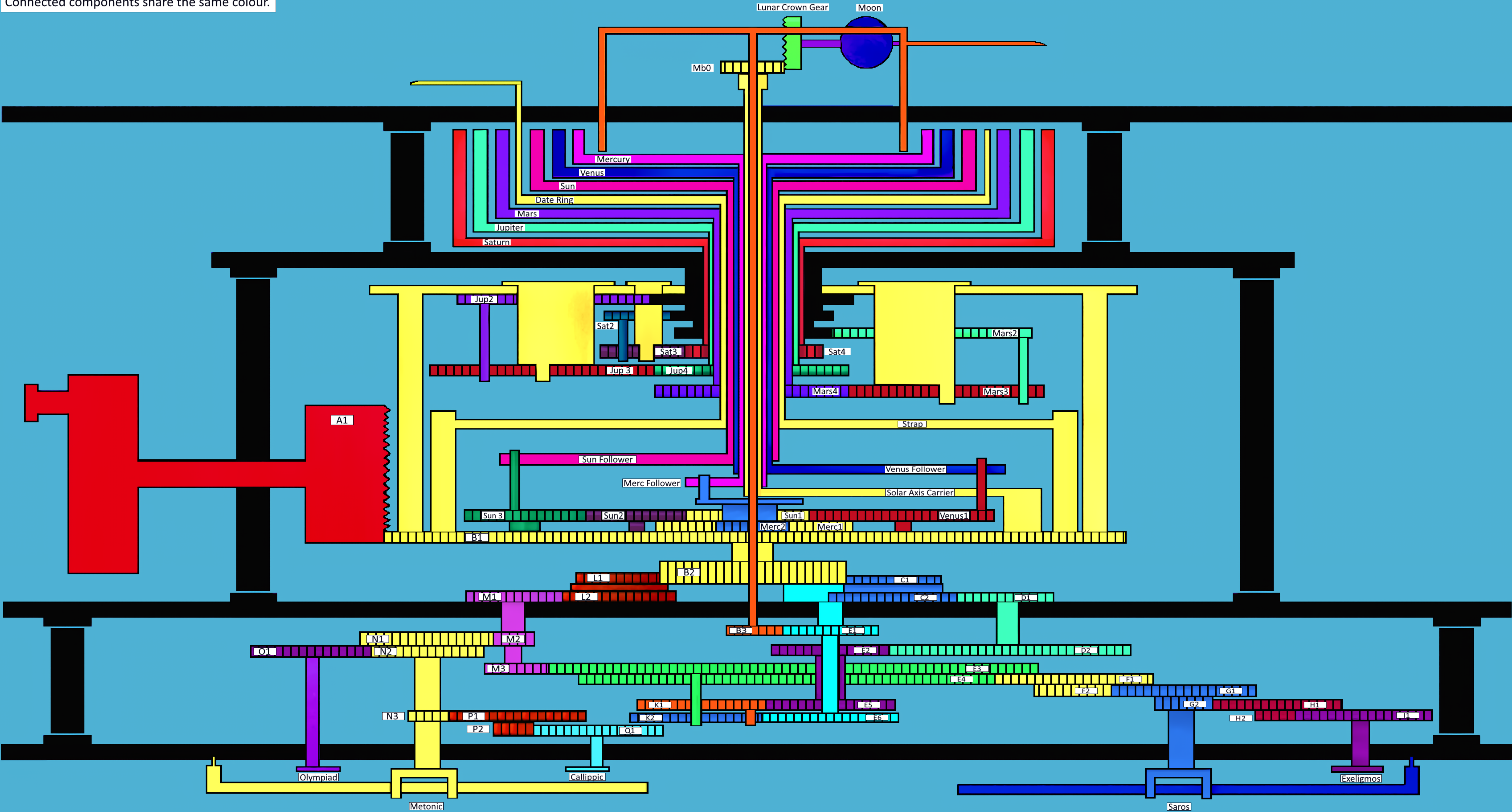


Connected components share the same colour.





The construction of the device indicates that ancient Greeks had knowledge of complex gear systems long before the Industrial Revolution.

The Antikythera Mechanism could predict the positions of the five classical planets known to the Greeks: Mercury, Venus, Mars, Jupiter, and Saturn.

The Antikythera Mechanism used a differential gear, which was not known to be used again until the 16th century.

Advanced imaging techniques have allowed researchers to read more than 3,000 characters of explanatory text inscribed on the mechanism.



It contained a mechanism to predict the colour of upcoming eclipses, which was linked to astrological predictions.

The Antikythera Mechanism also had a dial for the Callippic cycle, a more precise 76-year cycle used to correct the Metonic cycle.

The device could track the Metonic cycle, a period of 19 years after which the phases of the Moon repeat on the same days of the year.

The mechanism's dials included a 223-month Saros cycle dial for predicting eclipses.

Before you Print

What you will need

- > Super Glue
- > 400 Grit Sand Paper
- > A Small Filing Set
- > 2-3kg Filament
(PLA with our slicer settings is recommended)
- > Print bed size 220x220+
- > 0.4 Printer Nozzle

This is a challenging project but should you need help, have any questions or would like to give feedback our Email is fizzychickens@gmail.com

Or join our community of Antikythera makers on Discord and join discussions or share progress with others who are also working on this project:

<https://discord.com/invite/8PB2CHzkfk>

BEFORE YOU PRINT

Printing Tips

- > Wait until the print bed has cooled before removing the component.
- > Lightly sand face imperfections and test for smooth rotation of each gear before moving on.
- > Clean your print bed of oils or dirt that may prevent filament from sticking to the print bed.
- > Our Slicer-Settings can be found in the folder alongside the printable files.
- > What ever you do, DO NOT glue as you go or at least not until everything has been assembled and tested and you are sure it will be ok to glue what you need to. It is very easy to break something "I'm looking at you Lunar Shaft" and it can make things very difficult should you need to replace that component. At least at first follow what we have specified to glue or be super carful where you apply it.

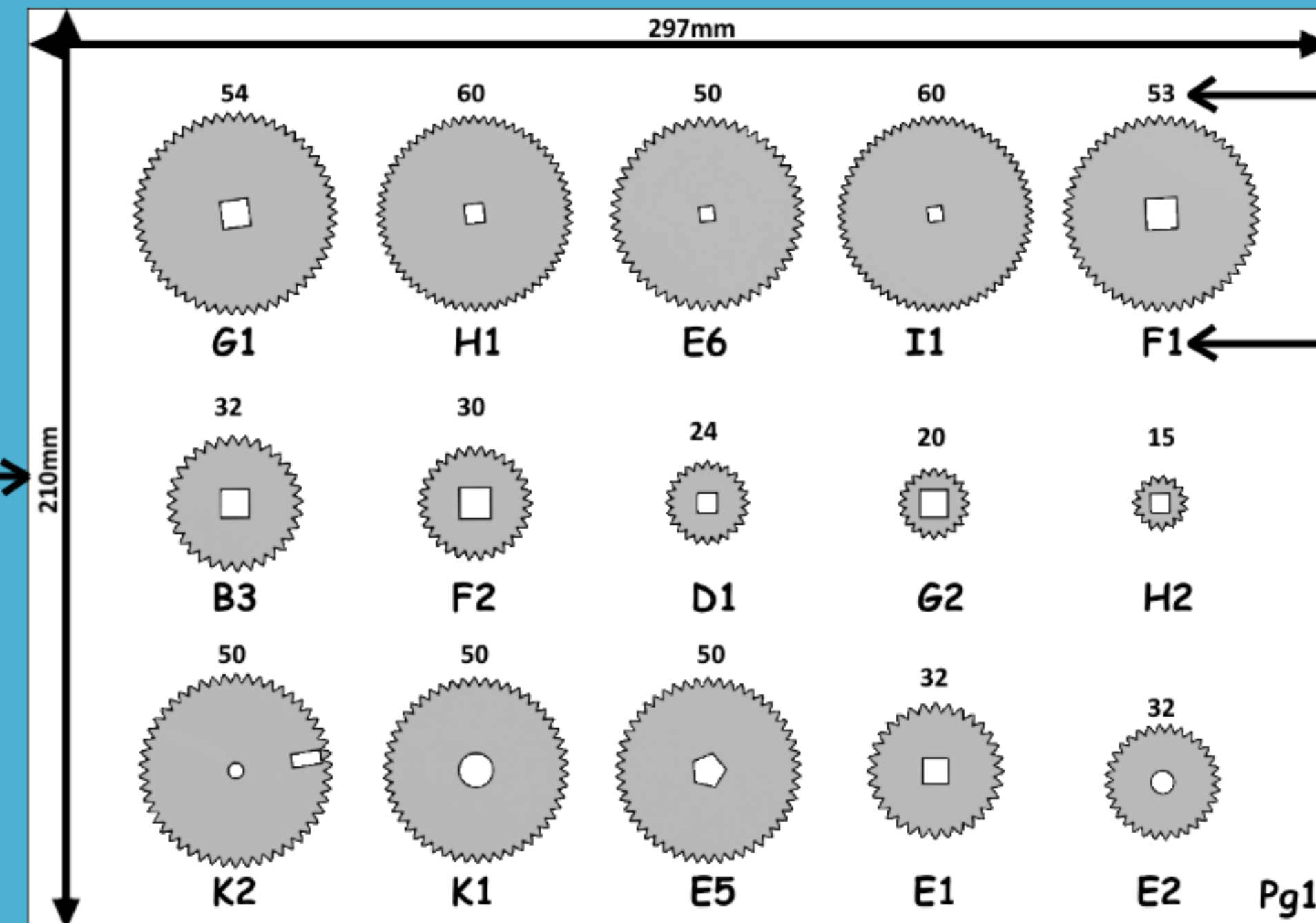
RECCOMENDED

We reccomend that you print then assemble or lable the parts to easily identify components. But it can still be easy to accidentally get gears mixed up, so as an extra precaution you can print the following 3 pages, *CHECK* the scale of your page matches the scale given and if so the gears on the page should be 1:1 of the actual gear size. Some gears however might be similar in size, but you can also identify the gear by the size of the center hole or by the number of teeth on the gear.



Gear Silhouettes

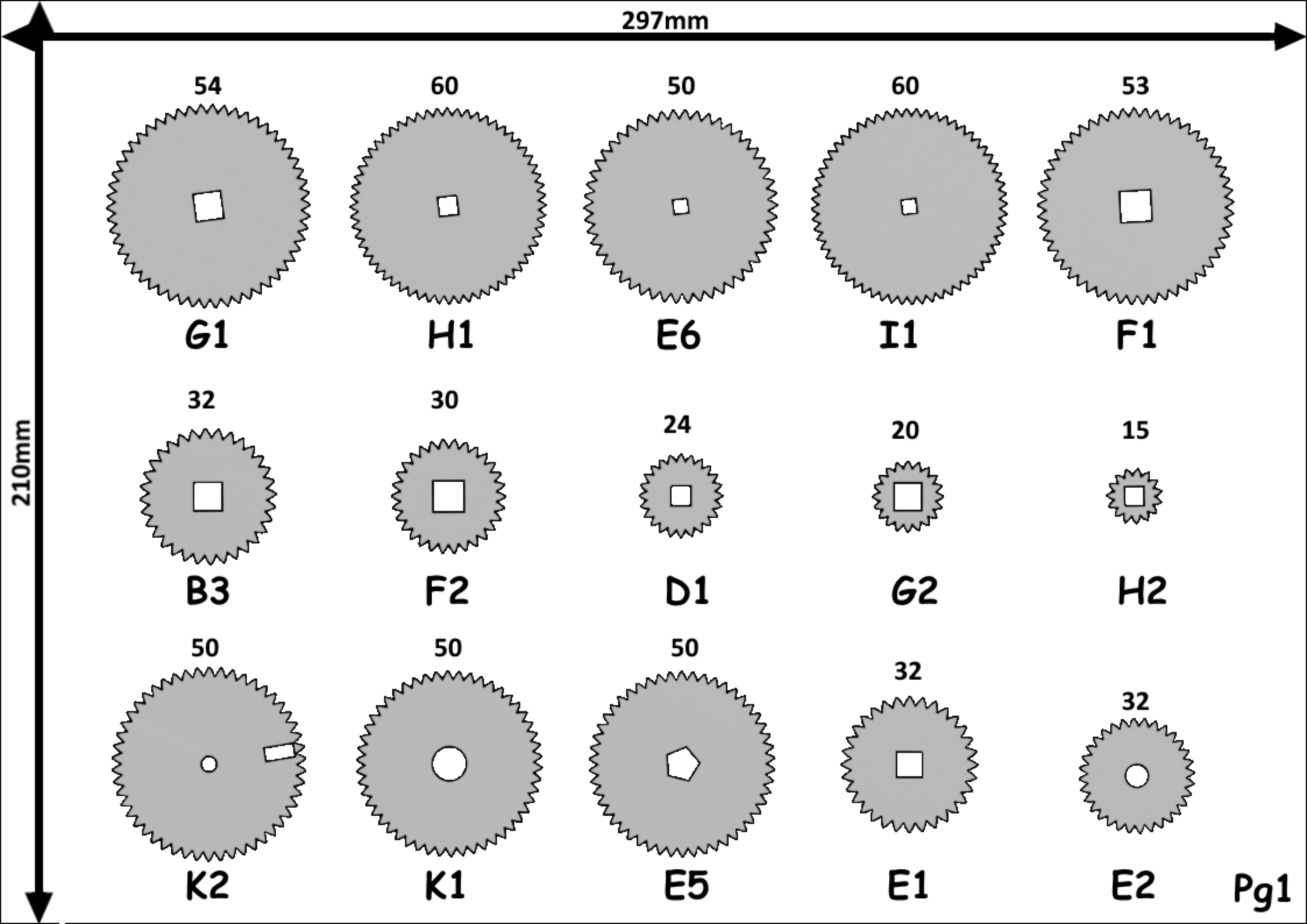
Size of A4 Page

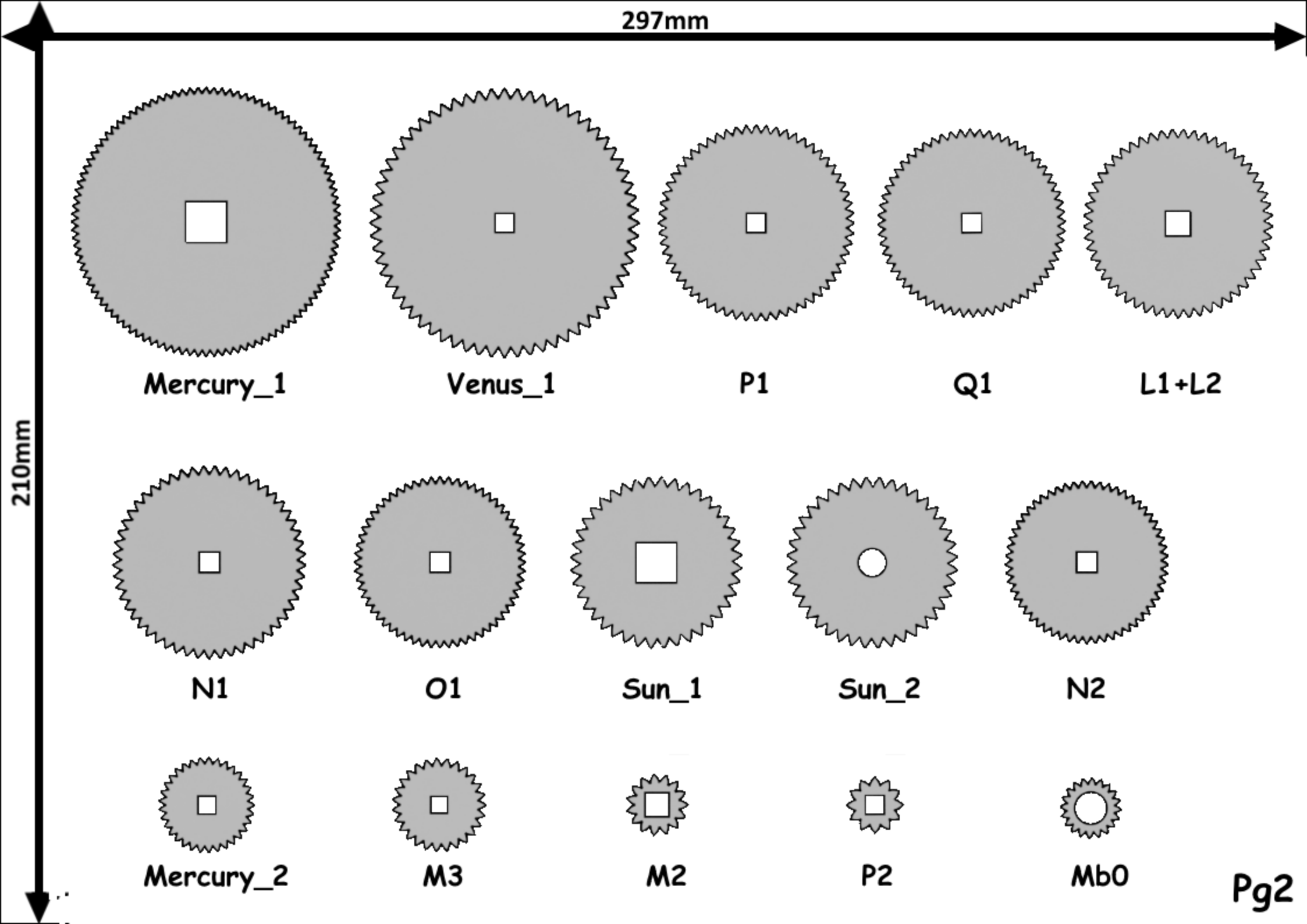


Number of
Teeth

Gear Name

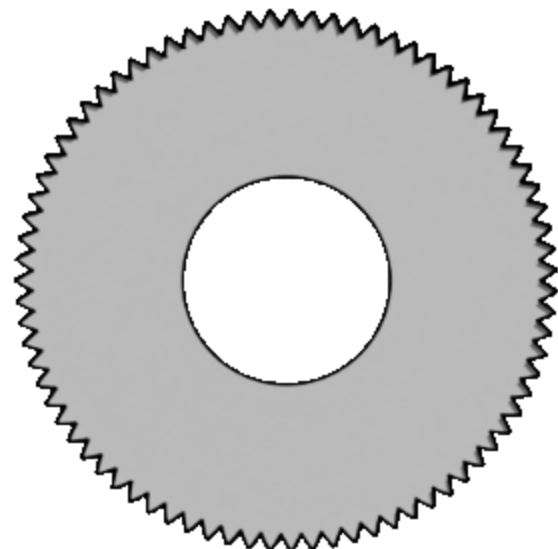
Pg1





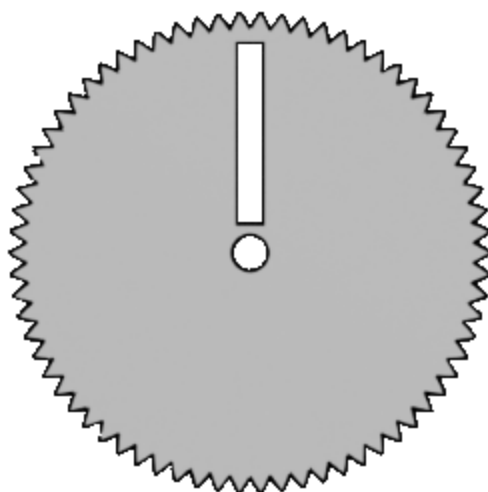
297mm

79



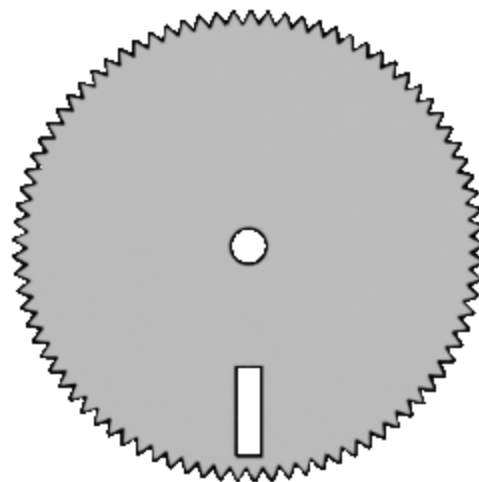
Mars_2

70



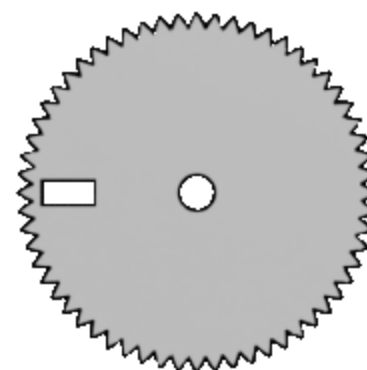
Mars_3

85



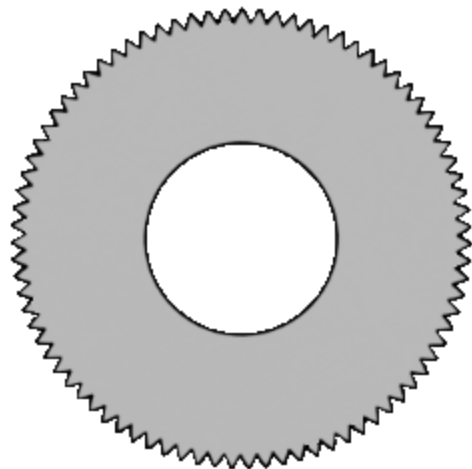
Jupiter_3

60



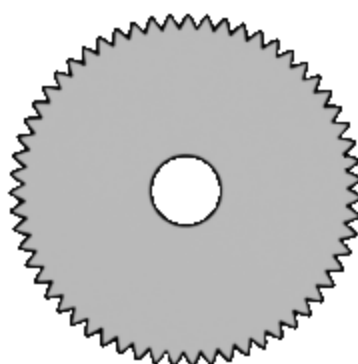
Saturn_3

83



Jupiter_2

59

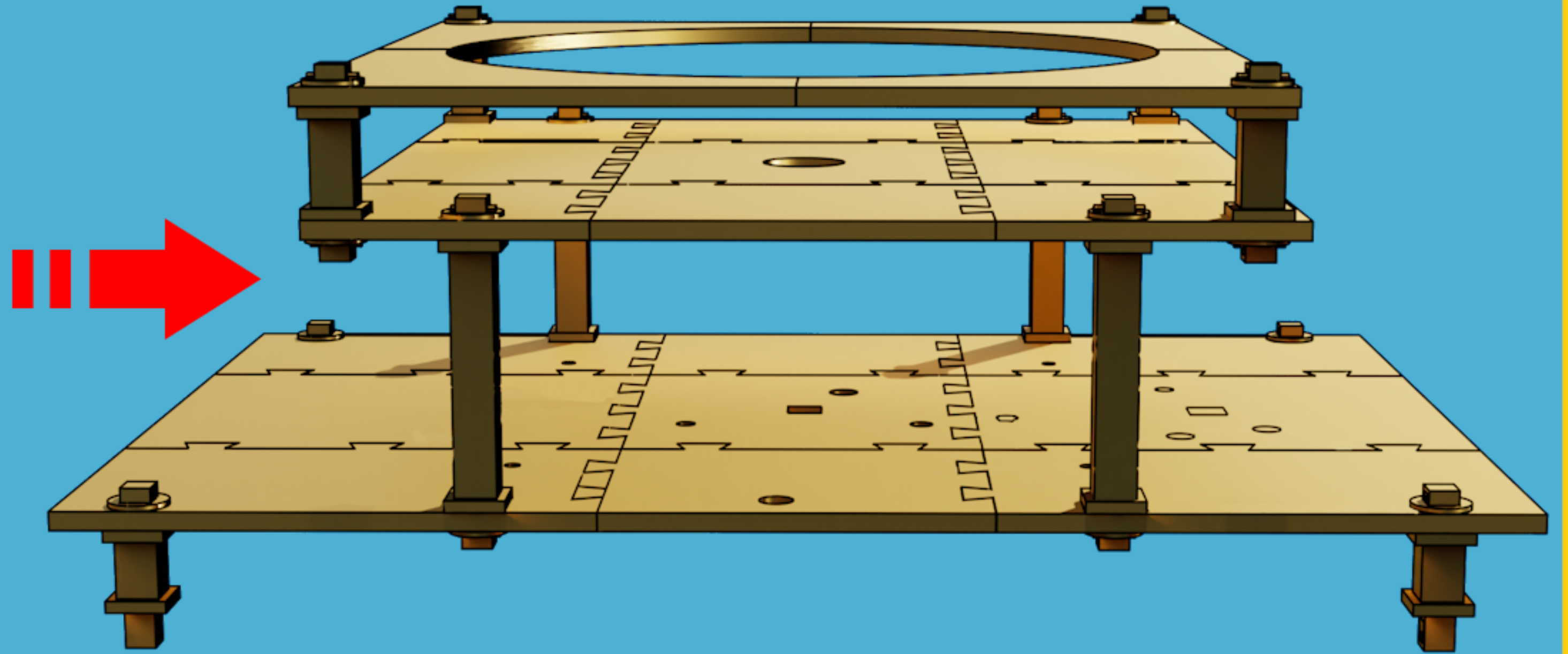


Saturn_2

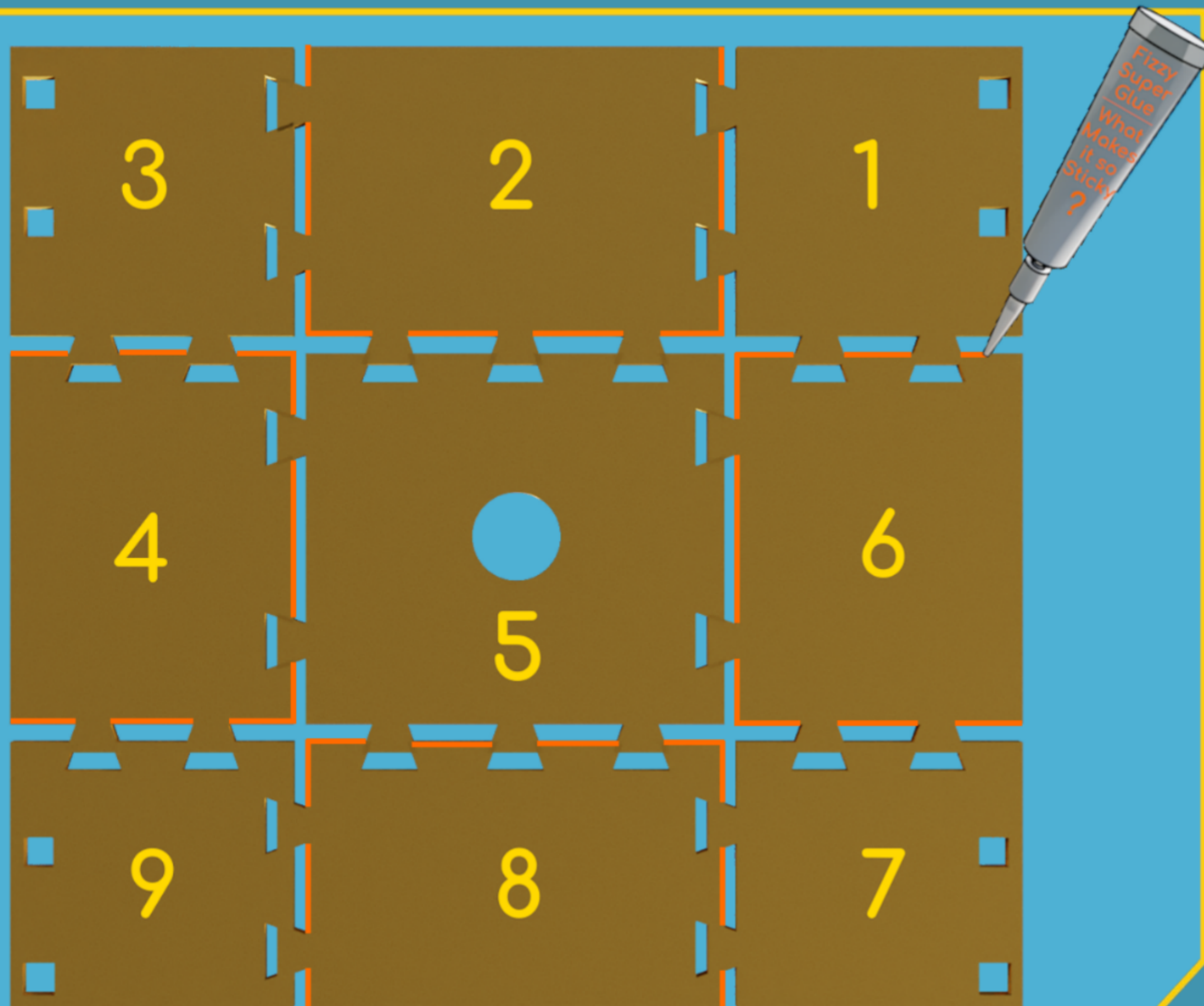
210mm

1

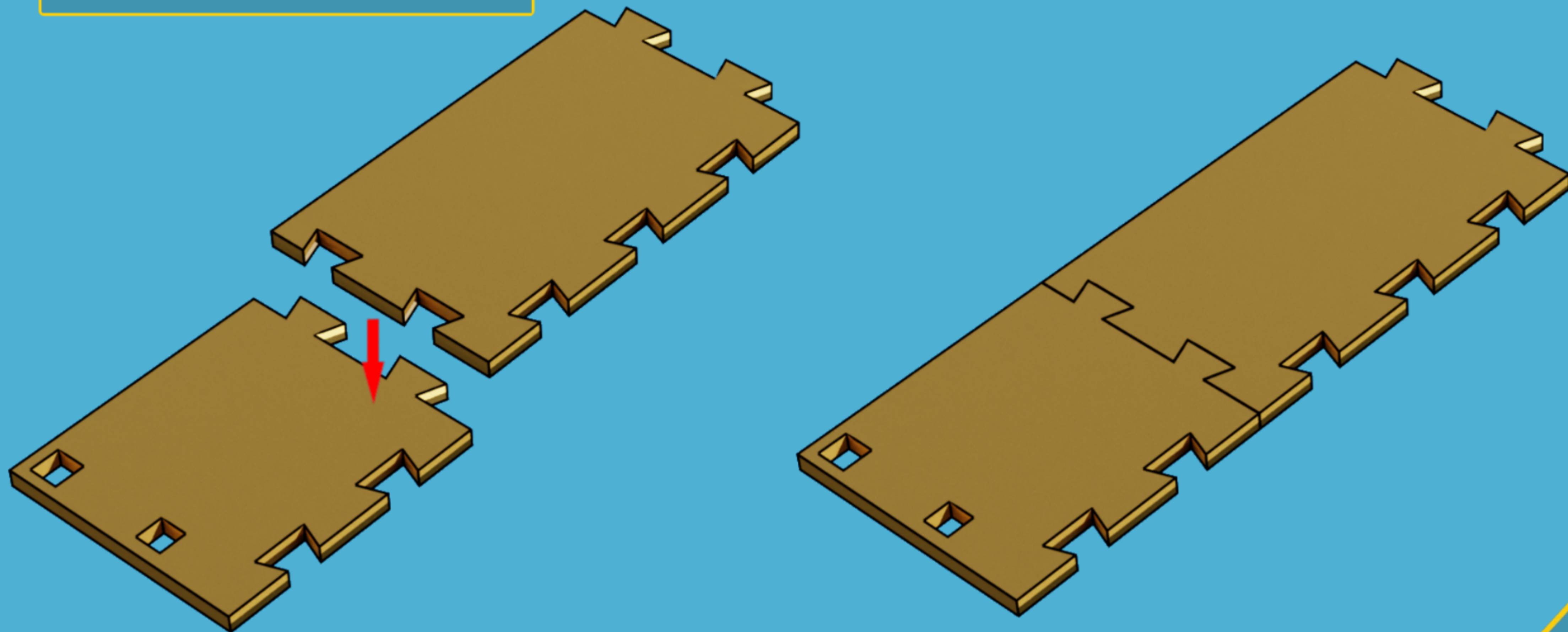
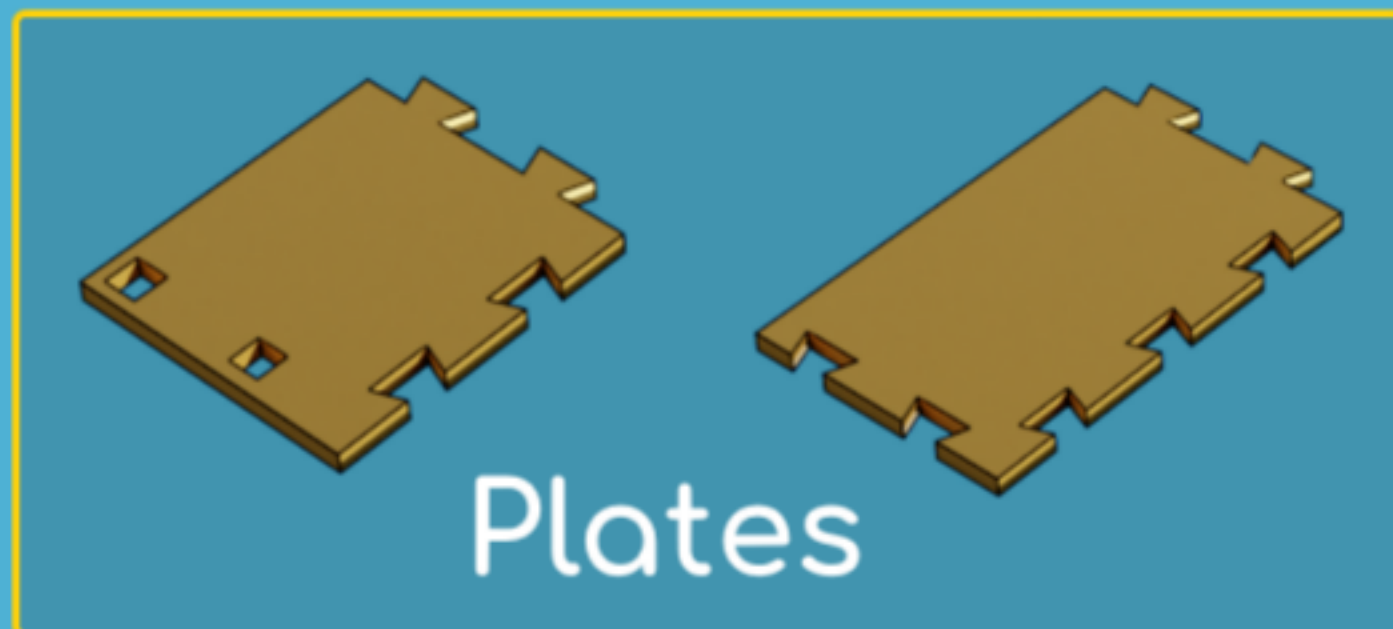
Plates



Top Plate
Print Layout



3



4



Pillar
End
x2

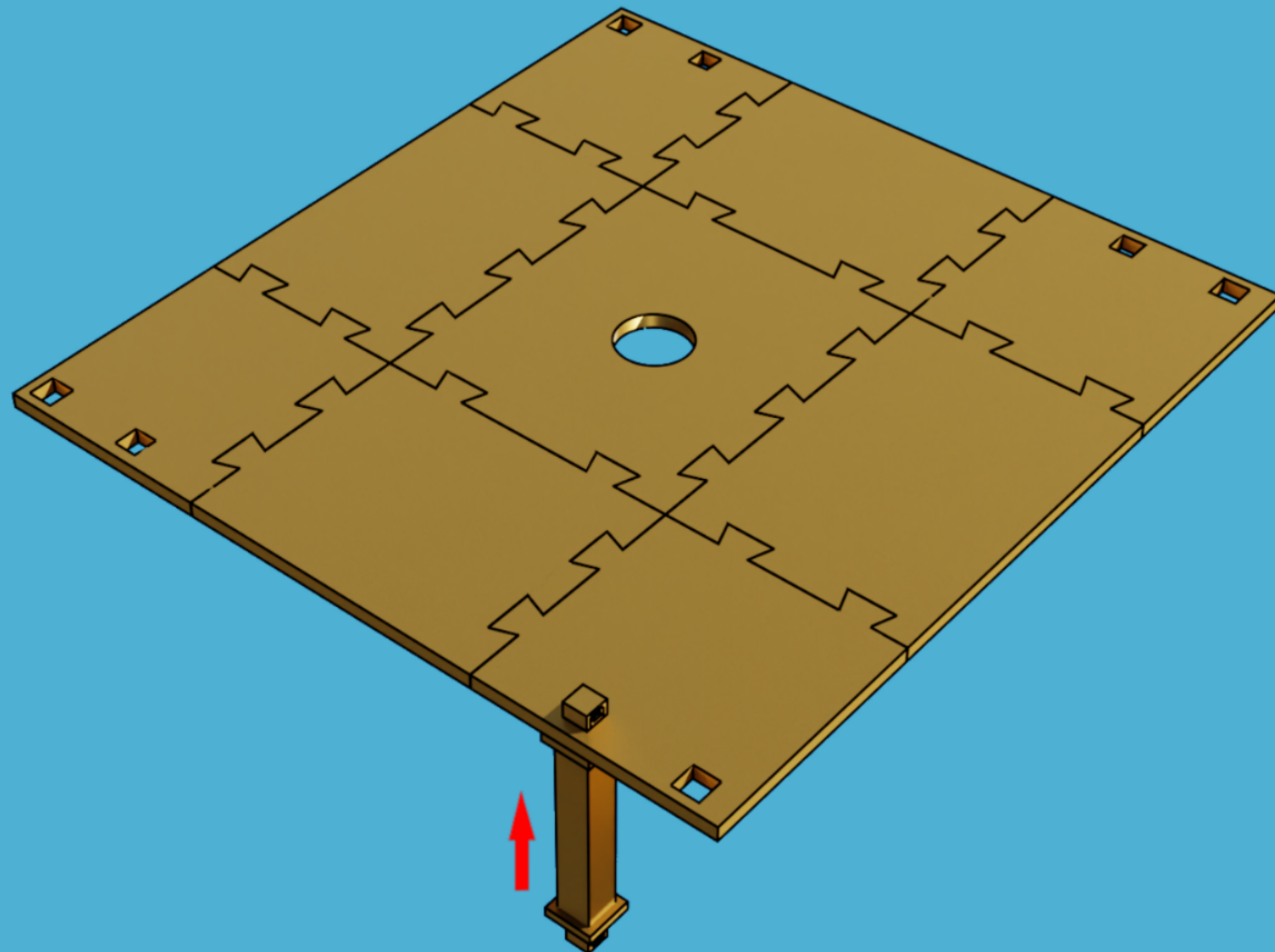
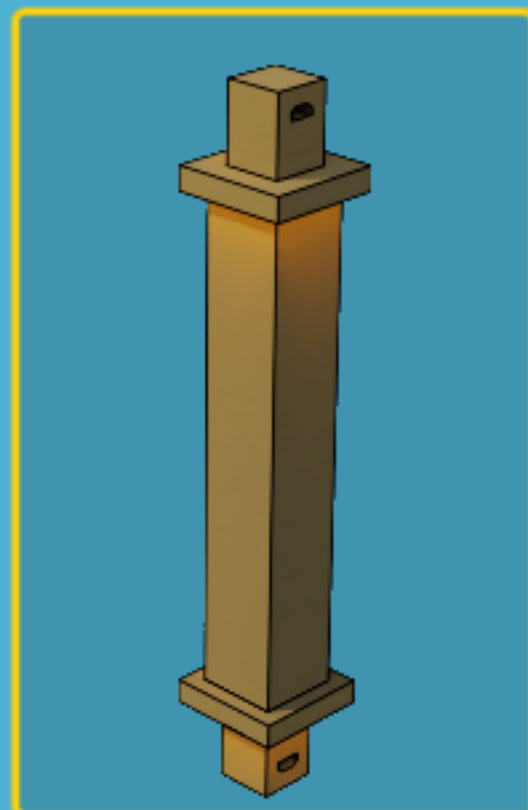
x4



Mid
Plate
Pillar



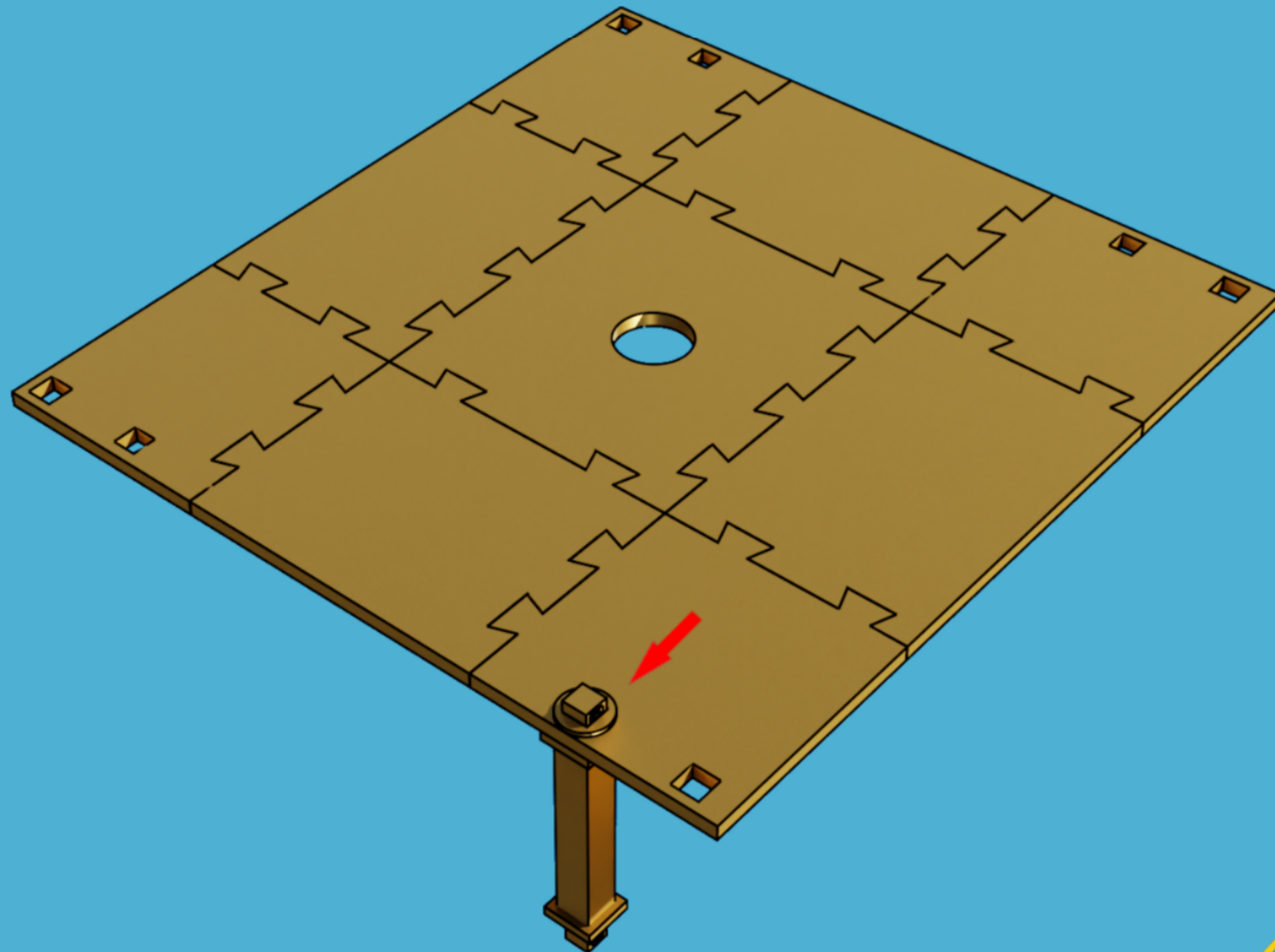
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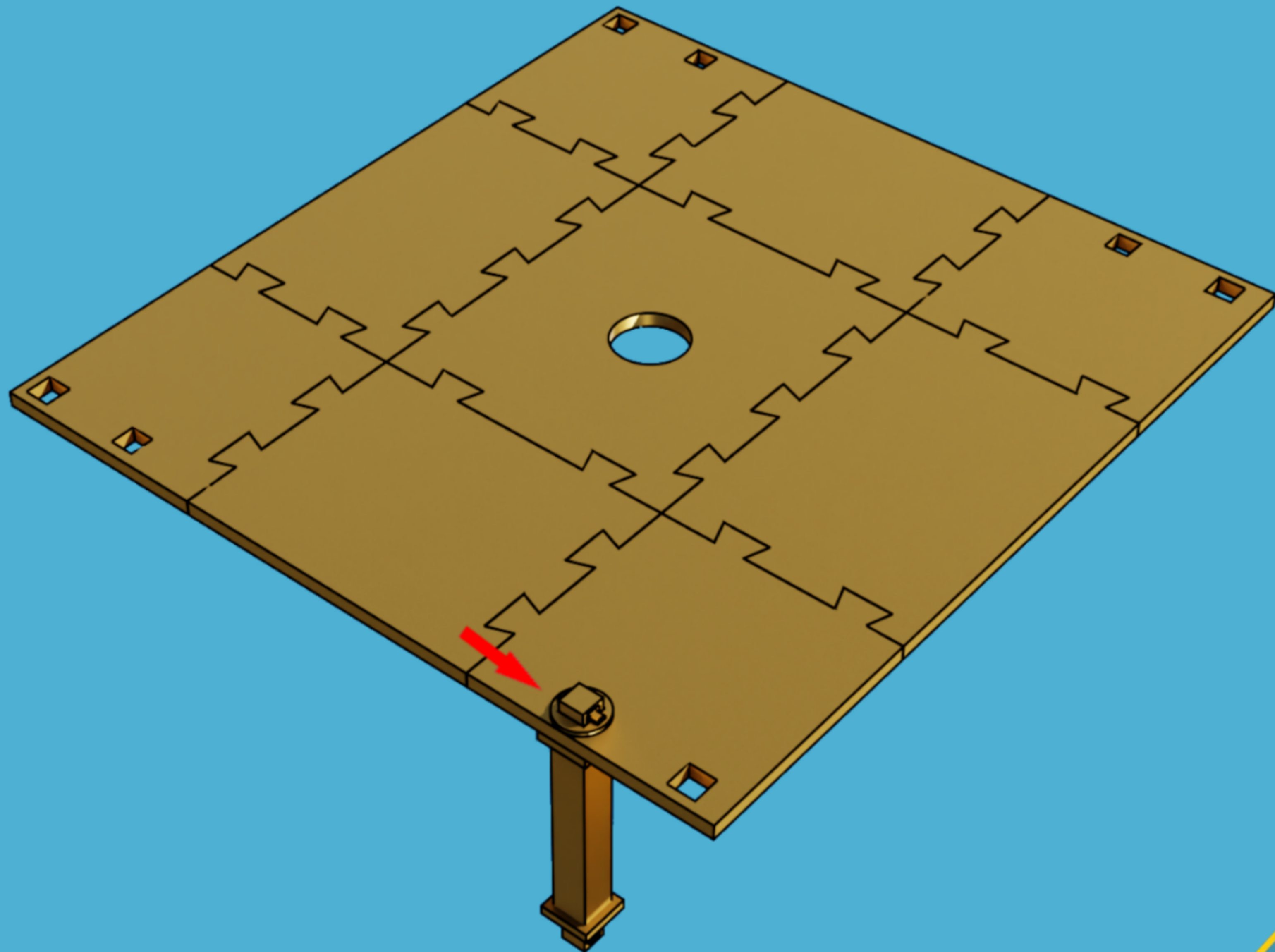
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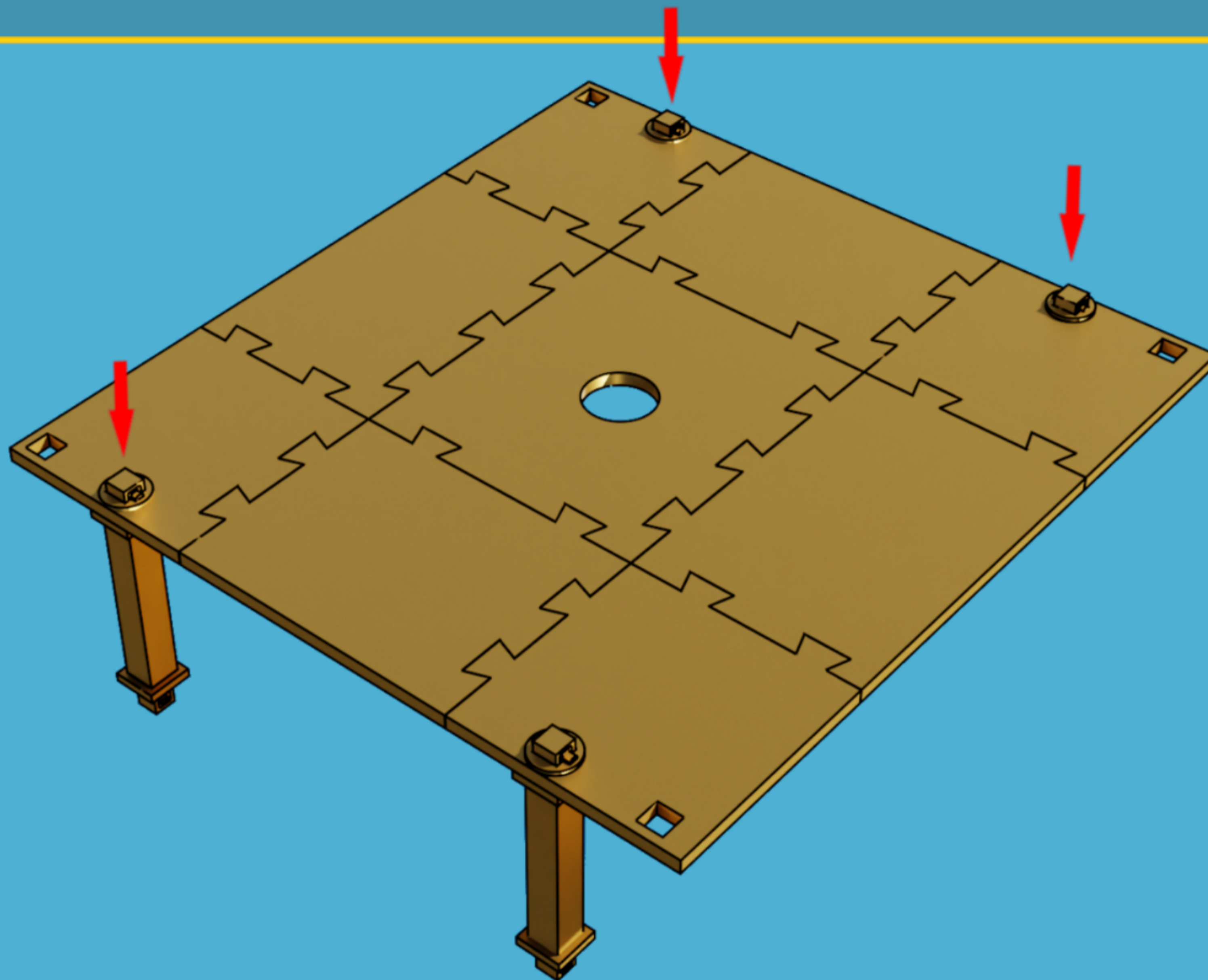


Pillar
Washer

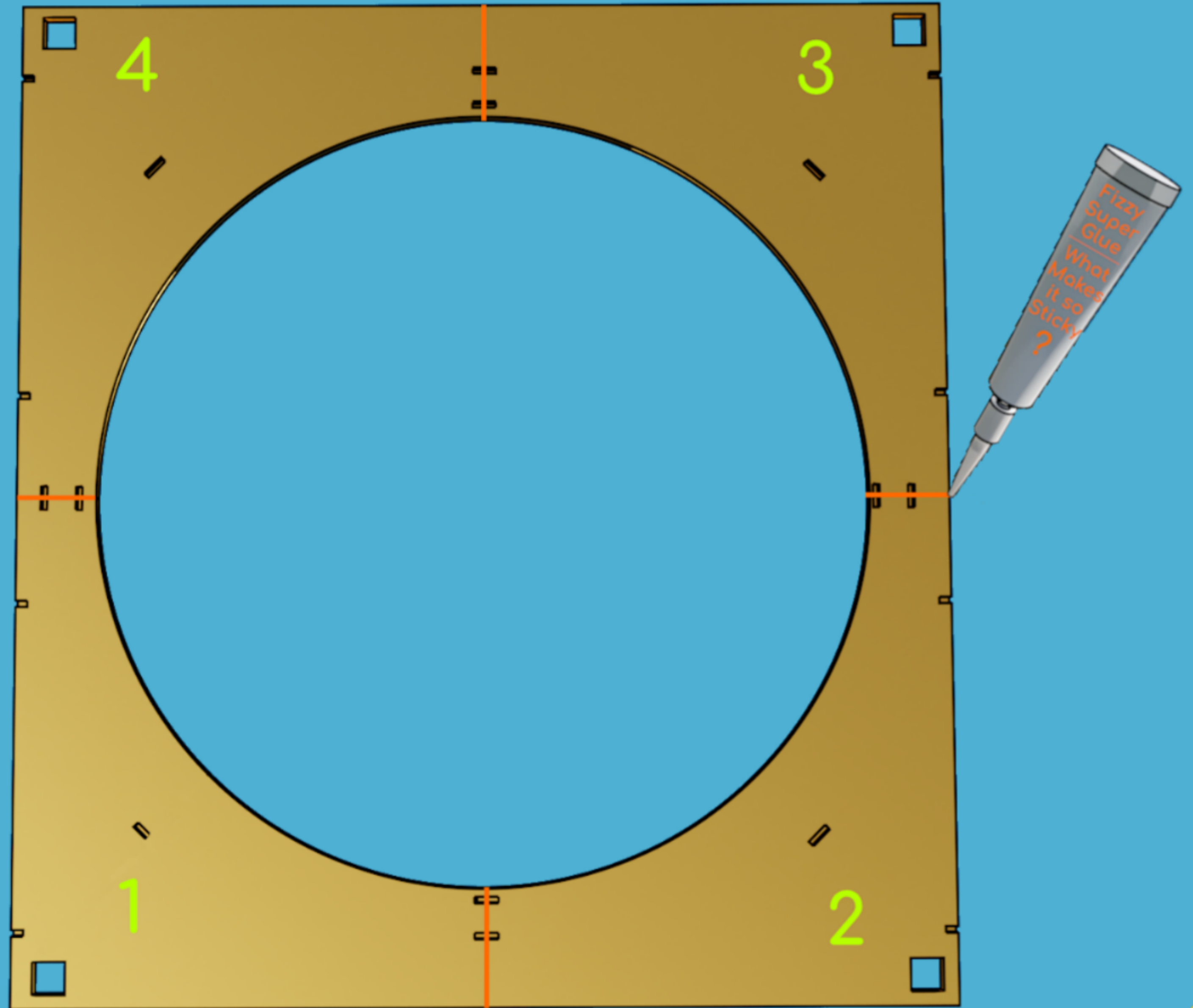


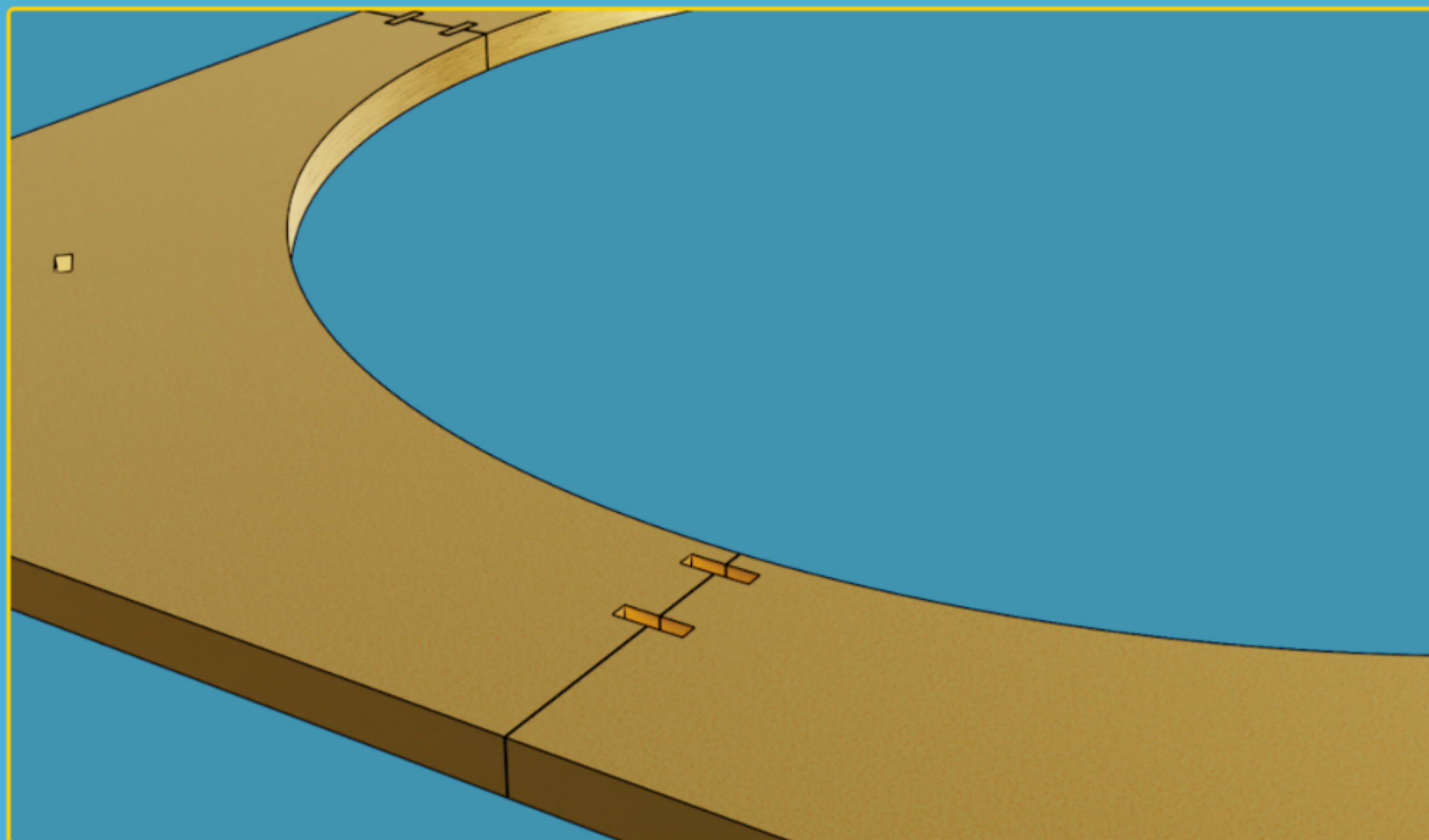
7





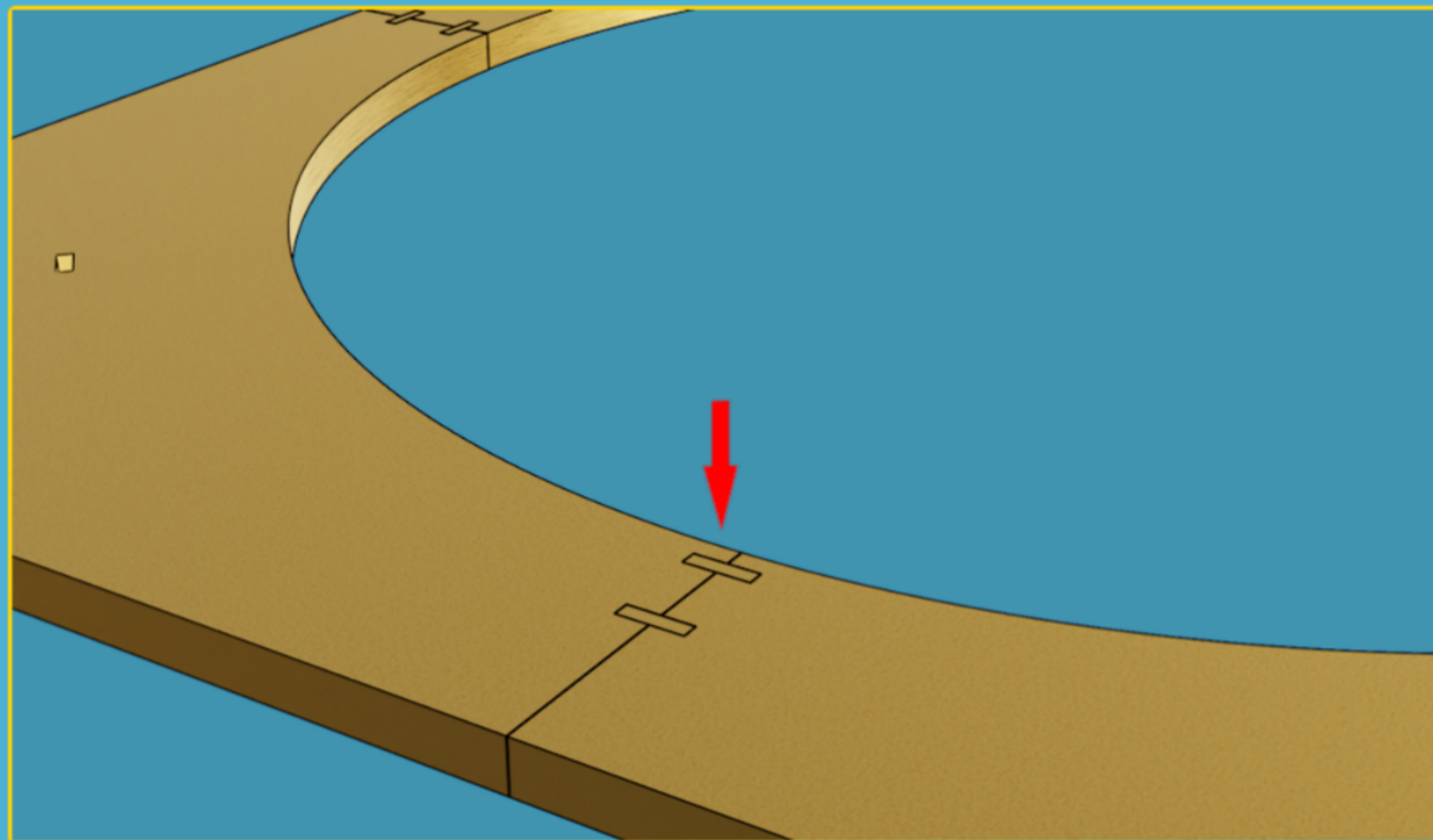
Front Plate Print Layout

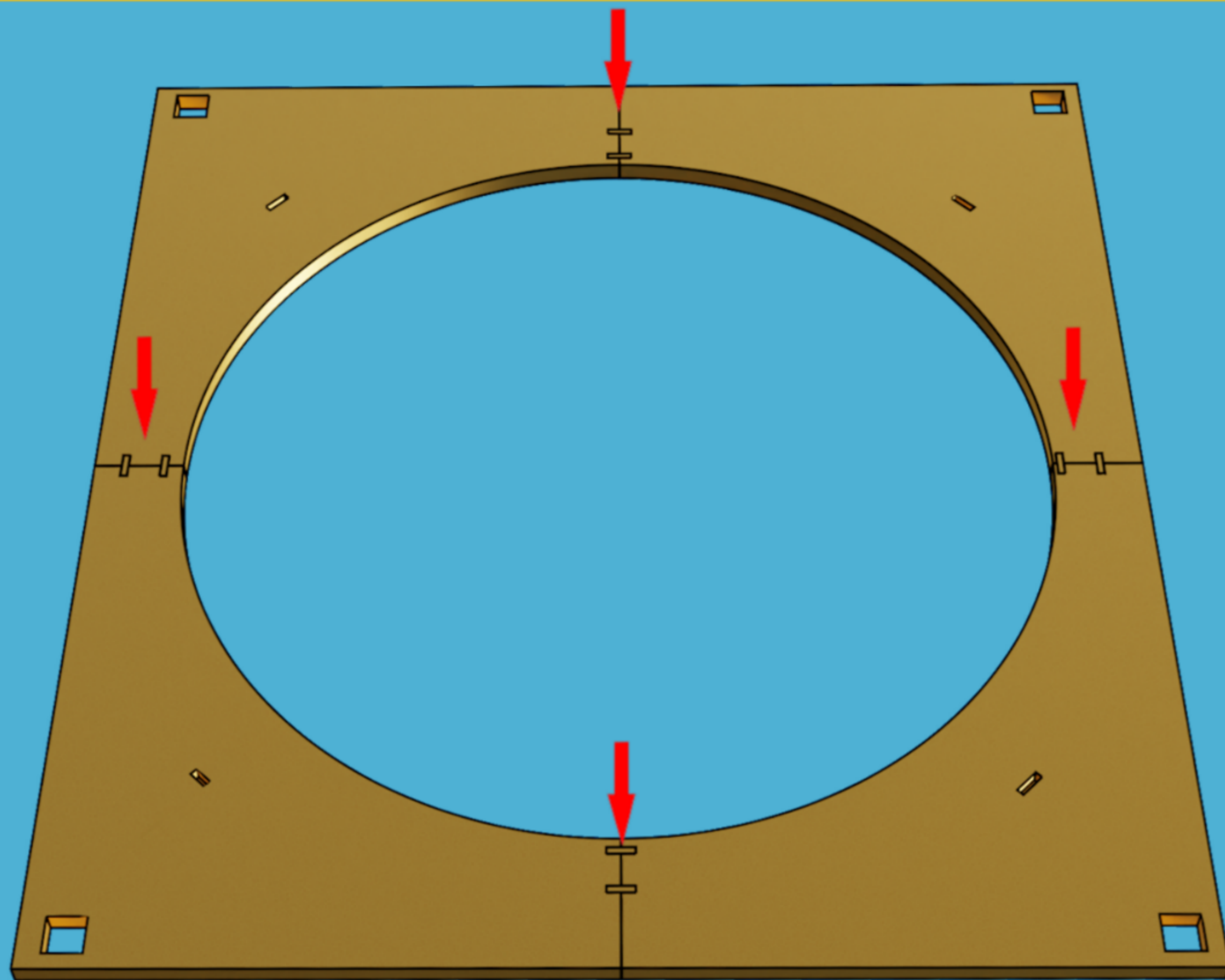




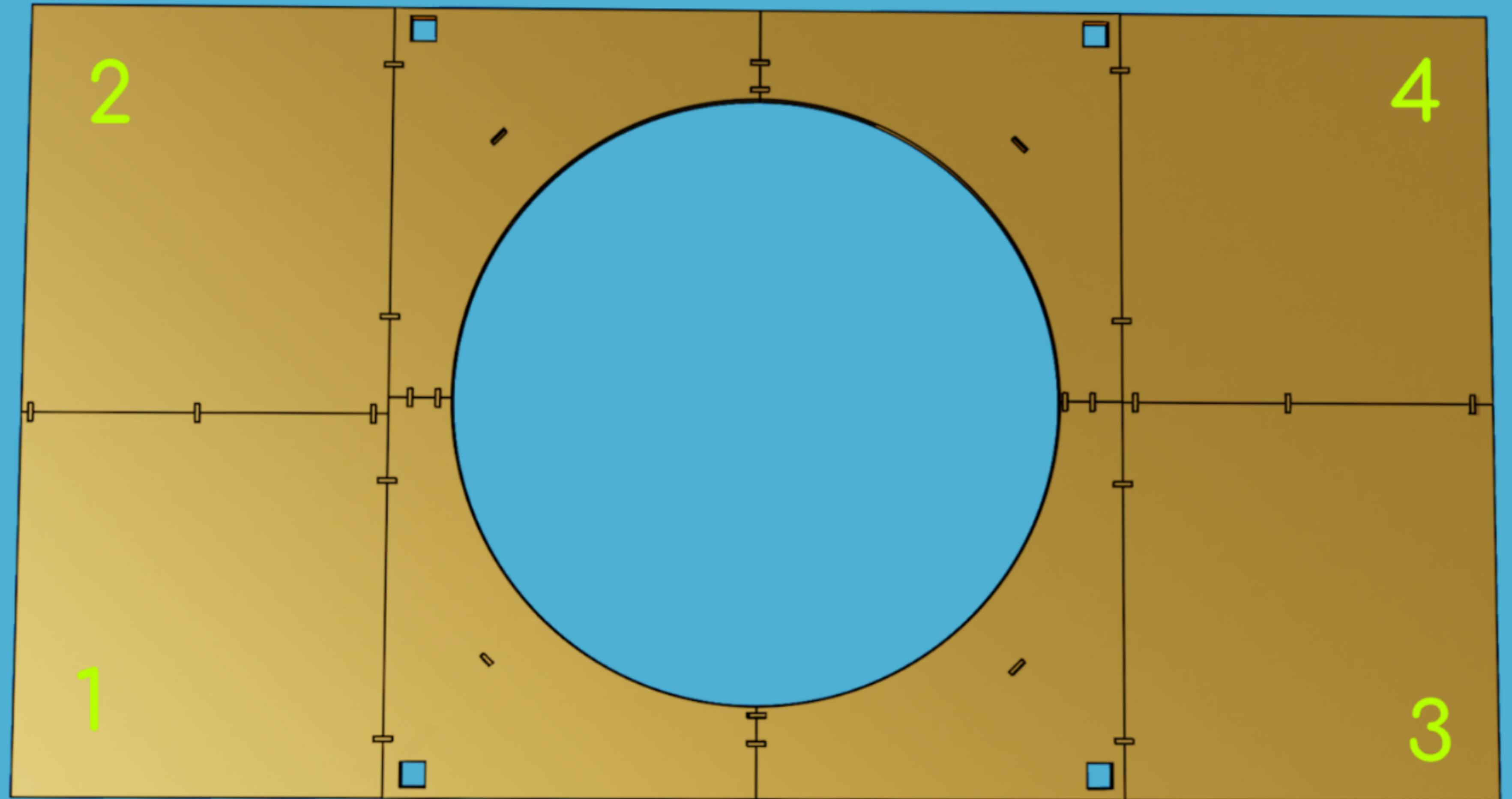


Alignment
Pin x8

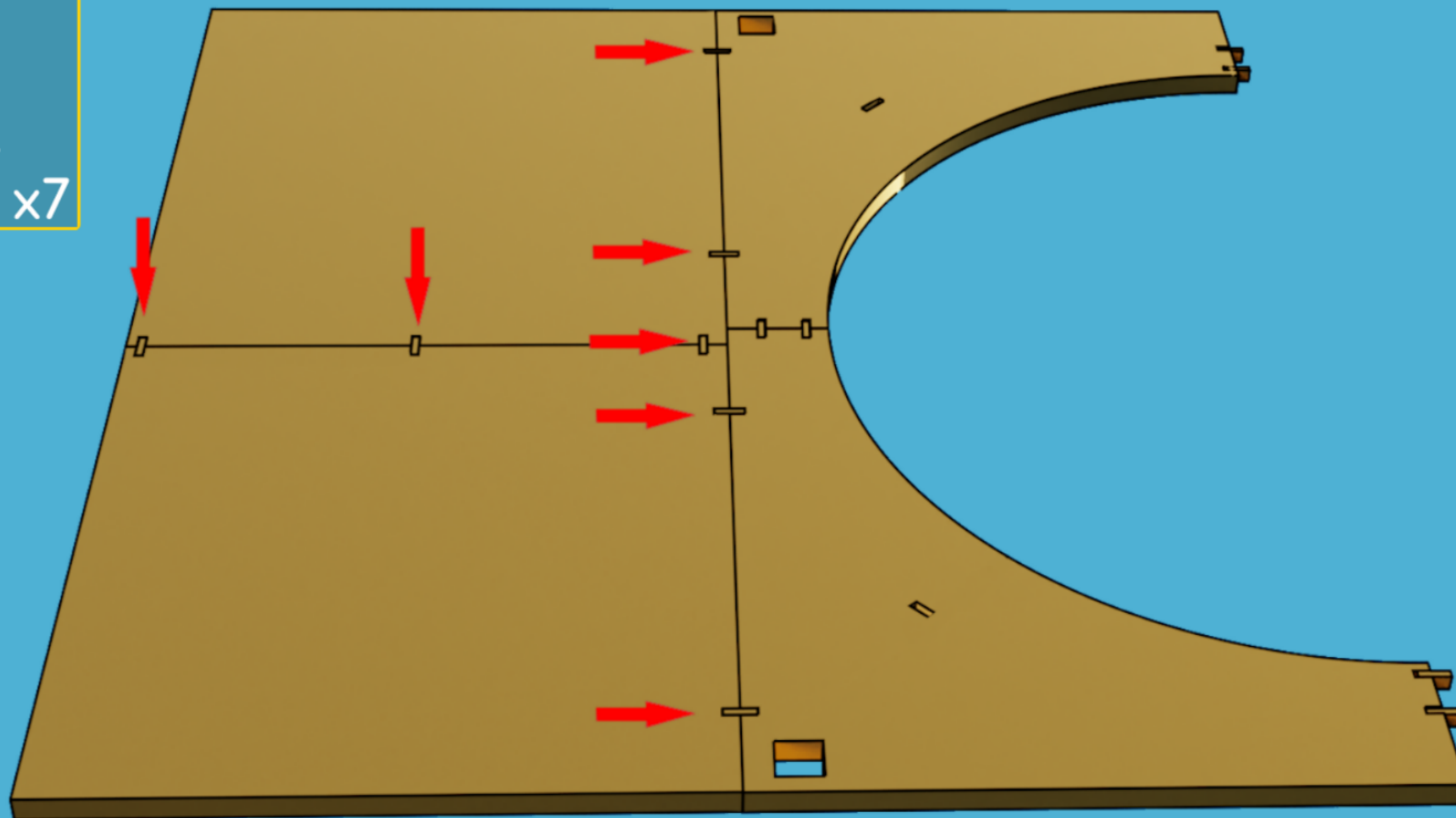




Parapegma
Print Layout



14



x2



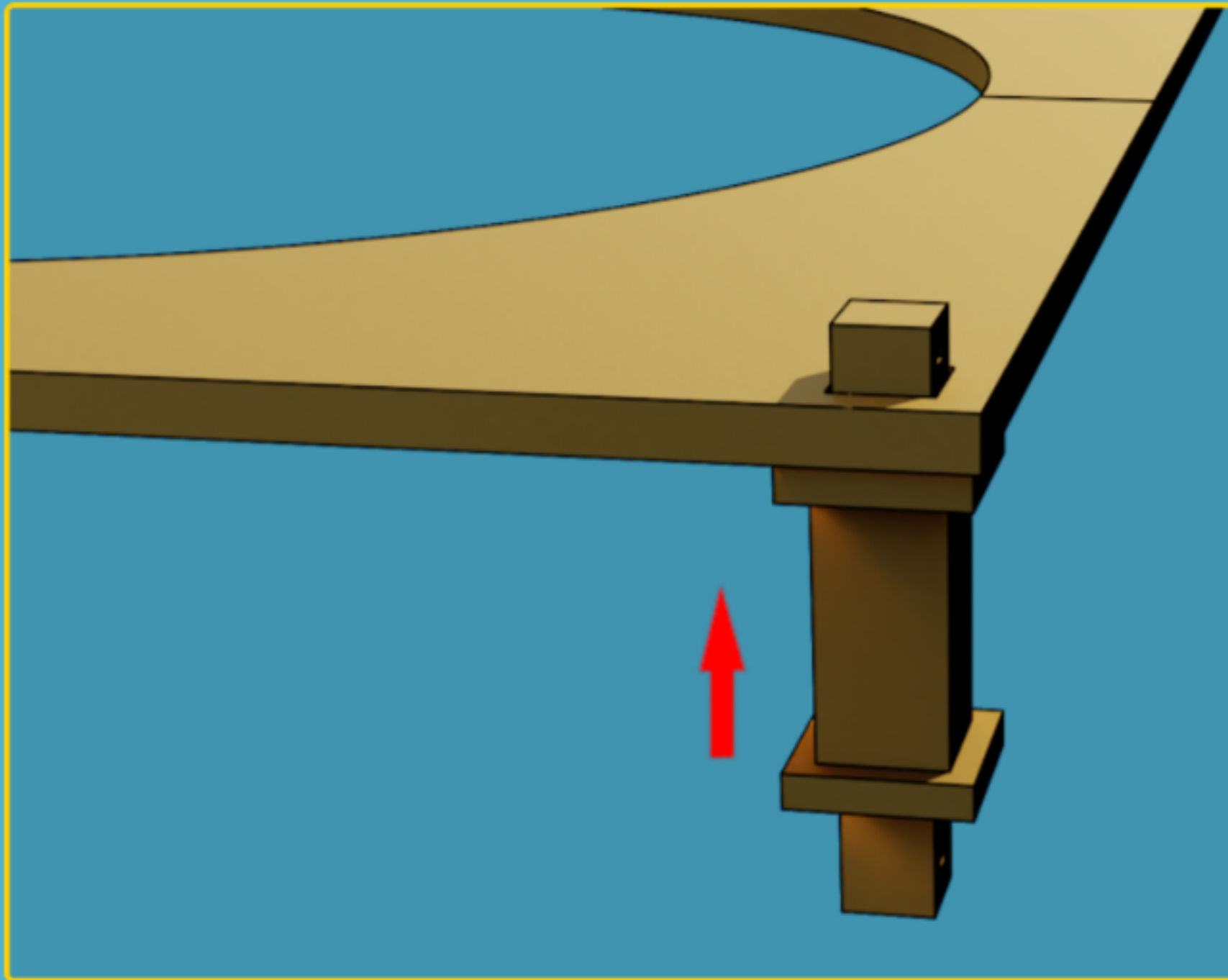
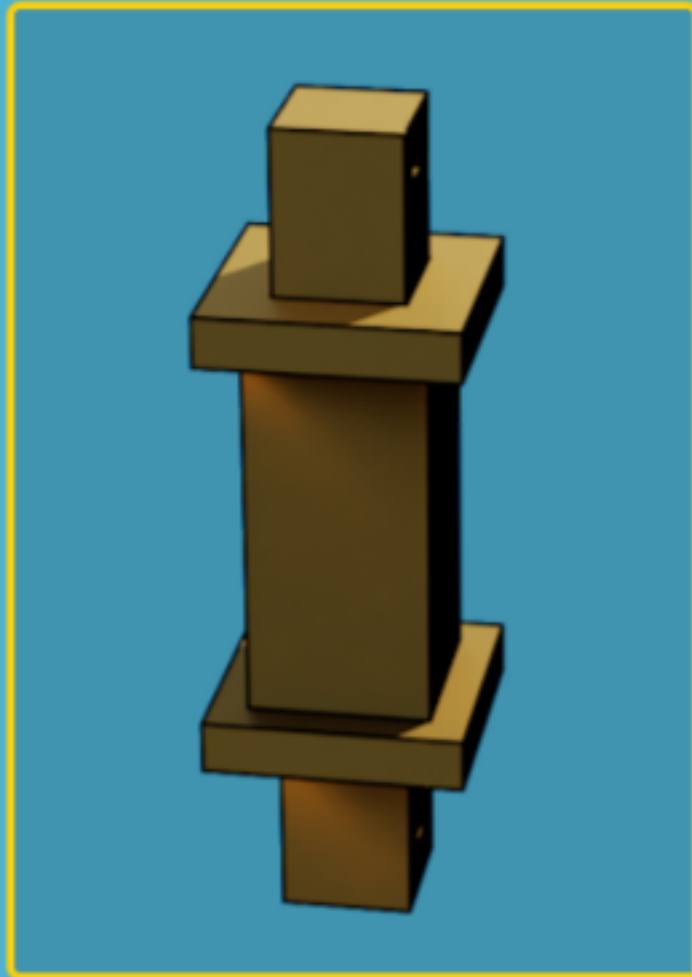
Pillar
End
x2

x4



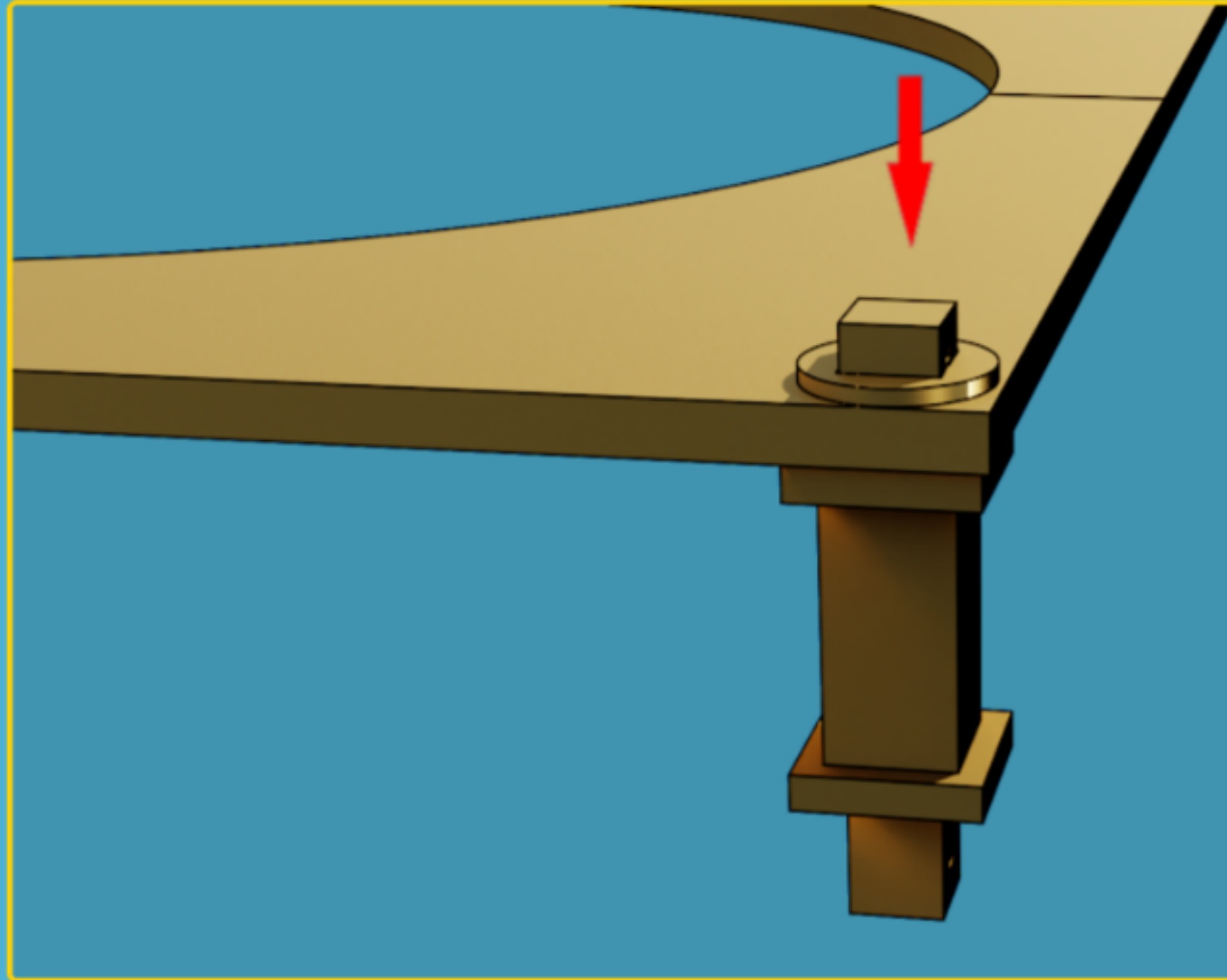
Top
Plate
Pillars

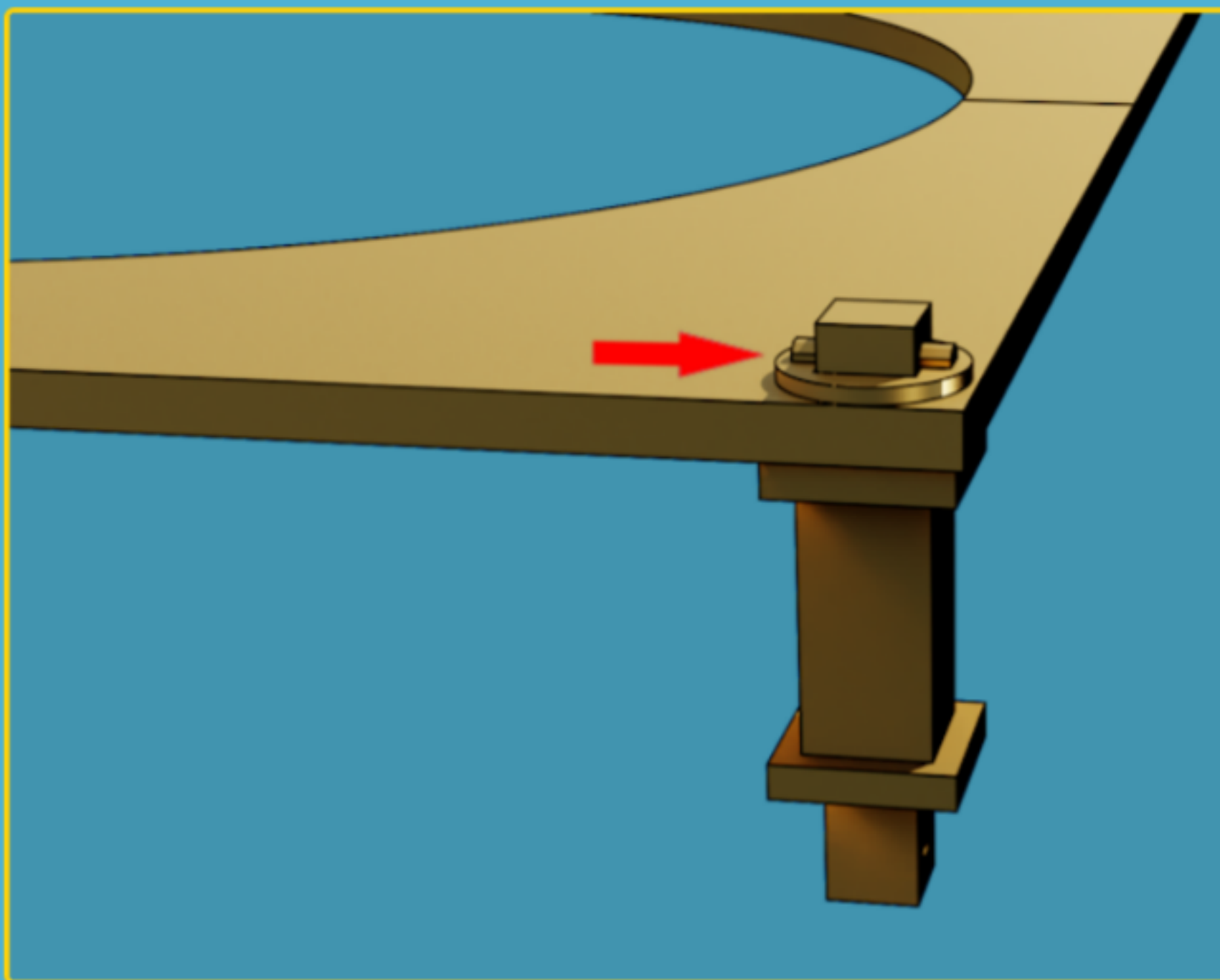


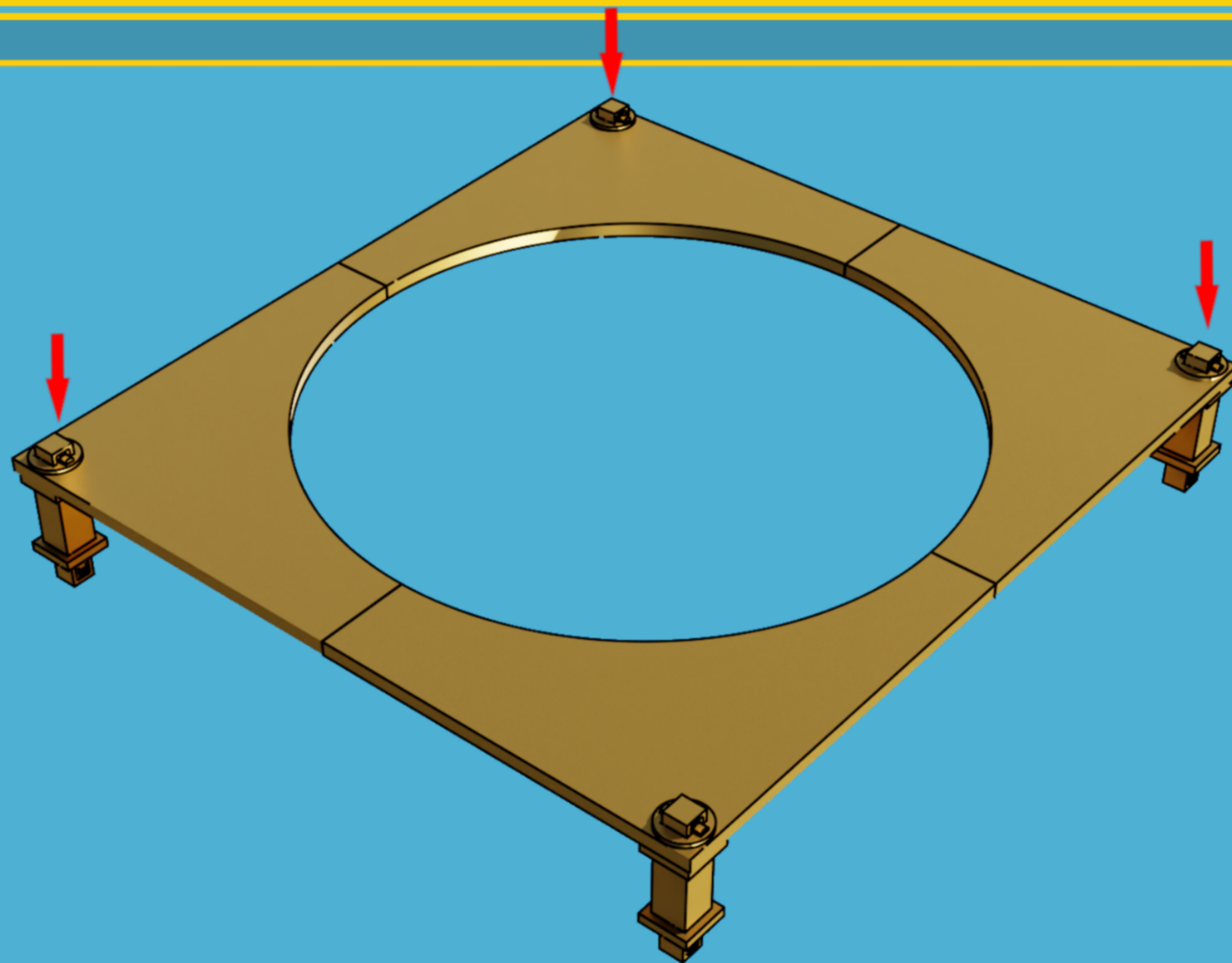


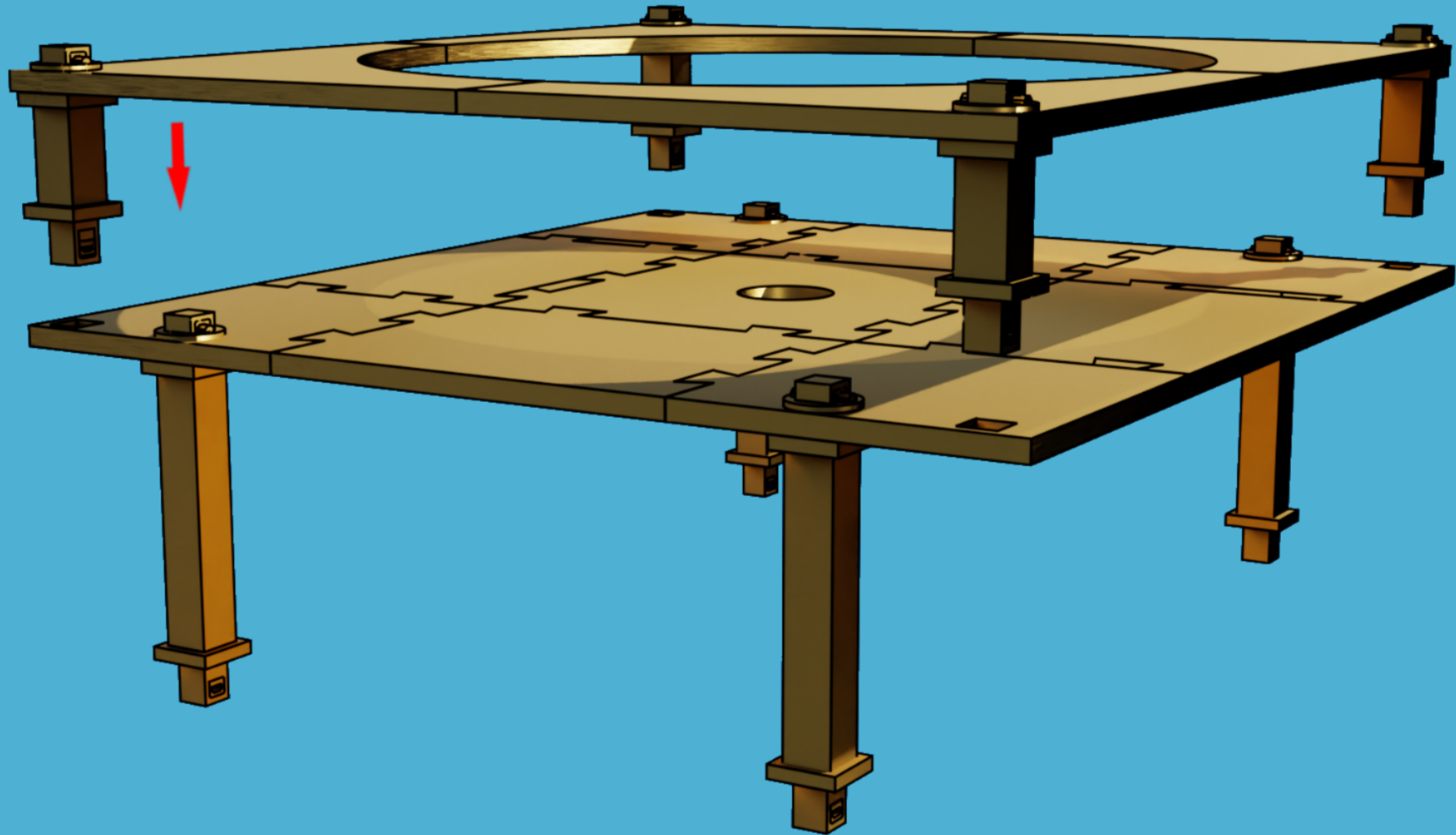


Pillar
Washer

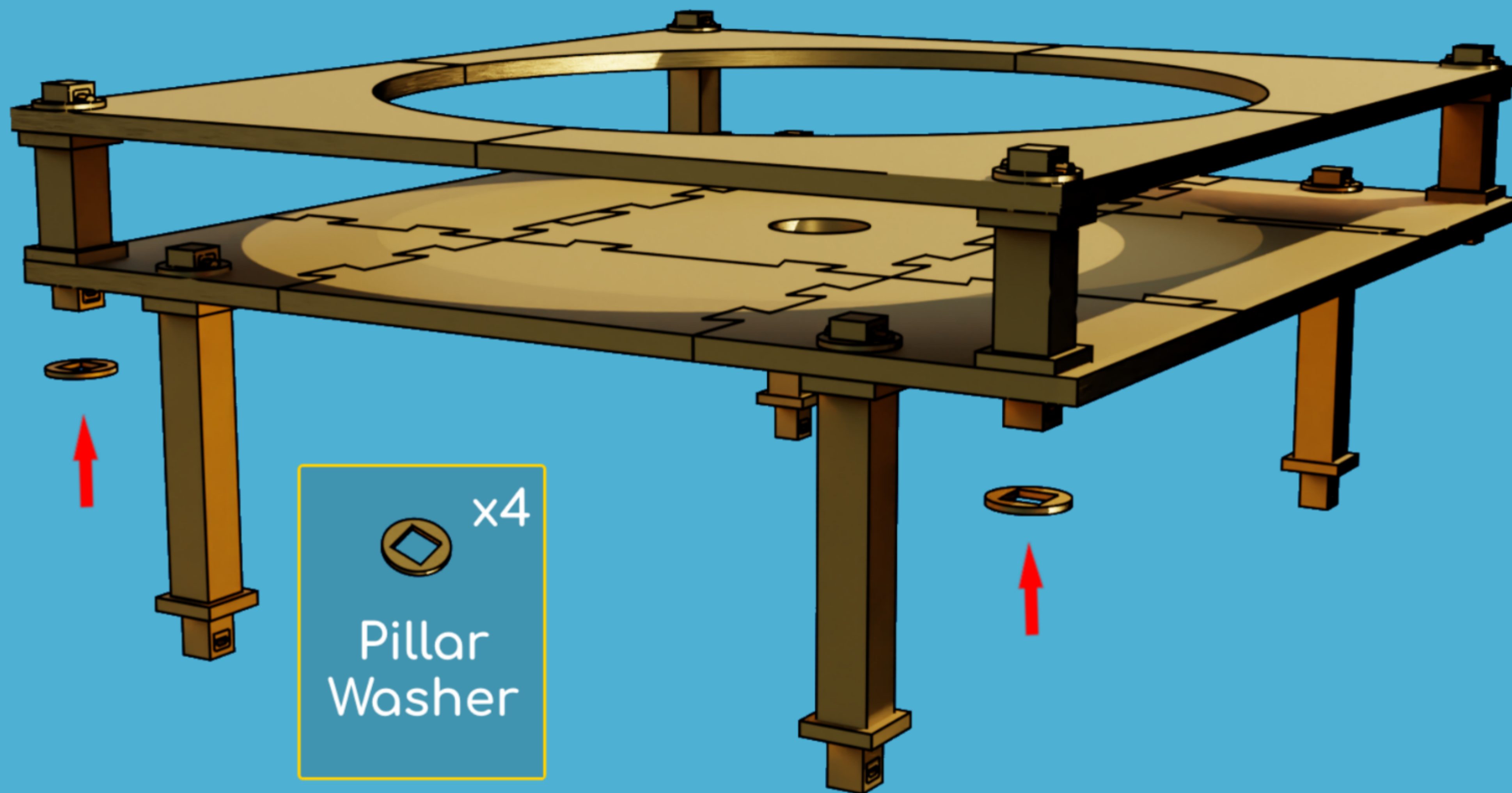


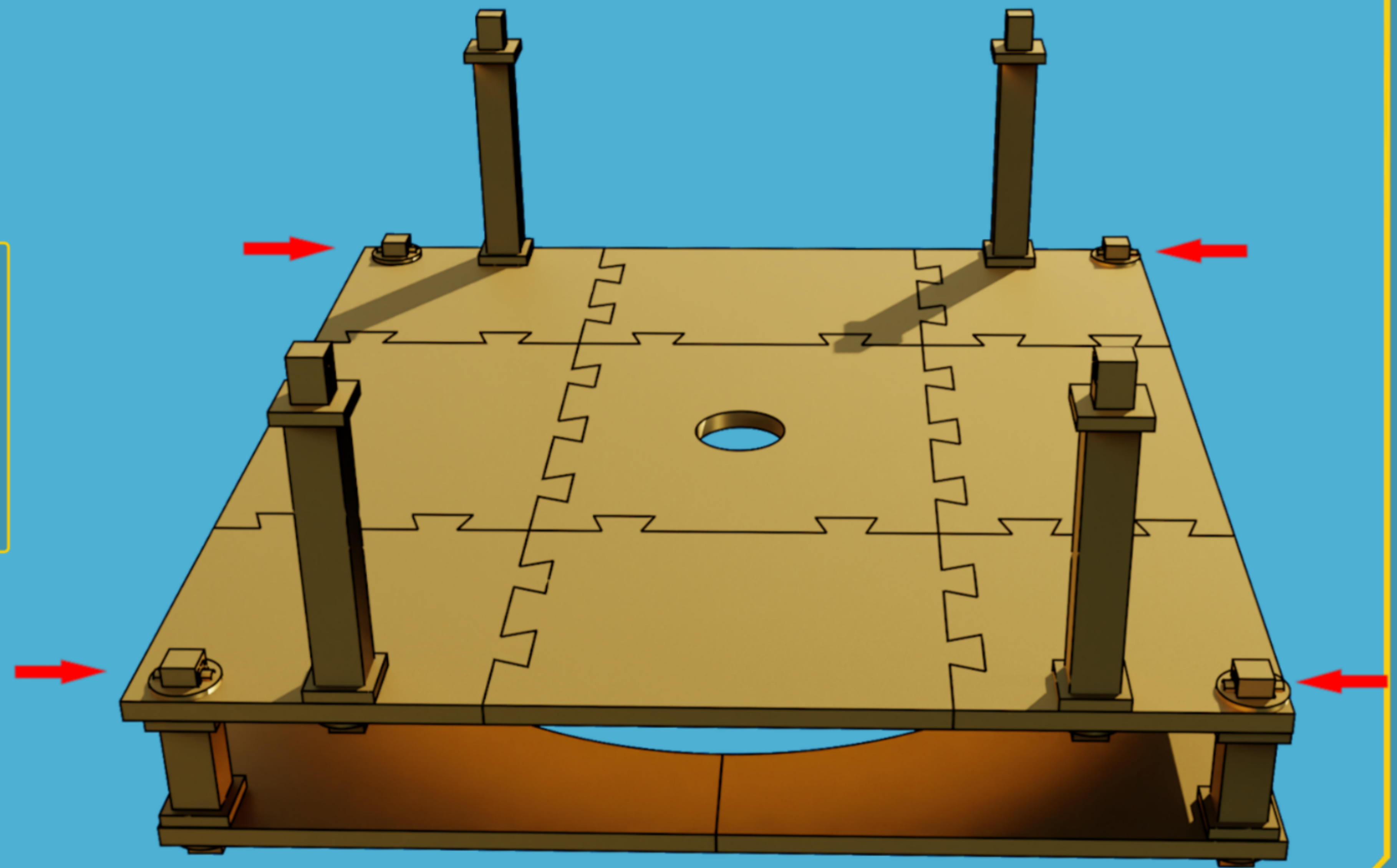




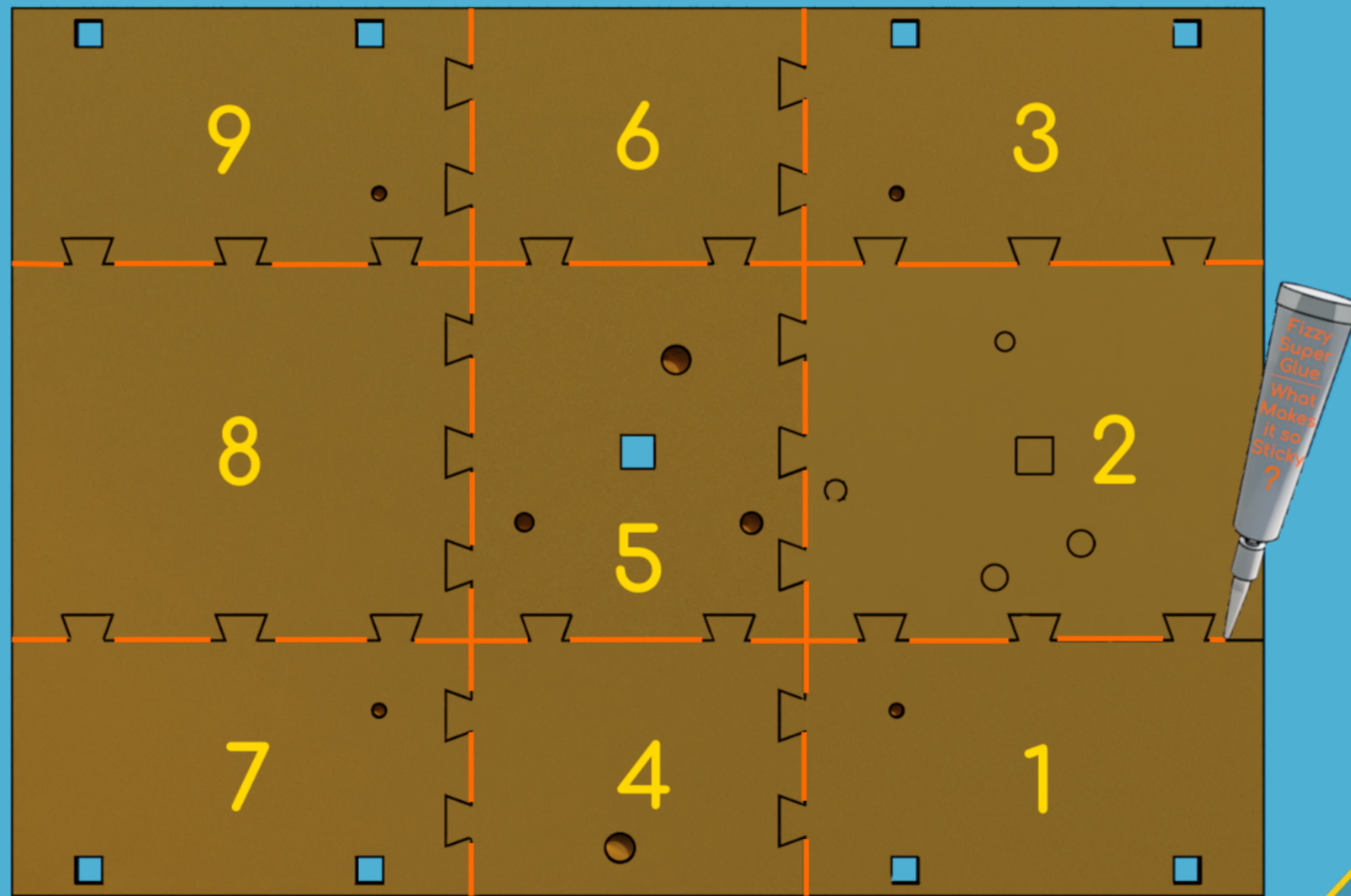


21

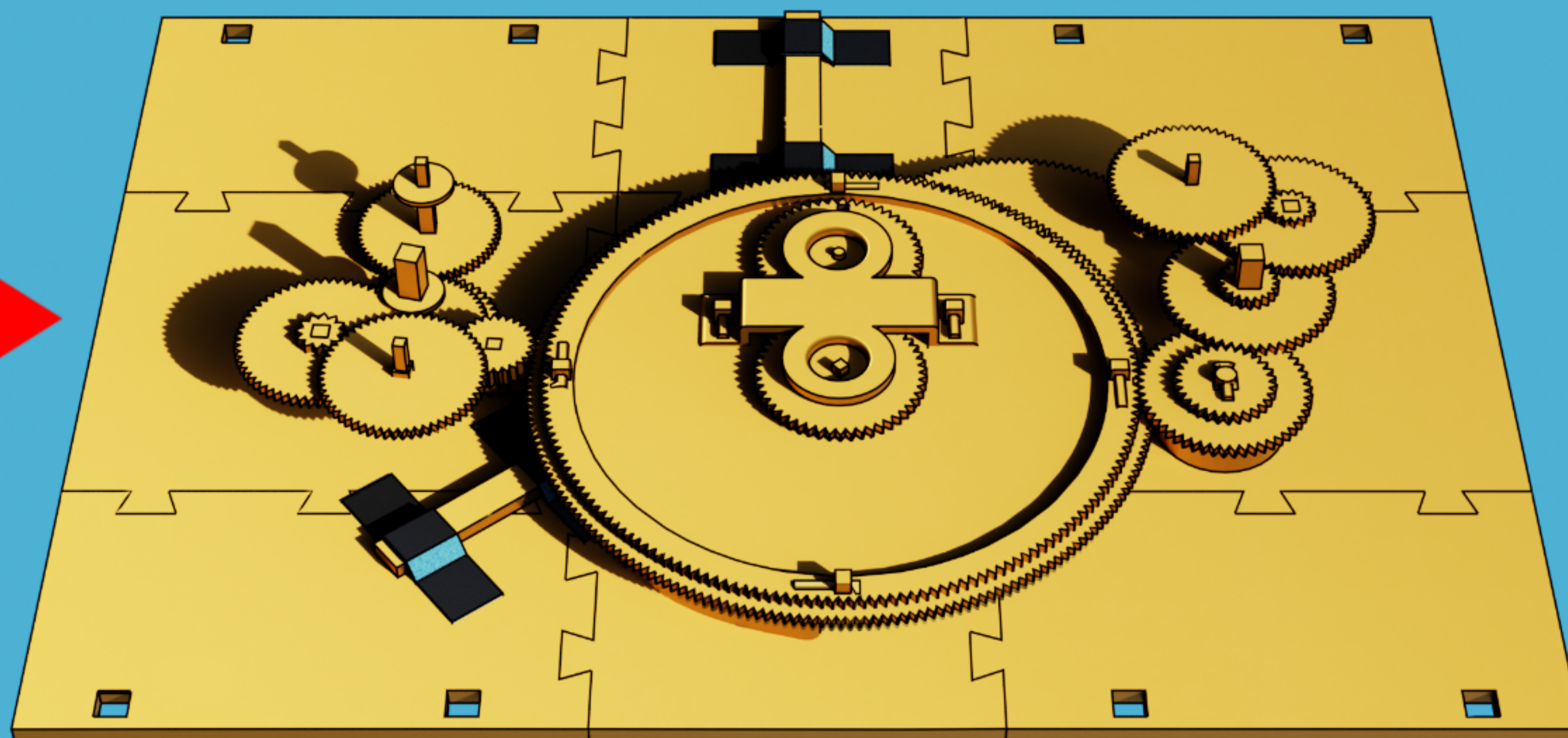


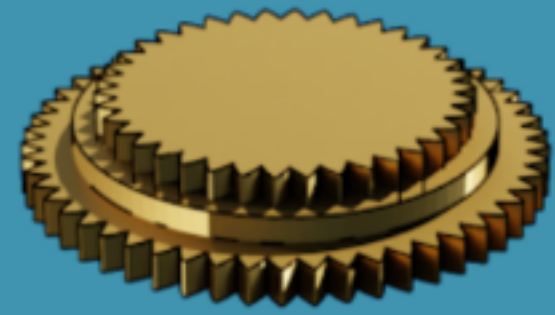


Mid Plate
Print Layout



Lunar,
Saros and Metonic Cycles

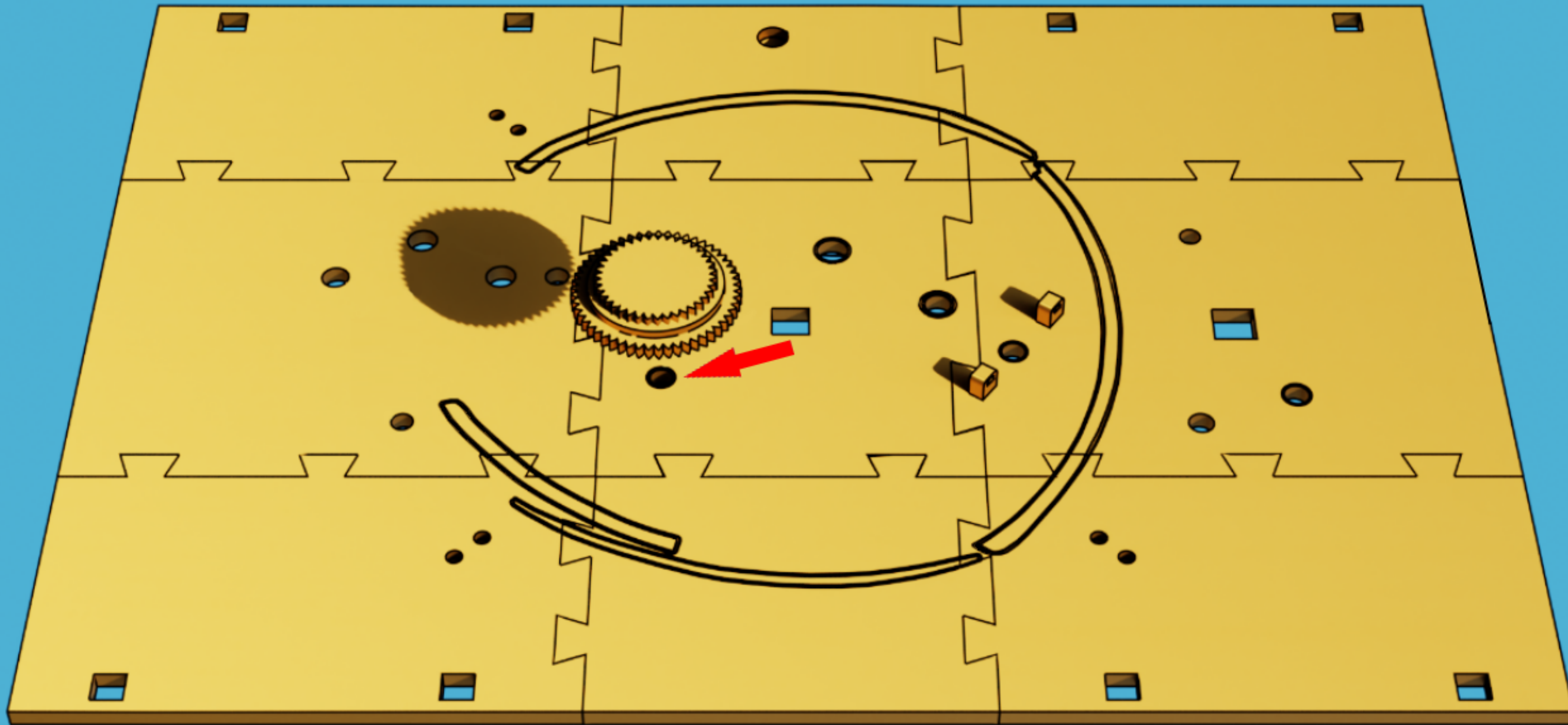
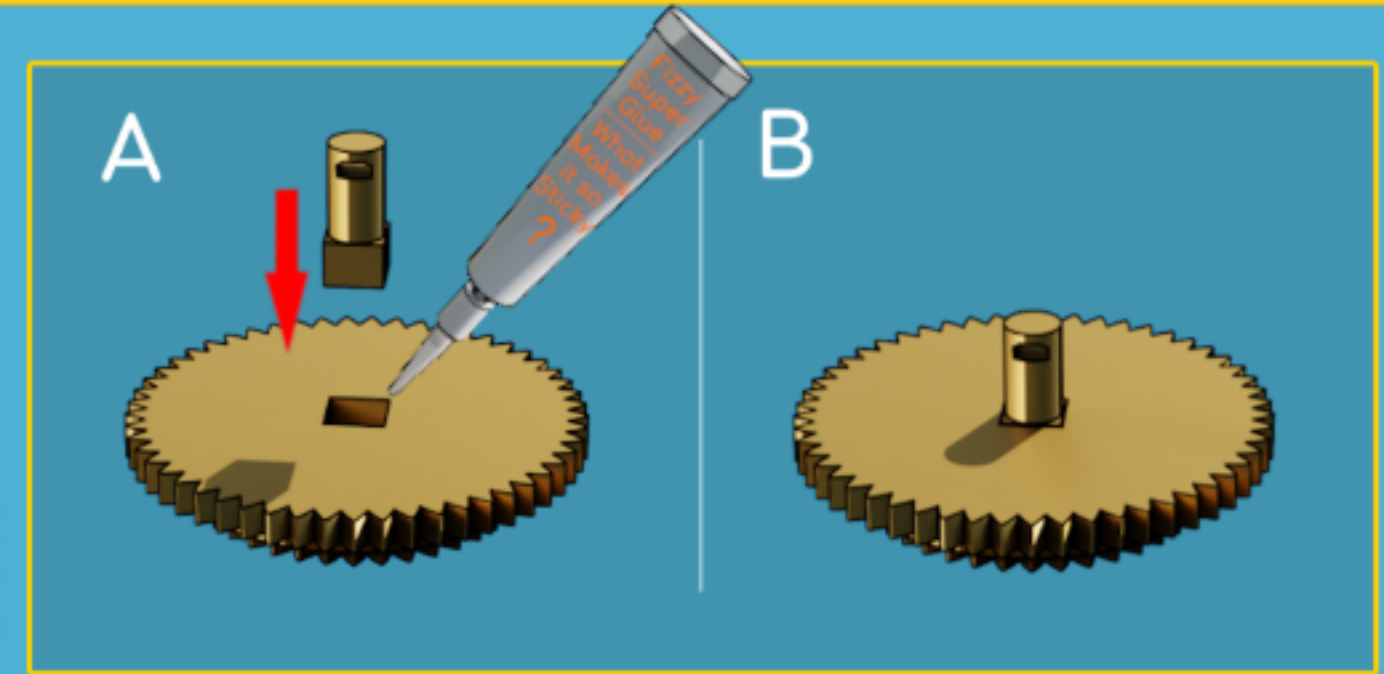




L1 + L2



L Arbor





Washer



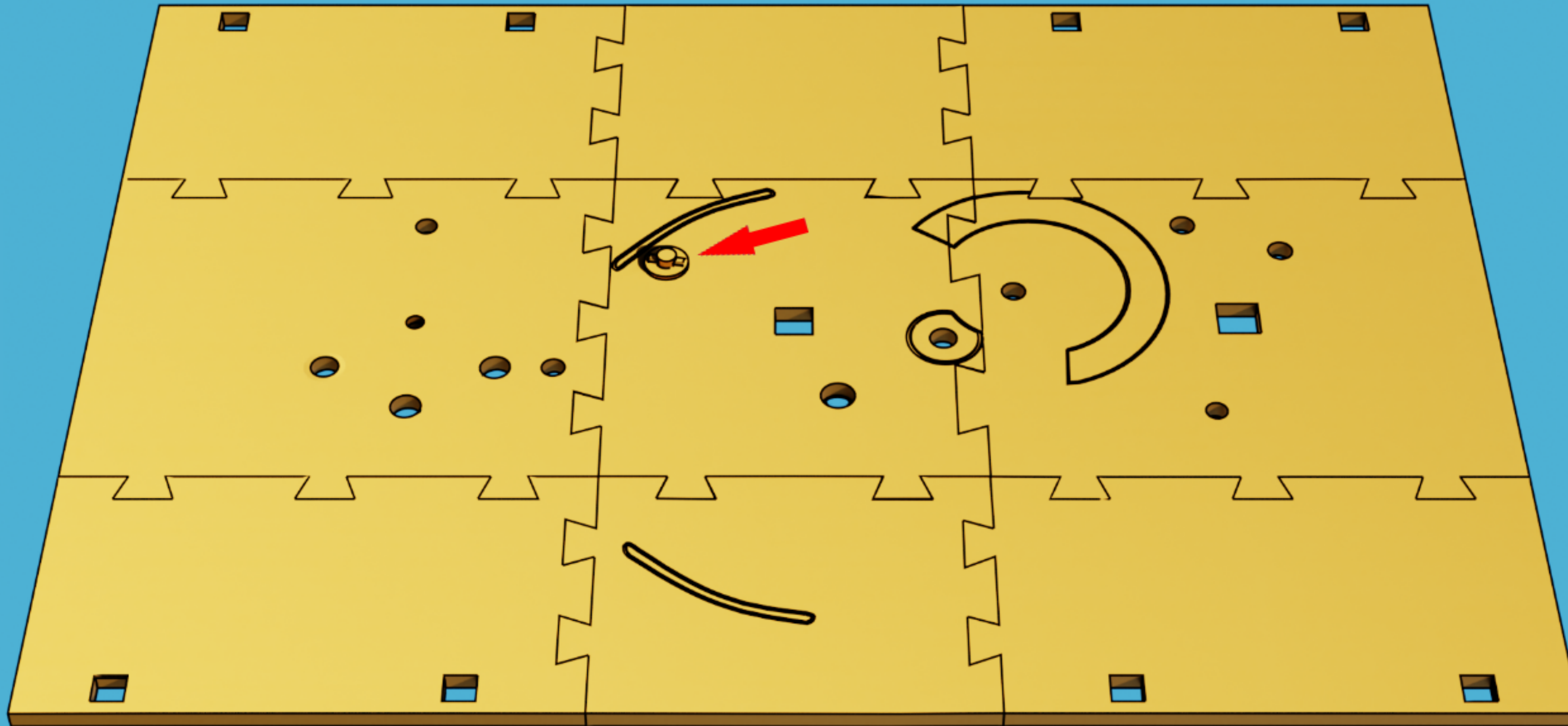
Pin



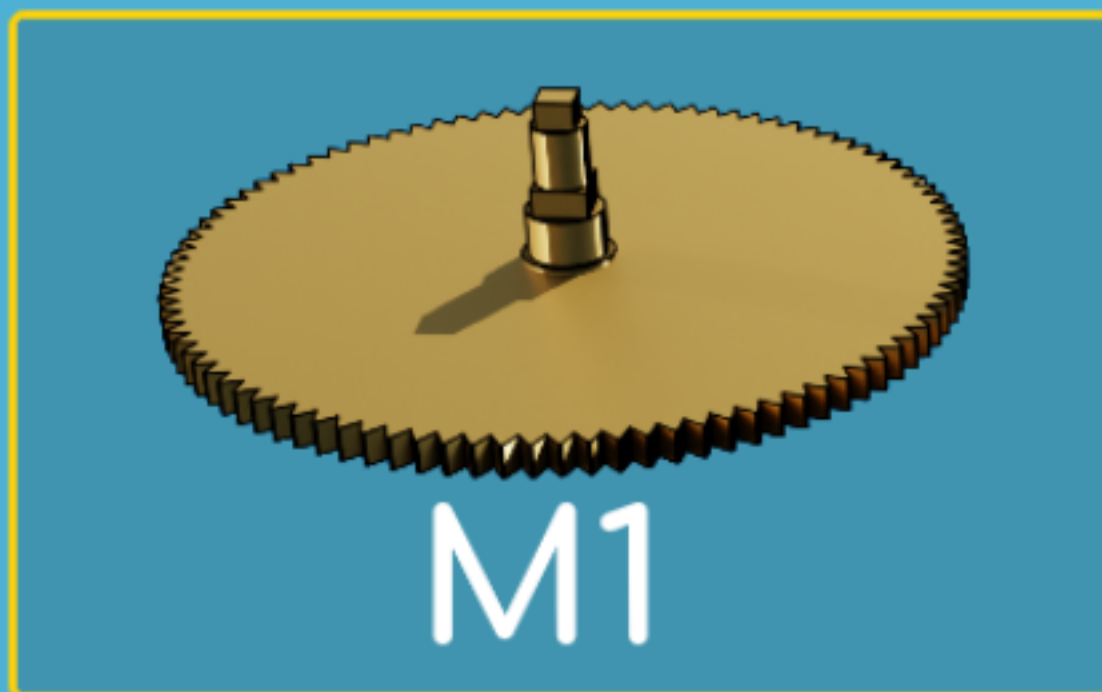
Arbor holes may need to be filed to clear the holes for an easy slide in for the pins.
keep in mind the pin shape, you want the flat side down.

The pin shape was an alteration to make them possible to print, the original mechanism would have had small round metal pins.

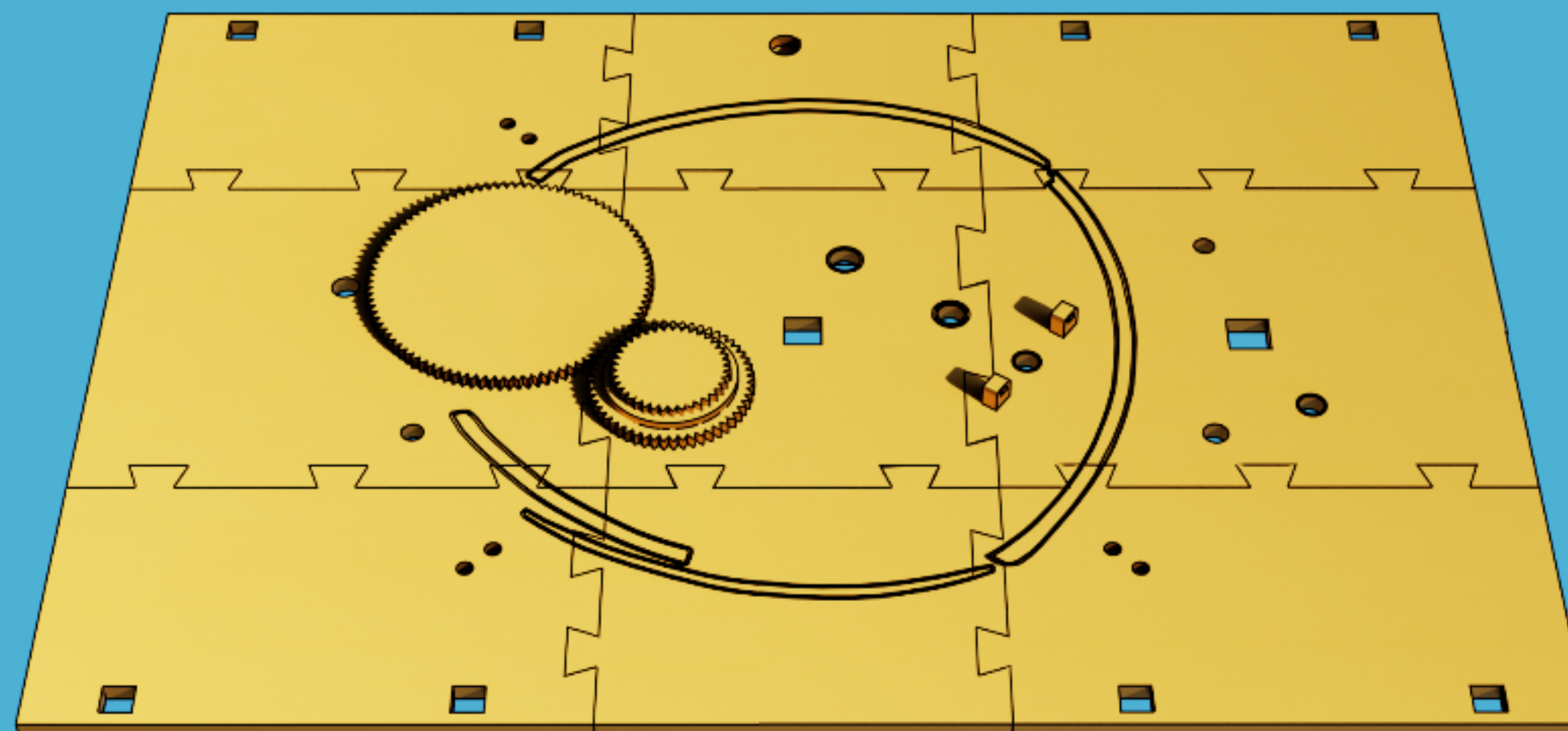
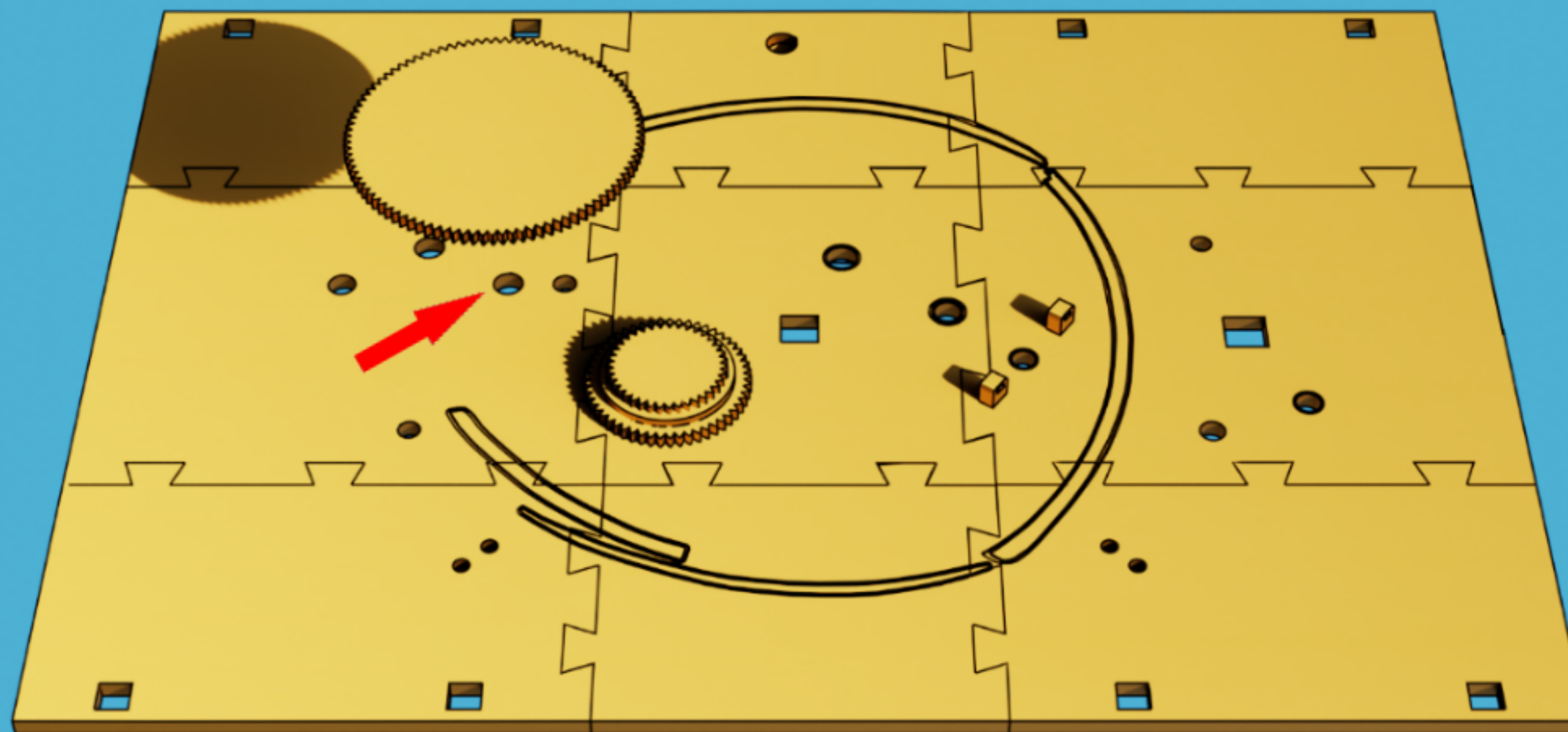
FLIP



27



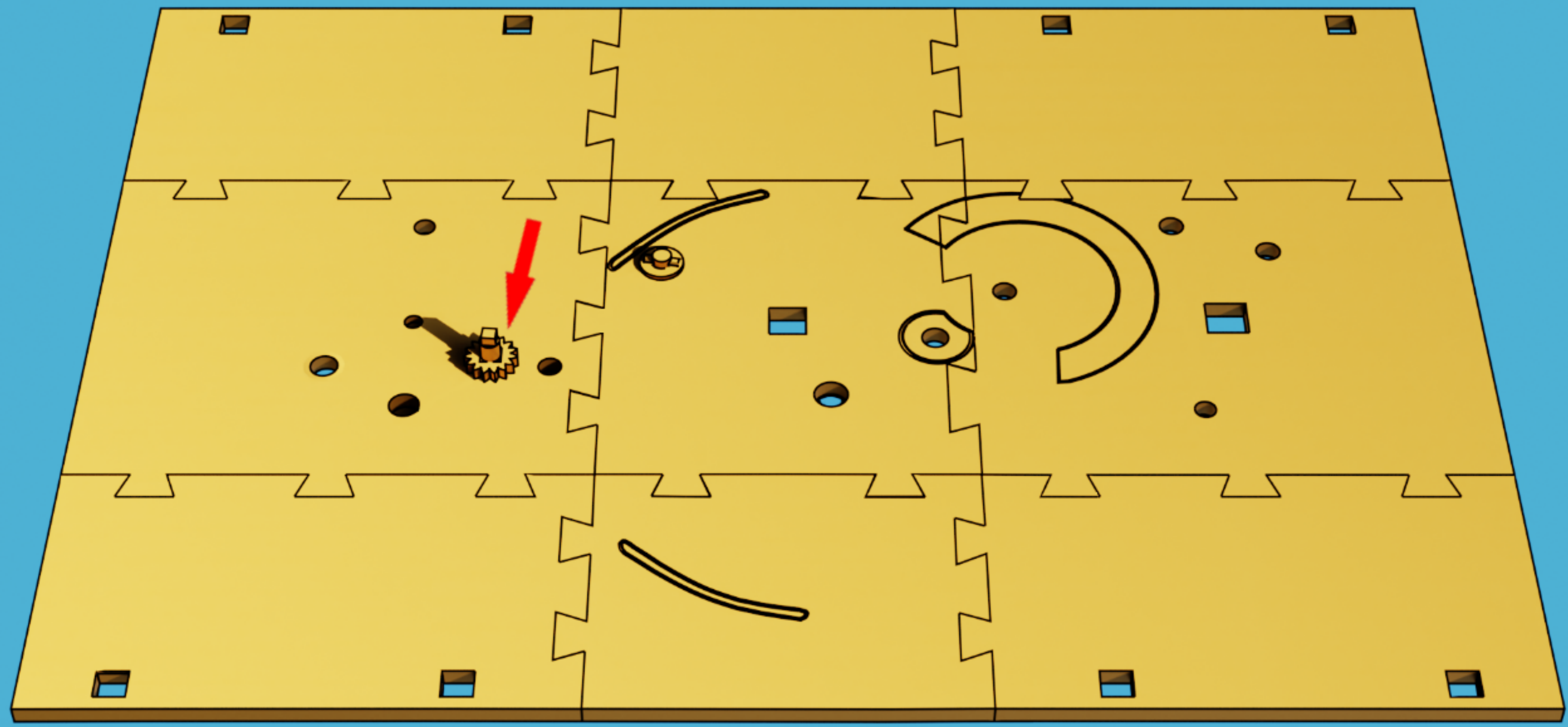
FLIP





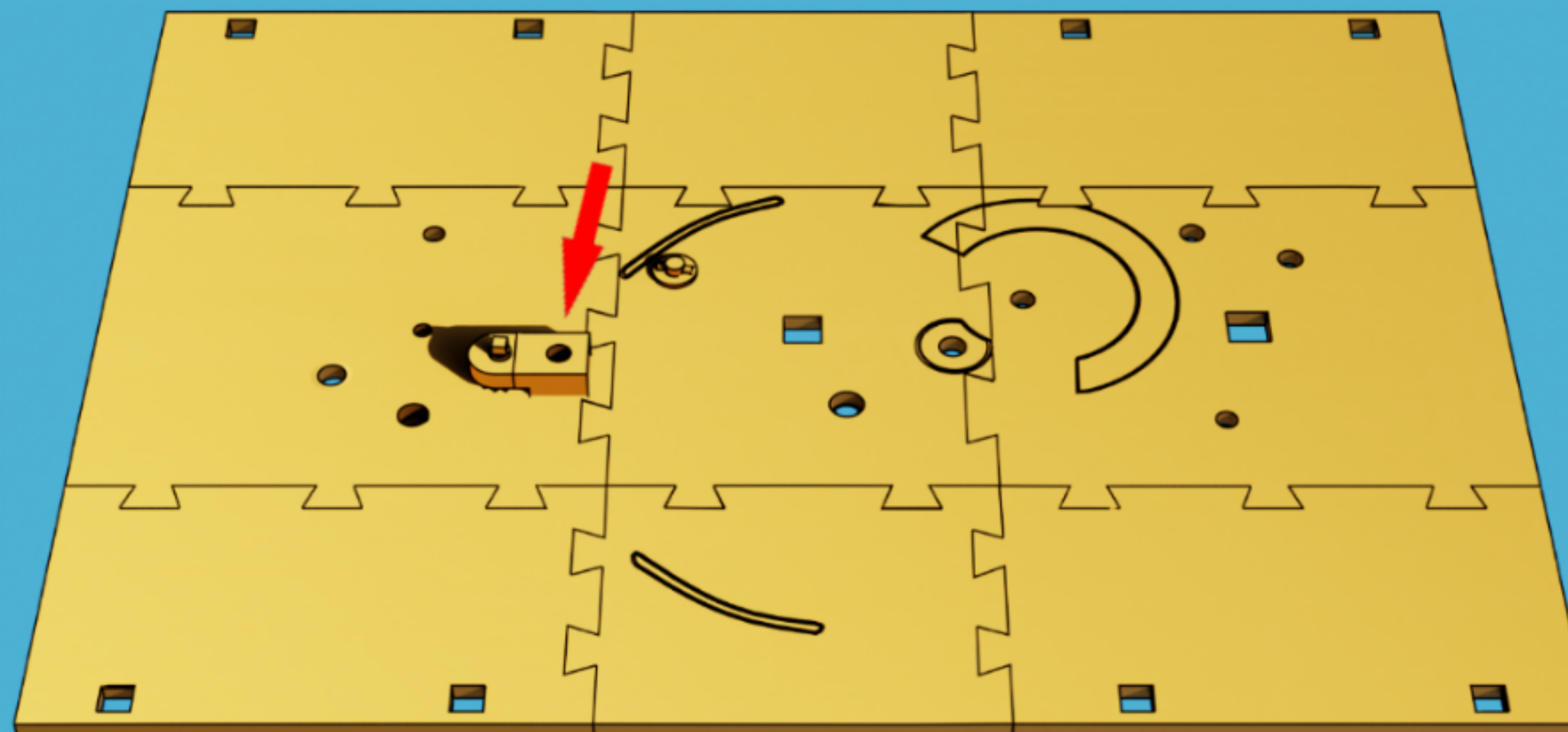
M2

FLIP

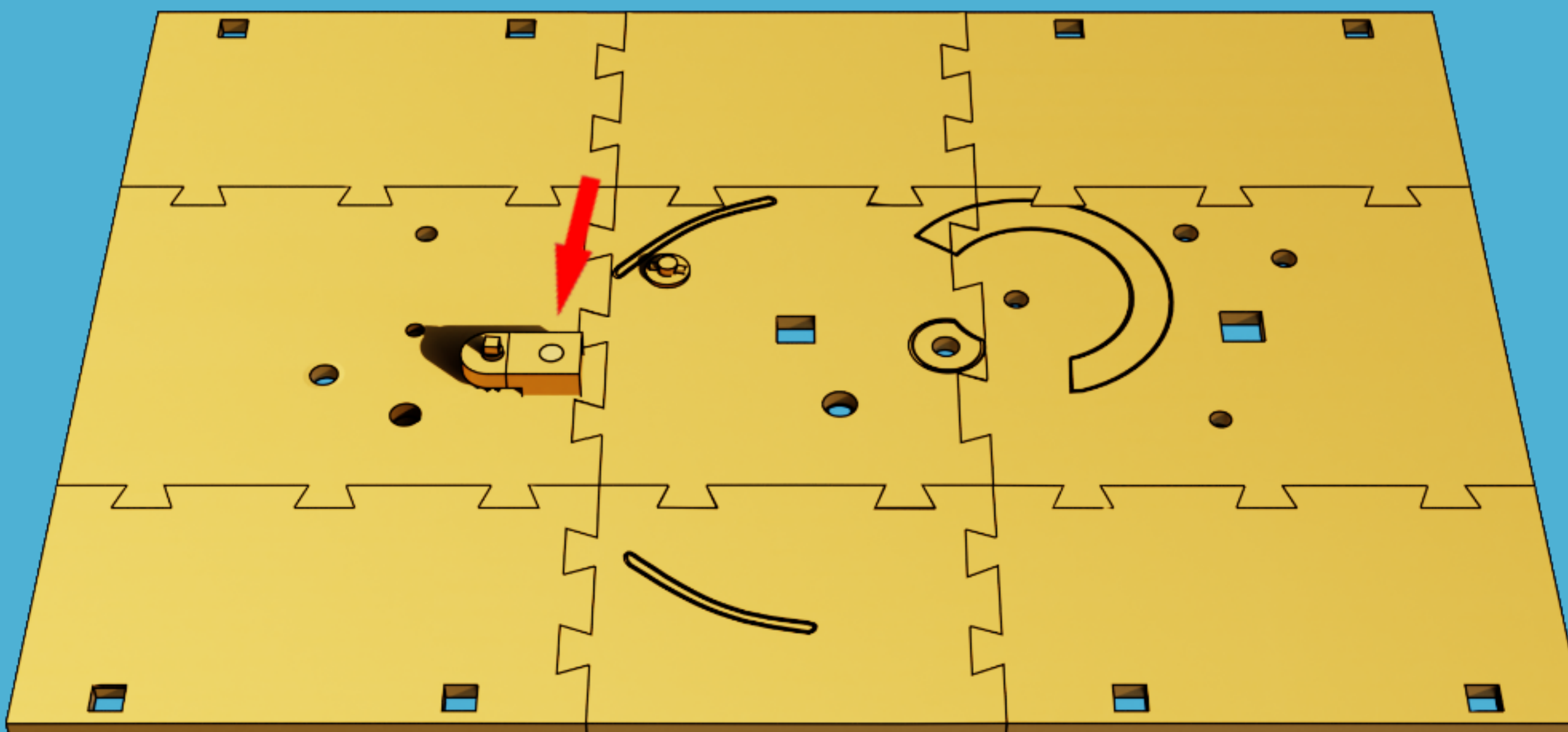




M Holder



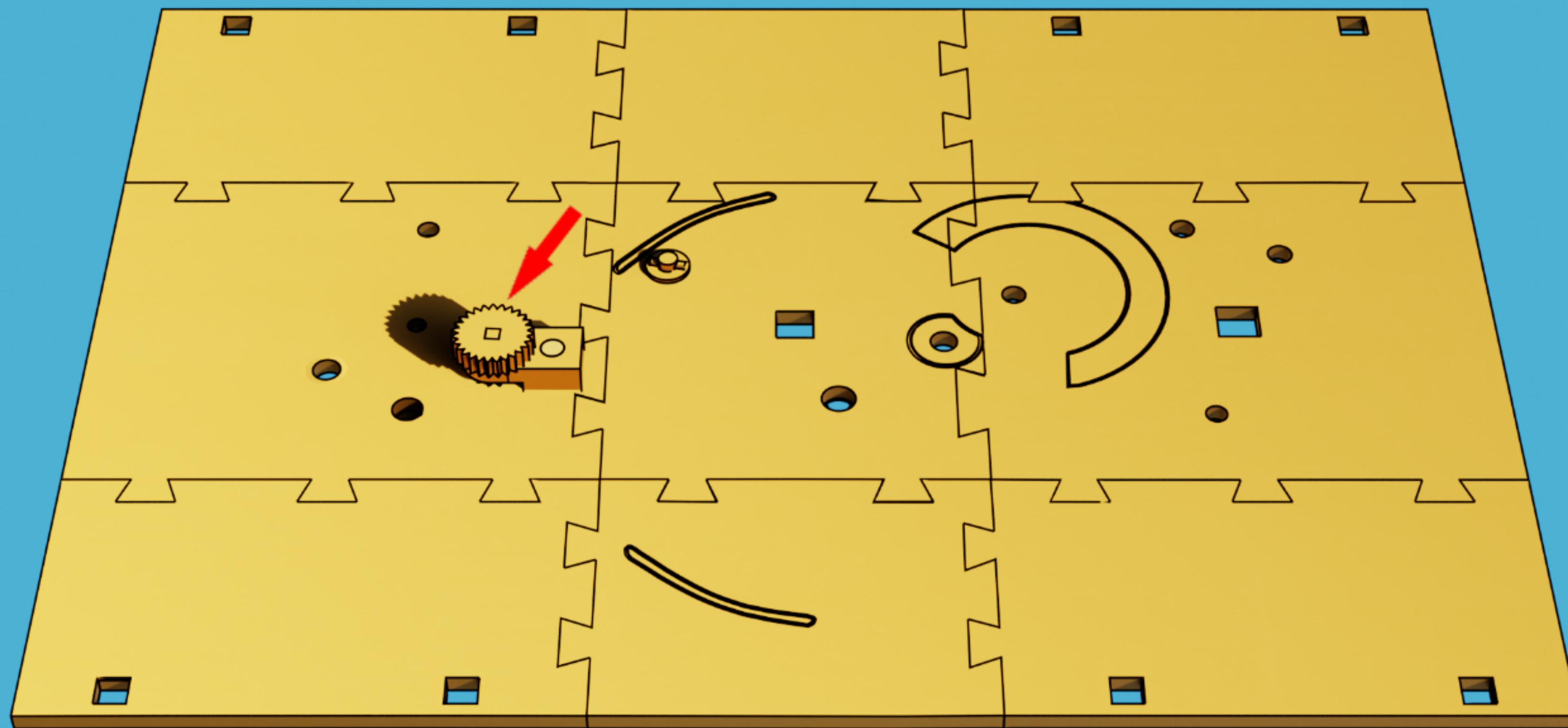
M Holder Pin



30



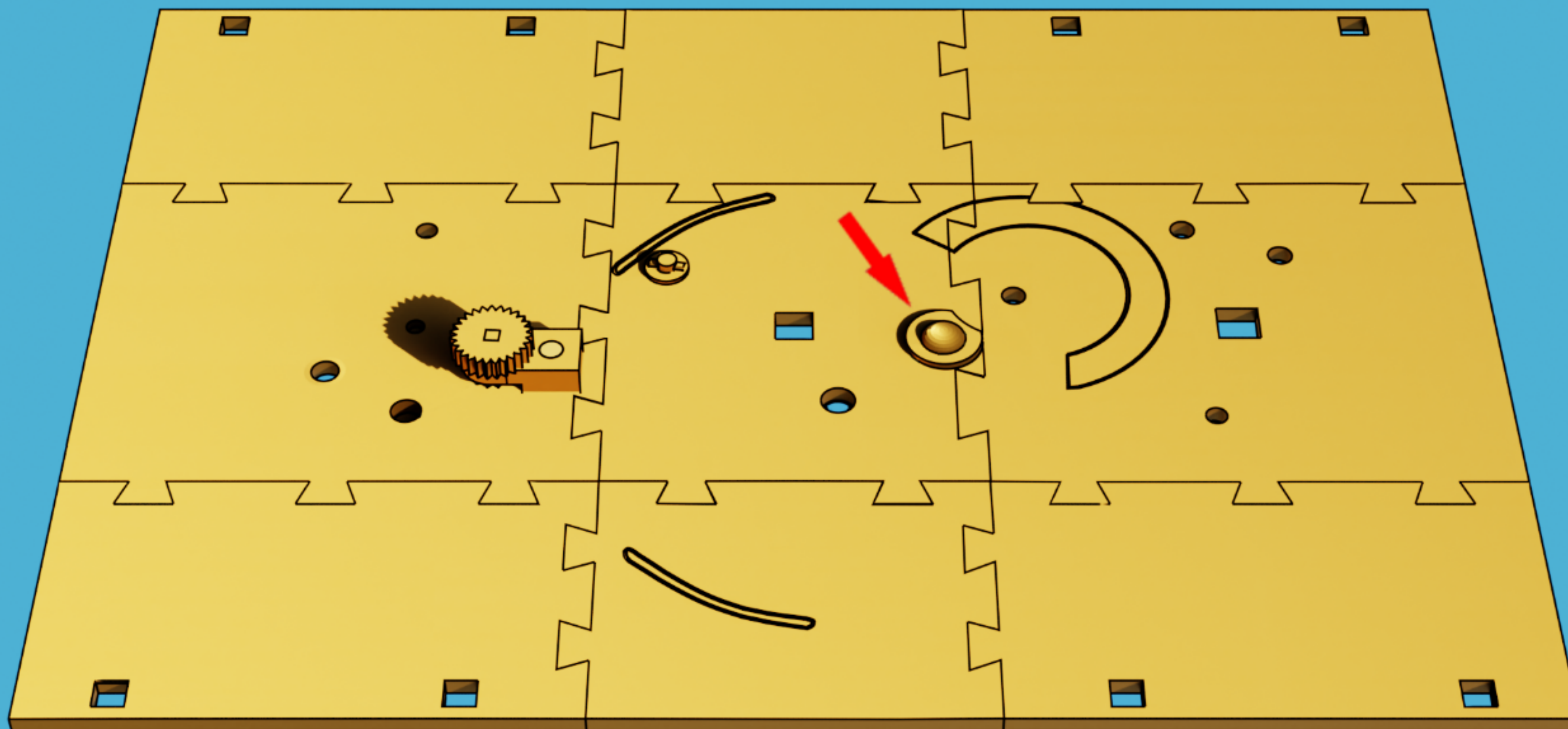
M3



31



C Arbor



32



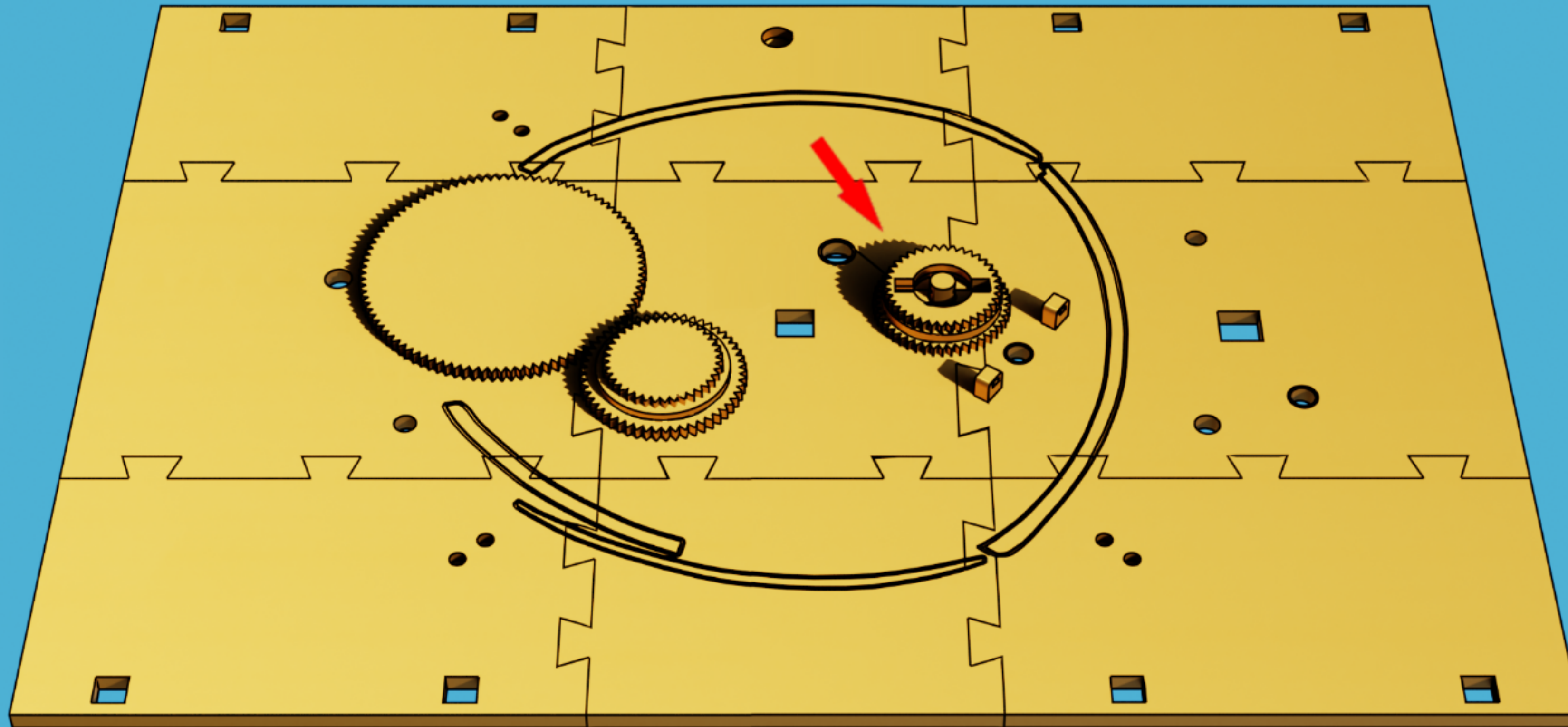
C1 + C2 Gear



C Pin

The C Pin is slightly different from the standard pin. Getting the pin in can be a fiddly process, we would recommend using some long nose pliers for this. Make sure the pin will fit in the C Arbor easily before trying to get it in with the gear on, the hole may need a file to clear any clog that may stop the pin.

FLIP



33

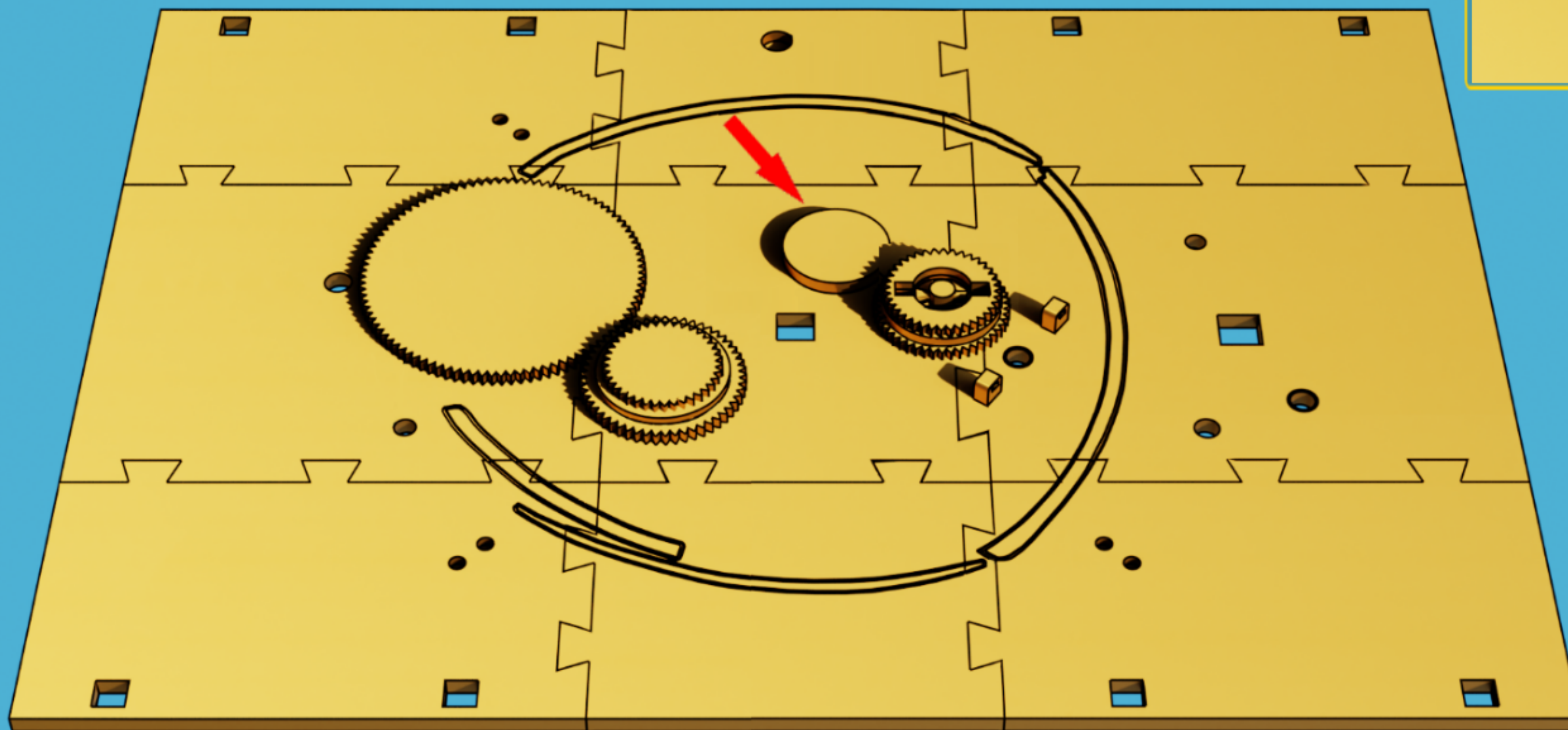
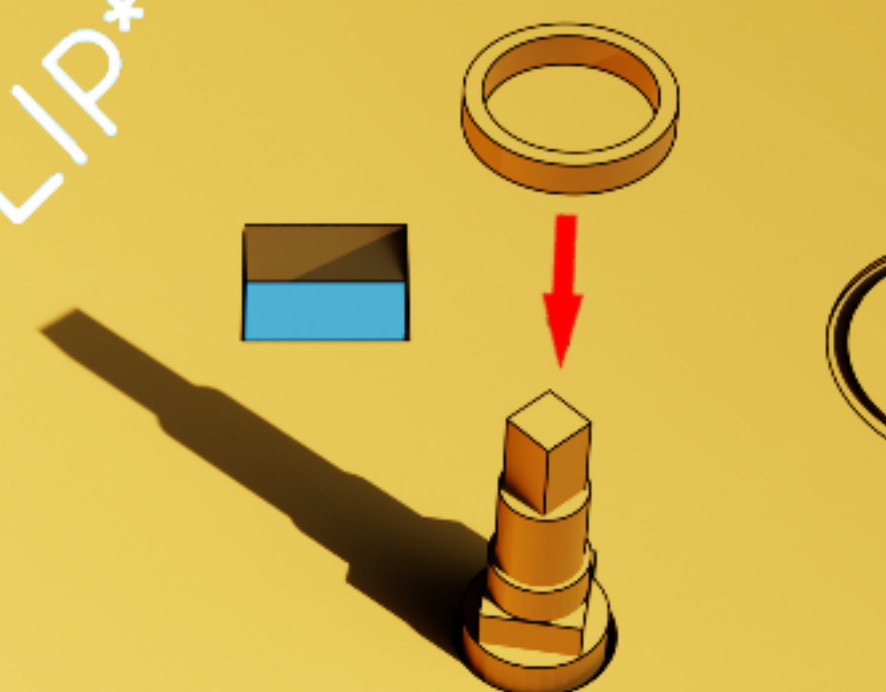


E Arbor



E Arbor Spacer

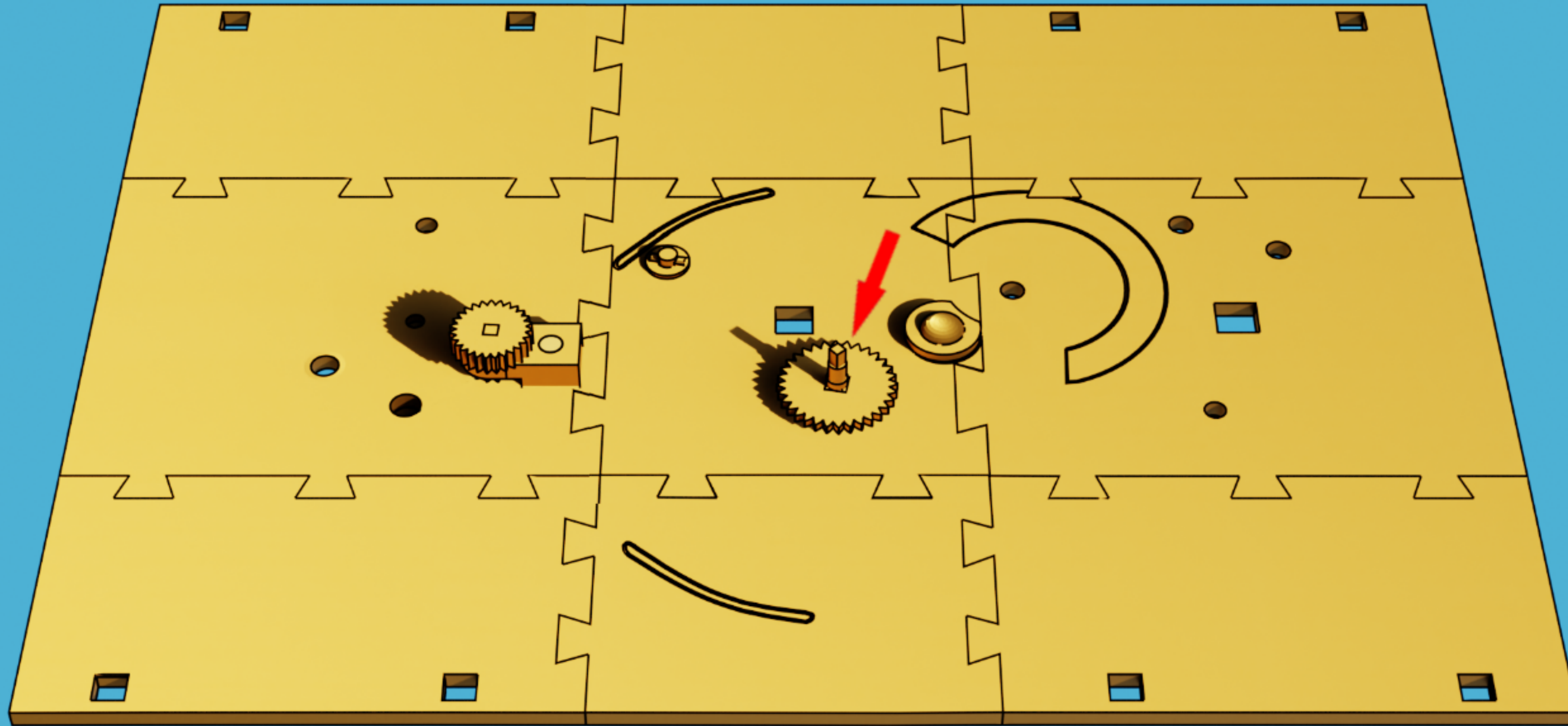
FLIP





E1 Gear

The E Arbor can be a very confusing section in terms with the way it works, as some gears turn with the E arbor and some gears turn independently on it. If the gear fits on with a square then it will turn with the arbor, If it fits on with a circle then it will rotate independently.



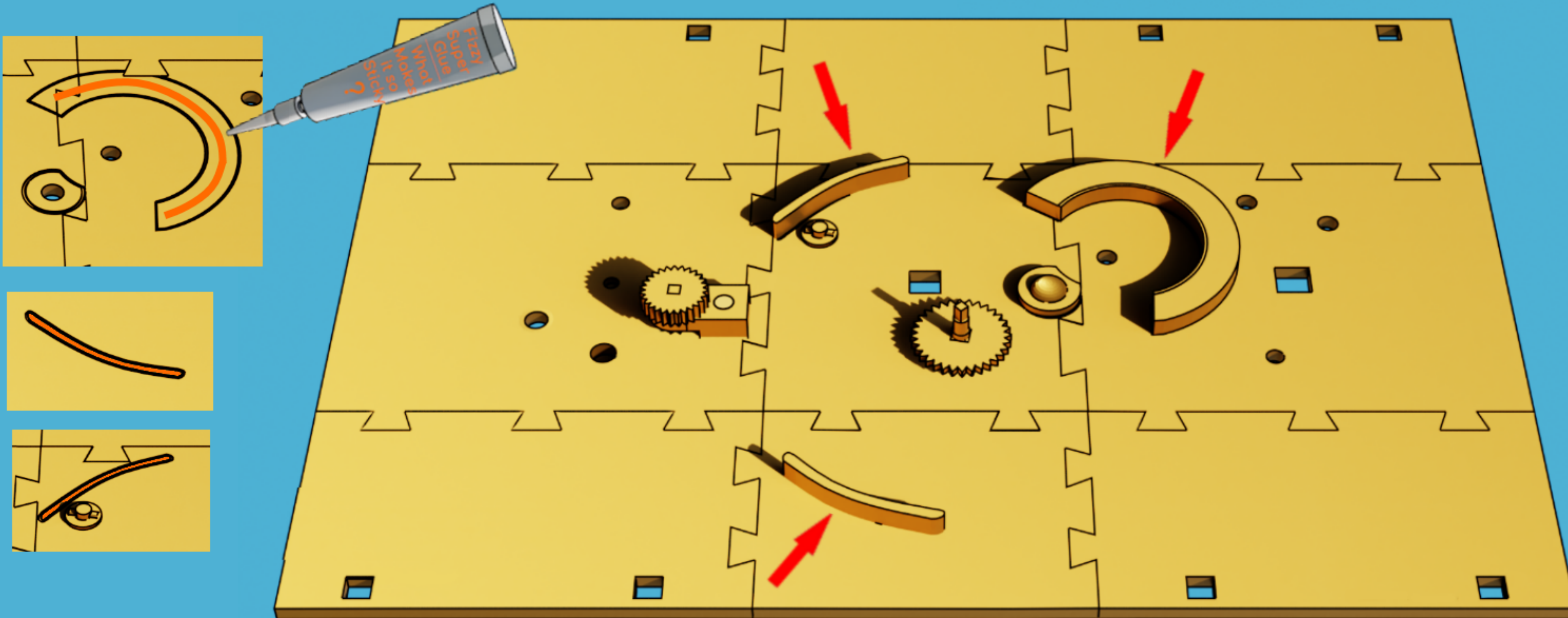


D Spacer



E Supports

On both the D spacer and E Supports there is a raised rim on the models. Due to friction being a bit of an inconvenience with PLA this is one of the solutions we came up with. It is important that models with a rimmed edge is facing the right way up. The rim separates components so a face may only rub on a thin line of plastic rather than full face to face contact.



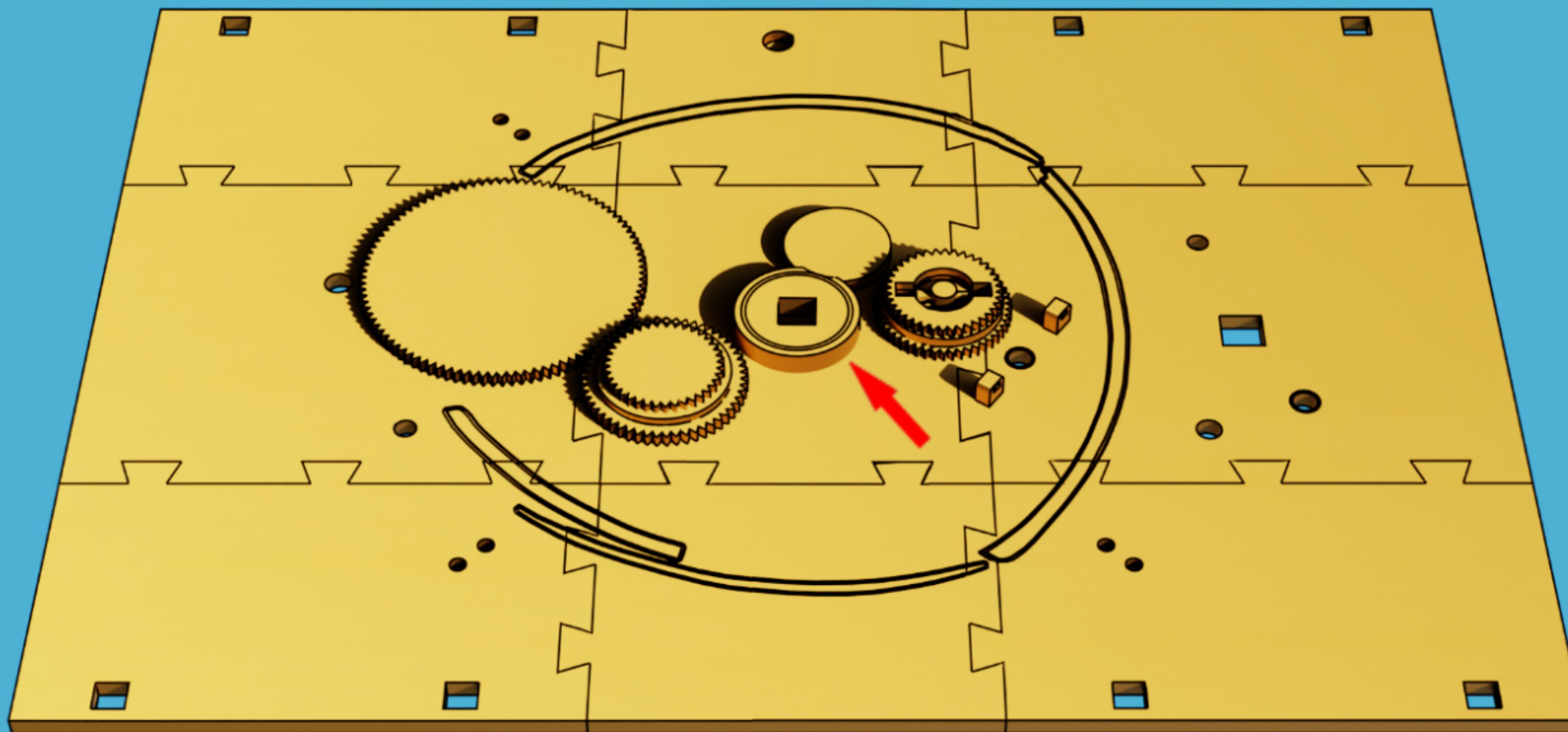
36



B1 Washer

Make sure the raised ring on the B1 washer is facing up, the groove taken out of the washer locks against the top of the E Arbor.

FLIP

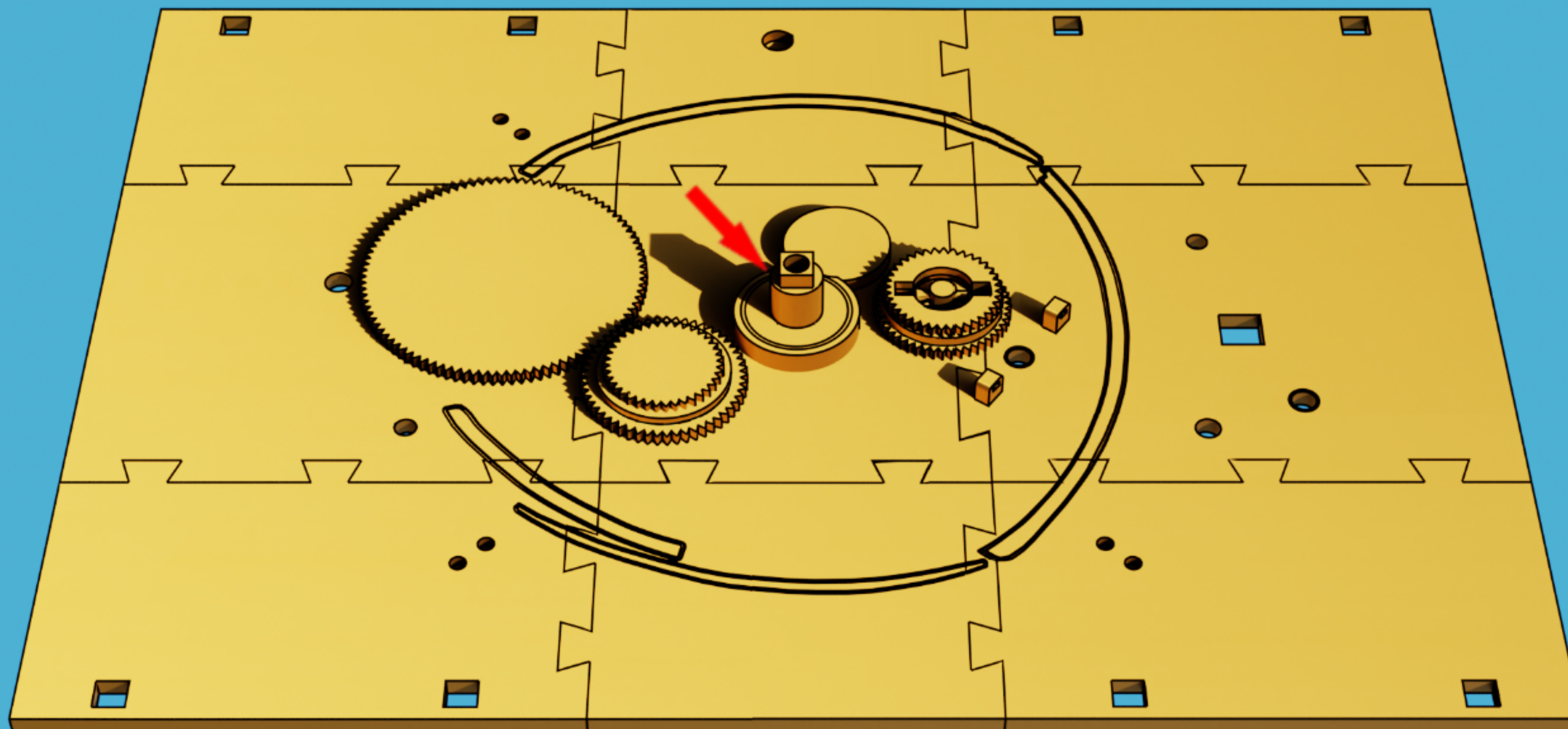


37



B1 Arbor

B1 Arbor and B1 Washer will be removed again later as they must be constructed with the B1 before going back in to position. Placing them on the plate now is to ensure that the soon to be added B3 gear lines up and meshes with E1.





B3



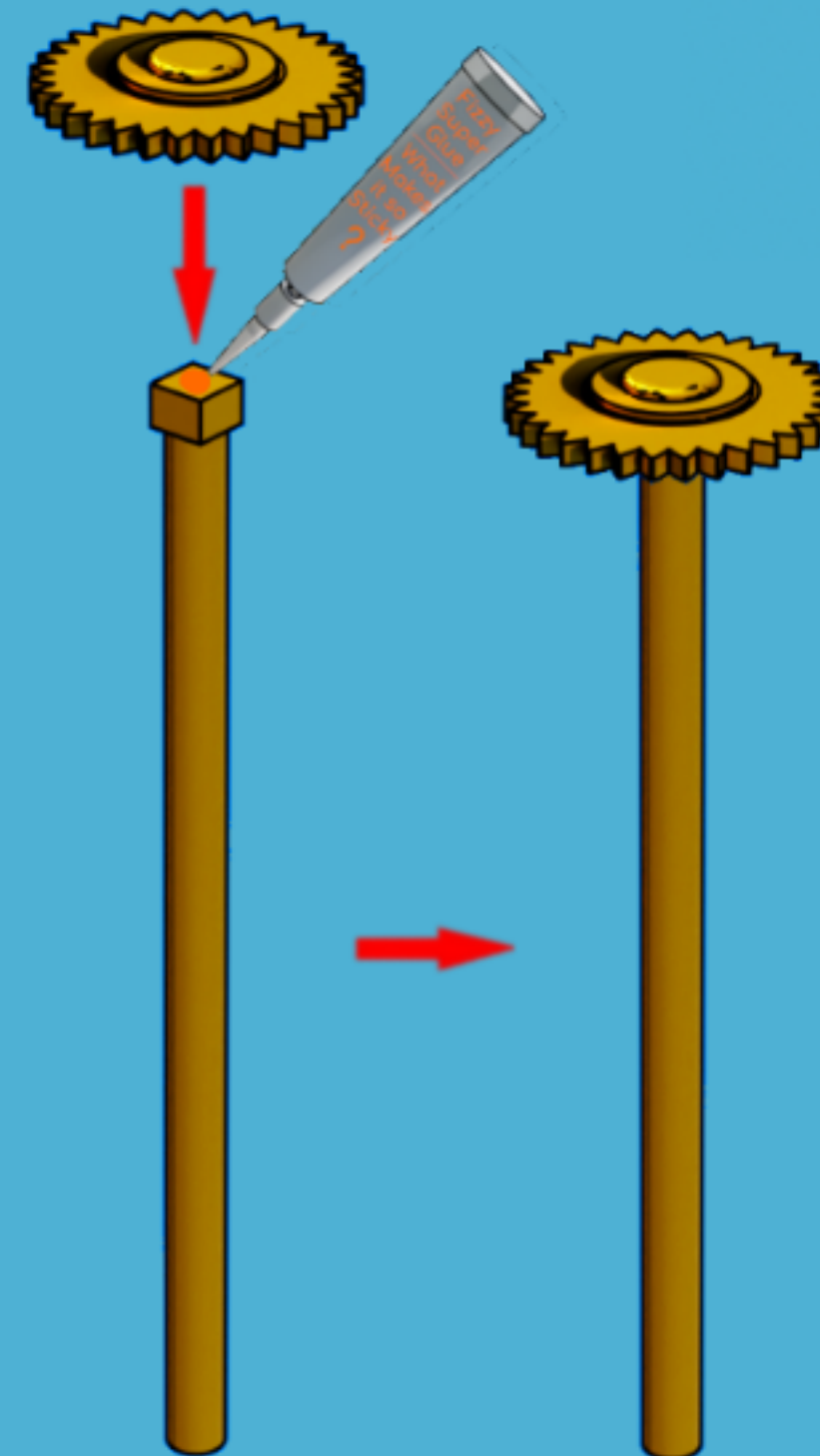
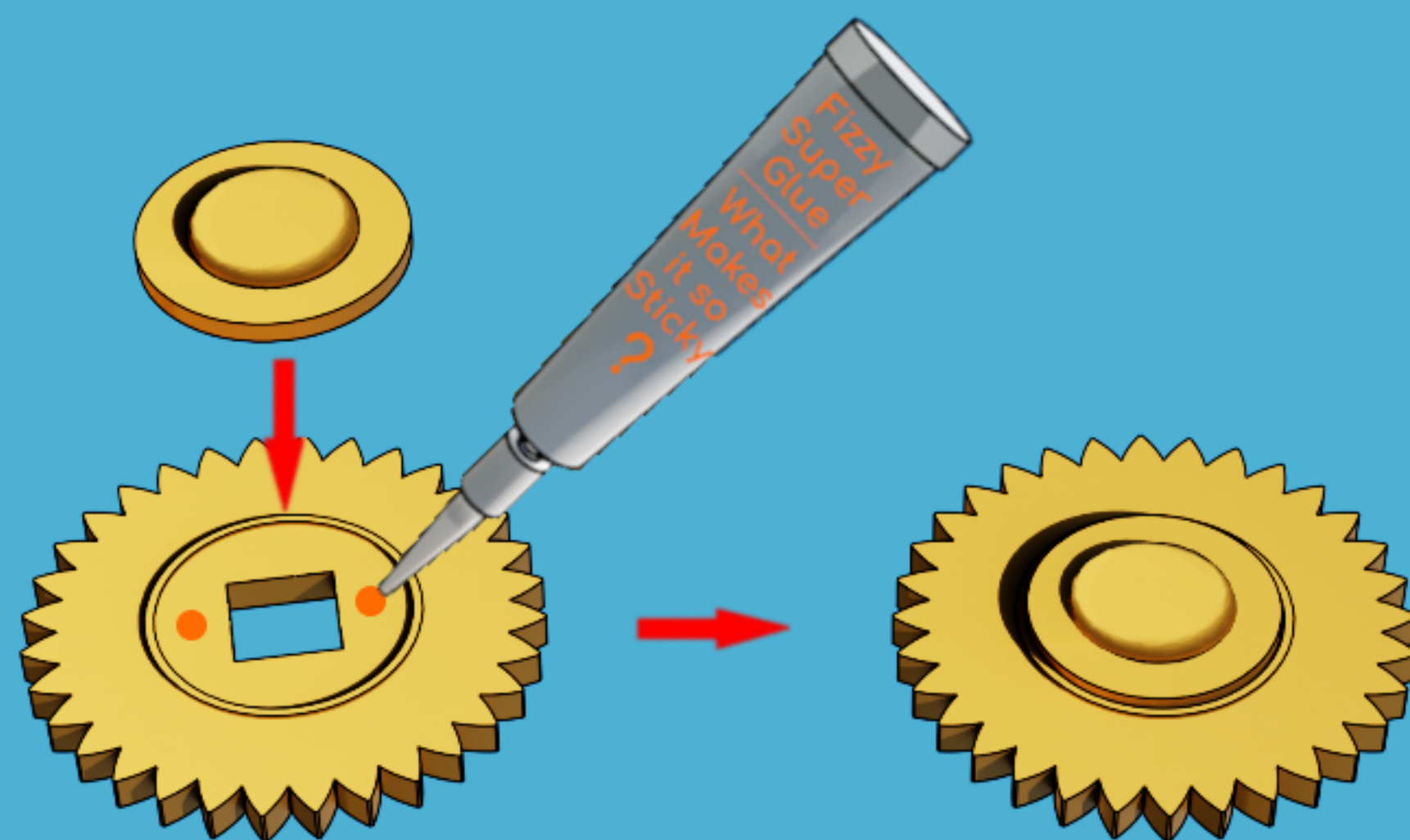
B3 Cap

50% infill



Lunar Shaft

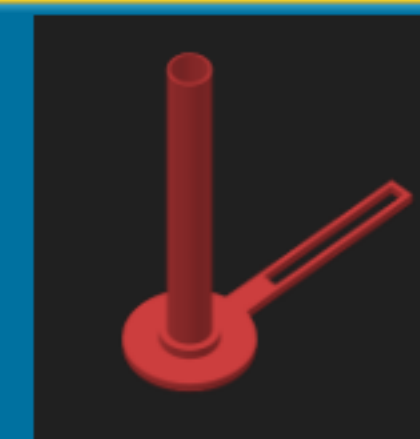
It is important that the B3 goes on the lunar shaft as square as possible. You might want to put it on without glue first and test it rotates with E1 without any wobble, then glue it on when you feel confident.



B1



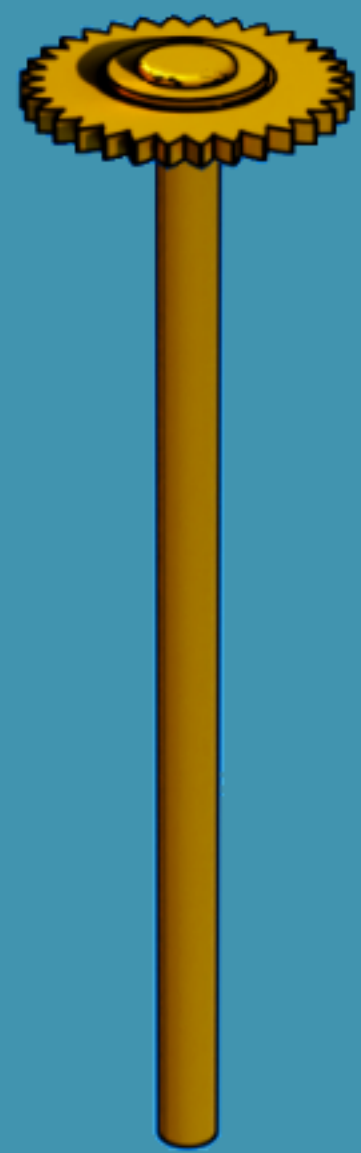
5. Shafts



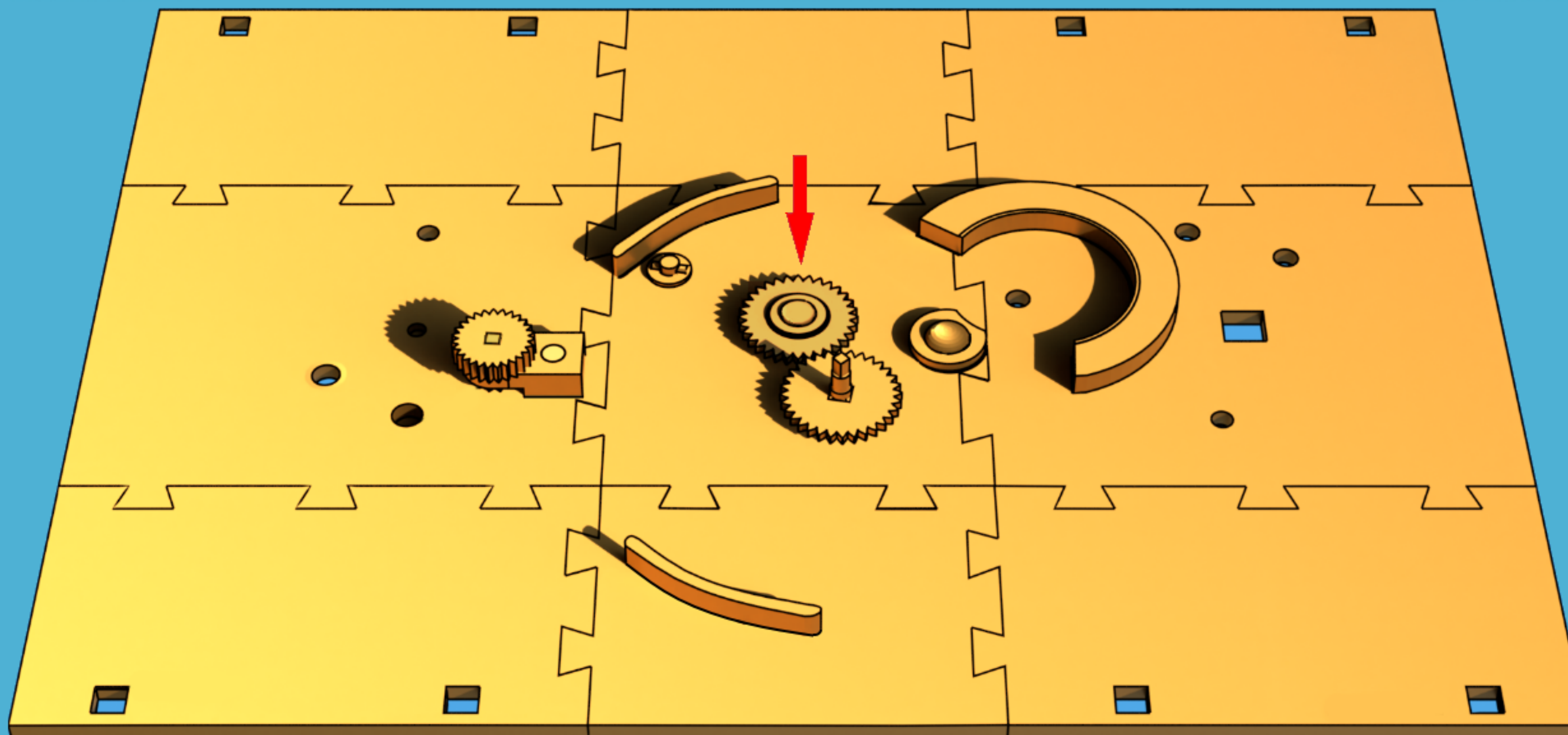
3. Mercury Follower

Print out the Mercury follower to test the lunar shaft will fit and rotate smoothly within it. Due to everyone's printers being slightly different and the tolerances being so fine, the lunar shaft may require a light sand until it can fit and turn freely within the follower. The follower at this stage is only to test the lunar shaft it isn't assembled until later in the build.

DO NOT USE GLUE PAST THIS POINT UNLESS INSTRUCTED.
The lunar shaft is exposed and is high risk of breaking, once you cover this gear make sure not to glue anything that might get in the way of replacing it, other wise your going to have a bad time.

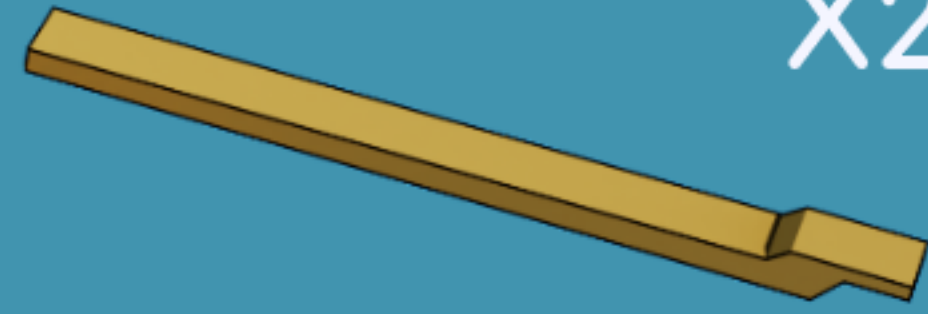


B3
+
Lunar Shaft



40

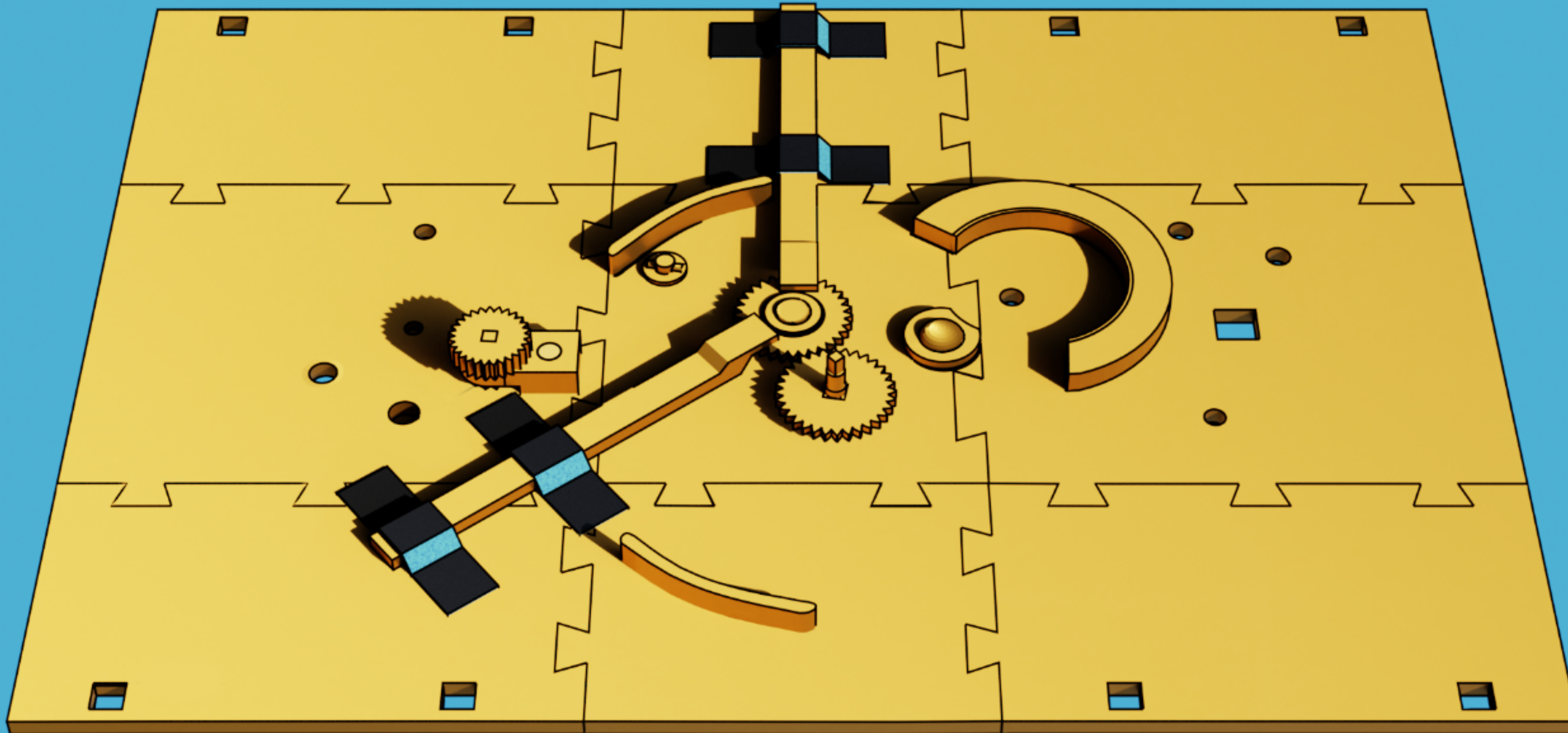
X2



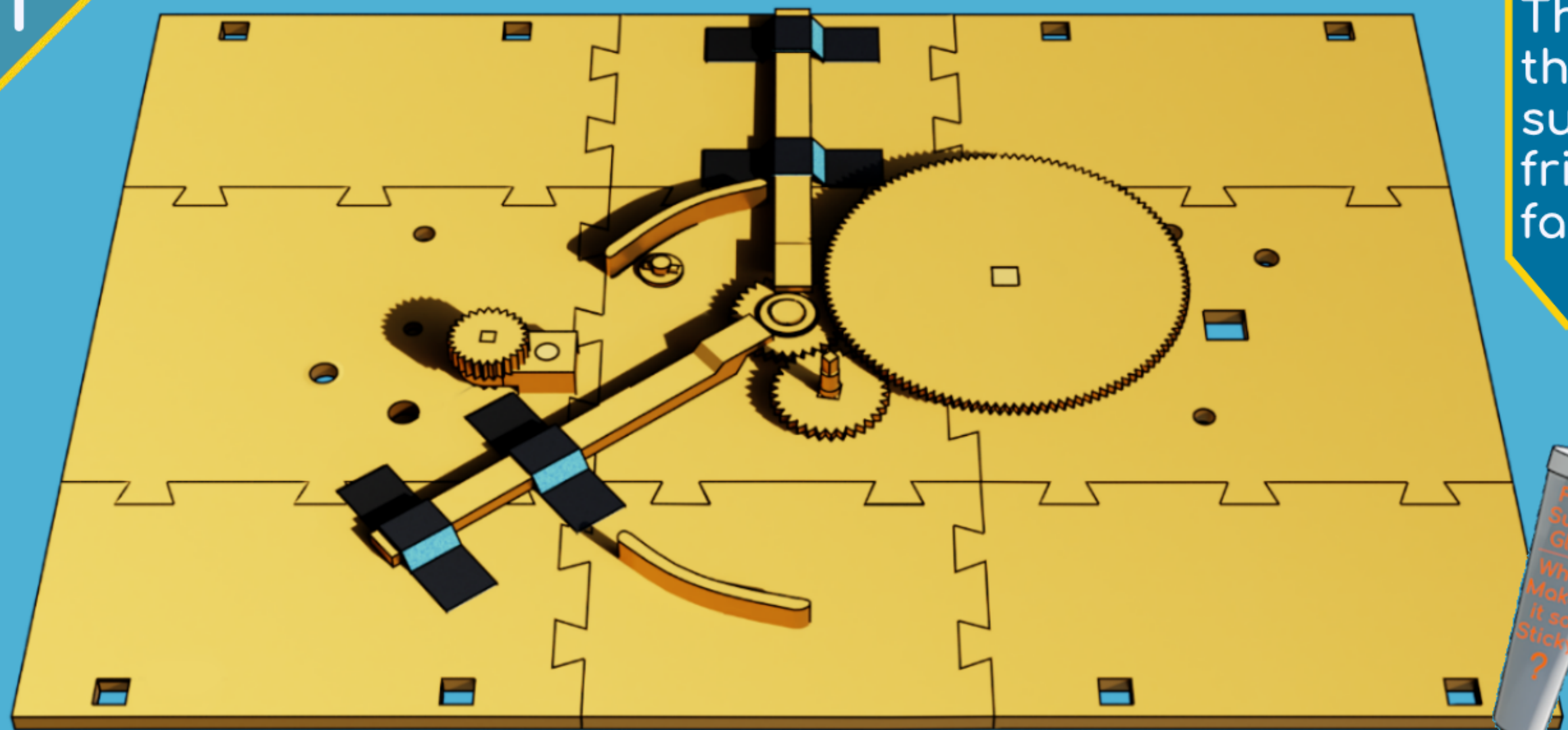
B3 Holder

The B3 holders are only to temporarily hold the B3 in place until it is finally held in position by the Mb0 at the top of the lunar shaft. These holders can be taped down until they are ready to be removed.

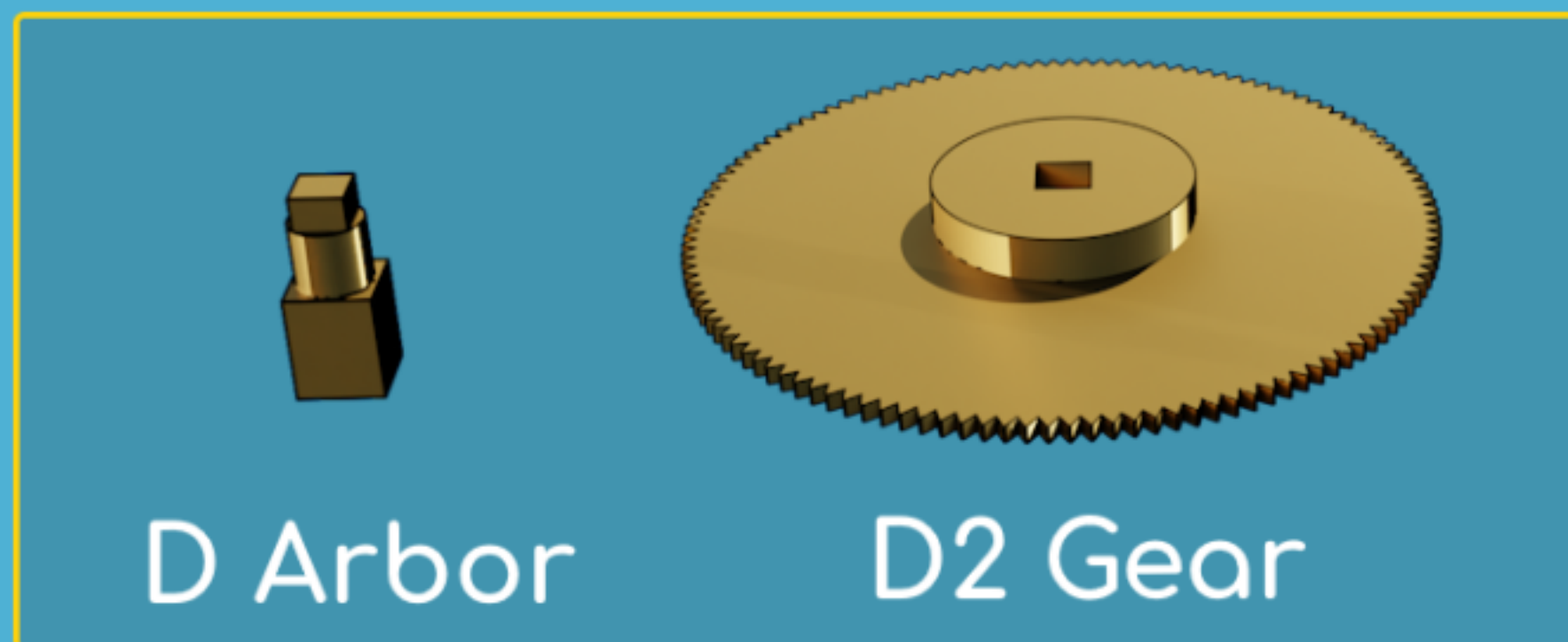
FLIP



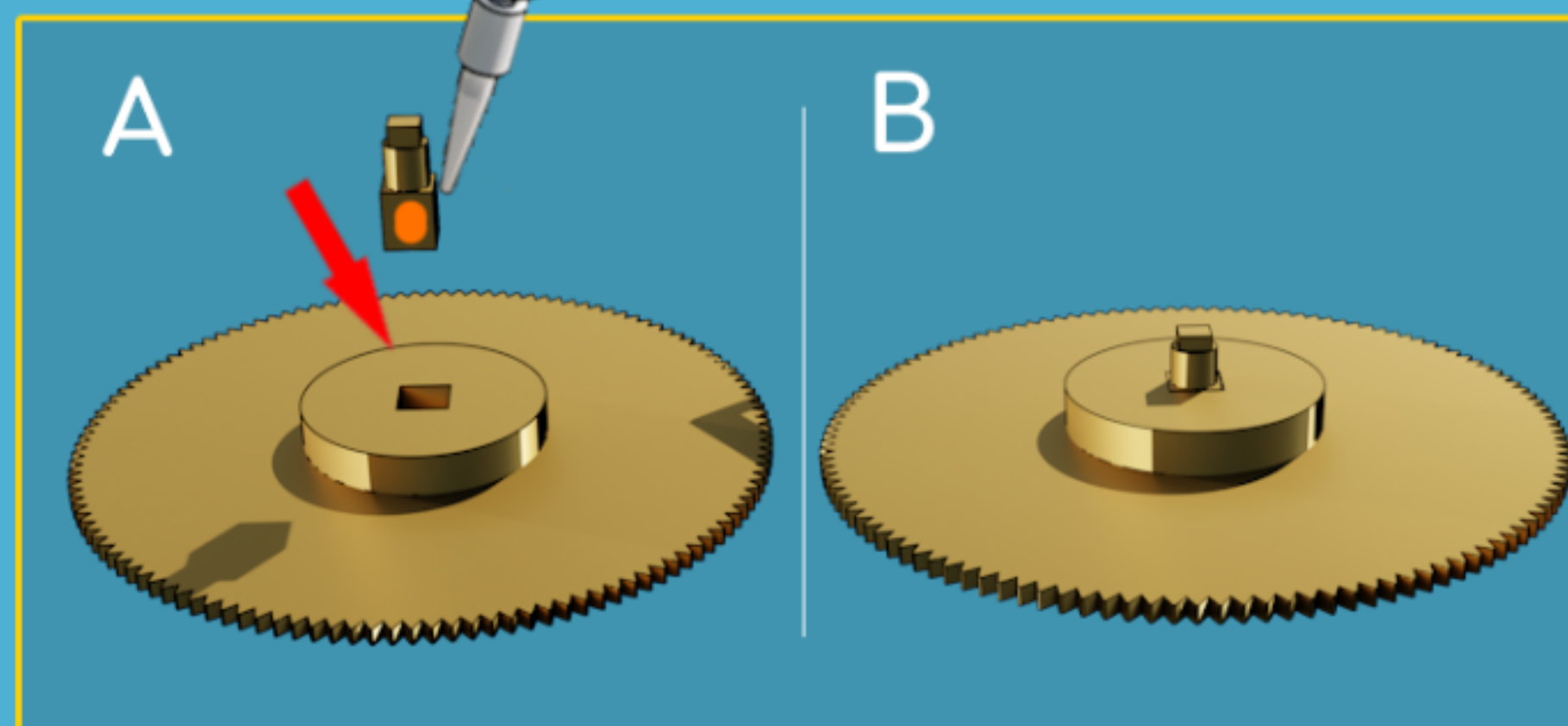
41



The D arbor Patruding past the D2 alittle is okay, it will support the E3 with less friction than having the full faces of both D2 and E3 rub.



FLIP

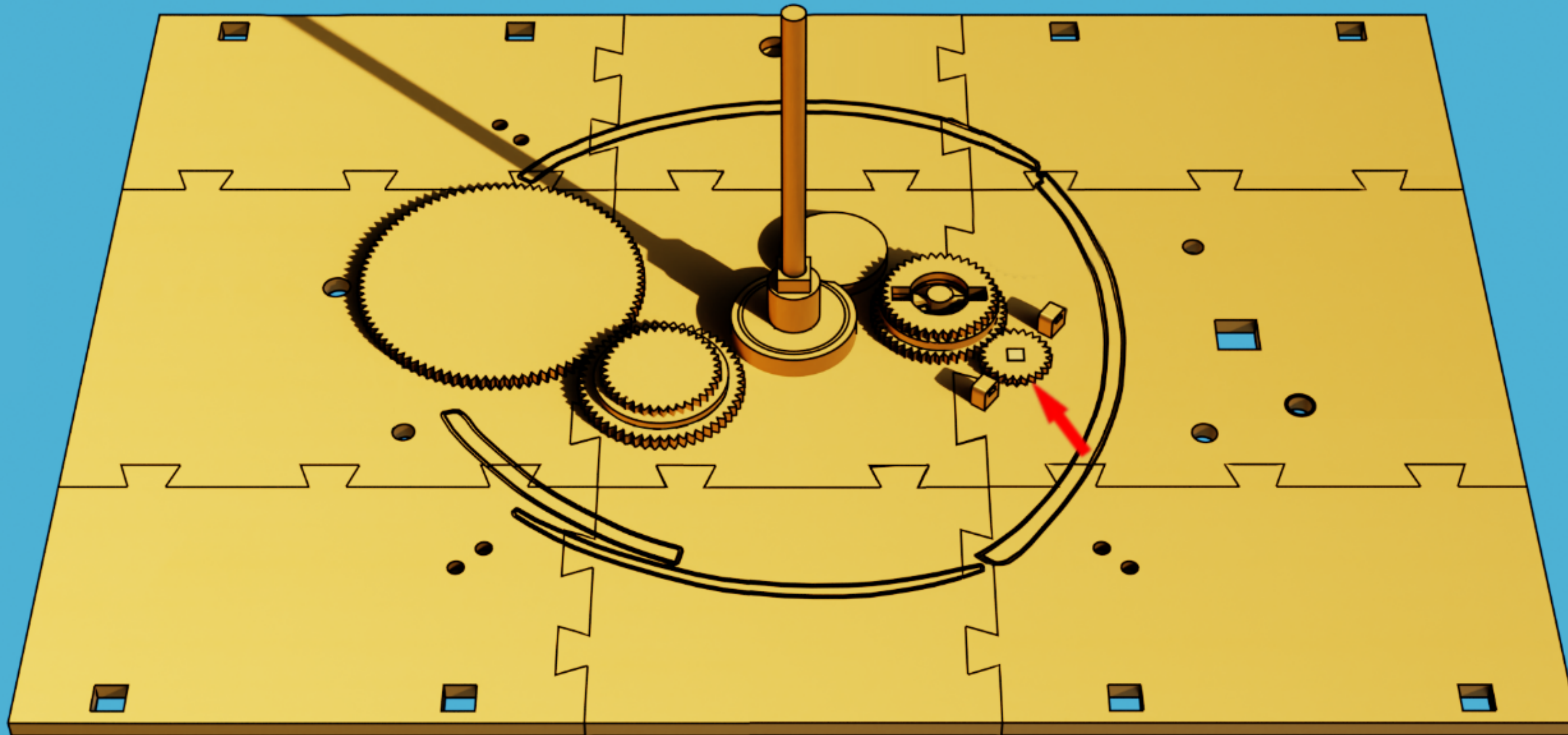


42

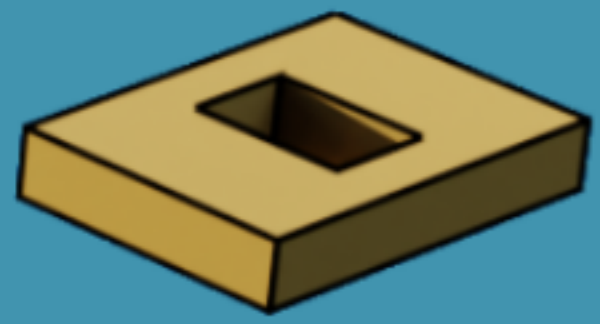


D1 Gear

FLIP

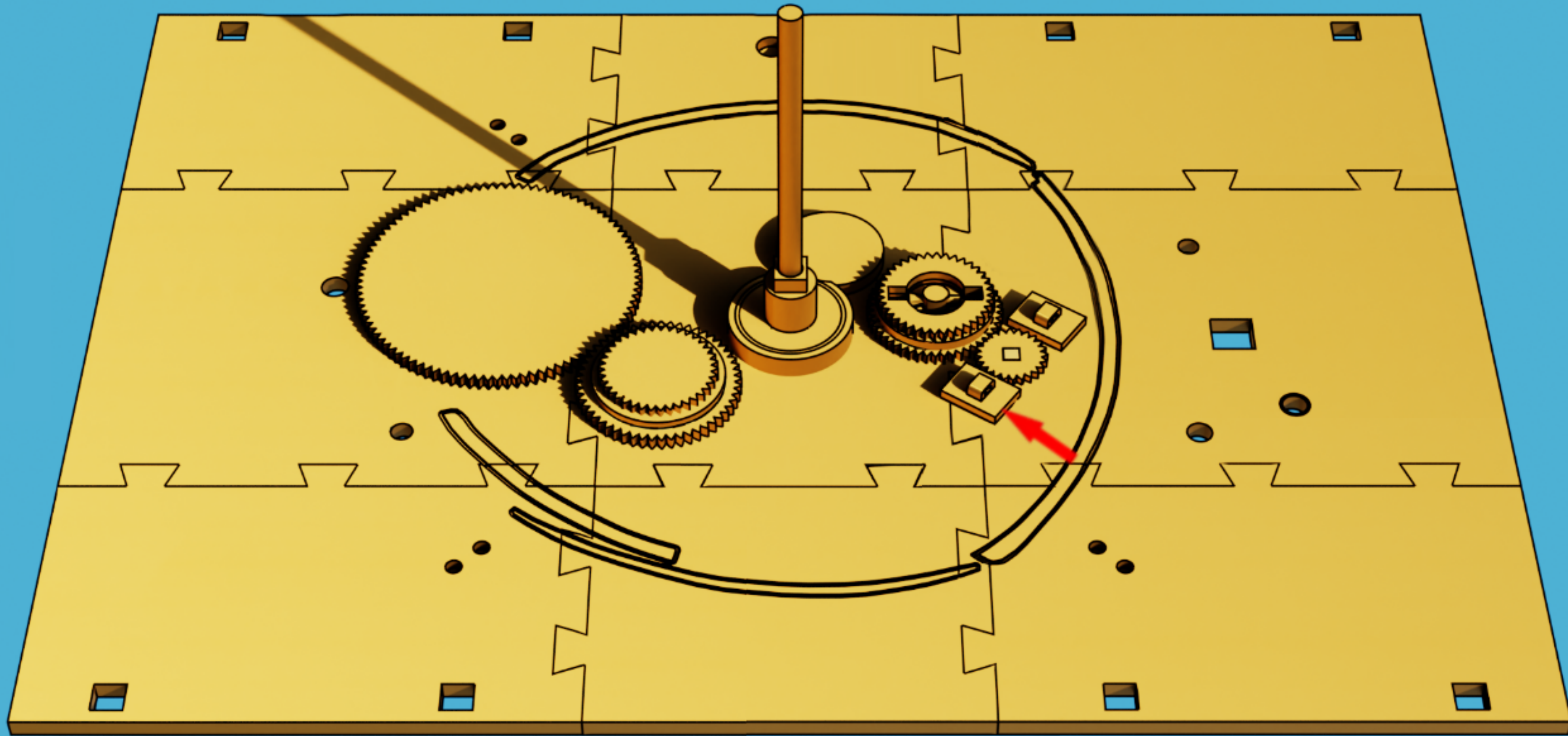


43



x2

D Plate



44

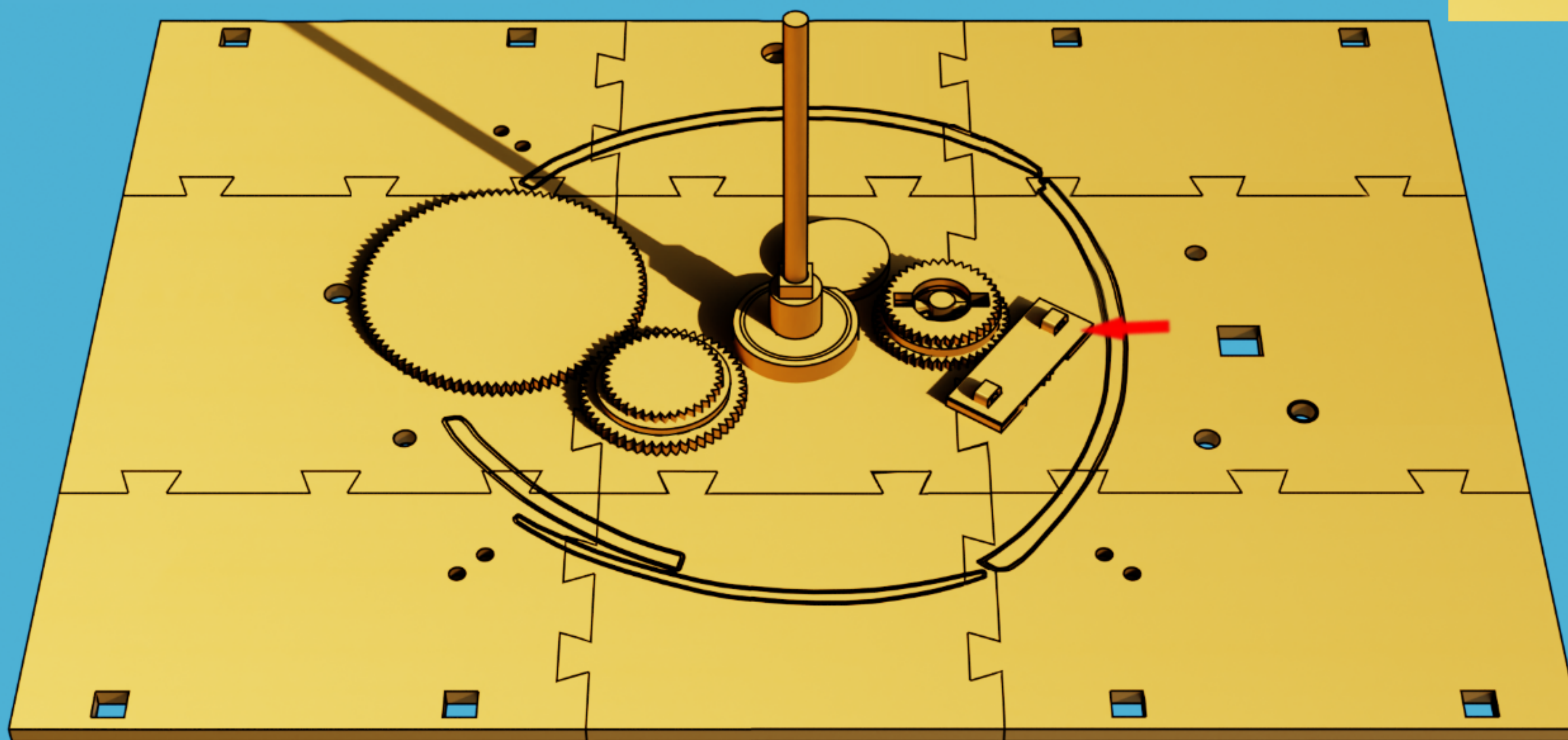
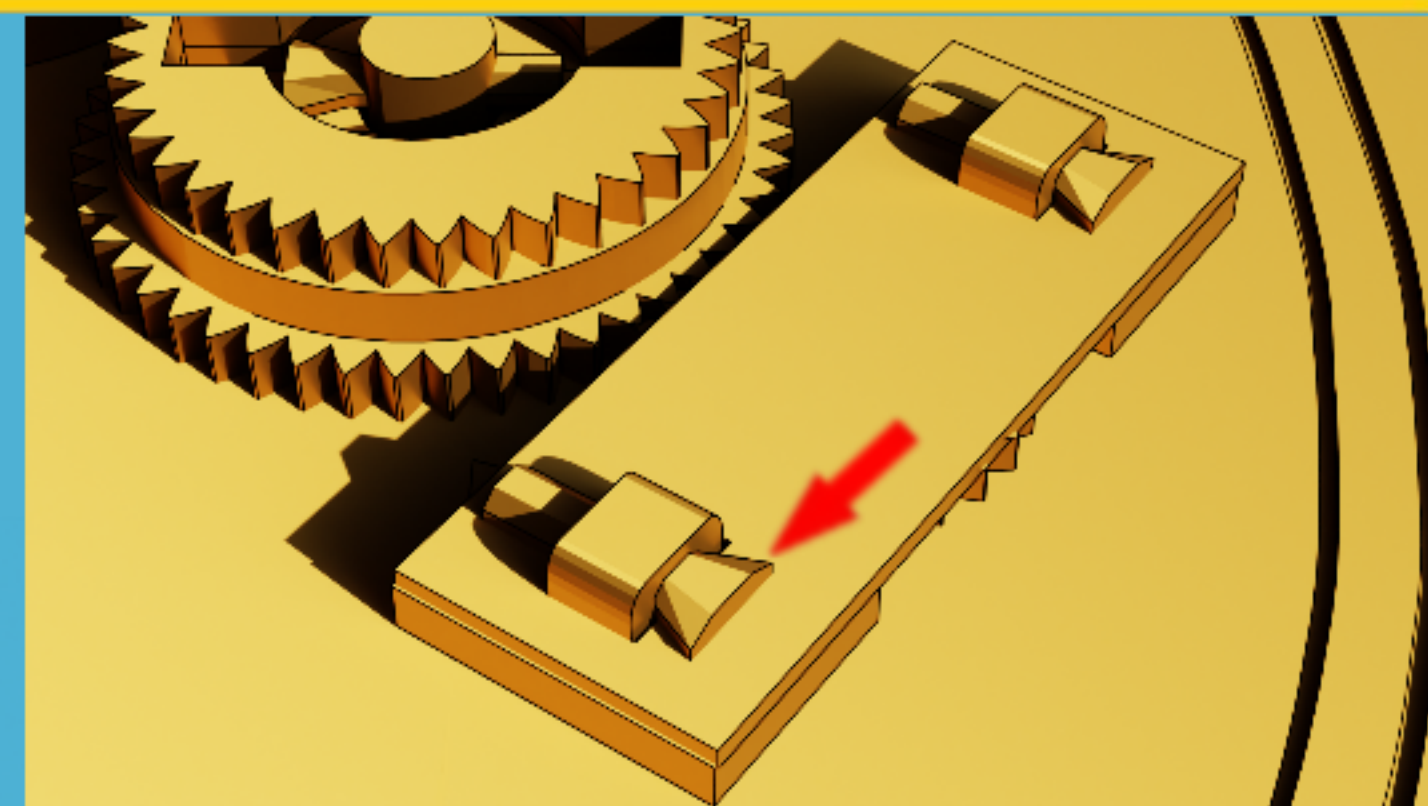


D Plate Cover



X2

Pin

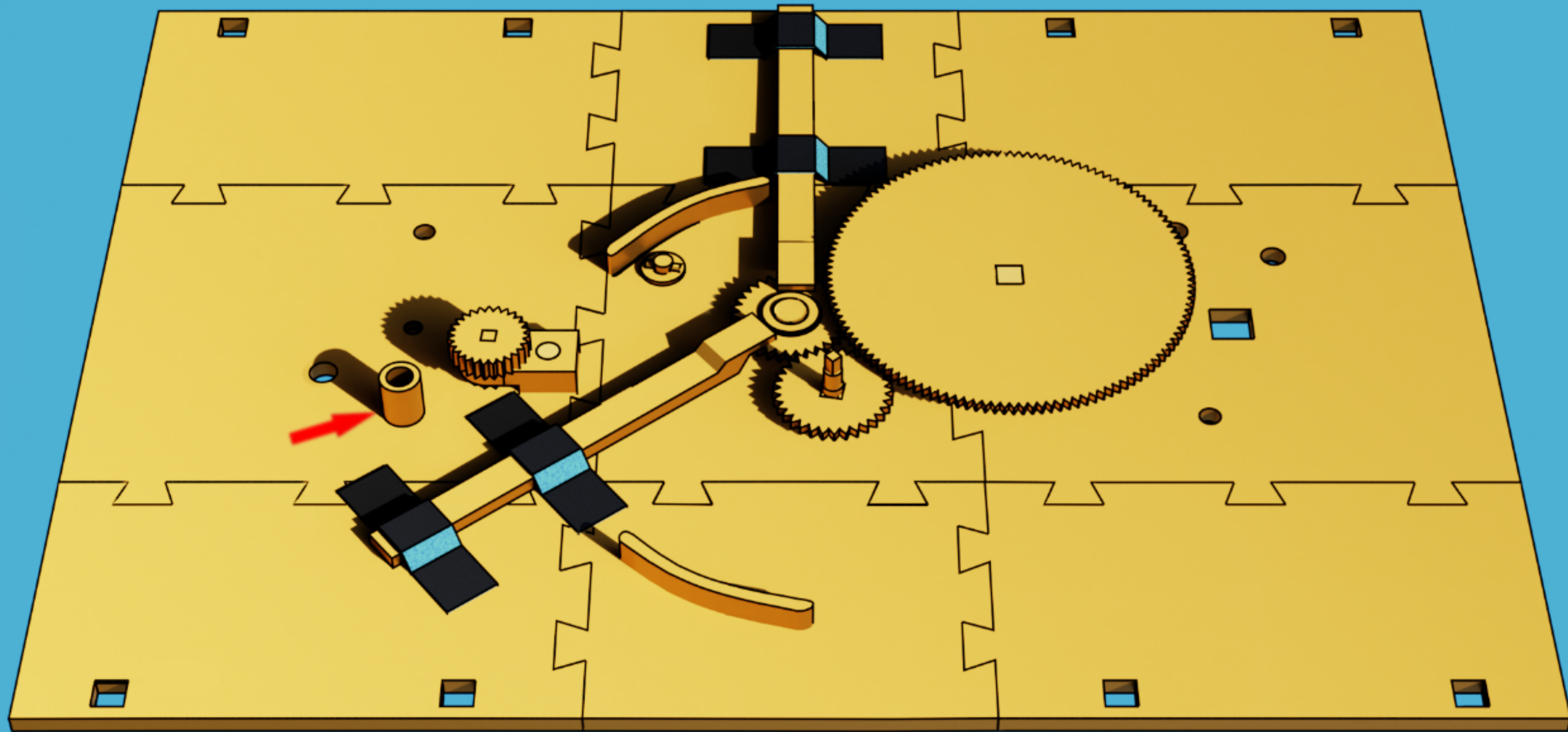


45



Q Arbor Plug

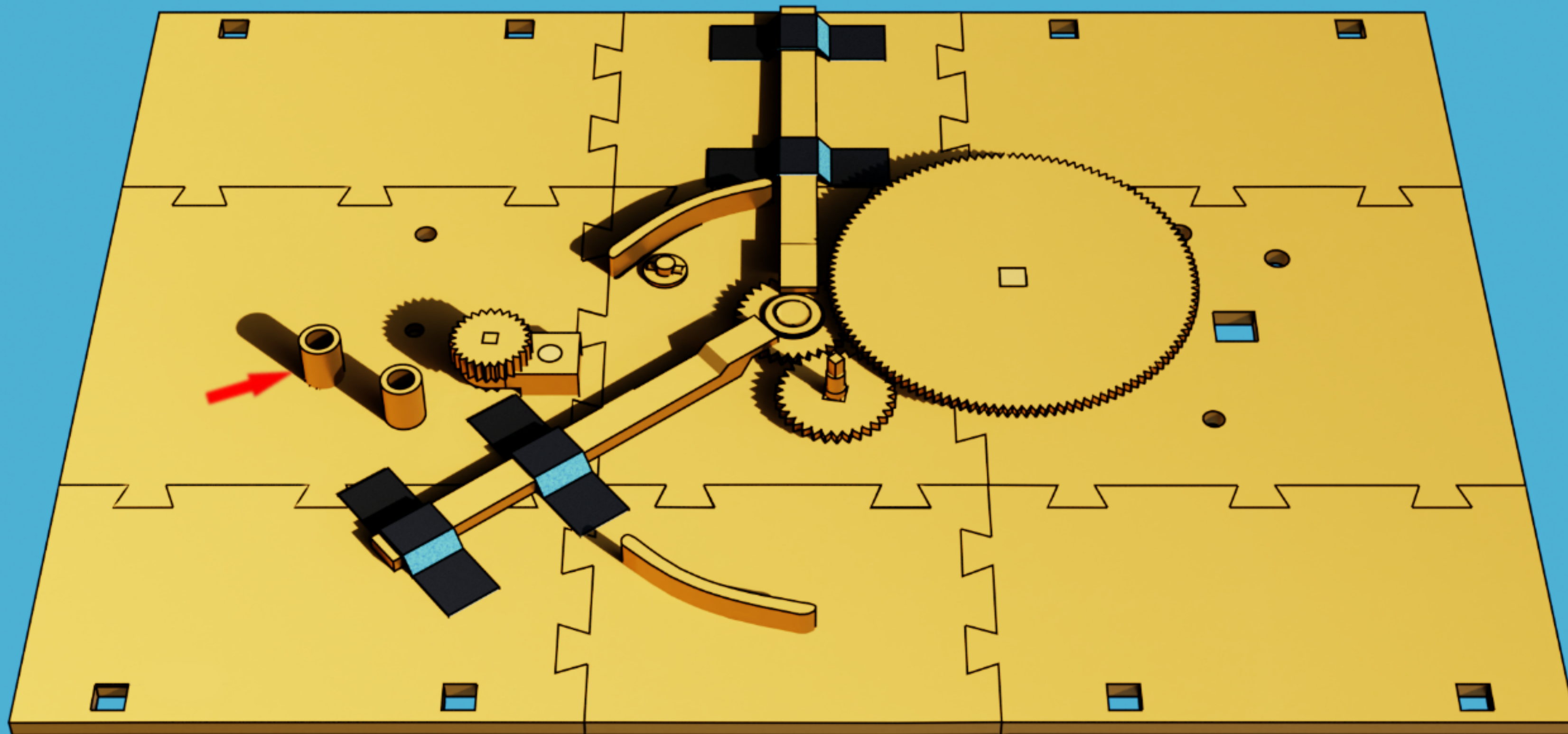
FLIP

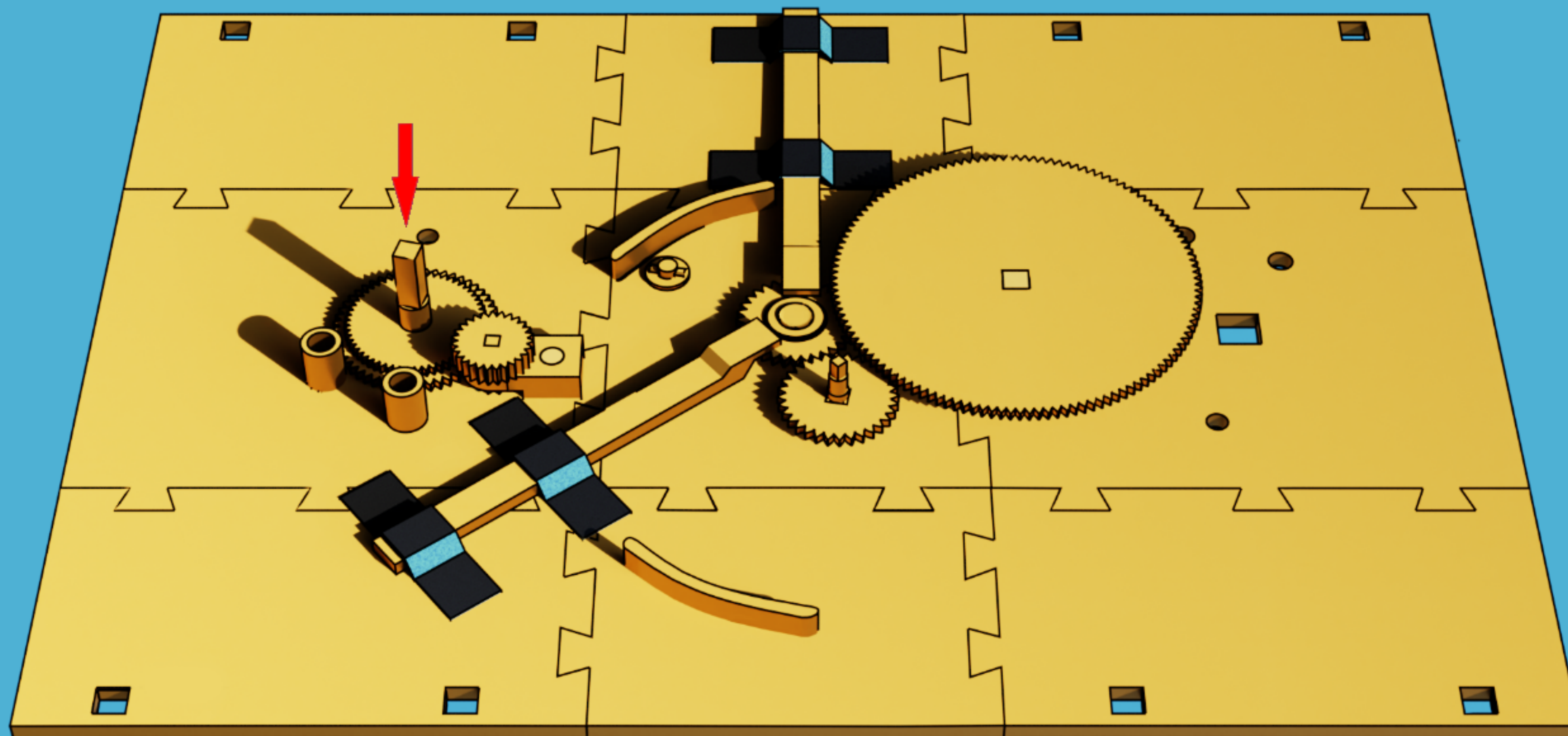
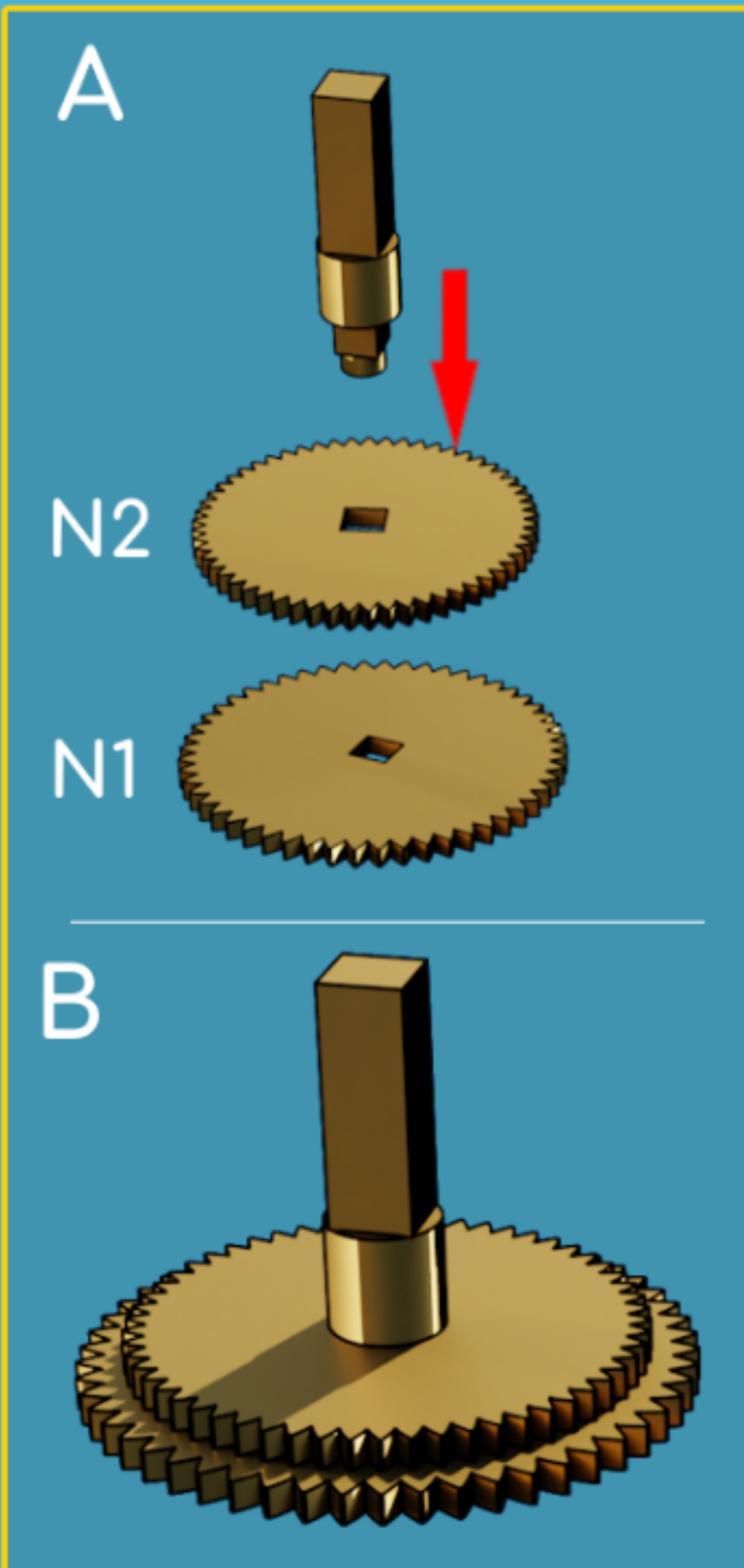


46



P Arbor Plug







O Arbor



O Arbor Washer



Washer



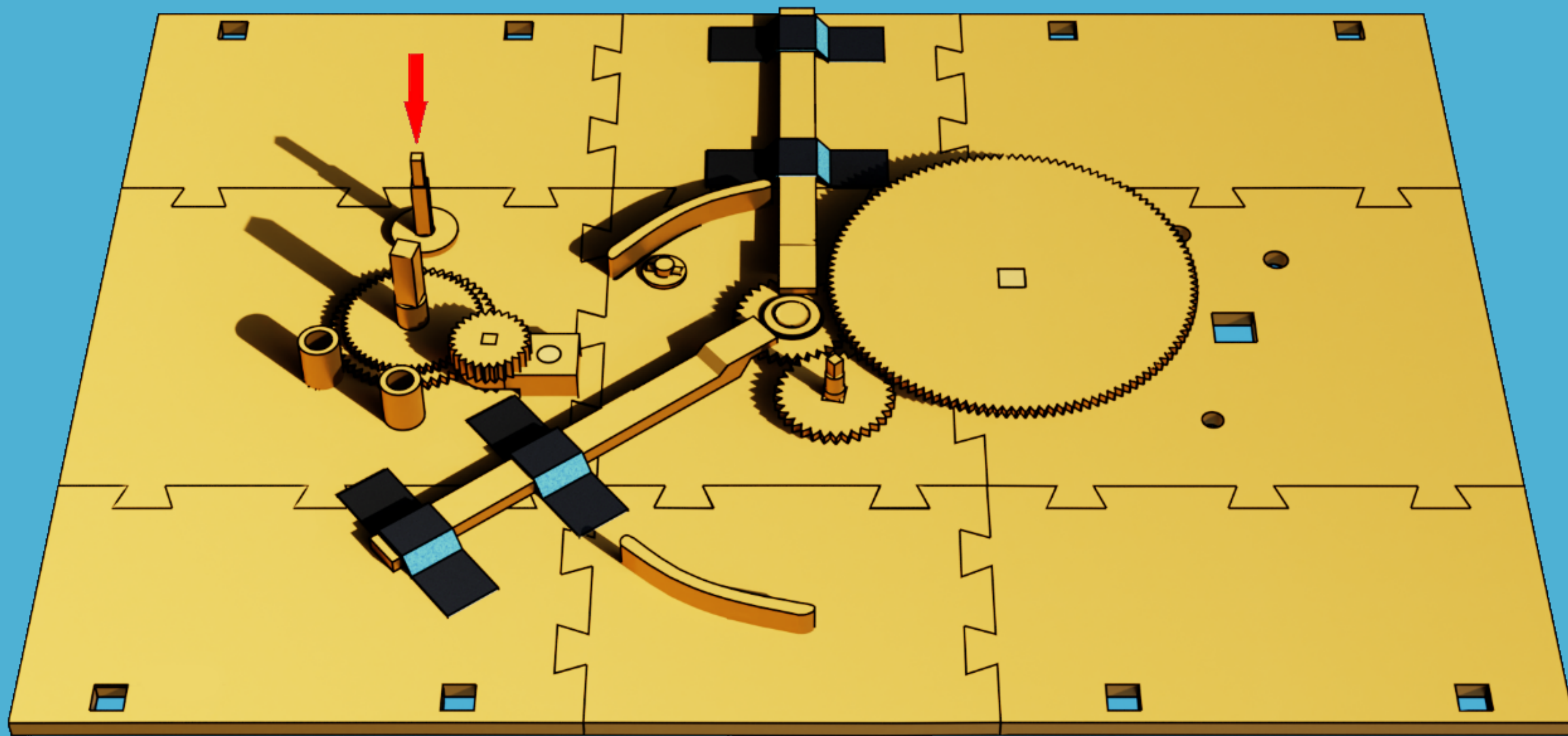
Pin



A



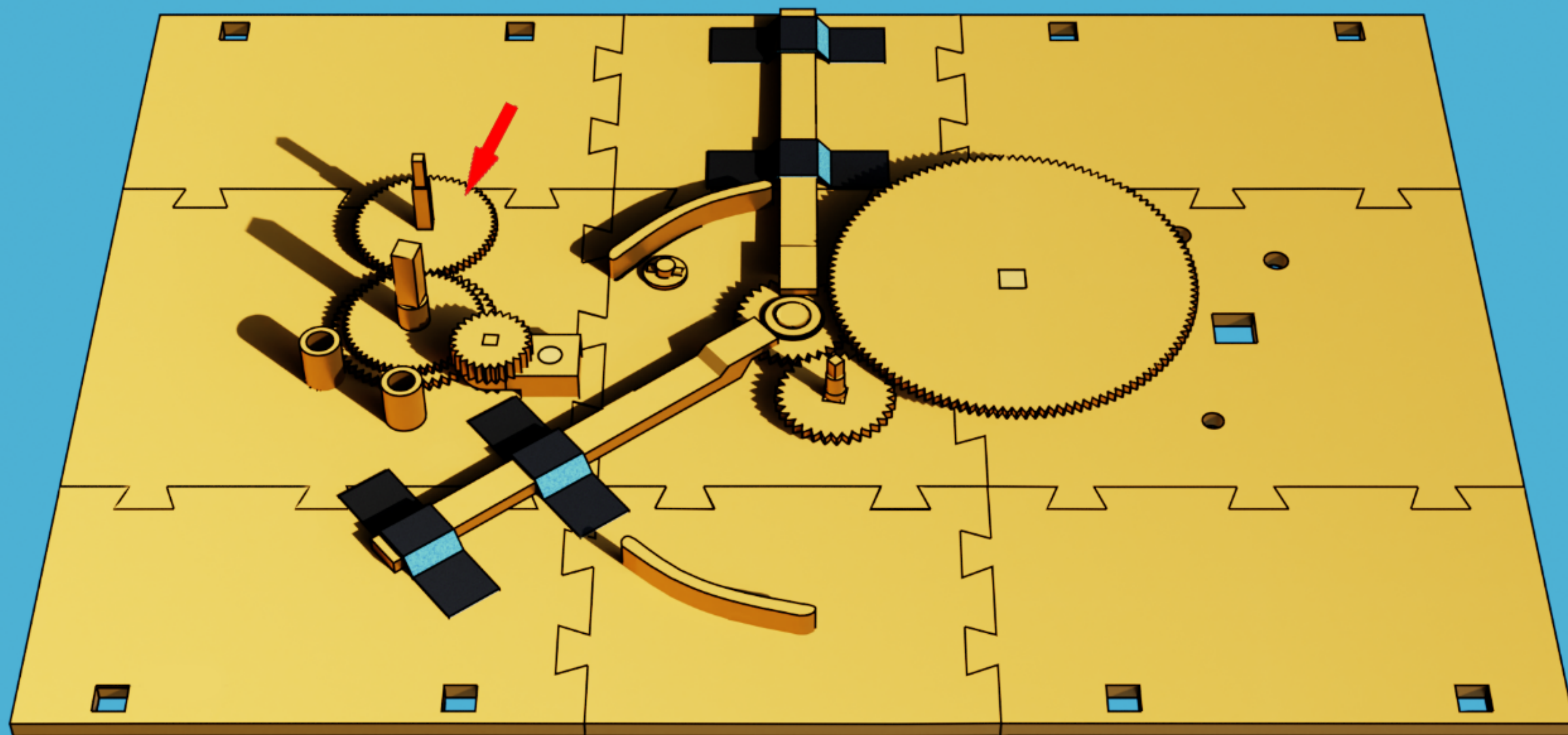
B



49



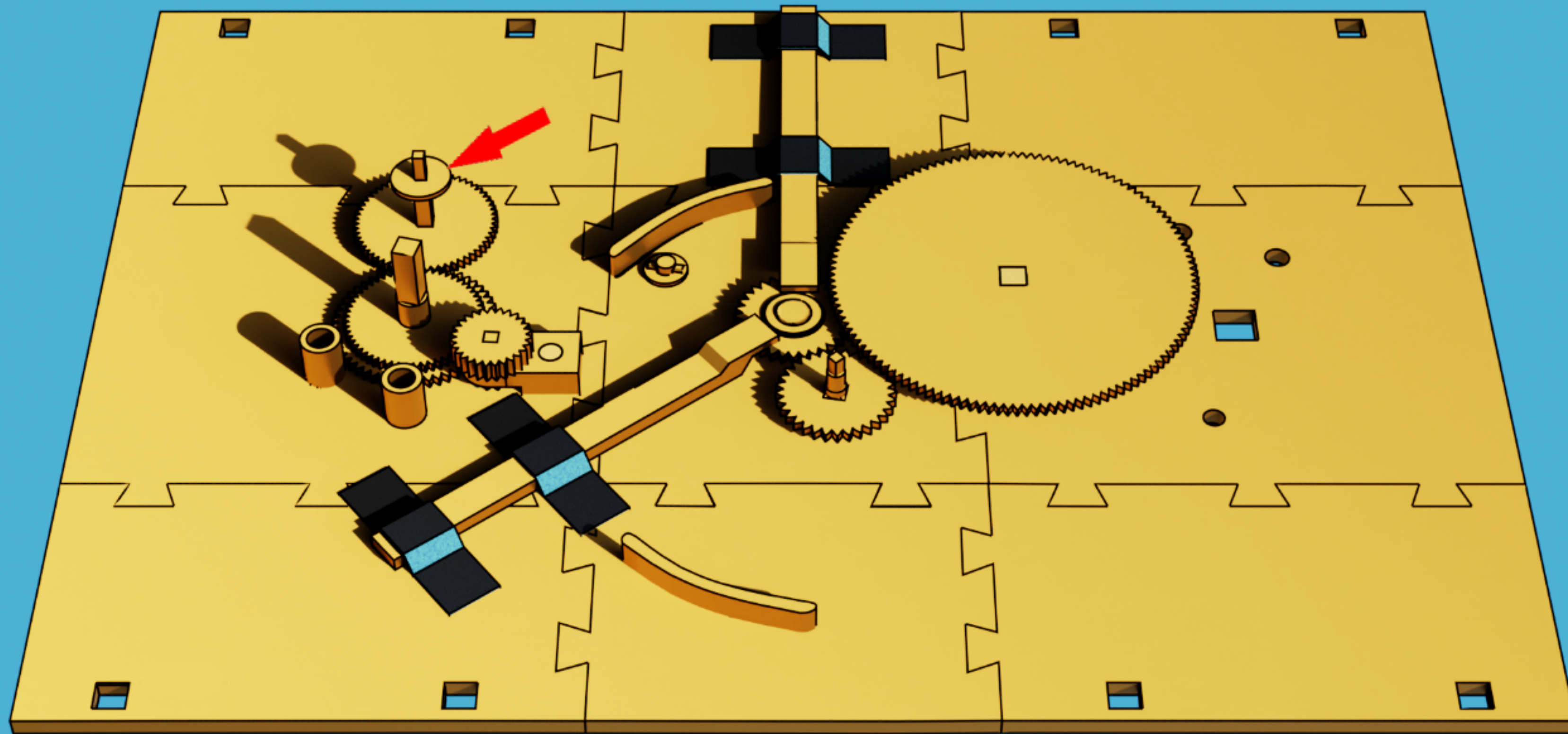
O1 Gear



50



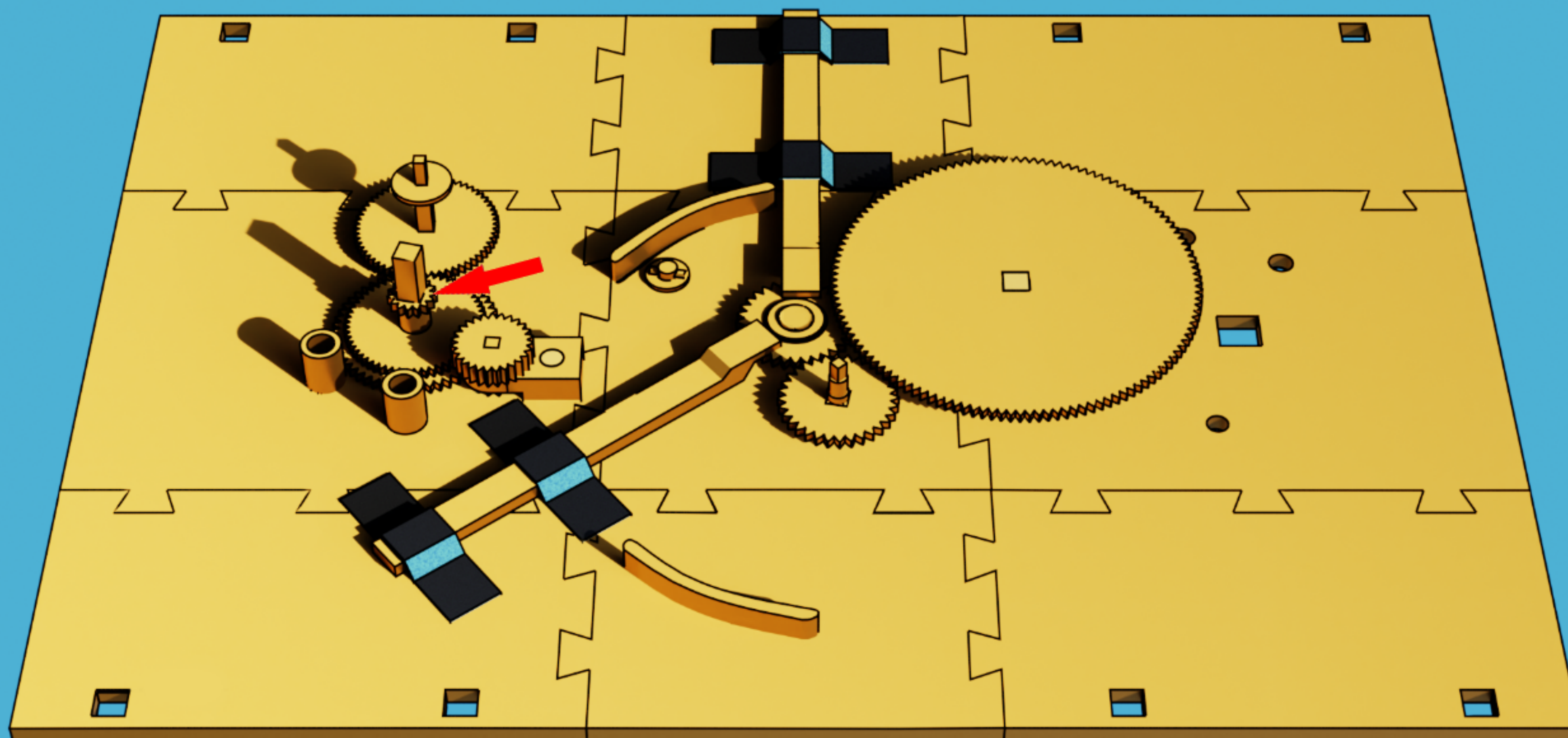
○ Washer 2

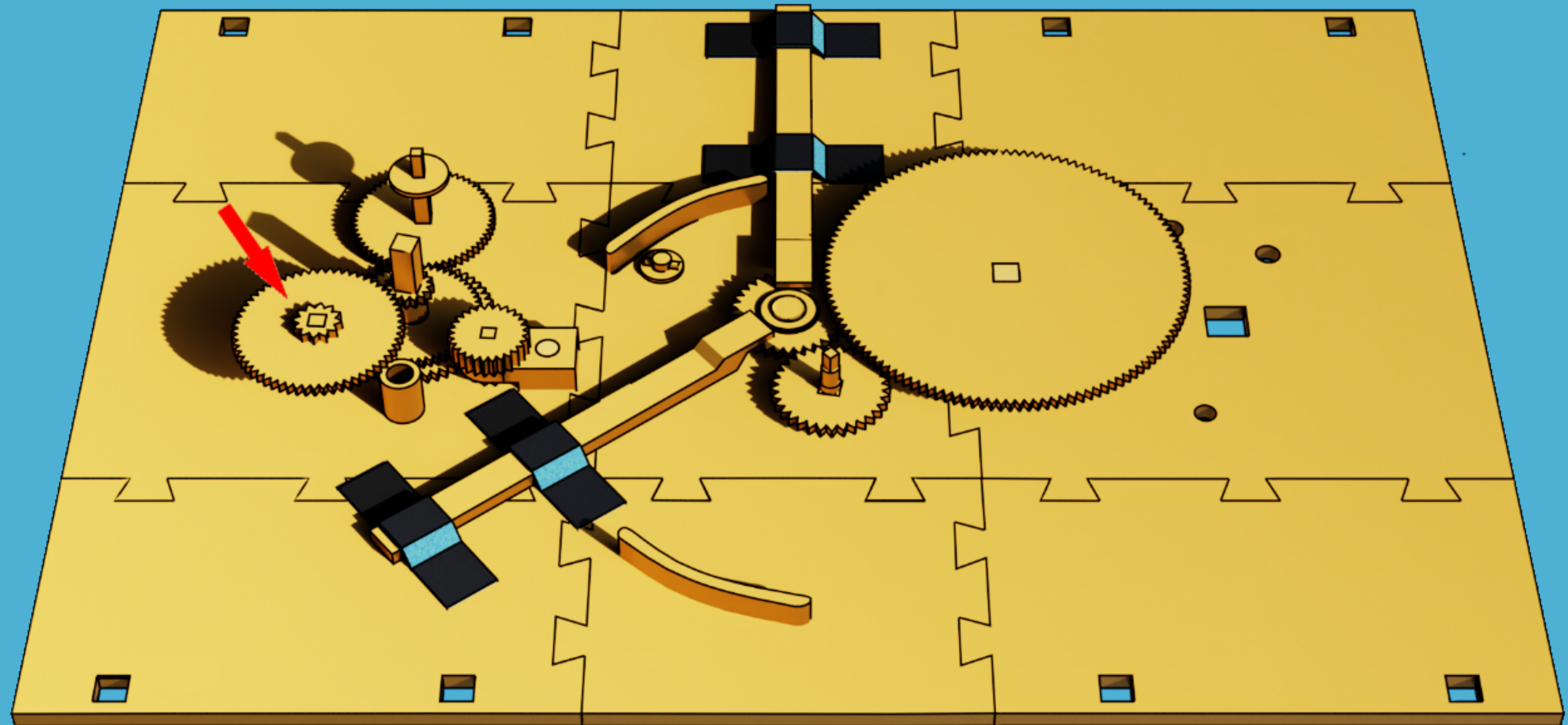
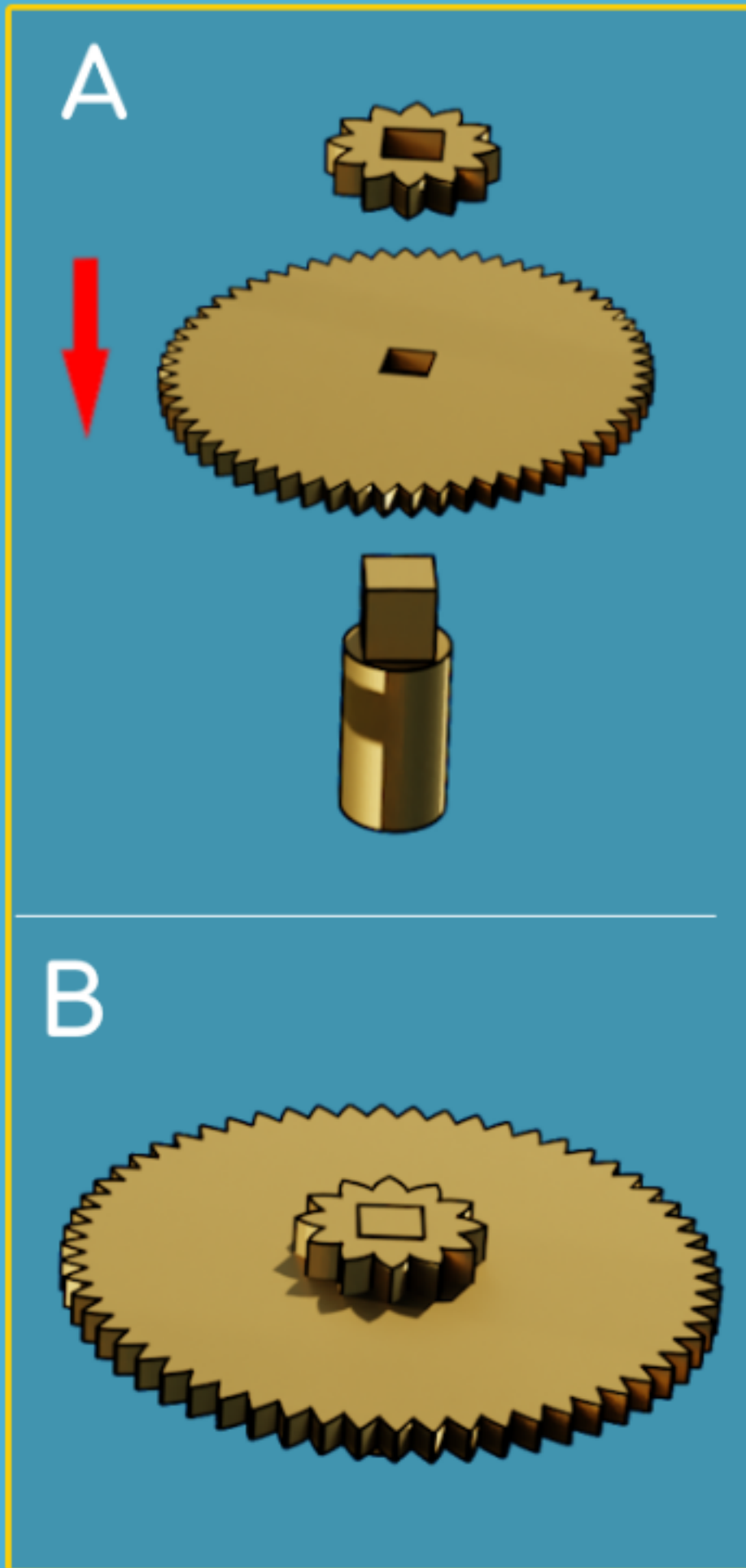


51



N3 Gear

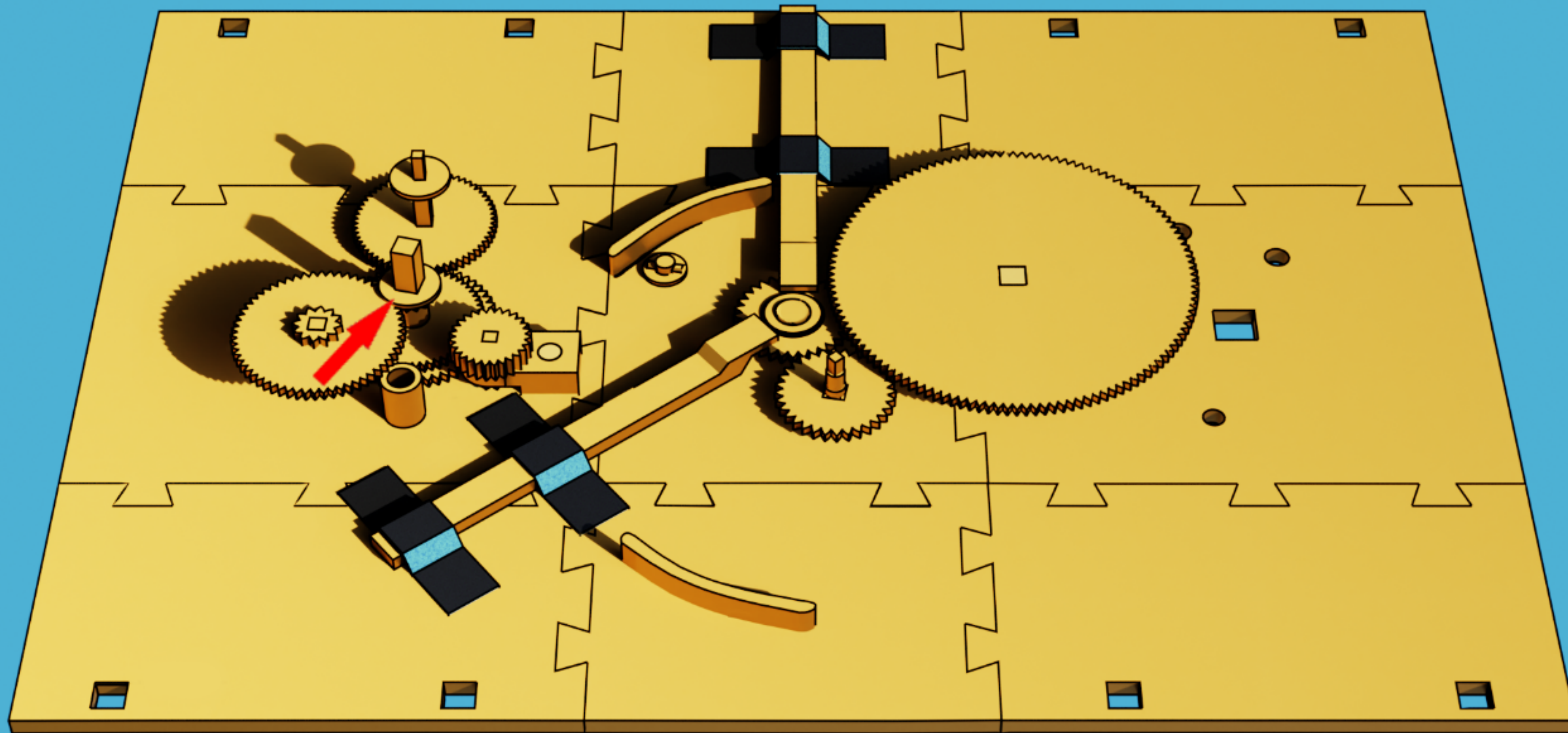




53



N Washer



A



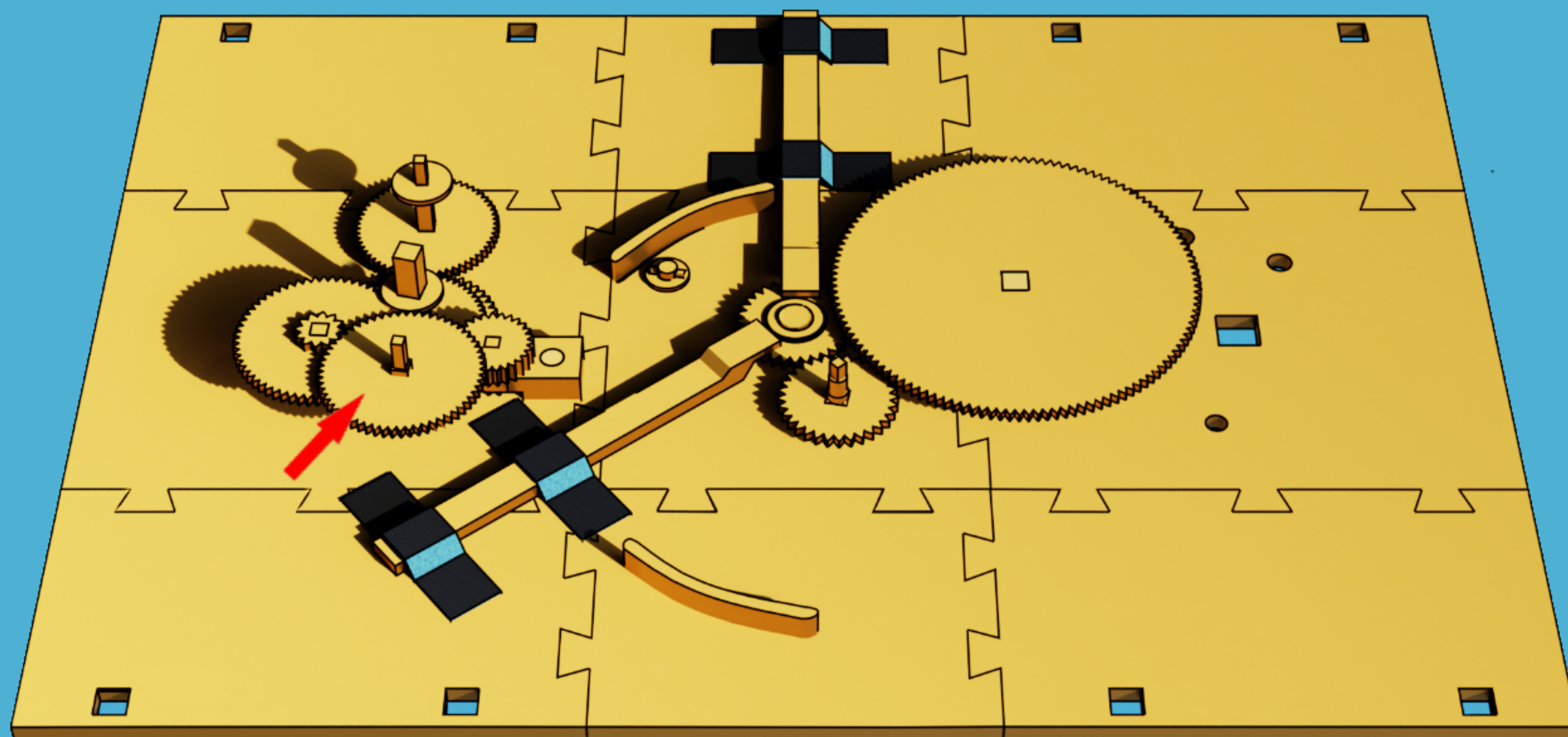
B



Q1 Gear

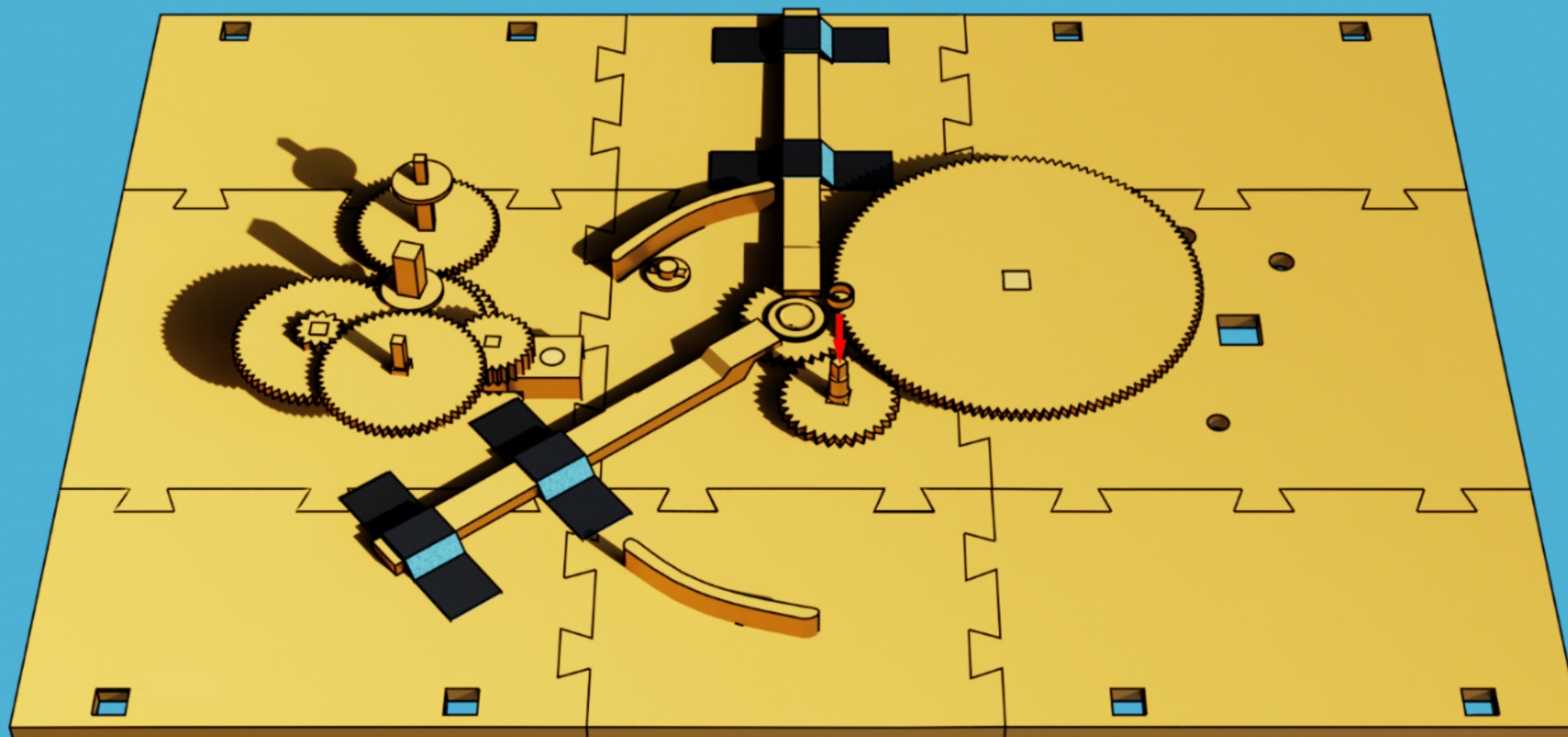


Q Arbor

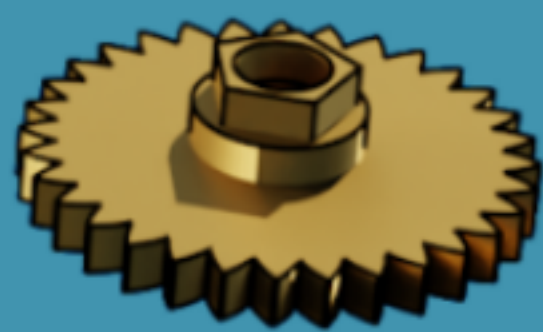




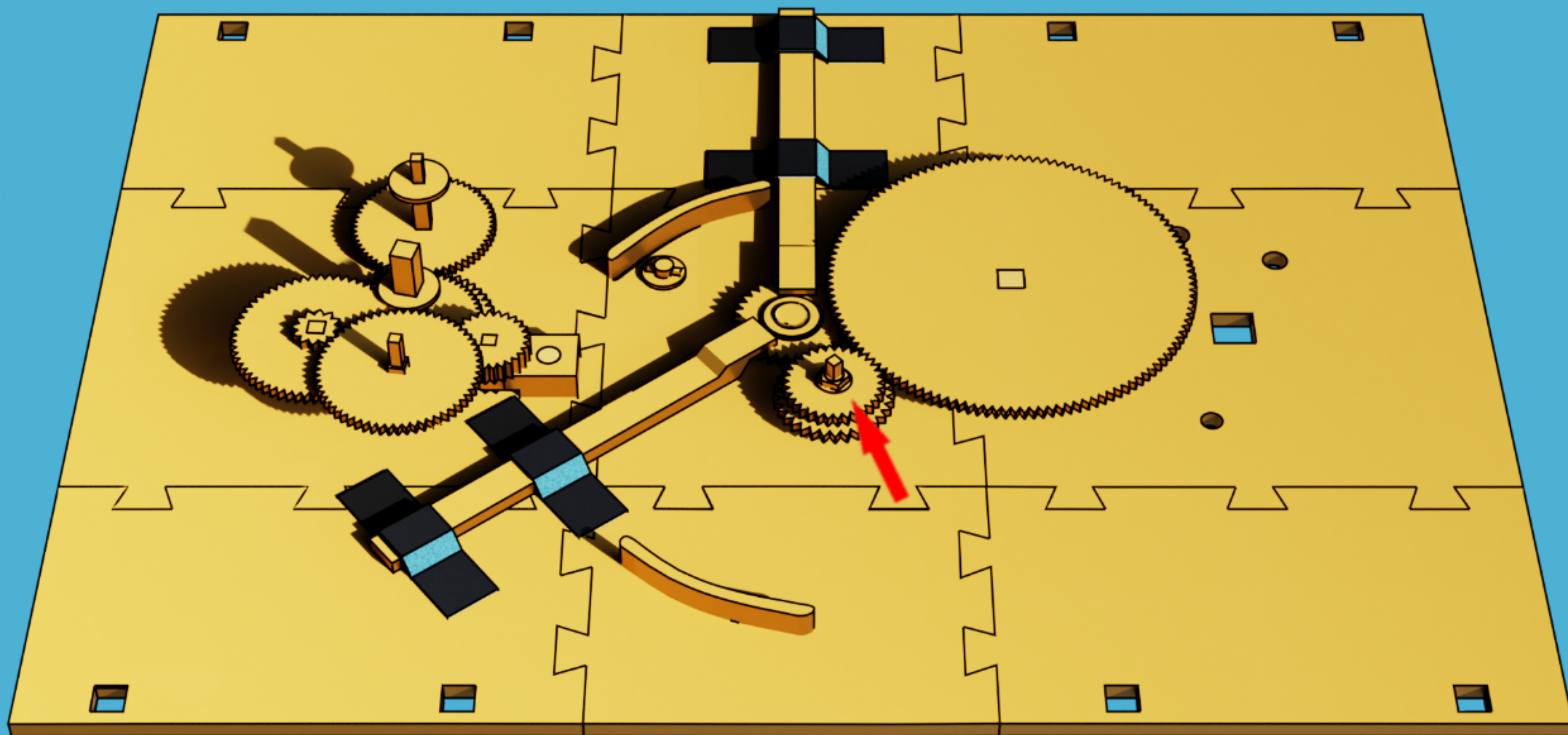
E Arbor Spacer 2

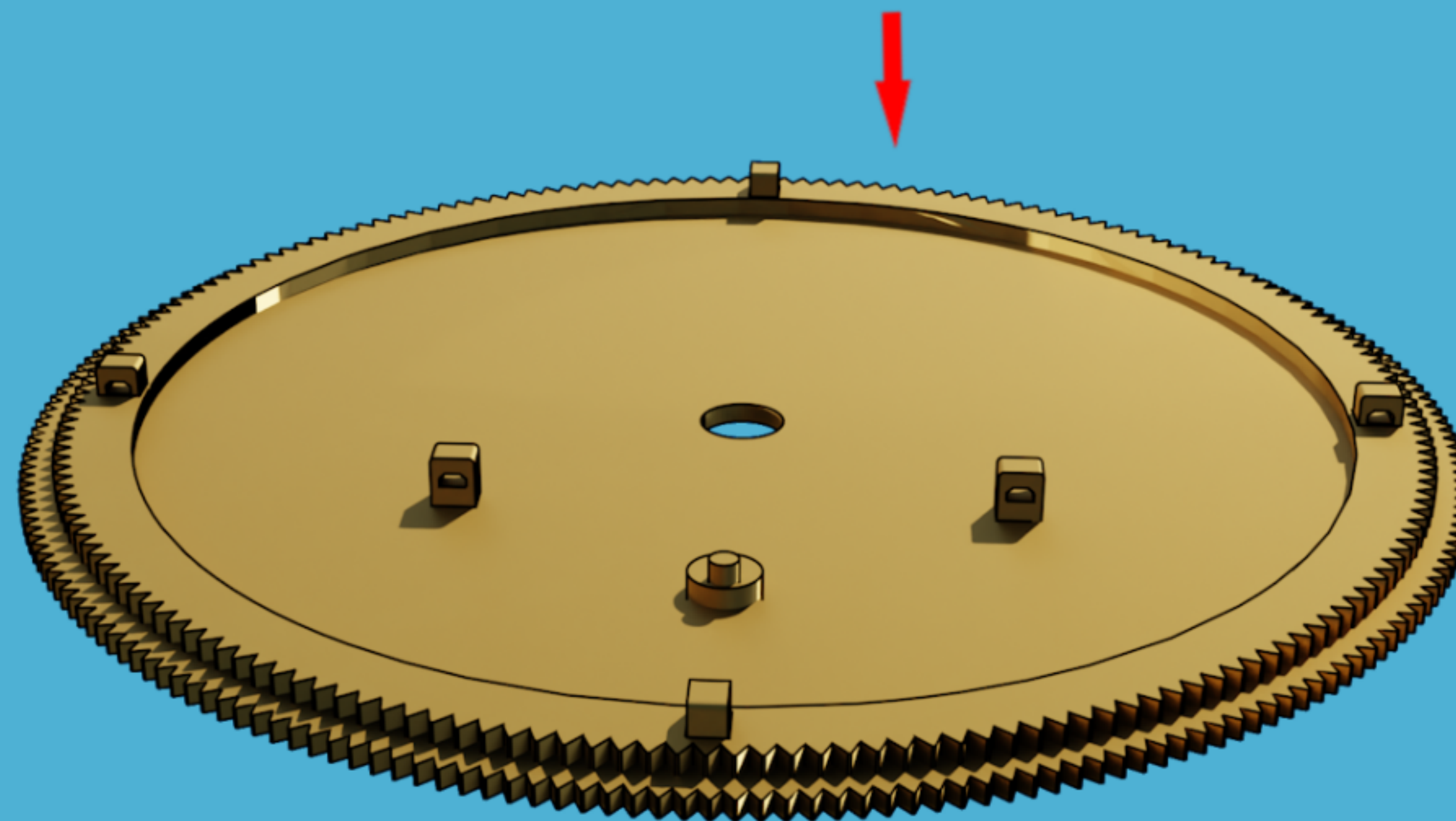
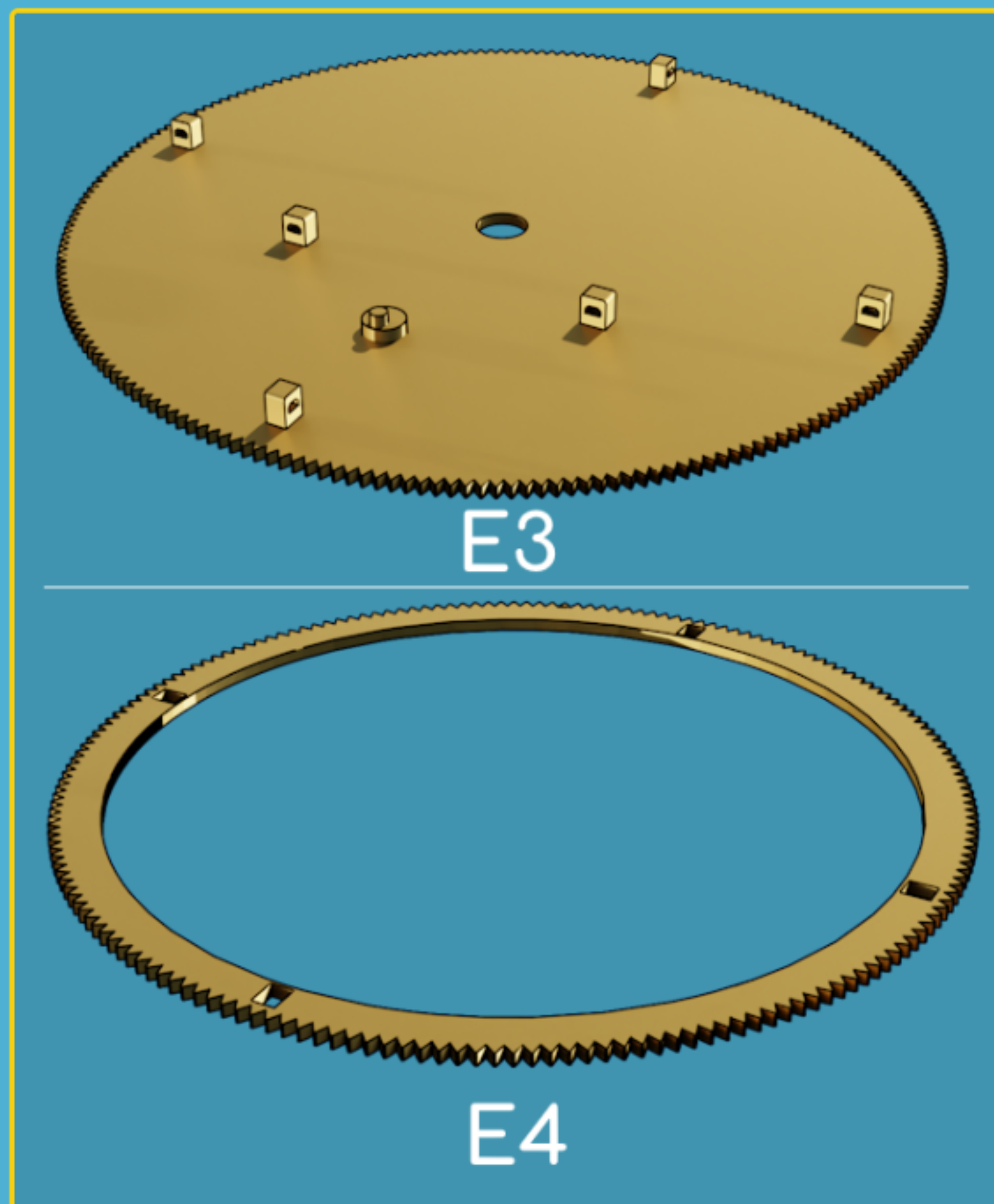


56



E2 Gear



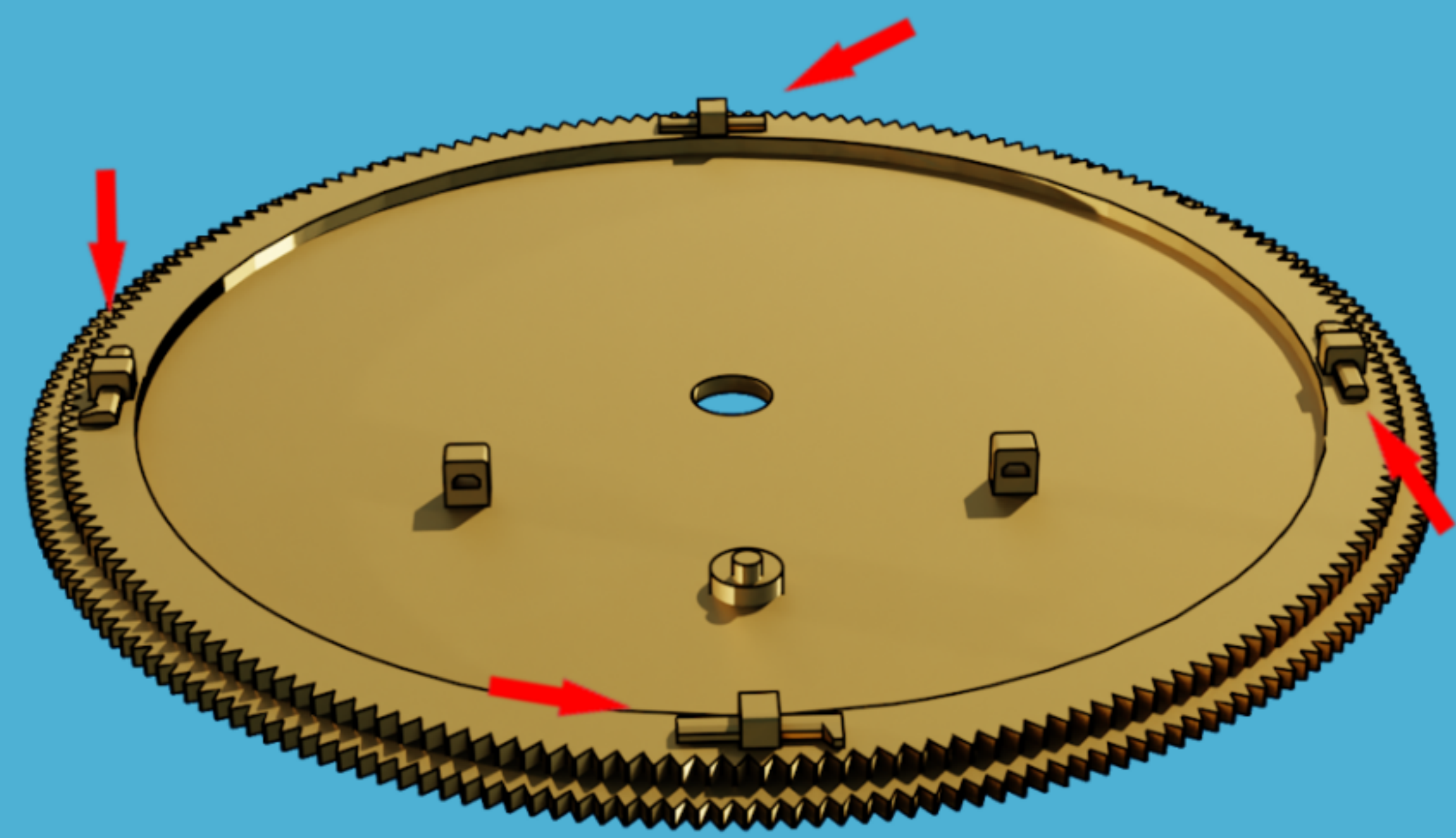


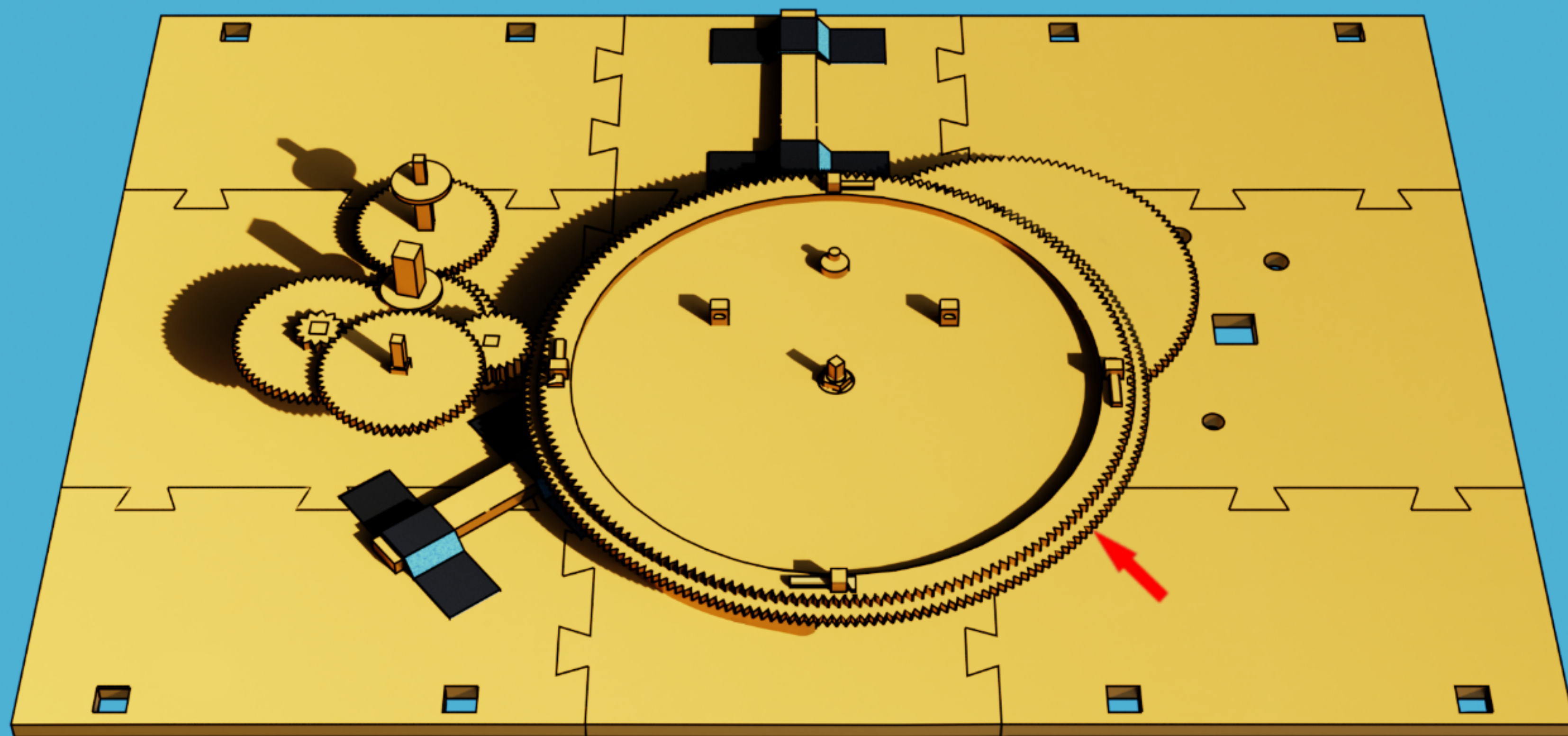
58

x4



E4 Pins

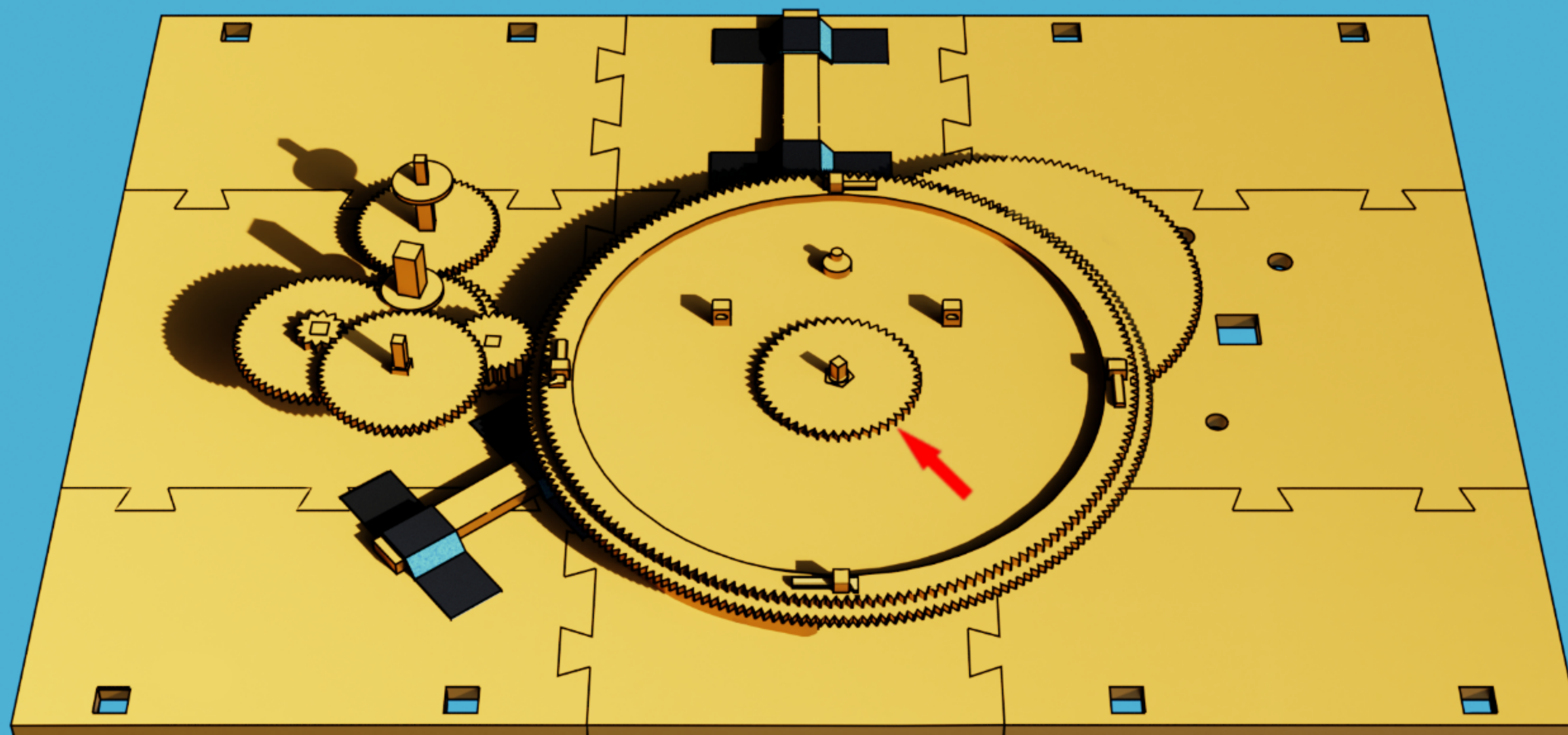




60



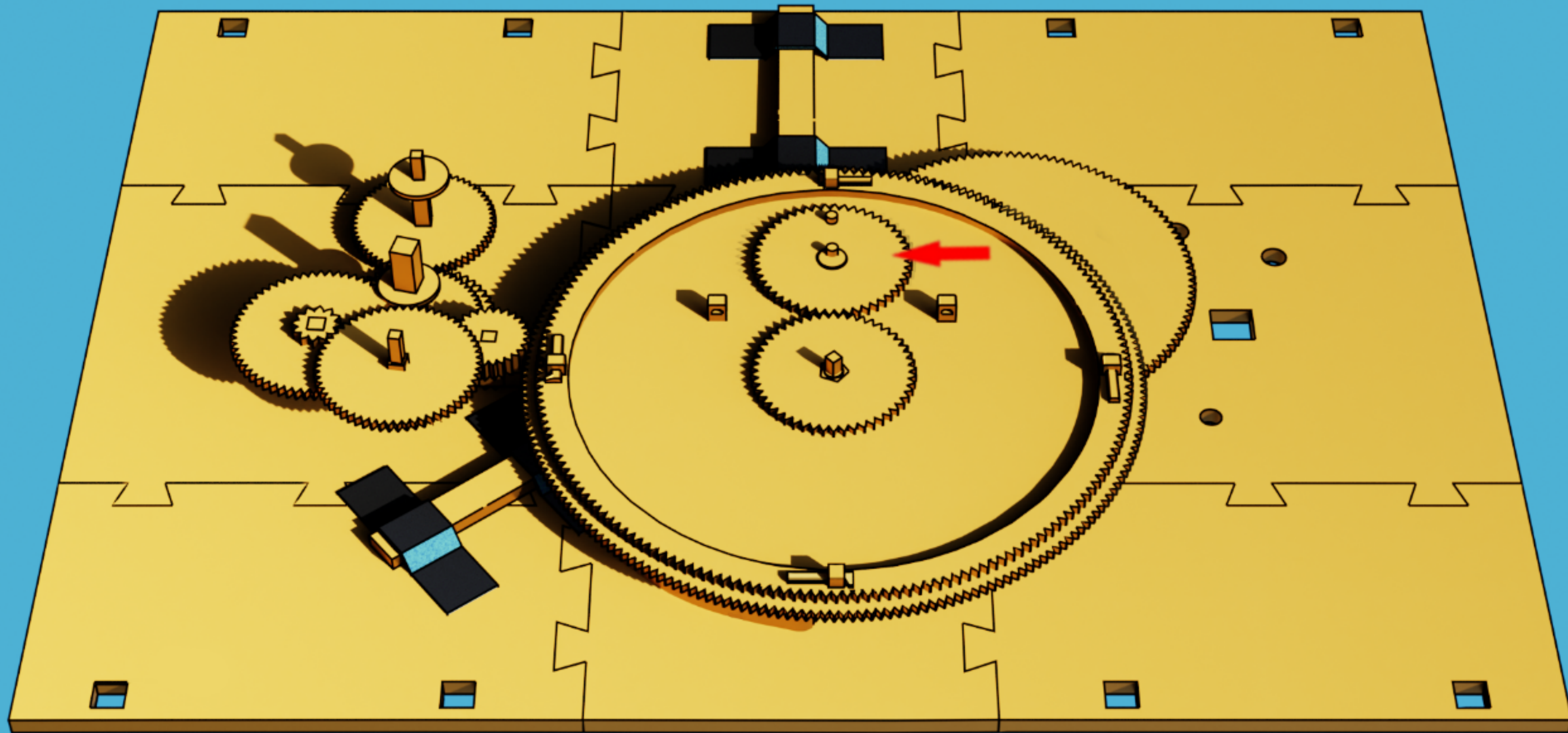
E5



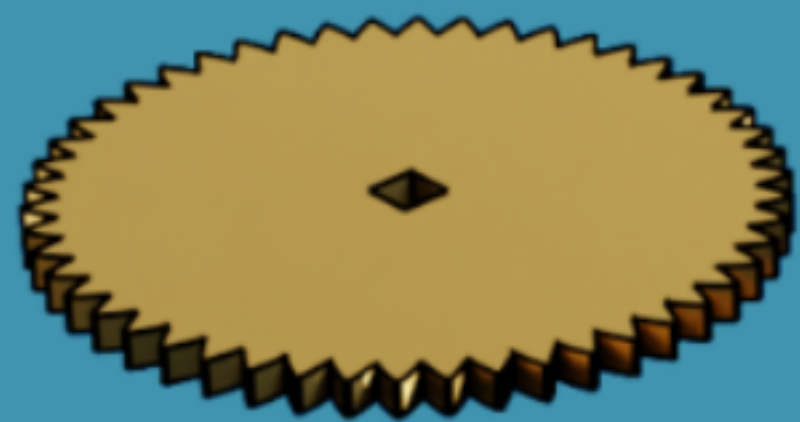
61



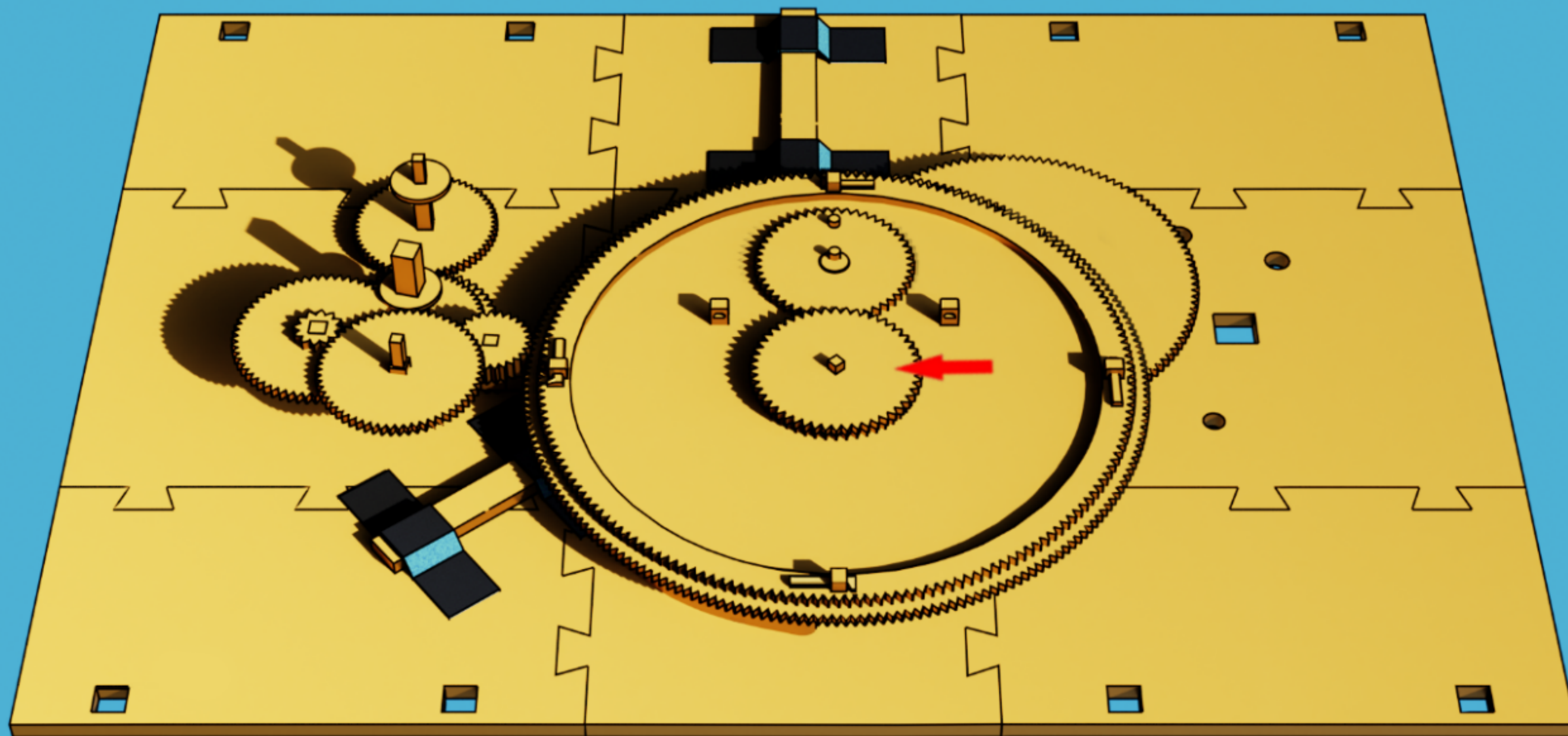
K1 Gear



62



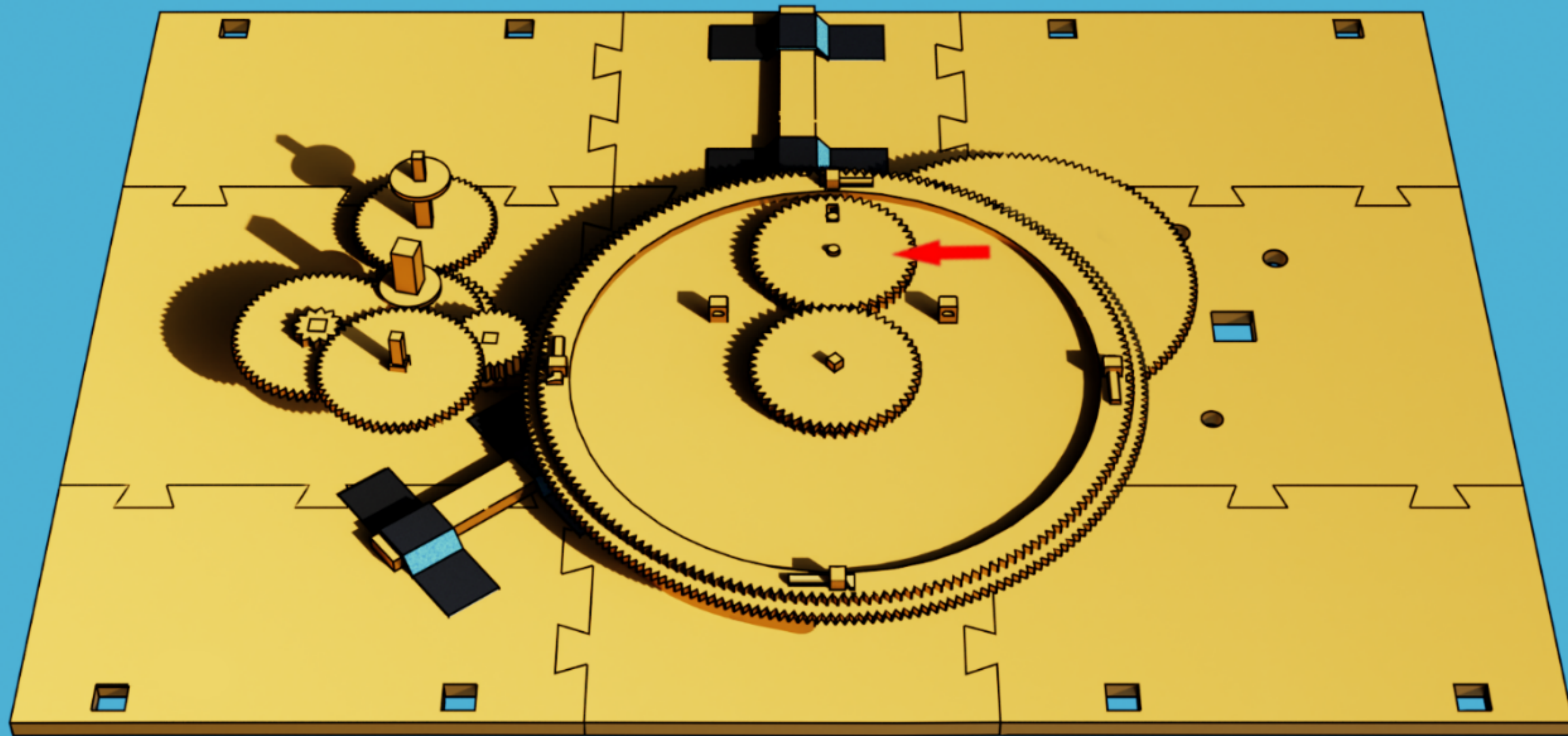
E6 Gear



63



K2 Gear



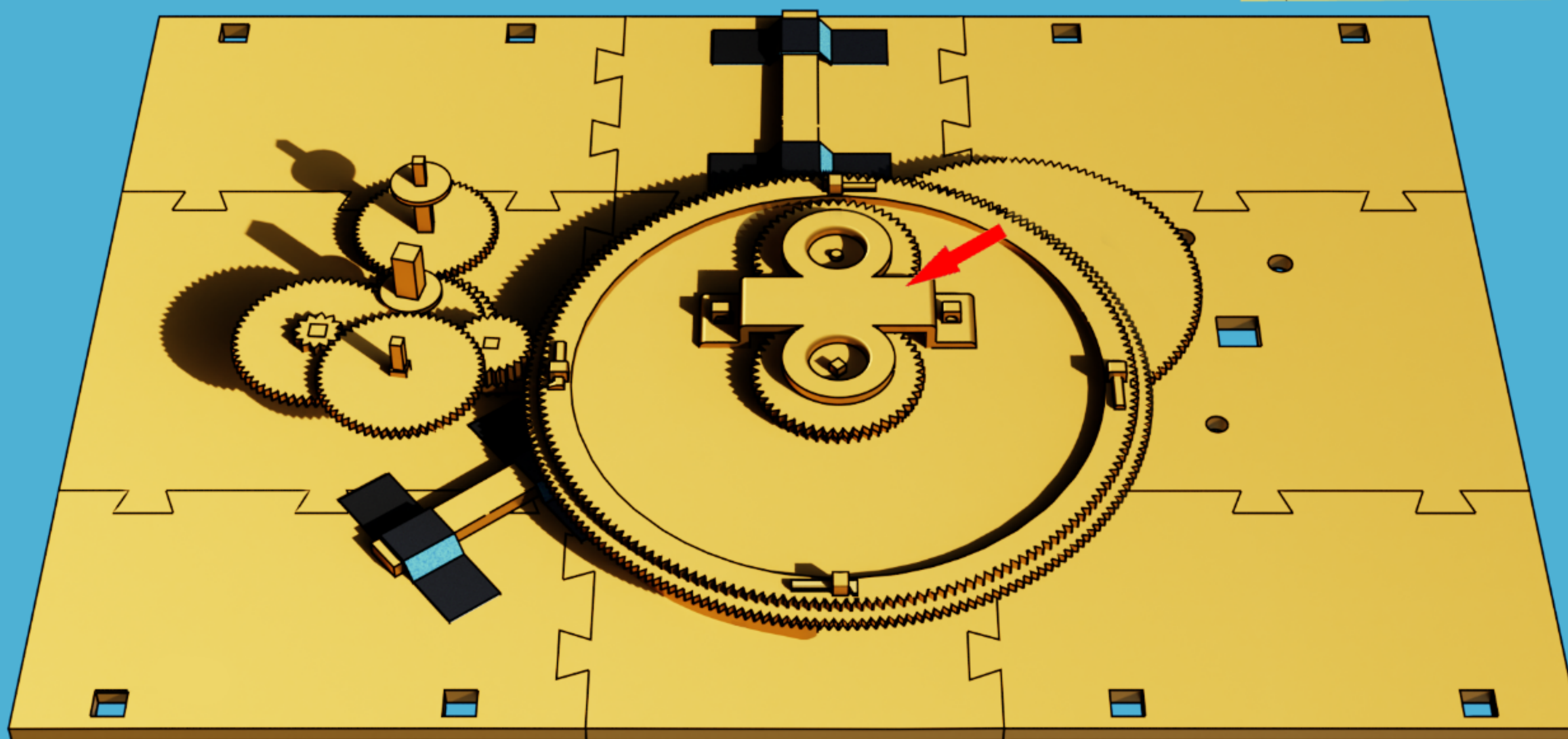


Lunar Clamp



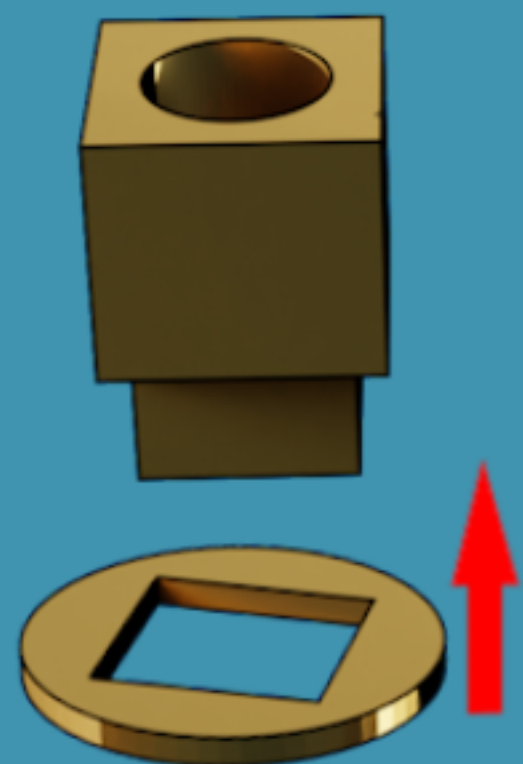
X2

Pin



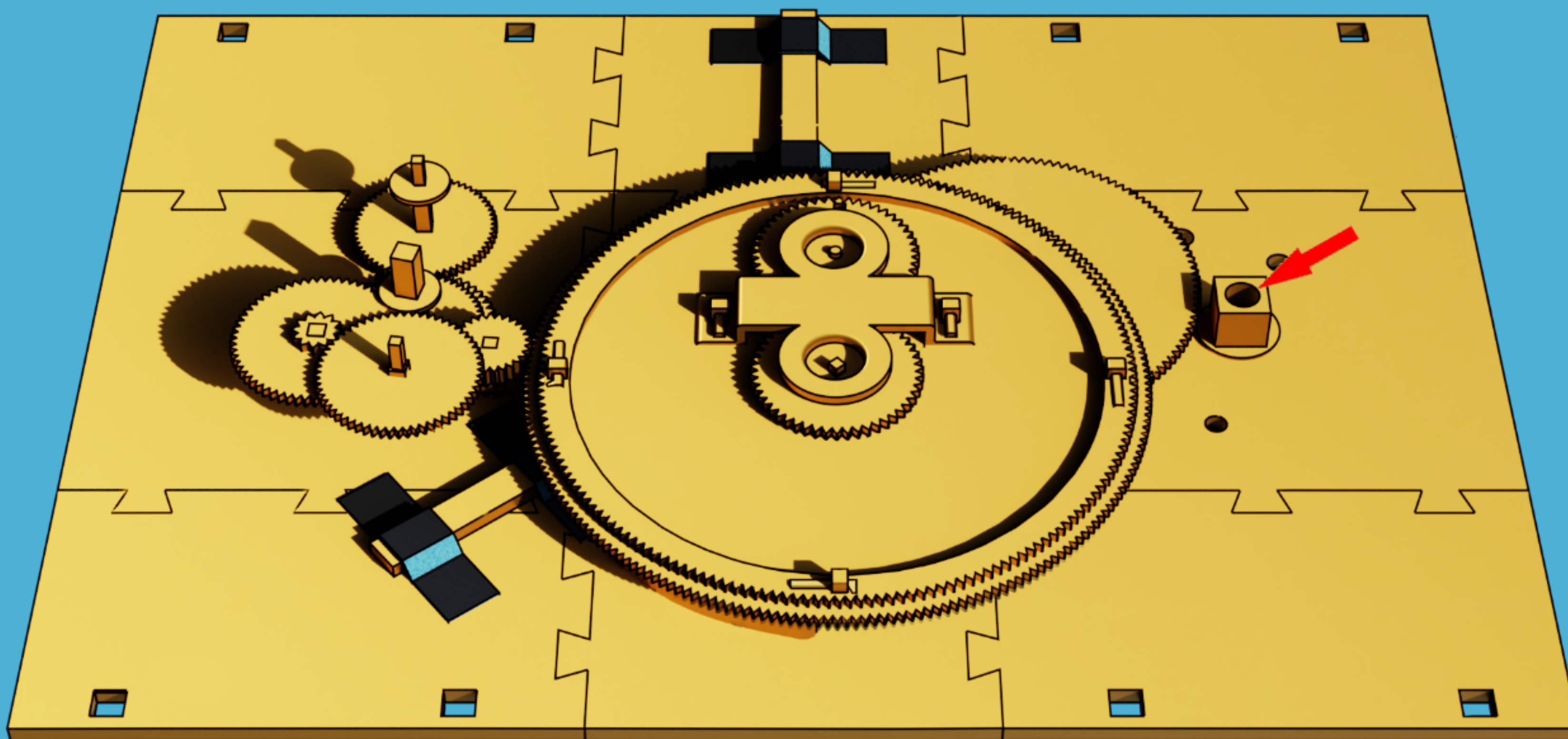
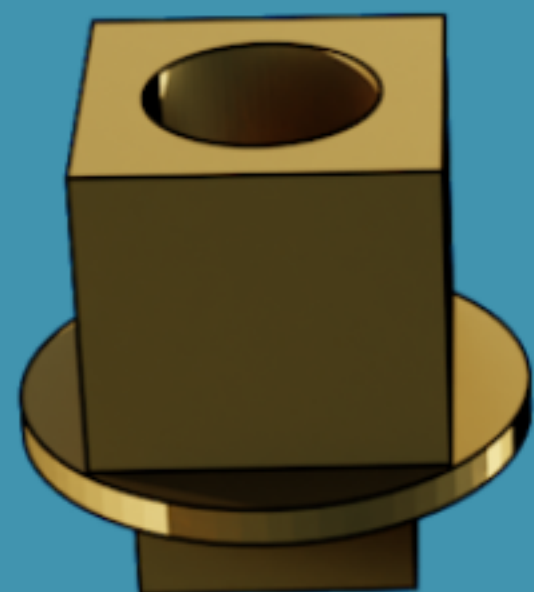
65

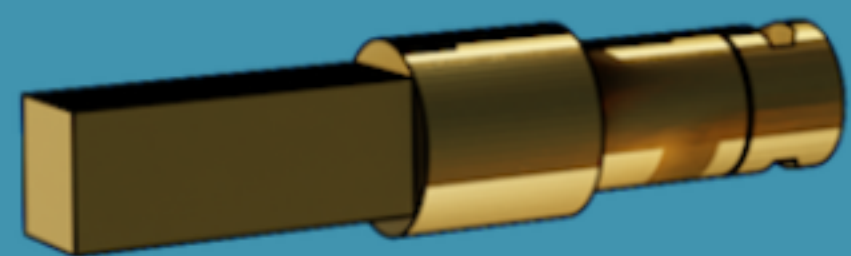
A



G Arbor Holder G Arbor Spacer

B





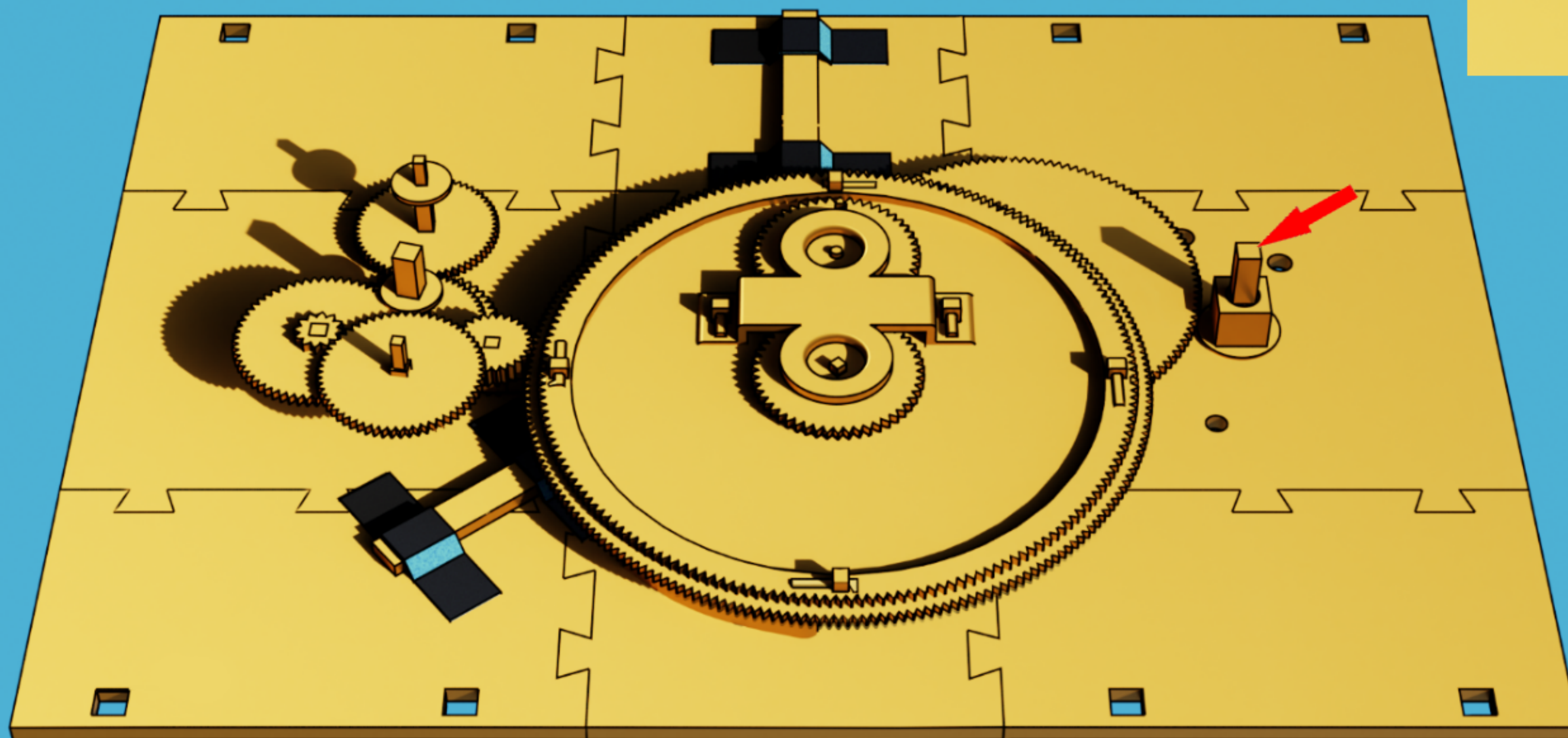
G Arbor

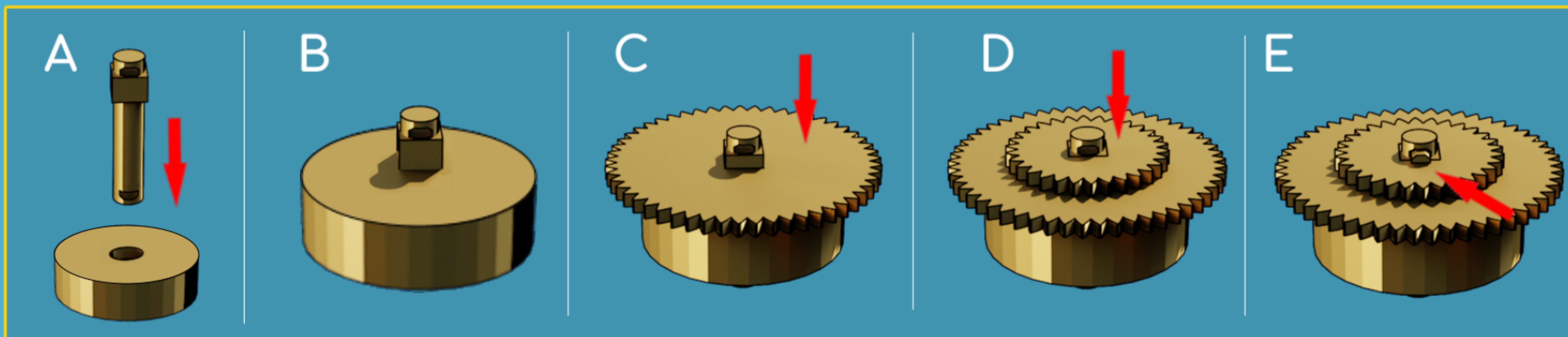
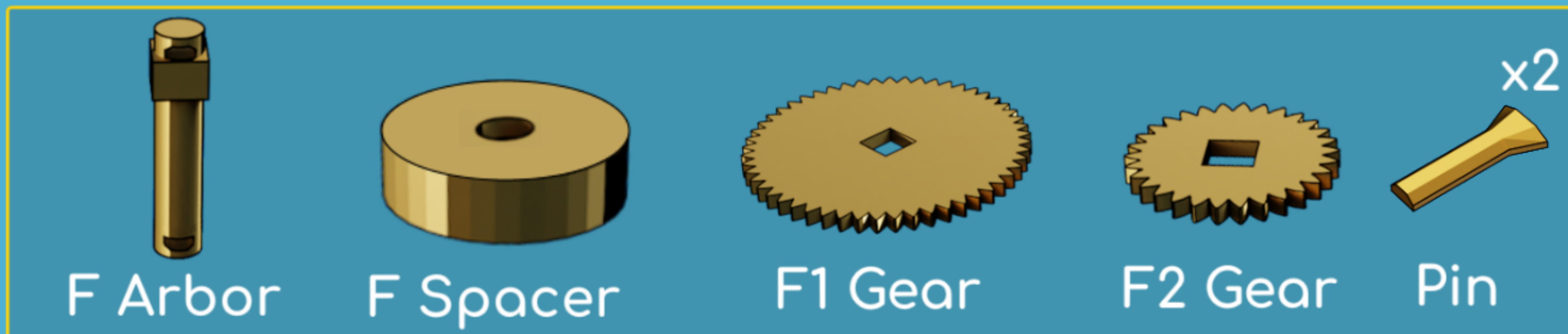


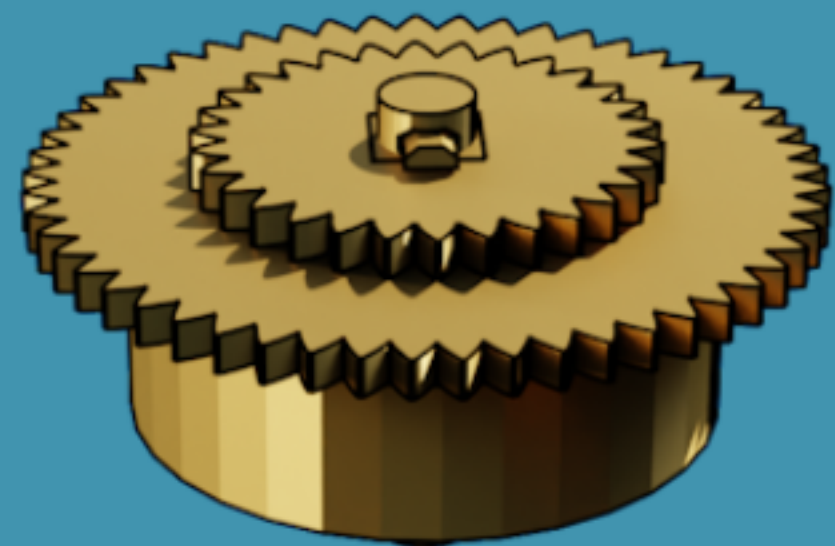
G Washer



Pin



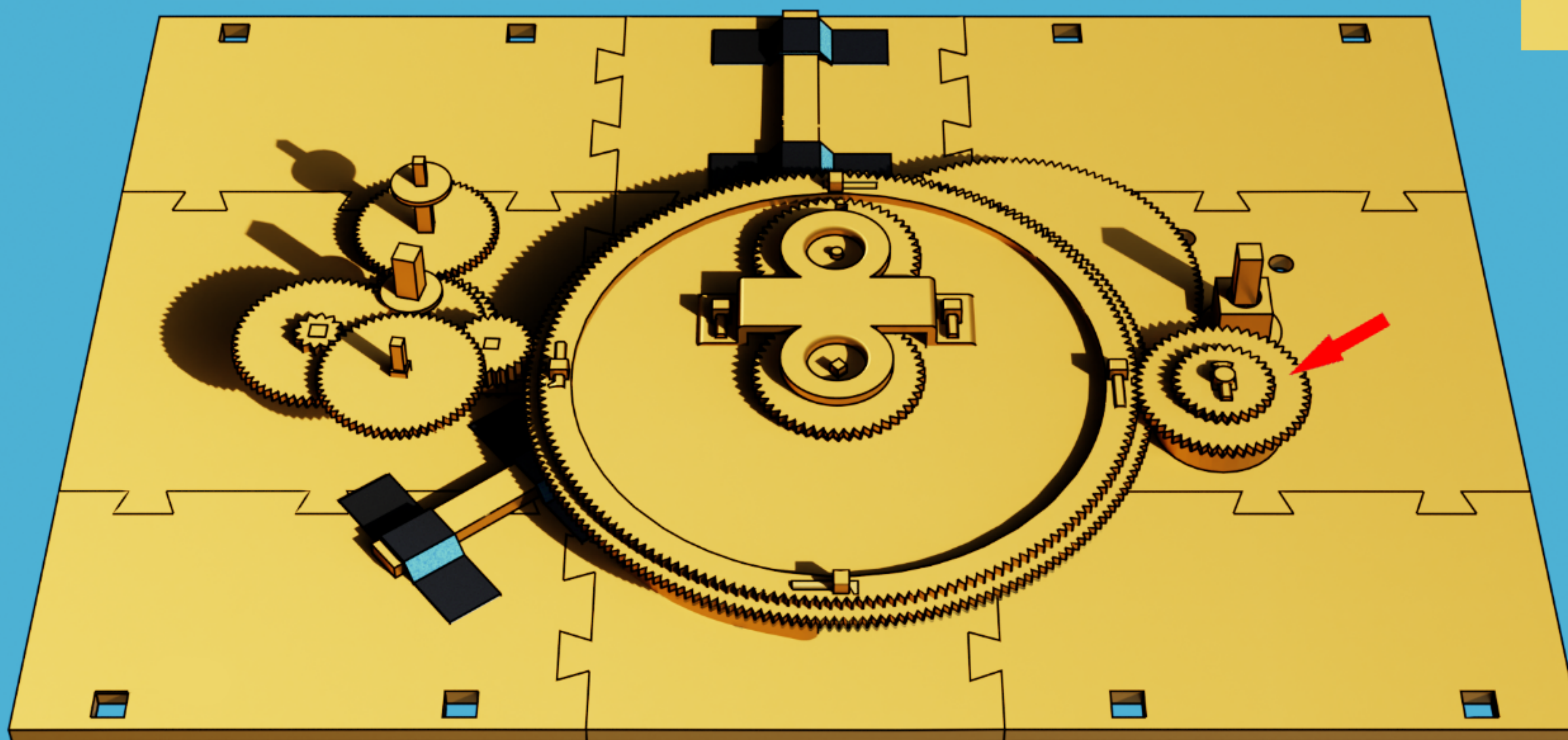


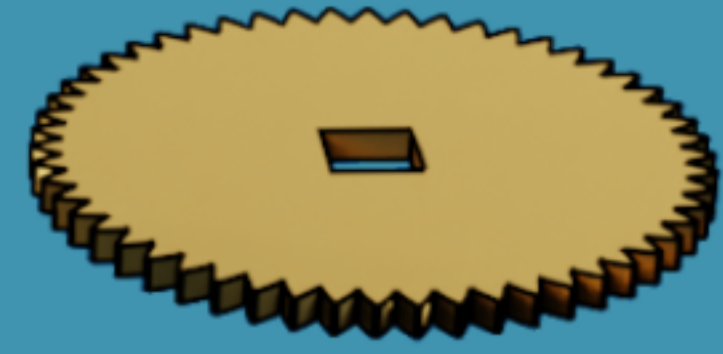


Washer

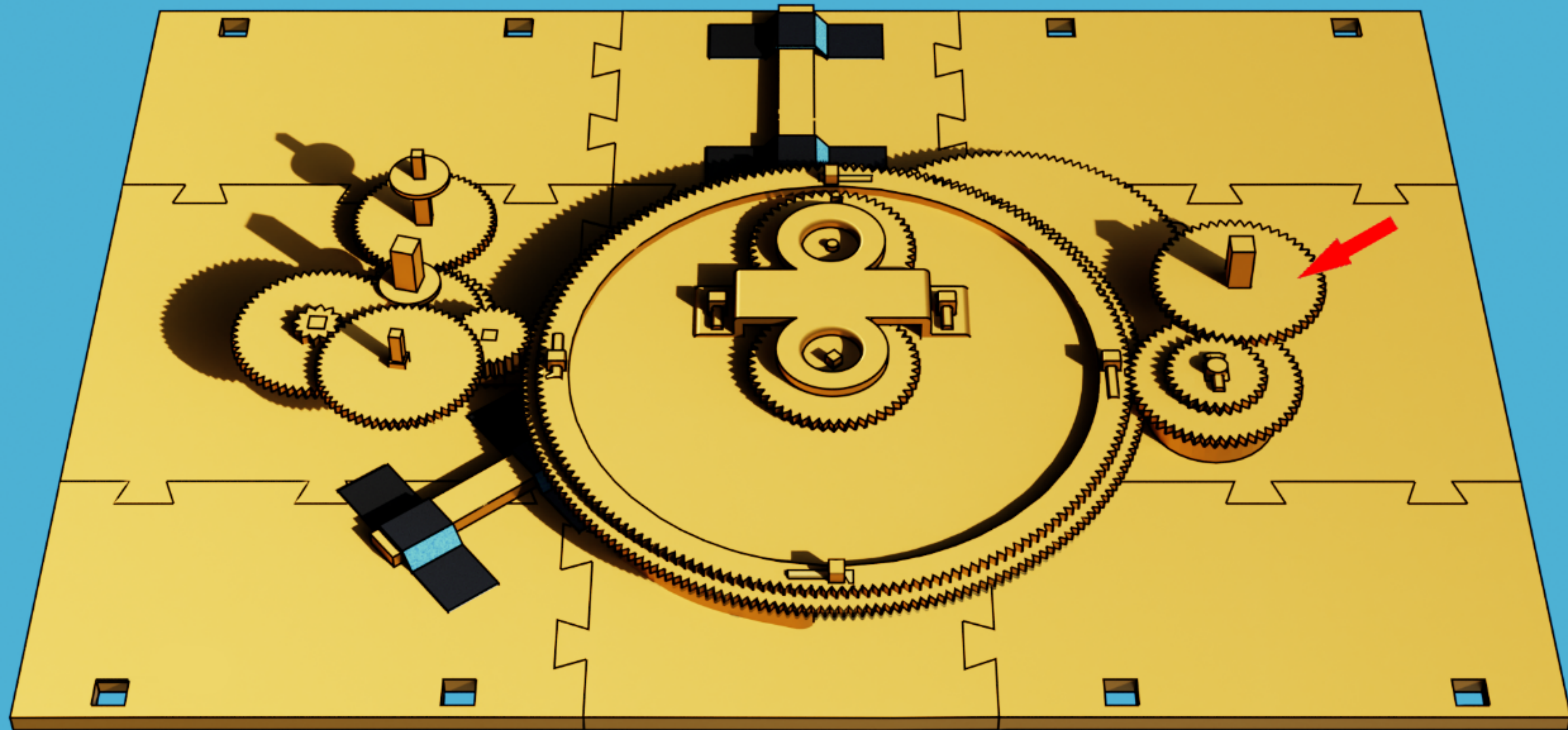


Pin



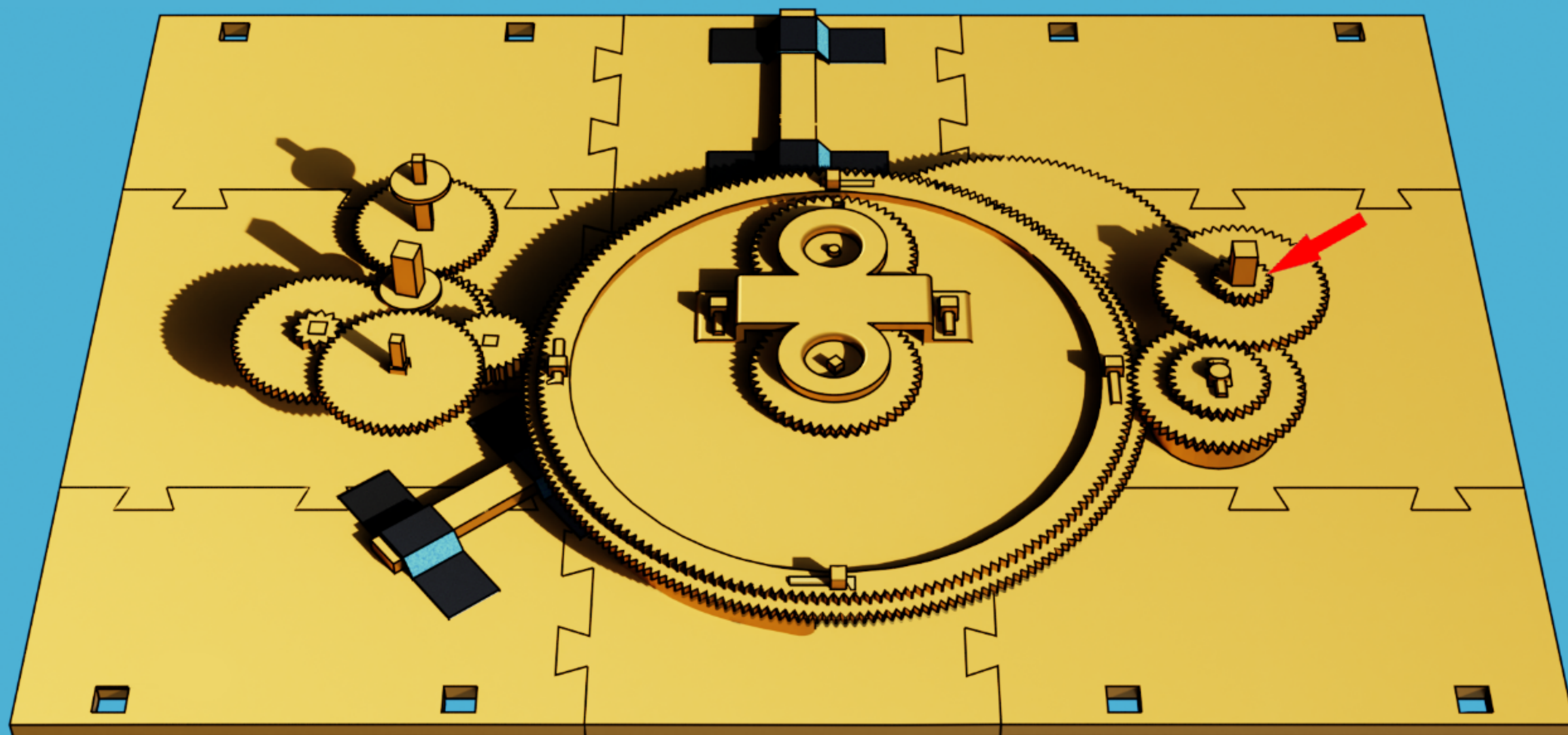


G1 Gear





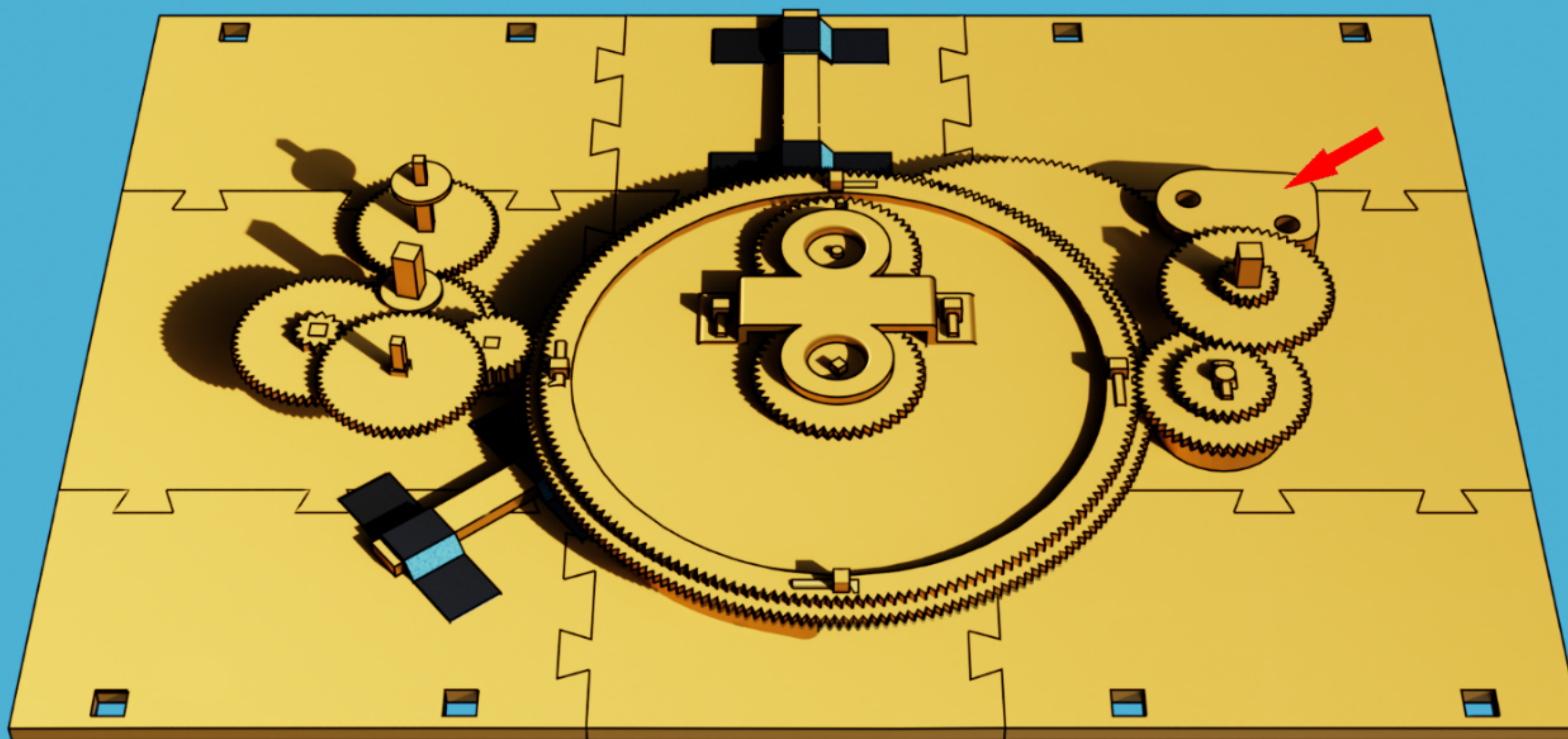
G2 Gear



71



H + I Outer Arbor





H Arbor



H1 Gear



H2 Gear

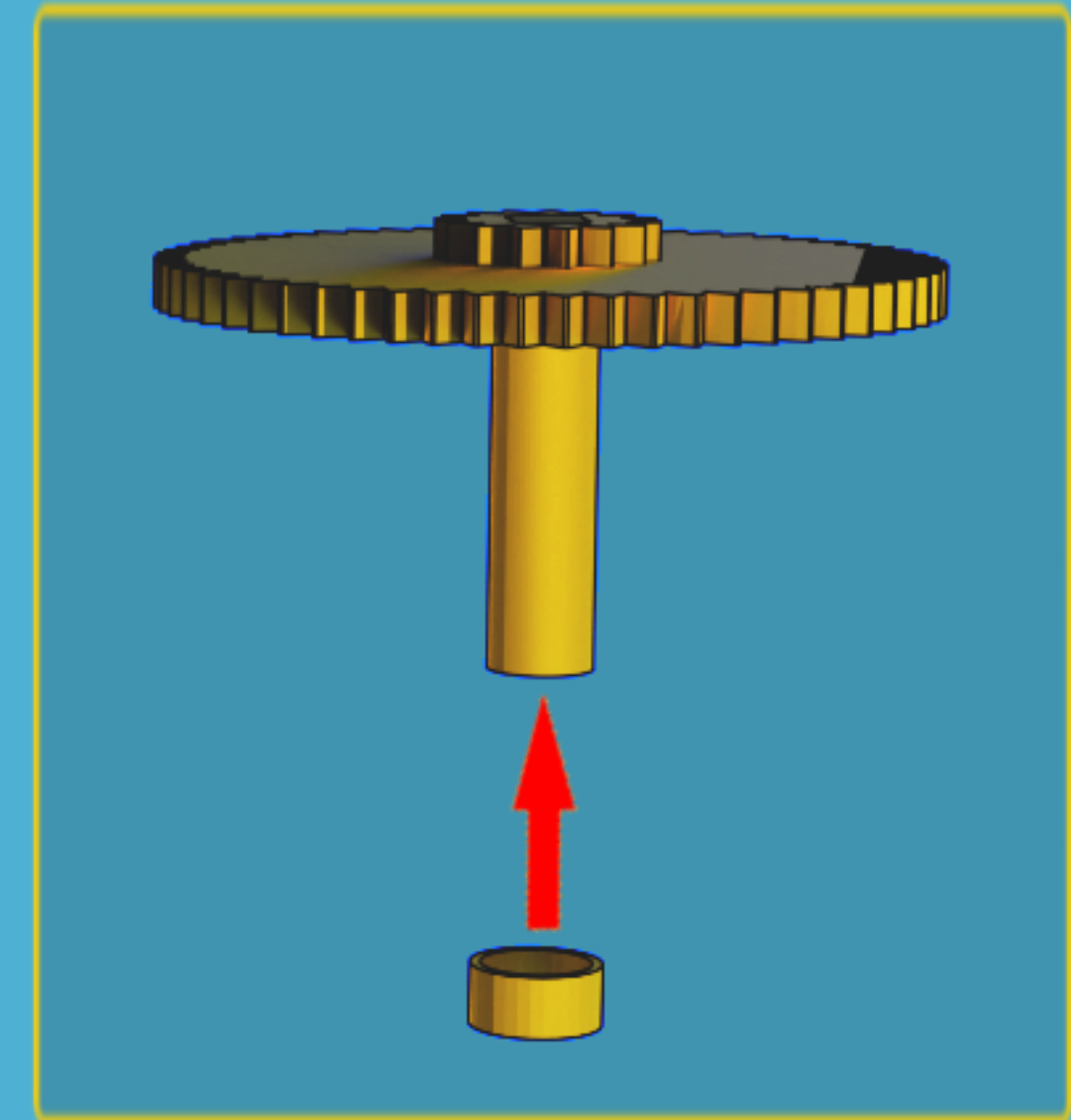
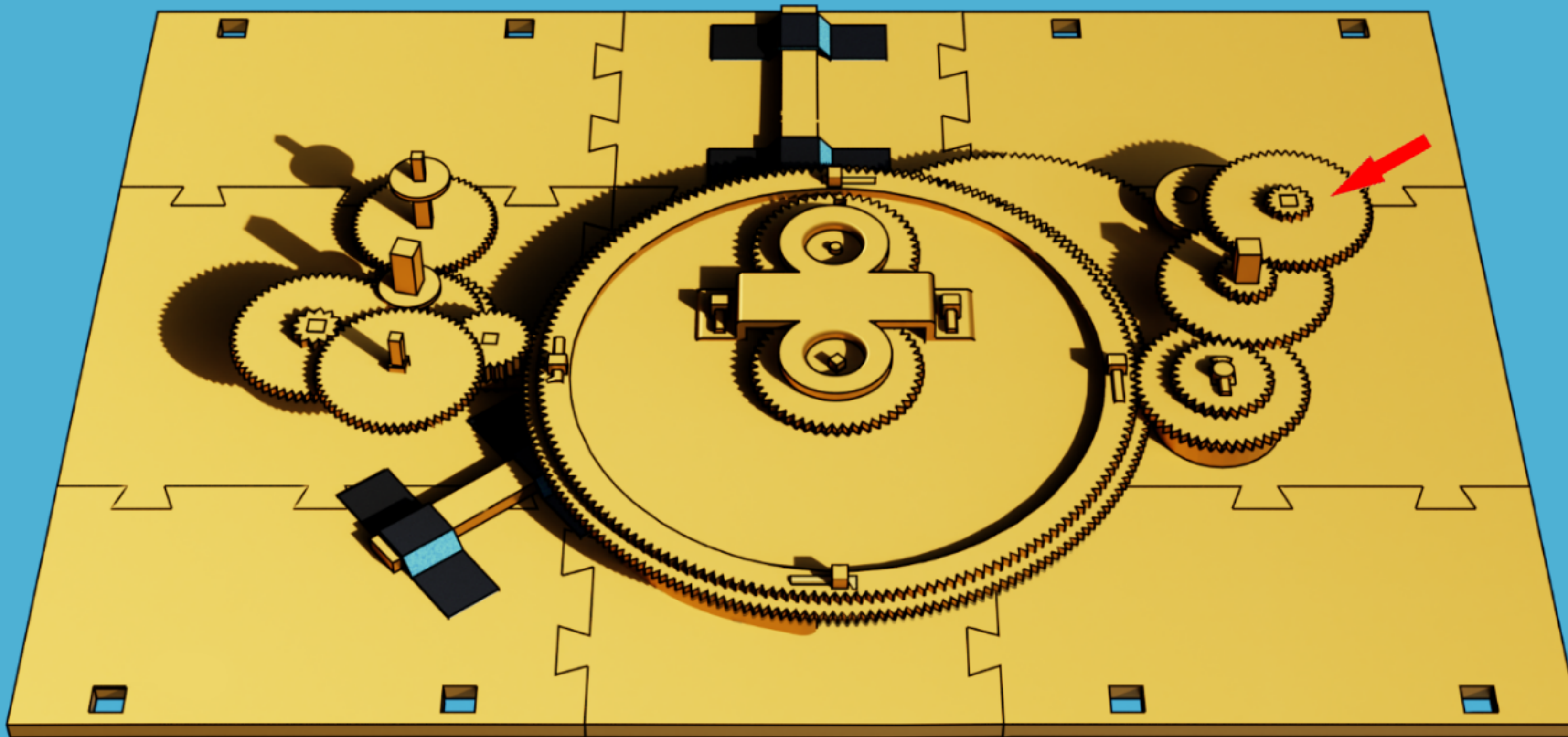
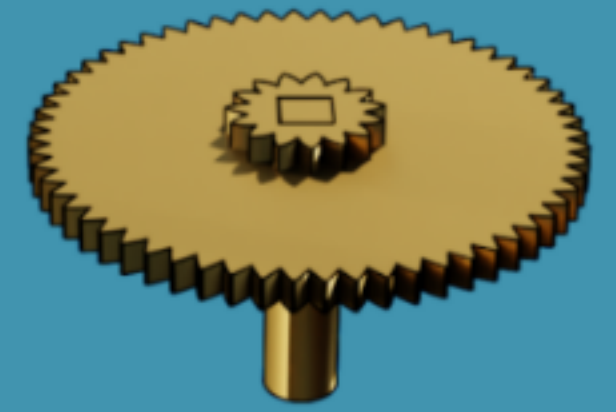


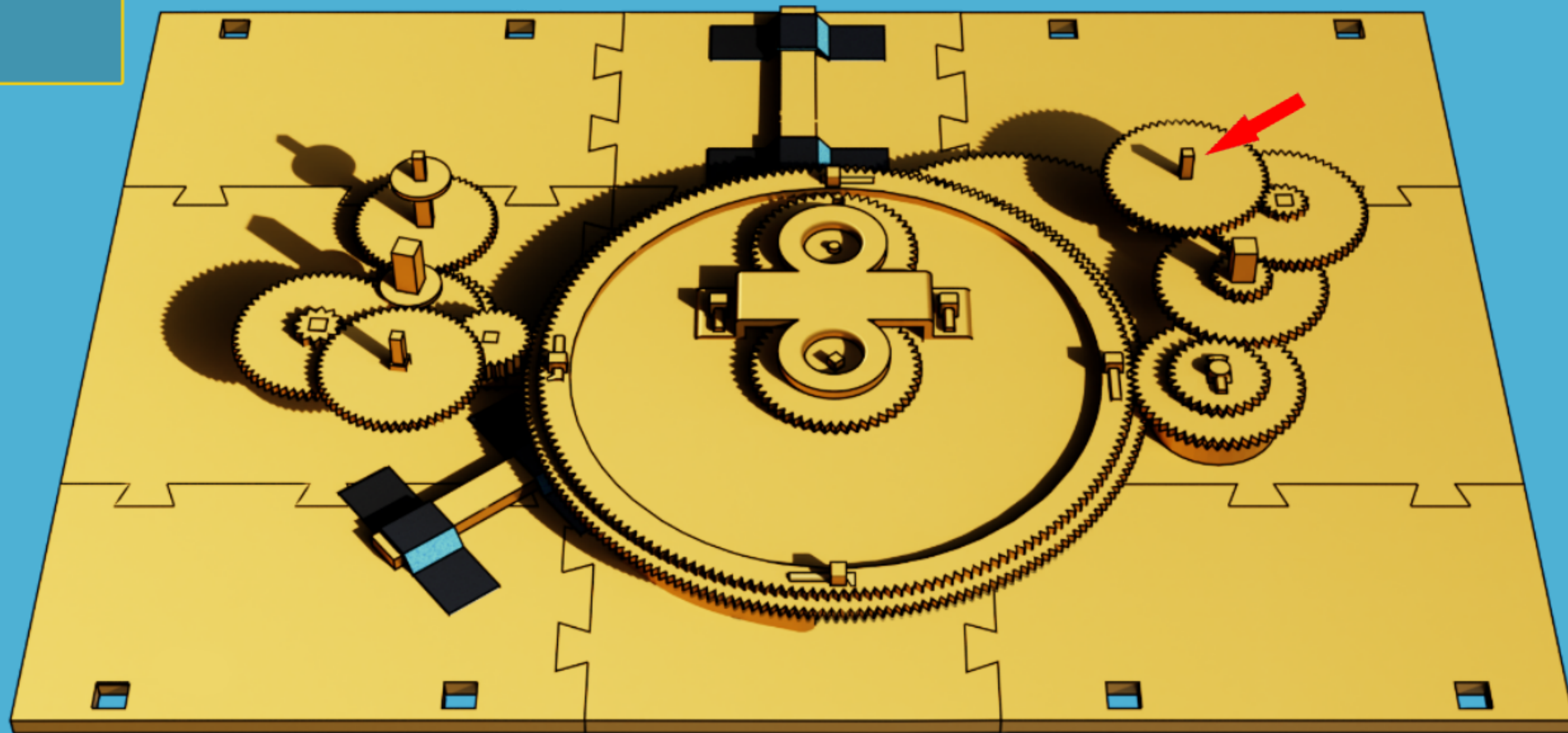
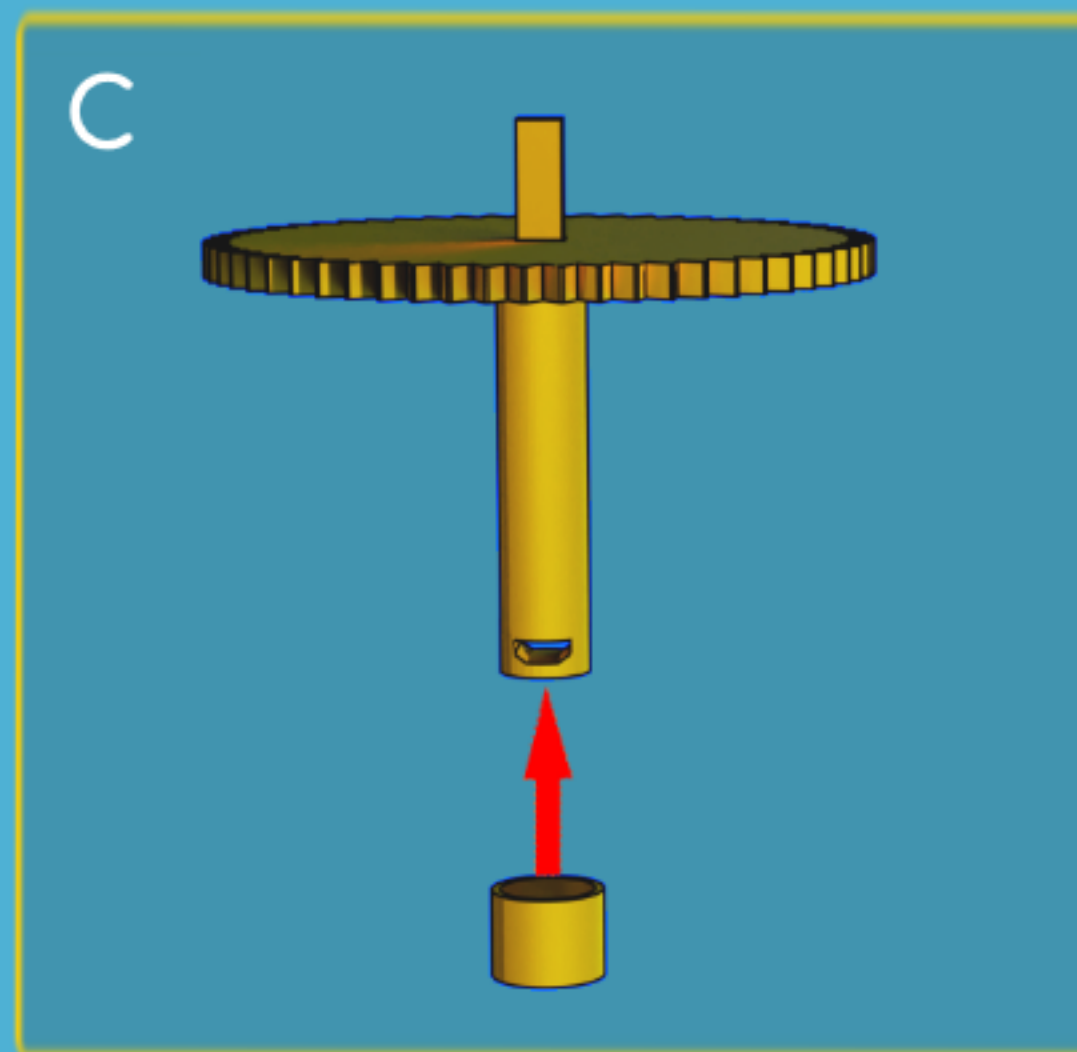
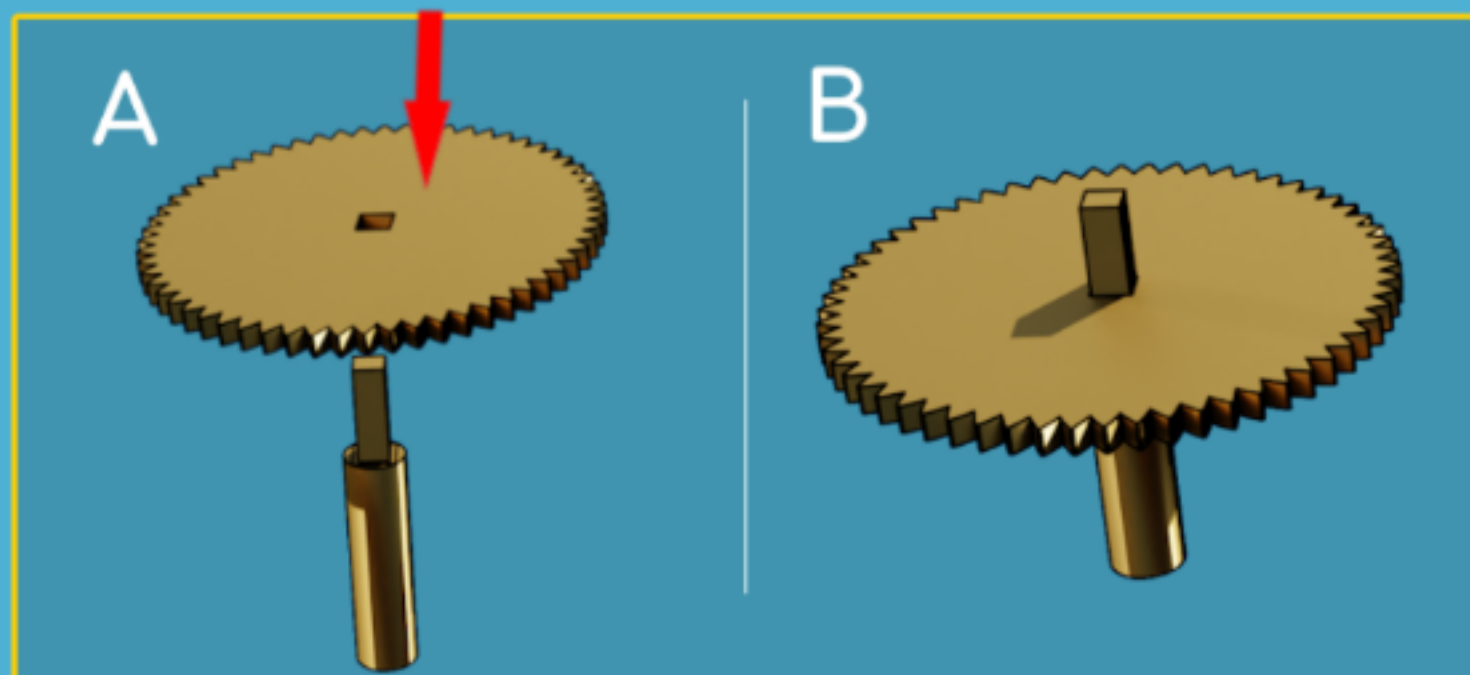
H Arbor Spacer

A



B







Pillar
End
x2

x4



Back
Plate
Pillar



75



Back Plate
Pillar

x4



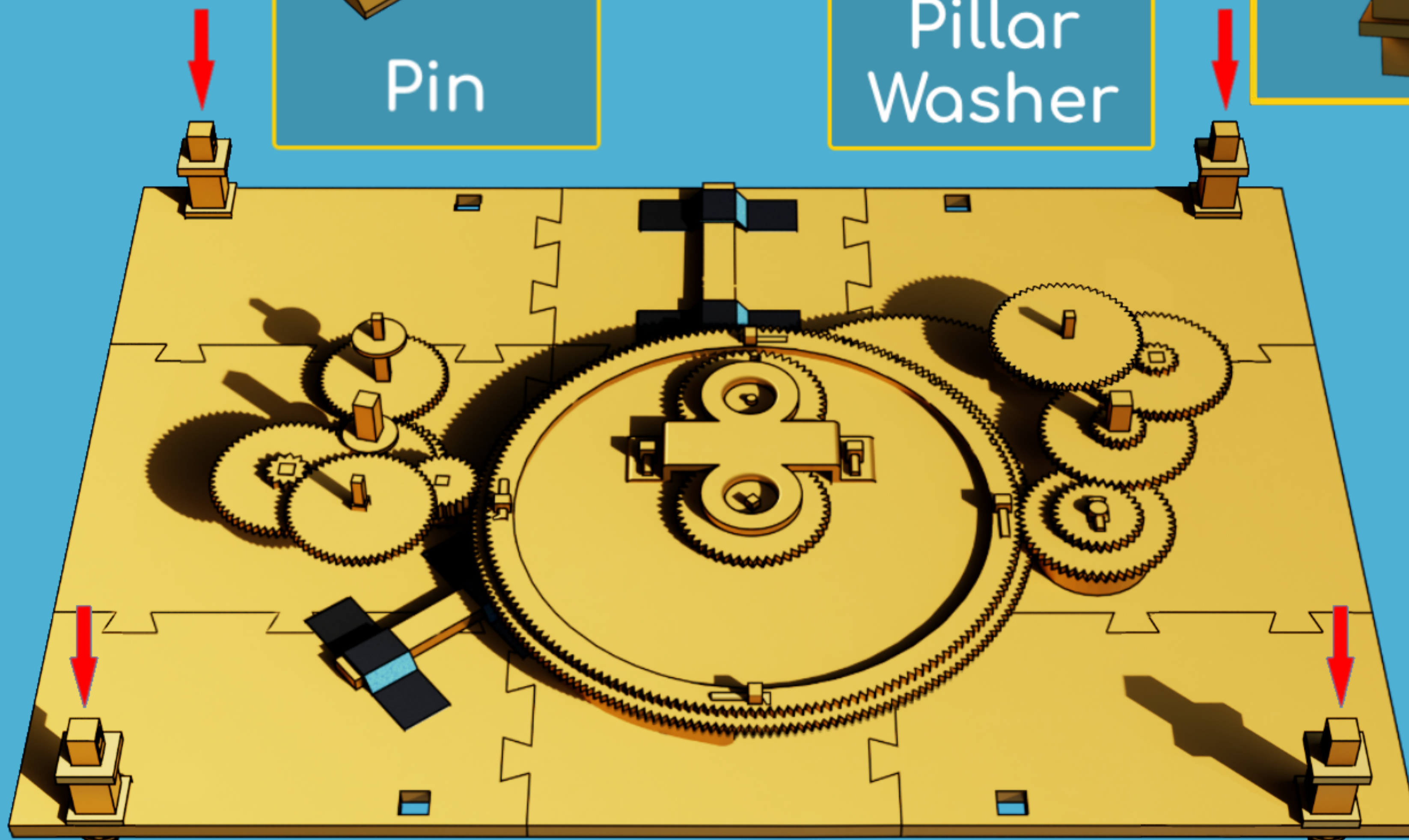
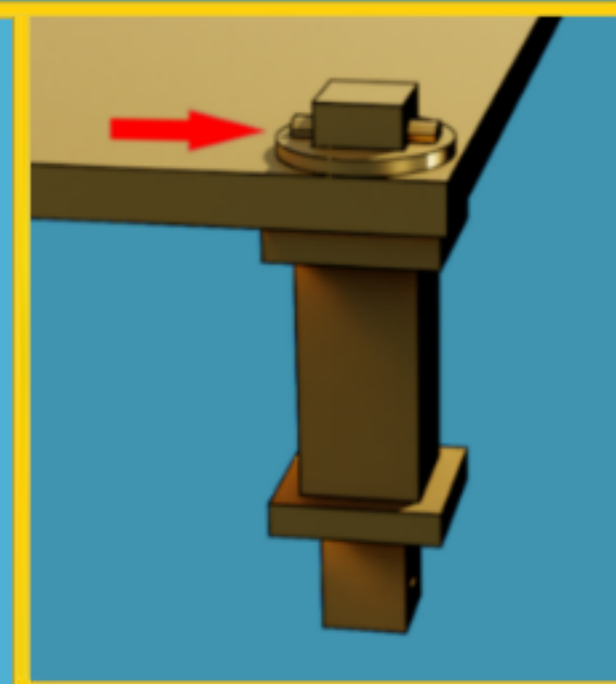
Pin

x4

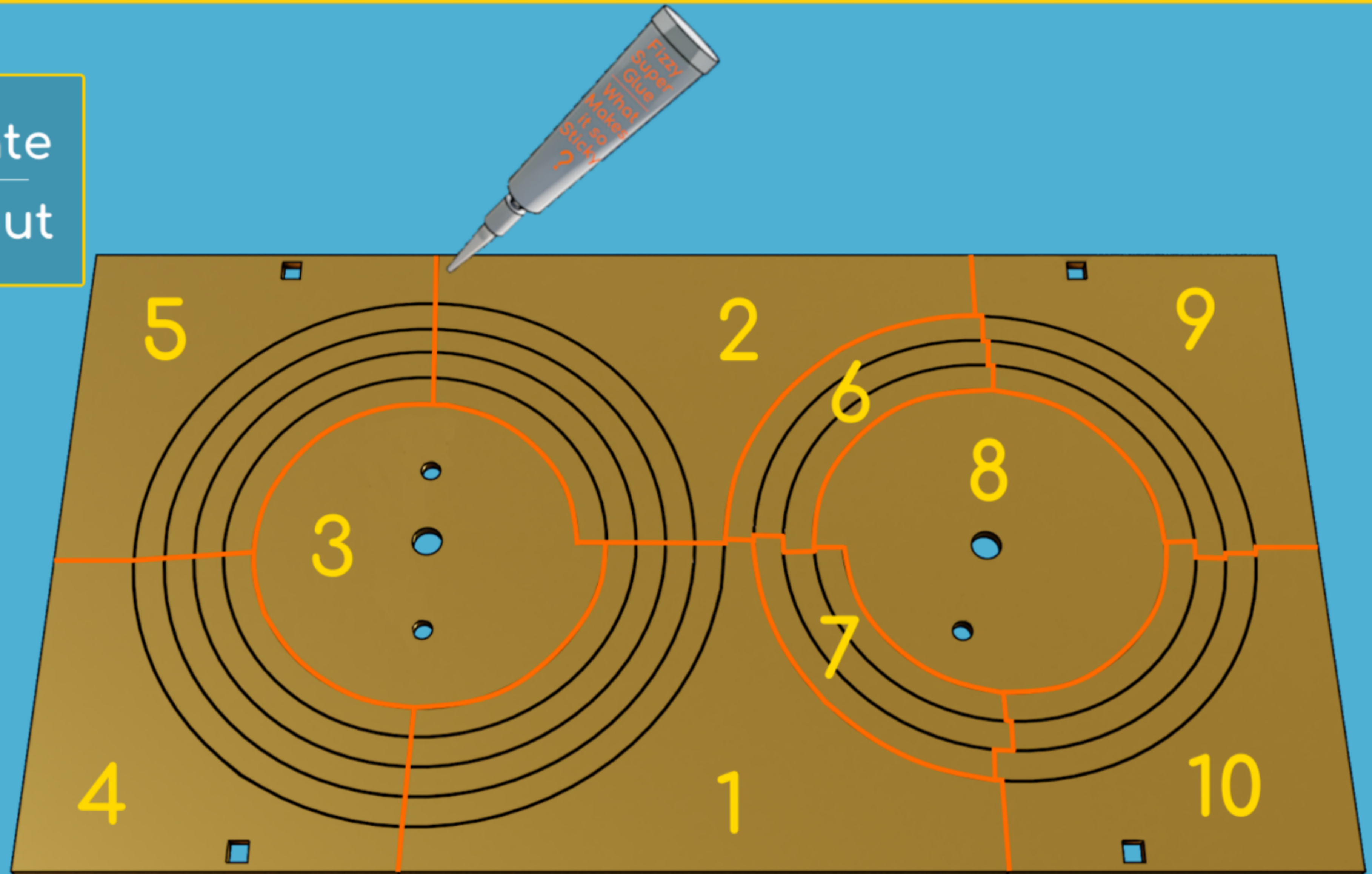


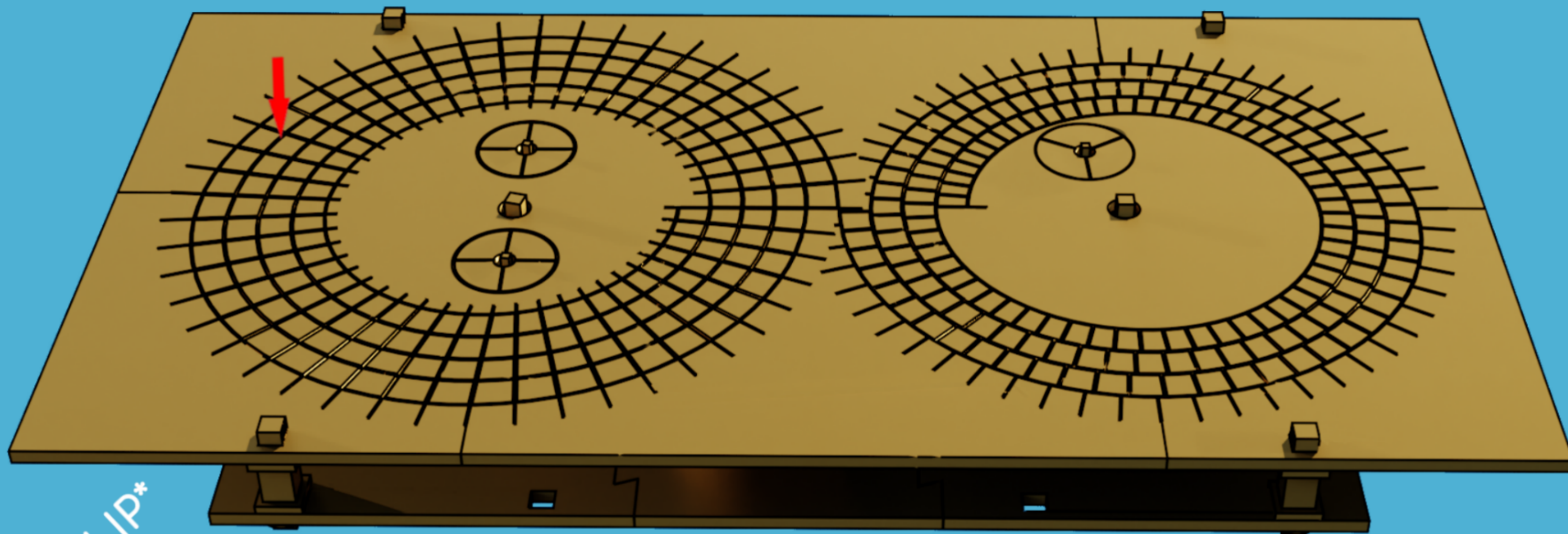
Pillar
Washer

x4



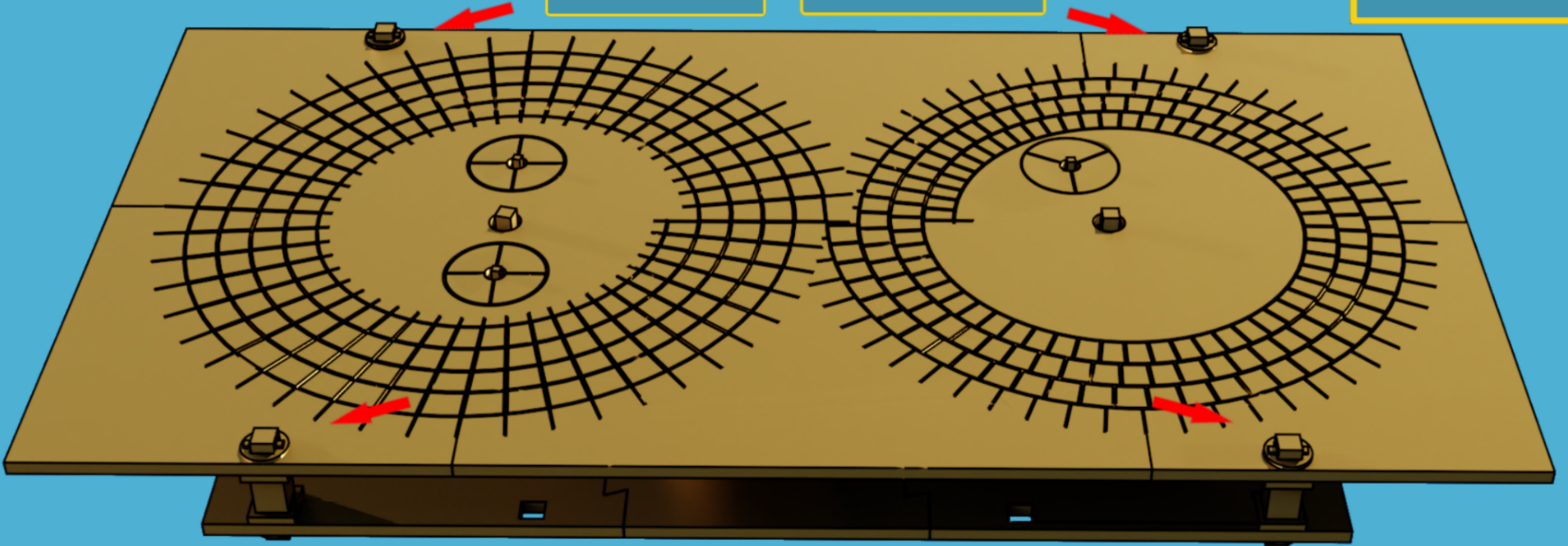
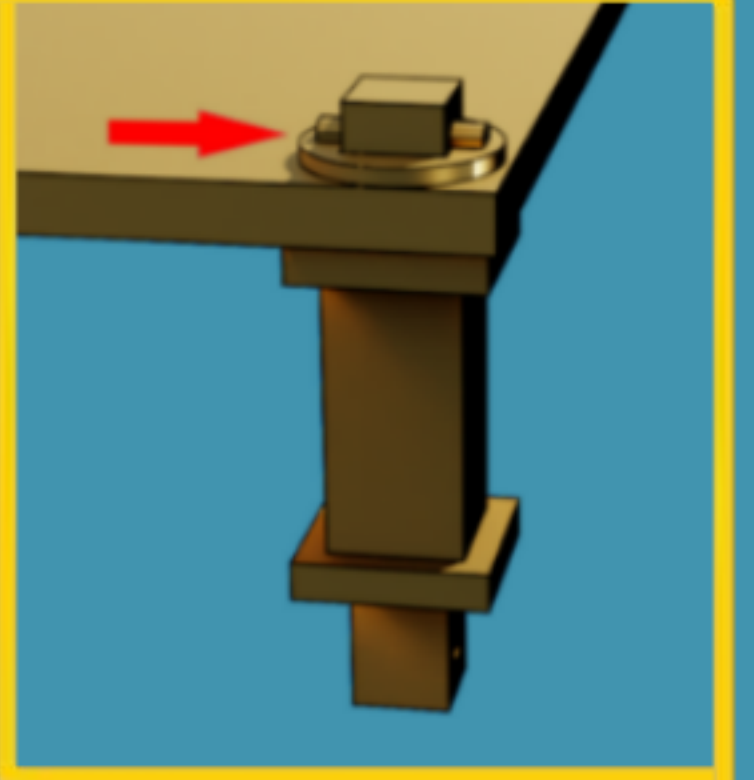
Bottom Plate Print Layout





FLIP

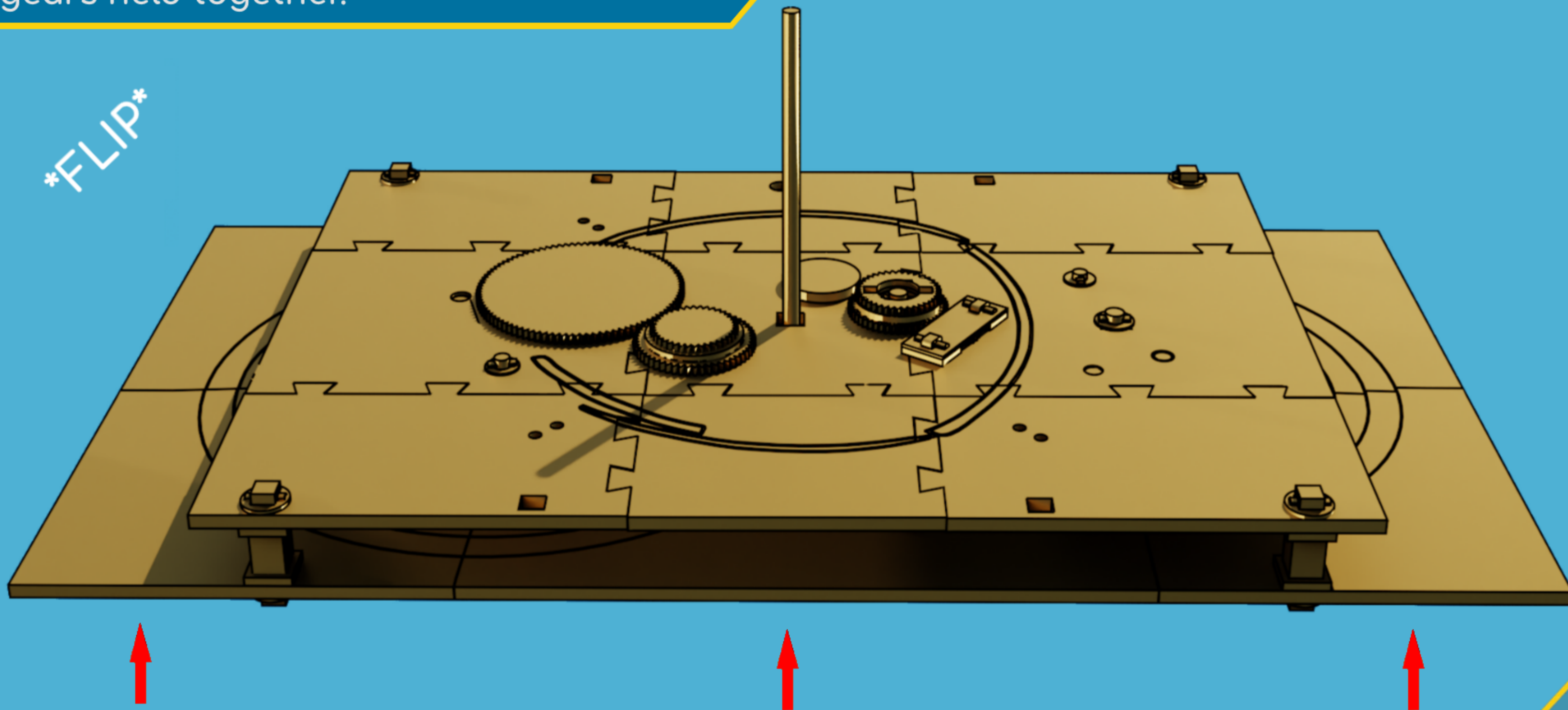
78



79

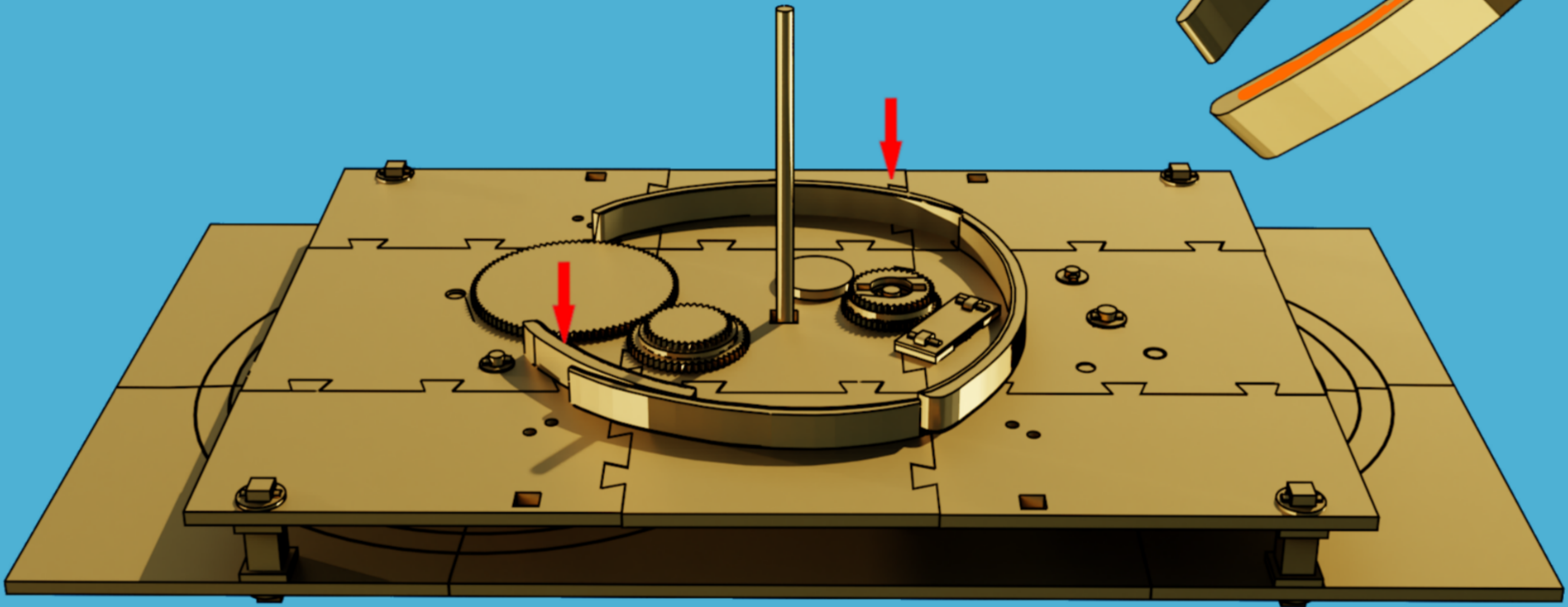
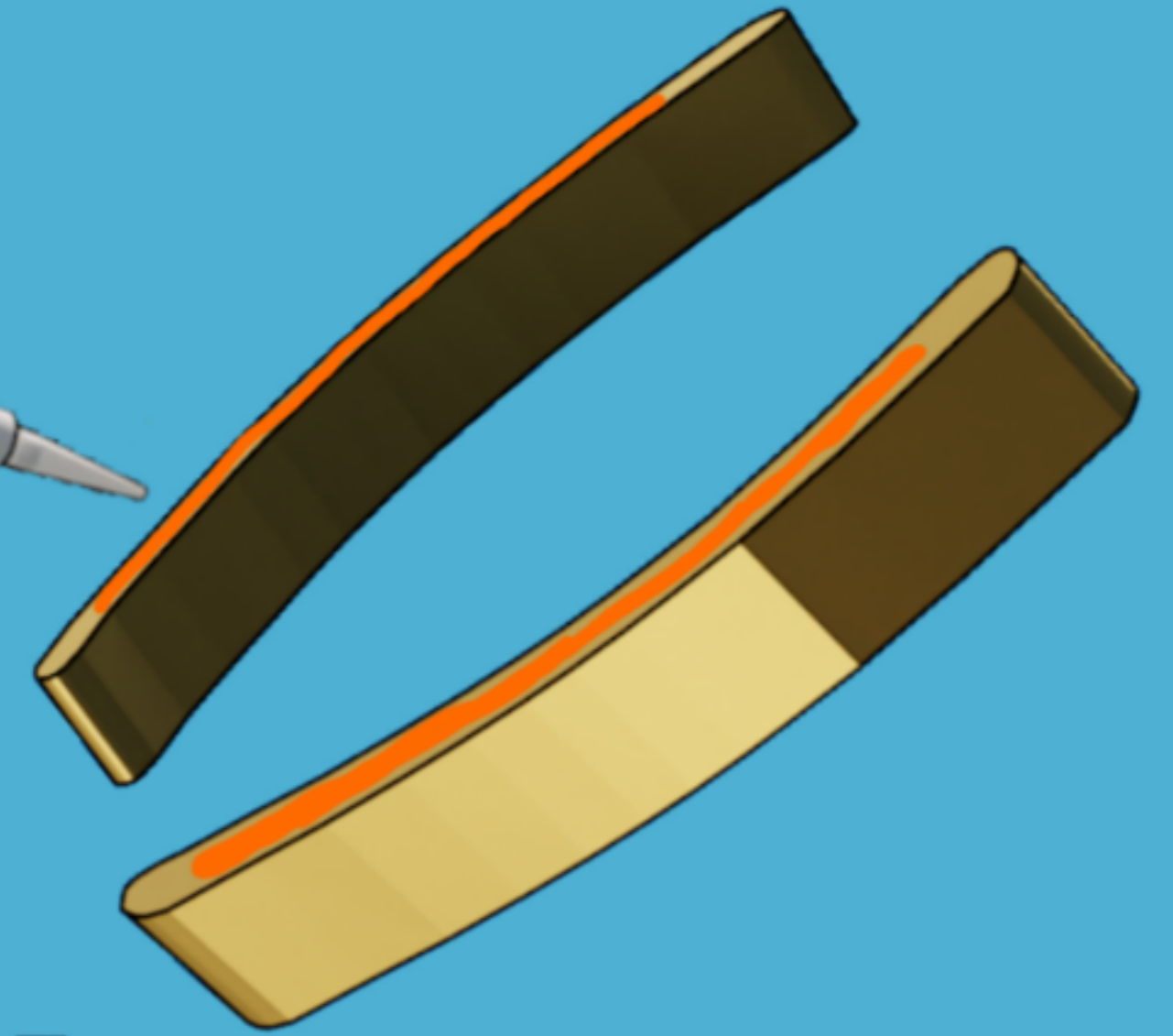
It might be easier to remove this back plate later on to remove the B3 holders, but for now it will keep all the gears held together.

FLIP

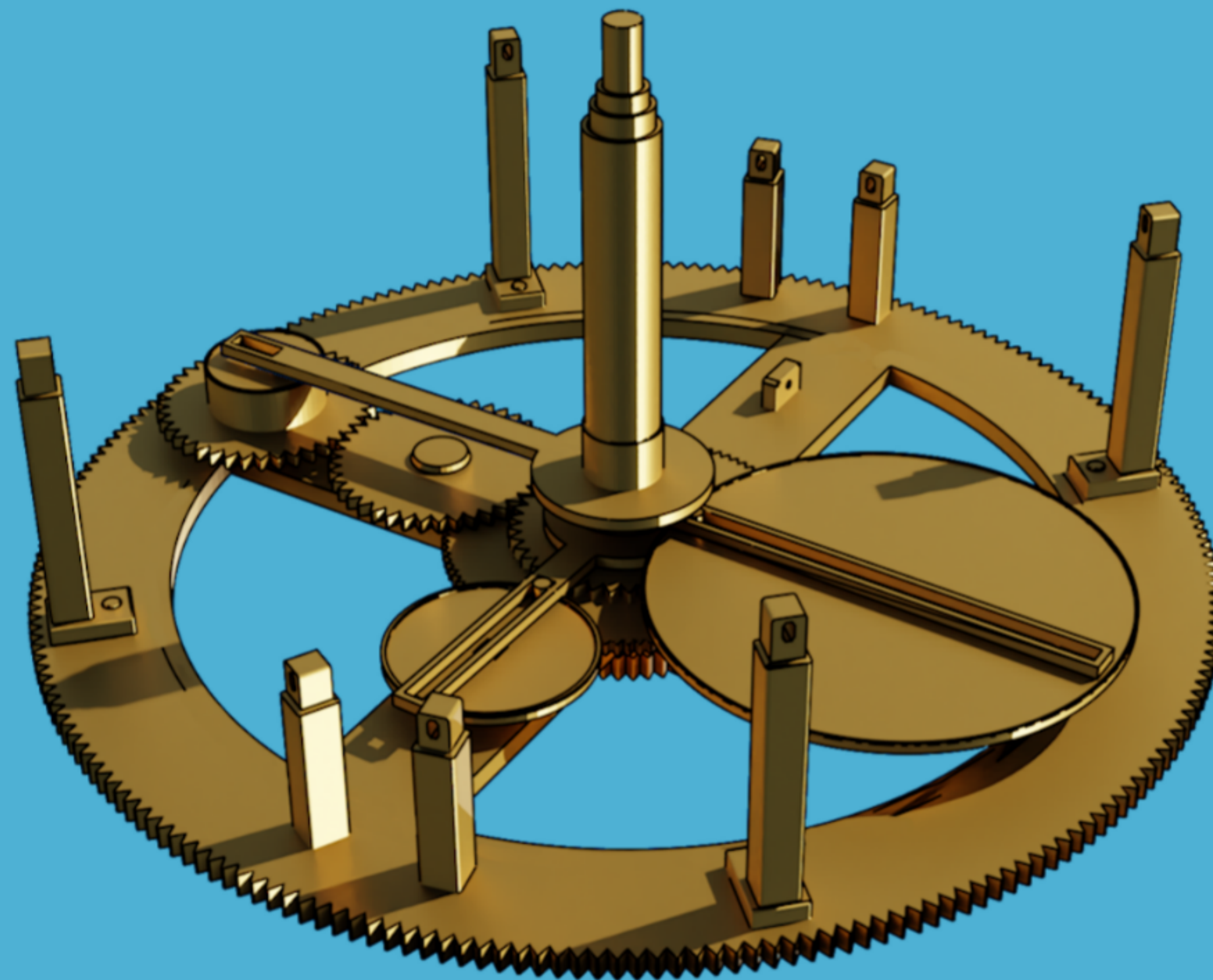
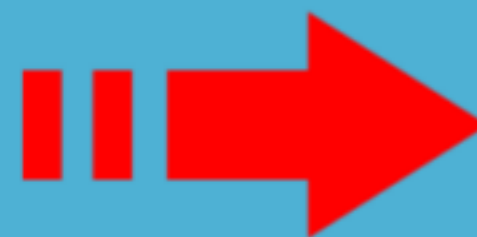


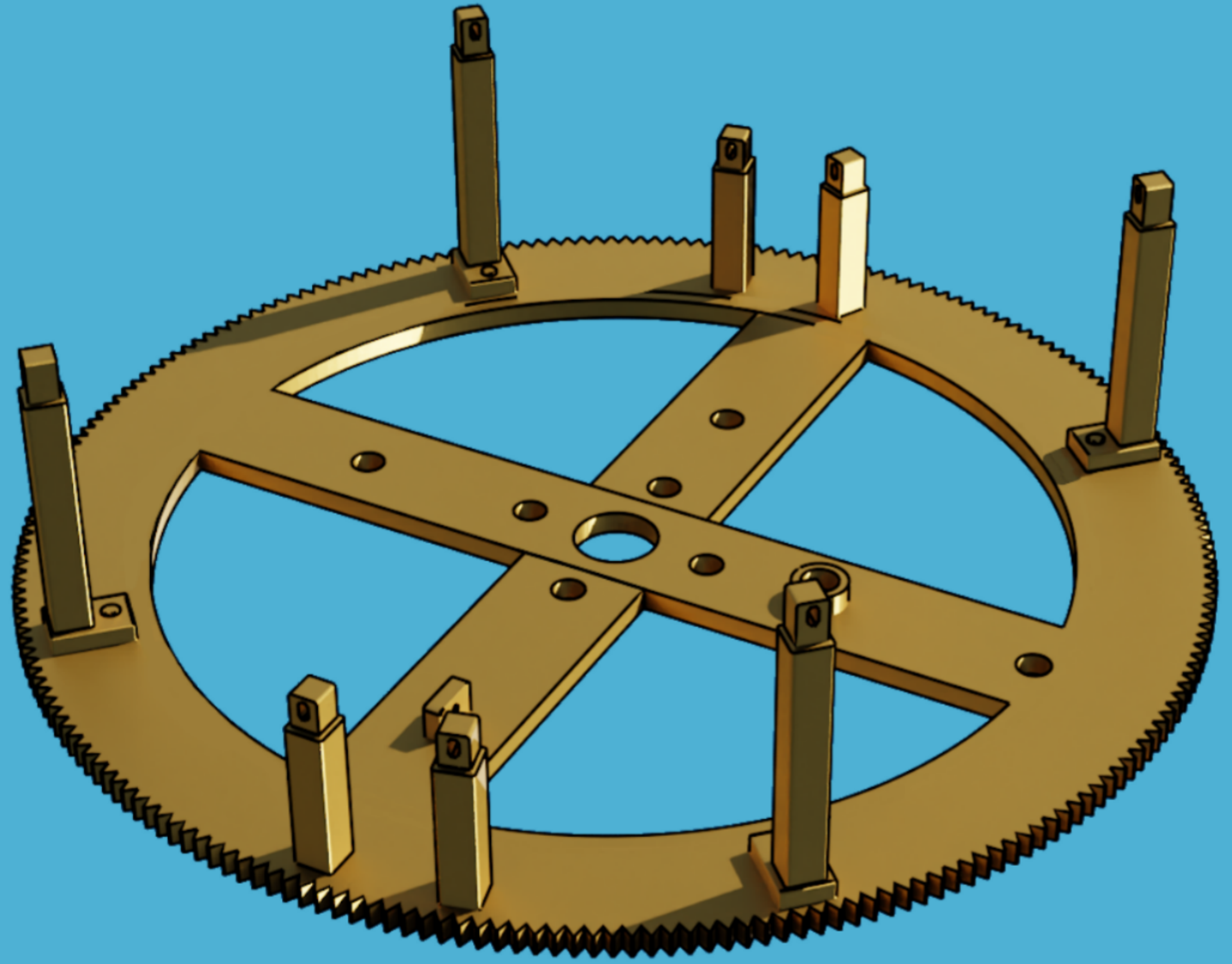
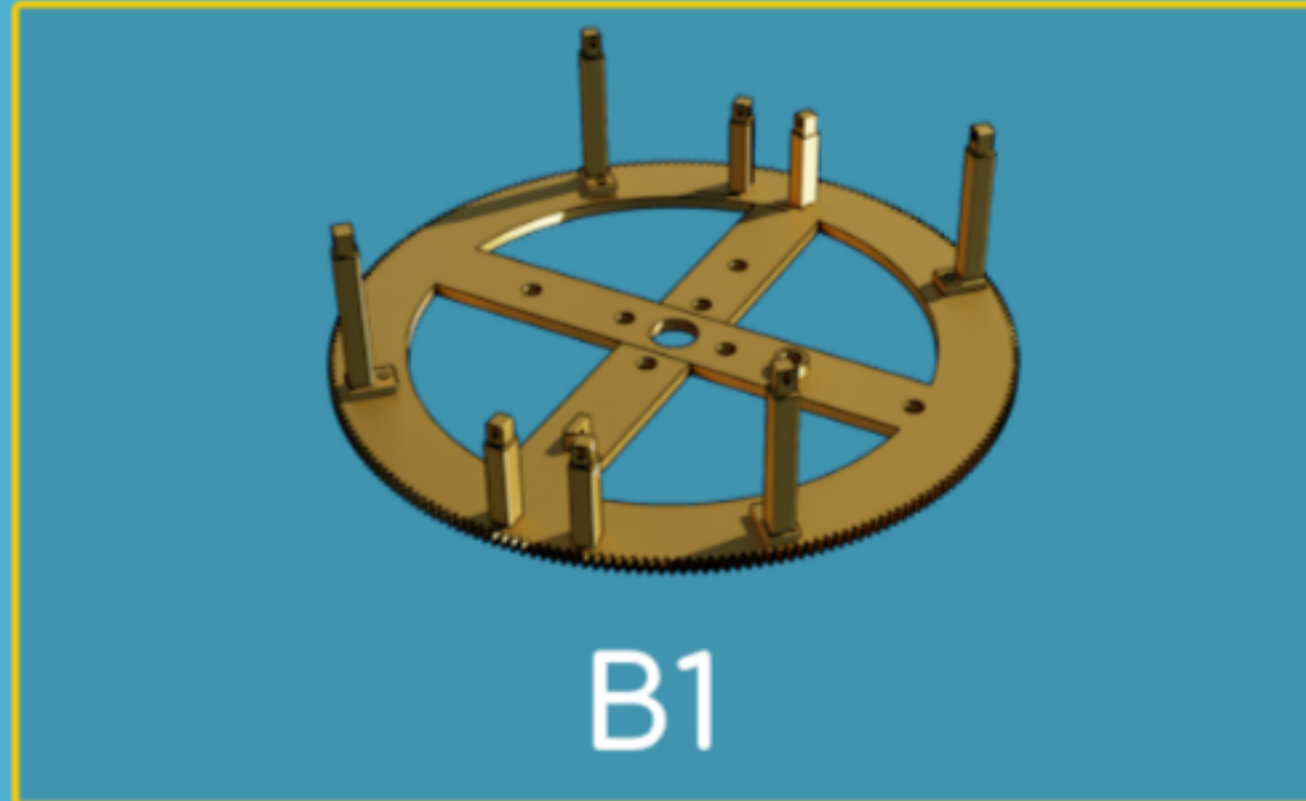


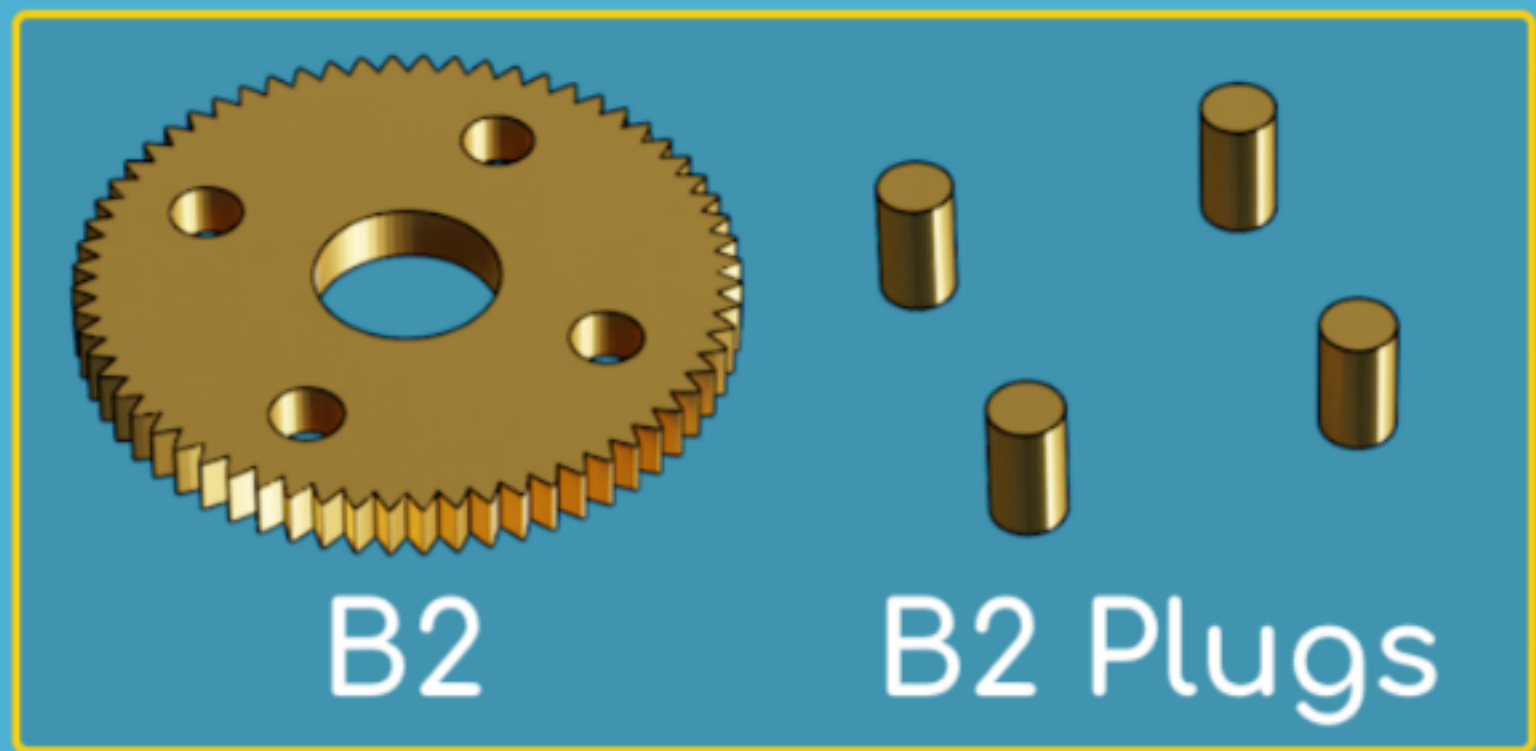
B1 Supports



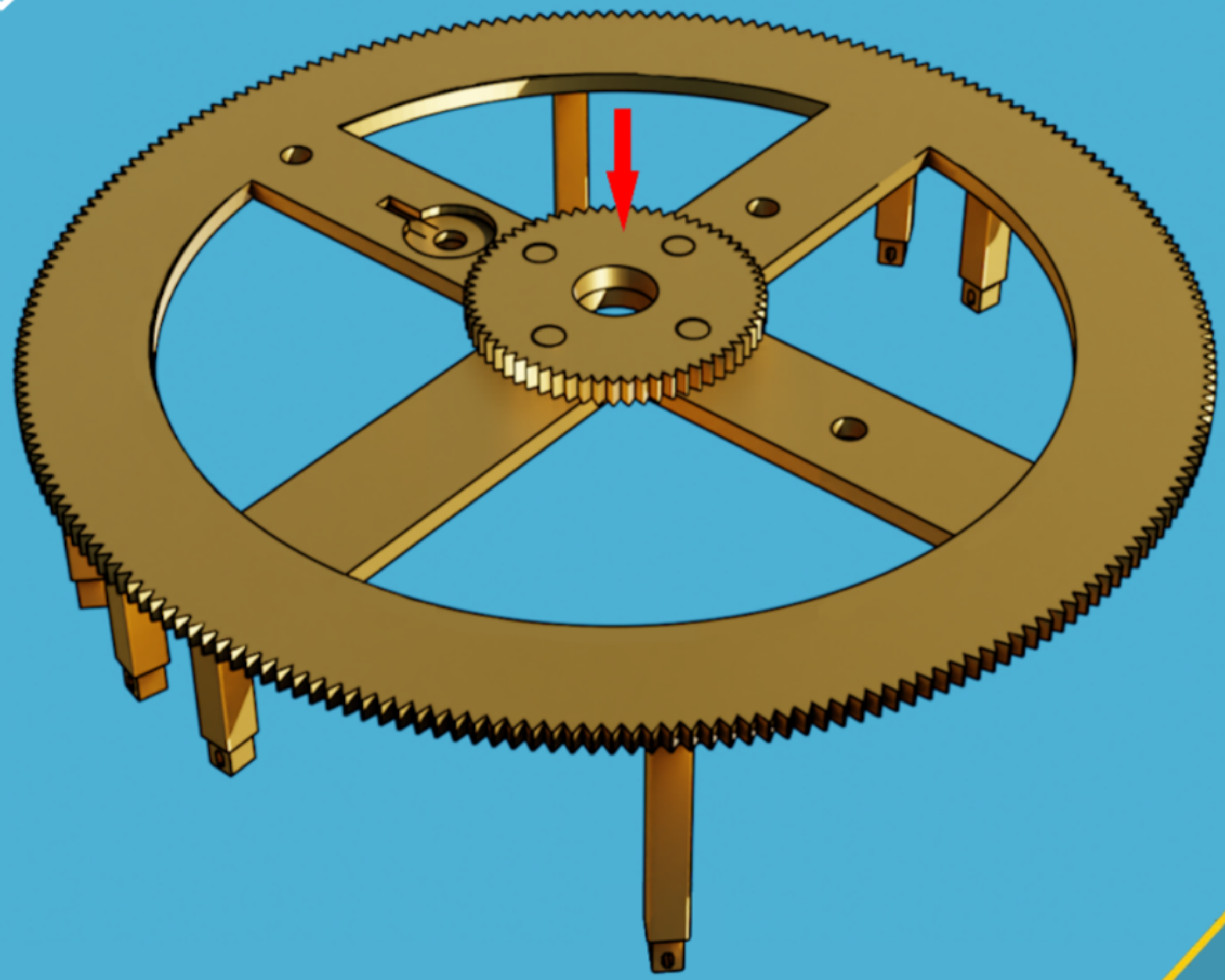
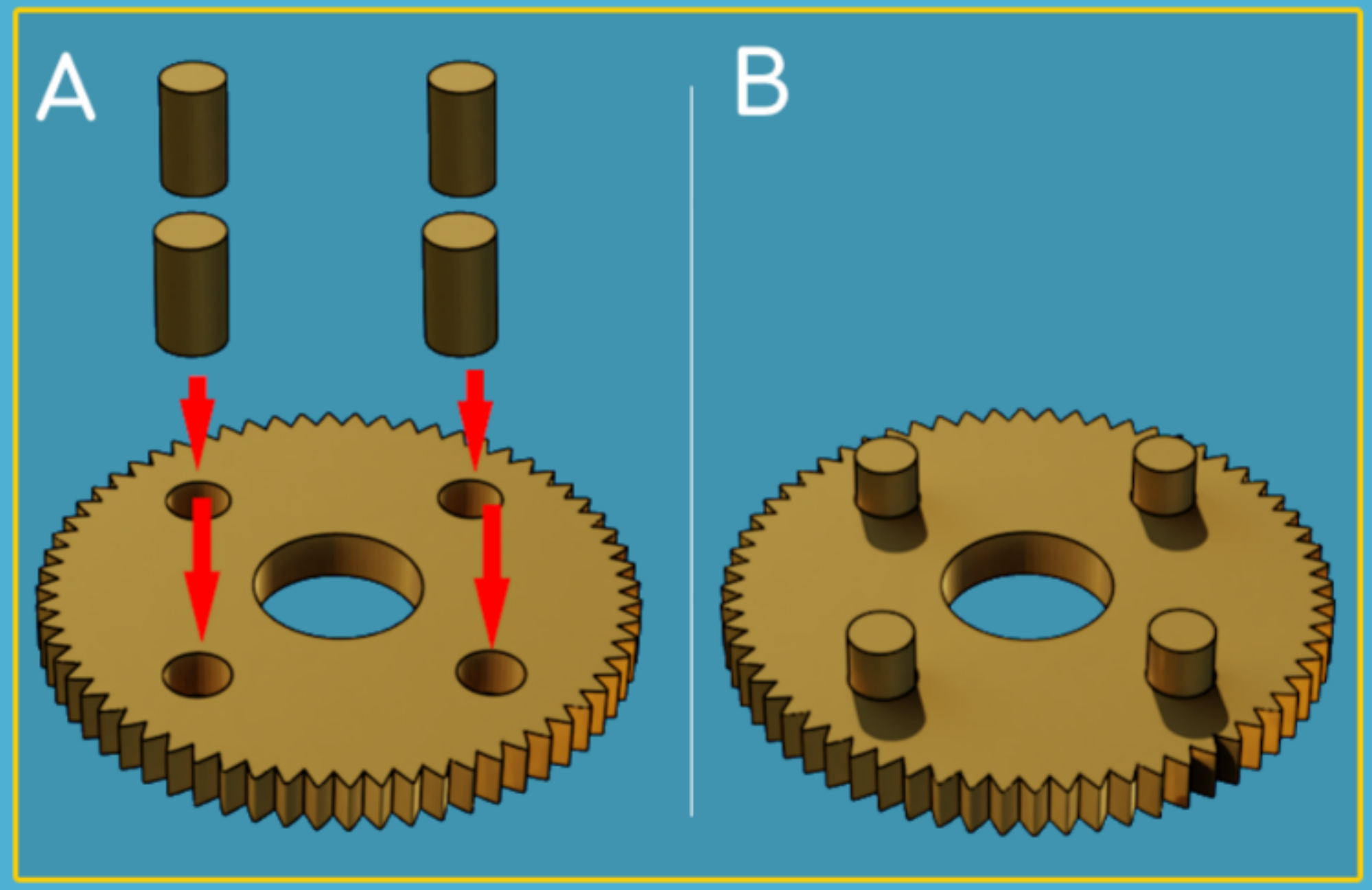
B1



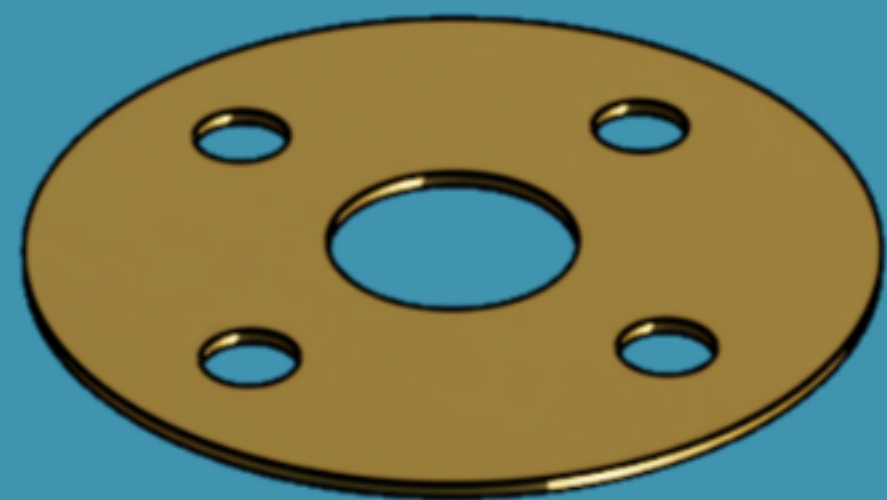




FLIP

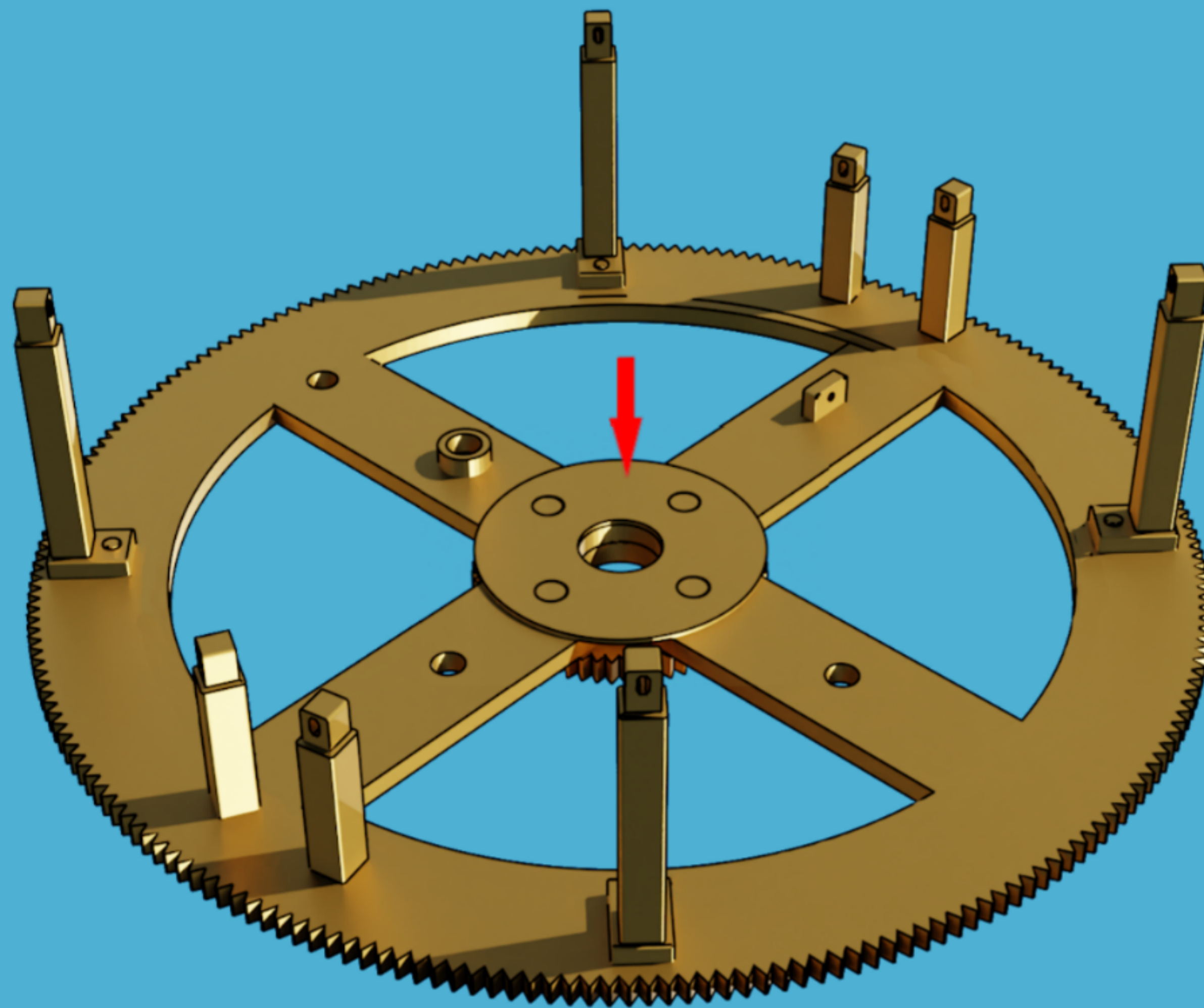


84



B1 Plate

FLIP





B1 Washer

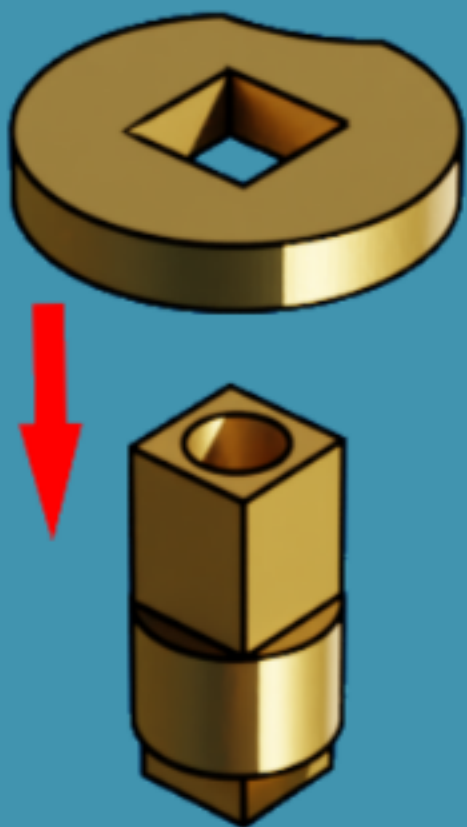


B1 Arbor

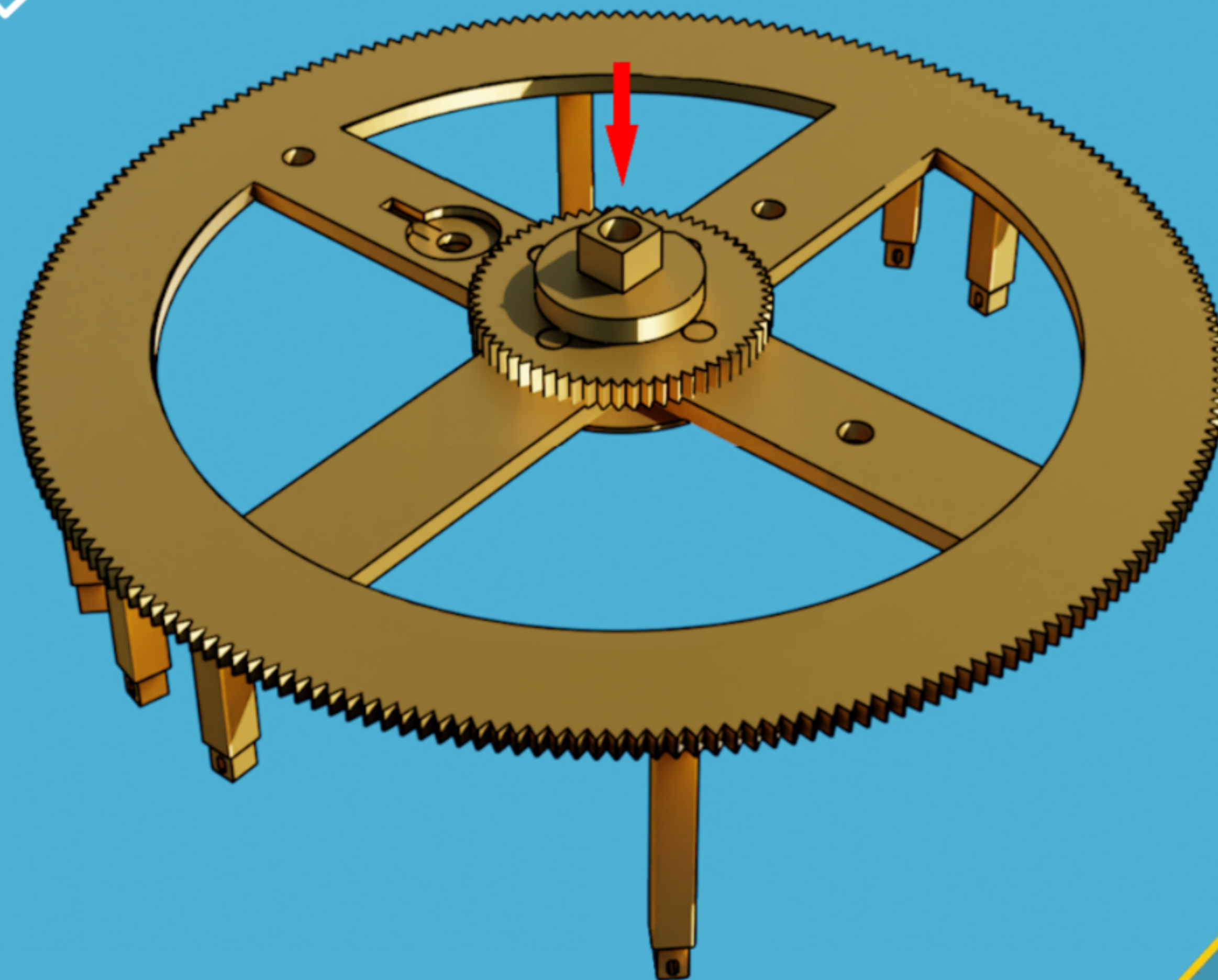
FLIP

Take the B1 Arbor and washer from the previous chapter it was only there to insure the alignment of B3 and E1 gears, but it is now needed for the B1 it will go back in later.

A

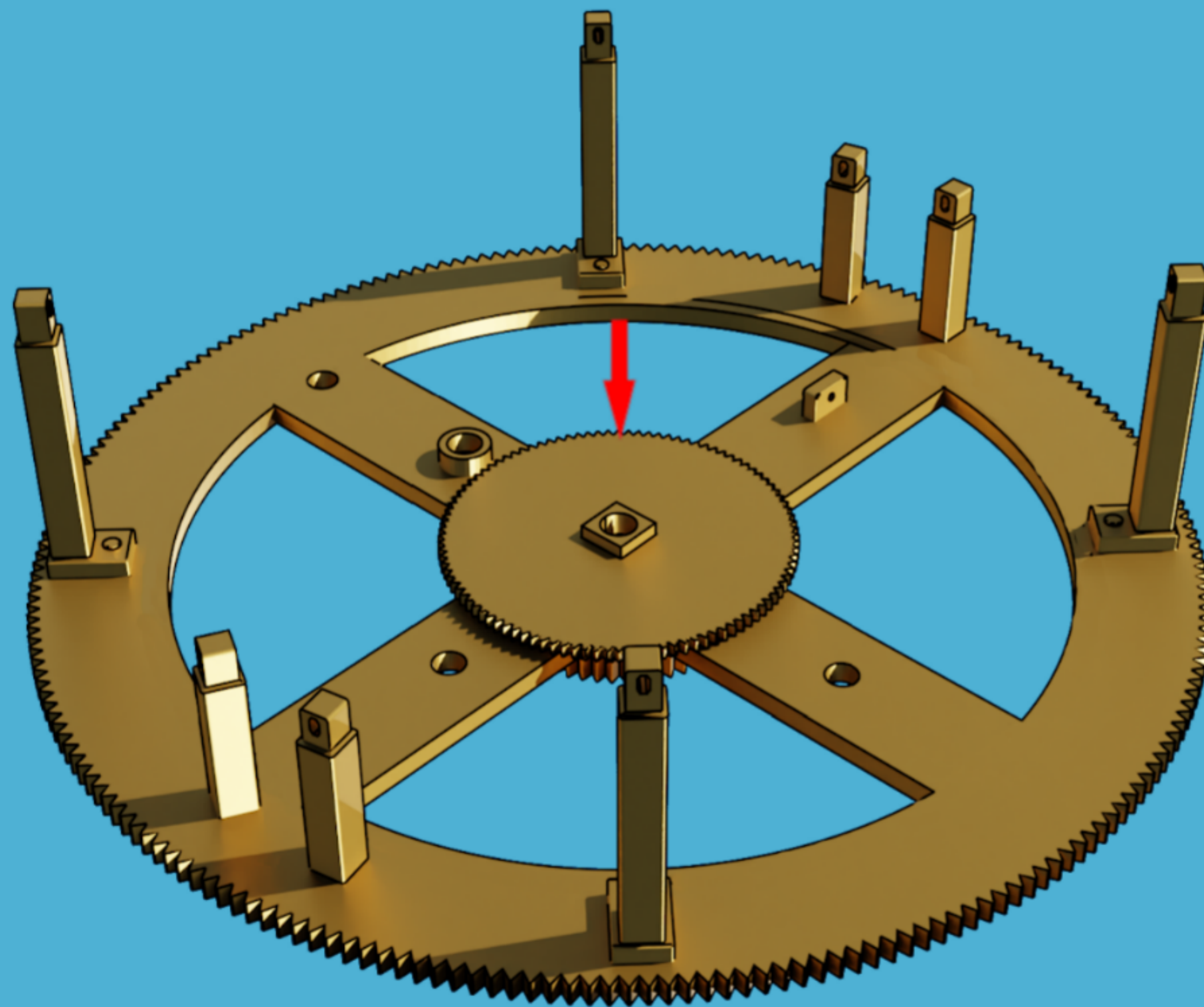


B





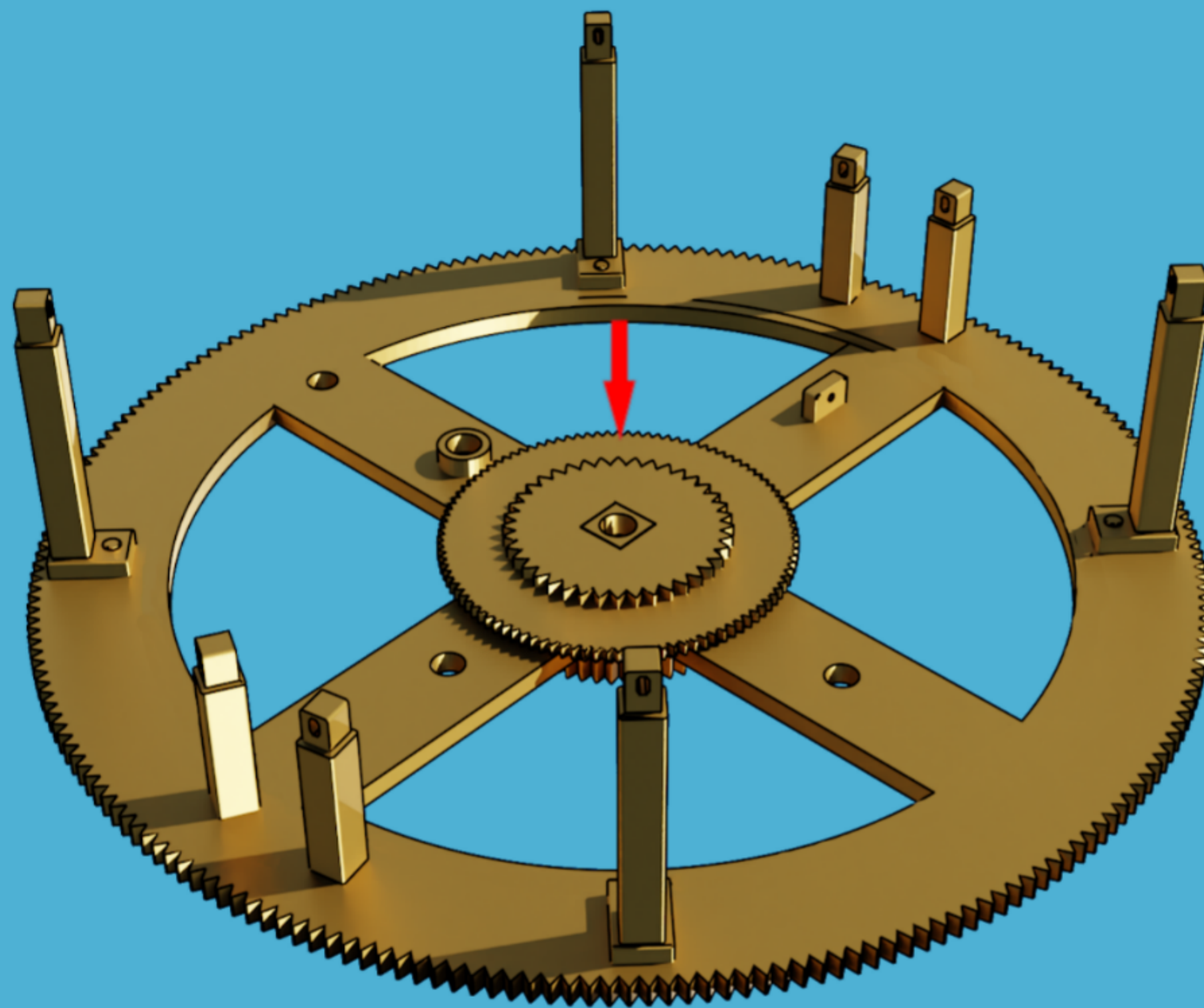
FLIP



87



Sun 1





Mercury Arbor 1

Pin



+



Washer

A



B



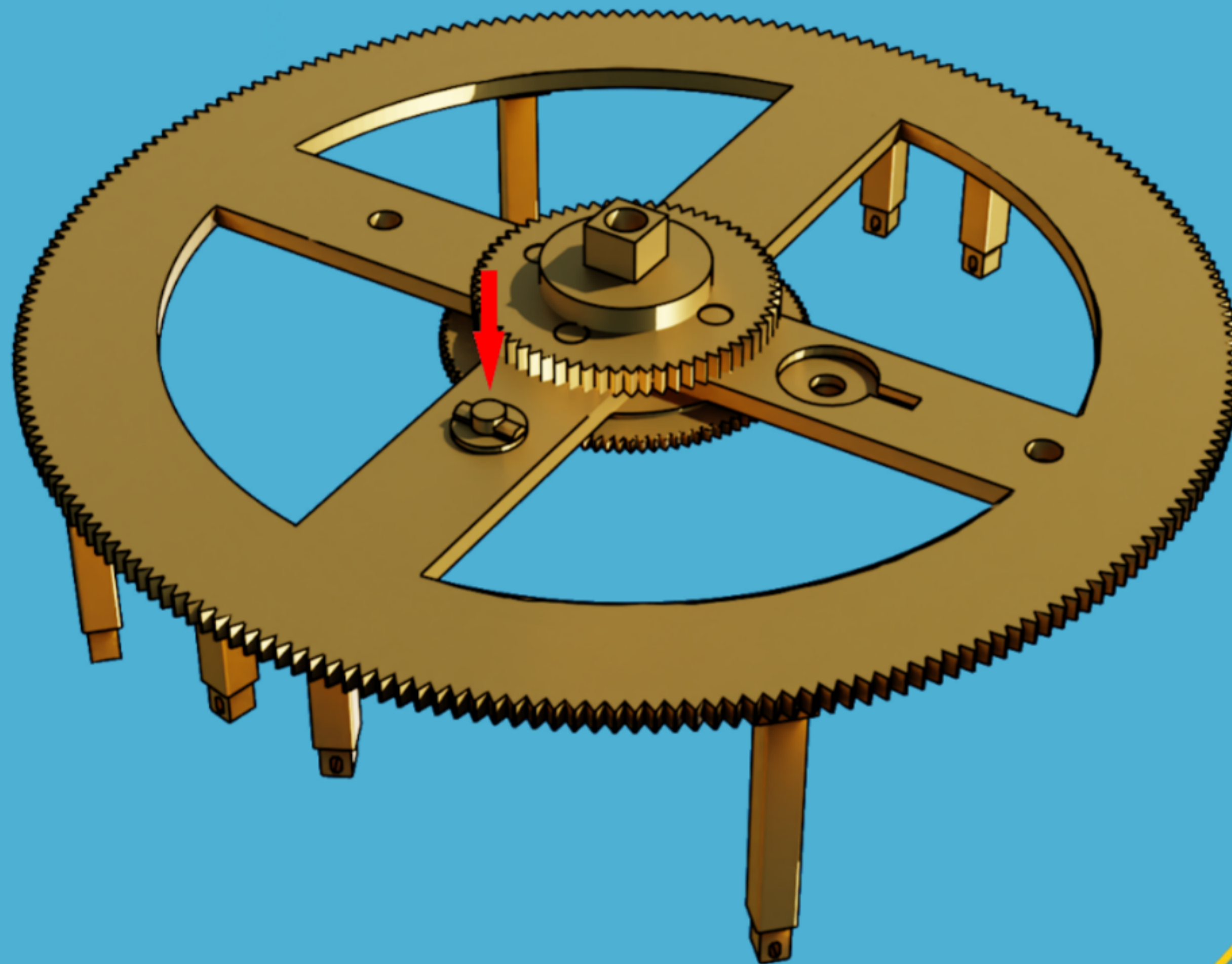
C



D

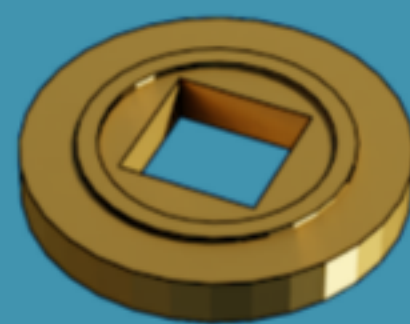


FLIP

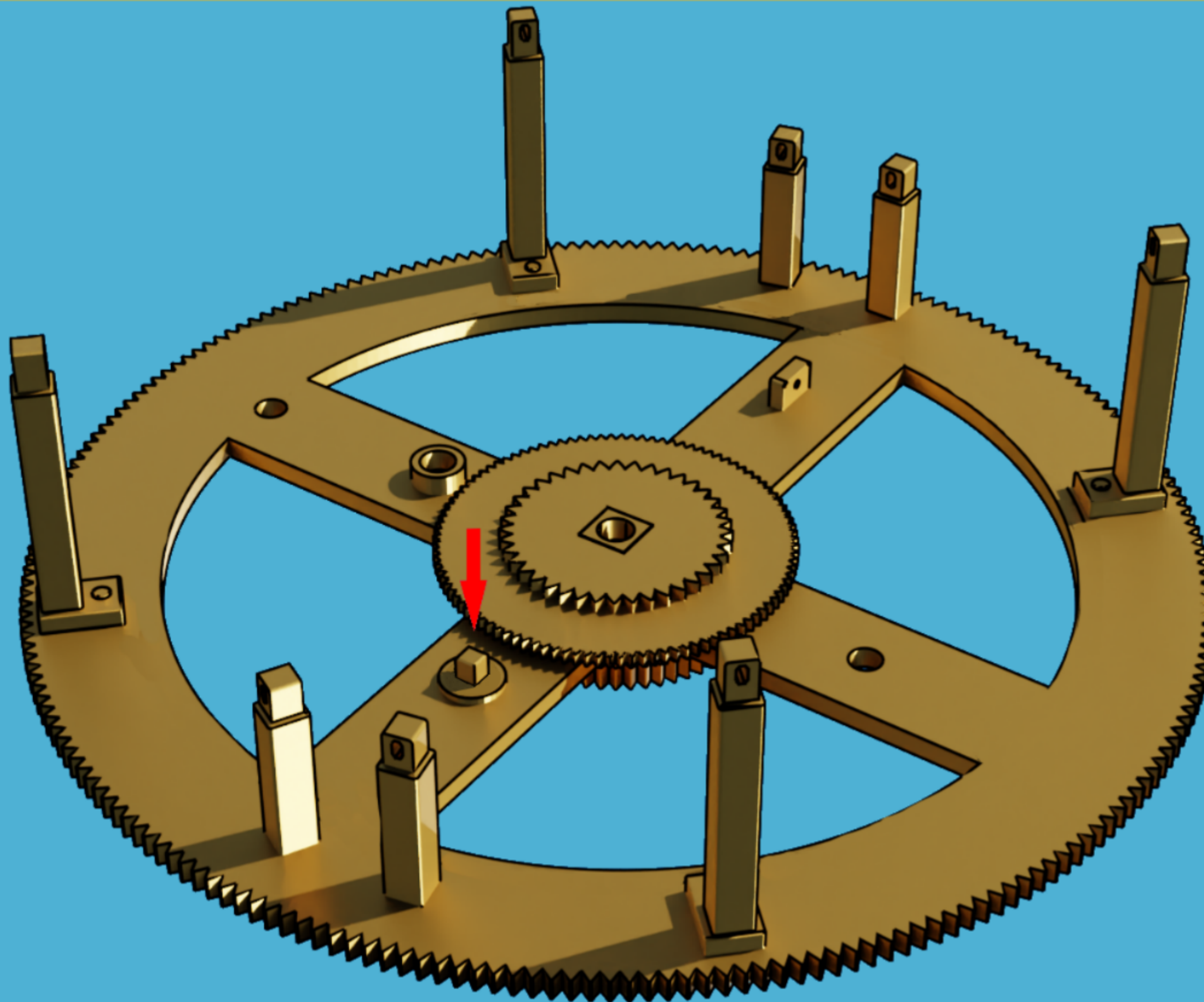


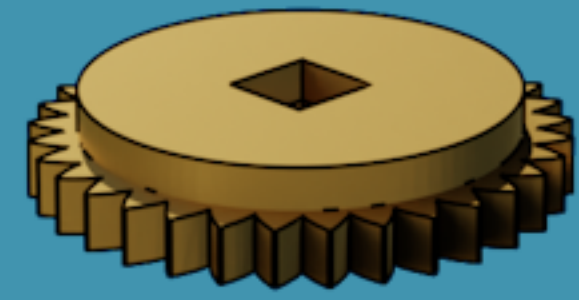
The raised rim faces down.

FLIP

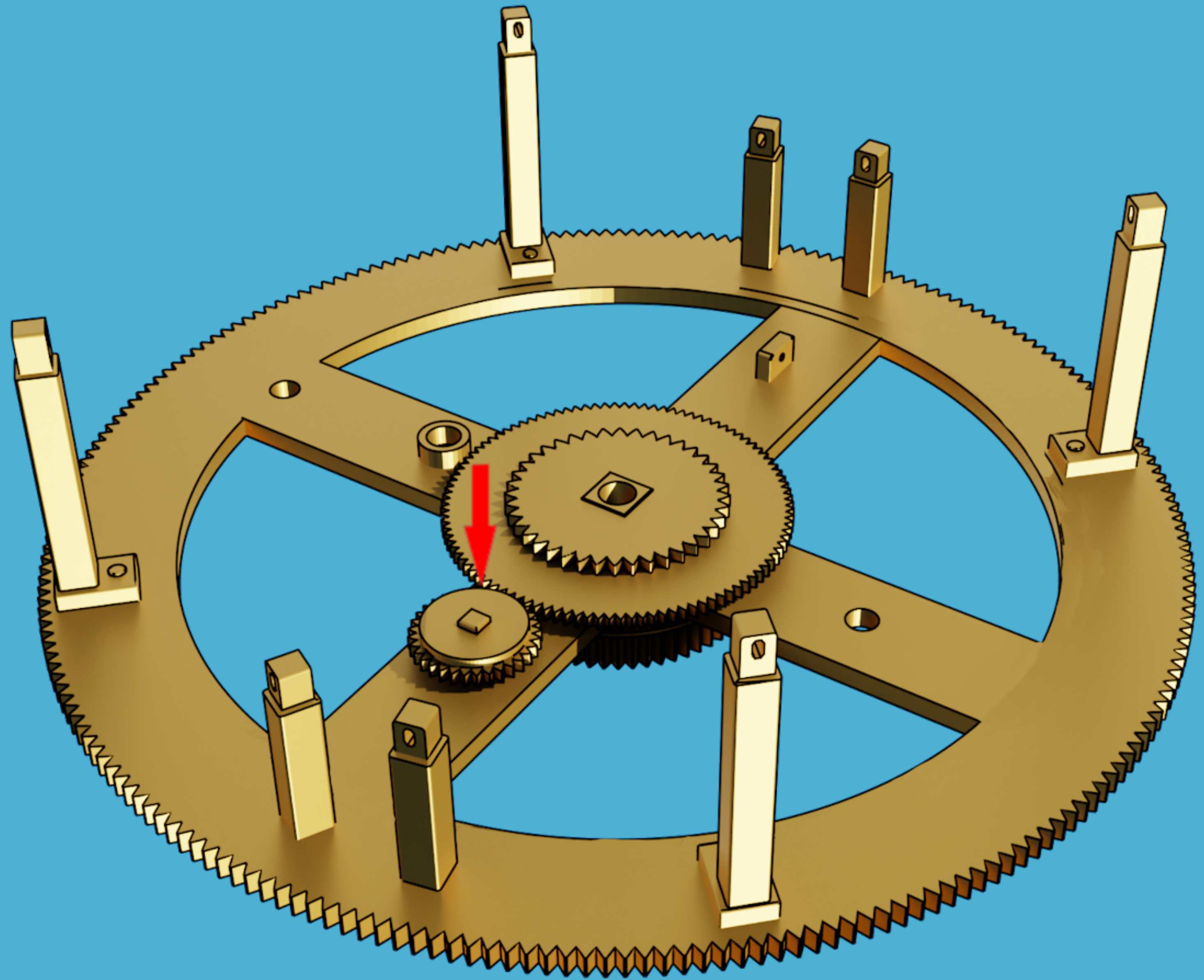


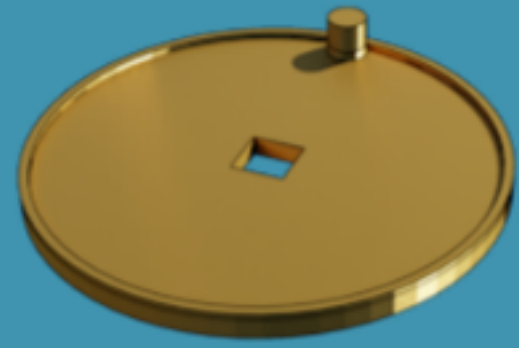
Mercury Arbor 2



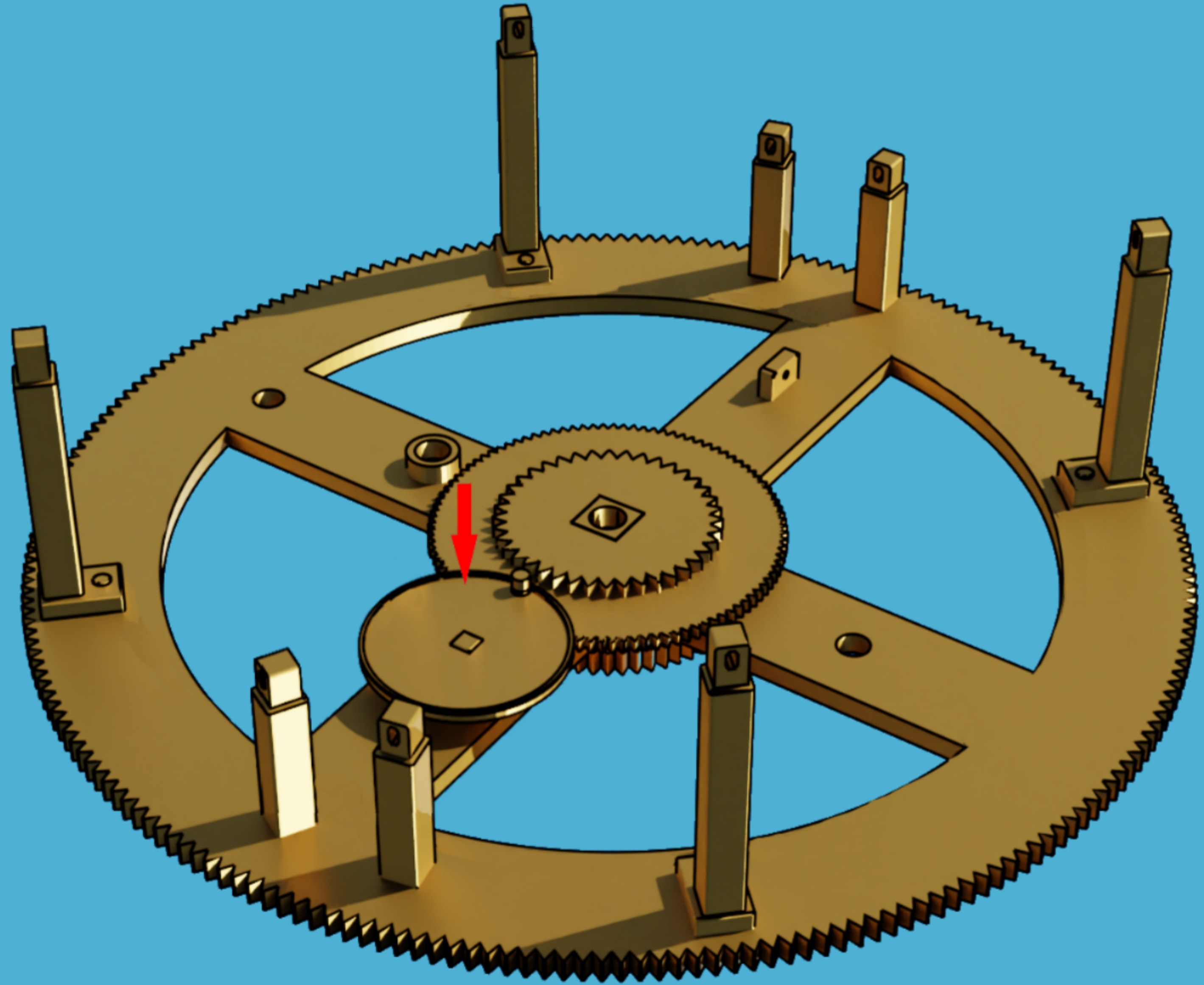


Mercury 2





Mercury Plate

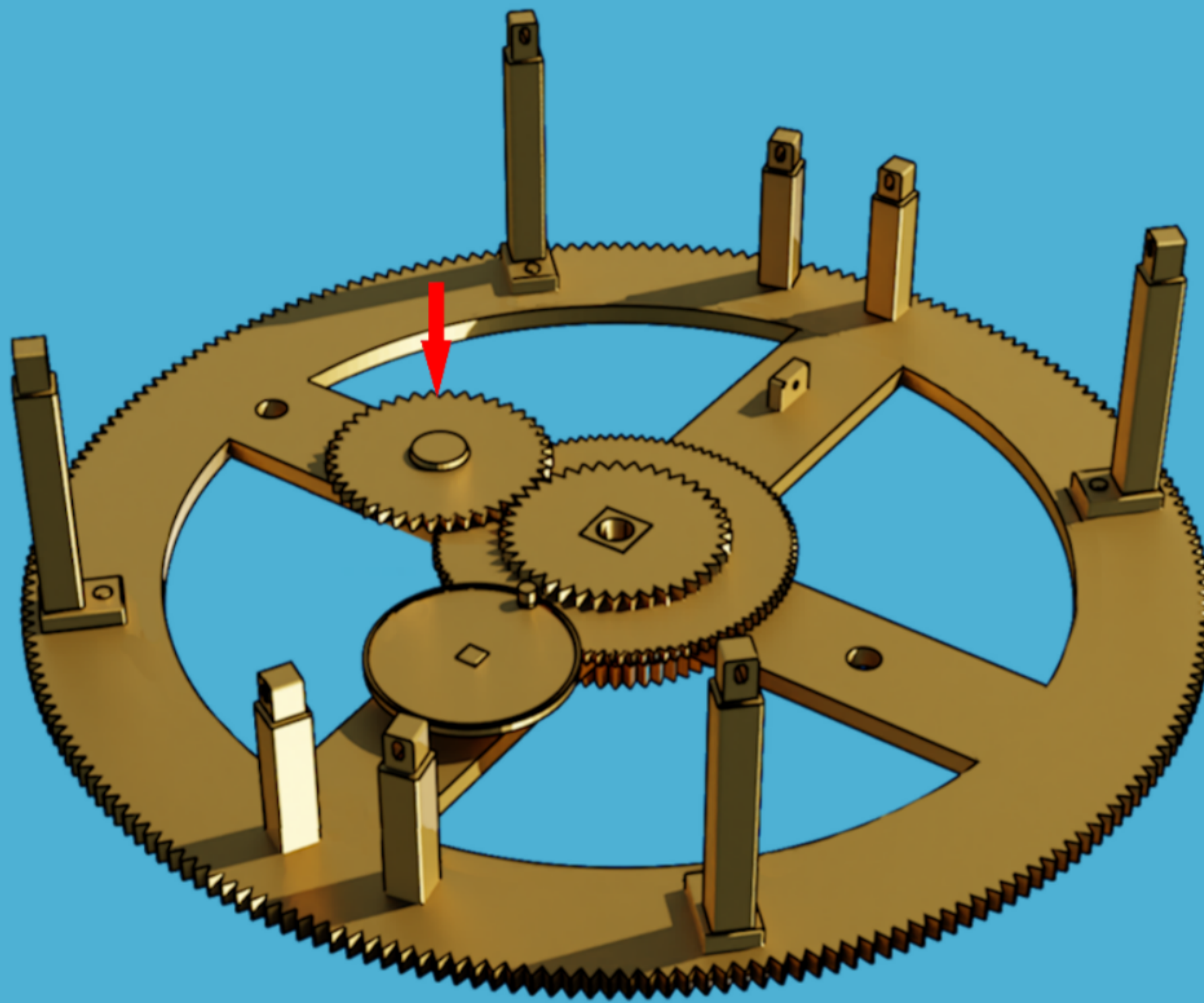
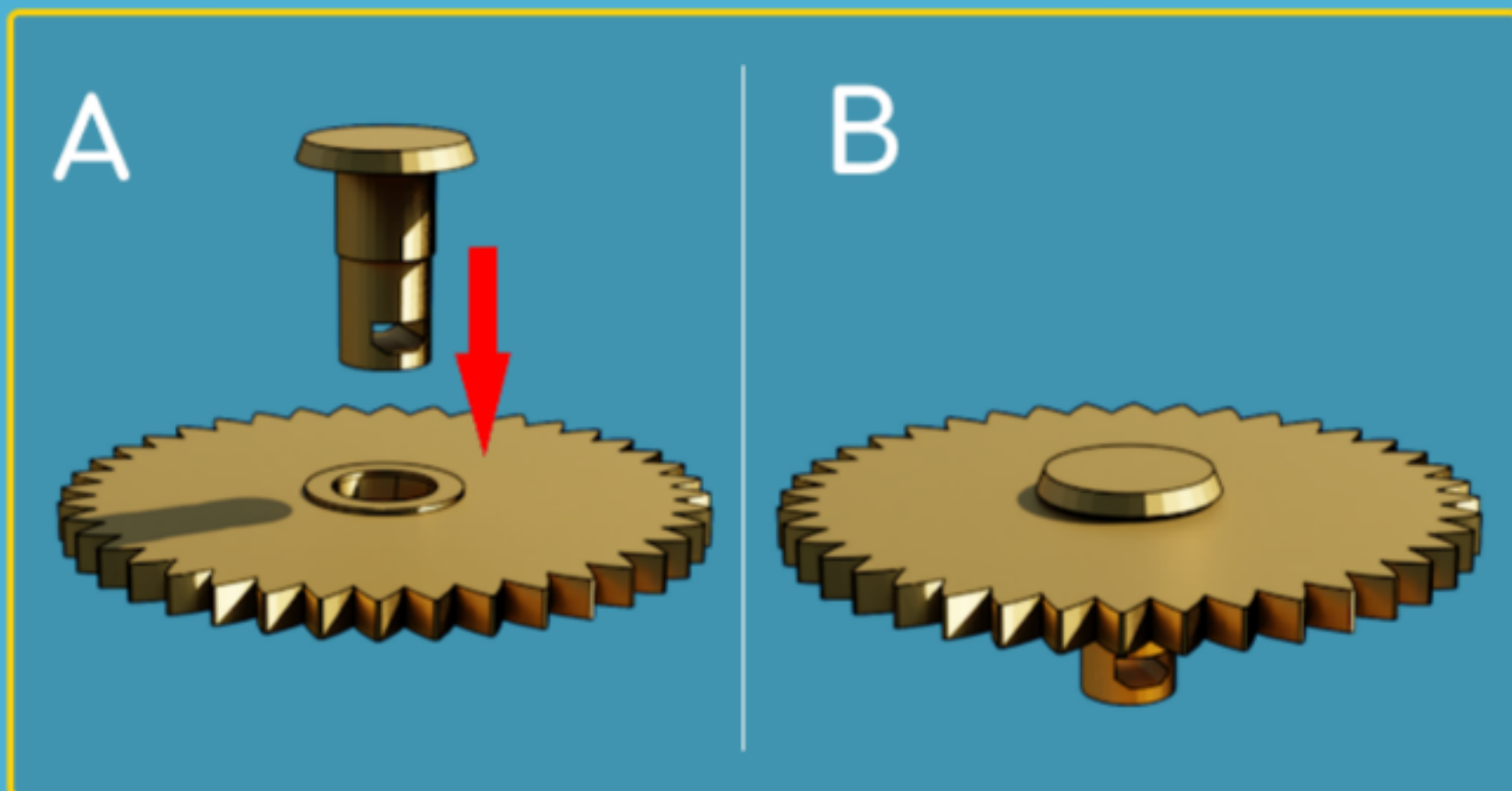




Sun 2



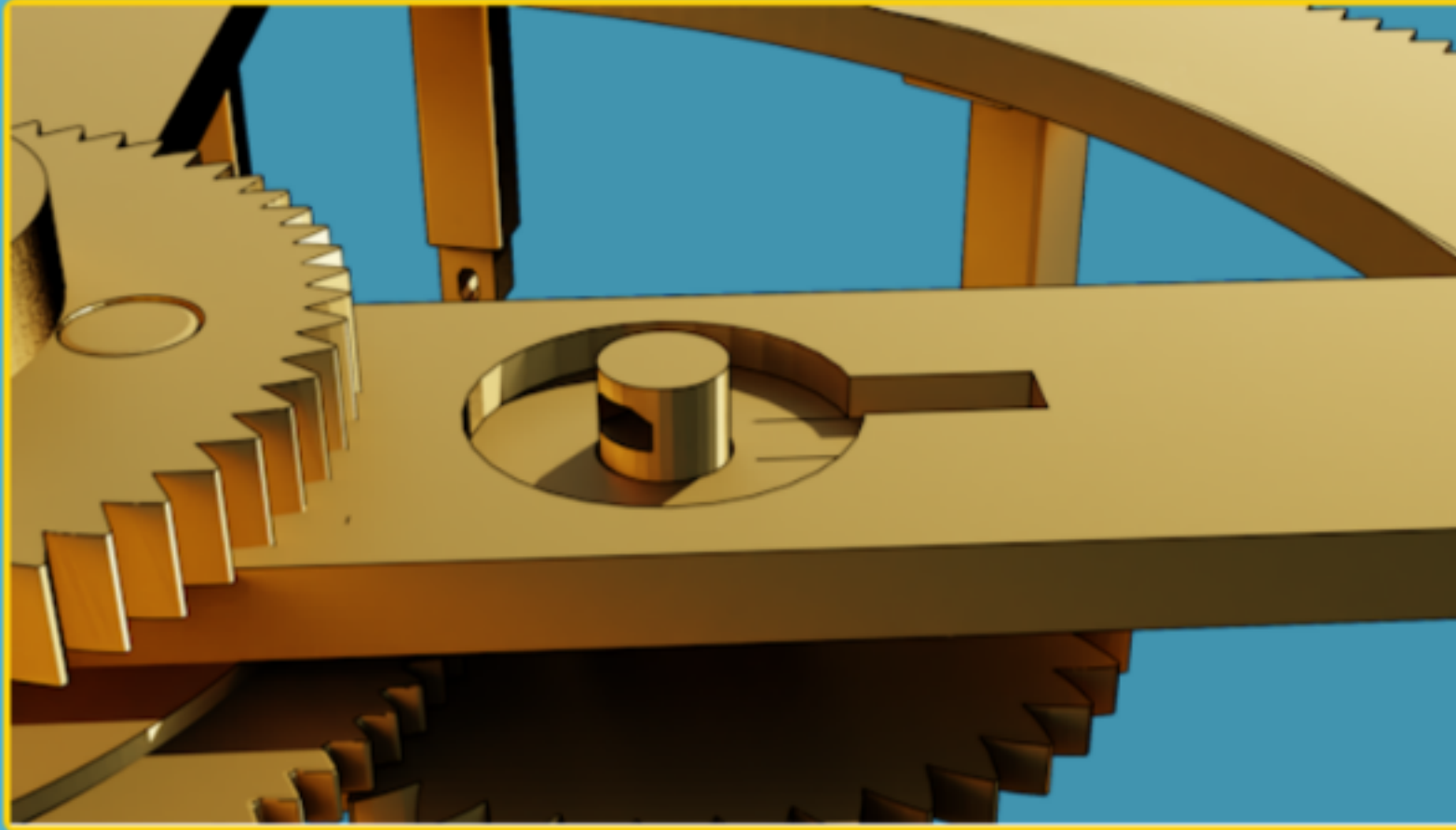
Sun 2 Arbor



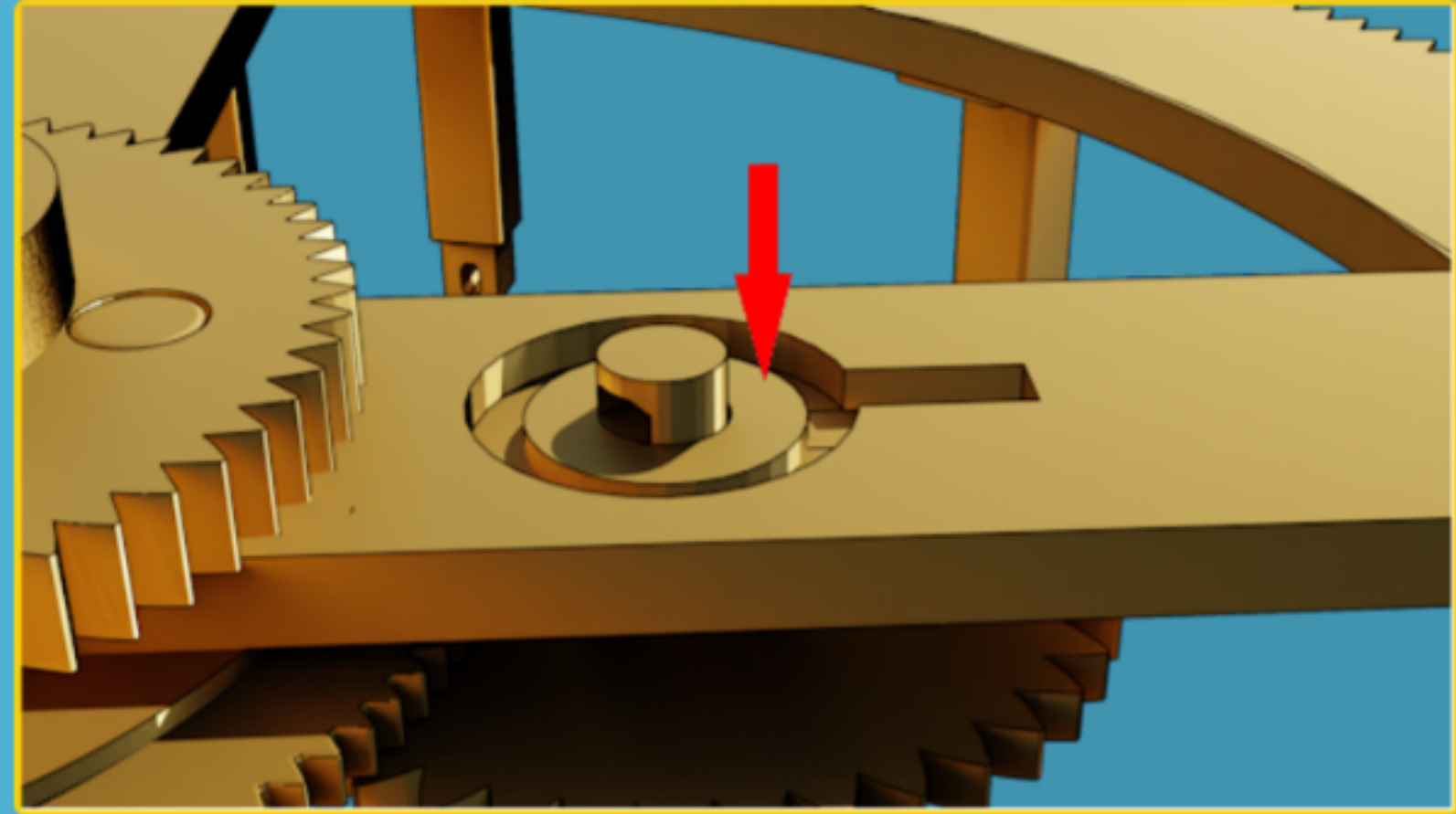
FLIP



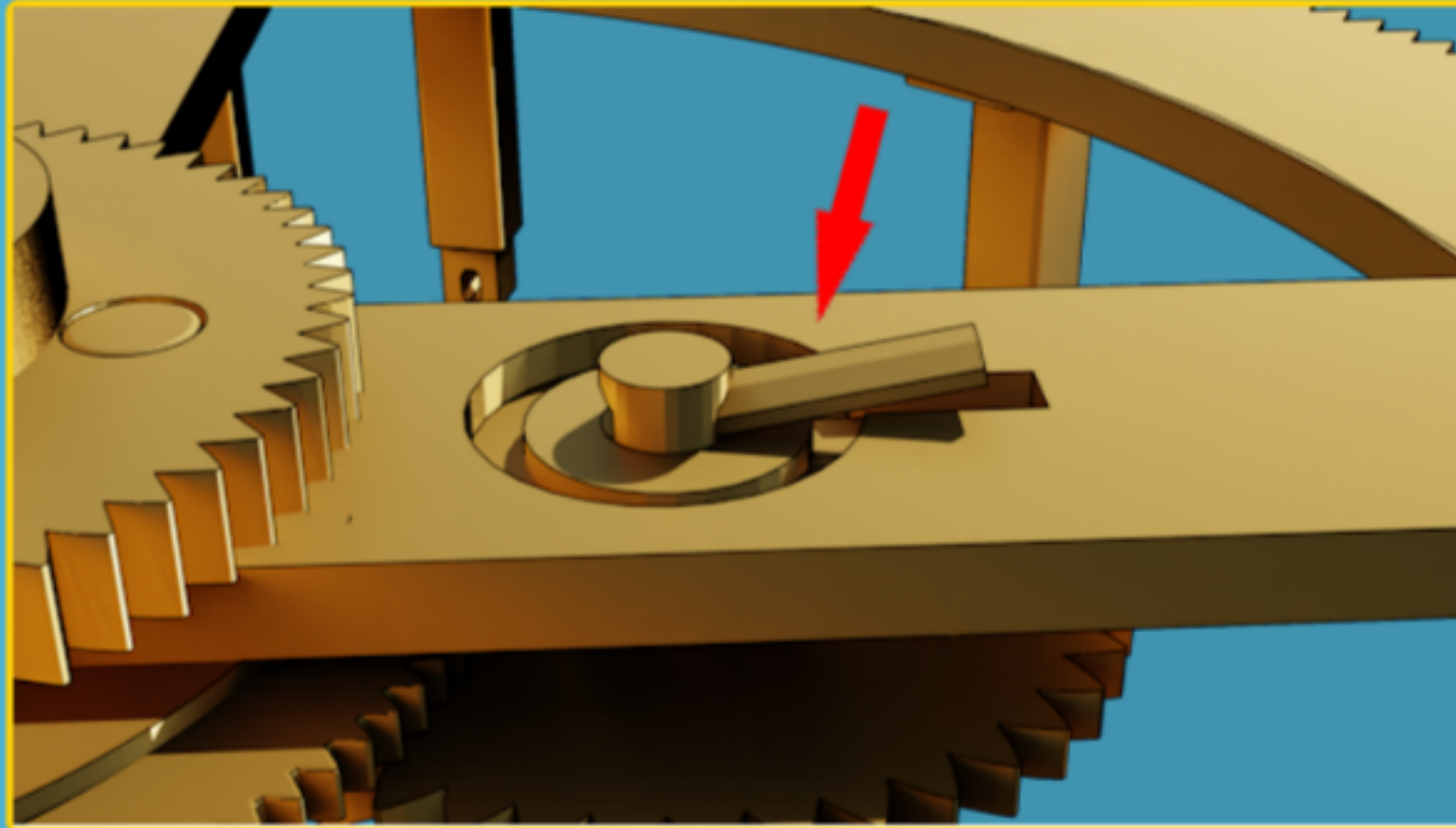
A



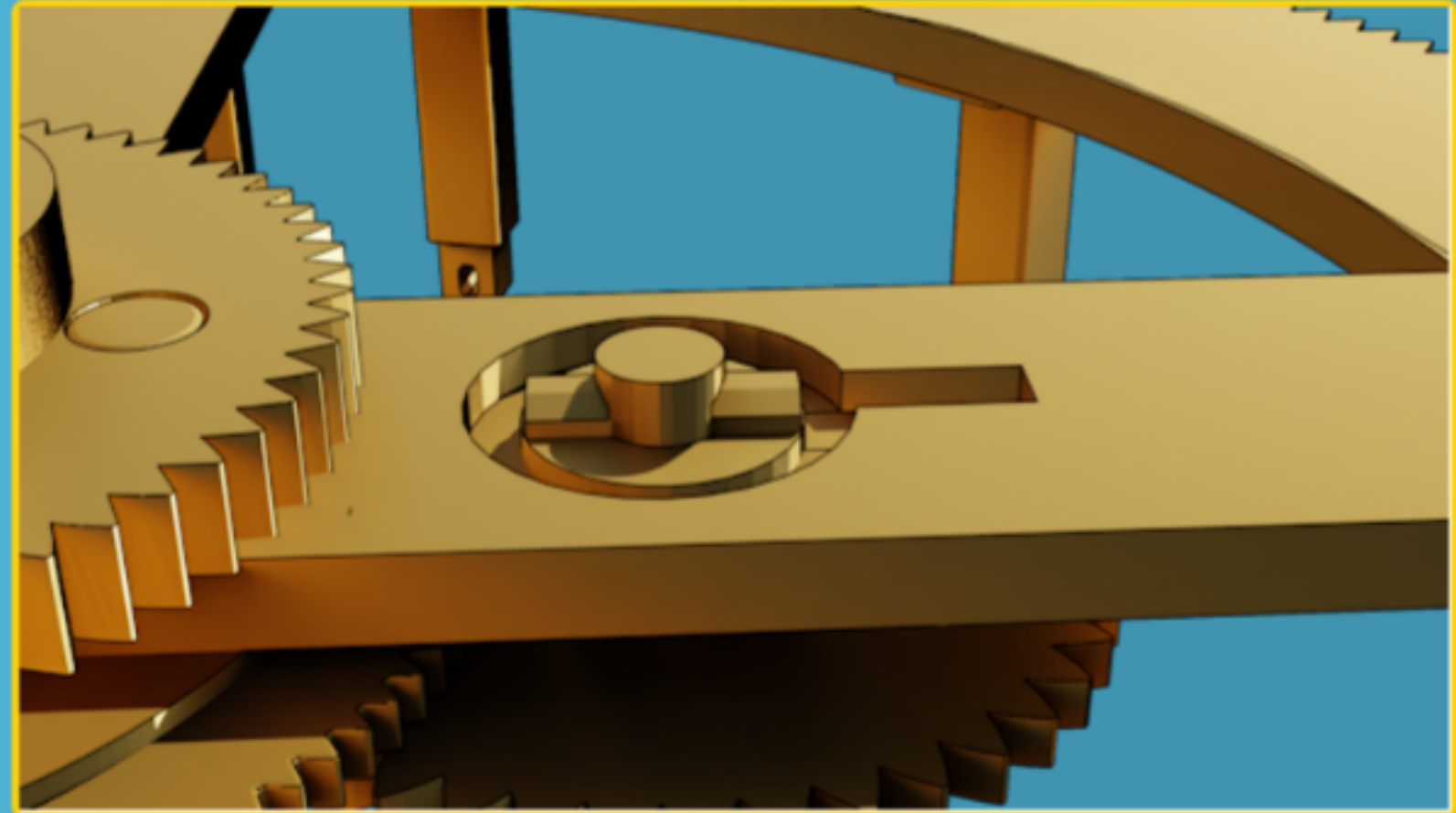
B

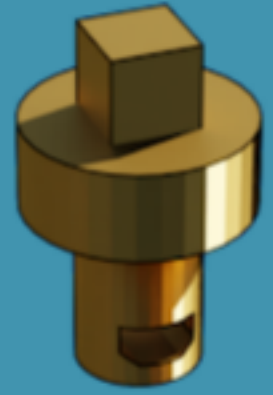


C

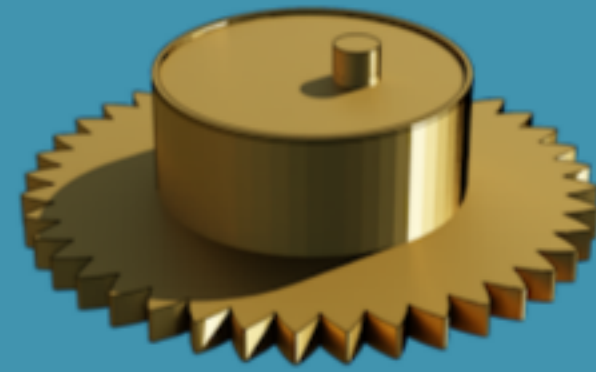


D



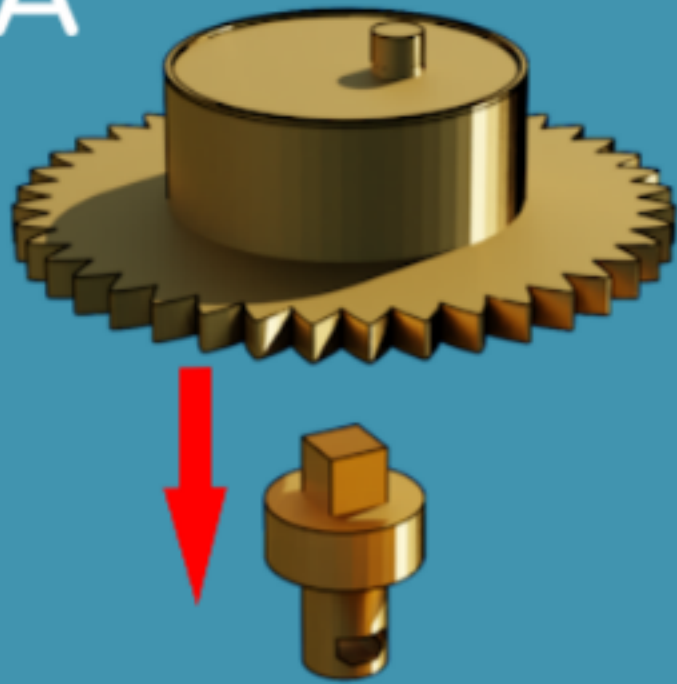


Sun 3 Arbor

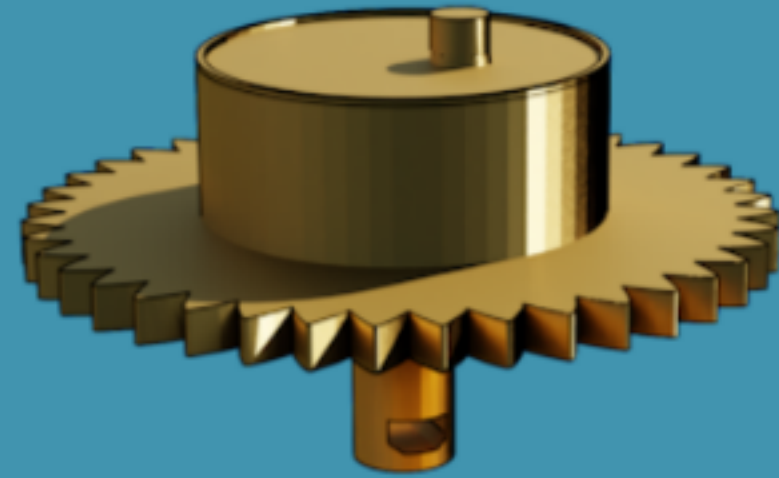


Sun 3

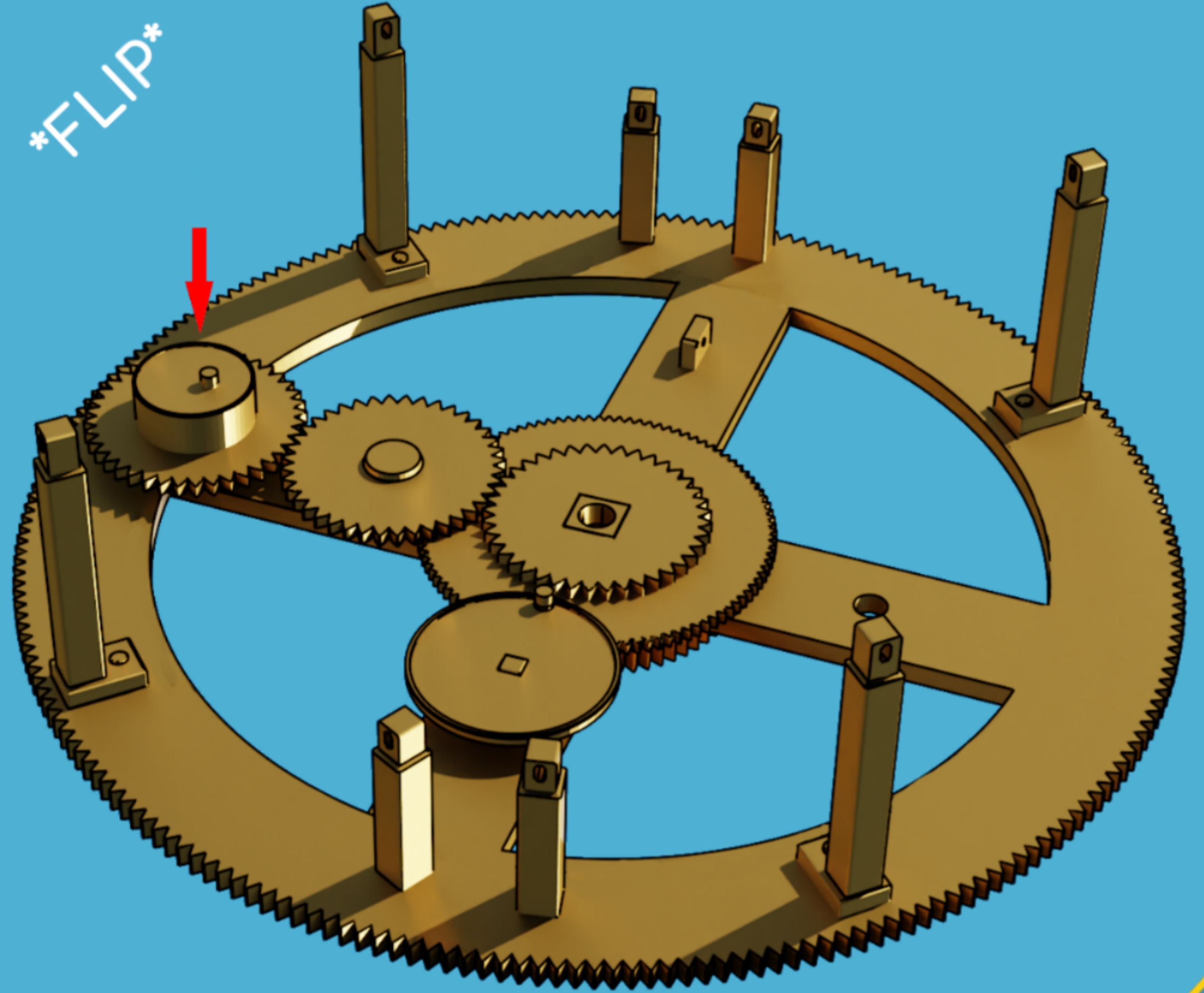
A



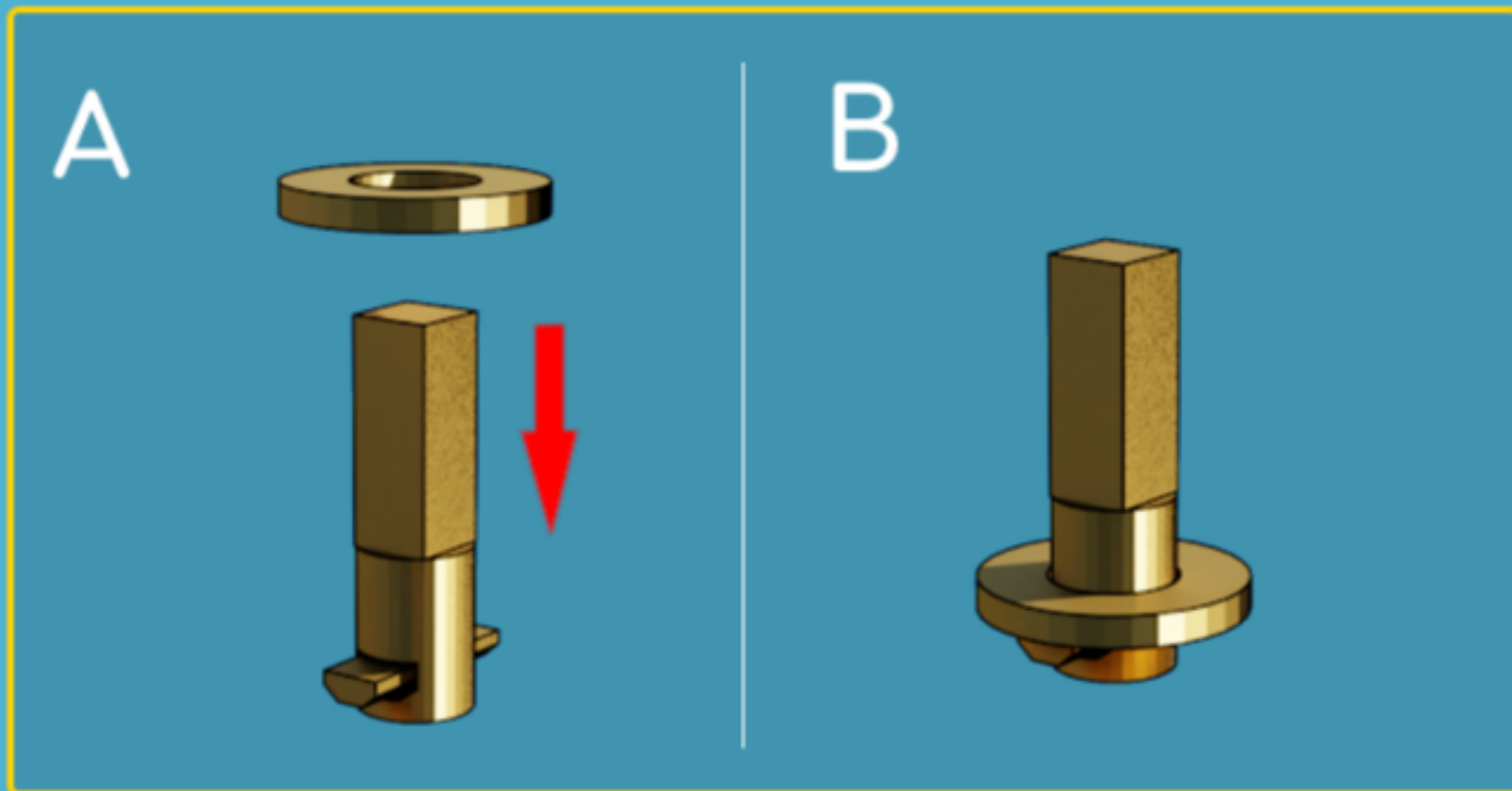
B



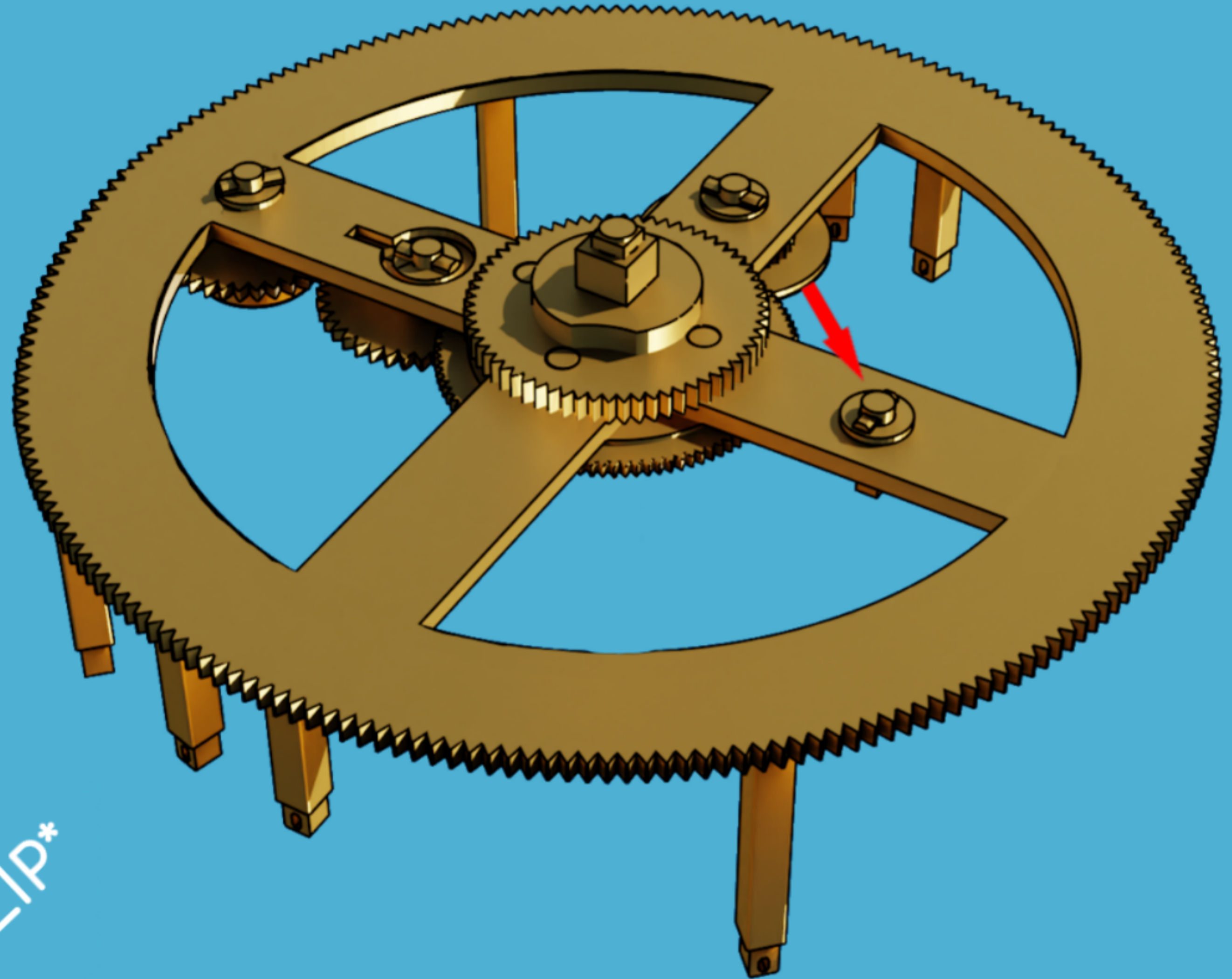
FLIP



95



FLIP

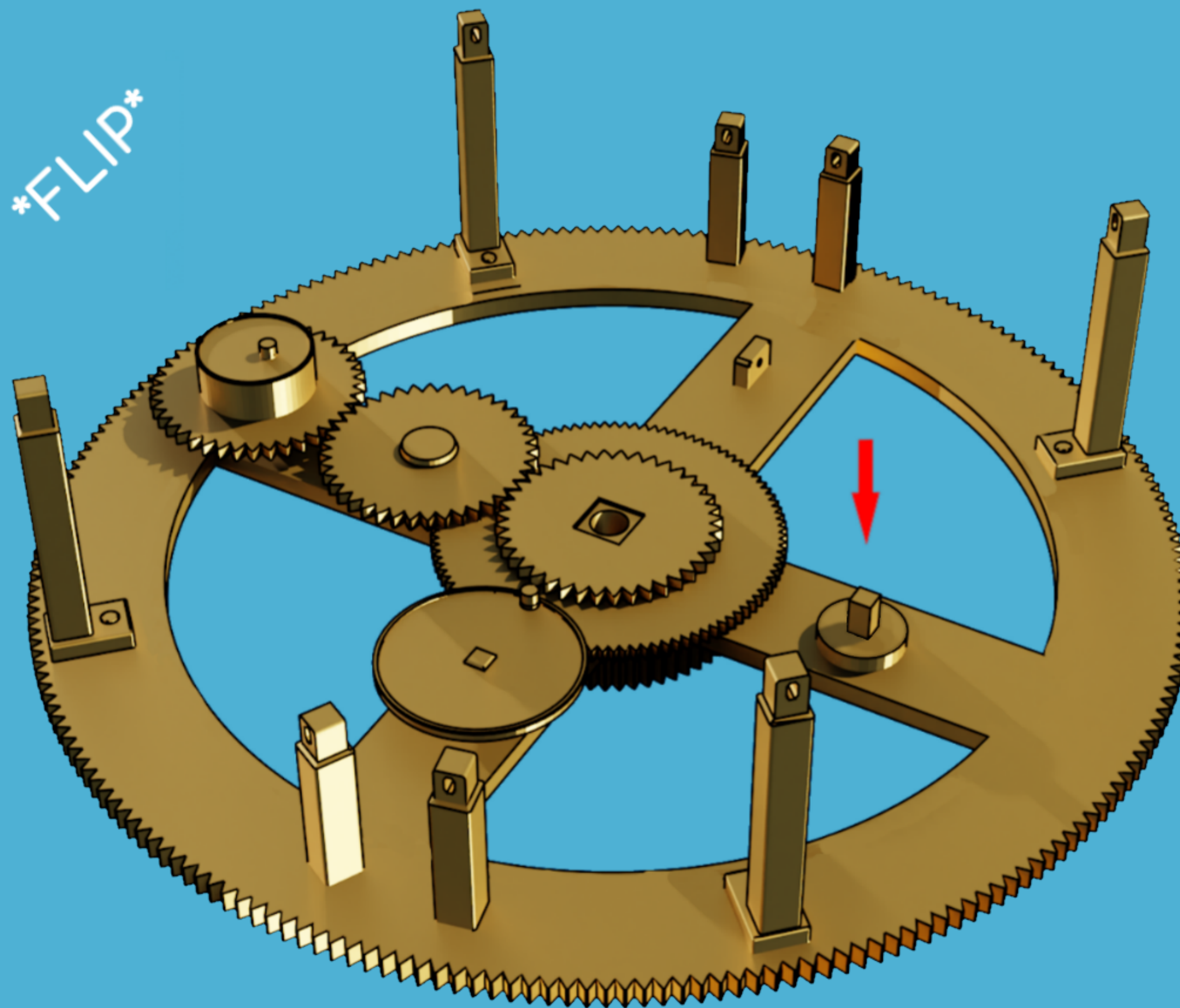


The raised rim faces down.



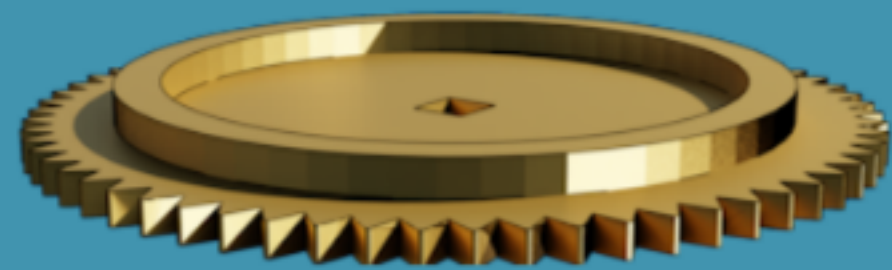
Venus Arbor 2

FLIP

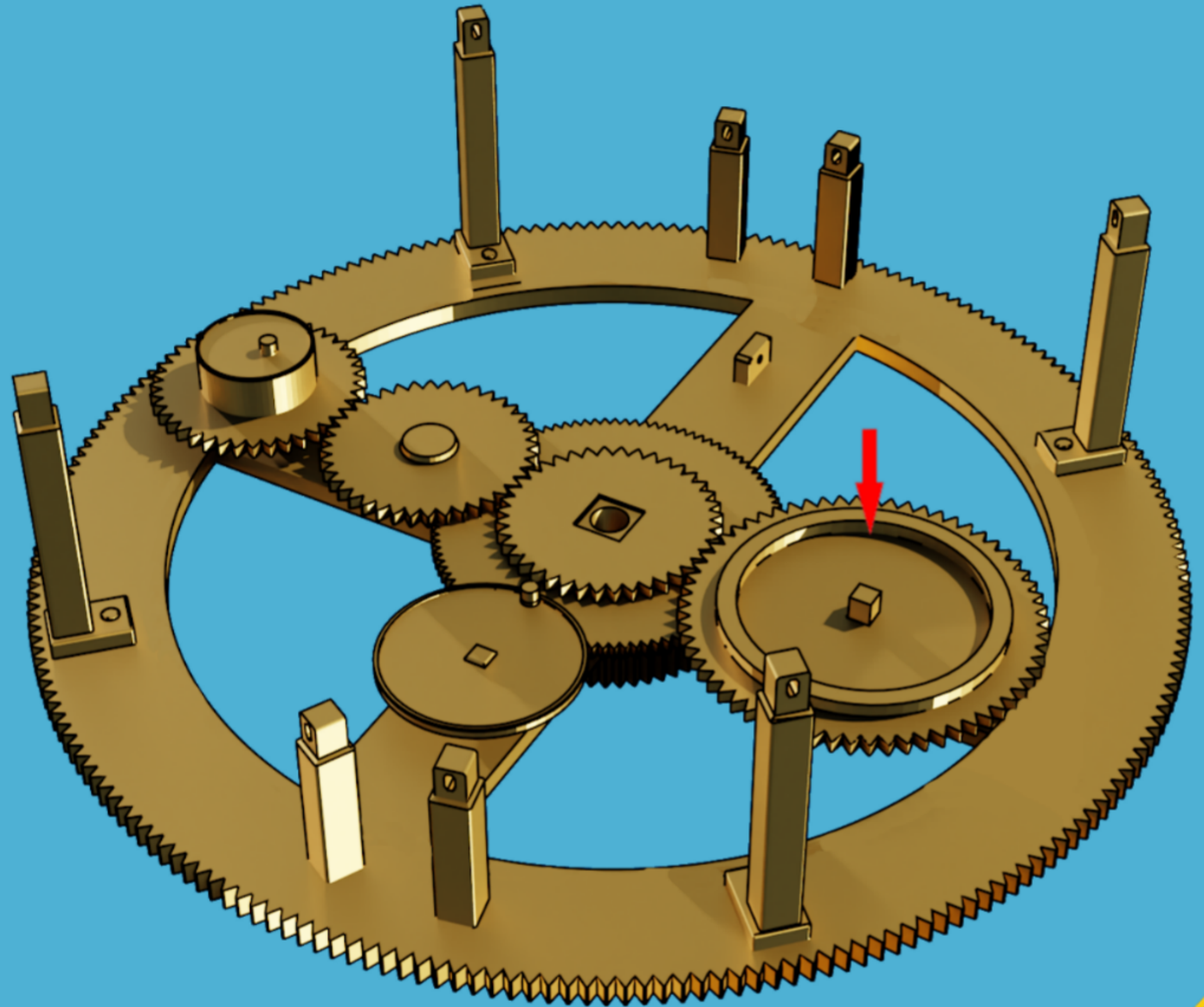


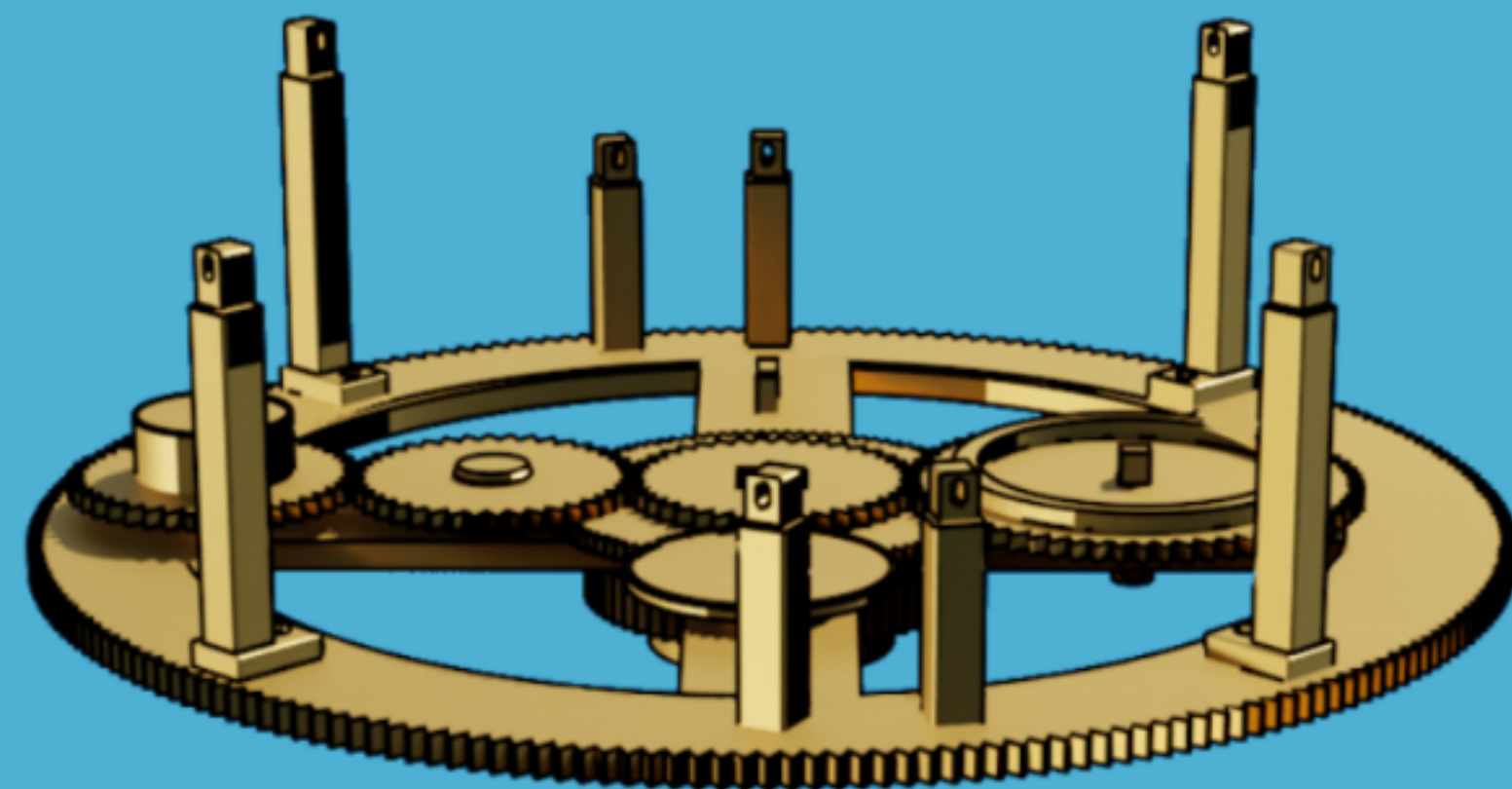
97

Now is the best time to test the B1 gears. Hold the B1 Arbor and give the B1 a Spin make sure the gears are all turning smooth.

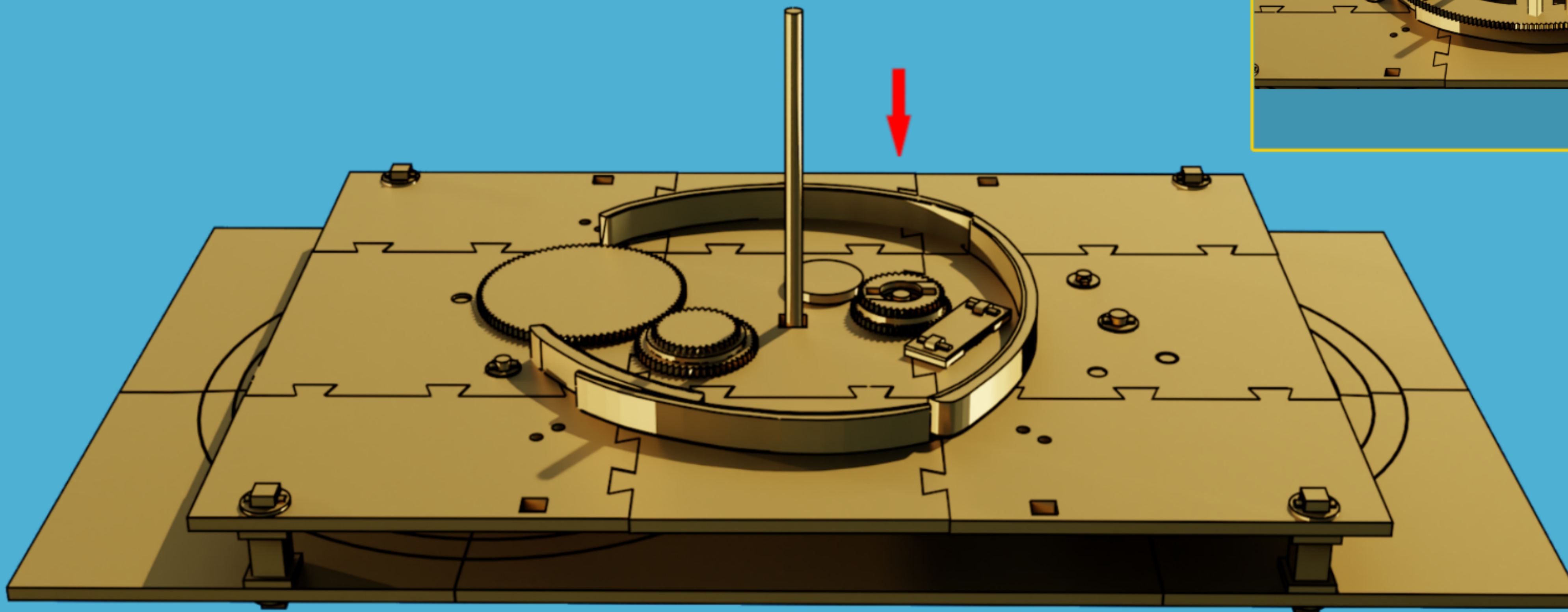
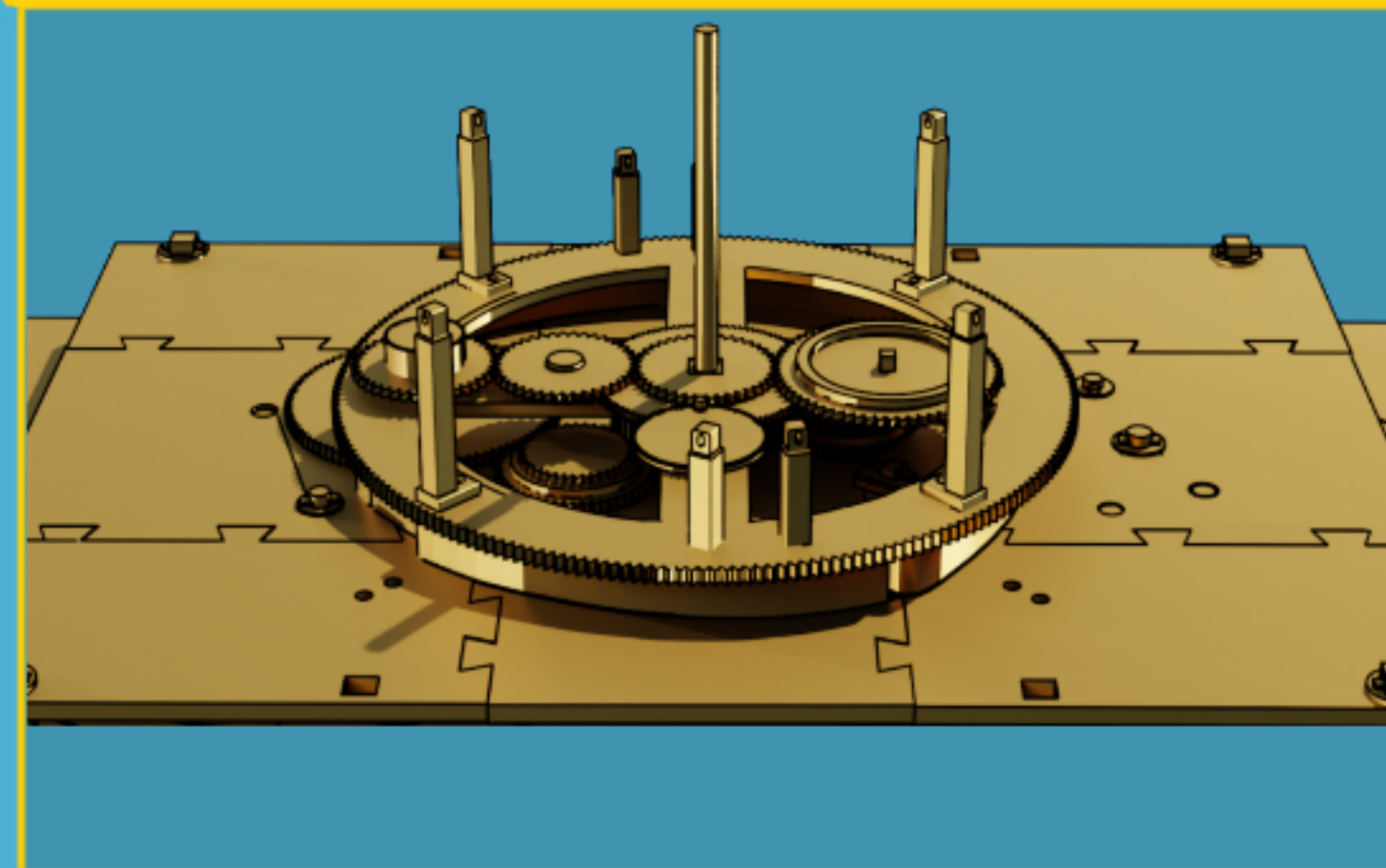


Venus Gear





Now is the time to put that B1 Arbor
back in.



x4



B1 Clamps

x8

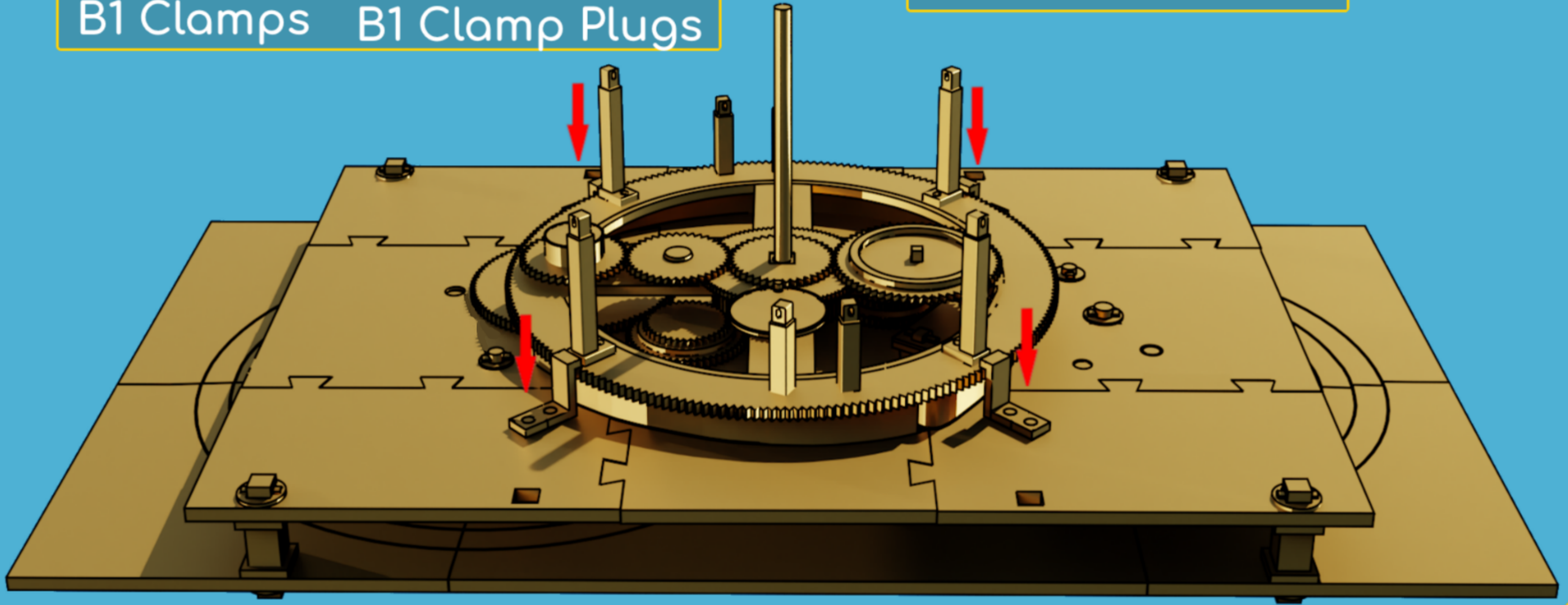


B1 Clamp Plugs

A



B

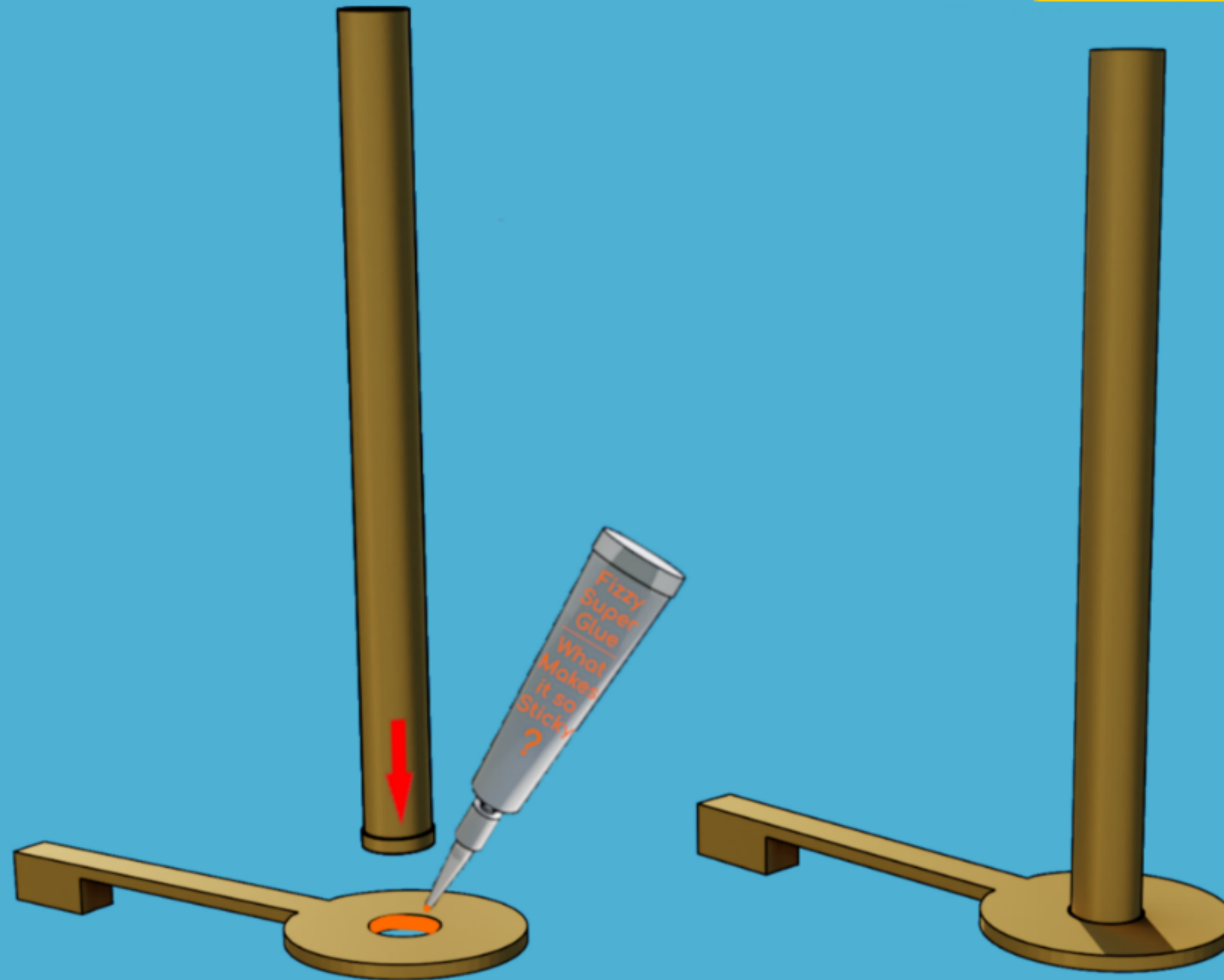




Solar Axis Carrier



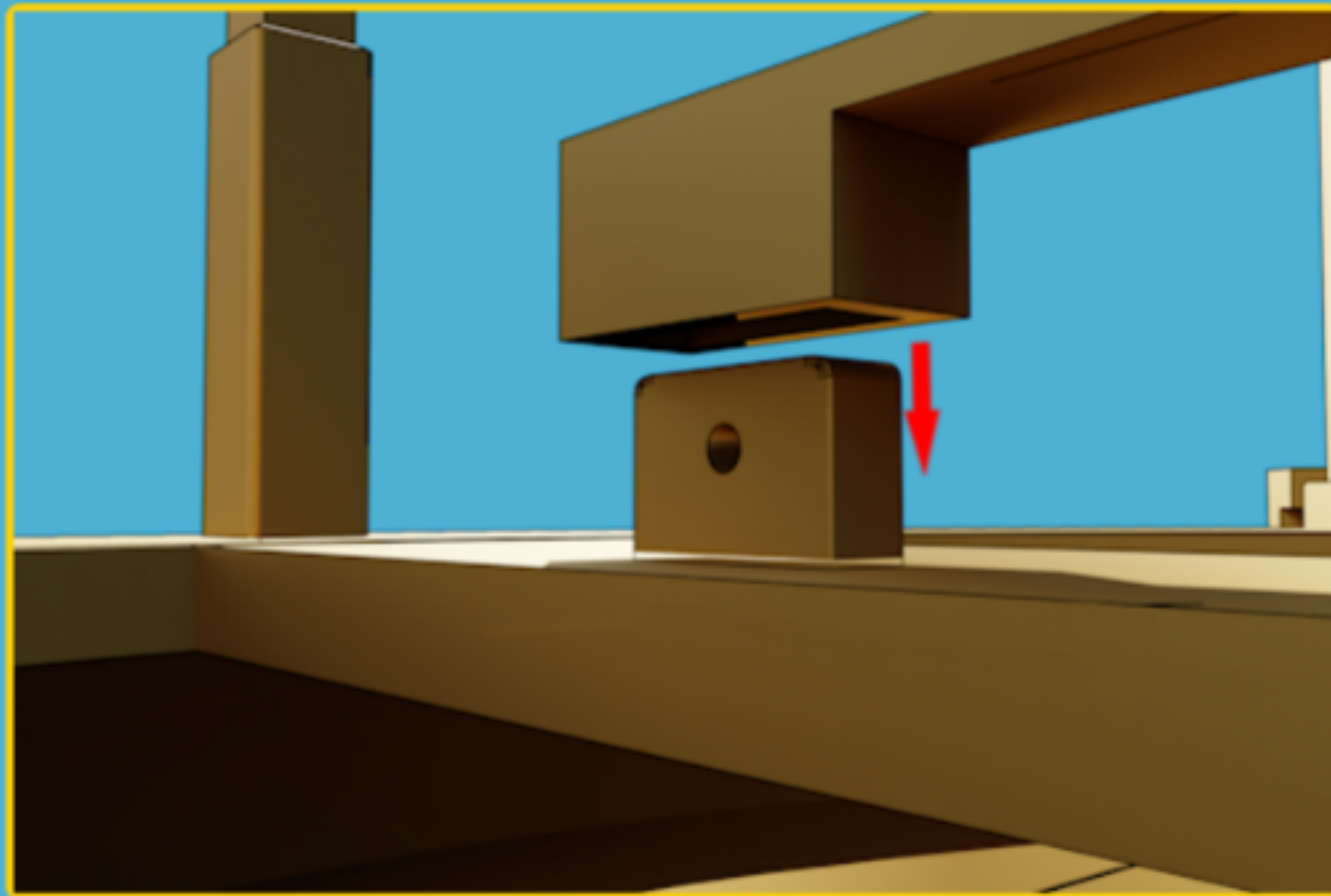
Solar Axis Shaft



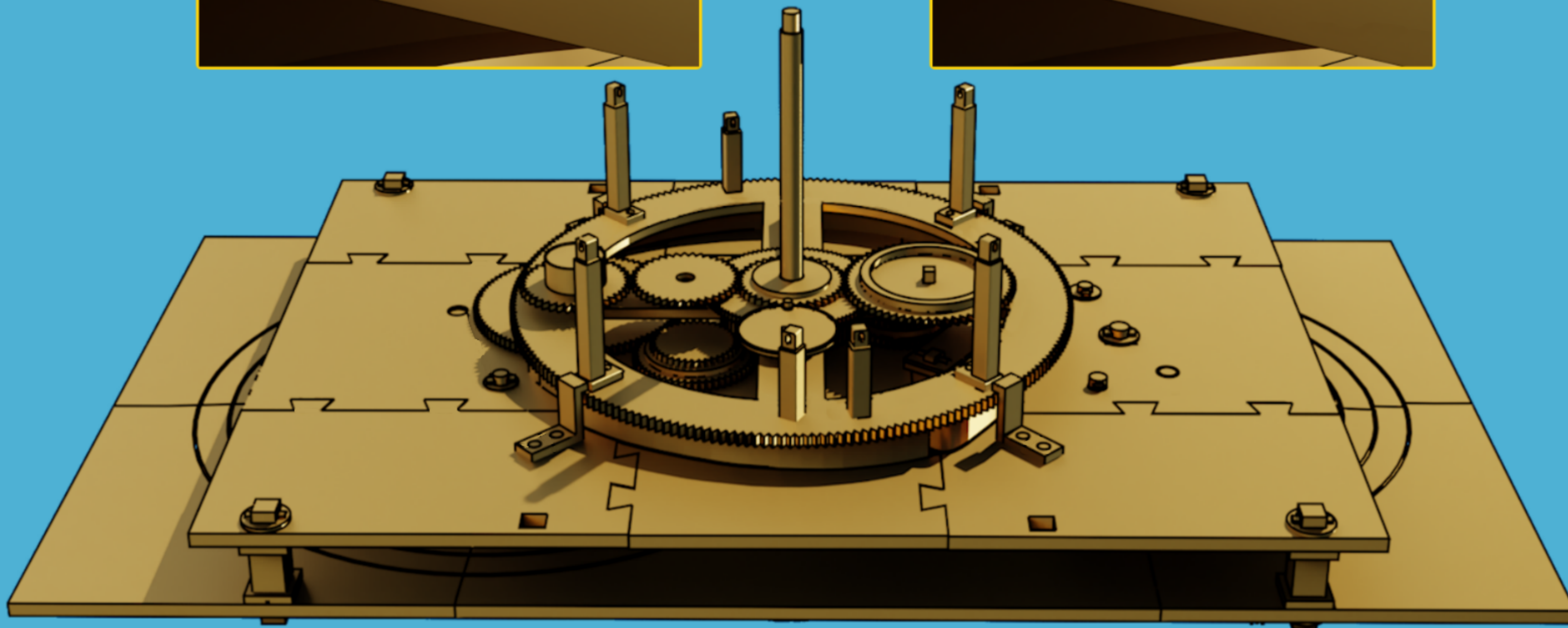
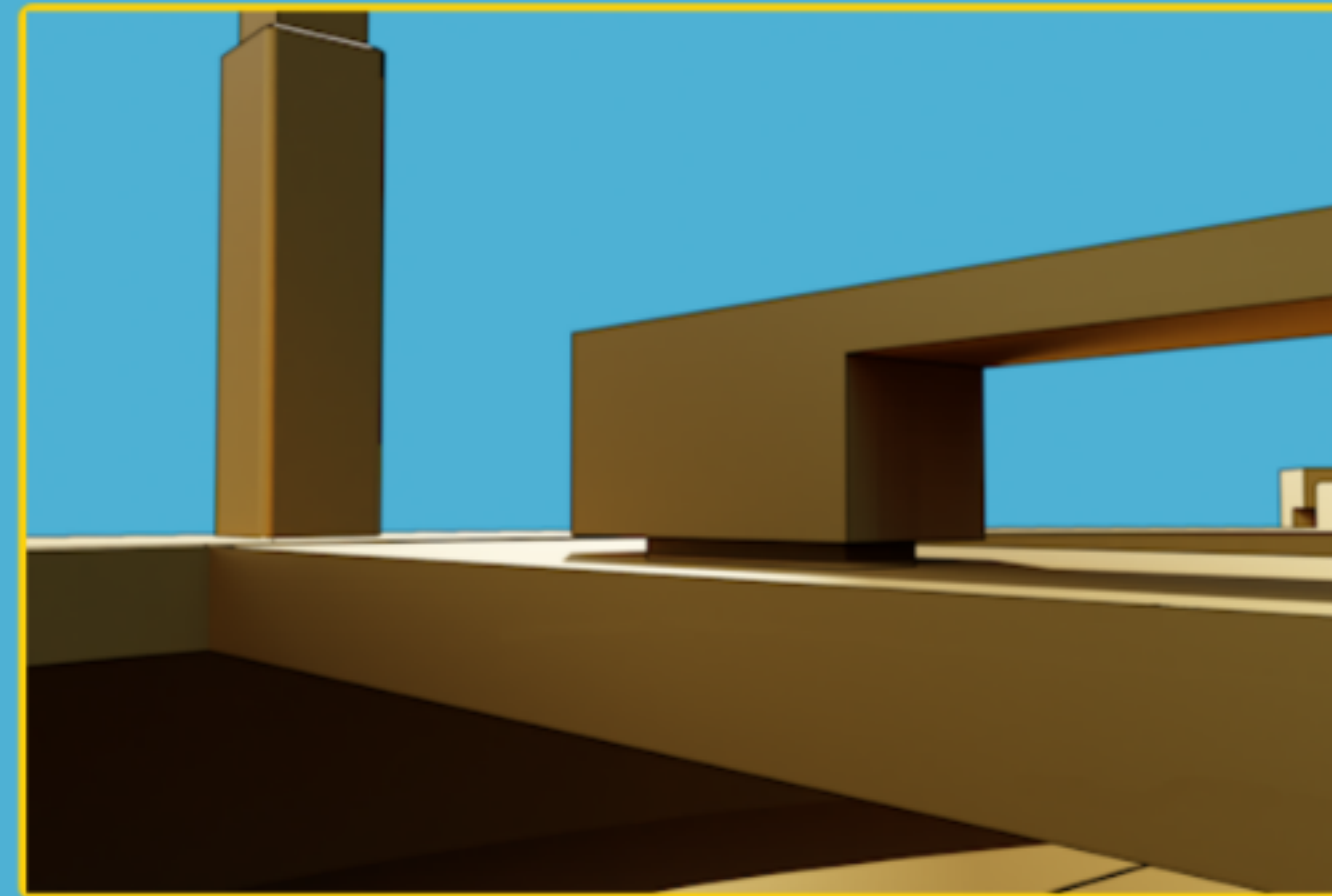
You might want to print out all the shafts and test them all together ensure they fit together, and rotate smoothly with each other.

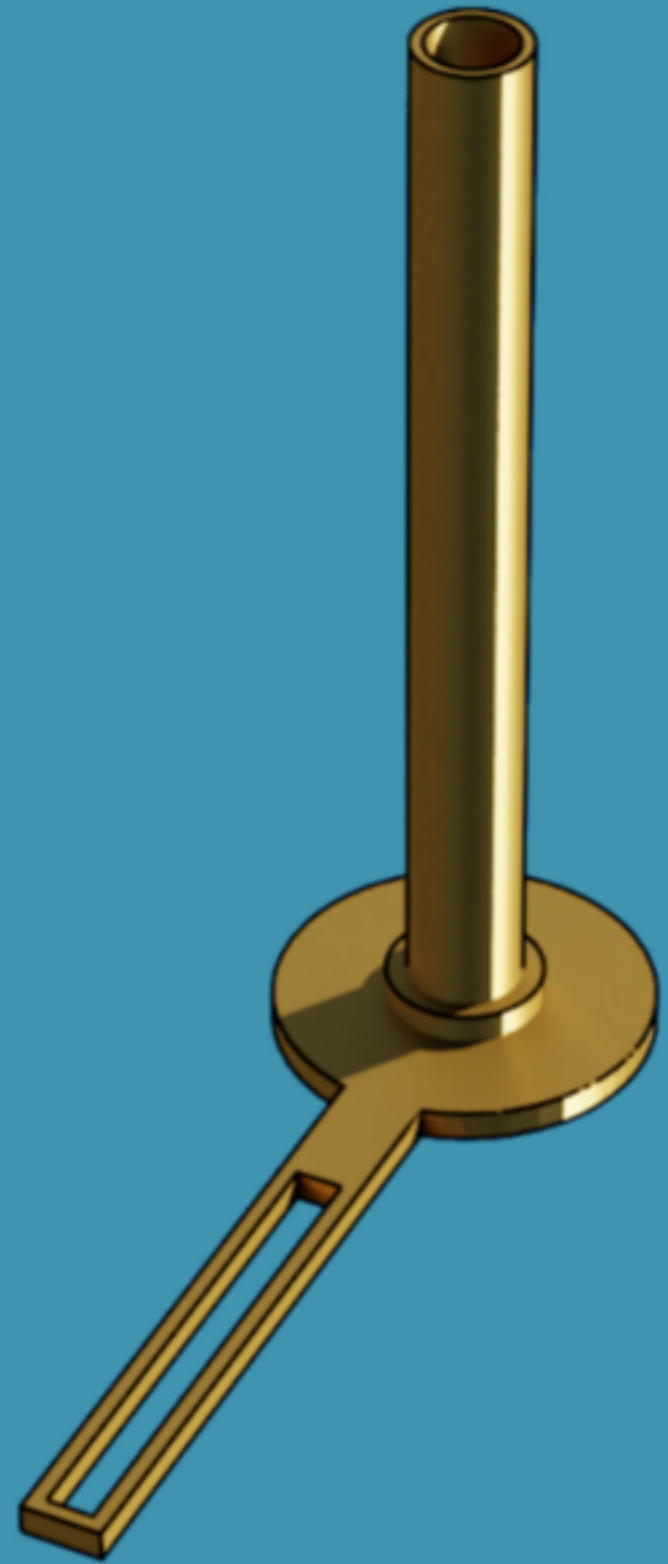
Also test the Solar Axis Shaft with the Lunar Shaft.

A

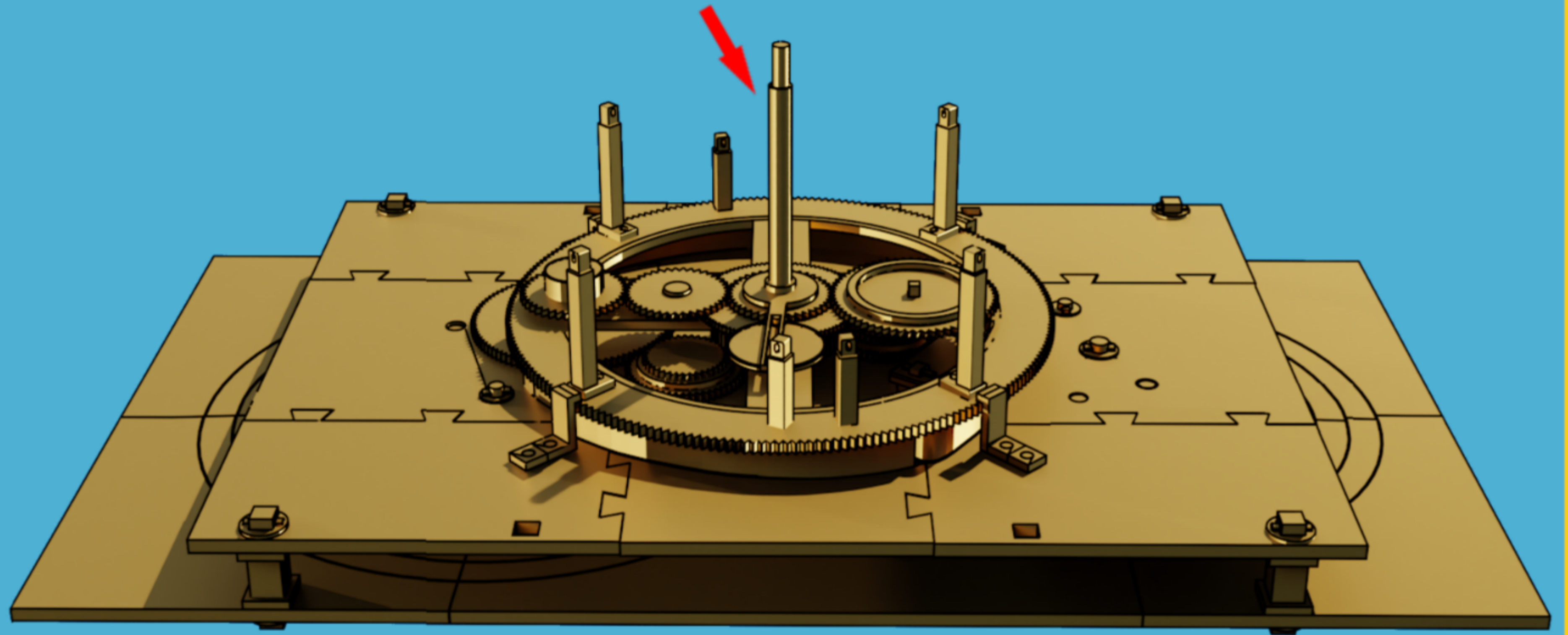


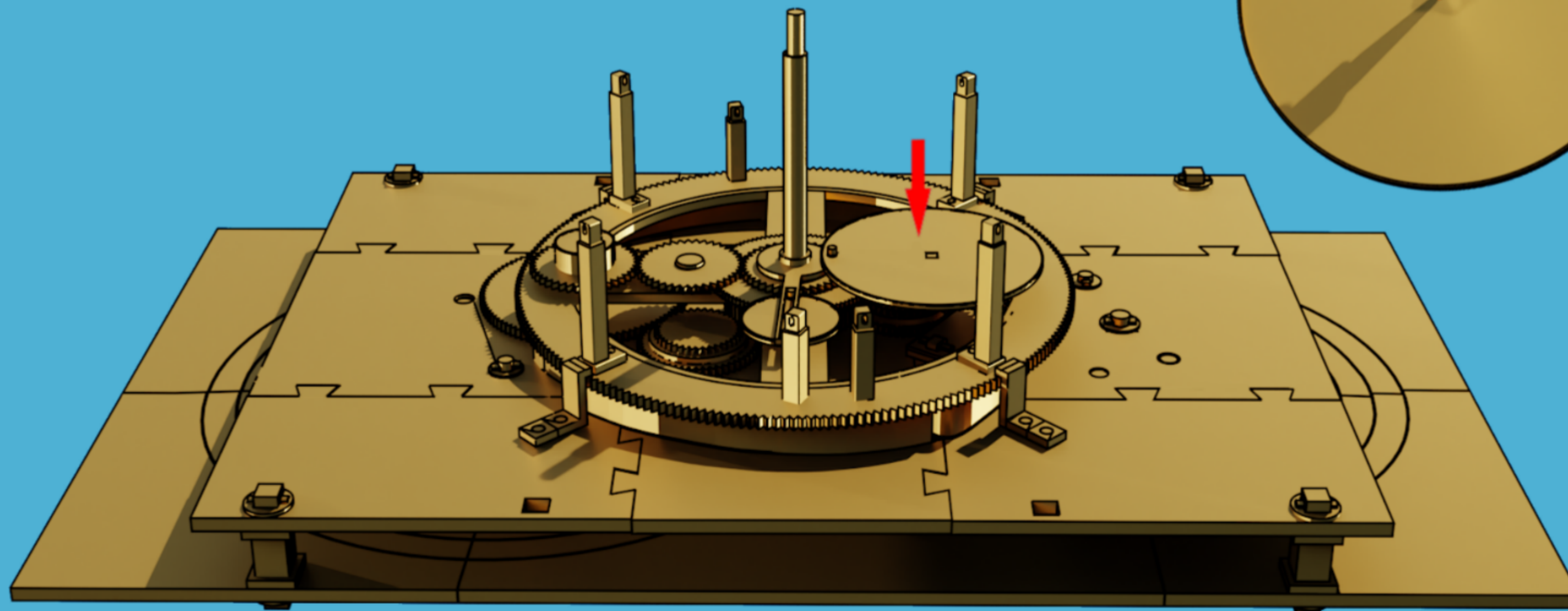
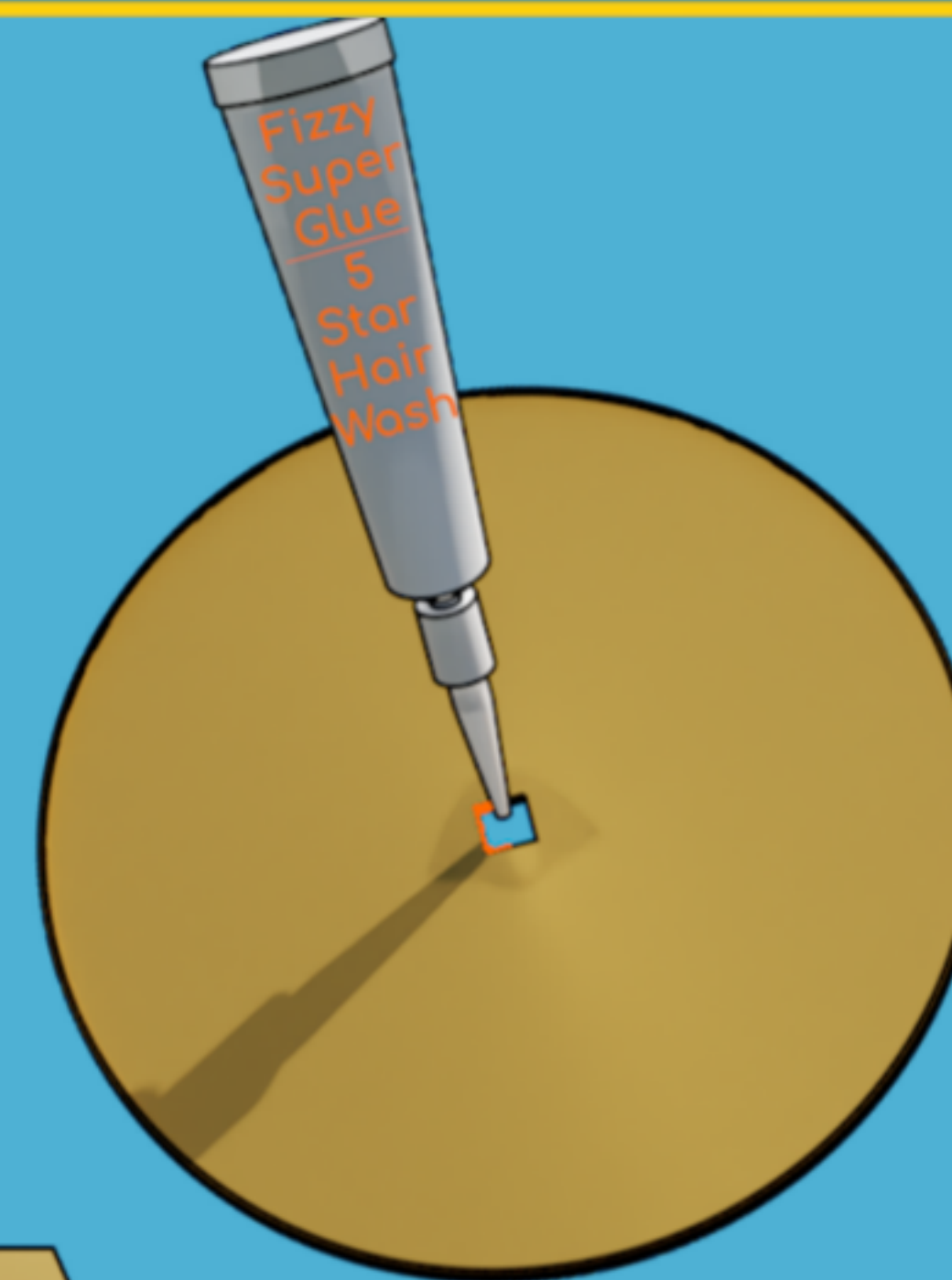
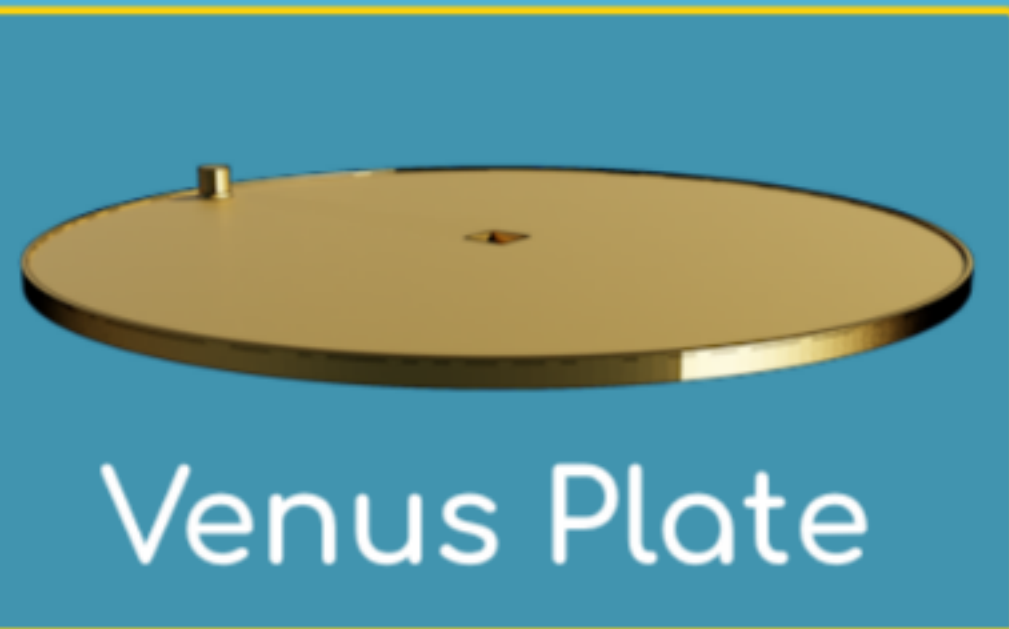
B

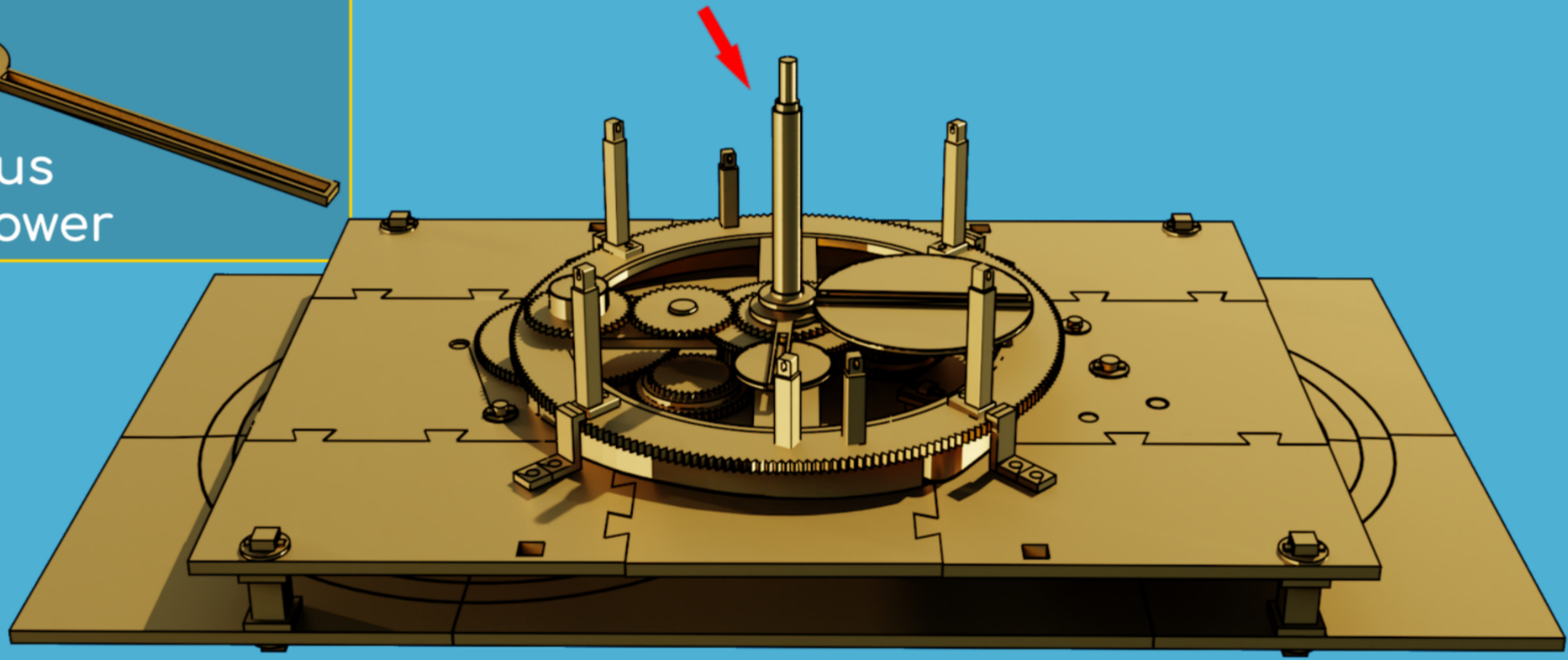
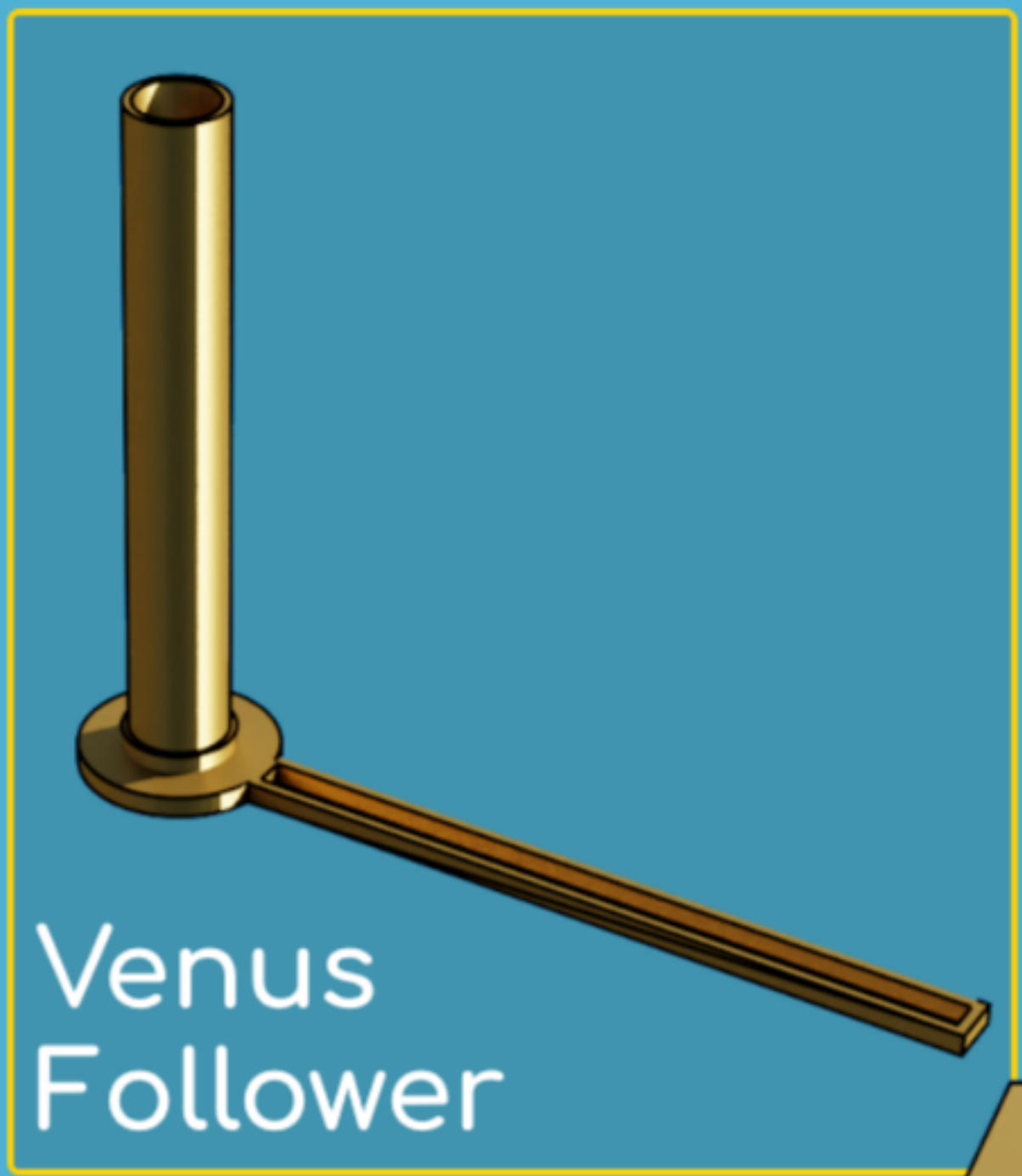


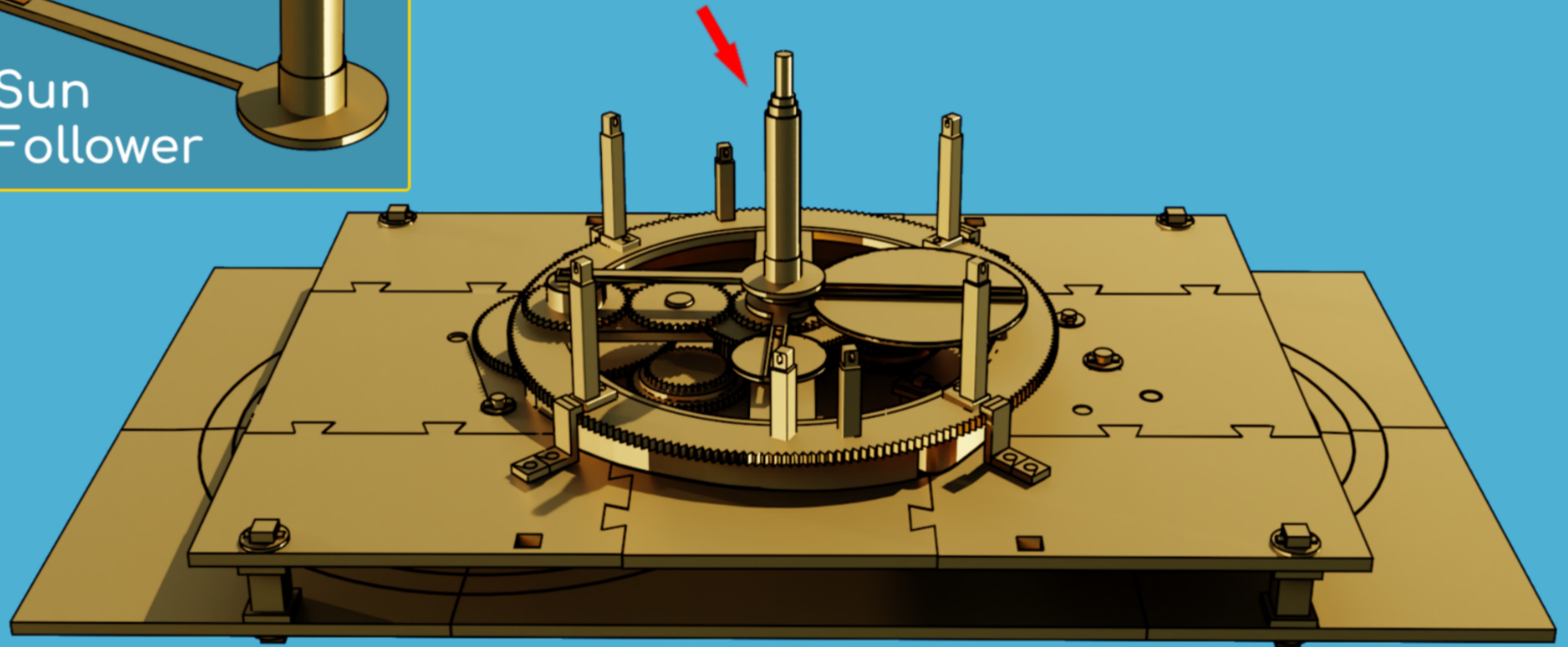
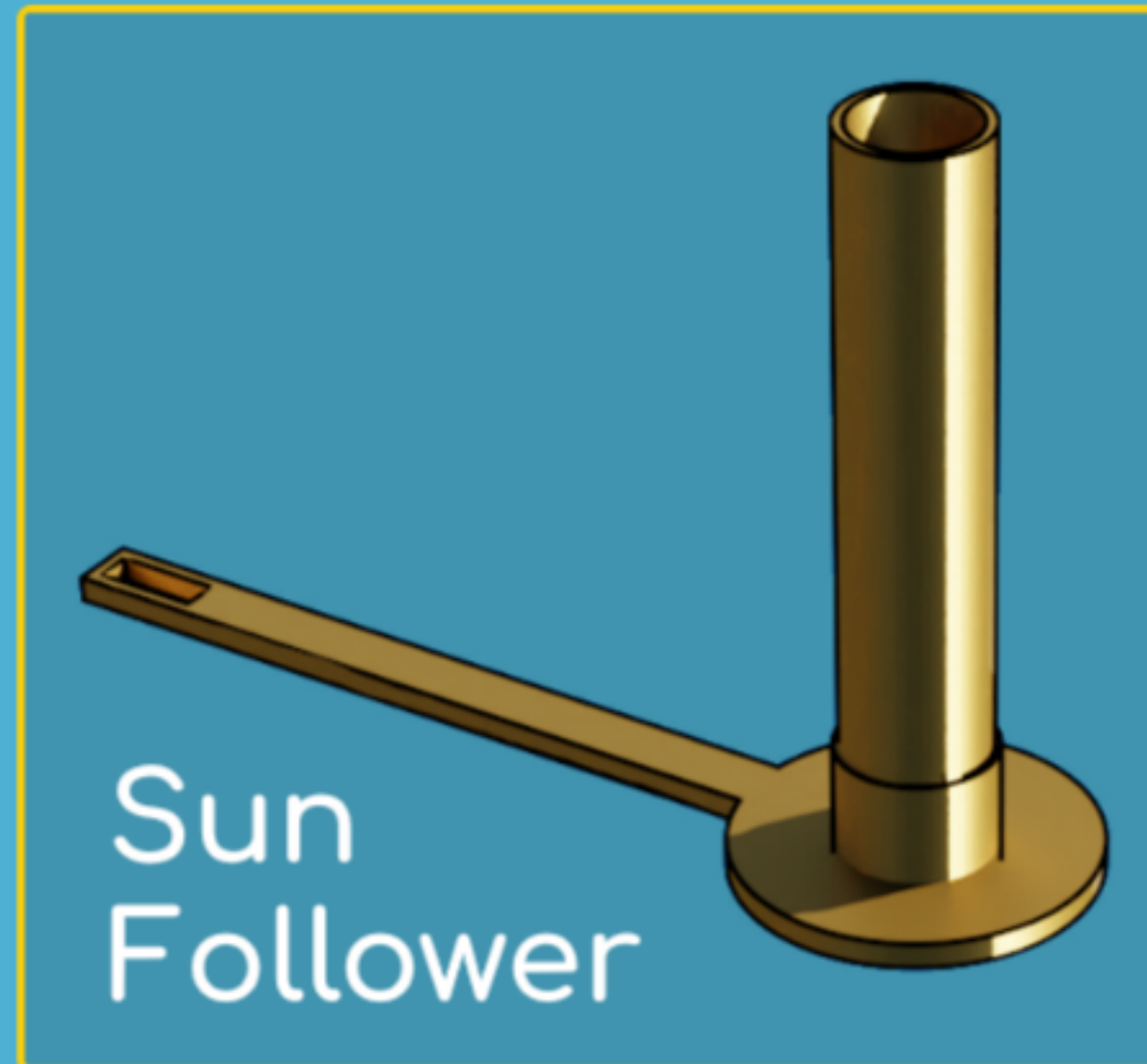


Mercury
Follower

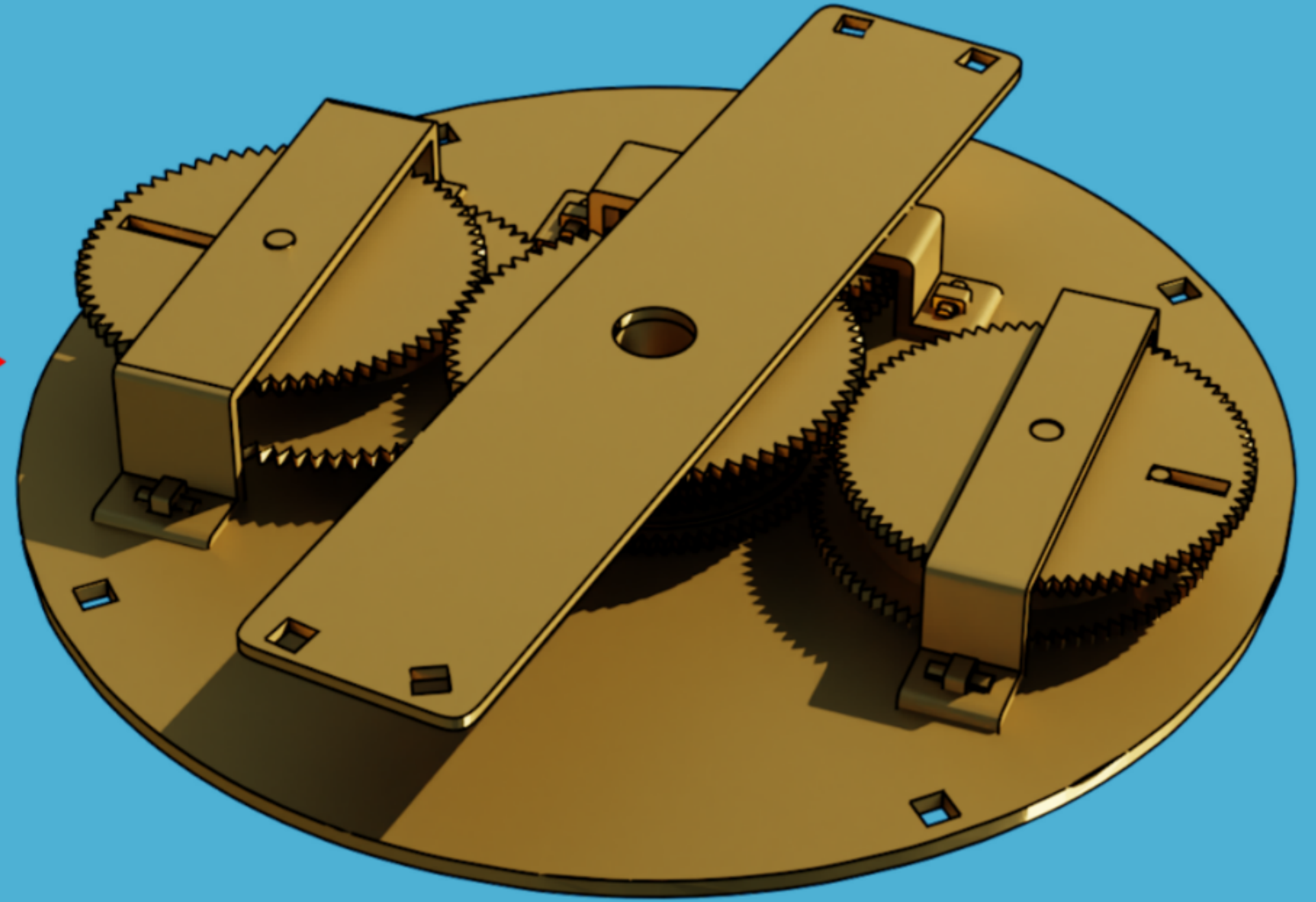
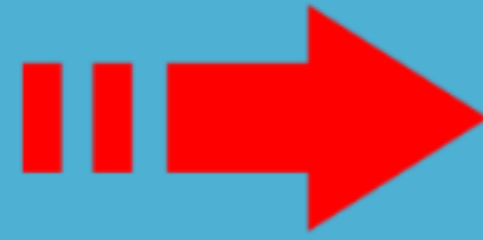








Superior Planet Plate





Fixed Gears

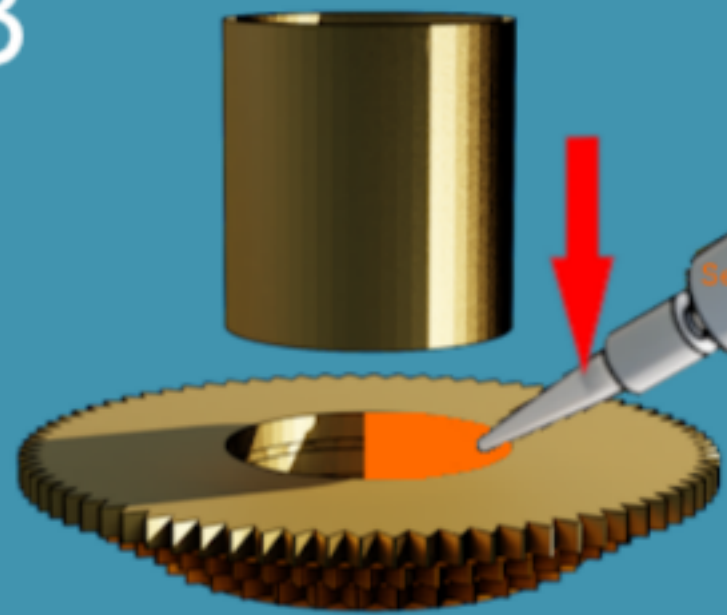


Fixed Shaft

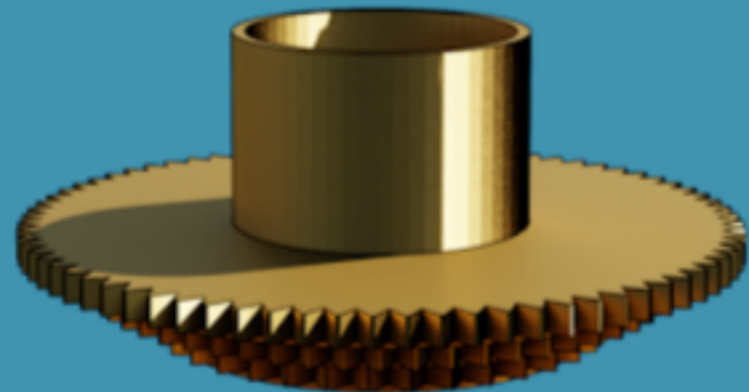
A



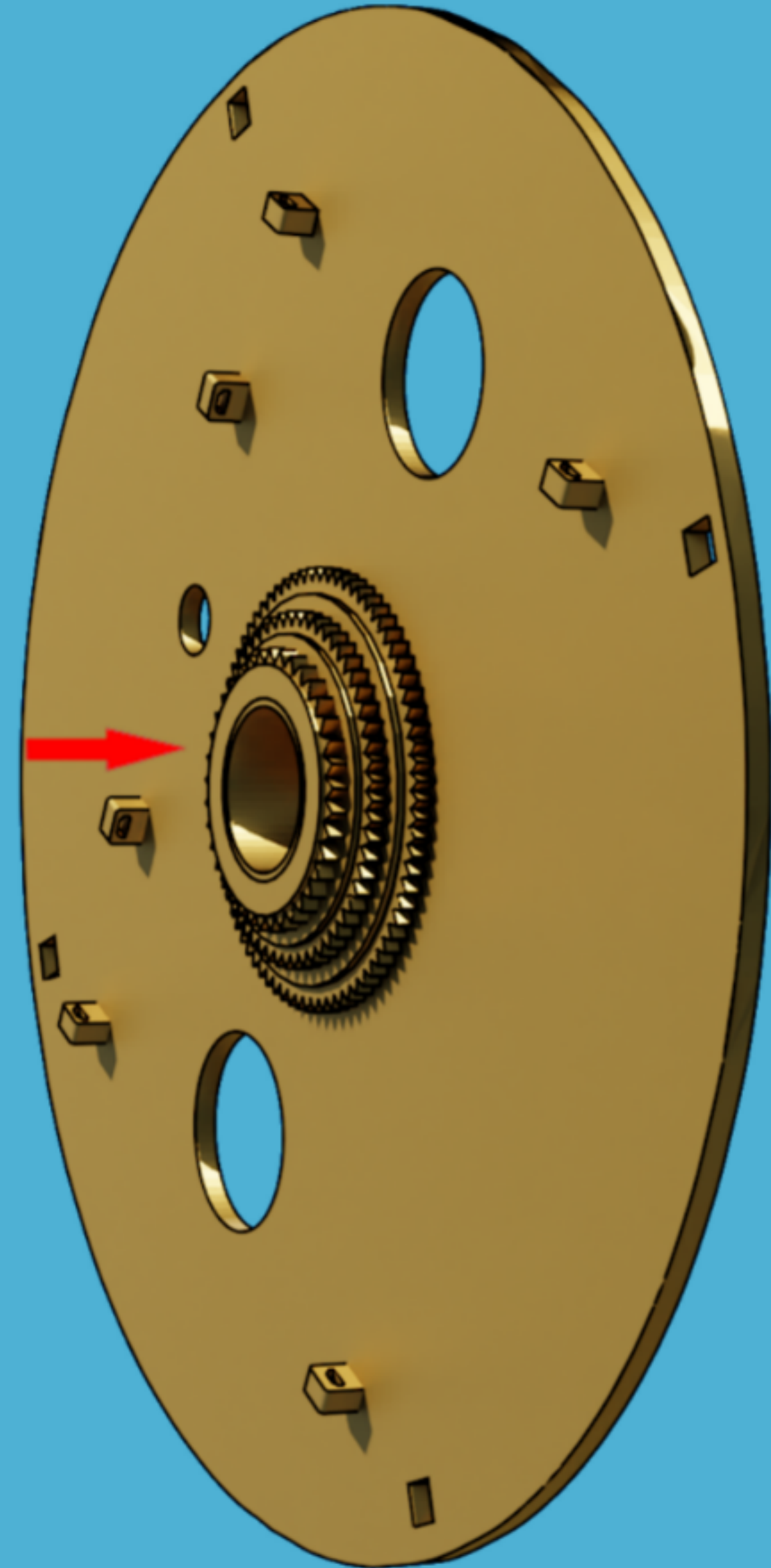
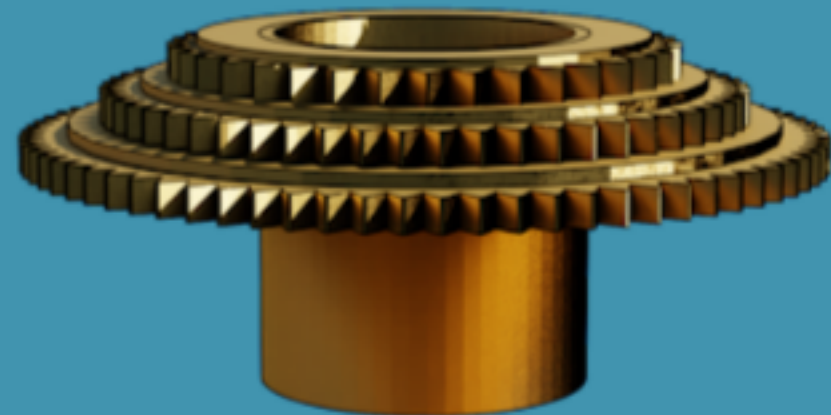
B



C

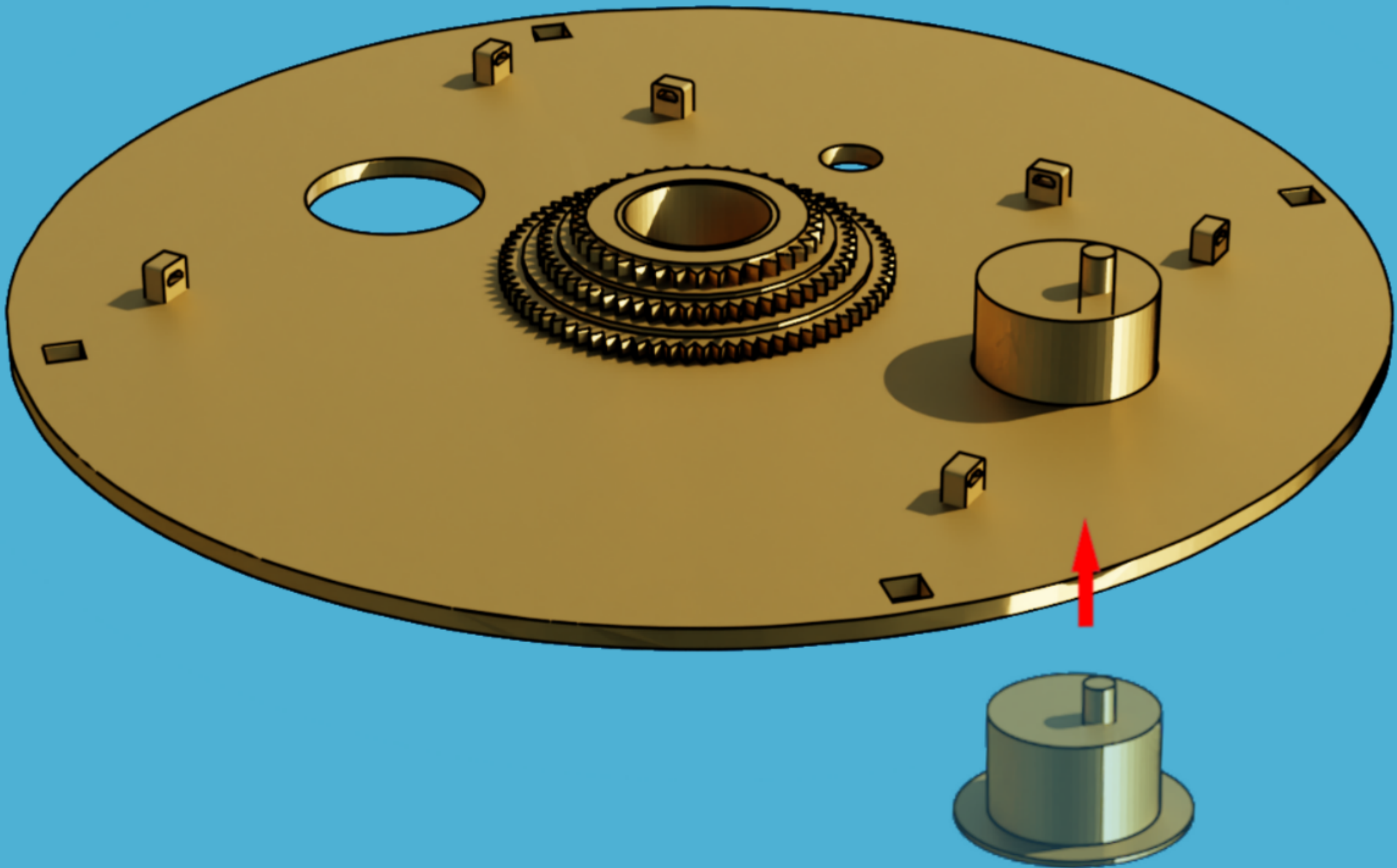


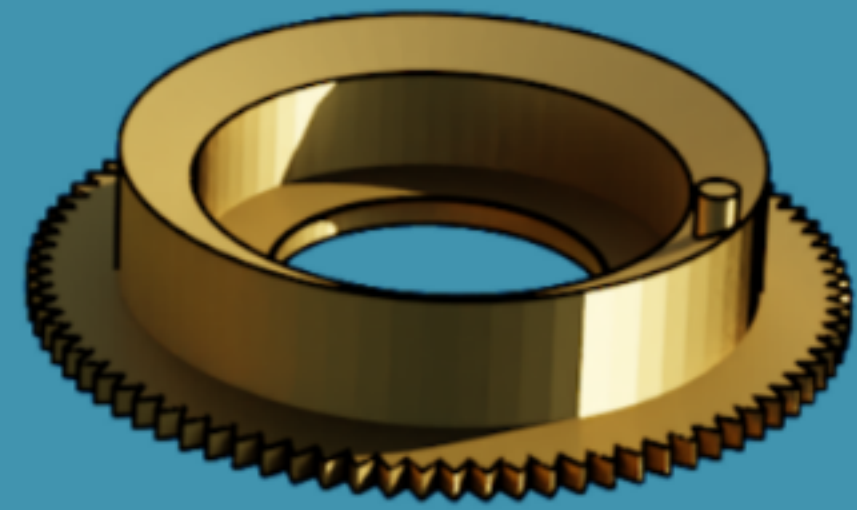
D



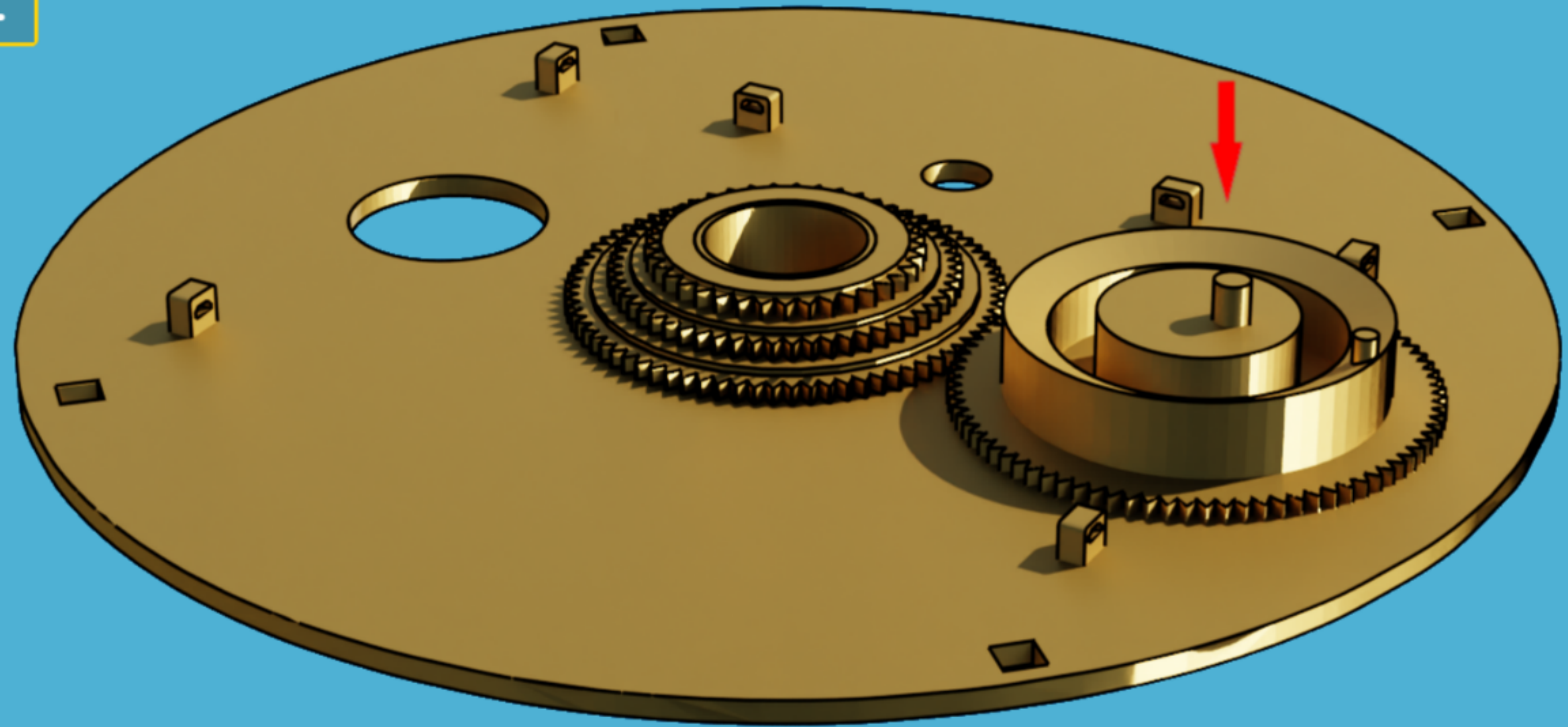


Jupiter
Plug





Jupiter Gear 2

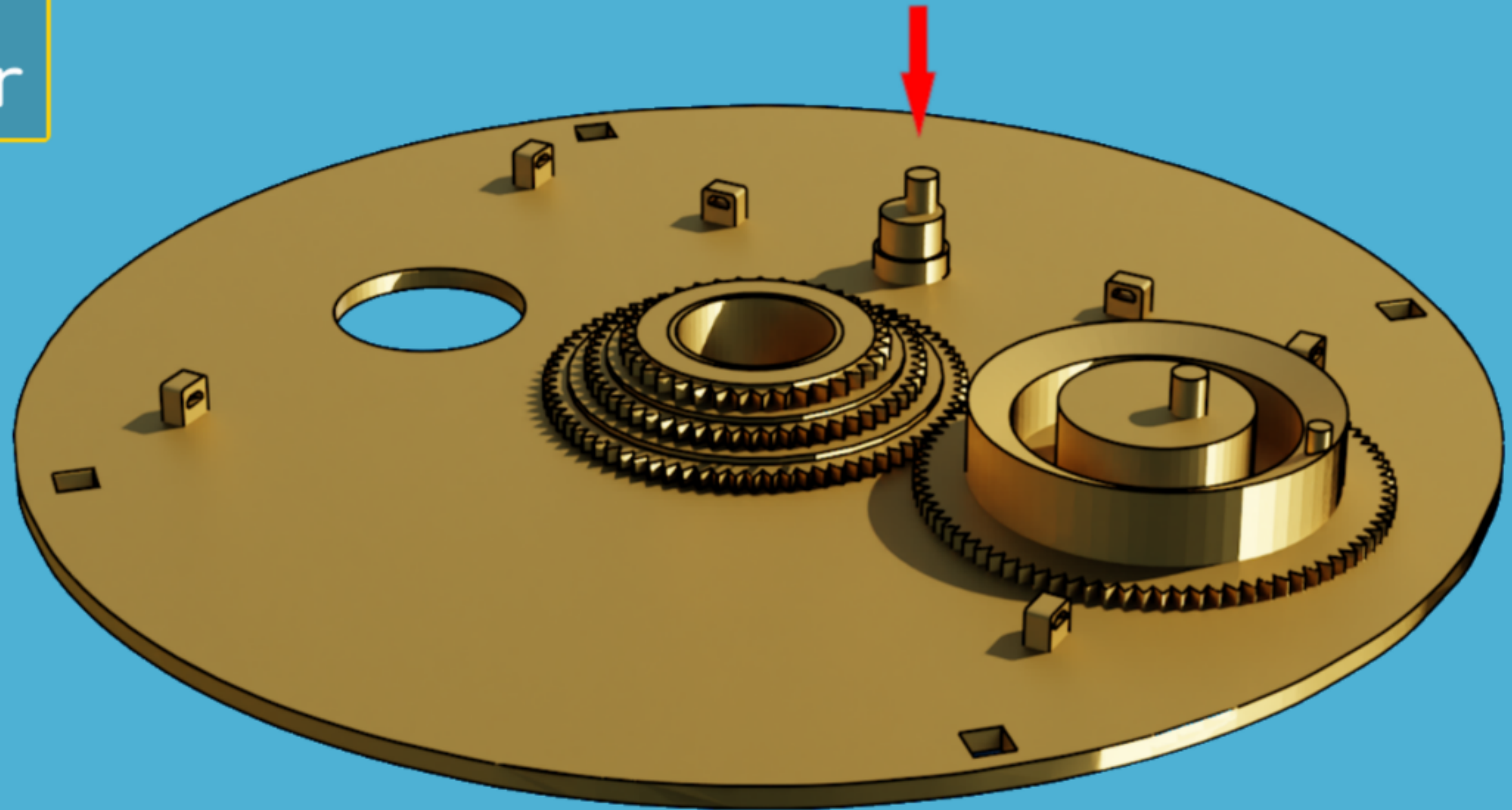
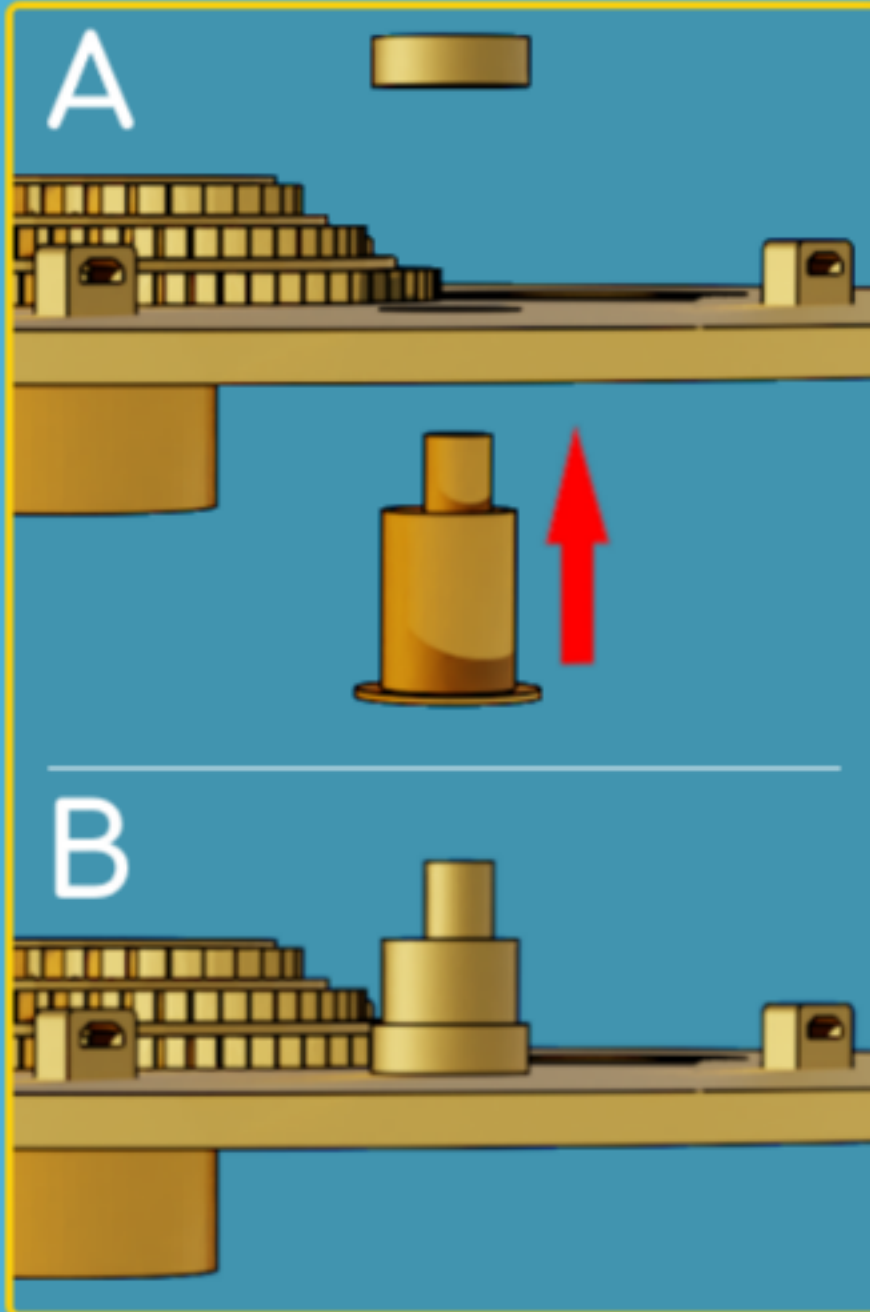




Saturn
Plug

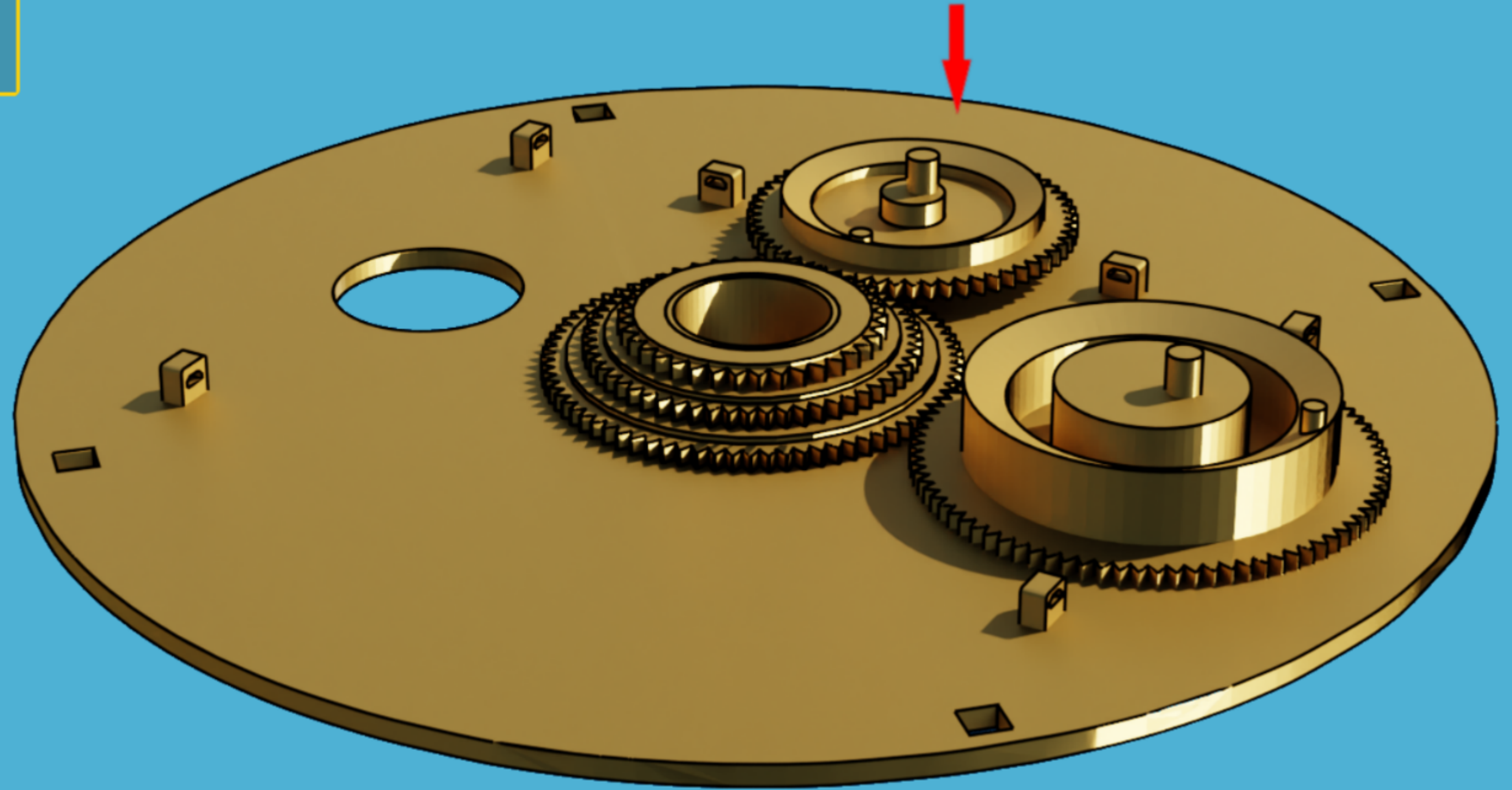


Saturn
Plug Washer





Saturn Gear 2

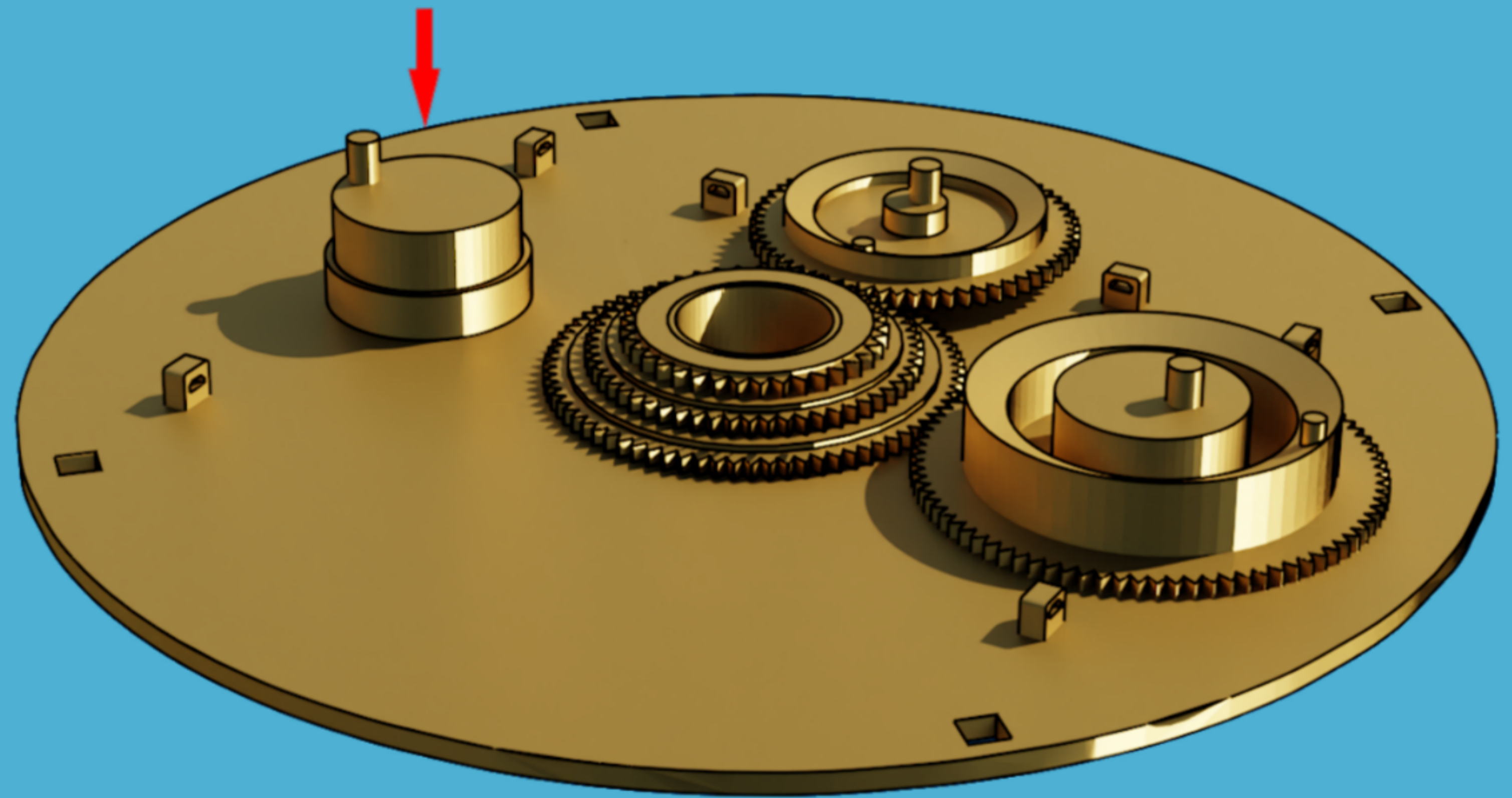
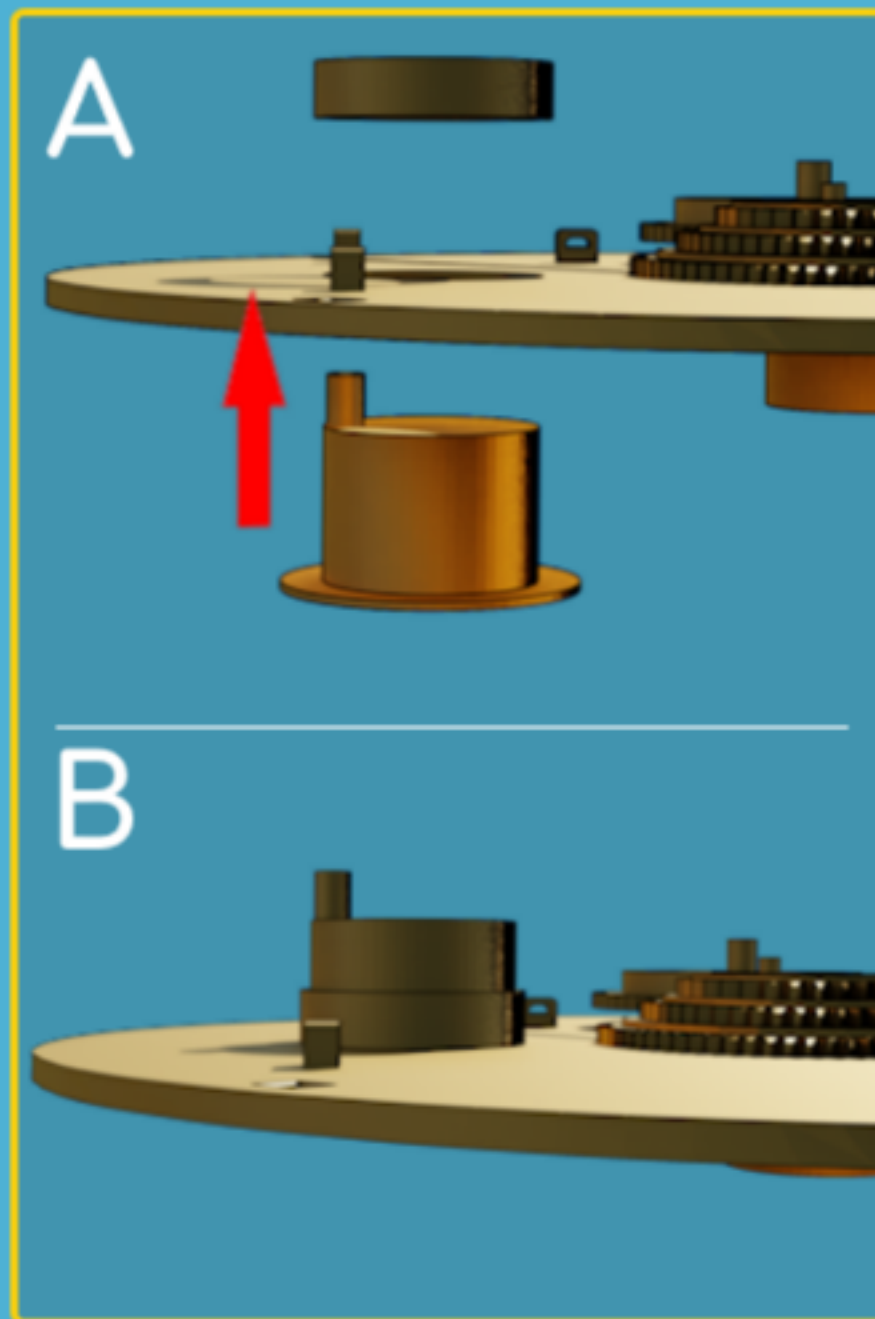




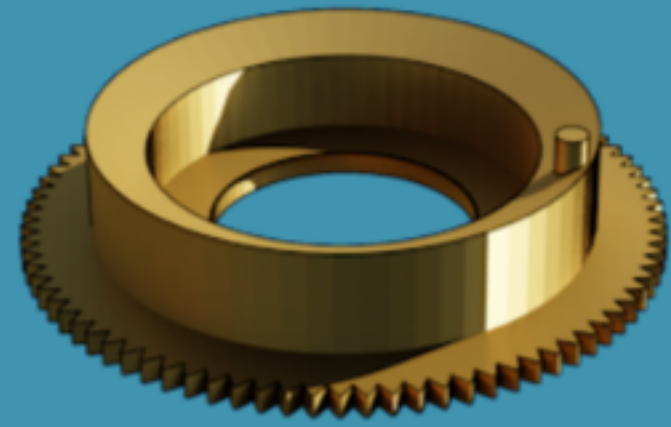
Mars Plug



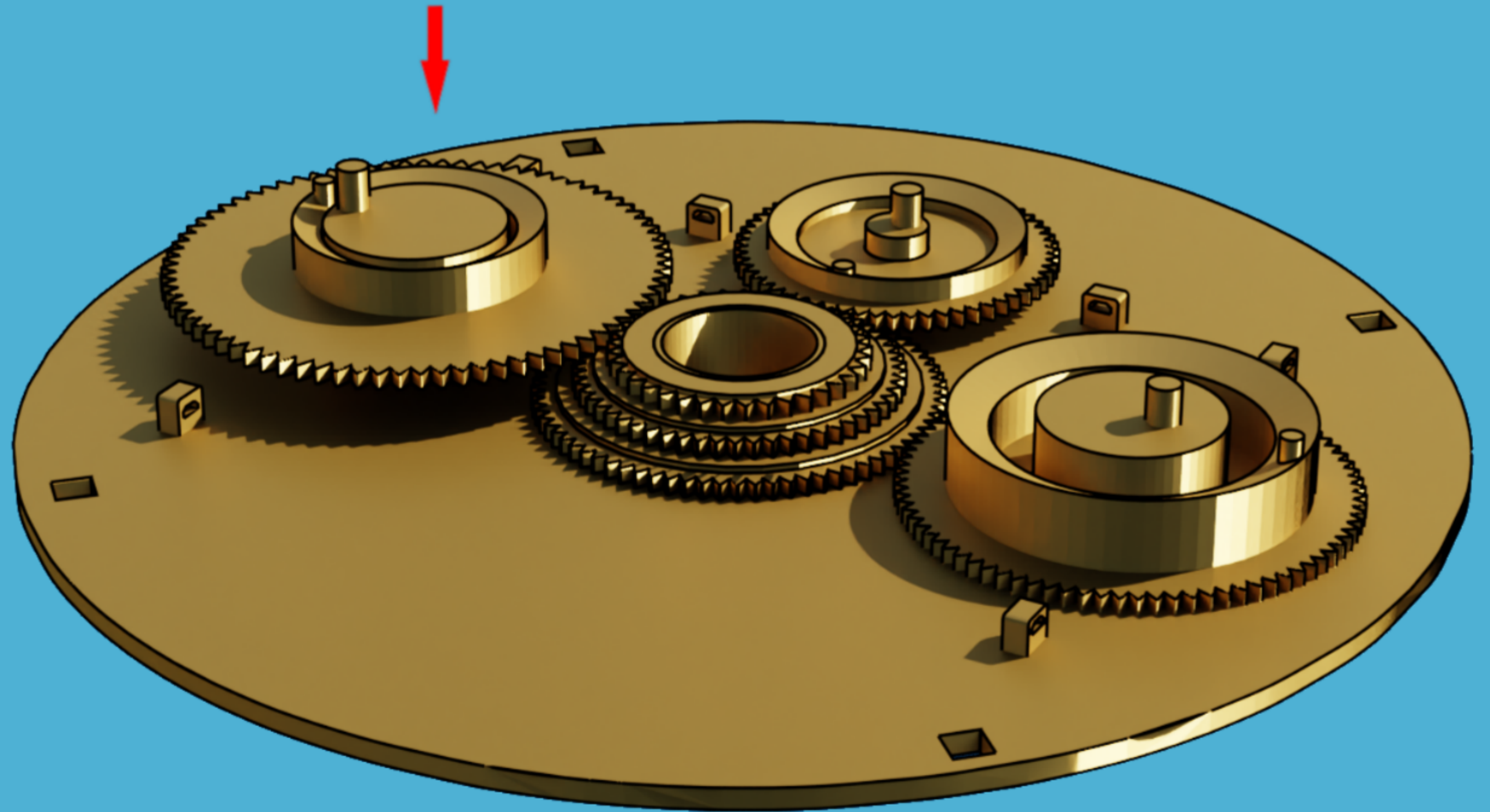
Mars
Plug Washer



113

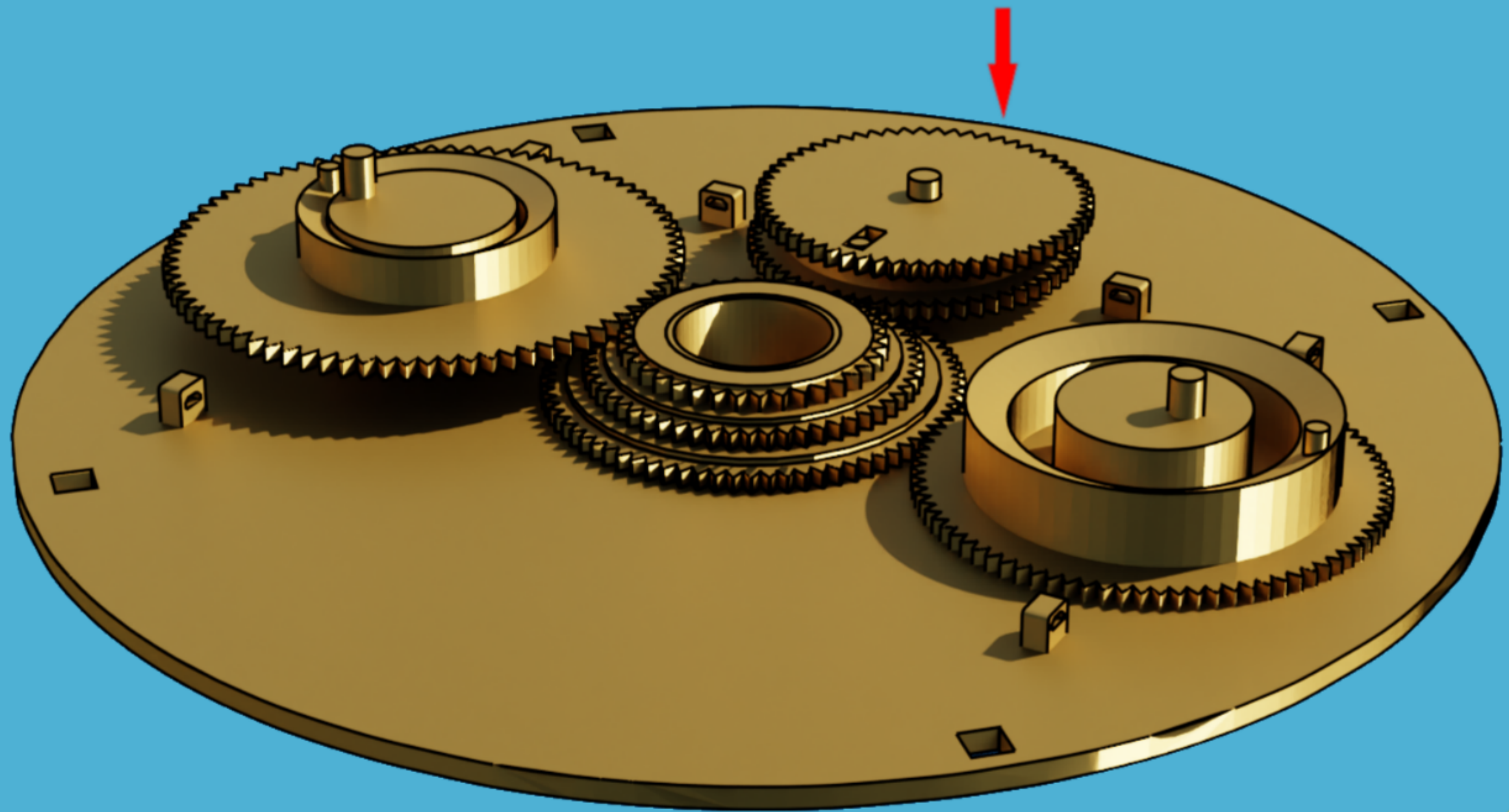


Mars Gear 2





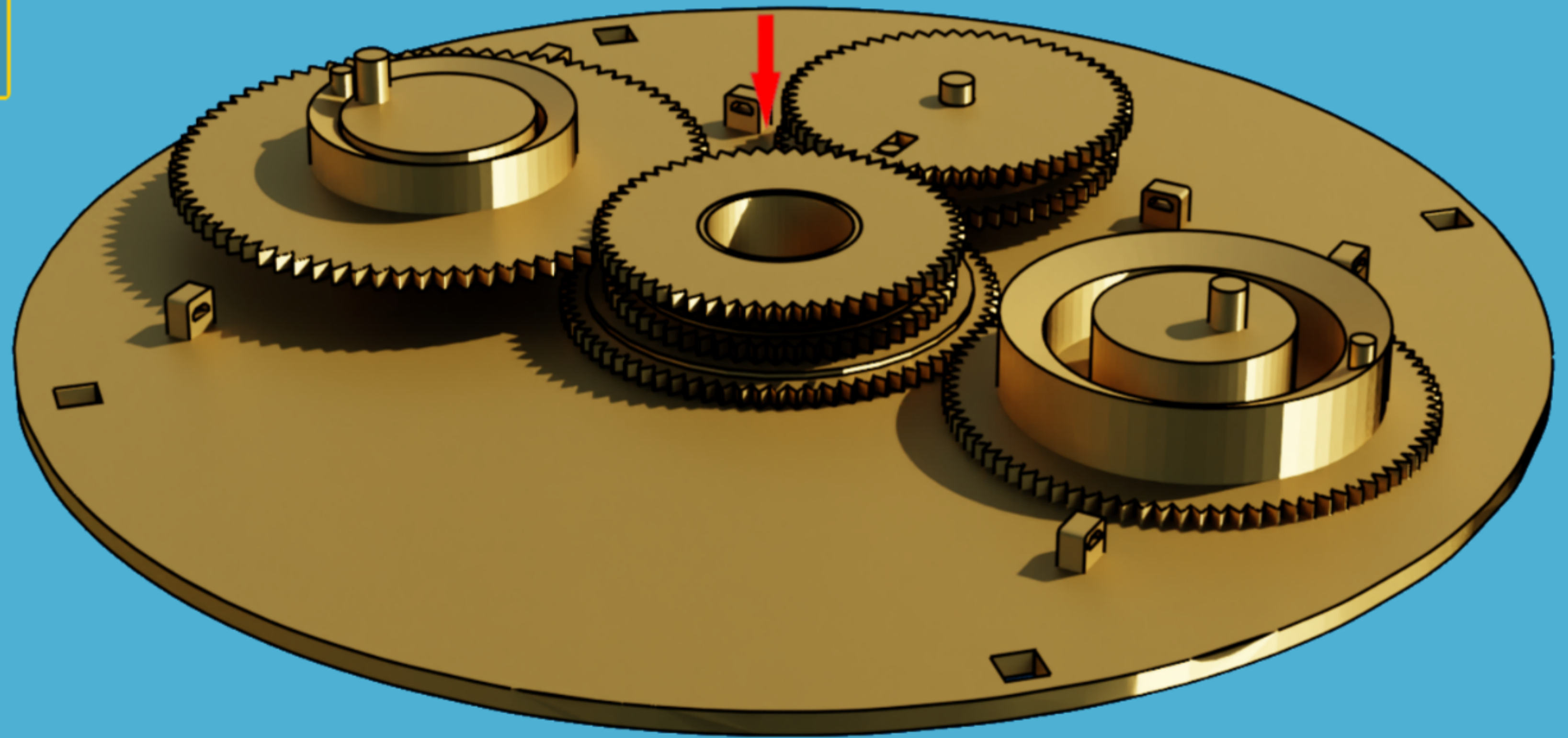
Saturn Gear 3



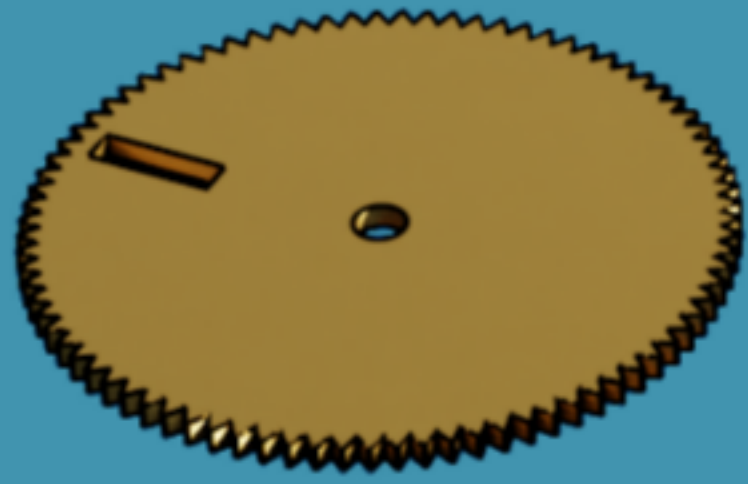
115



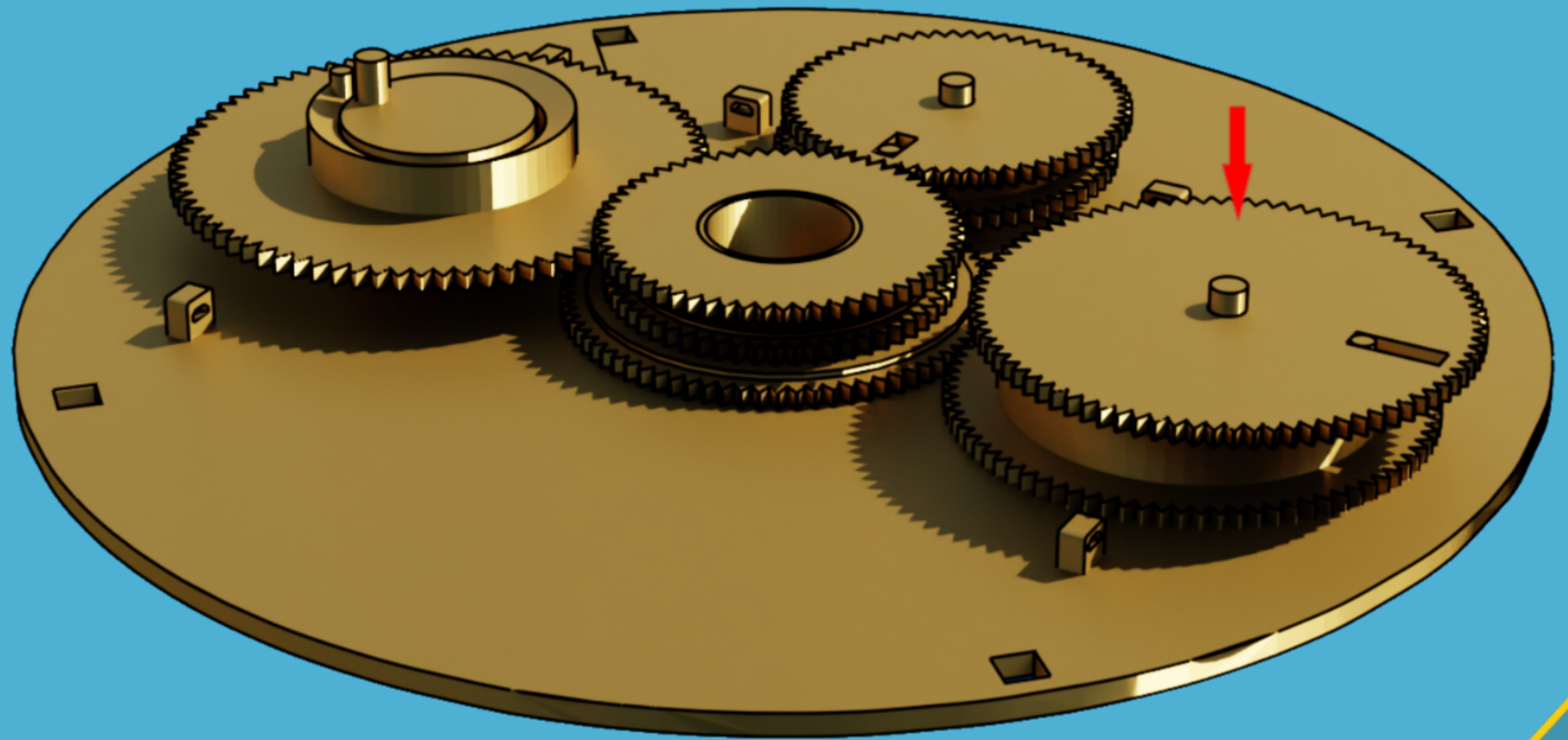
Saturn Gear 4



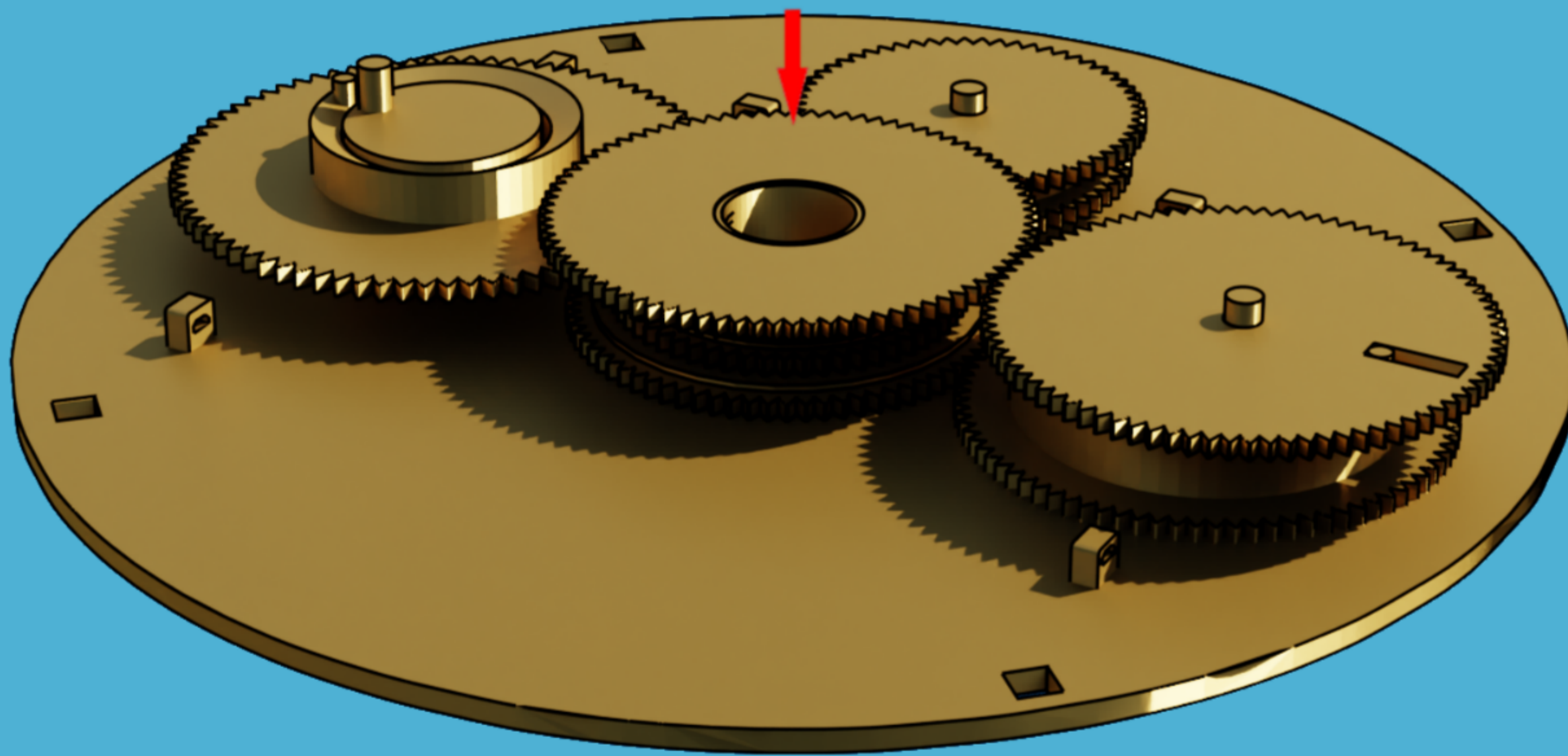
116

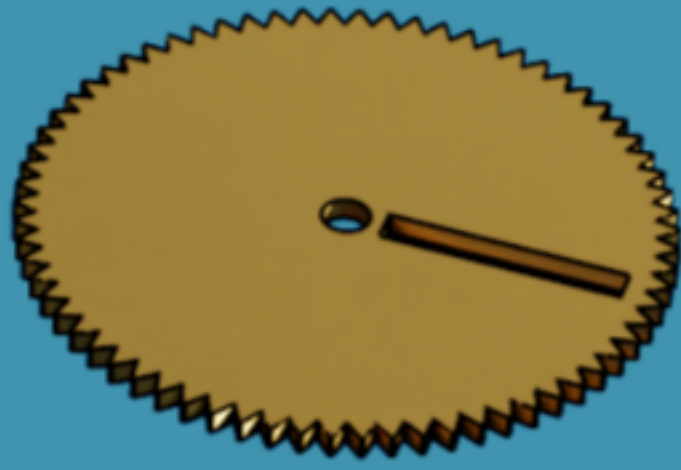


Jupiter Gear 3

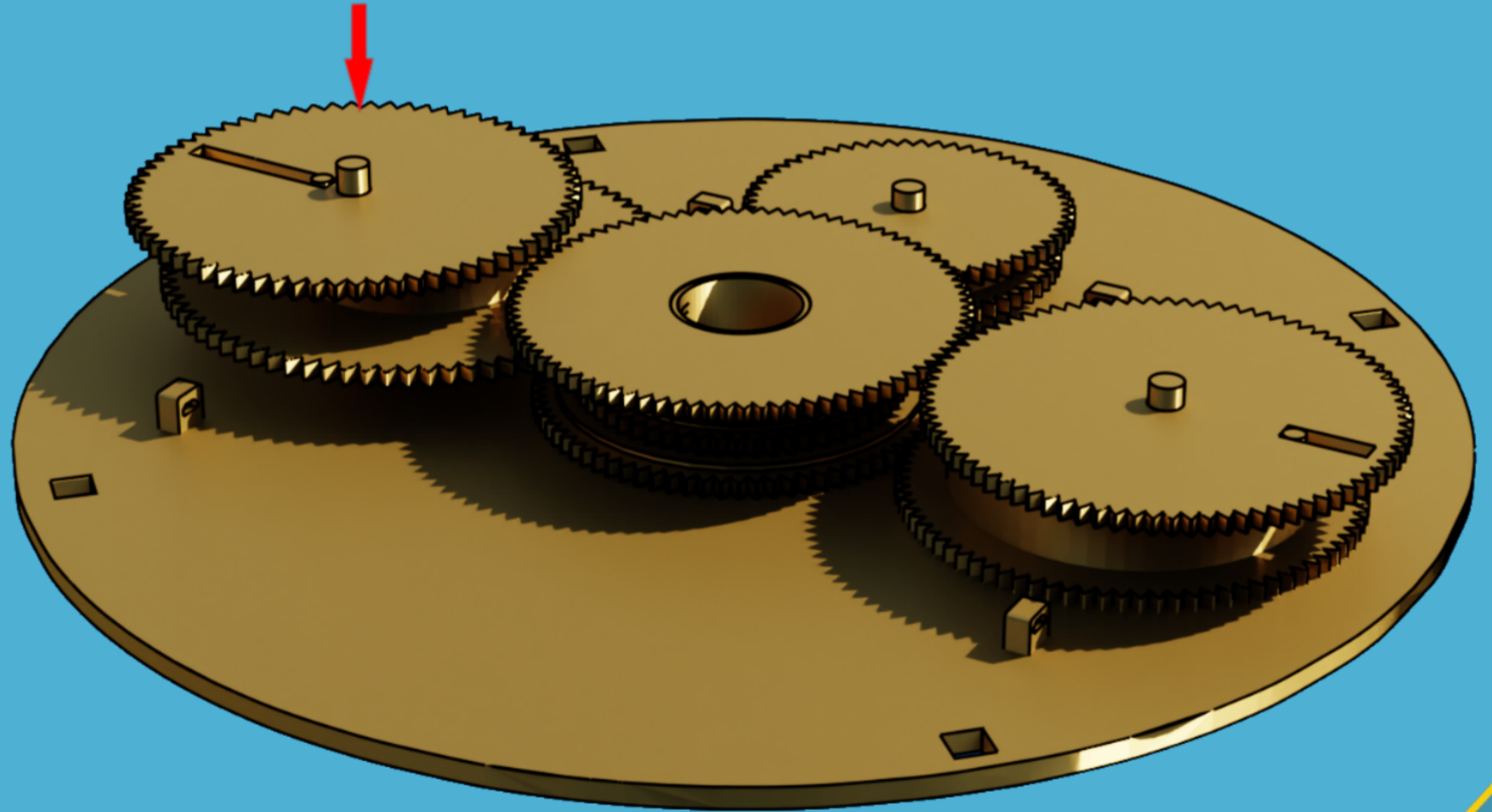


117



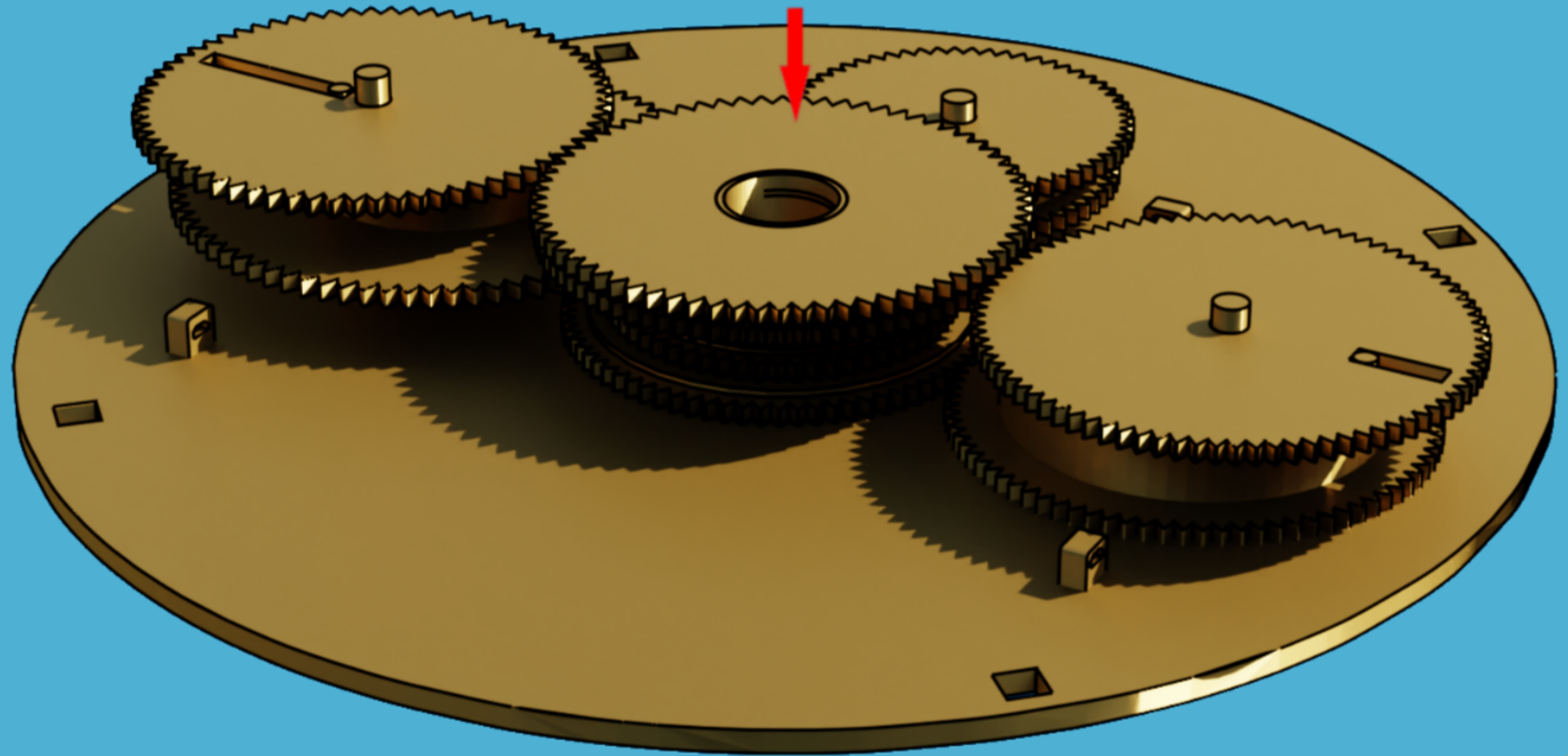


Mars Gear 3





Mars Gear 4

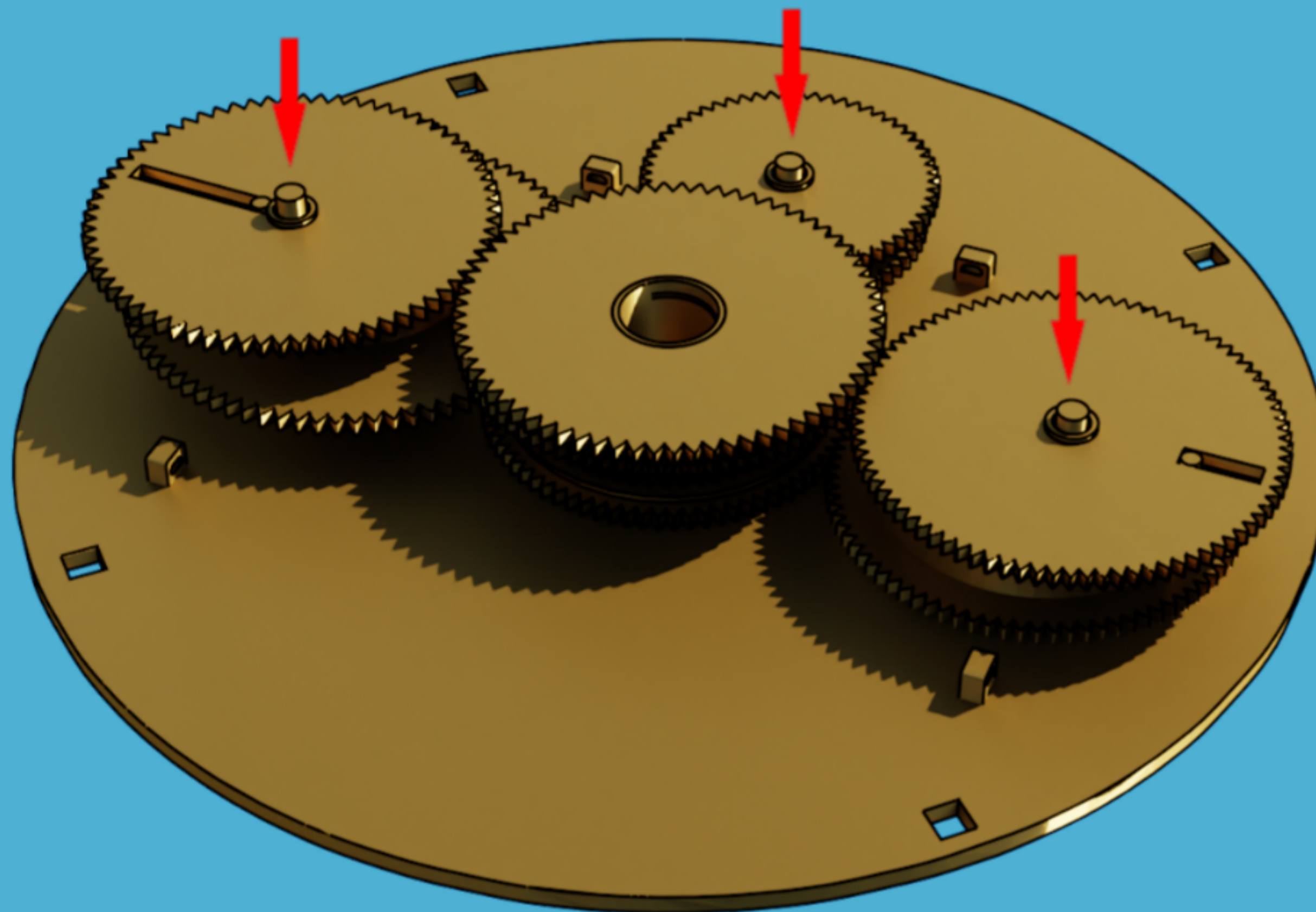


120



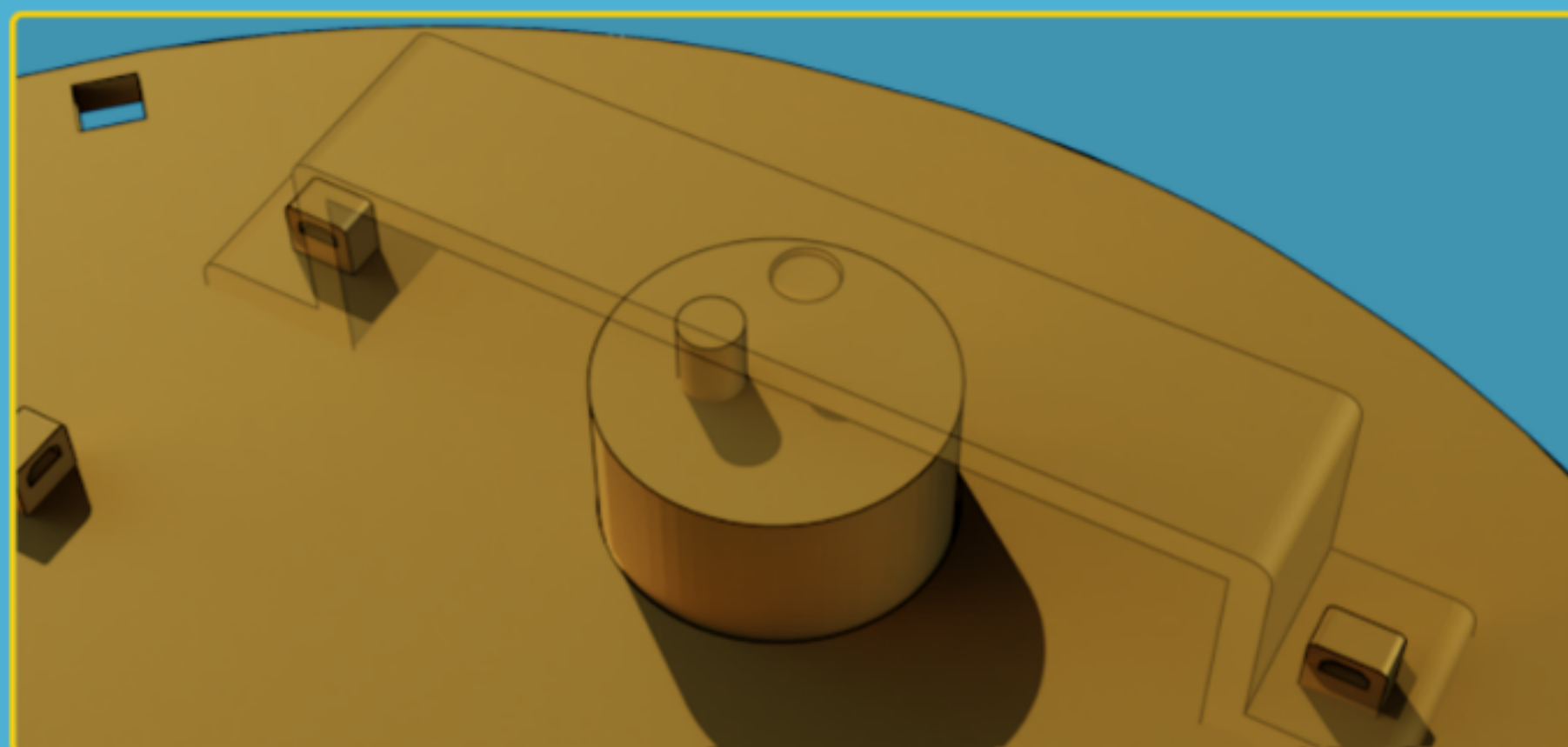
x3

Clamp Washer

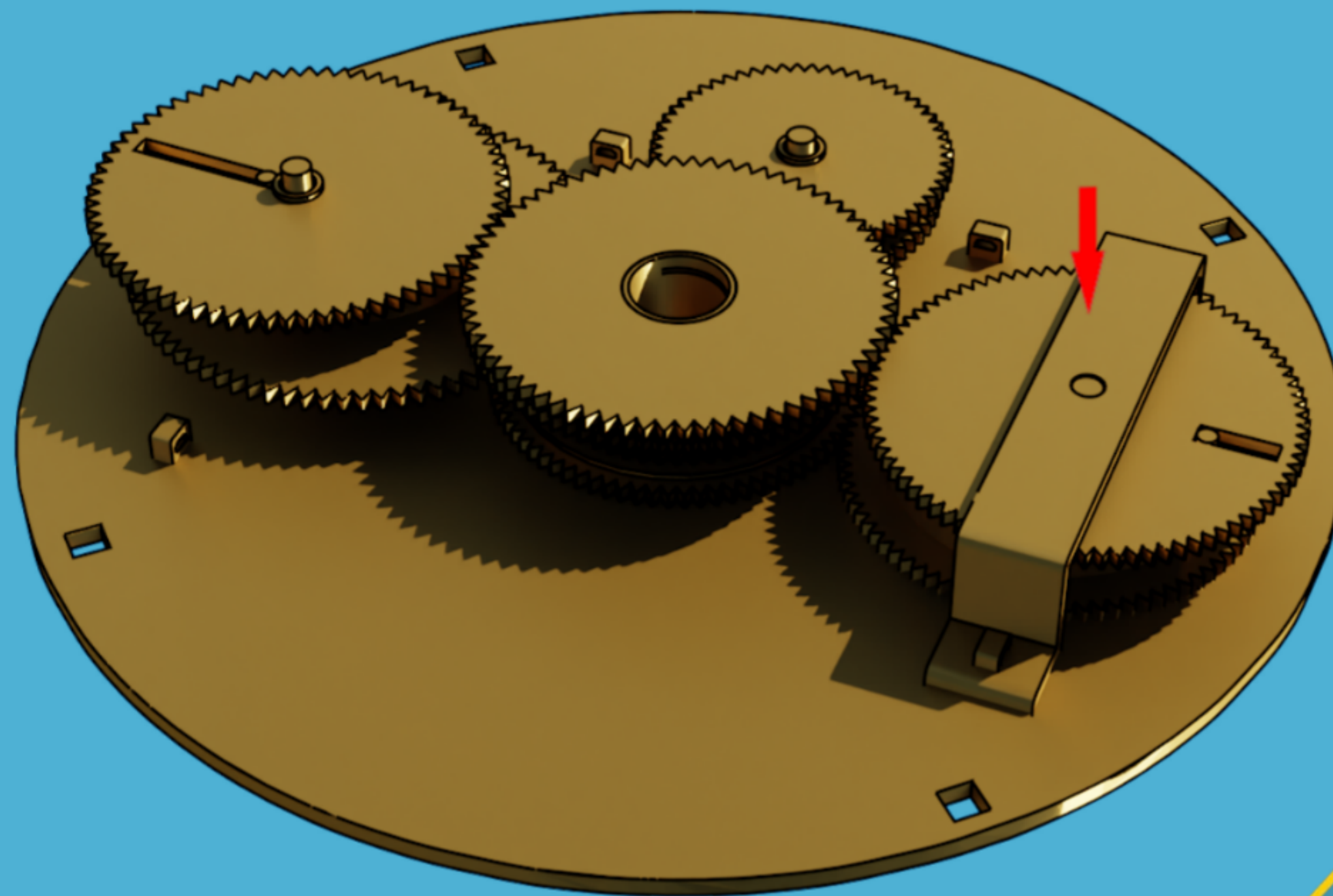




Jupiter Clamp



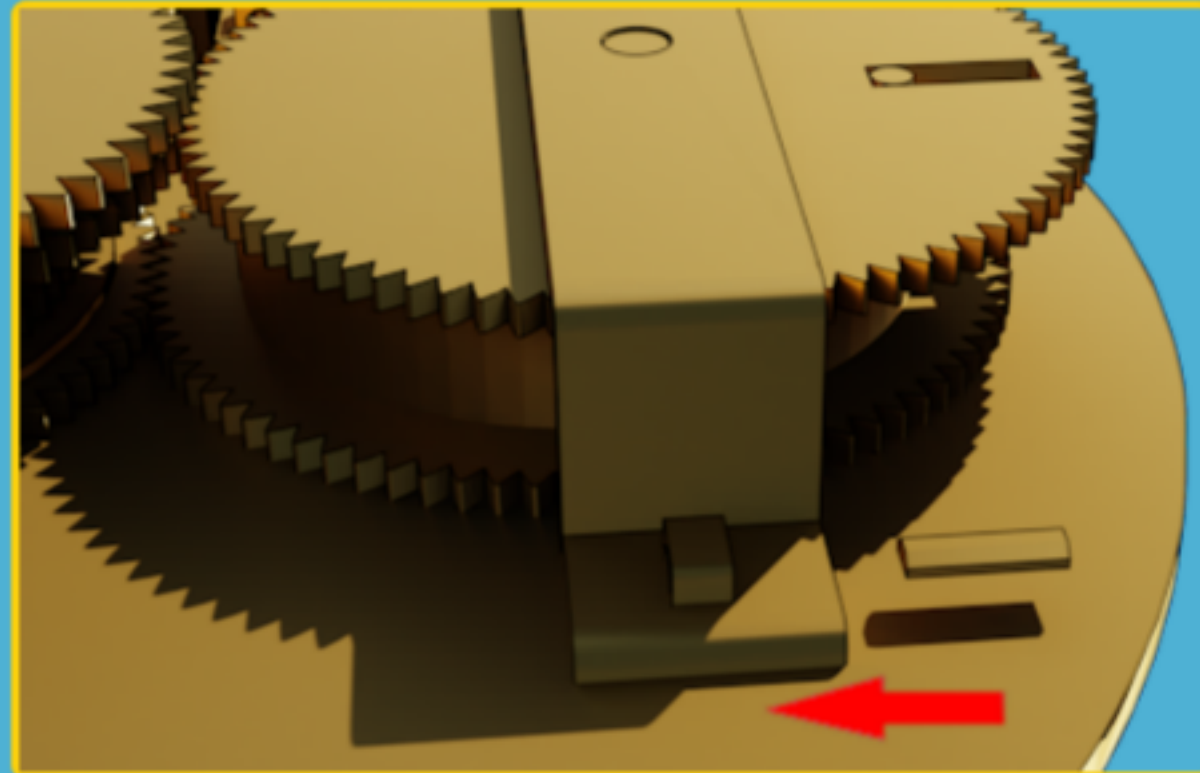
-Align Pin with Hole in Clamp-



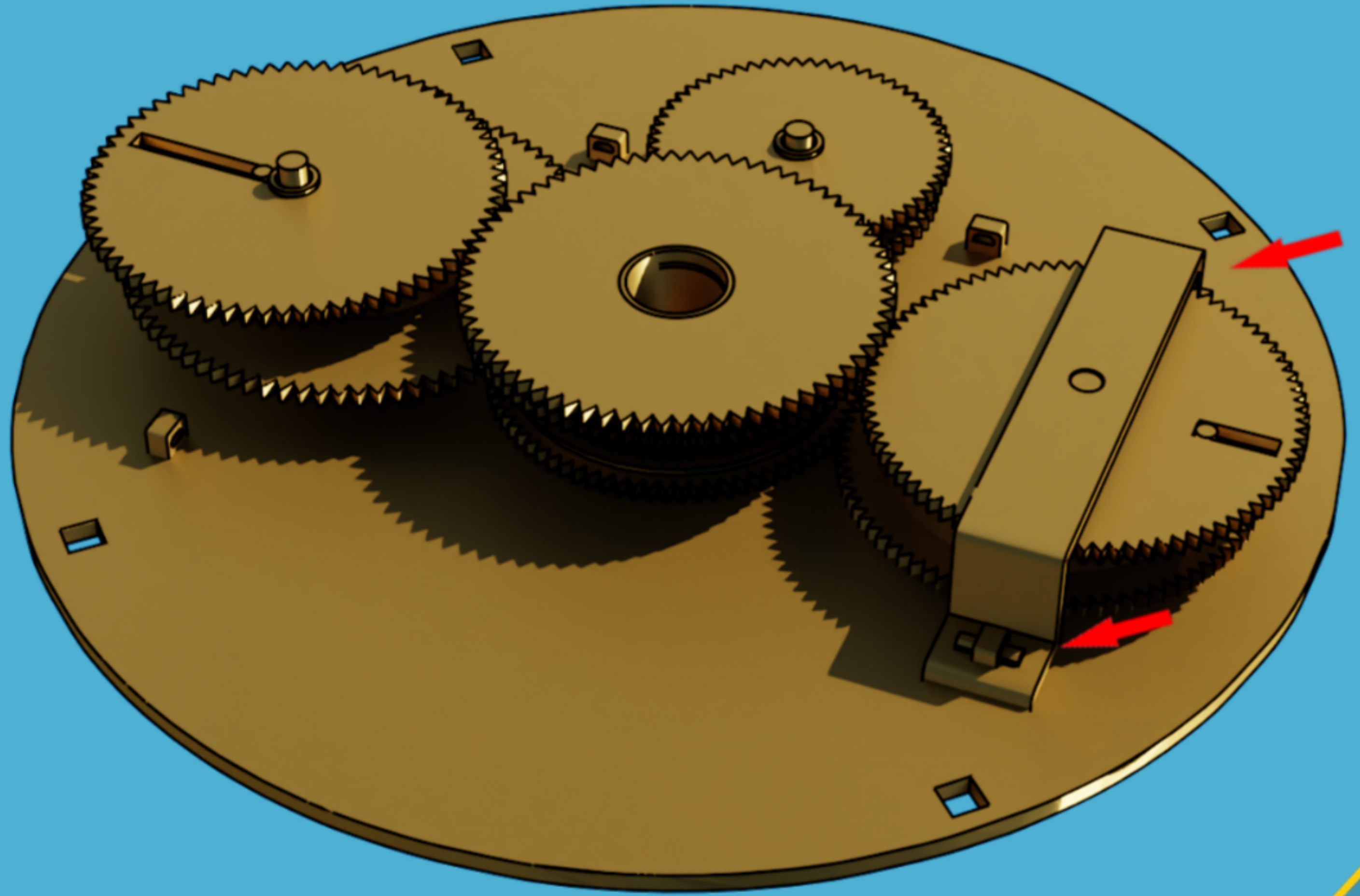
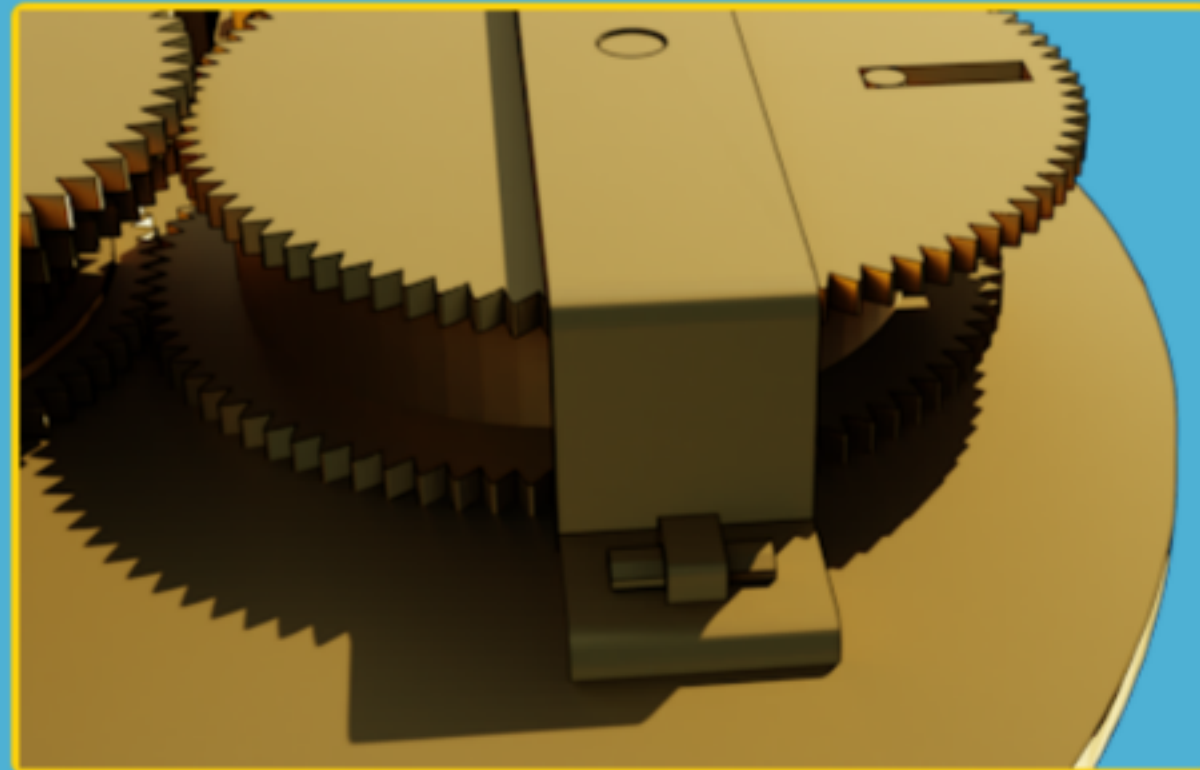


Pins x2

A



B



123

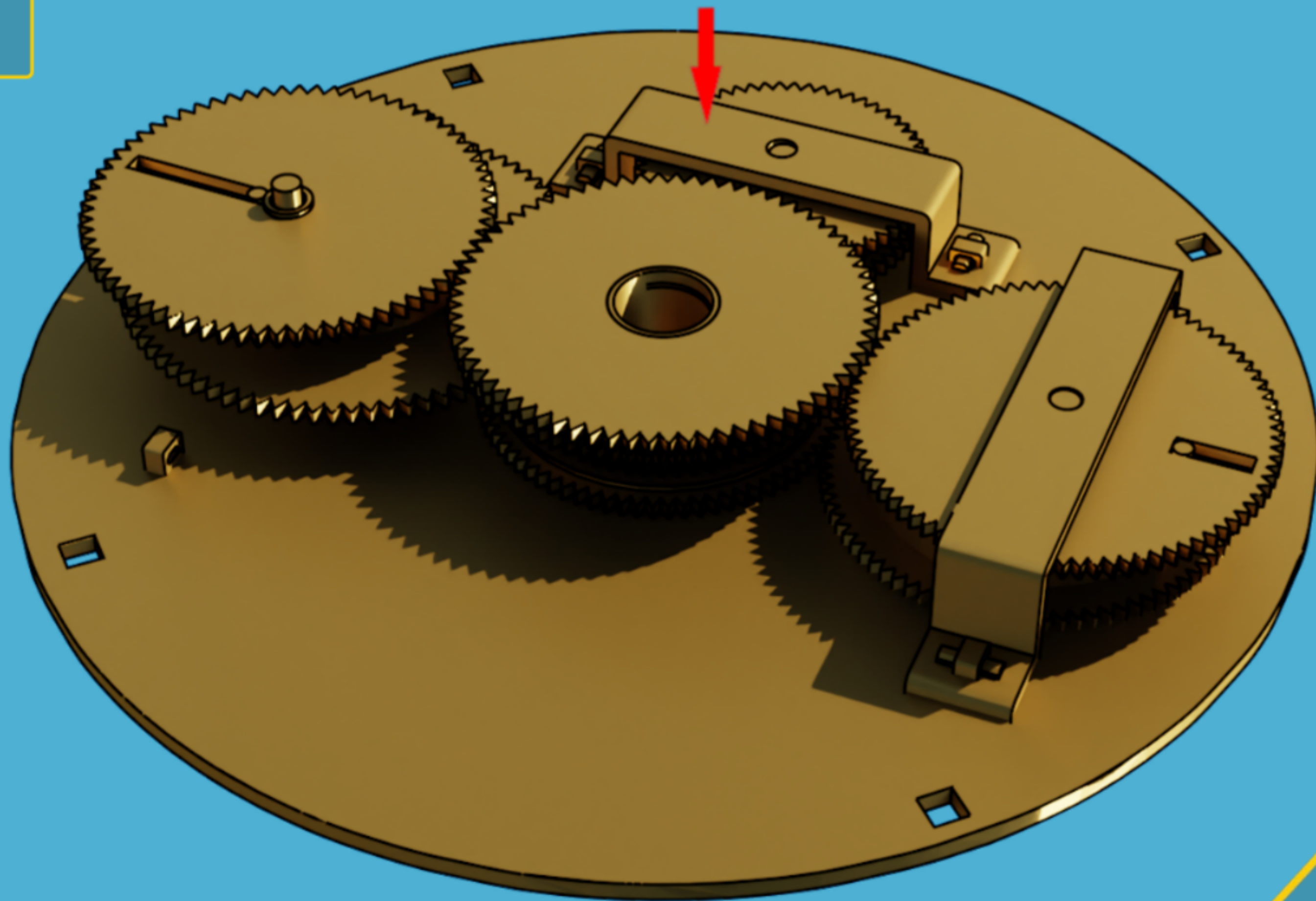


Saturn Clamp



Pins

x2



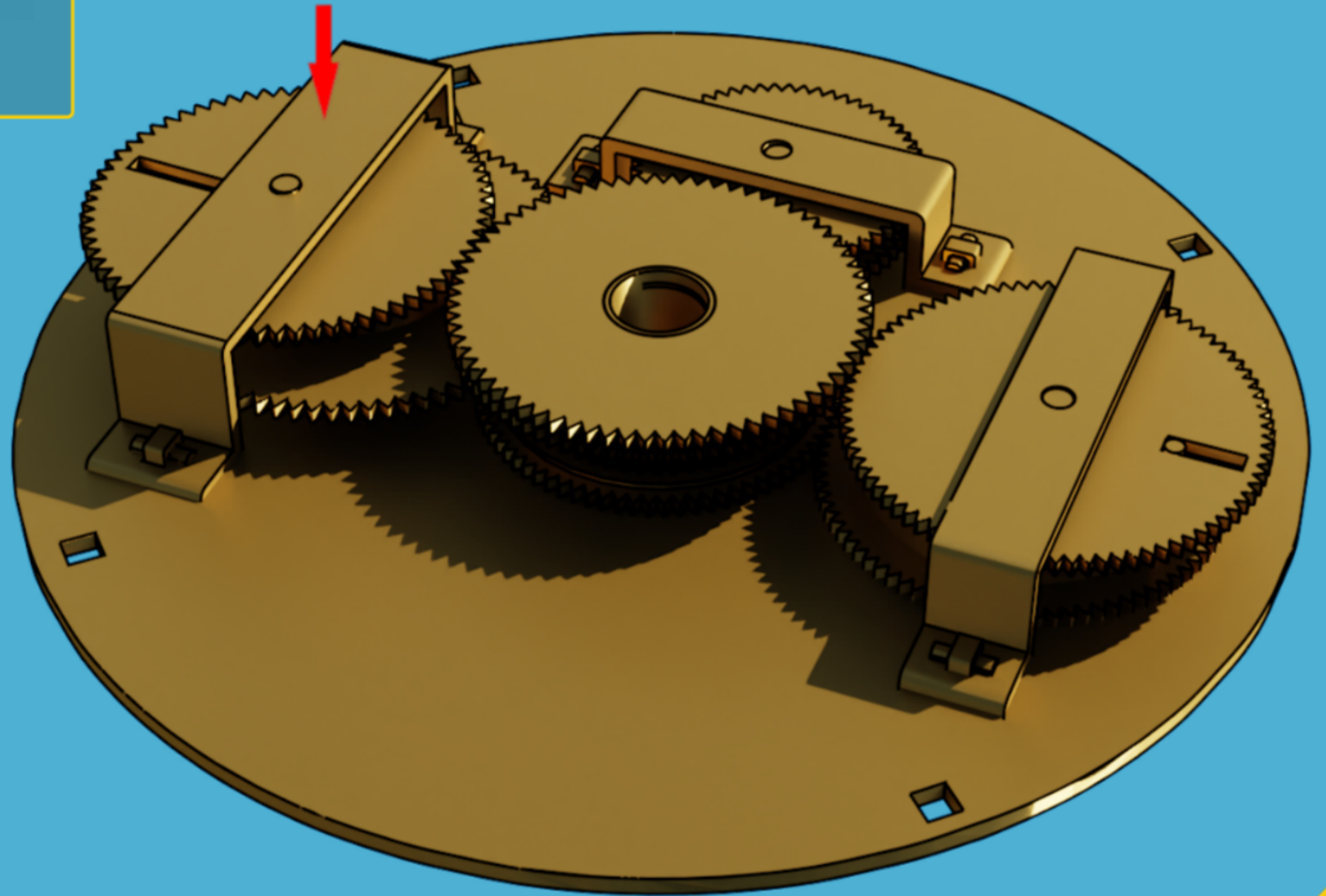


Mars Clamp



Pins

x2

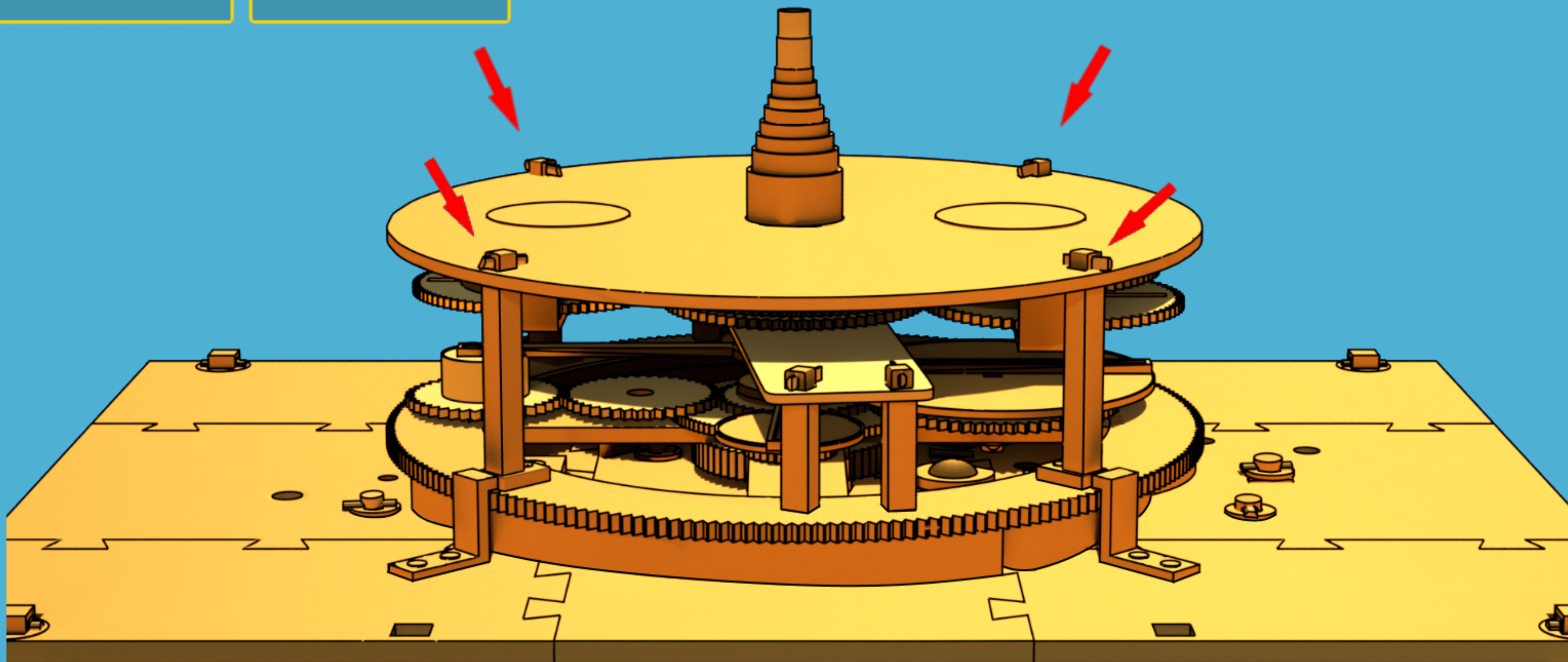


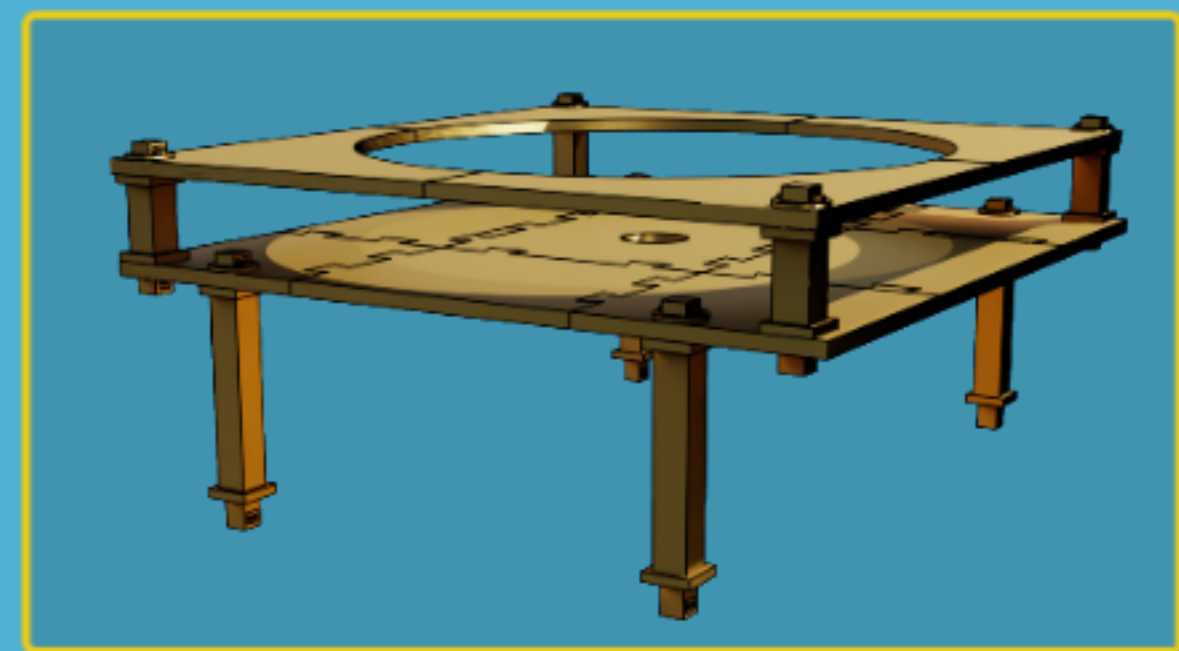


Pin

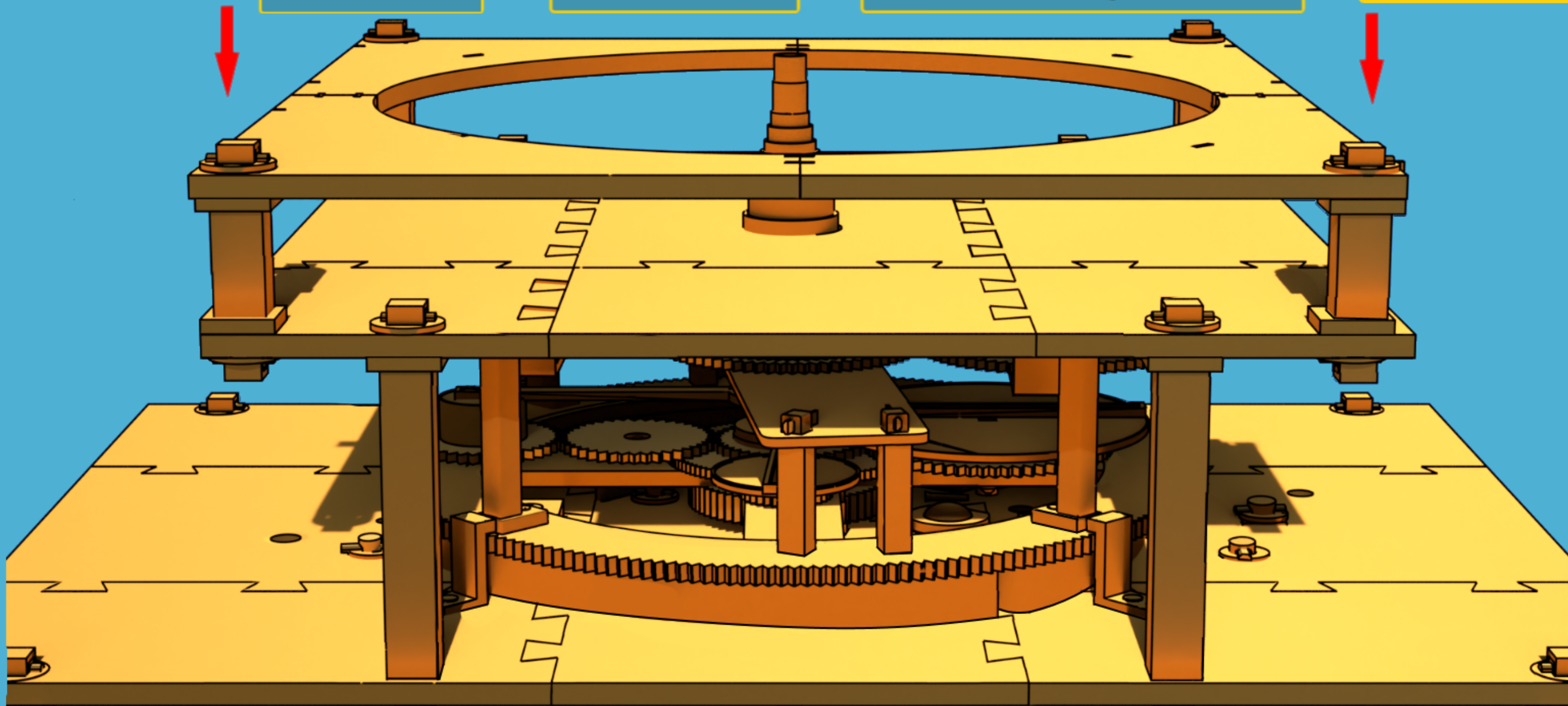


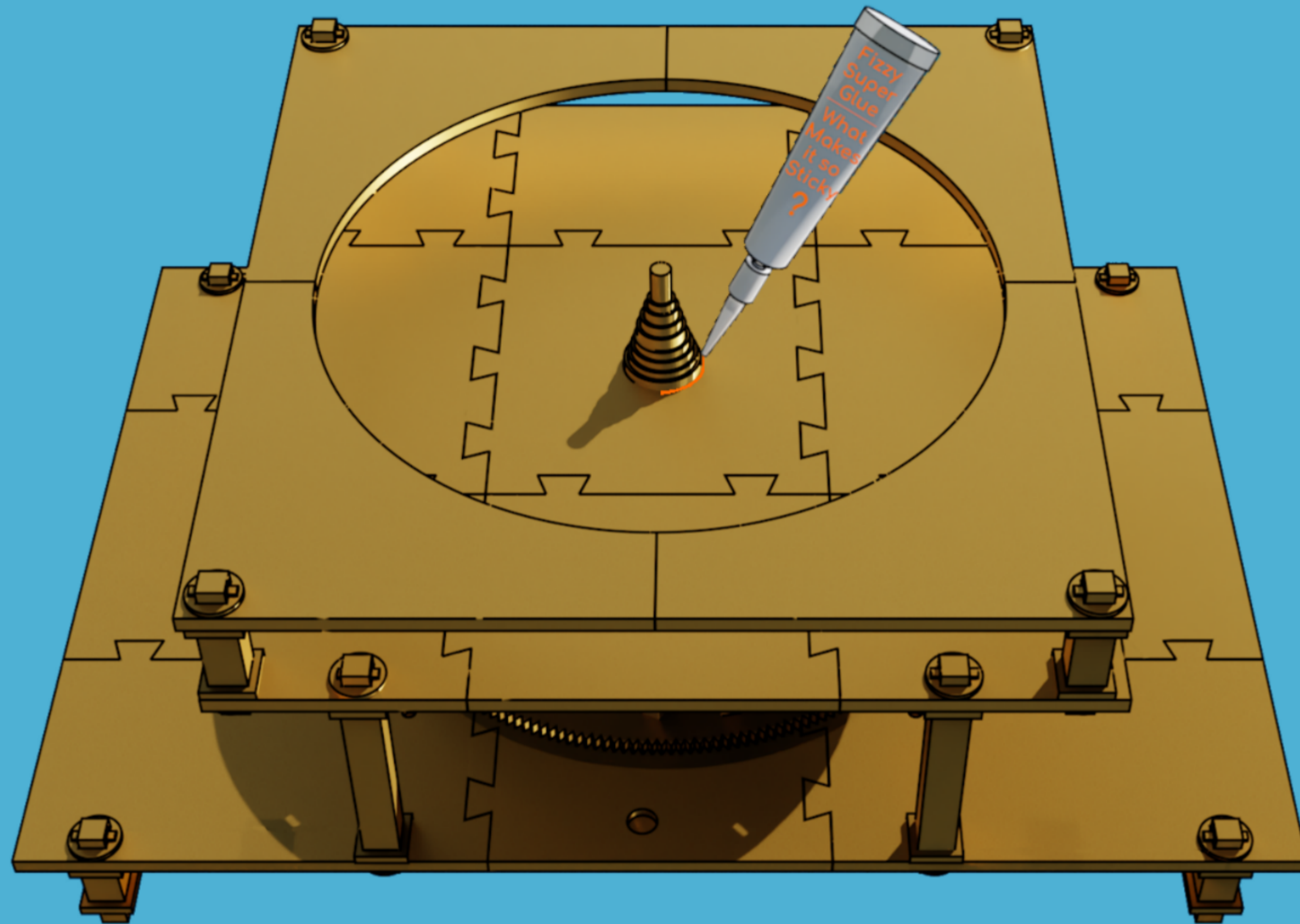
Washer



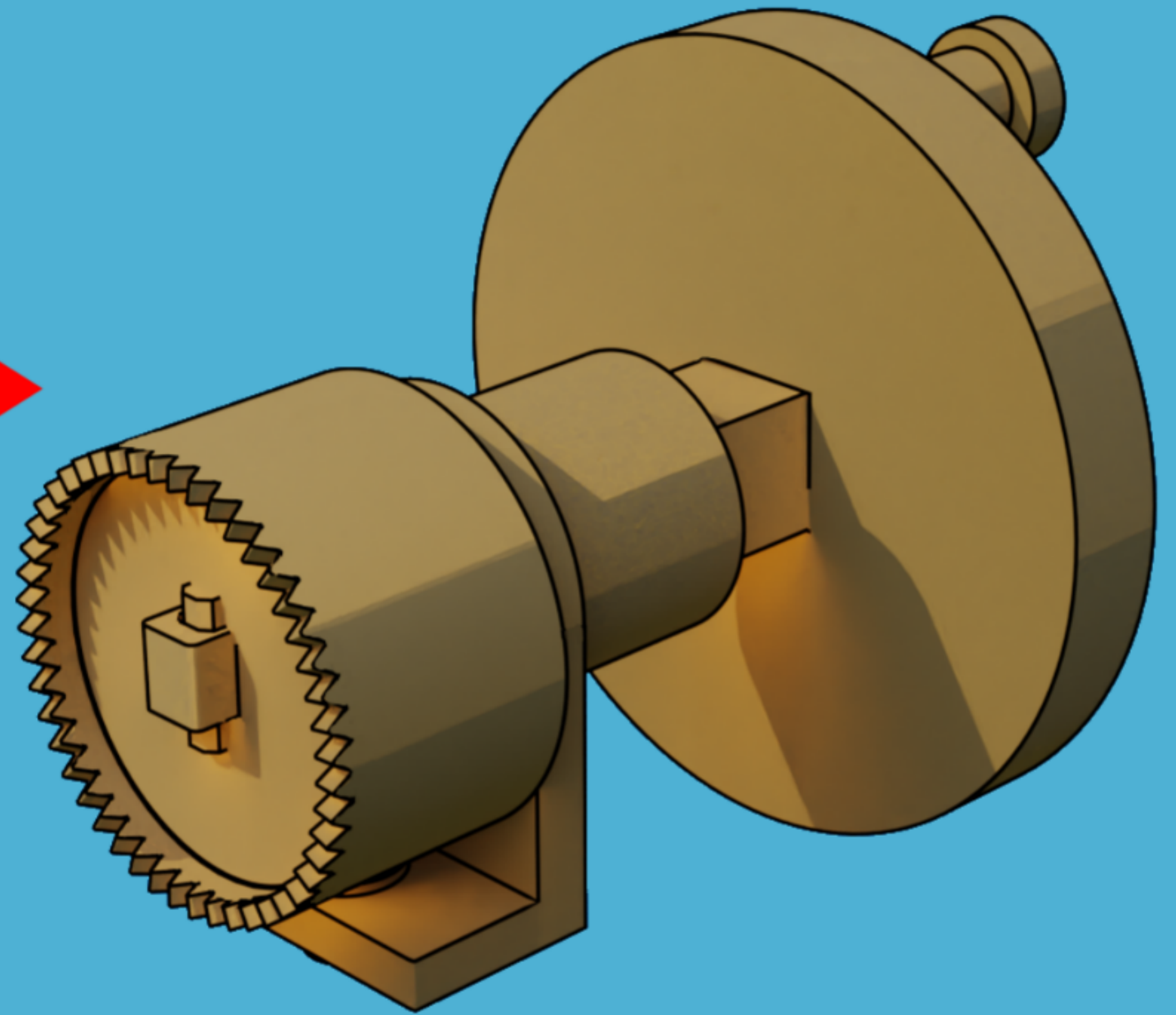
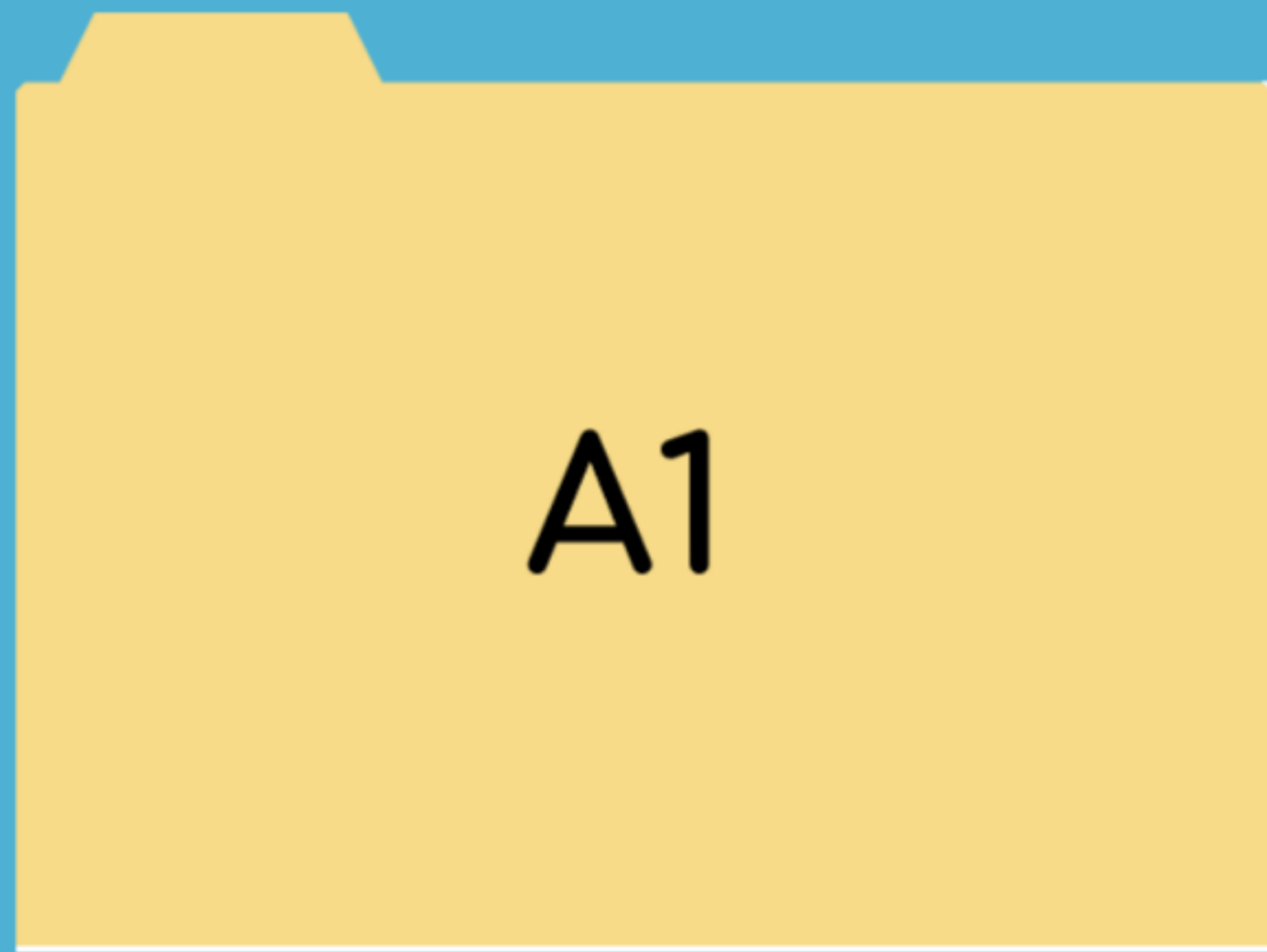


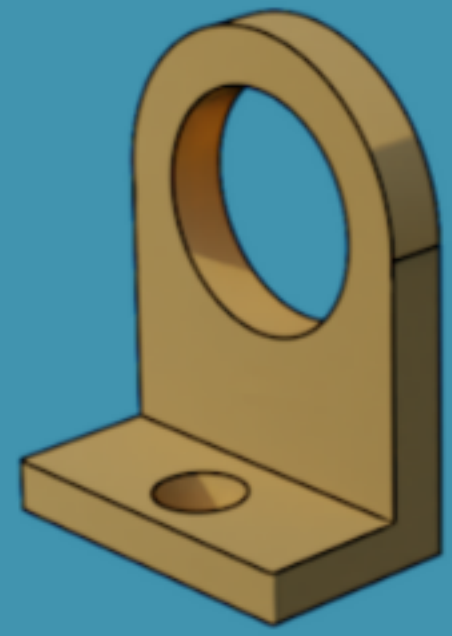
We only removed the Parapegma plates from these renders, as there shadows made it hard to see the rest of the model, you should have yours on.





128

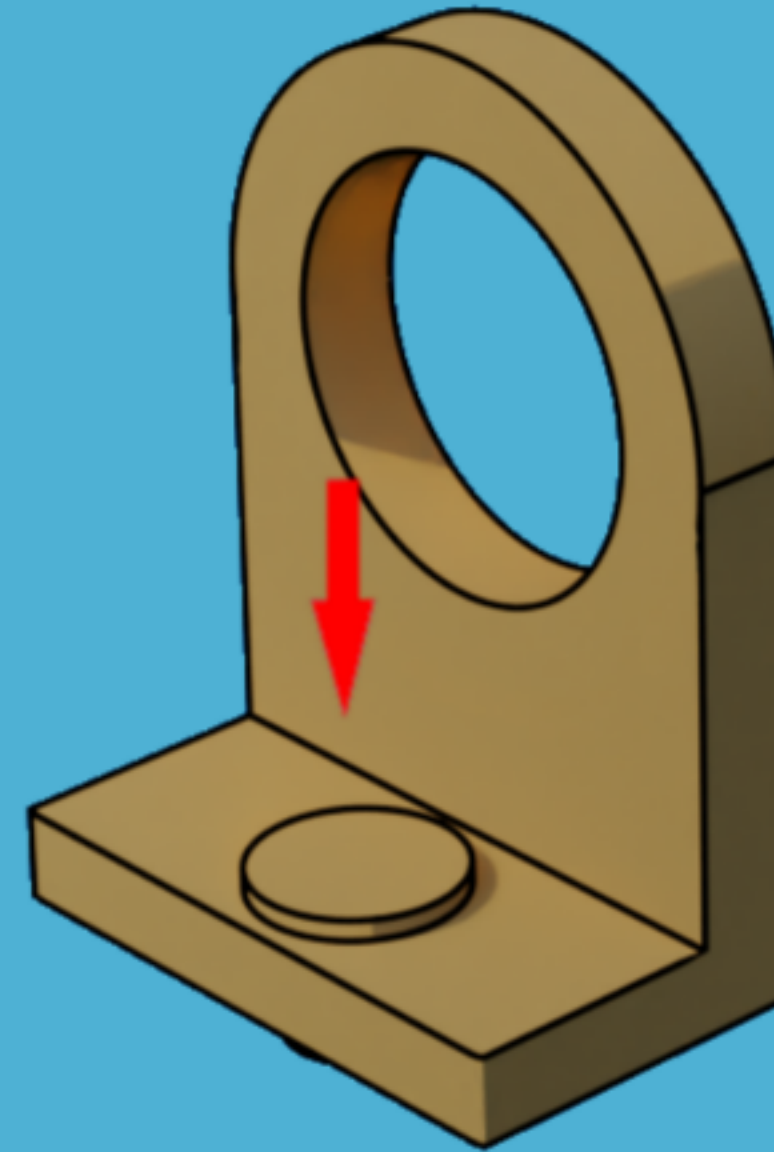




Mount



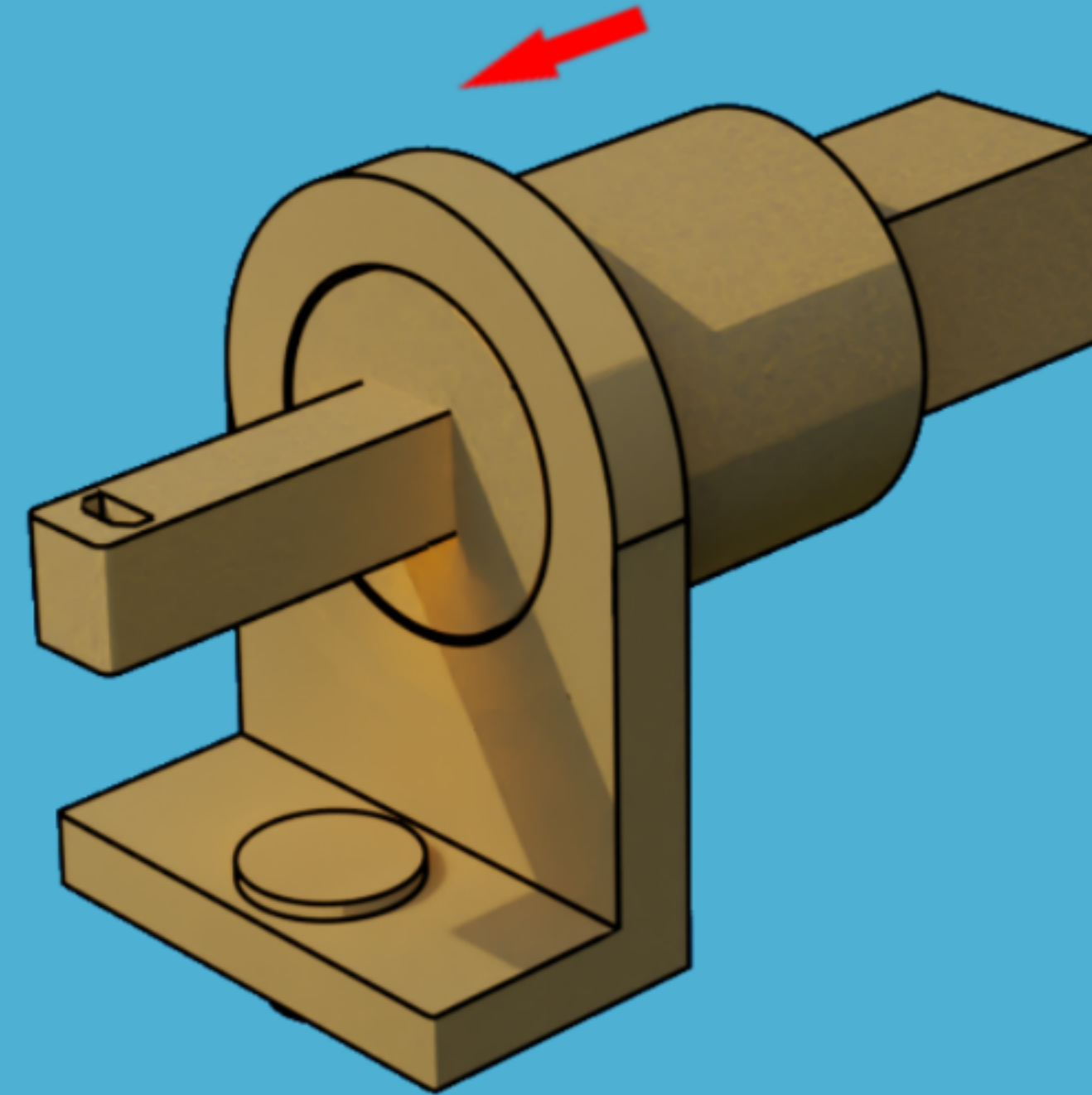
Plug



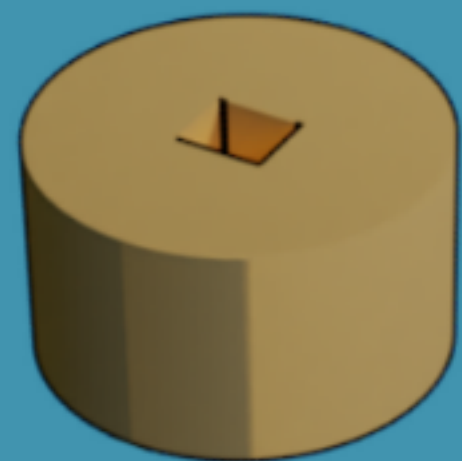
130



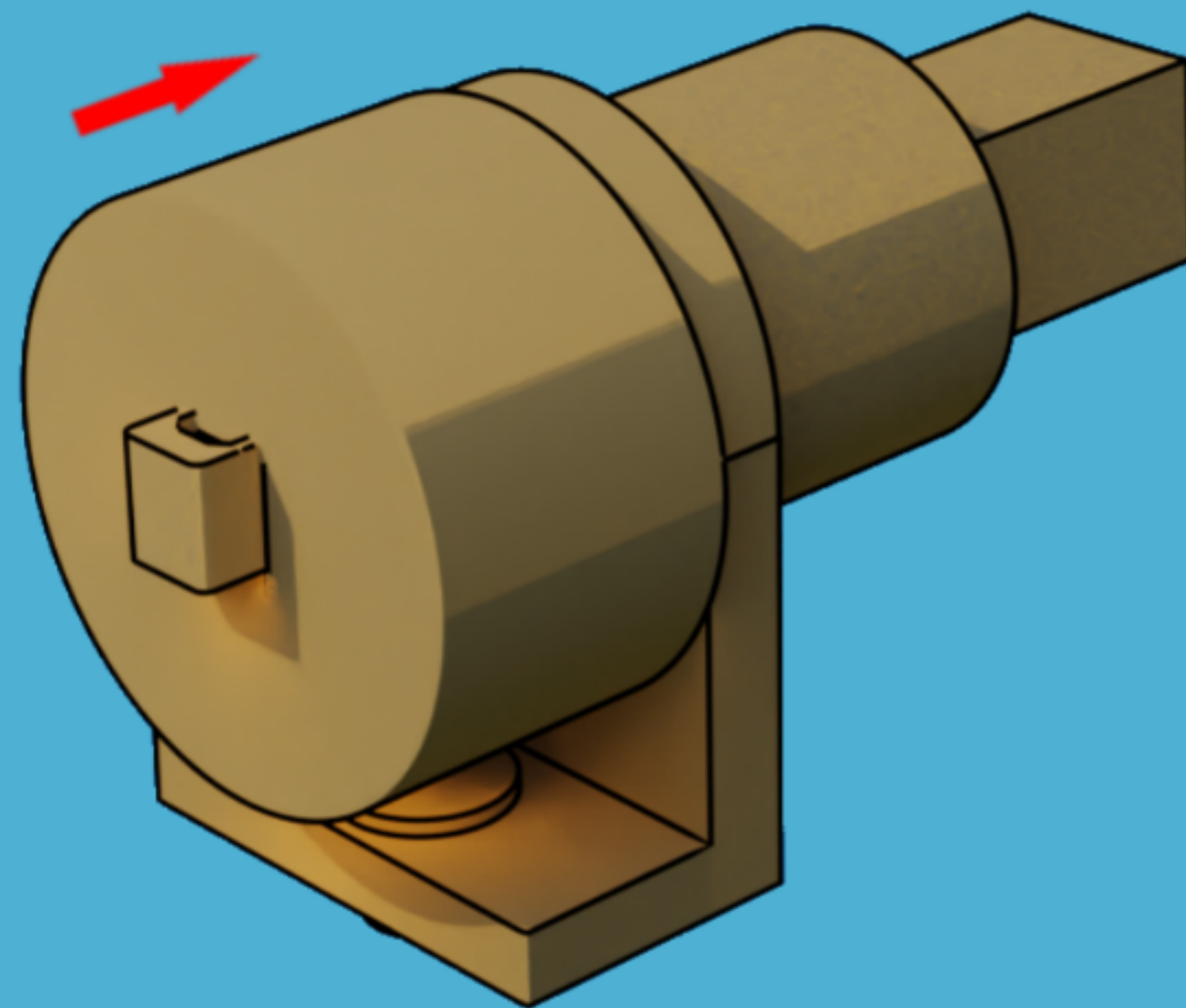
Main
Body
Bearing



131



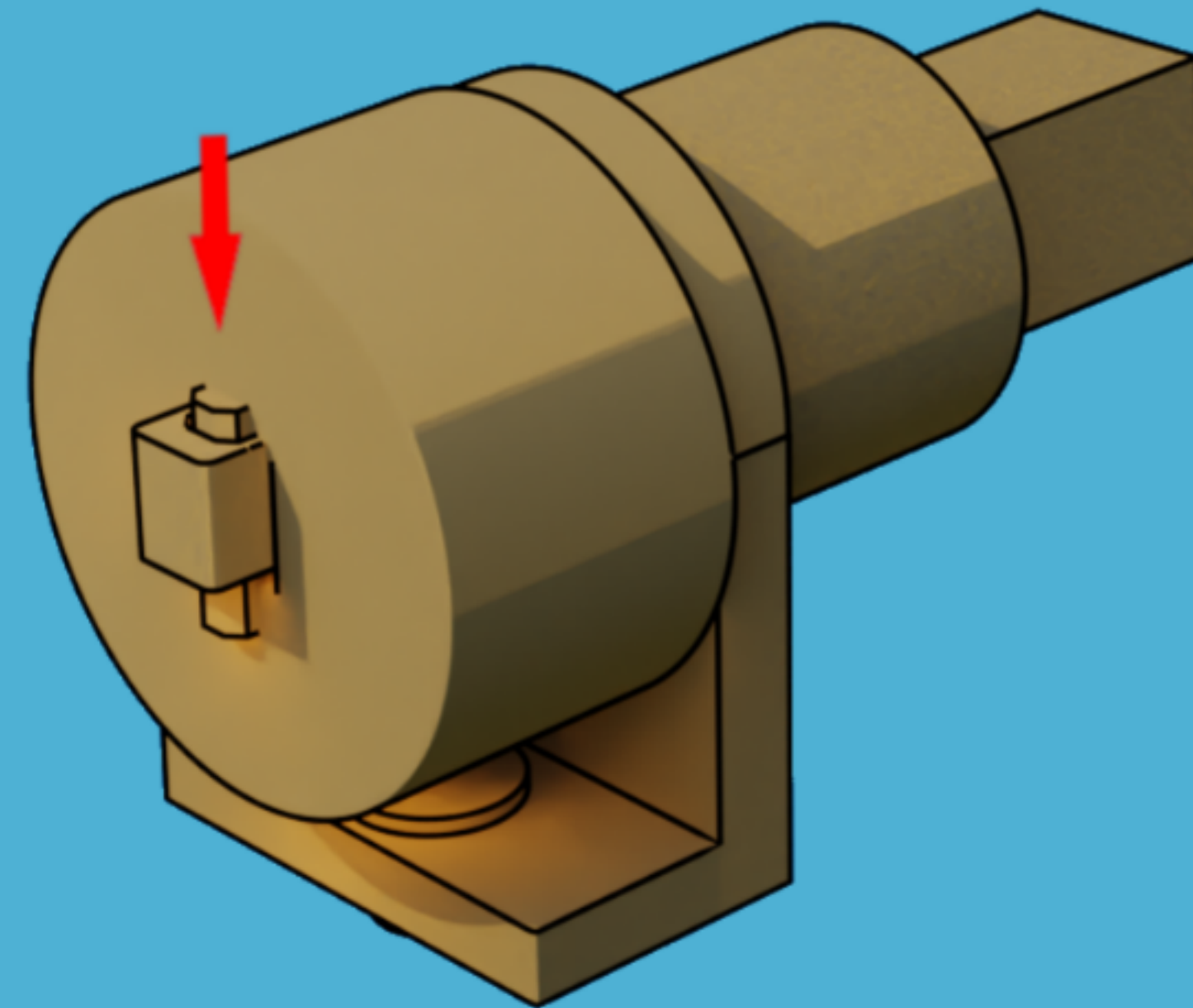
Inner

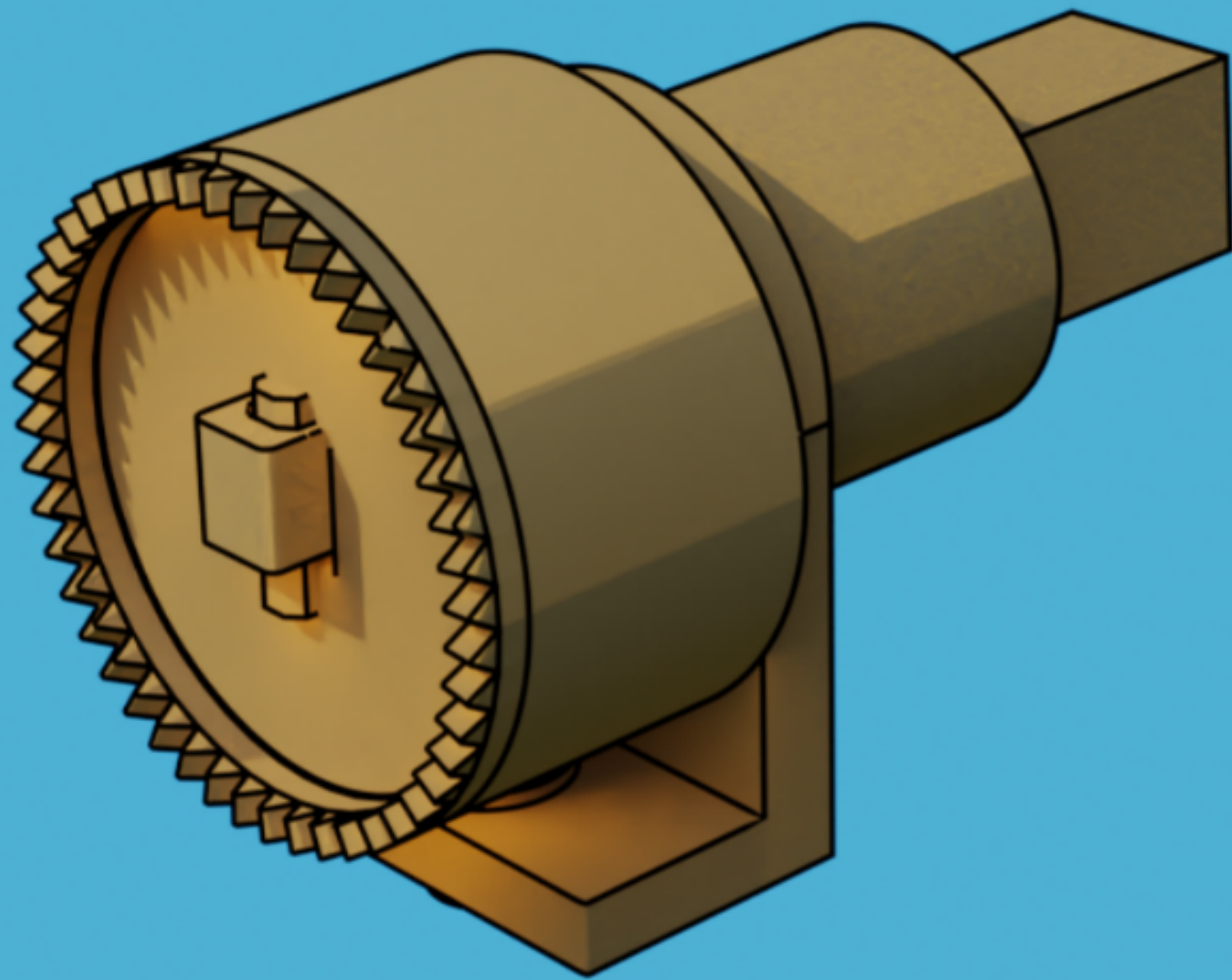
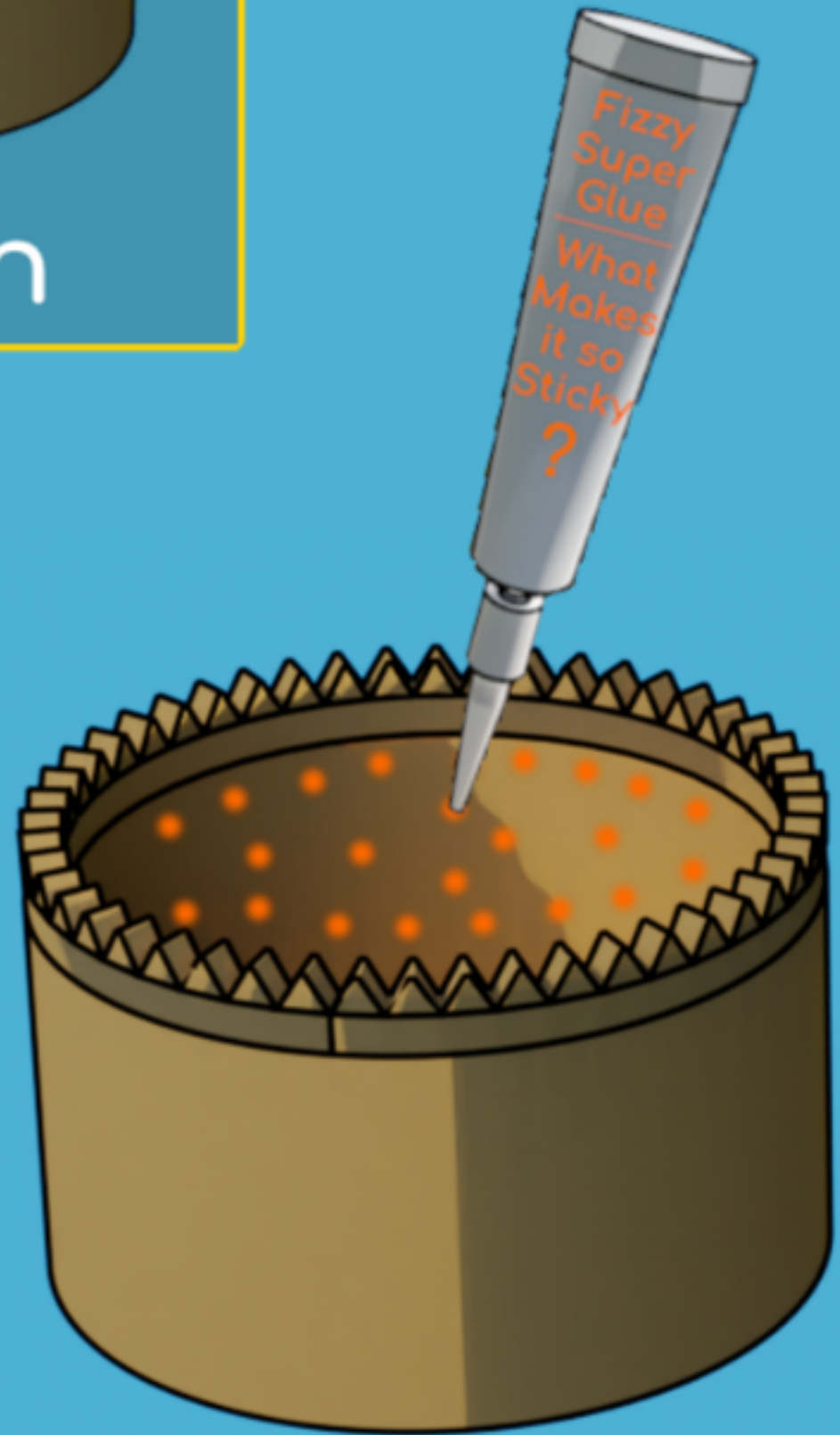


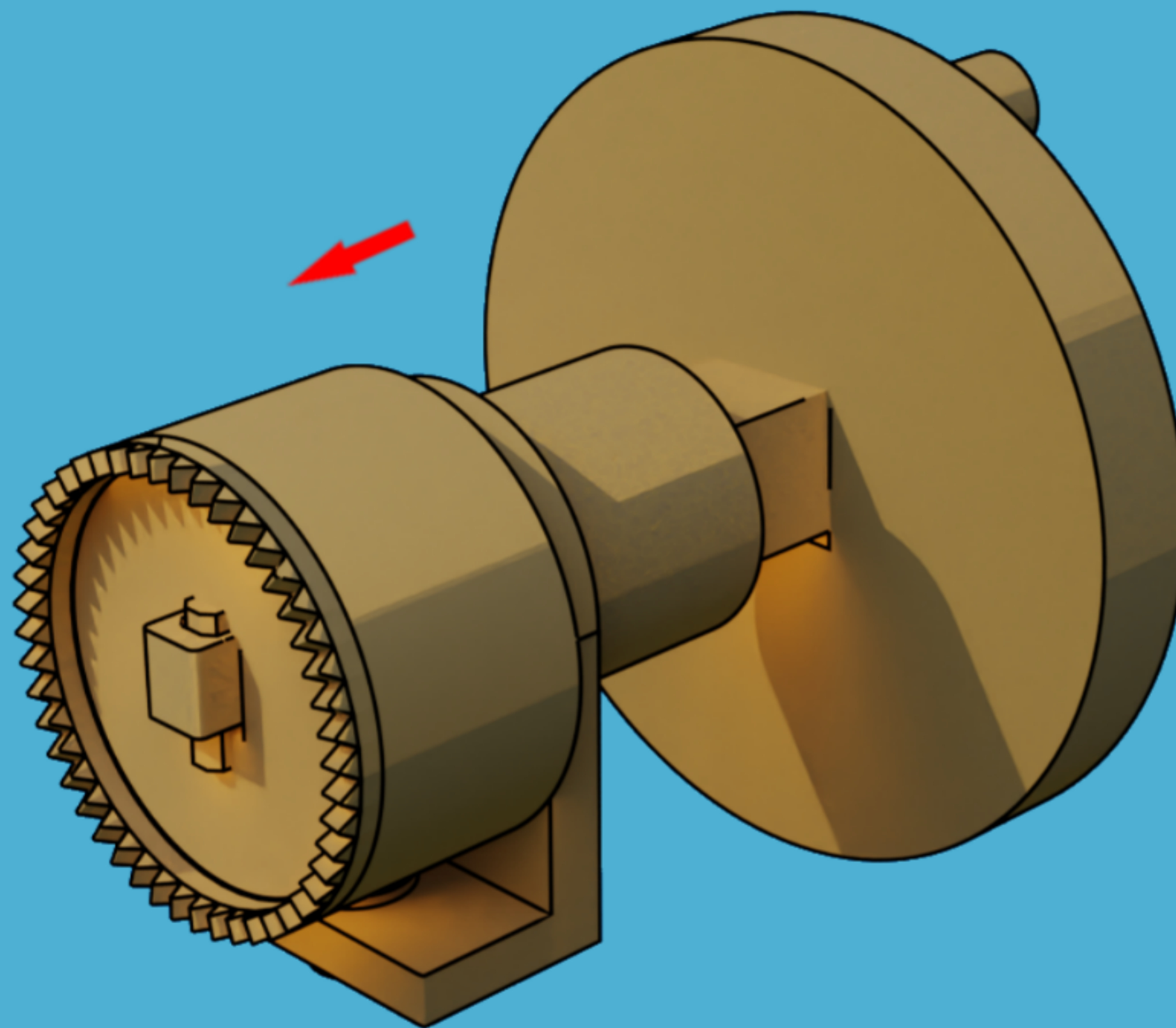
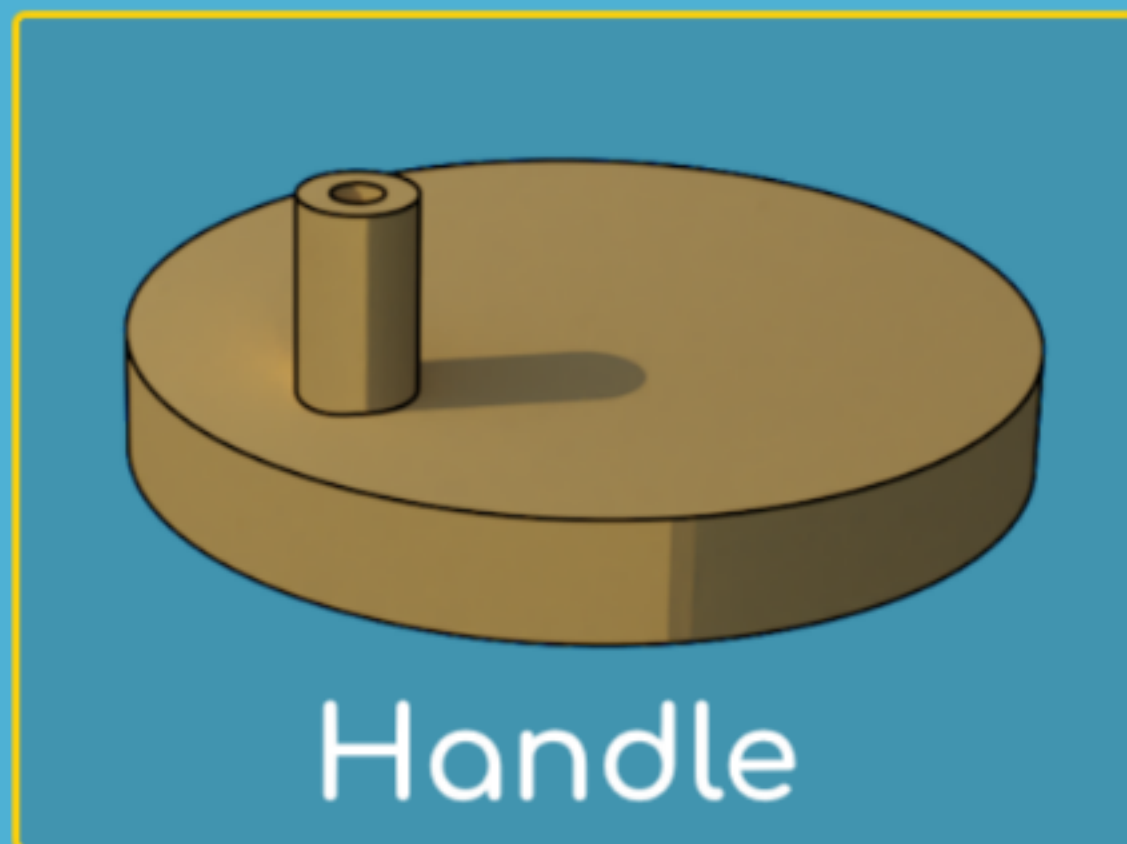
132



Pin



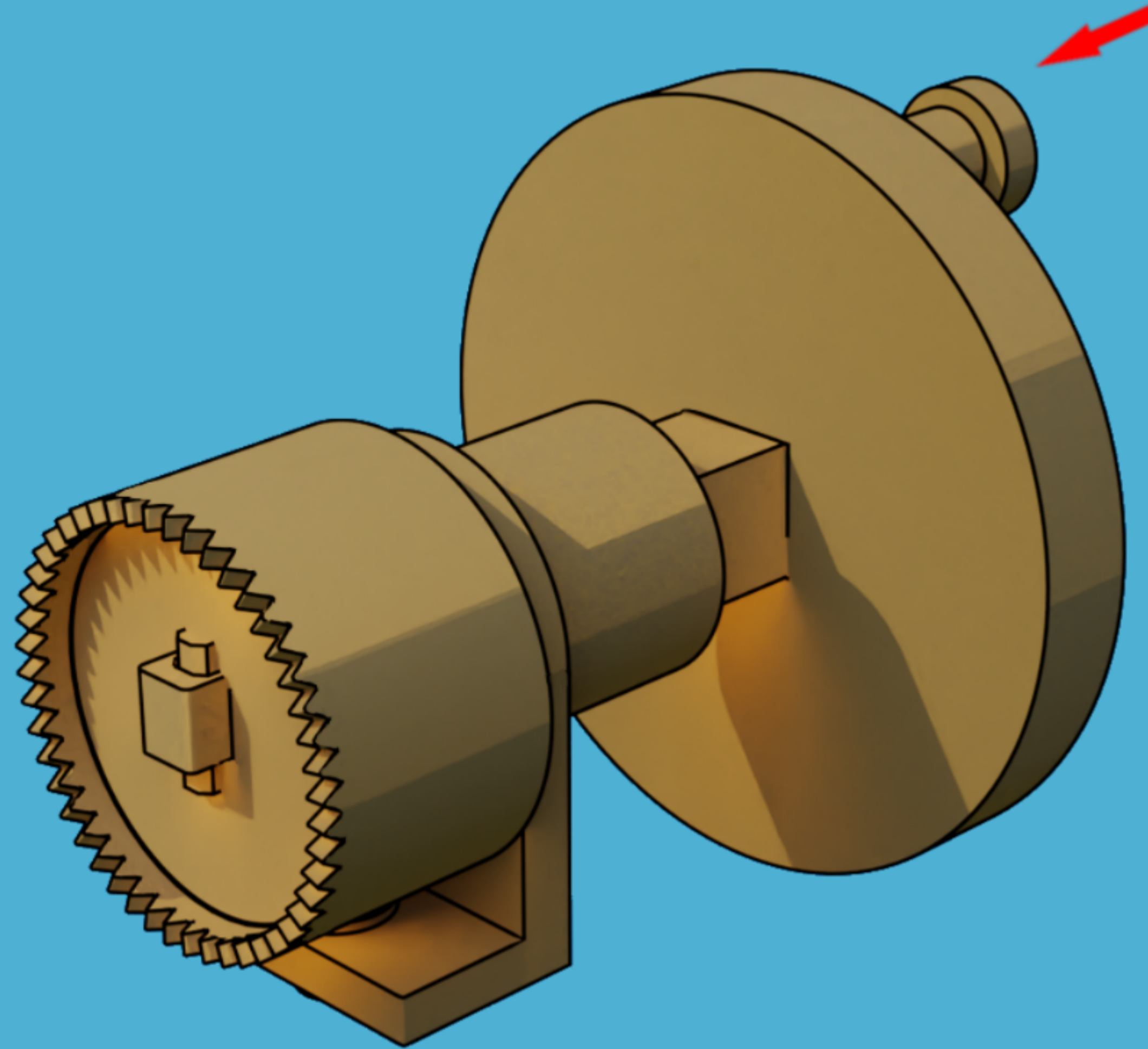


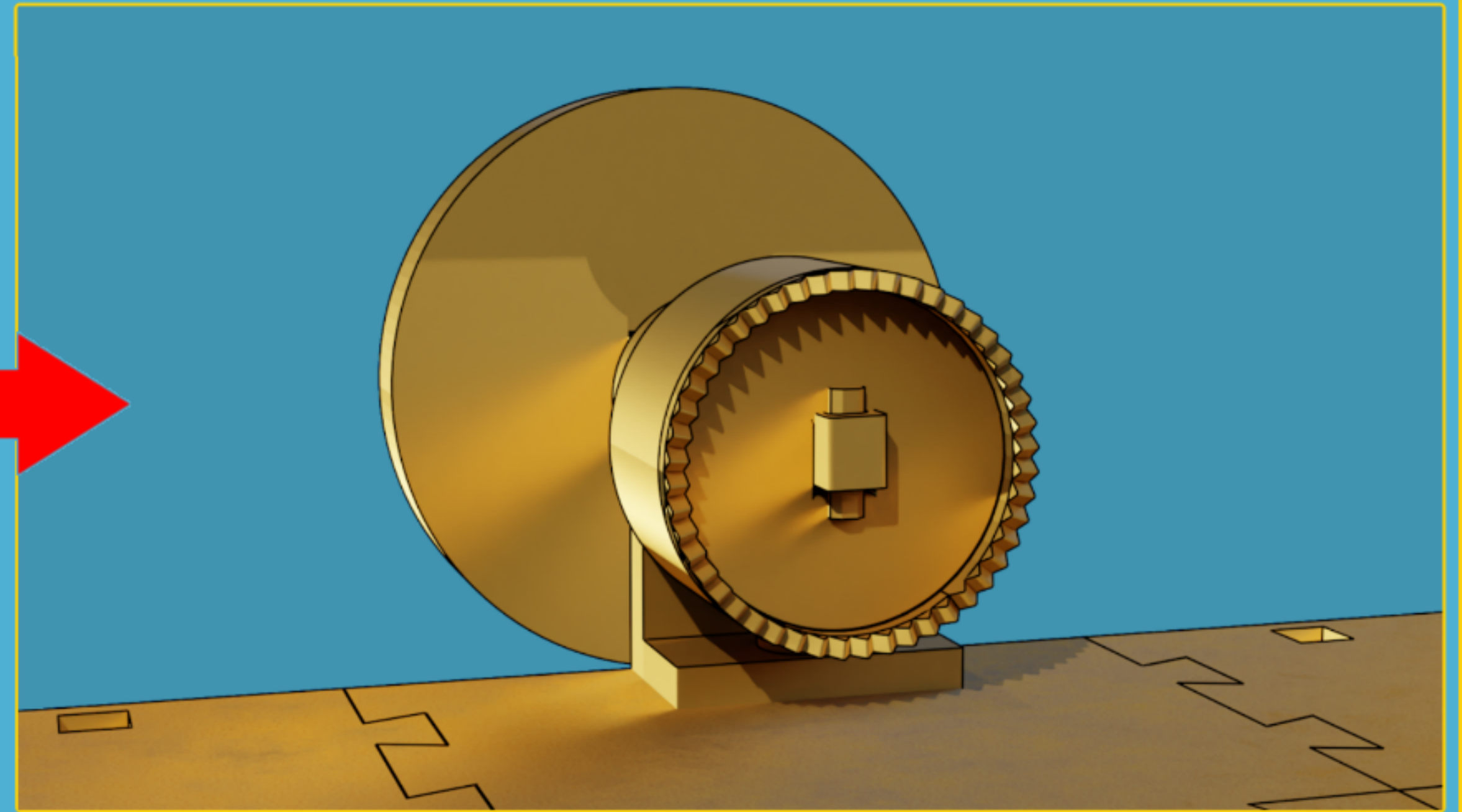
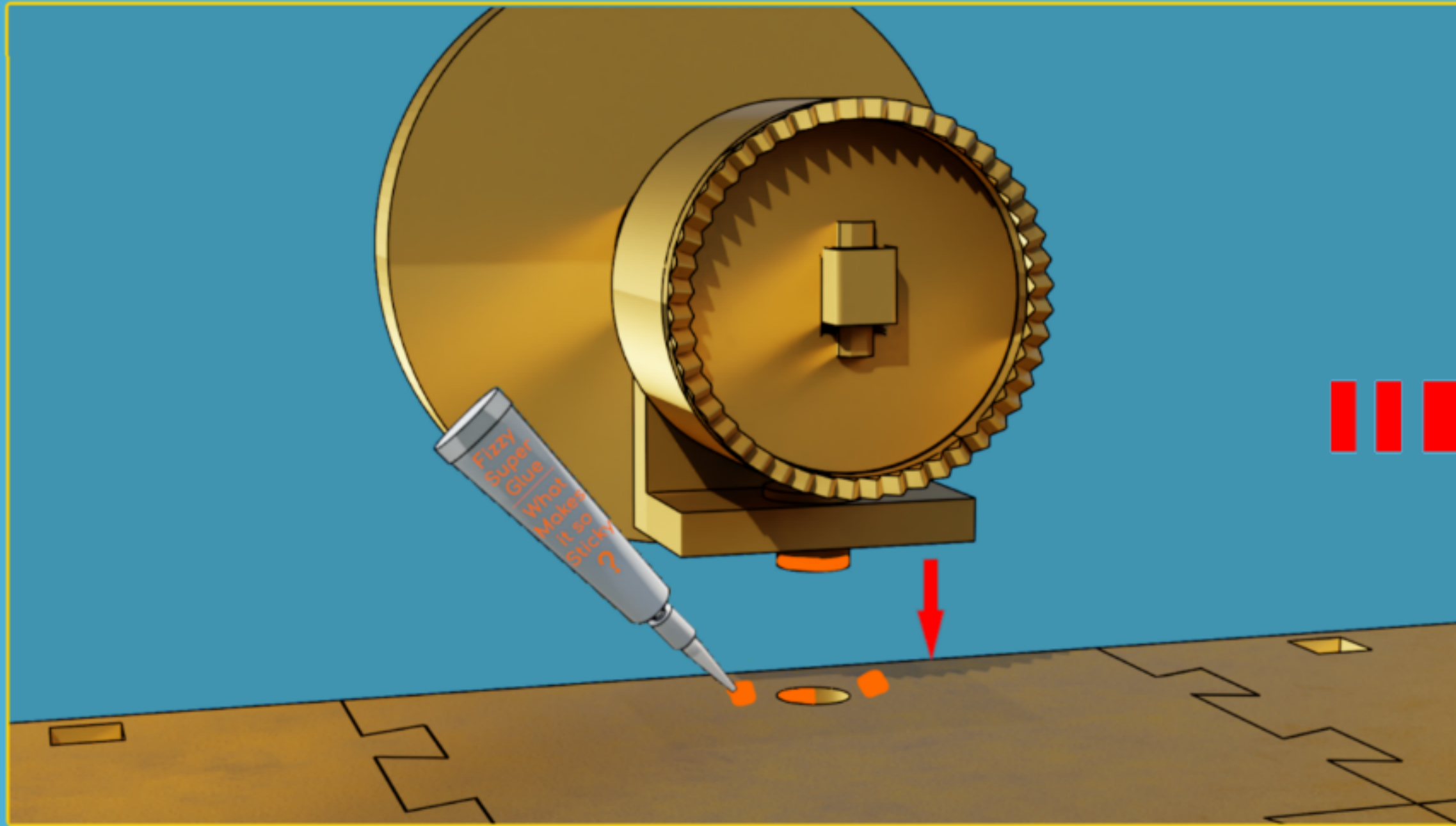


135

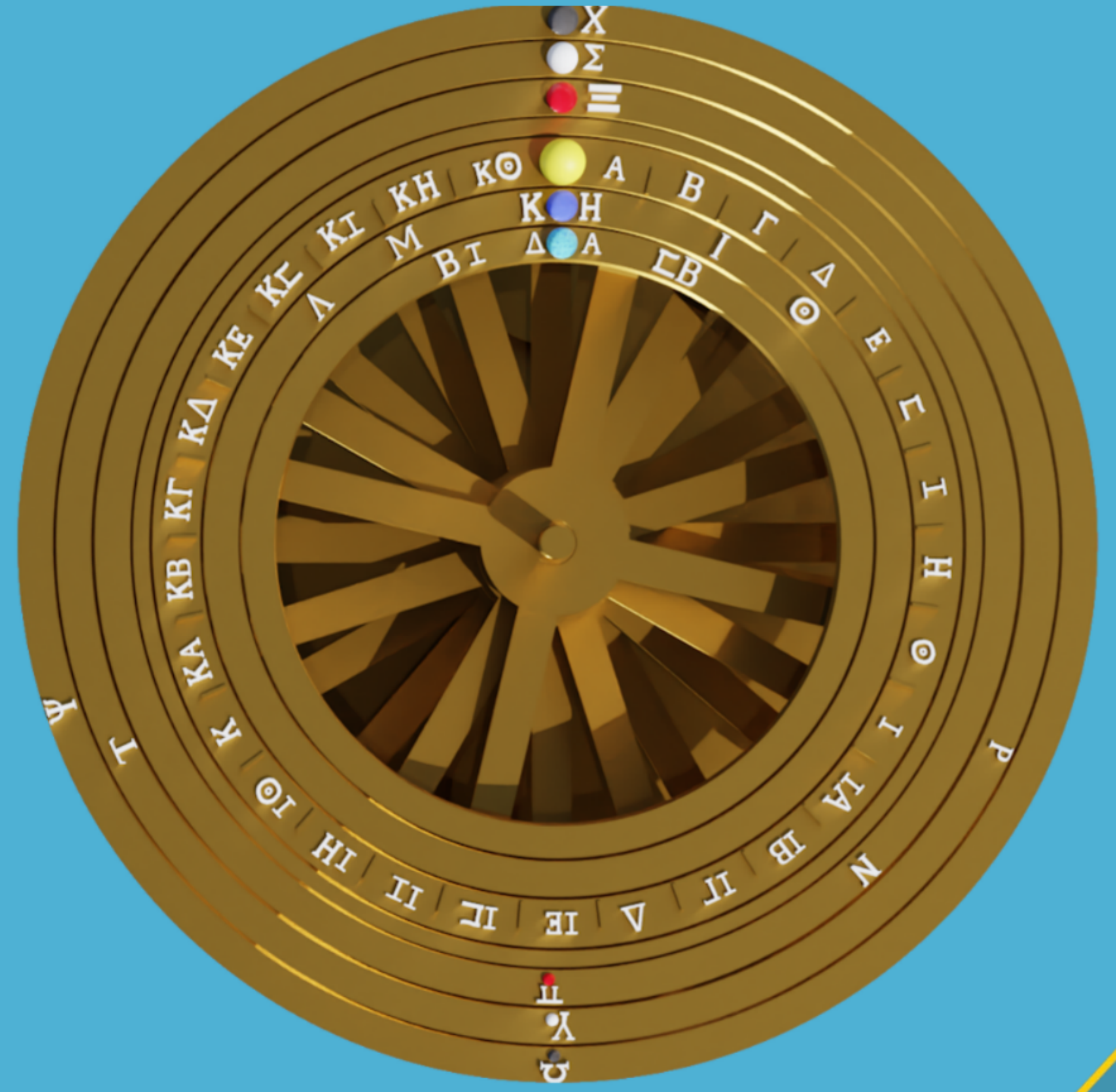
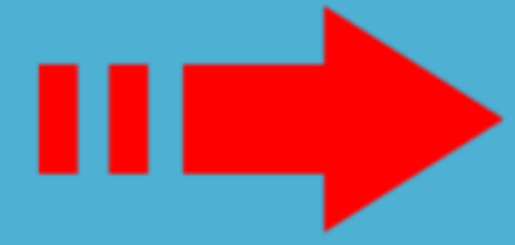


Handle
Button





Planetary Rings



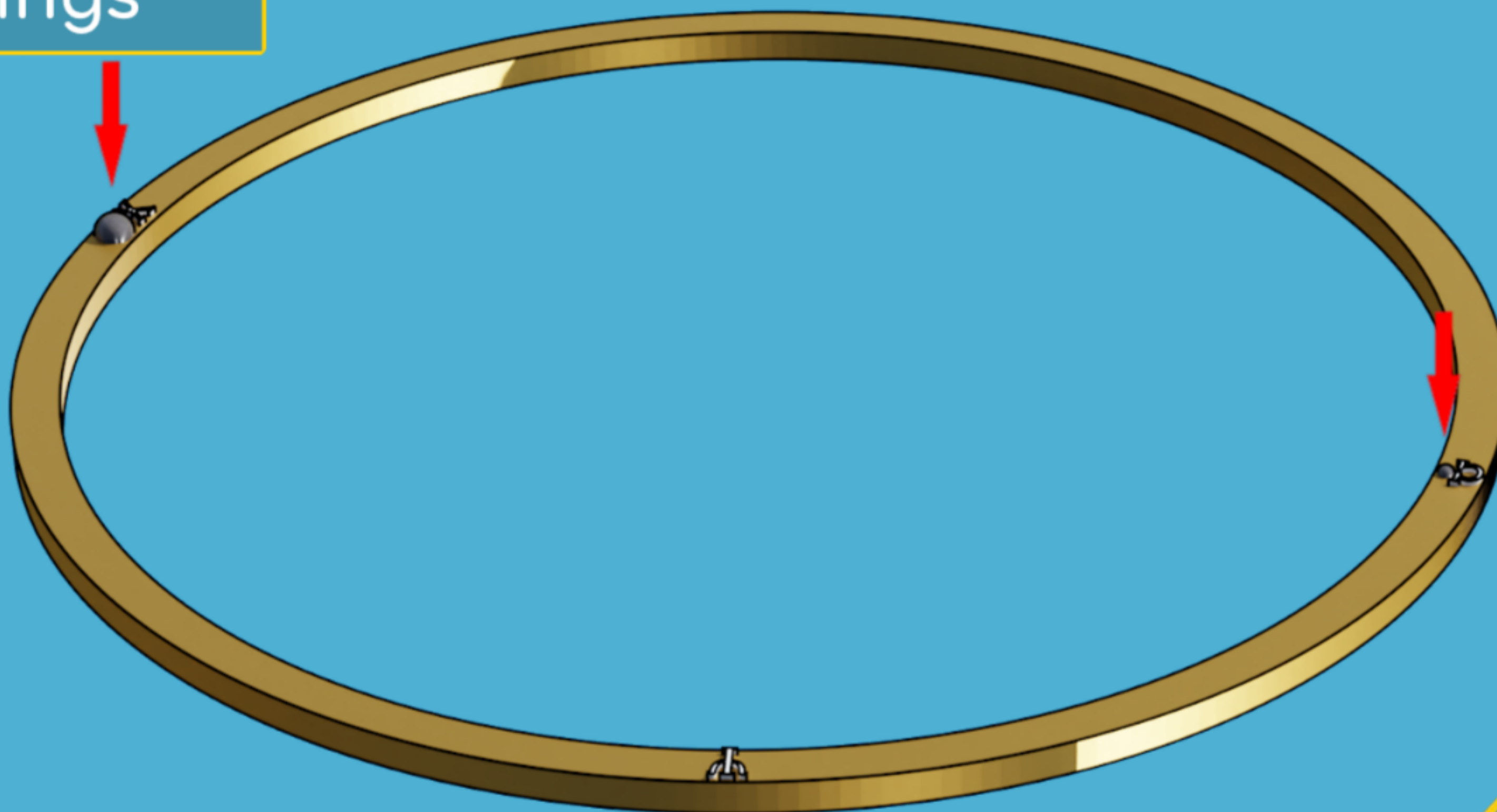


Small Planet

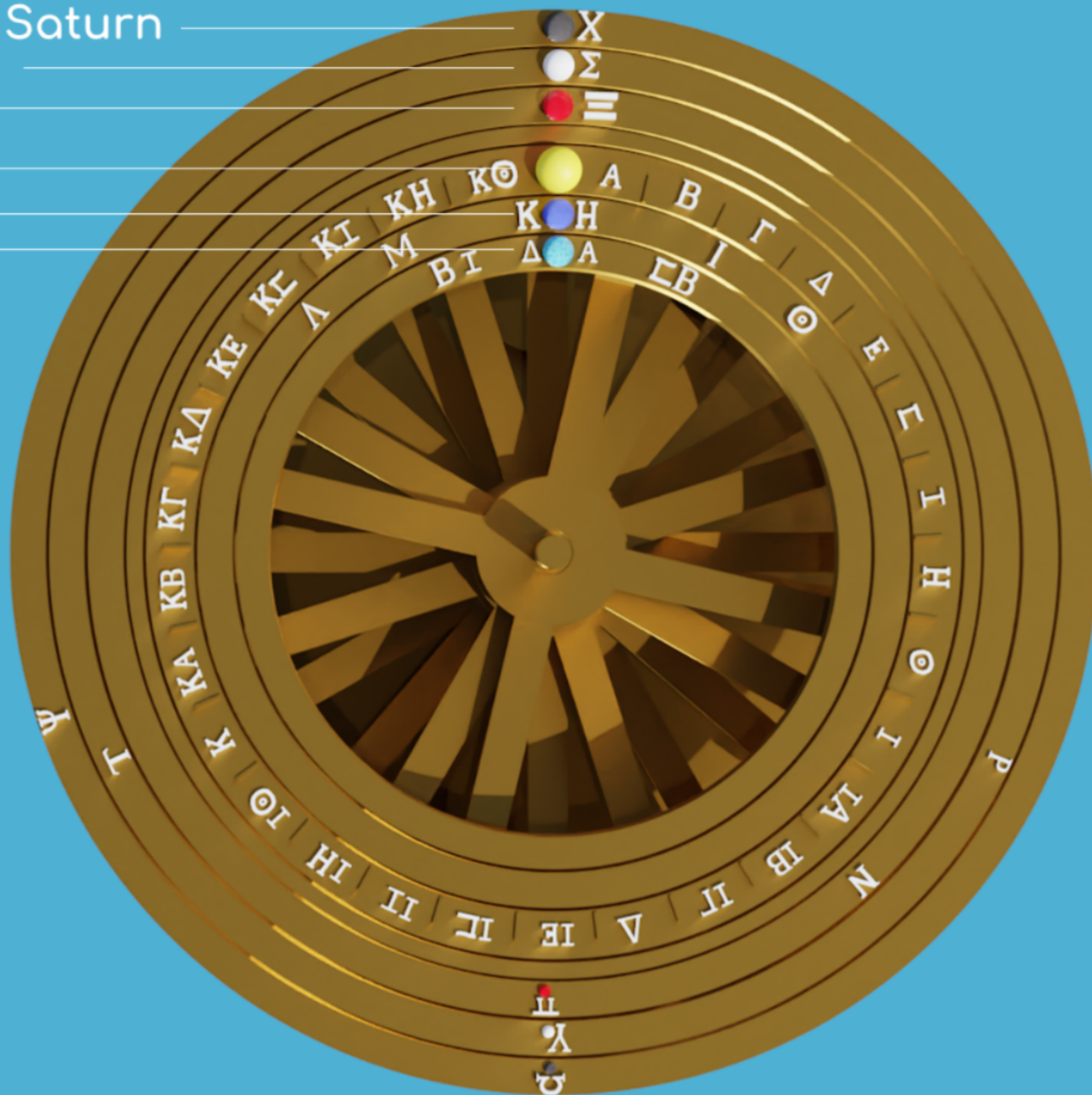
Planet

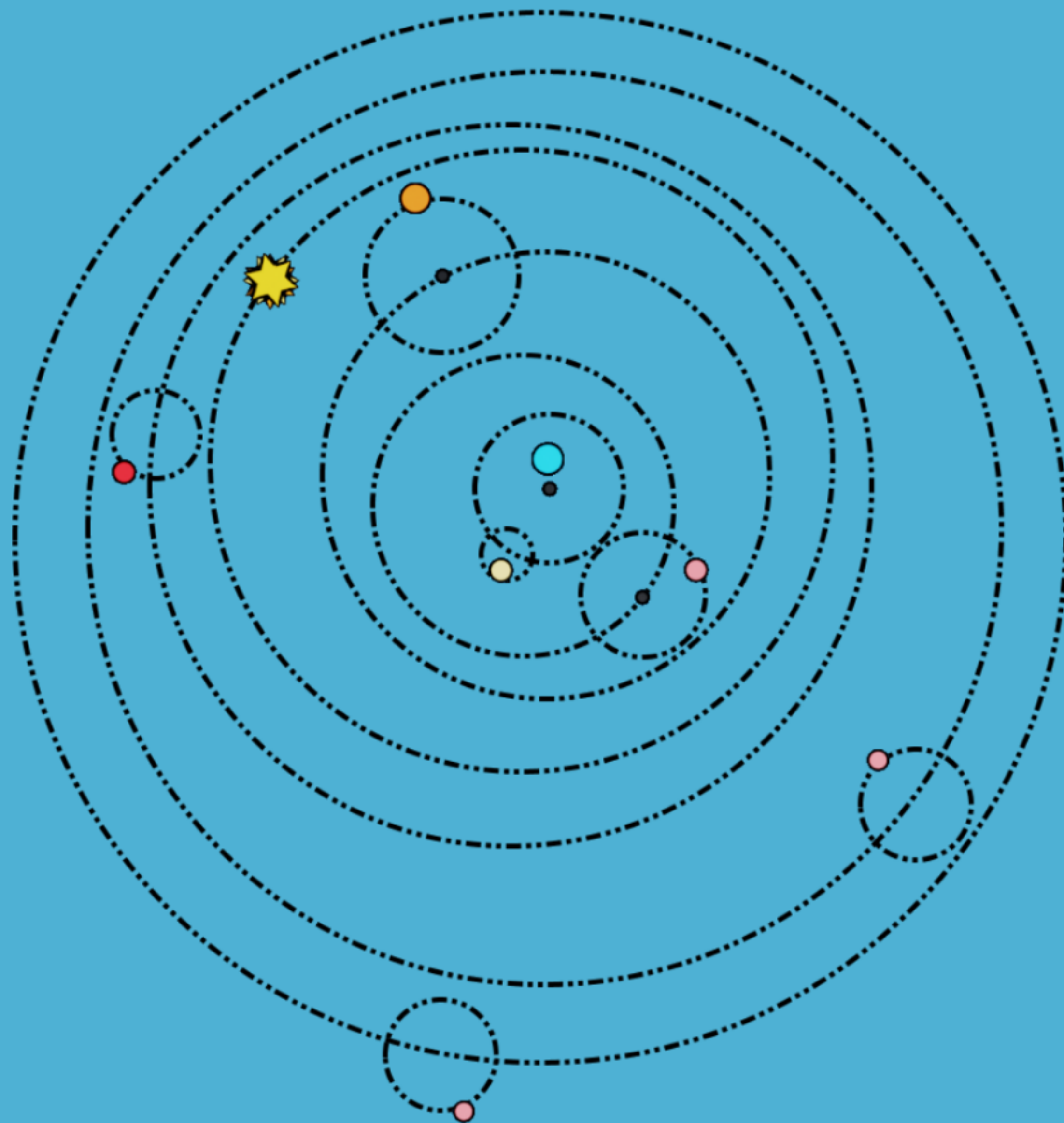
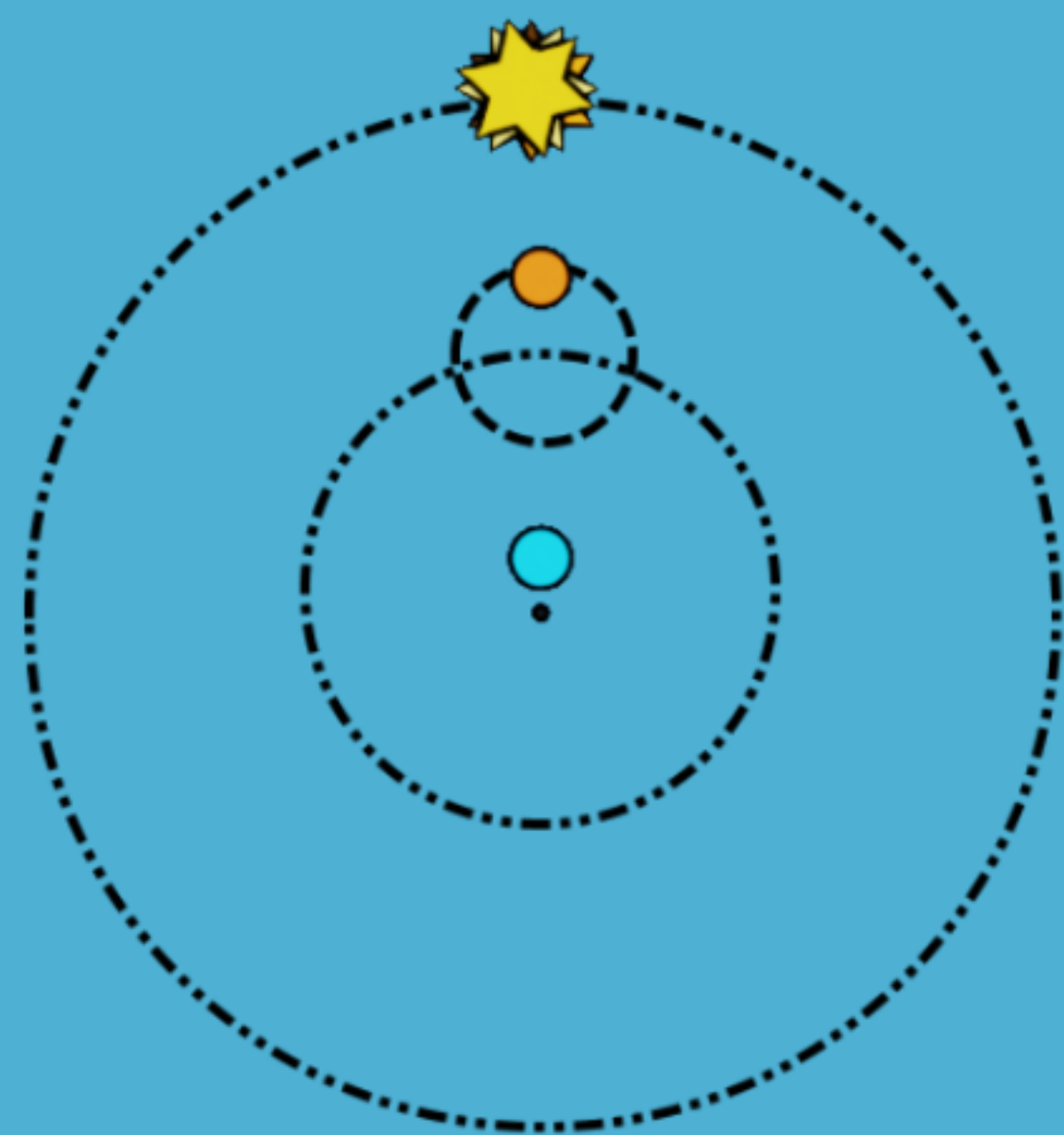


Planetary Rings
x6

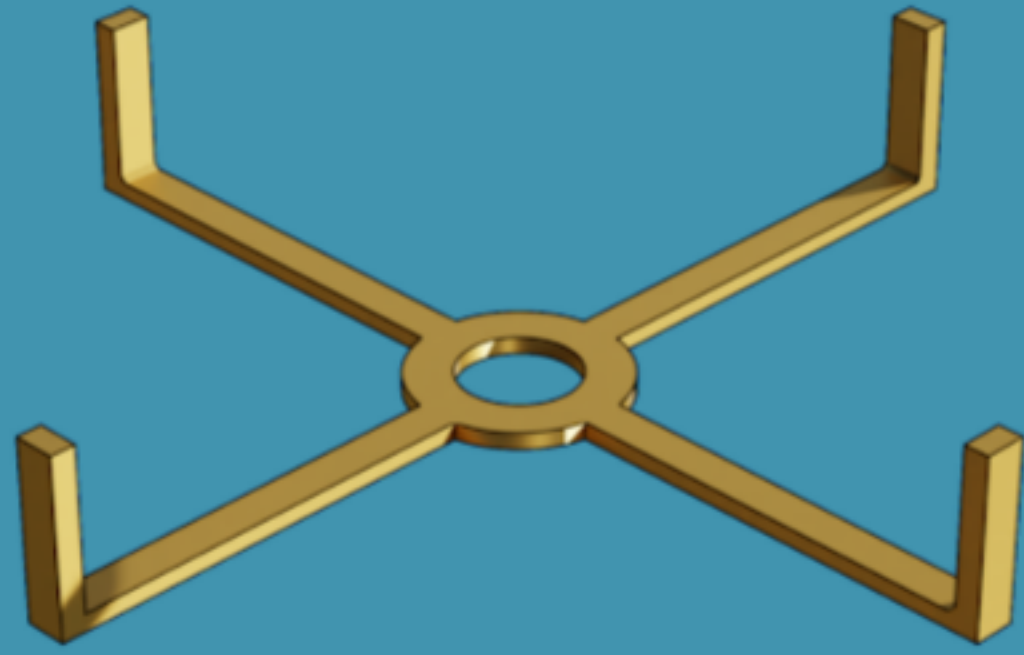


Saturn —
 Jupiter —
 Mars —
 Sun —
 Venus —
 Mercury —

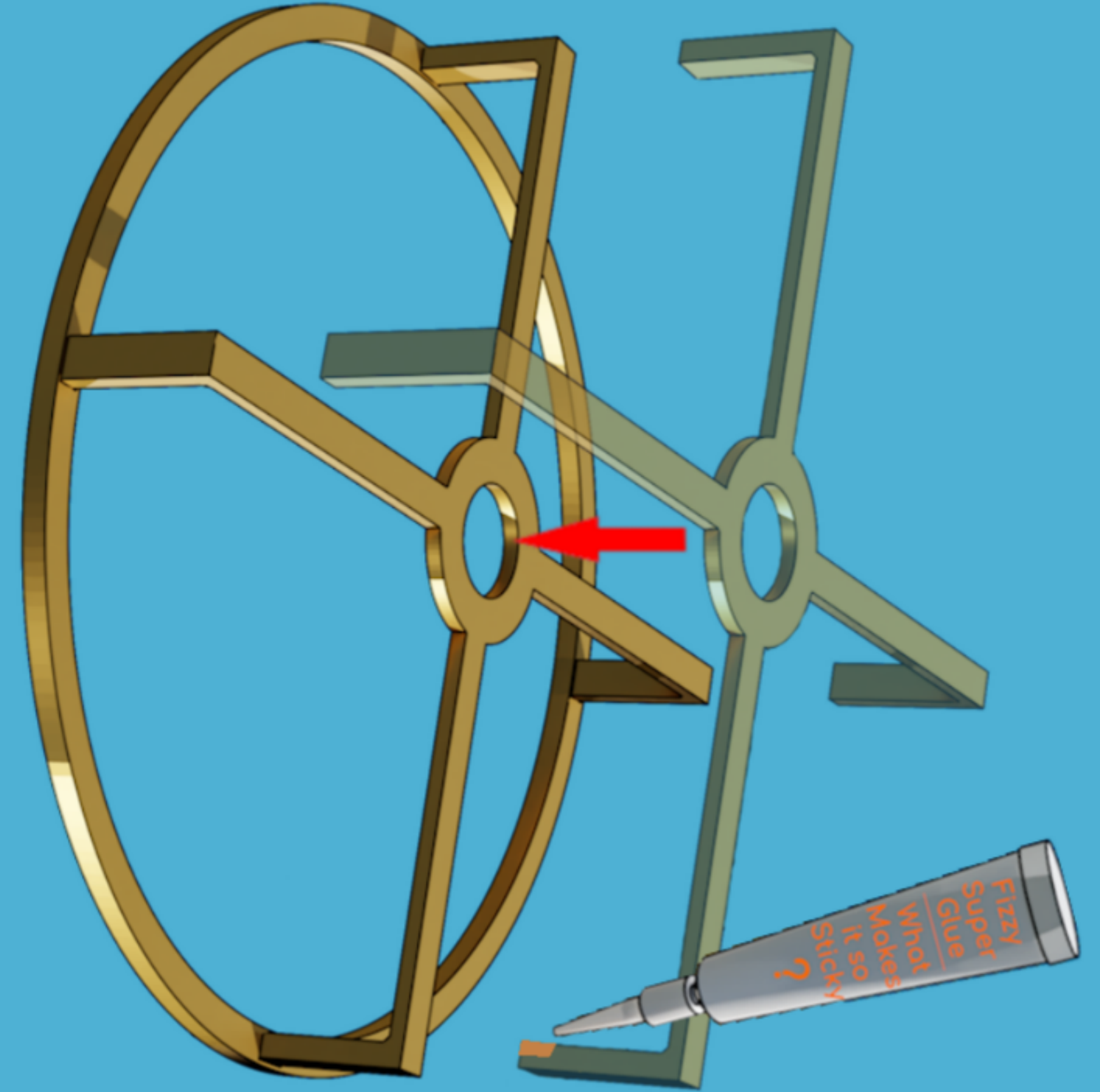




140

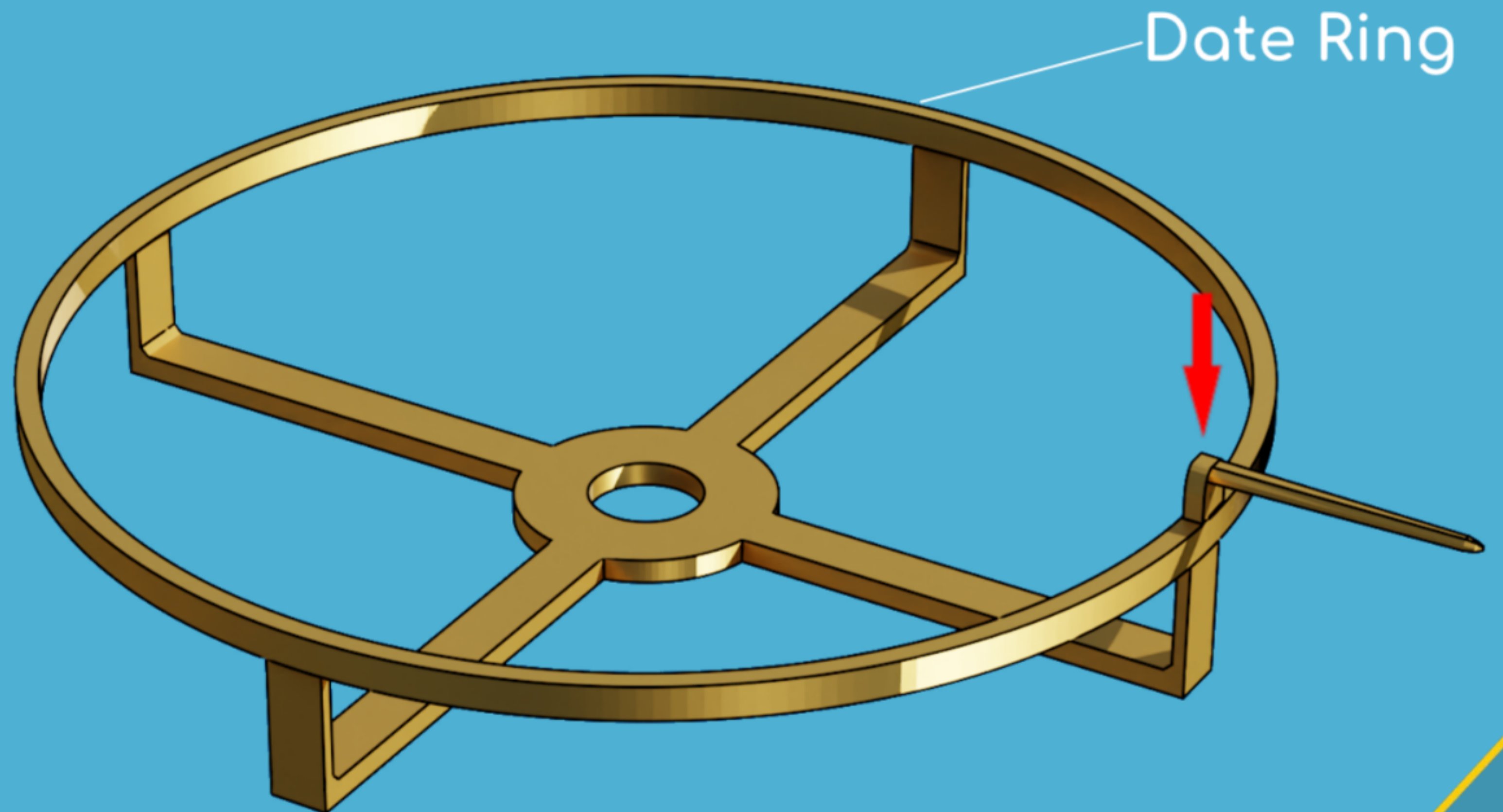
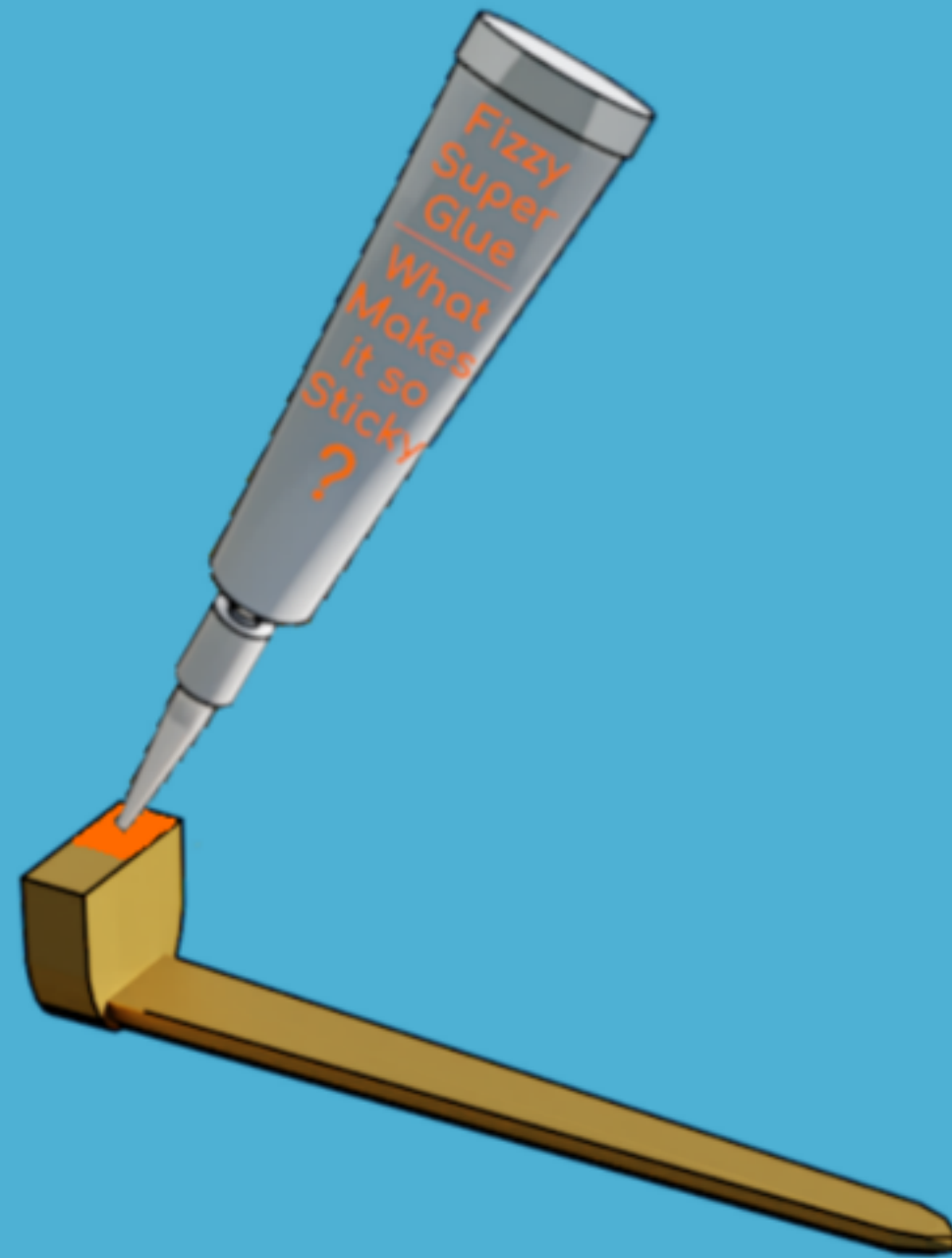


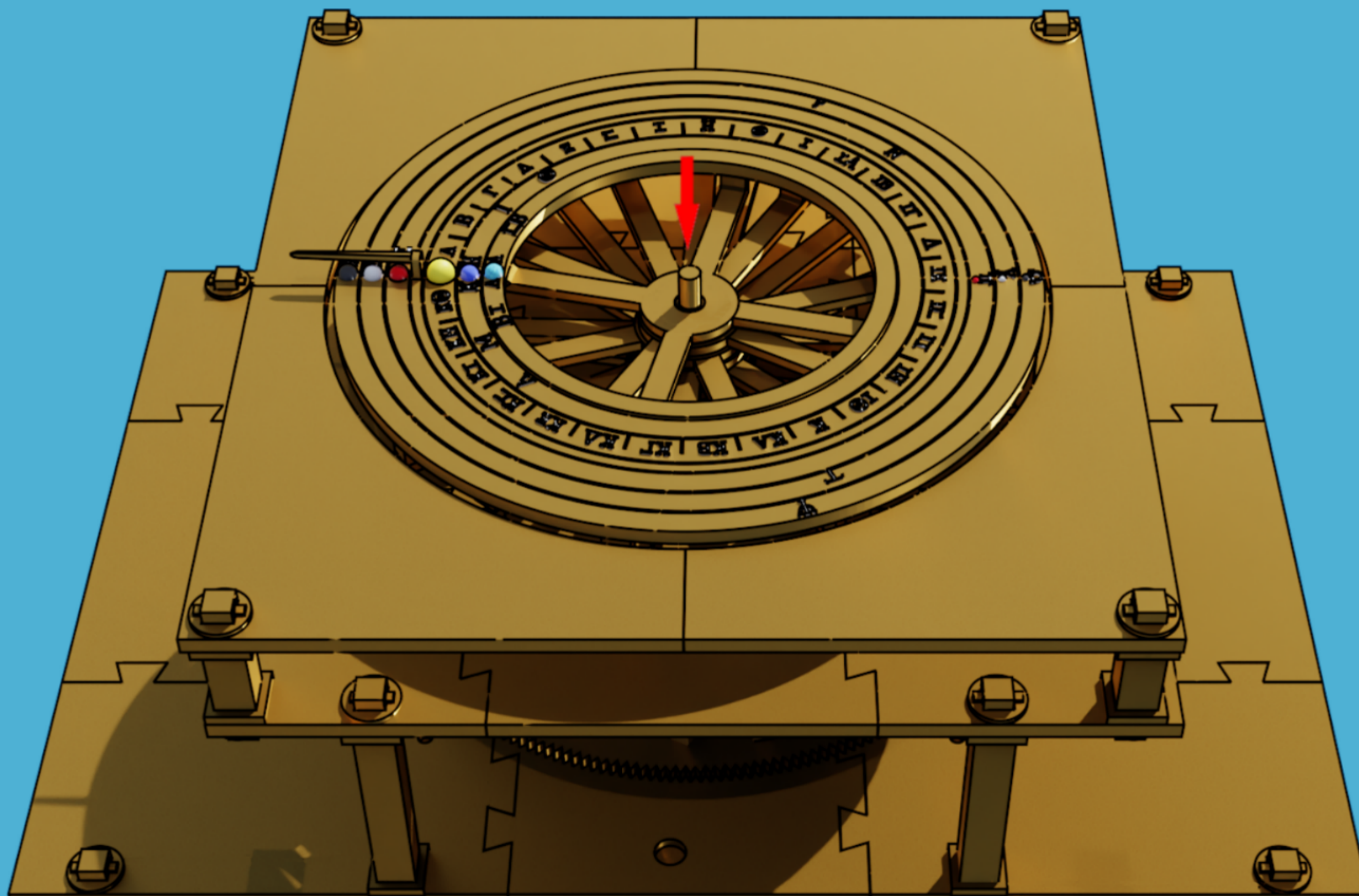
Ring
Connector x7



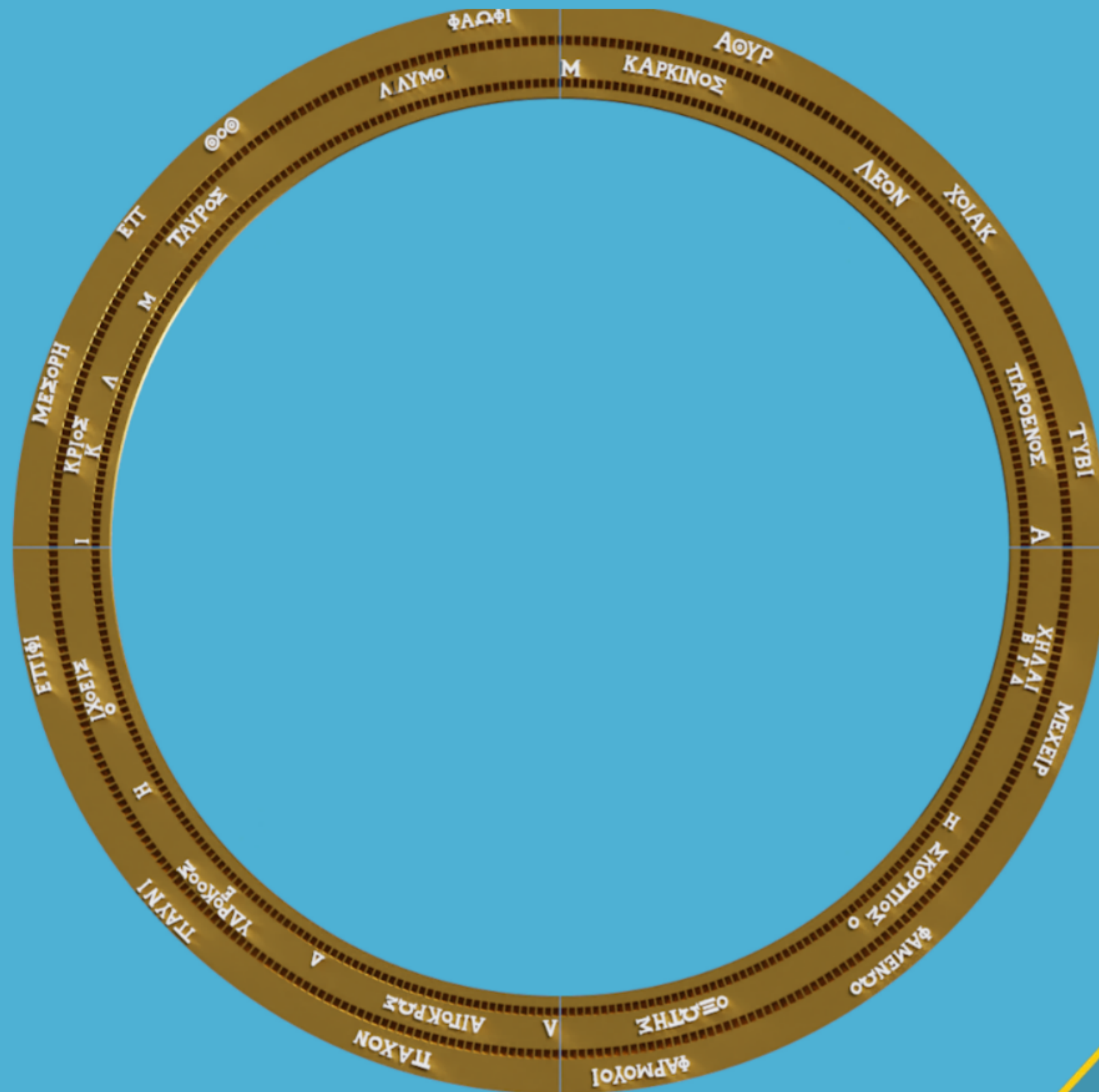


Date Pointer

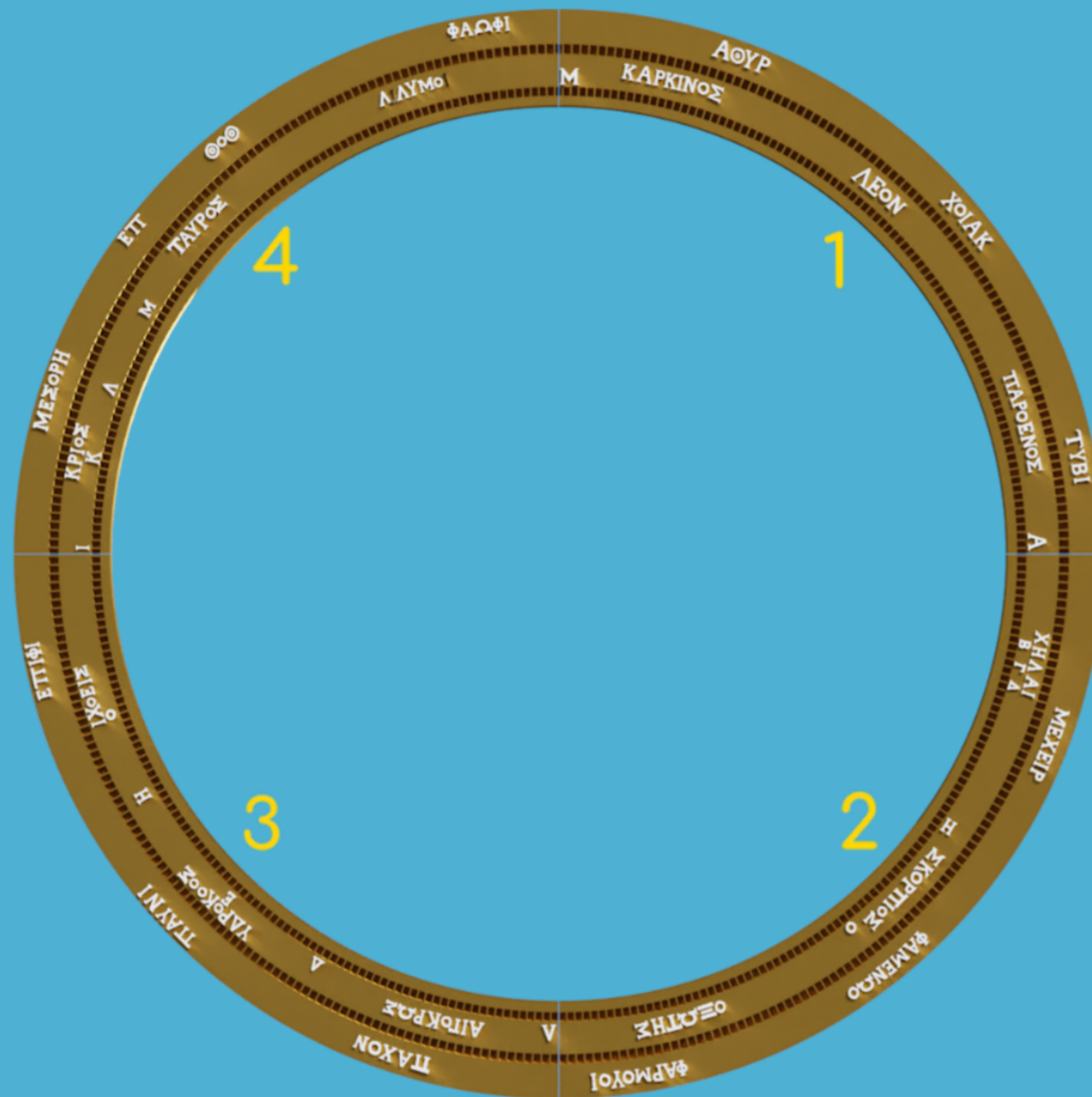


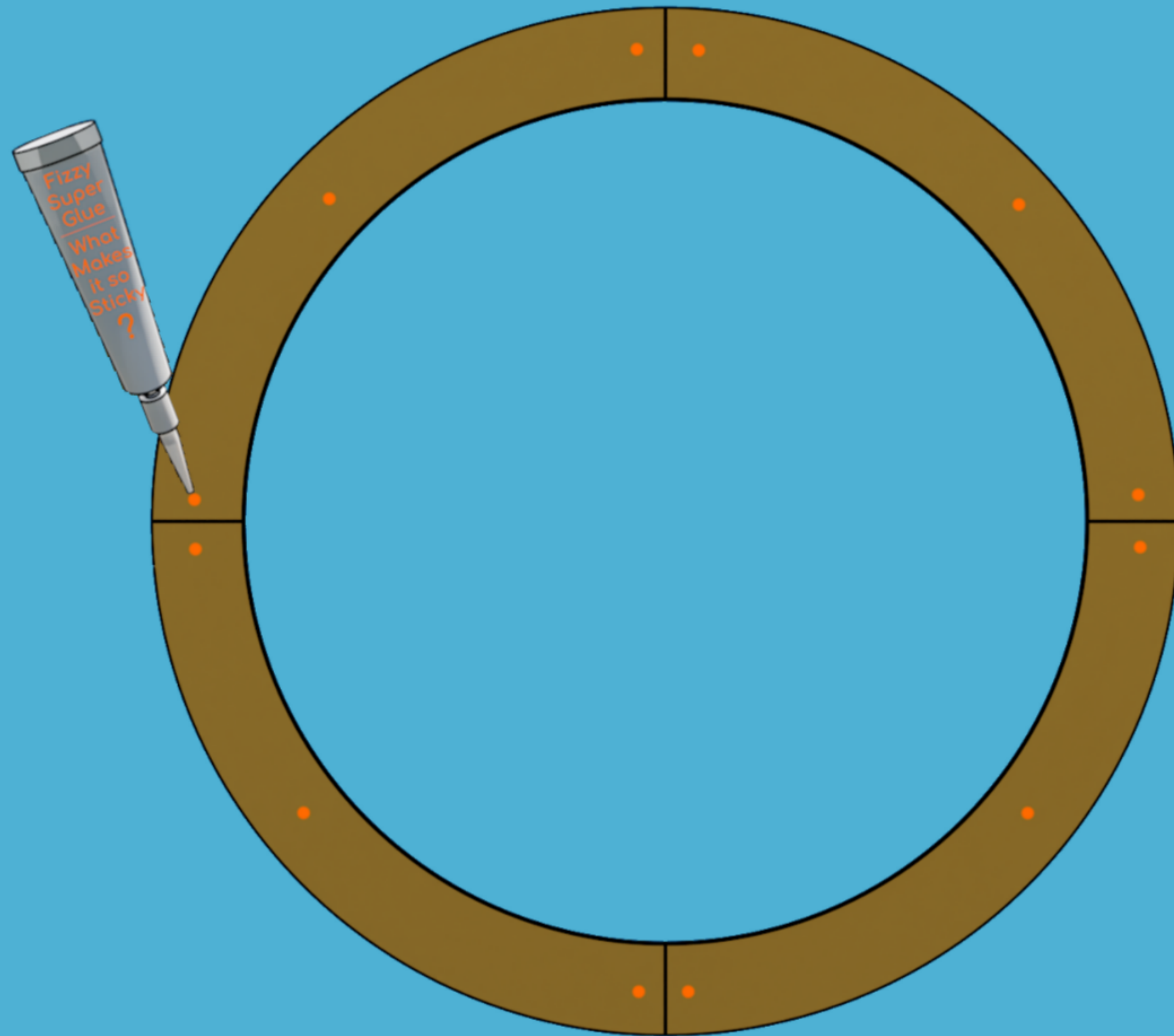


Front
Calendar
Ring



Calendar Ring Print Layout

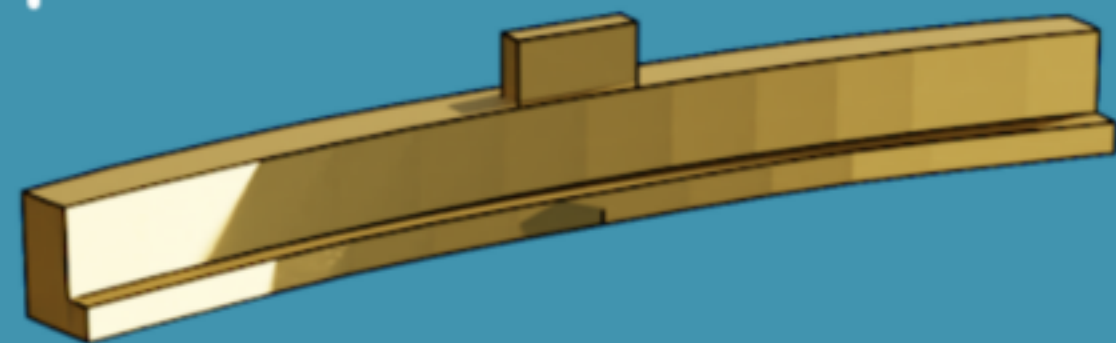




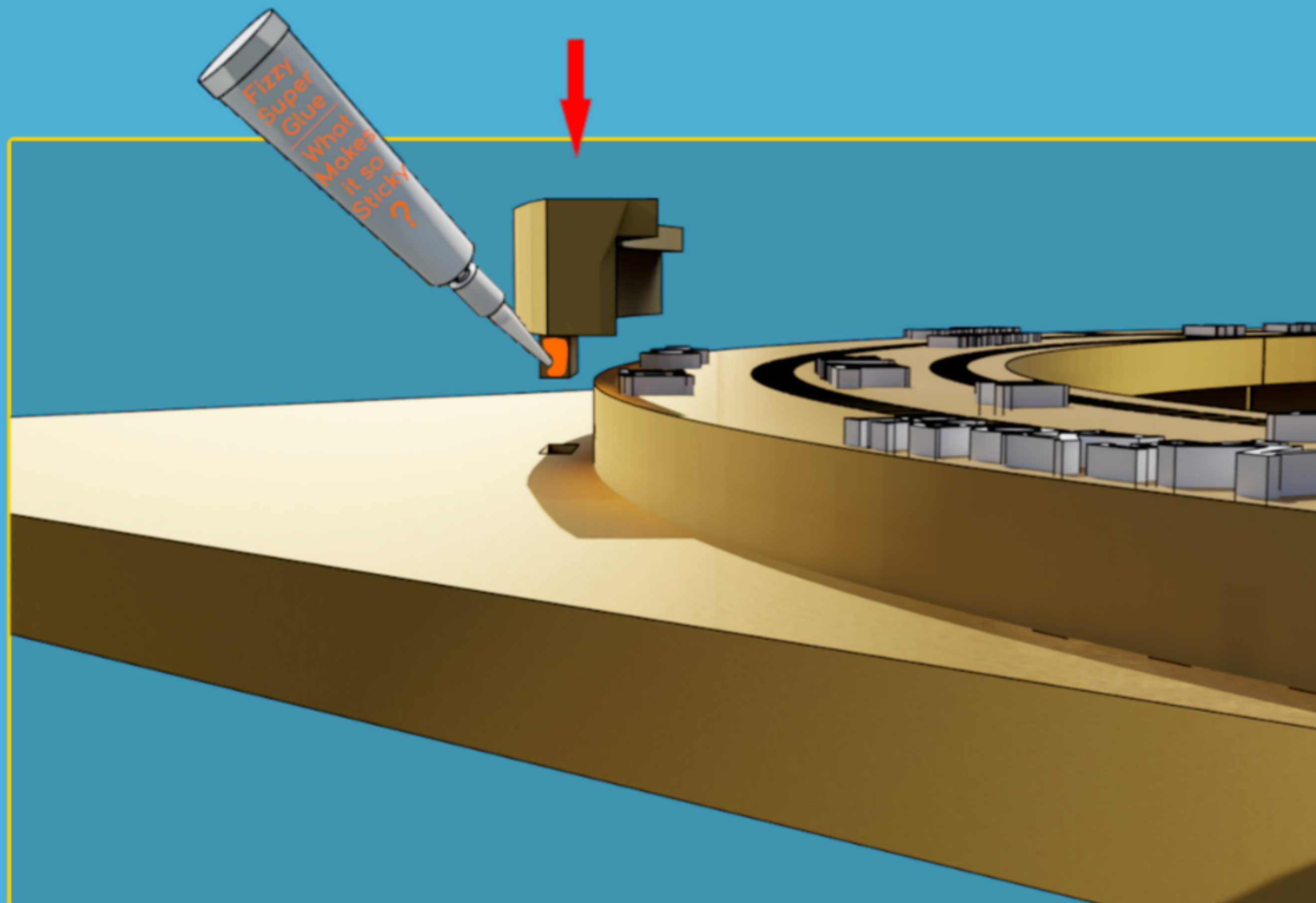


147

x4



Round Clamp



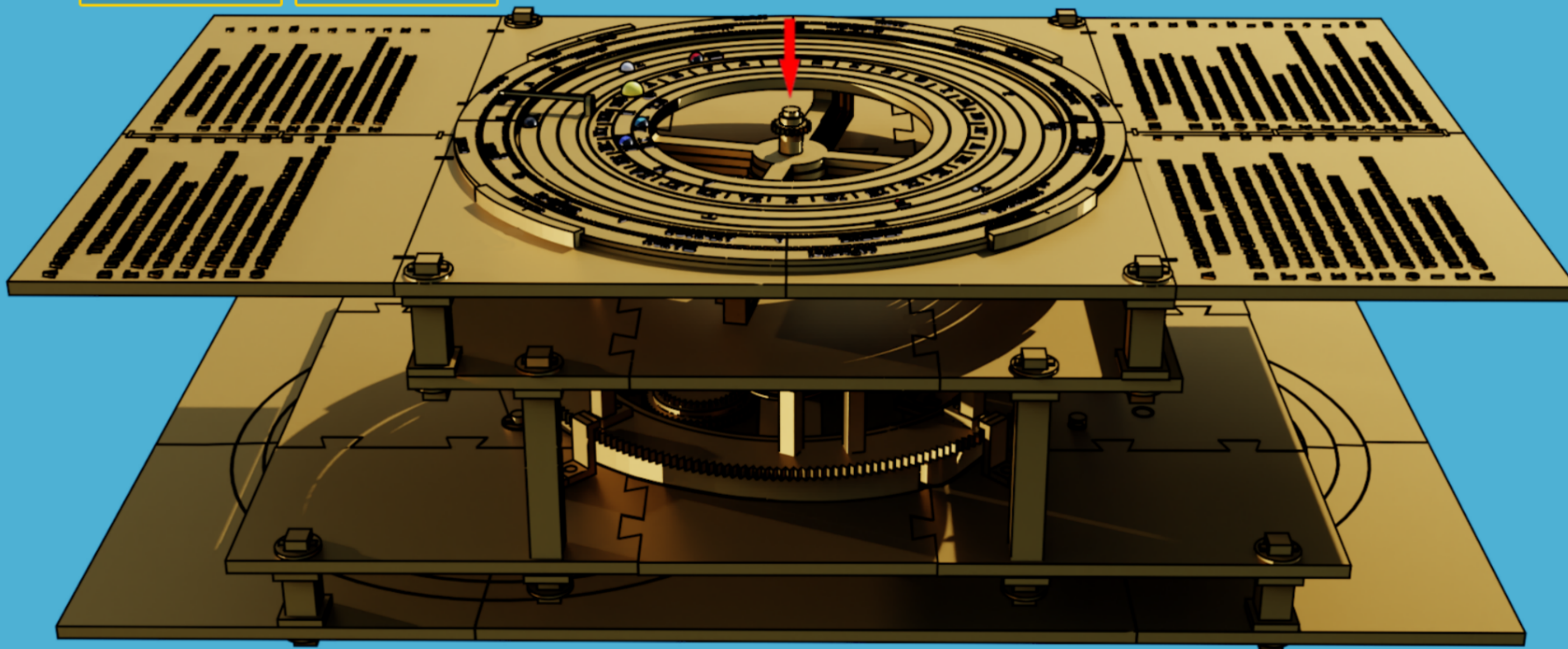


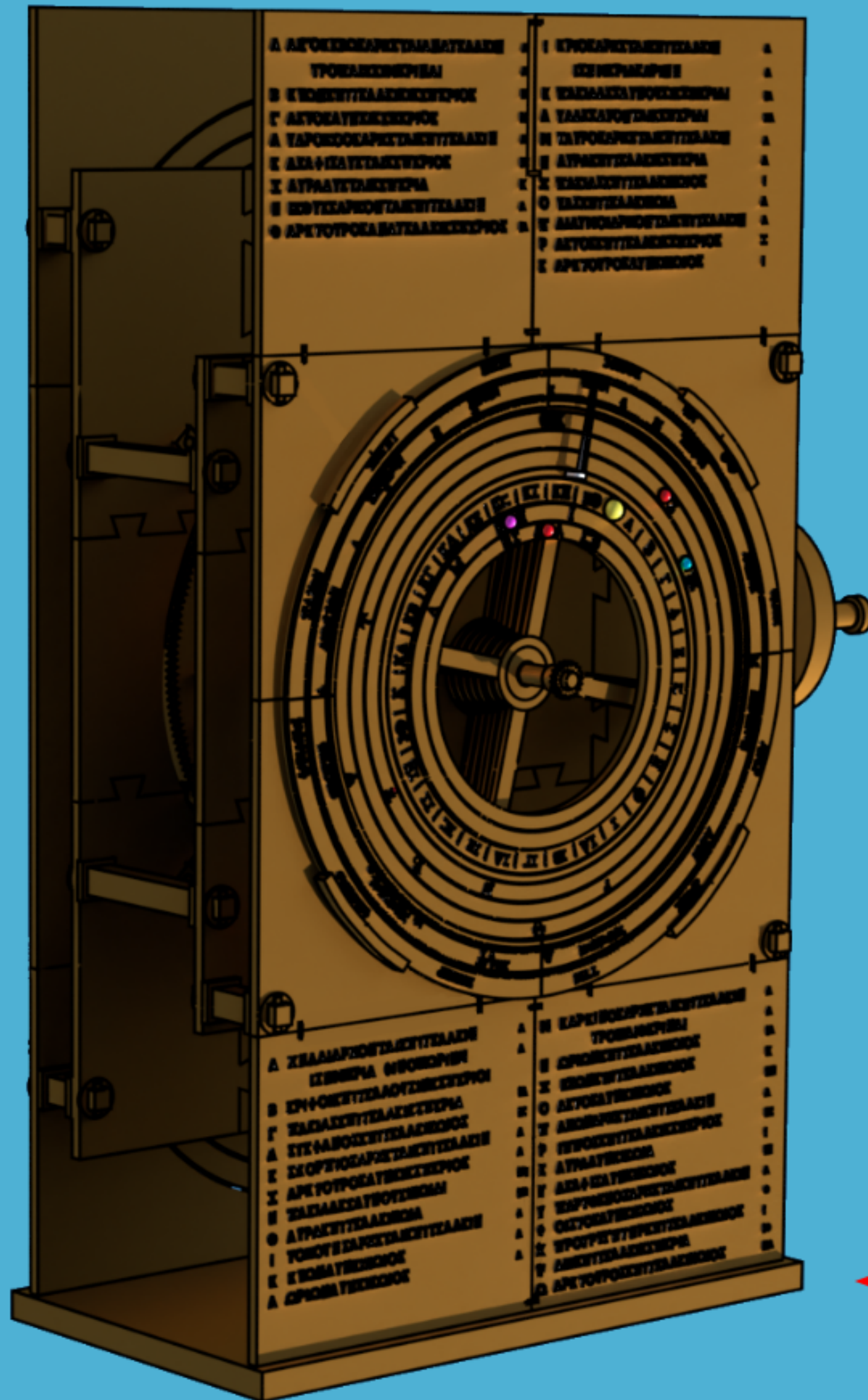
Lunar
Mb0 Gear



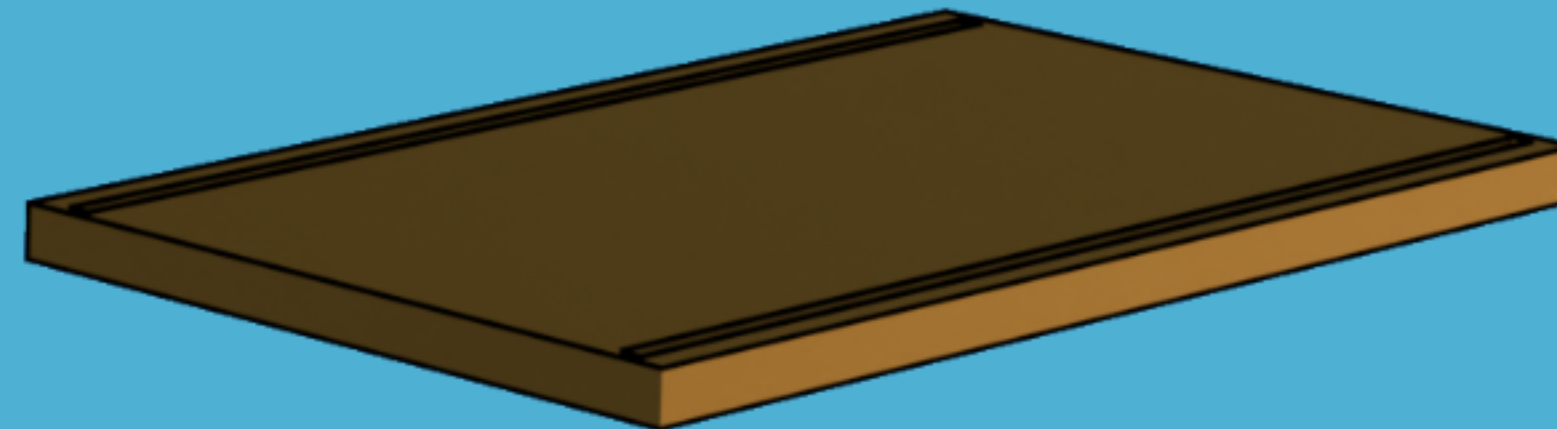
Lunar
Mb0 Divider

With the Mb0 gear tightly in place, now would be a good time to remove the back plate and remove those temporary B3 holders. Give the B3 a good inspect and make sure the B3 is meshed and turns well with the E1 Then put the back Plate back on.

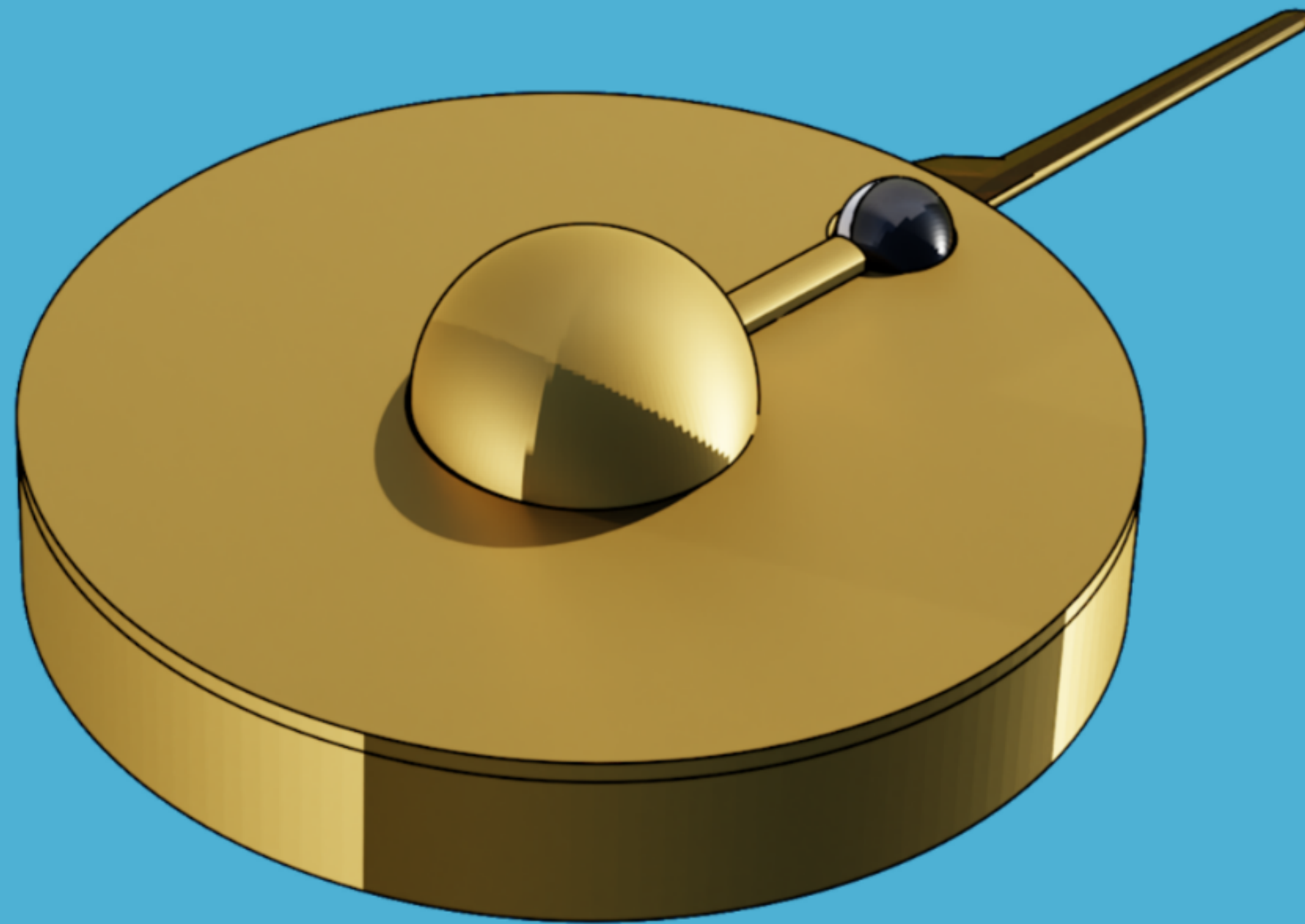




Once the mechanism is placed on its stand then turn the A1 handel and test the smoothness of the gears, if you would like to go back and smoothen things out or glue any thing that needs gluing now is your chance to make changes. As soon as the lunar section is glued in place it will prevent you from pulling apart the mechanism from B3 and above, only allowing clear access to the Saros and Metonic Cycles section.



Lunar
Dial

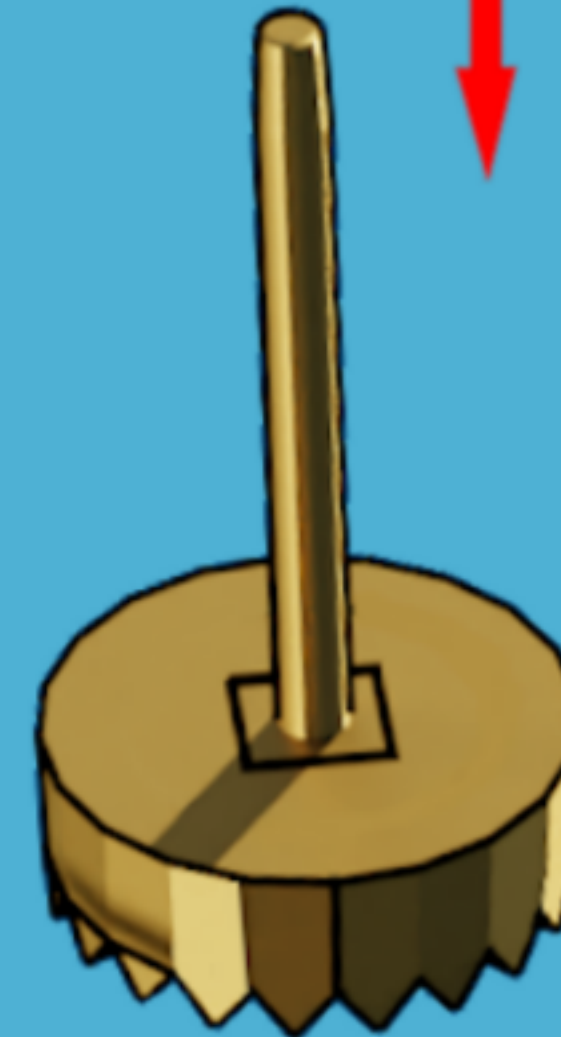




Lunar Arbor

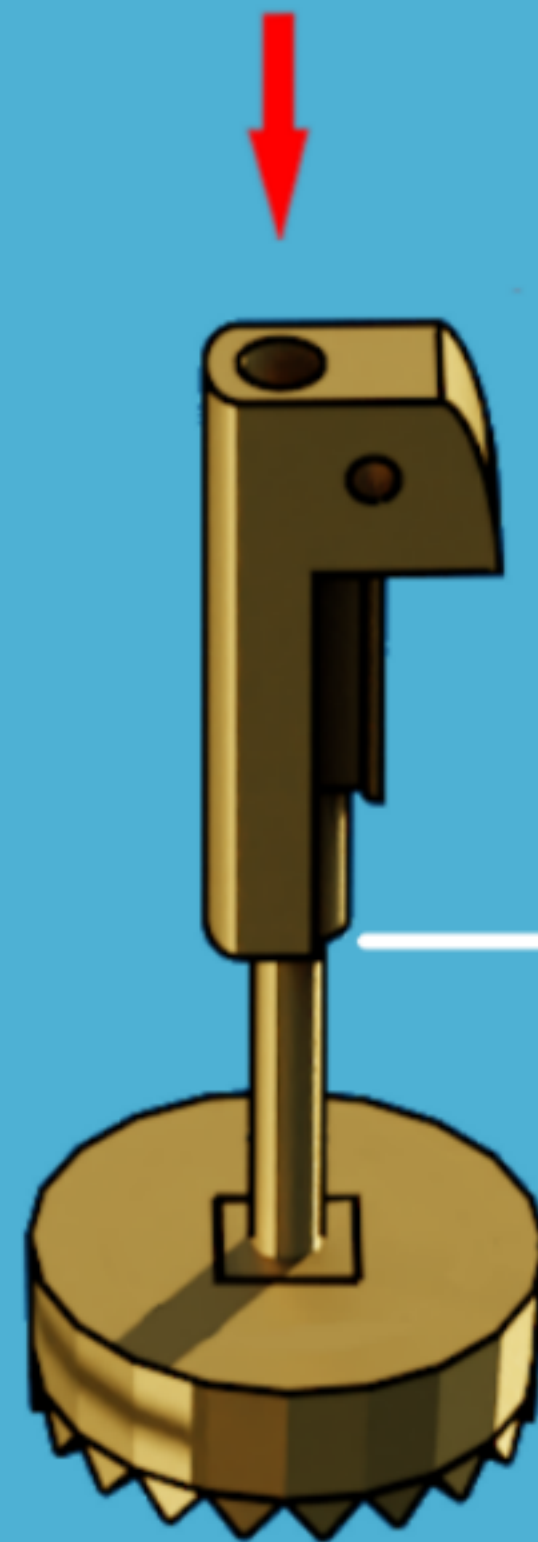


Lunar Crown Gear





Lunar Barrel



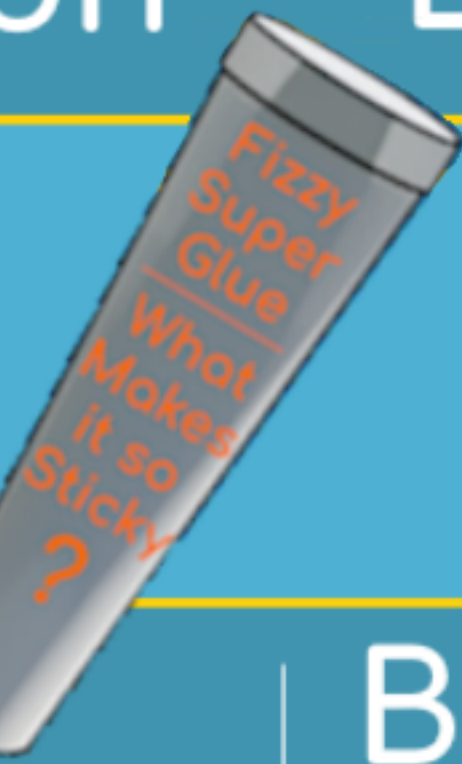
No Lower



White
Lunar Moon



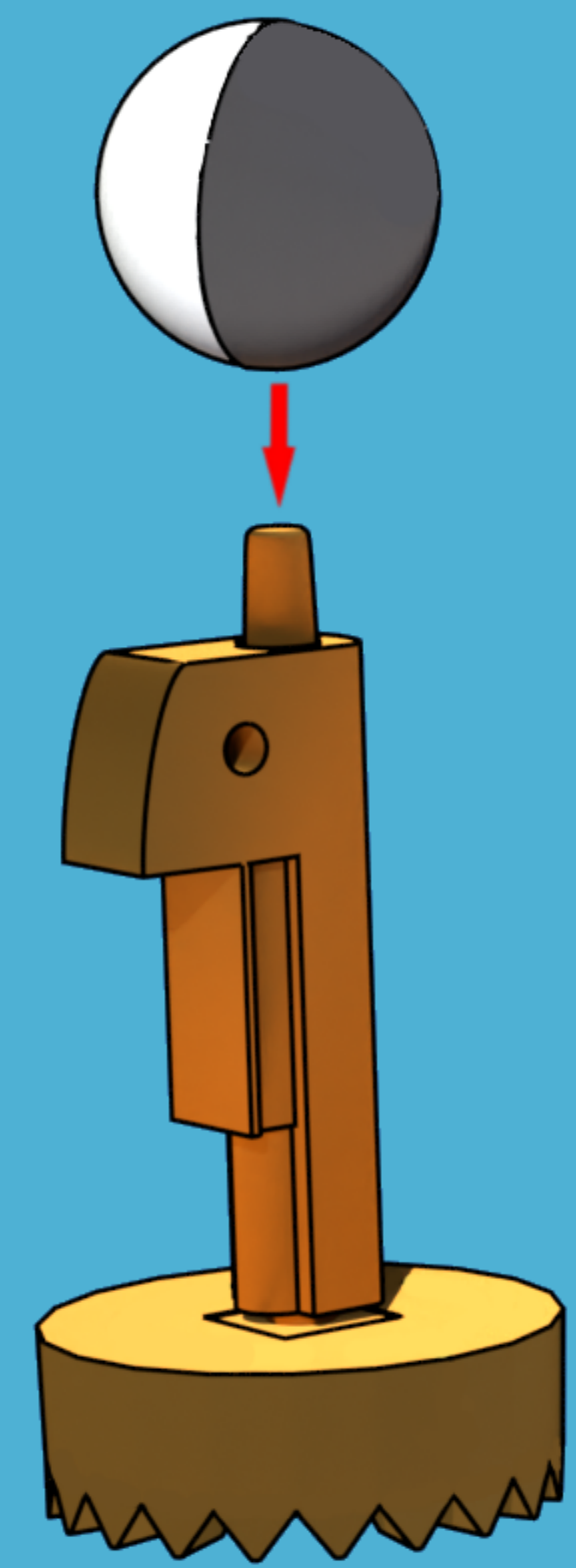
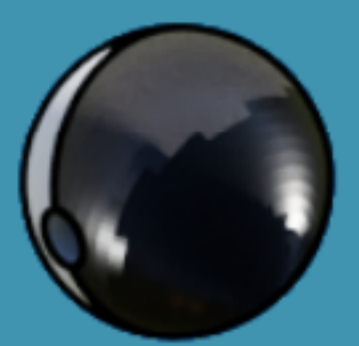
Black
Lunar Moon

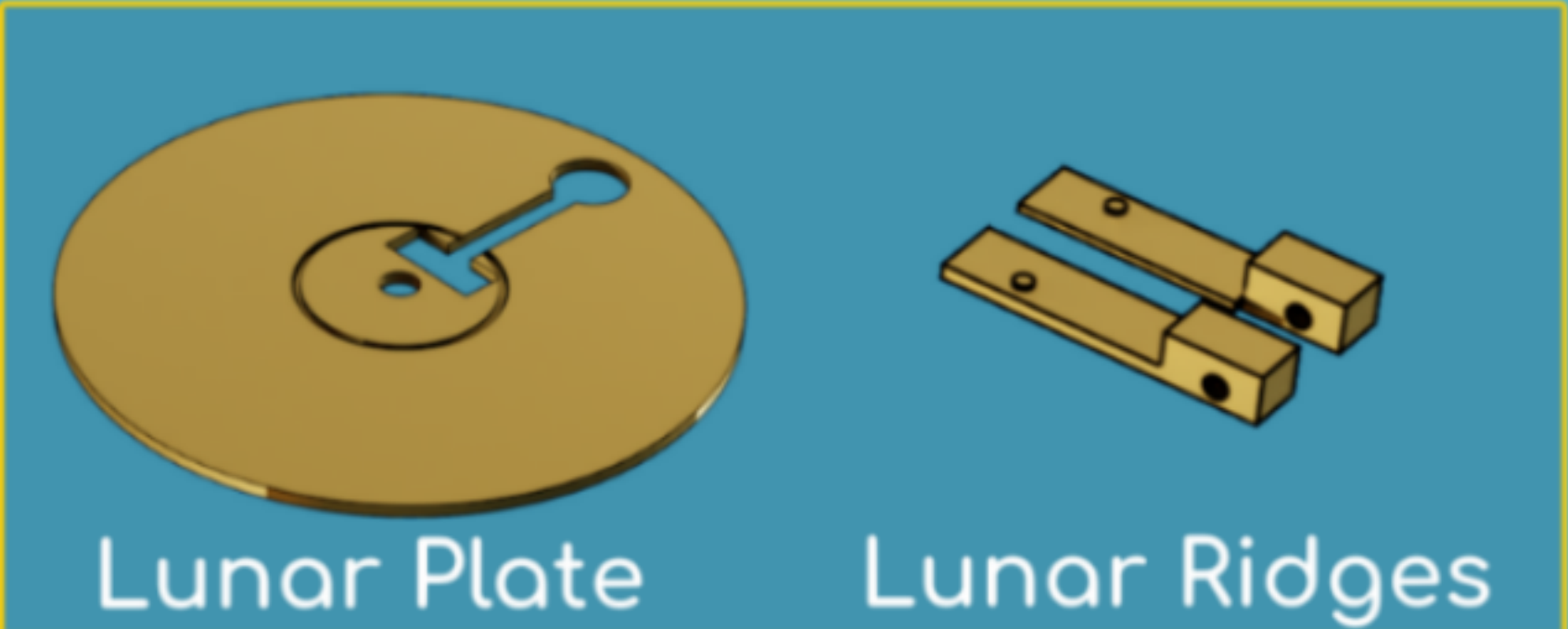


A

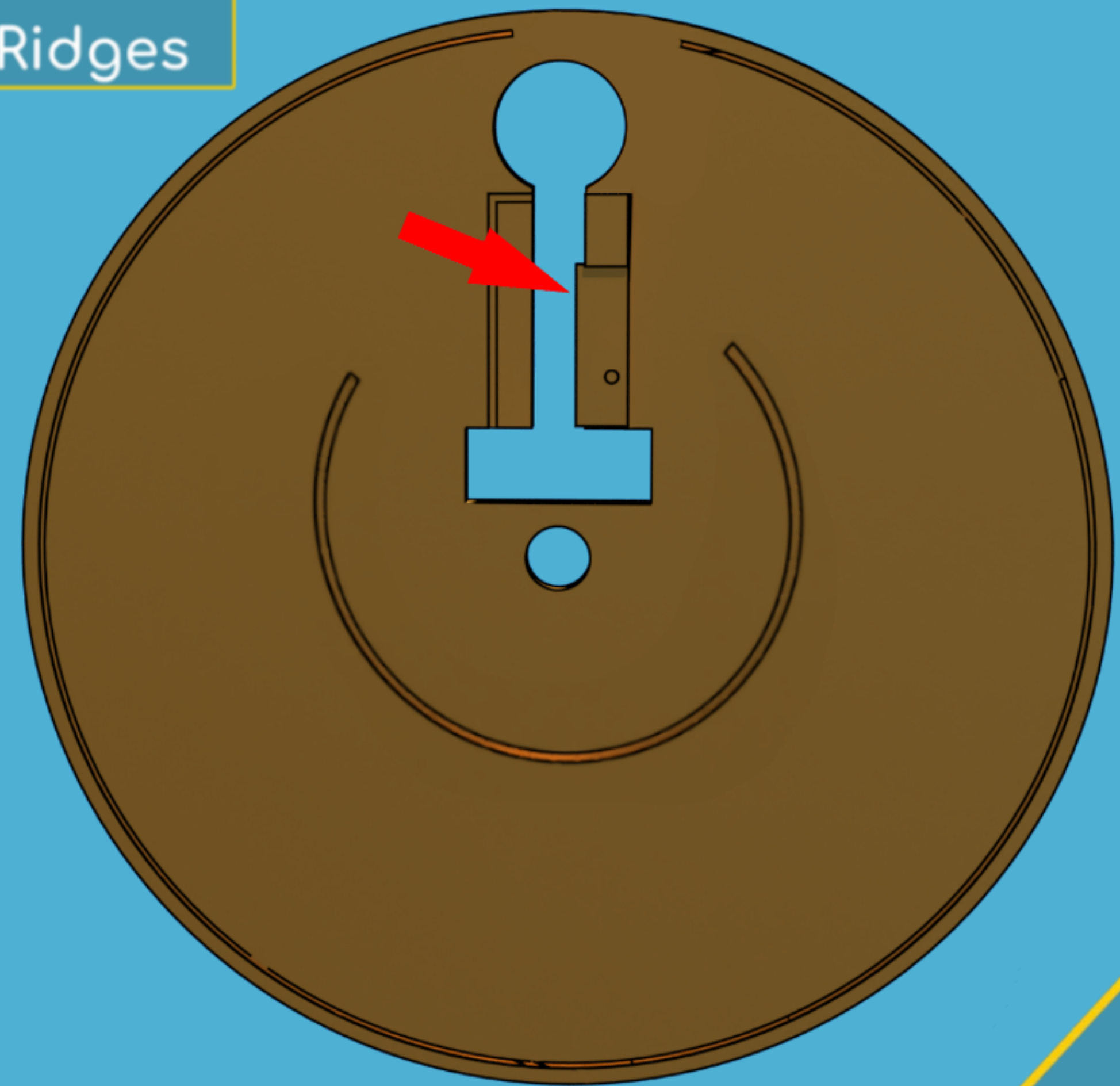
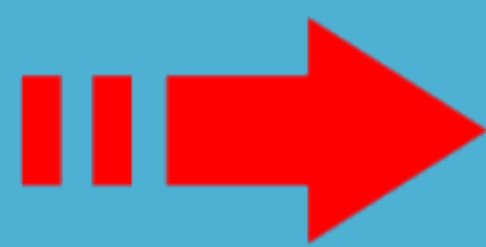
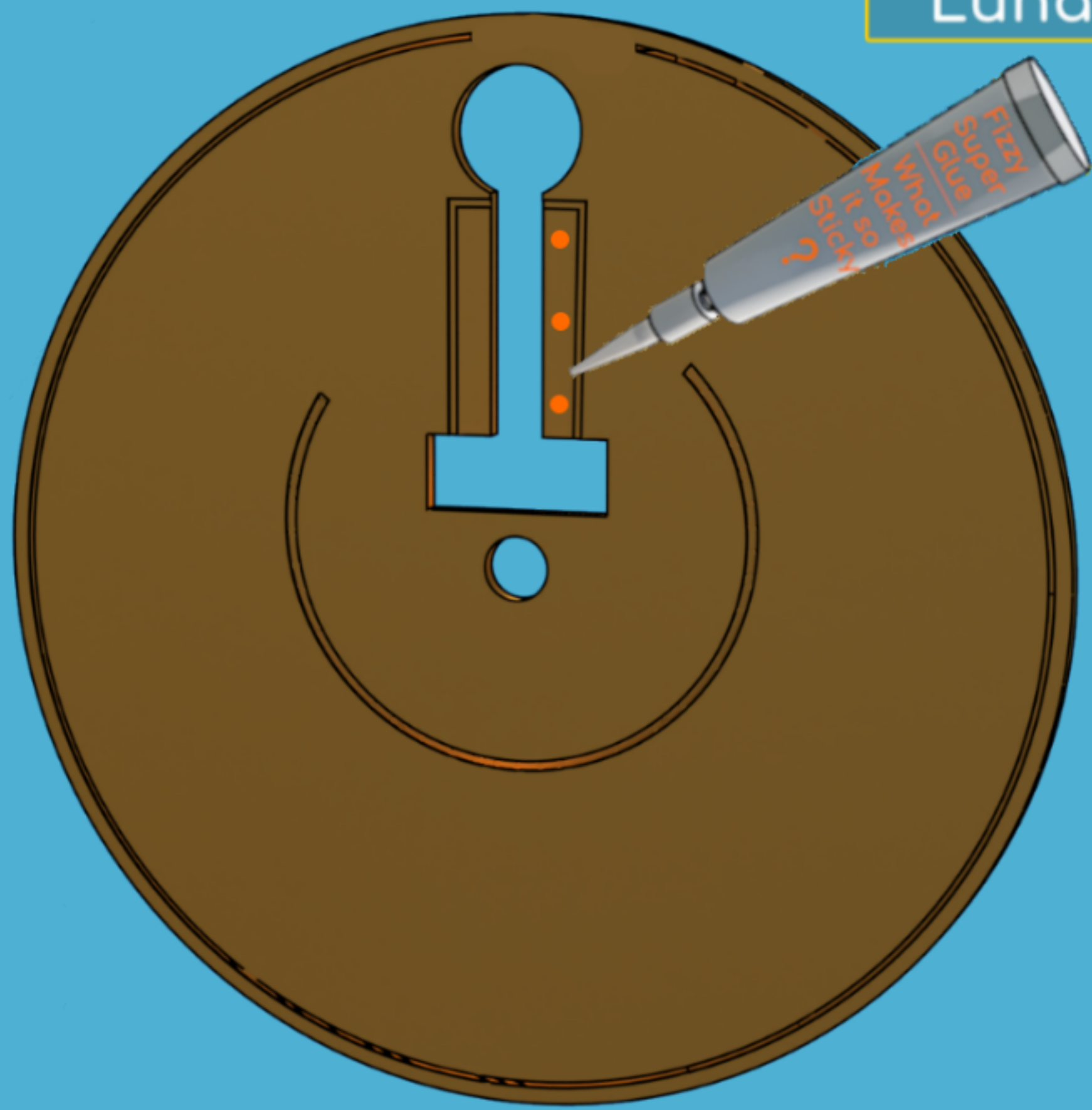


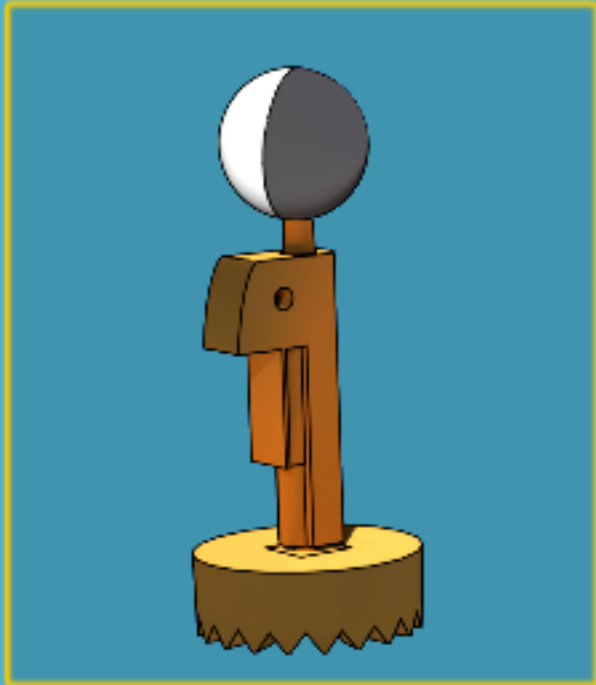
B



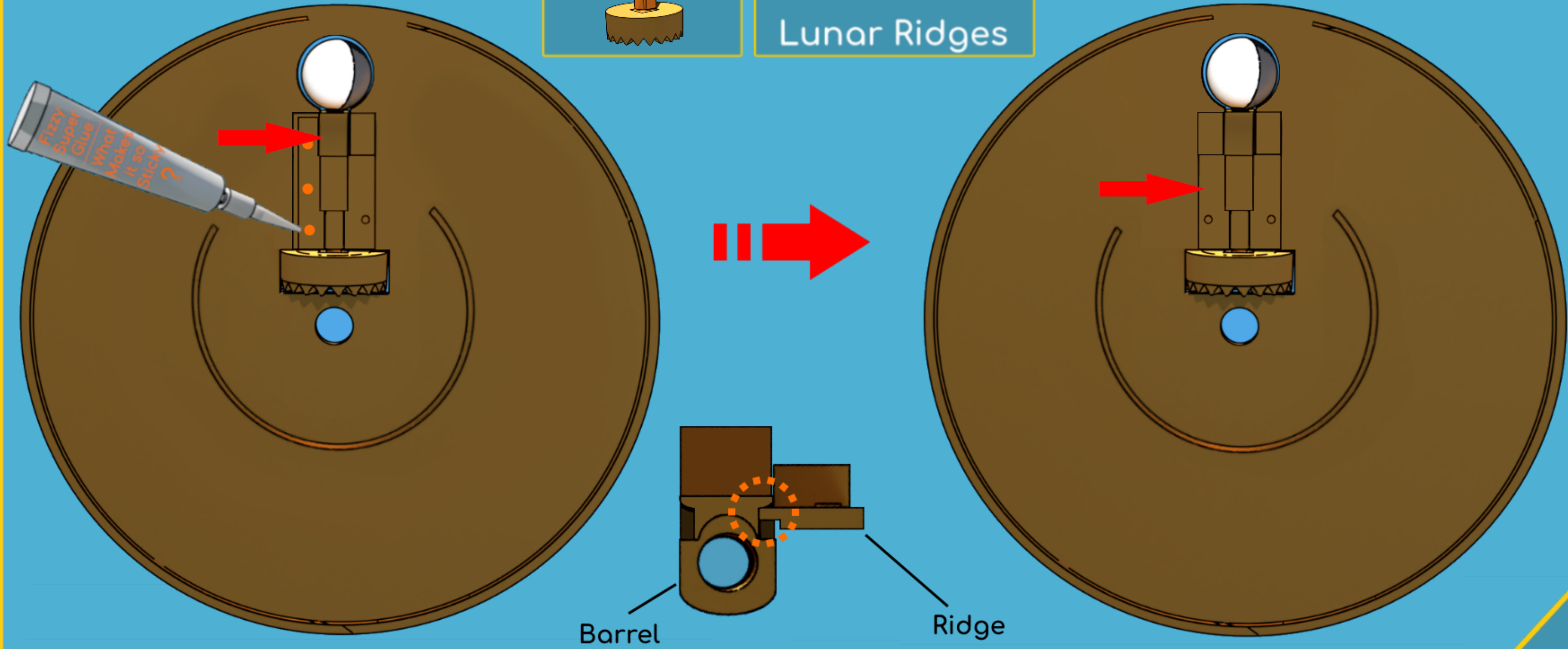


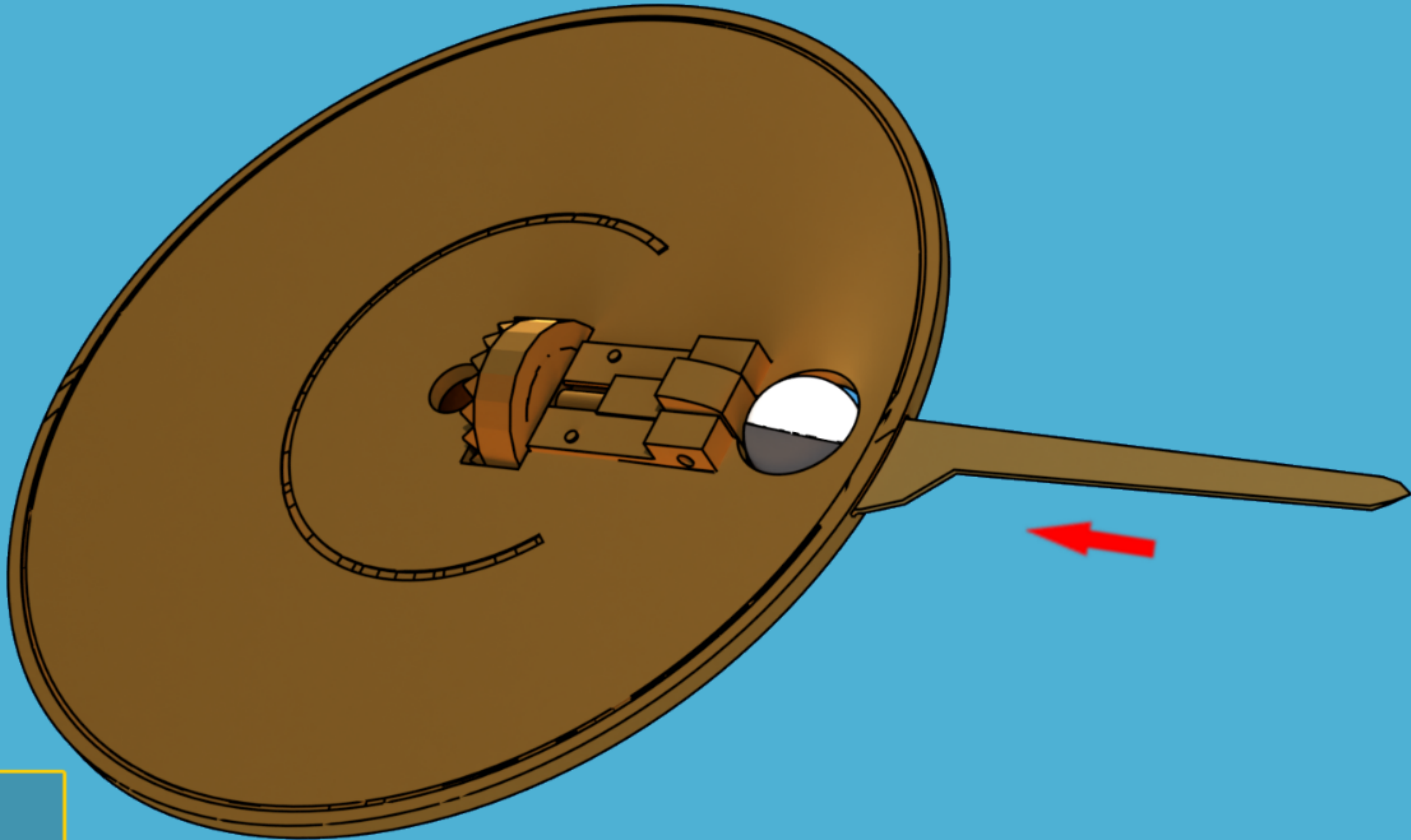
Put 1 lunar ridge side on for now.
Make sure the lip on the lunar ridge over hangs.





The Lip of the Ridge acts as a holder for the barrel so it need to be a tight fit. Put the barrel into the first ridge then gule the 2nd ridge in place.

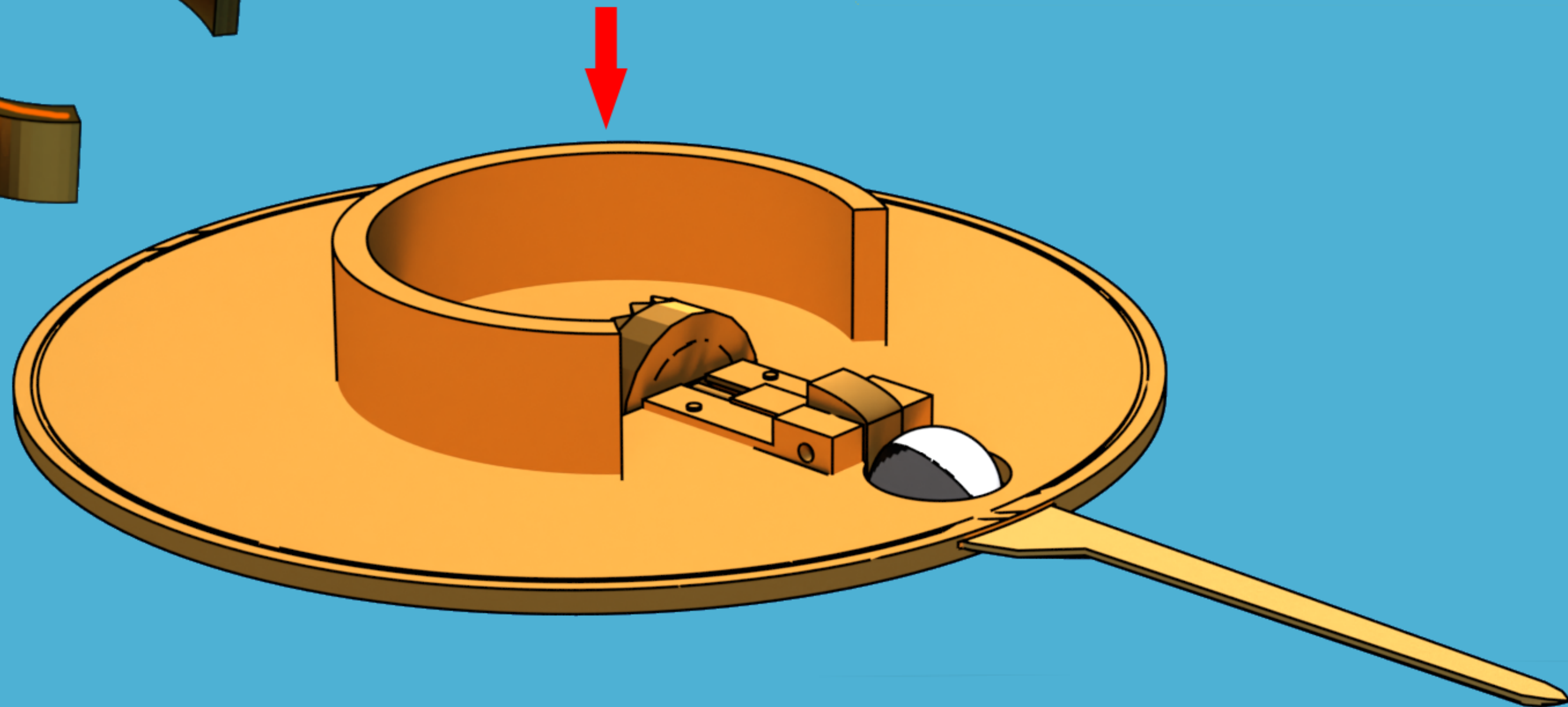




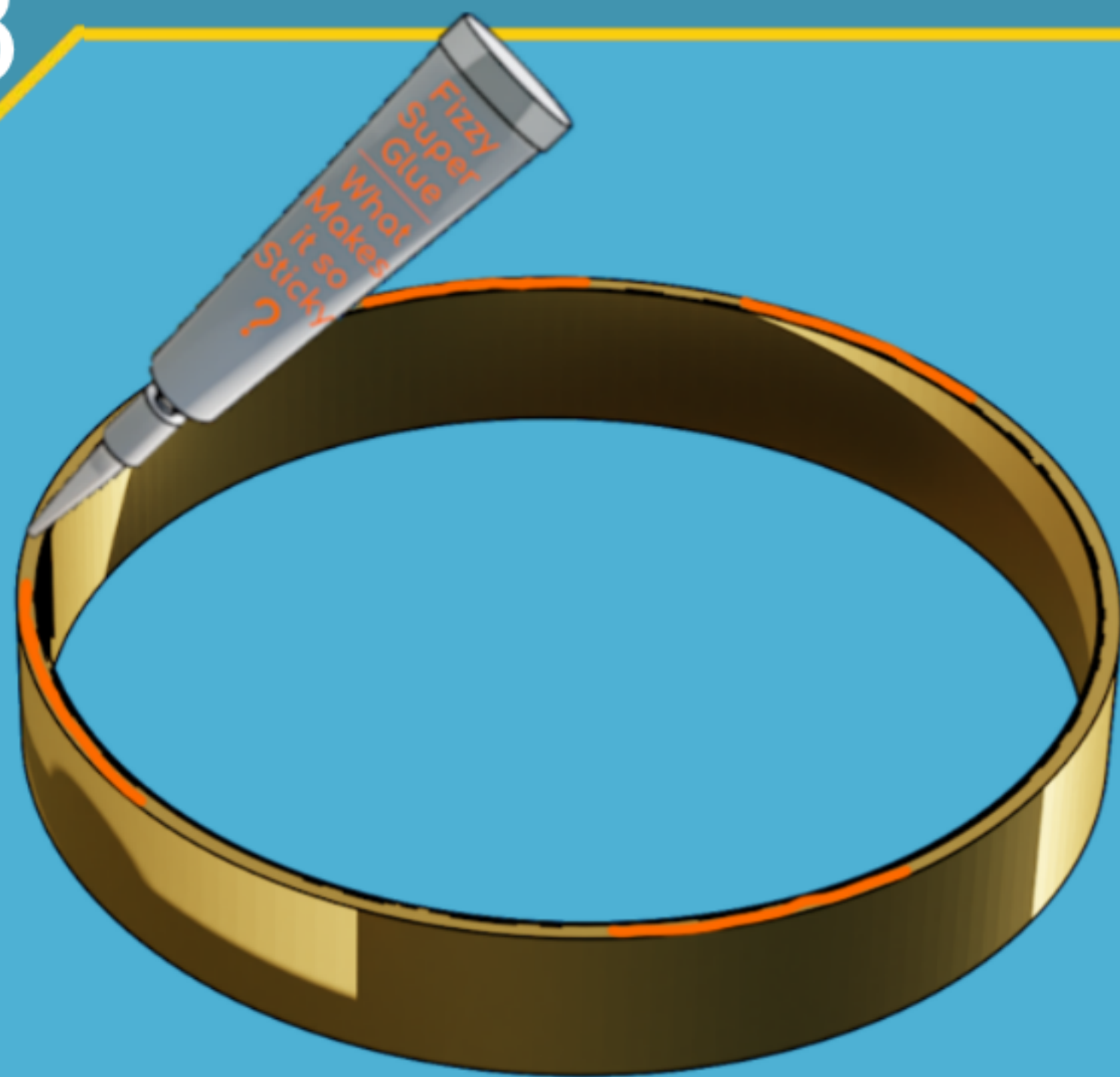
Lunar Pointer



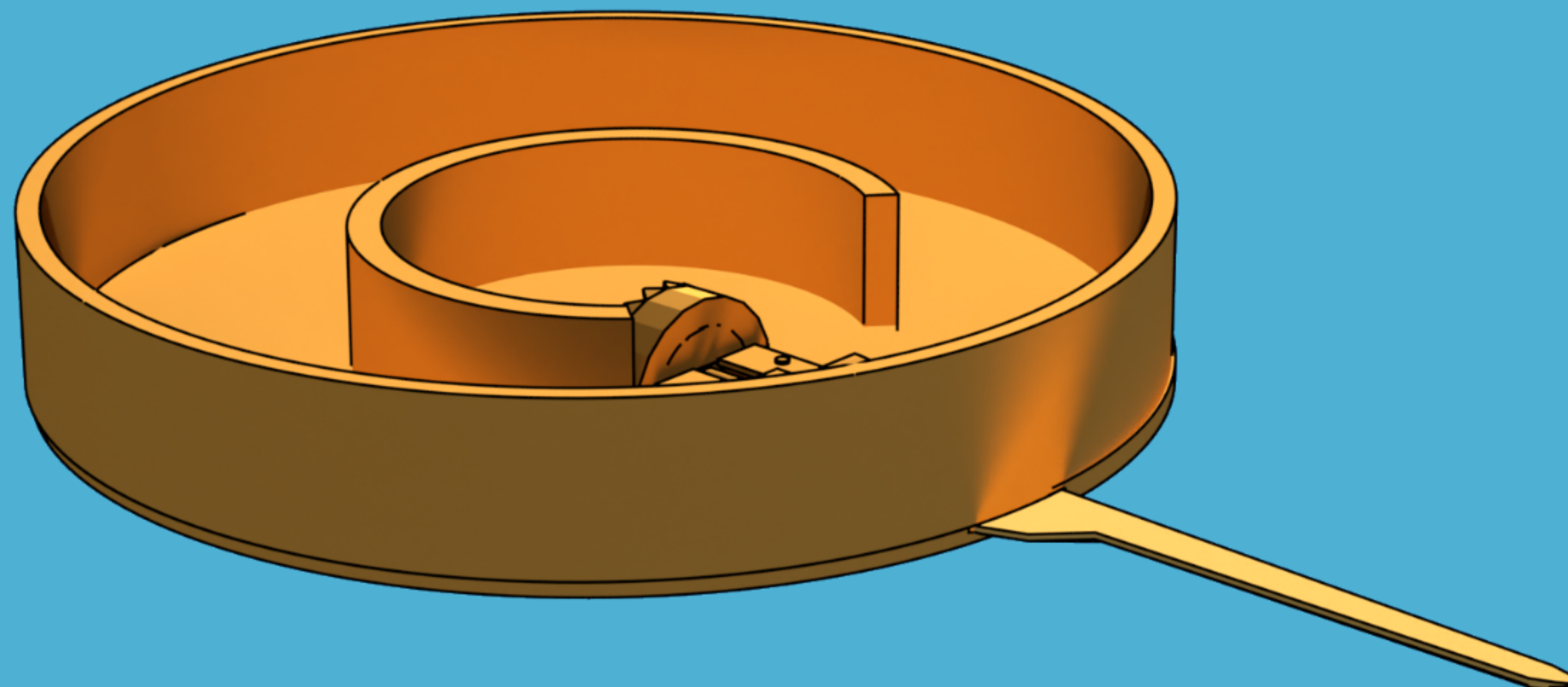
Lunar Inner Ring



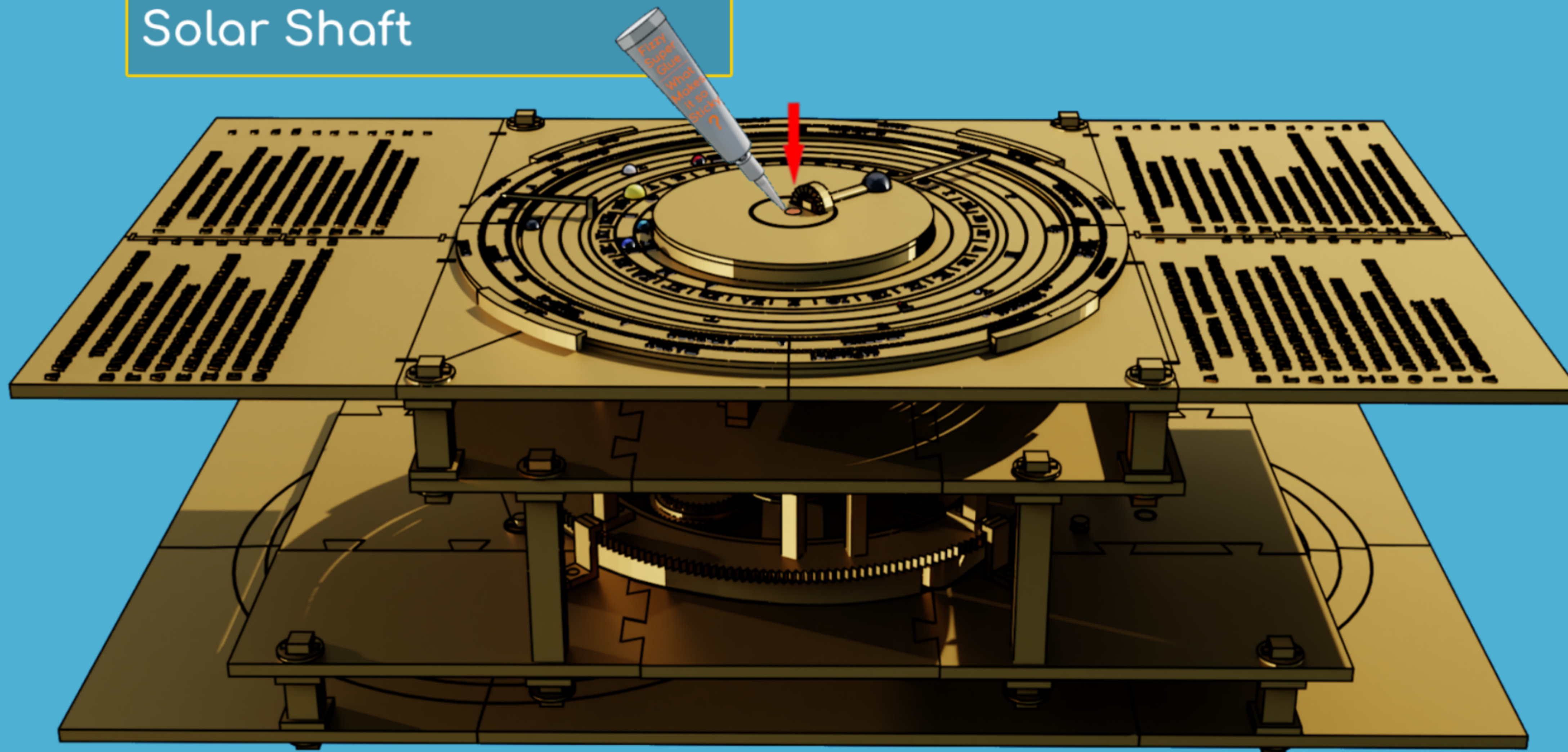
158

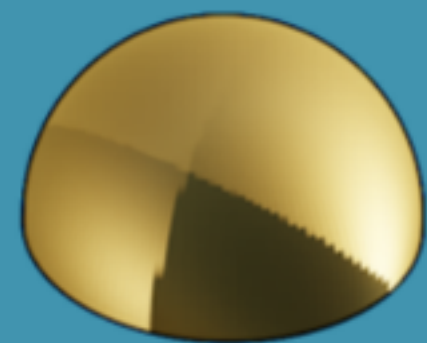


Lunar Outer Ring

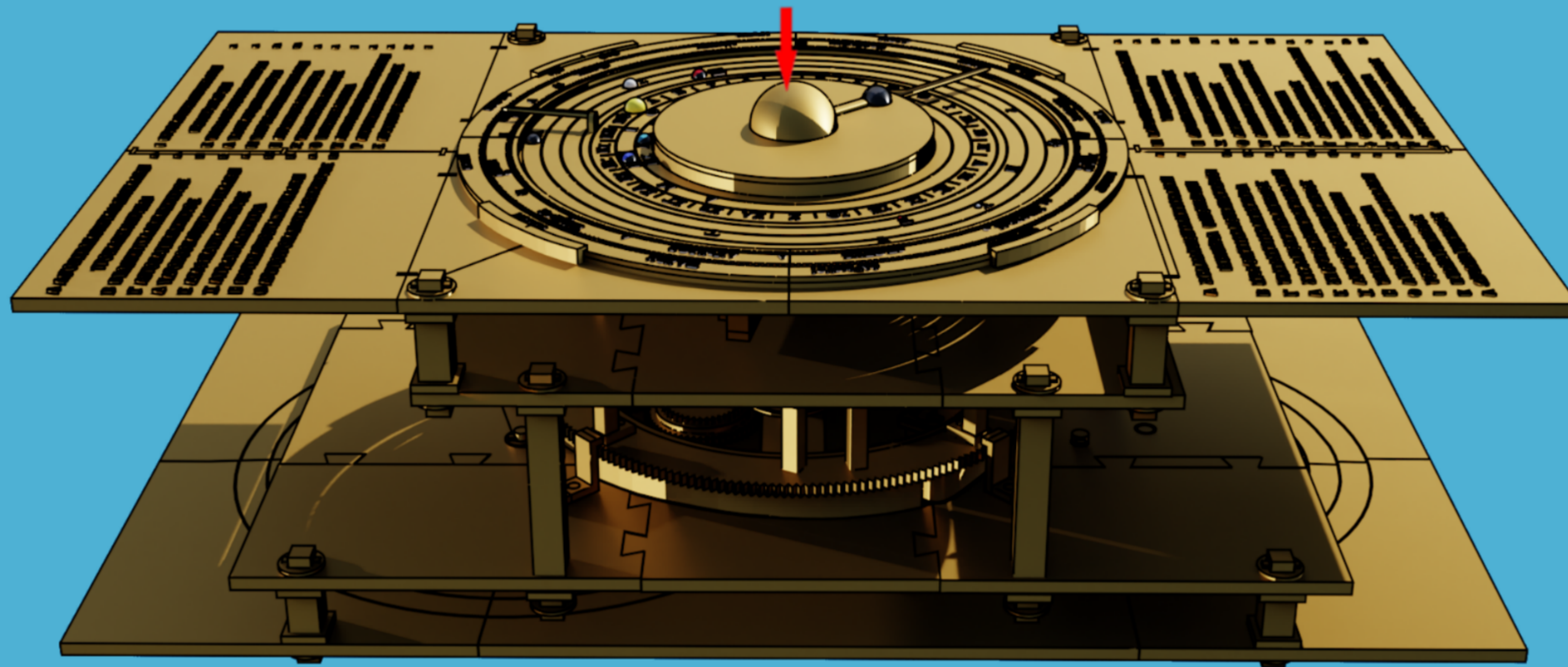


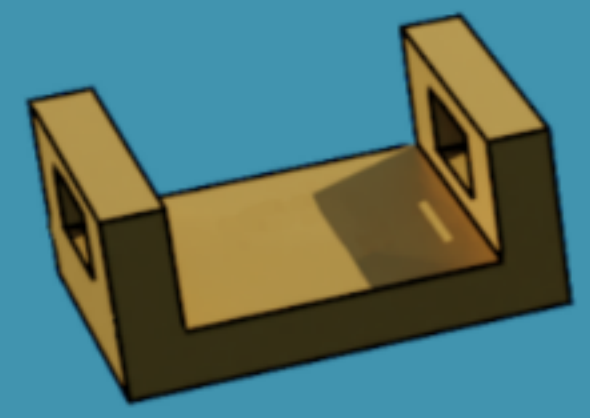
Attach Lunar Plate to Solar Shaft



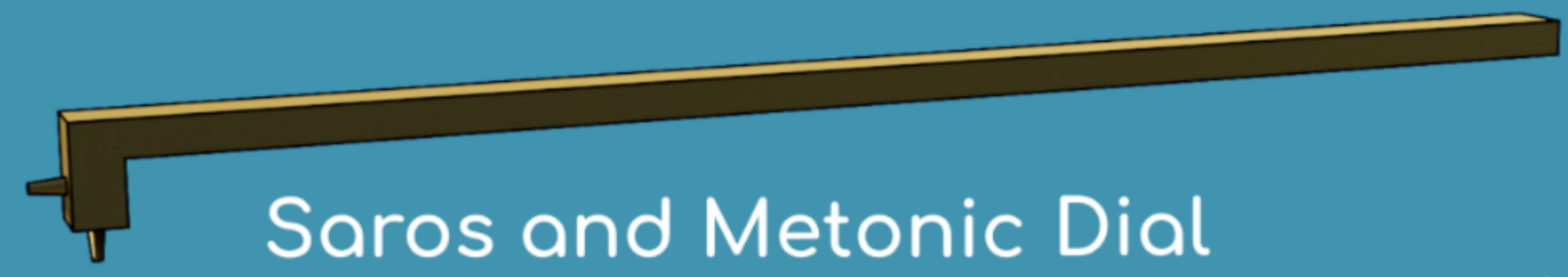


Lunar Dome Cover
(Earth)





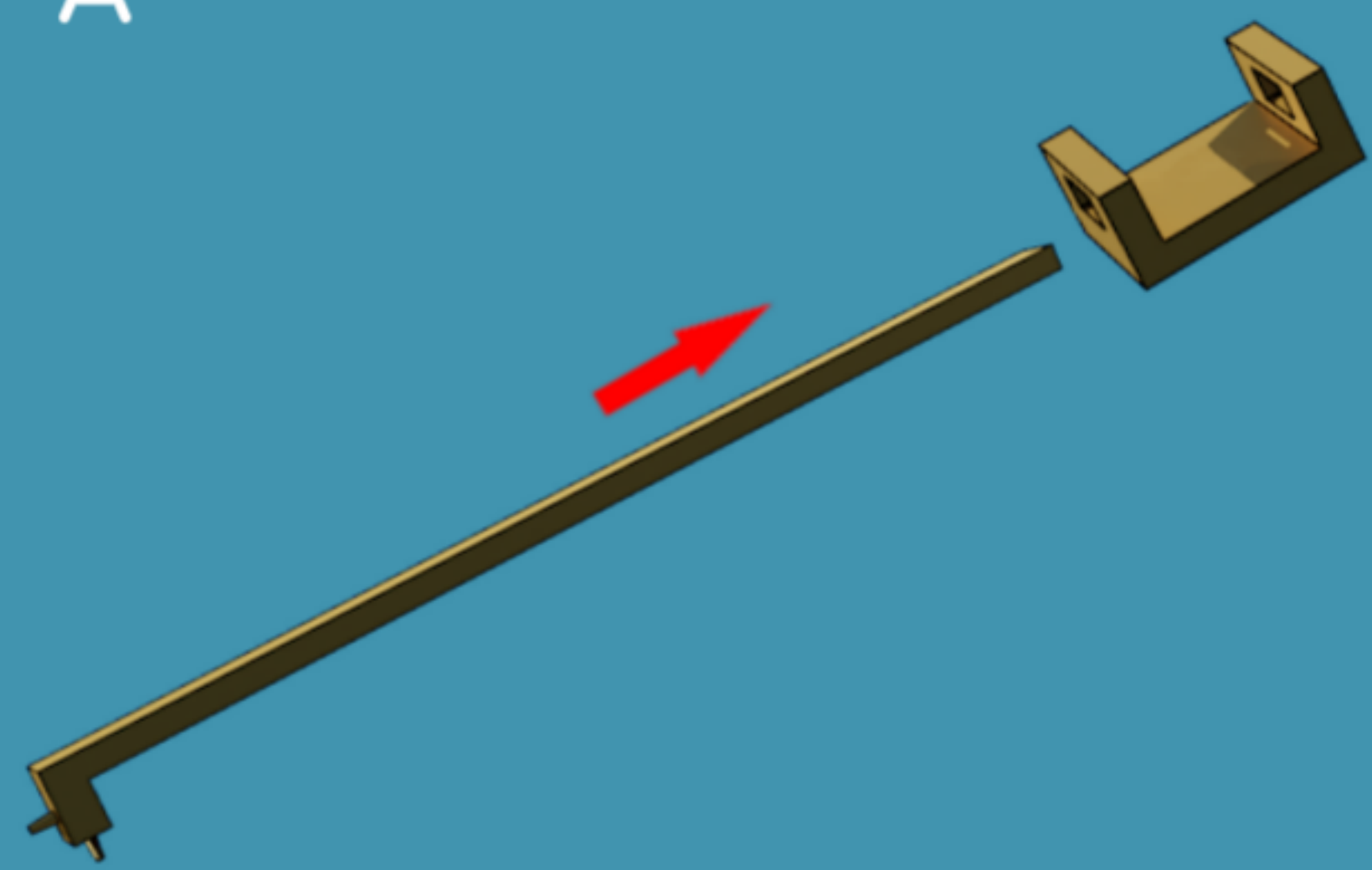
Holder



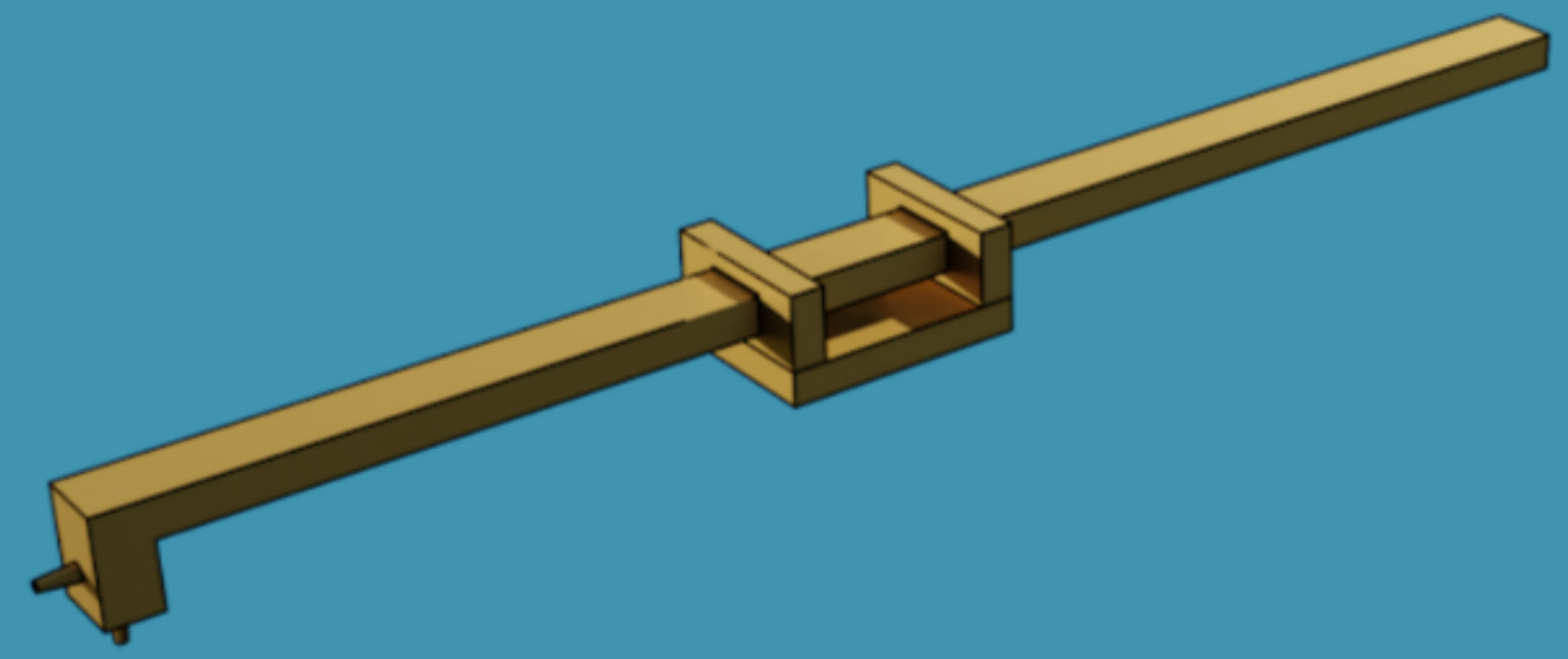
Saros and Metonic Dial

x2

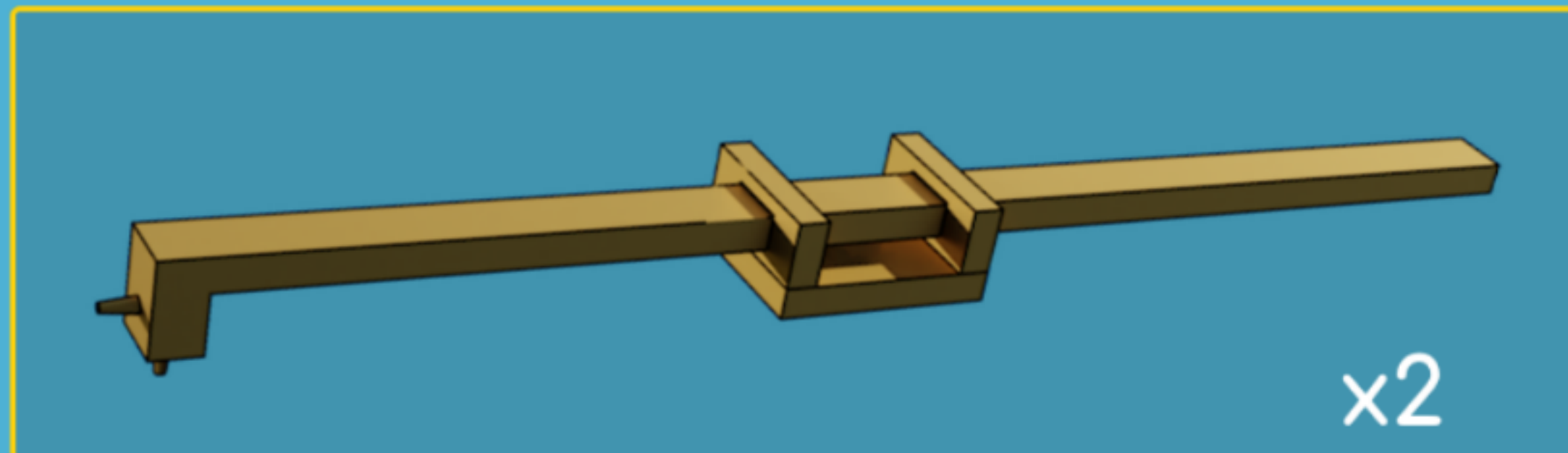
A



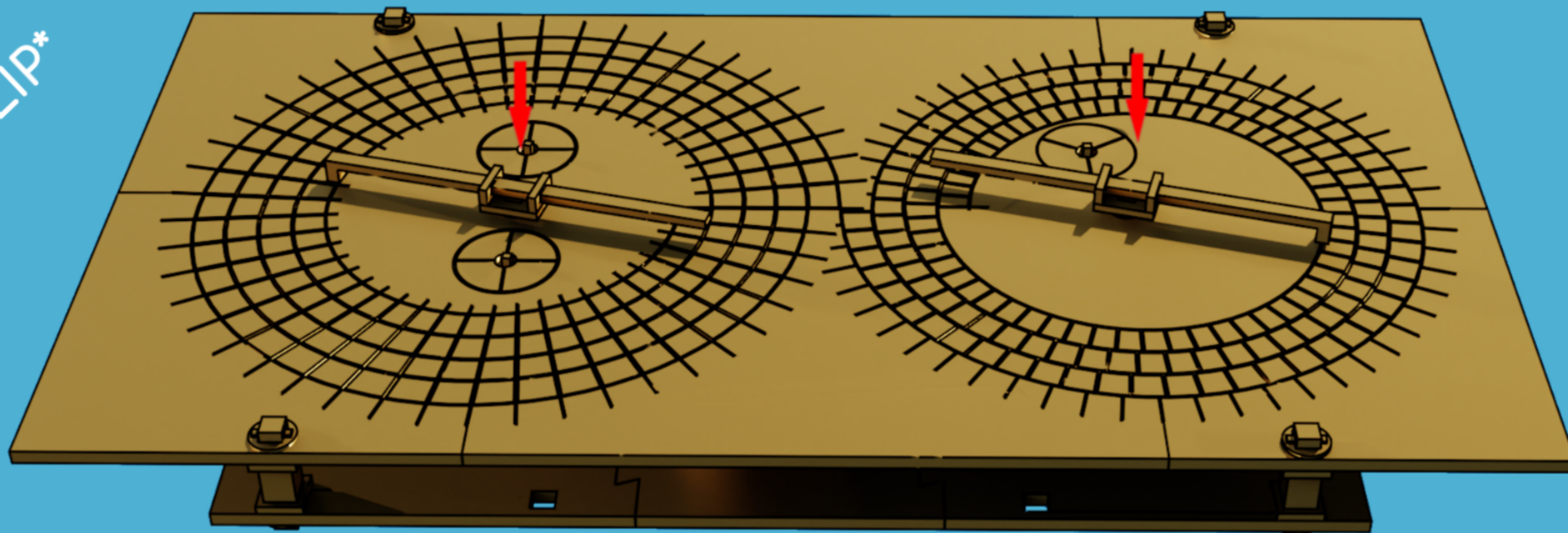
B



162



FLIP

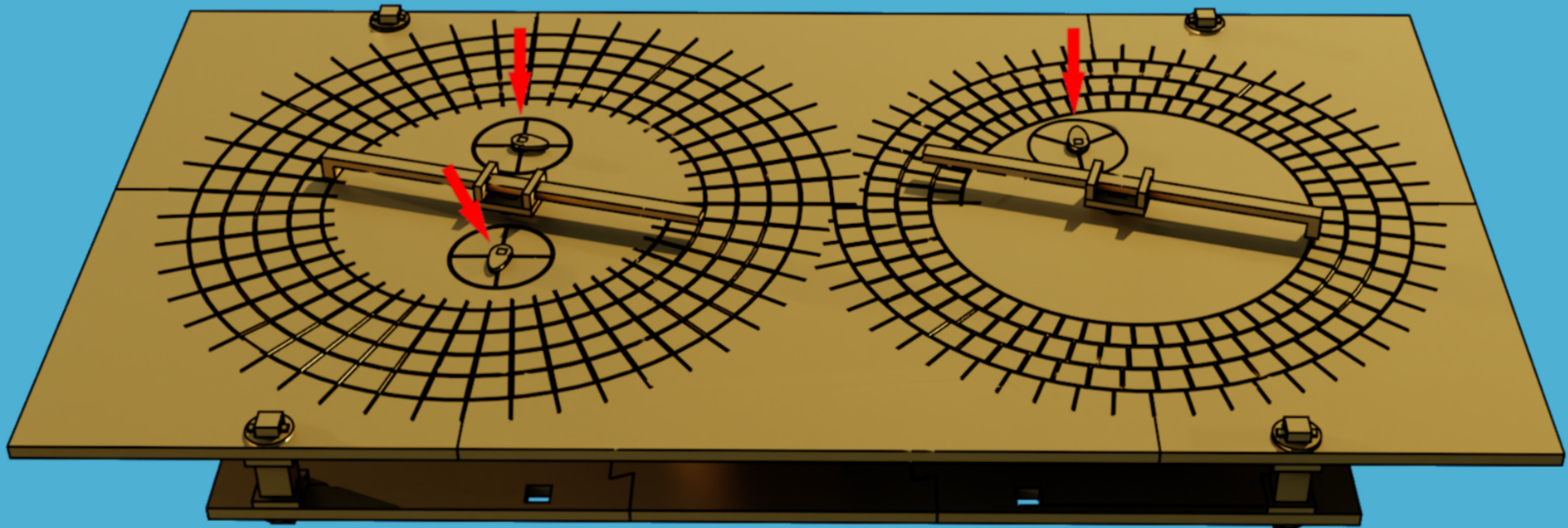


163

x3



Exeligmos Dial
Olympiad Dial
Callippic Dial



Part Name	Qty	Approx Printing Time	Material Length (m)	Nozzle Diameter	Layer Height	Outer Perimeter	Infil (%)	Print Support	Infill Pattern	Notes
B1										
B1	1	5h 40m	21.52	0.4	0.12	3	50	Yes	Gyroid	
B2	1	0h 36m	2.56	0.4	0.12	3	20	-	Gyroid	
B1 Arbor	1	0h 50m	0.94	0.4	0.12	3	20	Yes	Gyroid	
B1 Washer	1	0h 14m	1.08	0.4	0.12	3	20	-	Gyroid	Ridge side up towards the B2
B2 Plugs	4	0h 18m	0.37	0.4	0.12	3	20	-	Gyroid	
B1 Plate	1	0h 8m	0.65	0.4	0.12	3	20	-	Gyroid	
MERCURY										
Mercury 1	1	0h 25m	2.05	0.4	0.12	3	20	-	Gyroid	
Mercury Arbor 1	1	0h 8m	0.09	0.4	0.12	3	20	-	Grid	
Mercury Arbor 2	1	0h 2m	0.05	0.4	0.12	3	20	-	Grid	
Mercury 2	1	0h 17m	0.37	0.4	0.12	3	20	-	Gyroid	
Mercury Plate	1	0h 7m	0.56	0.4	0.12	3	20	-	Gyroid	
SUN										
Sun 1	1	0h 11m	0.79	0.4	0.12	3	20	-	Gyroid	
Sun 2 Arbor	1	0h 11m	0.13	0.4	0.12	3	20	-	Grid	
Sun 2	1	0h 11m	0.82	0.4	0.12	3	20	-	Gyroid	
Sun 3 Arbor	1	0h 20m	0.30	0.4	0.12	3	20	Yes	Grid	
Sun 3	1	0h 24m	1.35	0.4	0.12	3	20	Yes	Gyroid	
VENUS										
Venus Arbor 1	1	0h 11m	0.13	0.4	0.12	3	20	-	Grid	
Venus Arbor 2	1	0h 5m	0.19	0.4	0.12	3	20	-	Grid	Ridge side down towards the B1
Venus 1	1	0h 32m	2.56	0.4	0.12	3	20	-	Gyroid	
Venus Plate	1	0h 30m	2.98	0.4	0.12	3	20	-	Gyroid	
SHAFTS										
Solar Axis Shaft	1	0h 47m	0.53	0.4	0.12	3	20	-	Gyroid	A light sand might help make for smoother turning
Solar Axis Carrier	1	0h 14m	0.64	0.4	0.12	3	20	-	Gyroid	Take care when supergluing to the shaft.
Mercury Follower	1	1h 9m	1.16	0.4	0.12	3	20	-	Gyroid	Do not remove from buildplate until completly cooled to prevent warping
Sun Follower	1	1h 28m	1.65	0.4	0.12	3	20	-	Gyroid	-
Venus Follower	1	1h 10m	1.11	0.4	0.12	3	20	-	Gyroid	-
B1 SUPPORTS										
B1 Clamps	1	0h 46m	2.07	0.4	0.12	3	20	-	Gyroid	
B1 Clamp Plug	1	0h 10m	0.23	0.4	0.12	3	20	-	Gyroid	
B1 Supports	1	1h 57m	9.50	0.4	0.12	3	20	-	Gyroid	Ridge side up
SUPERIOR PLANET PLATE										
Superior Planet Plate	1	3h 41m	22.68	0.4	0.12	3	50	-	Gyroid	
FIXED GEARS										

Part Name	Qty	Approx Printing Time	Material Length (m)	Nozzle Diameter	Layer Height	Outer Perimeter	Infil (%)	Print Support	Infill Pattern	Notes
Fixed Gear Shaft	1	0h 44m	0.69	0.4	0.12	3	20	-	Gyroid	
Fixed Gears	1	0h 41m	2.80	0.4	0.12	3	20	-	Gyroid	Fixed Gears are made up of Jupiter 1, Saturn 1 and Mars 1.
JUPITER										
Jupiter Plug	1	0h 29m	1.54	0.4	0.12	3	20	-	Gyroid	Slightly rotating the plug tightens & loosens gears to the fixed gears, set before gluing
Jupiter 2	1	0h 44m	3.42	0.4	0.12	3	20	-	Gyroid	
Jupiter 3	1	0h 26m	2.14	0.4	0.12	3	20	-	Gyroid	
Jupiter 4	1	1h 21m	2.79	0.4	0.12	3	20	-	Gyroid	
Jupiter Clamp	1	0h 29m	1.98	0.4	0.12	2	20	-	Gyroid	
SATURN										
Saturn Plug	1	0h 21m	0.27	0.4	0.12	3	20	-	Gyroid	Slightly rotating the plug tightens & loosens gears to the fixed gears, set before gluing
Saturn Plug Washer	1	0h 2m	0.03	0.4	0.12	3	20	-	Gyroid	
Saturn 2	1	0h 23m	1.58	0.4	0.12	3	20	-	Gyroid	
Saturn 3	1	0h 16m	1.23	0.4	0.12	3	20	-	Gyroid	
Saturn 4	1	1h 0m	1.71	0.4	0.12	3	20	-	Gyroid	
Saturn Clamp	1	0h 26m	1.61	0.4	0.12	2	20	-	Gyroid	
MARS										
Mars Plug	1	0h 35m	1.92	0.4	0.12	3	20	-	Gyroid	Slightly rotating the plug tightens & loosens gears to the fixed gears, set before gluing
Mars Plug Washer	1	0h 9m	0.28	0.4	0.12	3	20	-	Gyroid	
Mars 2	1	0h 42m	3.27	0.4	0.12	3	20	-	Gyroid	
Mars 3	1	0h 28m	2.19	0.4	0.12	3	20	-	Gyroid	
Mars 4	1	1h 32m	2.88	0.4	0.12	3	20	-	Gyroid	
Mars Clamp	1	0h 45m	2.97	0.4	0.12	2	20	-	Gyroid	
STRAP										
Strap	1	2h 0m	5.69	0.4	0.12	3	20	-	Gyroid	A light sand on the shaft might help make for smoother turning
Clamp Washer	3	0h 1m	0.02	0.4	0.12	3	20	-	Gyroid	
PLANETARY RINGS										
Planets	5	0h 2m	0.02	0.4	0.12	3	20	-	Gyroid	
Sun	1	0h 5m	0.07	0.4	0.12	3	20	-	Gyroid	
RINGS										
Saturn Ring	1	1h 12m	5.03	0.4	0.12	3	20	-	Gyroid	Do not remove from buildplate until completely cooled to prevent warping
Jupiter Ring	1	1h 7m	4.57	0.4	0.12	3	20	-	Gyroid	-
Mars Ring	1	1h 2m	4.28	0.4	0.12	3	20	-	Gyroid	-
Sun Ring	1	1h 6m	4.65	0.4	0.12	3	20	-	Gyroid	-
Venus Ring	1	0h 46m	3.25	0.4	0.12	3	20	-	Gyroid	-
Mercury Ring	1	0h 41m	2.71	0.4	0.12	3	20	-	Gyroid	-
Date Ring	1	0h 34m	2.50	0.4	0.12	3	20	-	Gyroid	-
Date Ring Pointer	1	0h 9m	0.21	0.4	0.12	3	20	Yes	Gyroid	-

Part Name	Qty	Approx Printing Time	Material Length (m)	Nozzle Diameter	Layer Height	Outer Perimeter	Infil (%)	Print Support	Infill Pattern	Notes
RING CONNECTOR										
Saturn Ring Connector	1	1h 17m	4.08	0.4	0.12	3	20	-	Gyroid	Do not remove from buildplate until completly cooled to prevent warping
Jupiter Ring Connector	1	1h 11m	3.83	0.4	0.12	3	20	-	Gyroid	-
Mars Ring Connector	1	1h 2m	3.44	0.4	0.12	3	20	-	Gyroid	-
Date Ring Connector	1	0h 52m	2.74	0.4	0.12	3	20	-	Gyroid	-
Sun Ring Connector	1	0h 46m	2.84	0.4	0.12	3	20	-	Gyroid	-
Venus Ring Connector	1	0h 38m	2.36	0.4	0.12	3	20	-	Gyroid	-
Mercury Ring Connector	1	0h 30m	1.92	0.4	0.12	3	20	-	Gyroid	-
BACK PLATES										
Back Plate 1	1	4h 35m	19.10	0.4	0.12	3	20	Yes	Gyroid	Do not remove from buildplate until completly cooled to prevent warping
Back Plate 2	1	4h 4m	18.25	0.4	0.12	3	20	Yes	Gyroid	-
Back Plate 3	1	2h 40m	12.69	0.4	0.12	3	20	Yes	Gyroid	-
Back Plate 4	1	3h 25m	15.00	0.4	0.12	3	20	Yes	Gyroid	-
Back Plate 5	1	3h 43m	16.43	0.4	0.12	3	20	Yes	Gyroid	-
Back Plate 6	1	1h 15m	5.23	0.4	0.12	3	20	Yes	Gyroid	-
Back Plate 7	1	1h 6m	4.59	0.4	0.12	3	20	Yes	Gyroid	-
Back Plate 8	1	2h 23m	12.40	0.4	0.12	3	20	Yes	Gyroid	-
Back Plate 9	1	2h 52m	13.28	0.4	0.12	3	20	Yes	Gyroid	-
Back Plate 10	1	3h 11m	13.70	0.4	0.12	3	20	Yes	Gyroid	-
MID PLATES										
Mid Plate 1	1	1h 40m	10.47	0.4	0.12	3	20	-	Gyroid	Do not remove from buildplate until completly cooled to prevent warping
Mid Plate 2	1	2h 34m	15.12	0.4	0.12	3	20	-	Gyroid	-
Mid Plate 3	1	1h 34m	9.88	0.4	0.12	3	20	-	Gyroid	-
Mid Plate 4	1	1h 11m	7.65	0.4	0.12	3	20	-	Gyroid	-
Mid Plate 5	1	1h 46m	10.74	0.4	0.12	3	20	-	Gyroid	-
Mid Plate 6	1	1h 12m	7.38	0.4	0.12	3	20	-	Gyroid	-
Mid Plate 7	1	1h 37m	10.16	0.4	0.12	3	20	-	Gyroid	-
Mid Plate 8	1	2h 16m	14.43	0.4	0.12	3	20	-	Gyroid	-
Mid Plate 9	1	1h 32m	9.62	0.4	0.12	3	20	-	Gyroid	-
TOP PLATES										
Top Plate 1	1	0h 58m	6.12	0.4	0.12	3	20	-	Gyroid	Do not remove from buildplate until completly cooled to prevent warping
Top Plate 2	1	1h 19m	8.66	0.4	0.12	3	20	-	Gyroid	-
Top Plate 3	1	0h 52m	5.34	0.4	0.12	3	20	-	Gyroid	-
Top Plate 4	1	1h 6m	7.16	0.4	0.12	3	20	-	Gyroid	-
Top Plate 5	1	1h 38m	10.50	0.4	0.12	3	20	-	Gyroid	-
Top Plate 6	1	1h 9m	7.57	0.4	0.12	3	20	-	Gyroid	-
Top Plate 7	1	0h 56m	5.71	0.4	0.12	3	20	-	Gyroid	-

Part Name	Qty	Approx Printing Time	Material Length (m)	Nozzle Diameter	Layer Height	Outer Perimeter	Infil (%)	Print Support	Infill Pattern	Notes
Top Plate 8	1	1h 17m	7.52	0.4	0.12	3	20	-	Gyroid	-
Top Plate 9	1	0h 49m	4.94	0.4	0.12	3	20	-	Gyroid	-
FRONT PLATES										
Front Plate 1	1	1h 15m	7.86	0.4	0.12	3	20	-	Gyroid	Do not remove from buildplate until completly cooled to prevent warping
Front Plate 2	1	1h 15m	7.80	0.4	0.12	3	20	-	Gyroid	-
Front Plate 3	1	1h 15m	7.79	0.4	0.12	3	20	-	Gyroid	-
Front Plate 4	1	1h 15m	7.82	0.4	0.12	3	20	-	Gyroid	-
Parapegma Plate 1	1	2h 28m	14.88	0.4	0.12	3	20	-	Gyroid	-
Parapegma Plate 2	1	2h 39m	16.09	0.4	0.12	3	20	-	Gyroid	-
Parapegma Plate 3	1	2h 40m	15.85	0.4	0.12	3	20	-	Gyroid	-
Parapegma Plate 4	1	2h 40m	15.85	0.4	0.12	3	20	-	Gyroid	-
Round Clamp	4	0h 9m	0.41	0.4	0.12	3	20	-	Gyroid	-
PILLARS										
Mid Plate Pillar	4	2h 14m	2.43	0.4	0.12	3	20	-	Gyroid	
Top Plate Pillar	4	1h 15m	1.32	0.4	0.12	3	20	-	Gyroid	
Back Plate Pillar	4	1h 2m	1.09	0.4	0.12	3	20	-	Gyroid	
Pillar End	24	0h 4m	0.19	0.4	0.12	3	20	-	Gyroid	
Pillar Washer	24	0h 1m	0.05	0.4	0.12	3	20	-	Gyroid	
Pillar Pin	22	0h 1m	0.02	0.4	0.12	3	20	-	Gyroid	
FRONT CALENDAR RING										
Calendar Plate 1	1	1h 9m	4.20	0.4	0.12	3	20	-	Gyroid	
Calendar Plate 2	1	1h 9m	4.20	0.4	0.12	3	20	-	Gyroid	
Calendar Plate 3	1	1h 7m	4.20	0.4	0.12	3	20	-	Gyroid	
Calendar Plate 4	1	1h 8m	4.19	0.4	0.12	3	20	-	Gyroid	
C										
C1 + C2	1	0h 25m	1.49	0.4	0.12	3	20	-	Gyroid	
C Arbor	1	0h 28m	0.84	0.4	0.12	3	20	Yes	Grid	
C Pin	1	0h 2m	0.04	0.4	0.12	3	20	-	Gyroid	Might be easier to get in with long nose pliers
D										
D1	1	0h 5m	0.22	0.4	0.12	3	20	-	Gyroid	
D Arbor	1	0h 18m	0.21	0.4	0.12	3	20	-	Grid	Arbor patruding alittle past the D2 is okay it supports the E3 with less friction than having D2+E3 rub
D Plate	1	0h 6m	0.37	0.4	0.12	3	20	-	Gyroid	
D Plate Cover	1	0h 4m	0.34	0.4	0.12	3	20	-	Gyroid	
D Spacer	1	0h 19m	1.91	0.4	0.12	3	20	-	Gyroid	
D2	1	1h 6m	6.02	0.4	0.12	3	20	-	Gyroid	
E										
E Arbor	1	0h 26m	0.84	0.4	0.12	3	20	-	Grid	
E Arbor Spacer	1	0h 1m	0.02	0.4	0.12	3	20	-	Gyroid	

Part Name	Qty	Approx Printing Time	Material Length (m)	Nozzle Diameter	Layer Height	Outer Perimeter	Infil (%)	Print Support	Infill Pattern	Notes
E1	1	0h 8m	0.51	0.4	0.12	3	20	-	Gyroid	
E2	1	0h 13m	0.48	0.4	0.12	3	20	-	Gyroid	
E Arbor Spacer	1	0h 1m	0.02	0.4	0.12	3	20	-	Gyroid	
E3	1	2h 35m	14.16	0.4	0.12	3	20	-	Gyroid	
E4	1	0h 47m	2.83	0.4	0.12	3	20	-	Gyroid	
E5	1	0h 12m	0.97	0.4	0.12	3	20	-	Gyroid	
E6	1	0h 14m	1.06	0.4	0.12	3	20	-	Gyroid	
E Supports	2	0h 14m	1.35	0.4	0.12	3	20	-	Gyroid	Ridge side up
Lunar Clamp	1	0h 37m	2.85	0.4	0.12	3	20	Yes	Gyroid	Must be printed upside down, pretty side facing gears for smooth turning
F										
F Arbor	1	0h 31m	0.35	0.4	0.12	3	20	Yes	Grid	
F Spacer	1	0h 18m	1.47	0.4	0.12	3	20	-	Gyroid	
F1	1	0h 16m	1.22	0.4	0.12	3	20	-	Gyroid	
F2	1	0h 6m	0.35	0.4	0.12	3	20	-	Gyroid	
G										
G Arbor Holder	1	0h 31m	1.21	0.4	0.12	3	20	Yes	Gyroid	
G Arbor Spacer	1	0h 2m	0.12	0.4	0.12	3	20	-	Gyroid	
G Arbor	1	1h 2m	1.02	0.4	0.12	3	20	Yes	Grid	
G1	1	0h 16m	1.17	0.4	0.12	3	20	-	Gyroid	
G2	1	0h 4m	0.15	0.4	0.12	3	20	-	Gyroid	
H										
H + I Outer Arbor	1	0h 29m	2.42	0.4	0.12	3	20	-	Gyroid	
H Arbor	1	0h 19m	0.21	0.4	0.12	3	20	-	Grid	I know what it looks like but no this arbor is not ment to have a pin and washer.
H1	1	0h 15m	1.17	0.4	0.12	3	20	-	Gyroid	
H2	1	0h 3m	0.08	0.4	0.12	3	20	-	Gyroid	
I										
I Arbor	1	0h 27m	0.30	0.4	0.12	3	20	-	Grid	
I1	1	0h 14m	1.10	0.4	0.12	3	20	-	Gyroid	
Exeligmos Pointer	1	0h 2m	0.05	0.4	0.12	3	20	-	Gyroid	
K										
K1	1	0h 13m	0.97	0.4	0.12	3	20	-	Gyroid	
K2	1	0h 14m	1.06	0.4	0.12	3	20	-	Gyroid	
L										
L1 + L2	1	0h 34m	2.05	0.4	0.12	3	20	Yes	Gyroid	
L Arbor	1	0h 17m	0.24	0.4	0.12	3	20	Yes	Grid	
M										
M1	1	0h 54m	3.79	0.4	0.12	3	20	-	Gyroid	

Part Name	Qty	Approx Printing Time	Material Length (m)	Nozzle Diameter	Layer Height	Outer Perimeter	Infill (%)	Print Support	Infill Pattern	Notes
M Holder	1	0h 14m	0.75	0.4	0.12	3	20	-	Gyroid	
M Holder Plug	1	0h 11m	0.13	0.4	0.12	3	20	-	Gyroid	
M2	1	0h 4m	0.10	0.4	0.12	3	20	-	Gyroid	
M3	1	0h 5m	0.27	0.4	0.12	3	20	-	Gyroid	
N										
N Arbor	1	0h 34m	0.38	0.4	0.12	3	20	-	Grid	
N1	1	0h 14m	1.05	0.4	0.12	3	20	-	Gyroid	
N2	1	0h 10m	0.76	0.4	0.12	3	20	-	Gyroid	
N3	1	0h 4m	0.07	0.4	0.12	3	20	-	Gyroid	
N Washer	1	0h 2m	0.10	0.4	0.12	3	20	-	Gyroid	
O										
O Arbor	1	0h 22m	0.24	0.4	0.12	3	20	-	Grid	
O Arbor Washer 1	1	0h 3m	0.19	0.4	0.12	3	20	-	Gyroid	
O1	1	0h 11m	0.84	0.4	0.12	3	20	-	Gyroid	
O Arbor Washer 2	1	0h 2m	0.12	0.4	0.12	3	20	-	Gyroid	
Callippic Pointer	1	0h 2m	0.05	0.4	0.12	3	20	-	Gyroid	
P										
P Arbor Holder	1	0h 25m	0.40	0.4	0.12	3	20	Yes	Gyroid	
P Arbor	1	0h 15m	0.17	0.4	0.12	3	20	-	Grid	
P1	1	0h 14m	1.10	0.4	0.12	3	20	-	Gyroid	
P2	1	0h 4m	0.09	0.4	0.12	3	20	-	Gyroid	
Q										
Q Arbor Holder	1	0h 25m	0.40	0.4	0.12	3	20	-	Gyroid	
Q Arbor	1	0h 19m	0.21	0.4	0.12	3	20	-	Grid	
Q1	1	0h 13m	1.01	0.4	0.12	3	20	-	Gyroid	
Olympiad Pointer	1	0h 2m	0.05	0.4	0.12	3	20	-	Gyroid	
LUNAR SHAFT										
B3	1	0h 8m	0.51	0.4	0.12	3	20	-	Gyroid	The ridge is a guide for the B3 Cap
B3 Cap	1	0h 3m	0.12	0.4	0.12	3	20	-	Gyroid	
Lunar Shaft	1	3h 14m	3.91	0.4	0.12	3	50	-	Grid	A light sand might help make for smoother turning
A1										
Plug	1	0h 12m	0.18	0.4	0.12	3	20	-	Gyroid	Handle design taken from Freeth 2021 Research Paper
Mount	1	0h 43m	2.67	0.4	0.12	3	20	-	Gyroid	
Main Bearing Body	1	2h 14m	5.45	0.4	0.12	3	30	Yes	Gyroid	
Inner	1	0h 43m	4.19	0.4	0.12	3	20	-	Gyroid	
Crown	1	0h 49m	3.09	0.4	0.12	3	20	-	Gyroid	
Pin	1	0h 3m	0.06	0.4	0.12	3	20	-	Gyroid	

Part Name	Qty	Approx Printing Time	Material Length (m)	Nozzle Diameter	Layer Height	Outer Perimeter	Inflil (%)	Print Support	Infill Pattern	Notes
Handle	1	1h 58m	10.64	0.4	0.12	3	20	Yes	Gyroid	
Handle Button	1	0h 11m	0.29	0.4	0.12	3	20	-	Gyroid	