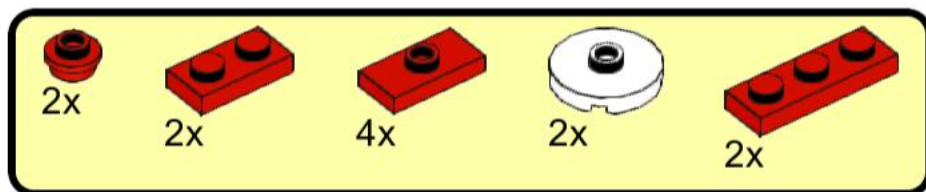
326



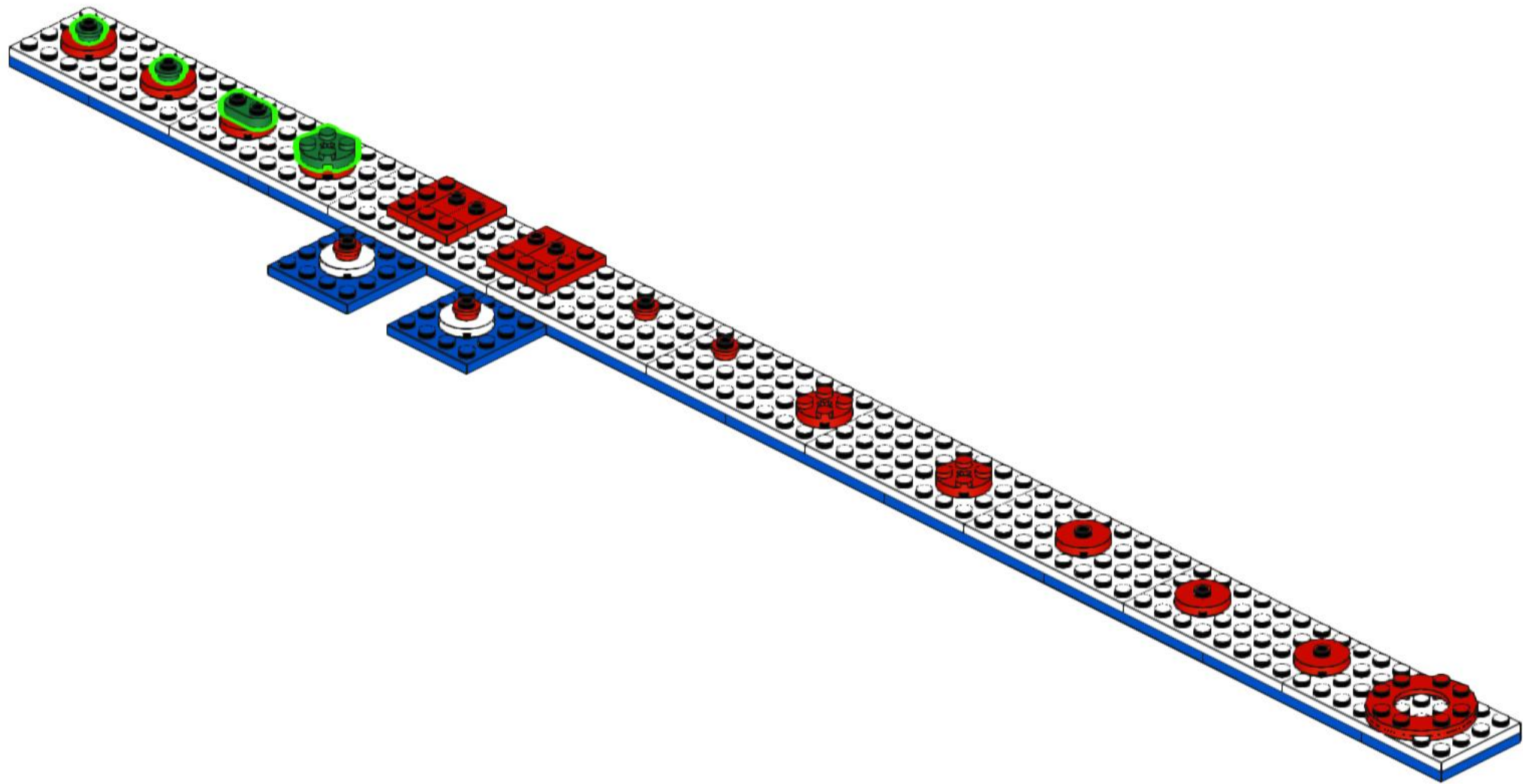
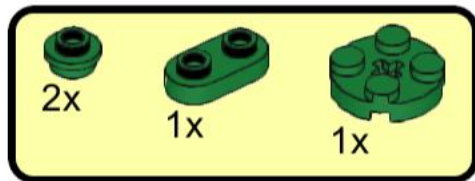
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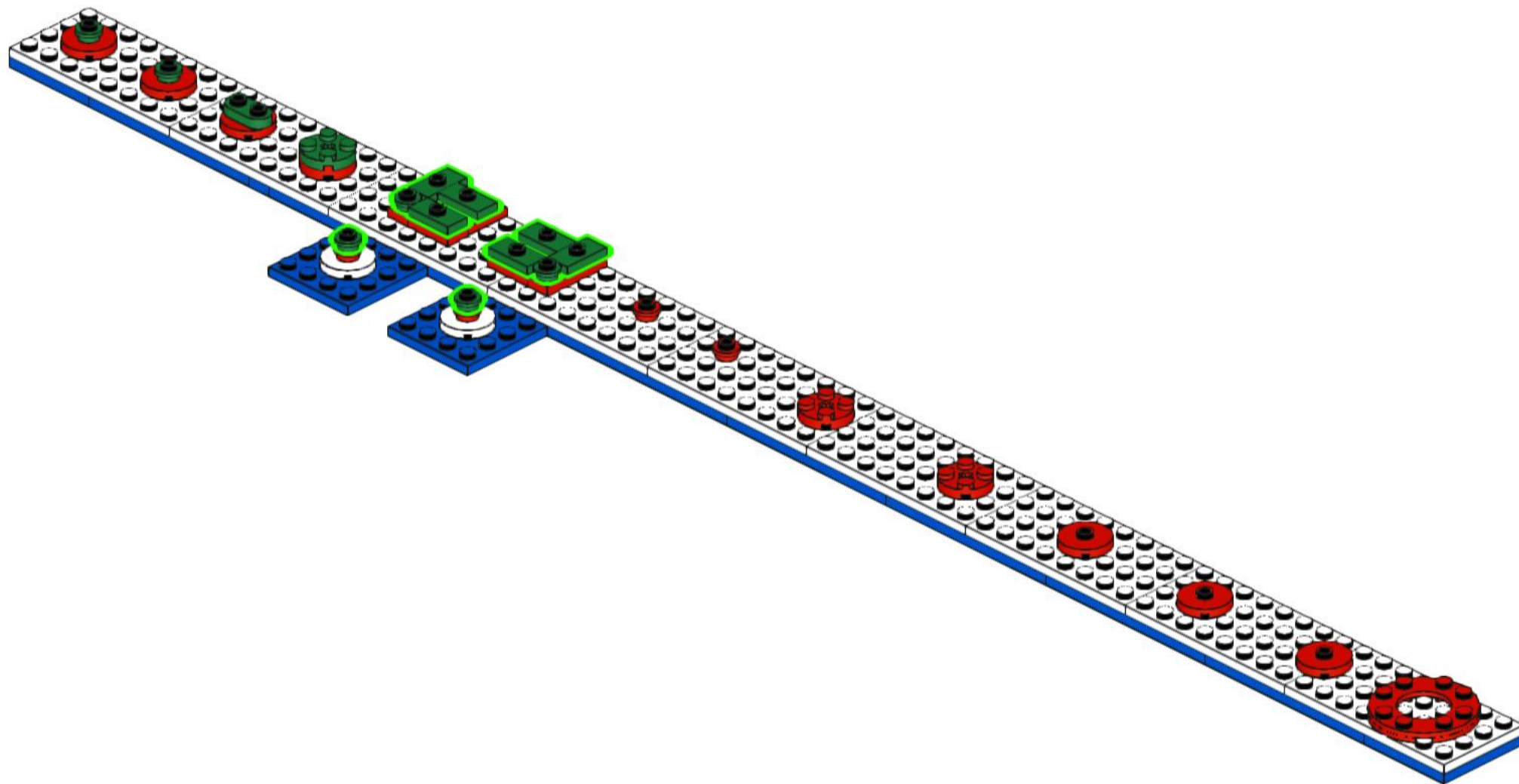
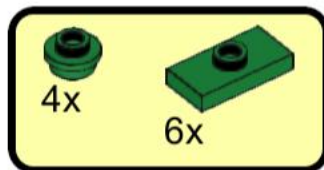
328



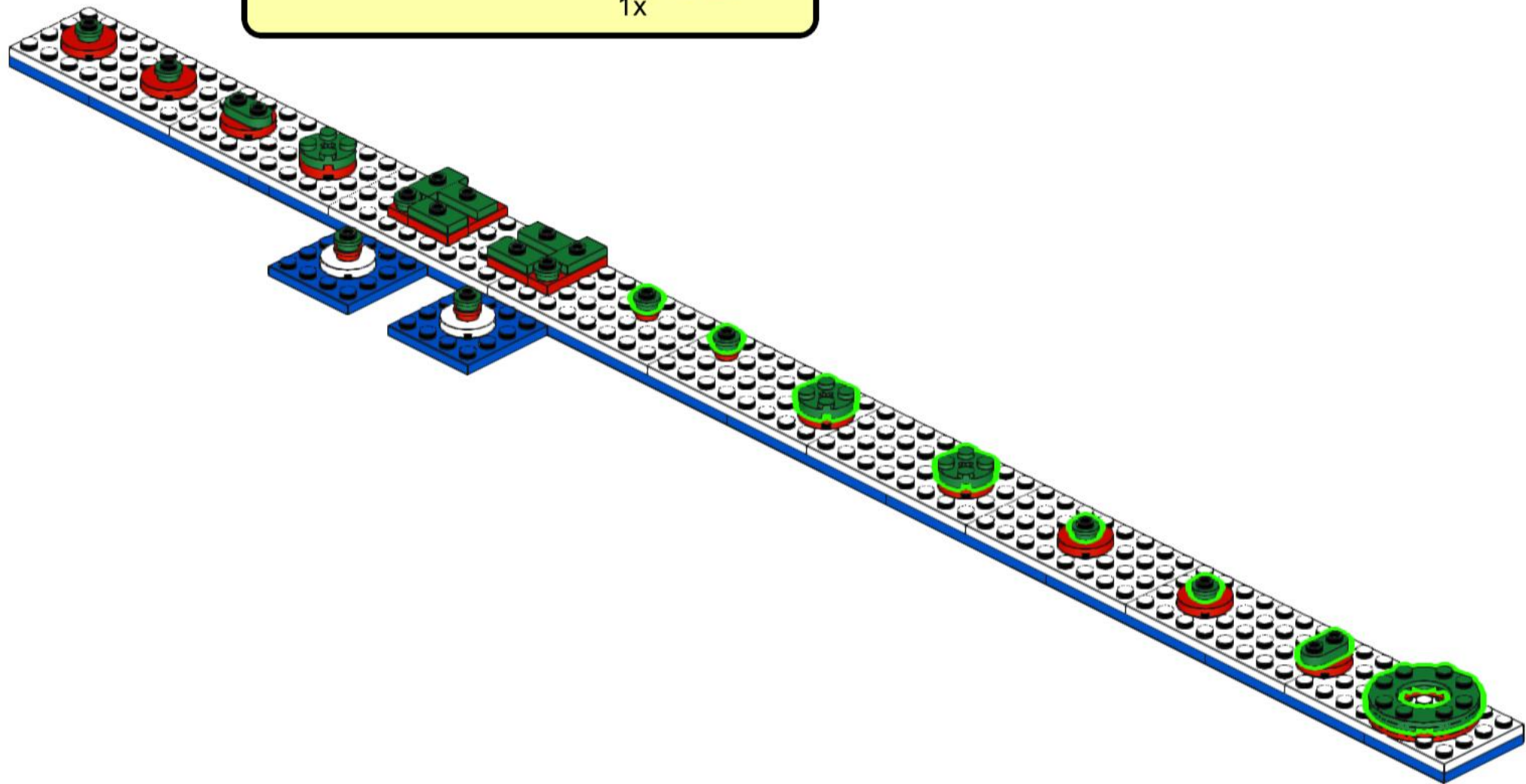
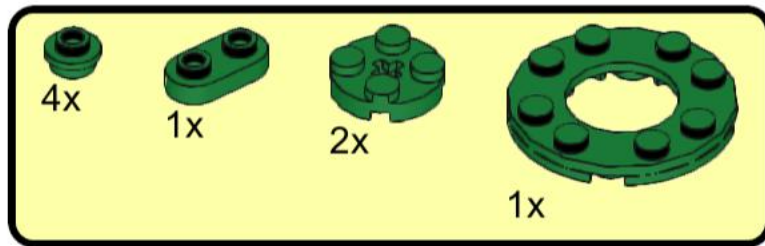
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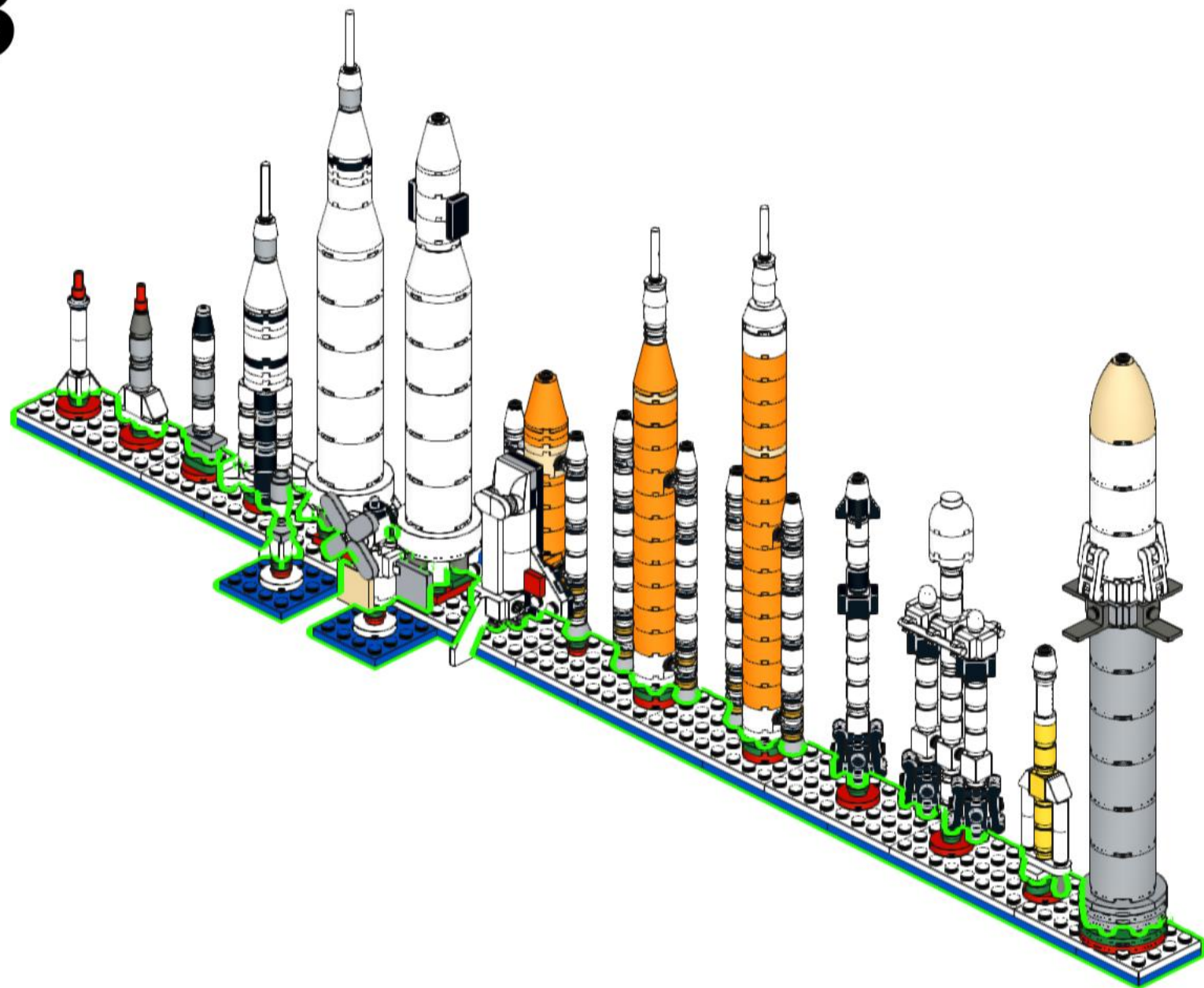
331



332

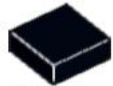


333



Teileliste

Bill of Materials



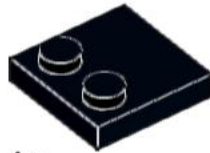
12x
3070
Black



1x
4589b
Black



12x
32828
Black



1x
33909
Black



2x
30374
Black



32x
85861
Black



7x
3062
Black



1x
60470b
Black



12x
78257
Black



1x
3705
Black



1x
3737
Black



1x
3024
Black



2x
3023
Black



1x
11476
Black



3x
87994
Black



1x
3795
Black



19x
85861
Dark Bluish Gray



2x
54200
Black



2x
35480
Black



3x
4032
Black



1x
4588
Black



6x
89678
Dark Bluish Gray



2x
20482
Black



2x
3069
Black



2x
26601
Black



3x
90202
Black



3x
79194
Dark Bluish Gray



1x
3707
Black



13x
4589b
Dark Bluish Gray



4x
73825
Dark Bluish Gray



6x
3062
Light Bluish Gray



4x
1126
Light Bluish Gray



4x
27925
Light Bluish Gray



1x
11833
Light Bluish Gray



56x
85861
White



7x
85975
White



10x
85861
Light Bluish Gray



6x
33492
Light Bluish Gray



4x
3794b
Light Bluish Gray



1x
87994
Light Bluish Gray



1x
60474
Light Bluish Gray



14x
54200
White



6x
4589b
White



1x
3024
Light Bluish Gray



4x
26604
Light Bluish Gray



1x
15573
Light Bluish Gray




6x
3941
Light Bluish Gray



1x
20482
White



1x
20482
White



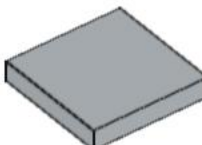
62x
3062
White



12x
4274
Light Bluish Gray



1x
3023
Light Bluish Gray



1x
3068
Light Bluish Gray



6x
73111
Light Bluish Gray



2x
24246
White



11x
15712
White



10x
36841
White



1x
20482
Light Bluish Gray



1x
35480
Light Bluish Gray



2x
4032
Light Bluish Gray



2x
3070
White



2x
58176
White



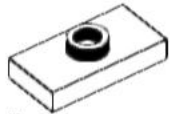
2x
87087
White



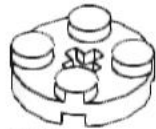
1x
98138
White



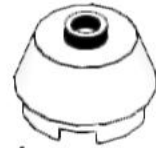
7x
37762
White



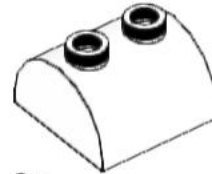
5x
3794b
White



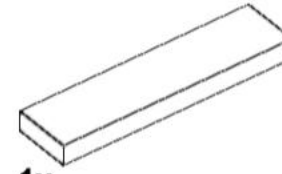
17x
4032
White



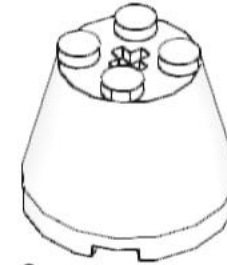
1x
98100
White



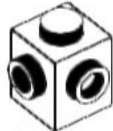
2x
30165
White



1x
2431
White



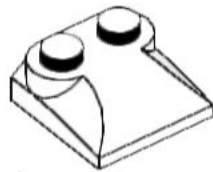
2x
6233
White



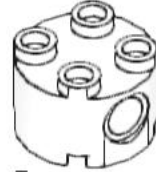
4x
26604
White



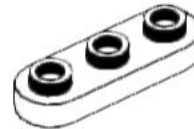
6x
4733
White



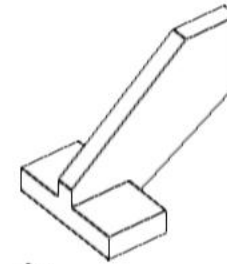
1x
47457
White



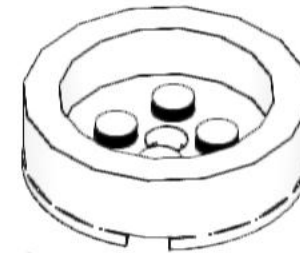
5x
17485
White



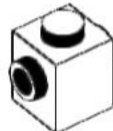
2x
77850
White



1x
44661
White



2x
68325
White



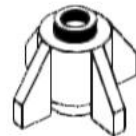
3x
47905
White



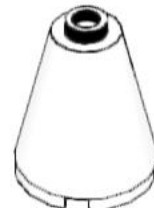
3x
18674
White



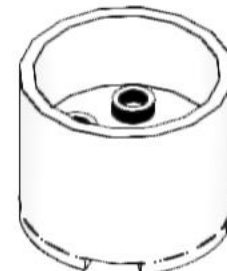
19x
87994
White



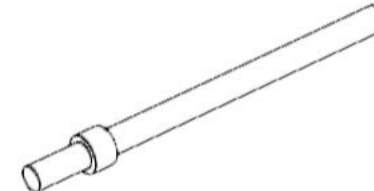
2x
4588
White



3x
3942c
White



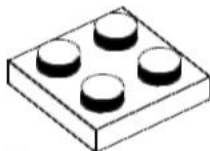
13x
73111
White



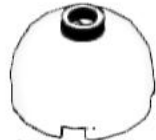
1x
63965
White



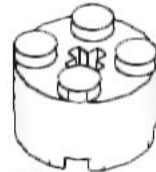
1x
78258
White



1x
3022
White



1x
553a
White



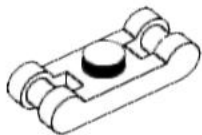
19x
3941
White



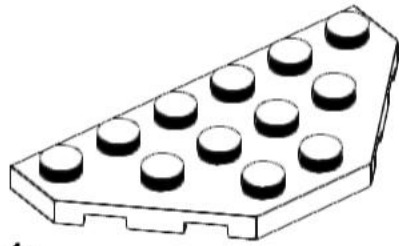
21x
30374
White



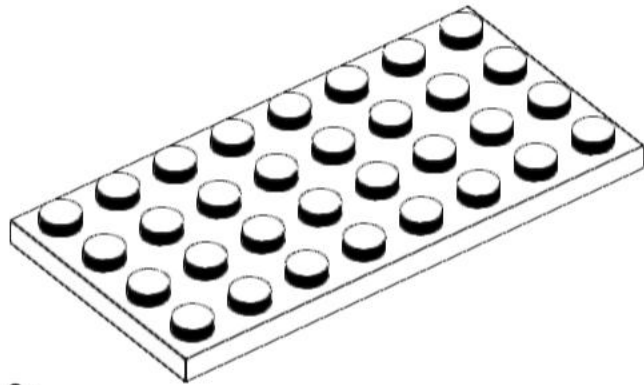
2x
35480
White



4x
78257
White



1x
2419
White



9x
3035
White



2x
85861
Dark Red



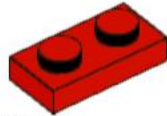
1x
3070
Red



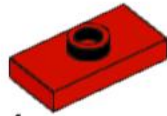
4x
85861
Red



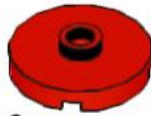
2x
78258
Red



2x
3023
Red



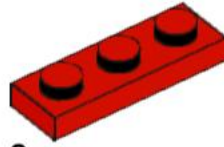
4x
3794b
Red



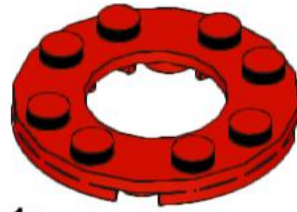
6x
18674
Red



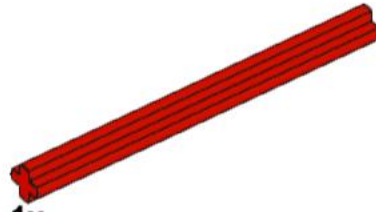
3x
4032
Red



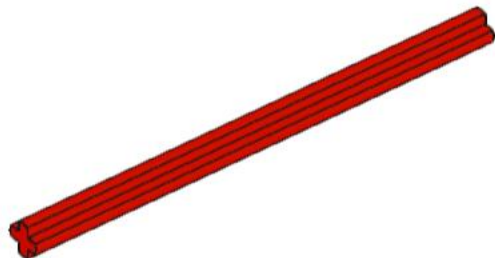
2x
3623
Red



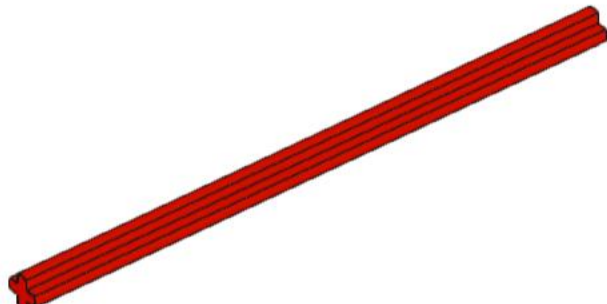
1x
11833
Red



1x
3706
Red



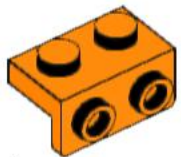
2x
3707
Red



1x
3737
Red



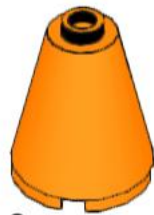
2x
25269
Orange



1x
99781
Orange



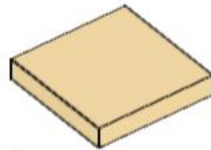
1x
2654
Orange



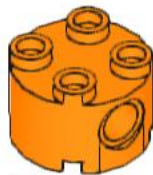
2x
3942c
Orange



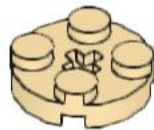
3x
4032
Orange



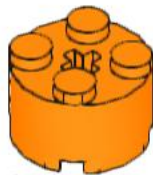
1x
3068
Tan



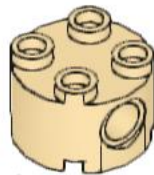
3x
17485
Orange



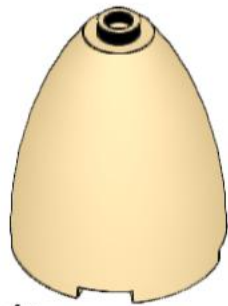
3x
4032
Tan



27x
3941
Orange



1x
17485
Tan



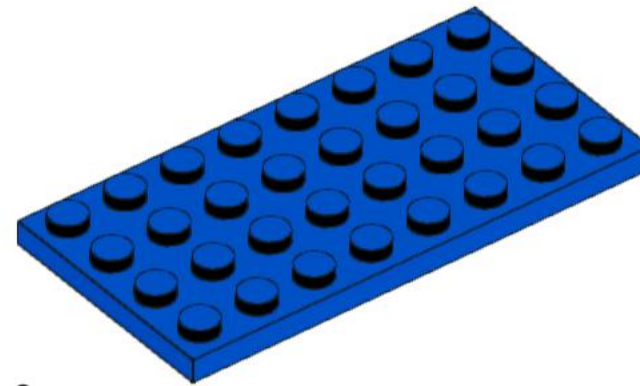
1x
1744
Tan



10x
85861
Green



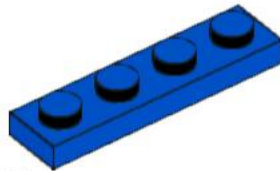
1x
98138
Blue



8x
3035
Blue



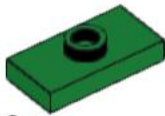
2x
35480
Green



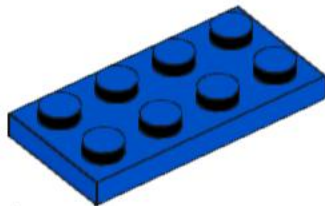
2x
3710
Blue



3x
85861
Yellow



6x
3794b
Green



1x
3020
Blue



2x
4073
Trans-Clear



4x
3062
Yellow



3x
4032
Green



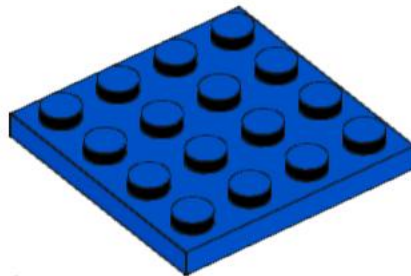
1x
85861
Trans-Clear



1x
47905
Yellow



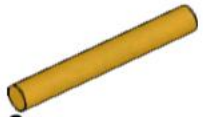
1x
11833
Green



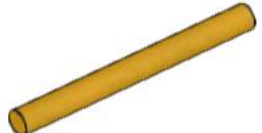
3x
3031
Blue



12x
85861
Pearl Gold



2x
87994
Pearl Gold



1x
30374
Pearl Gold