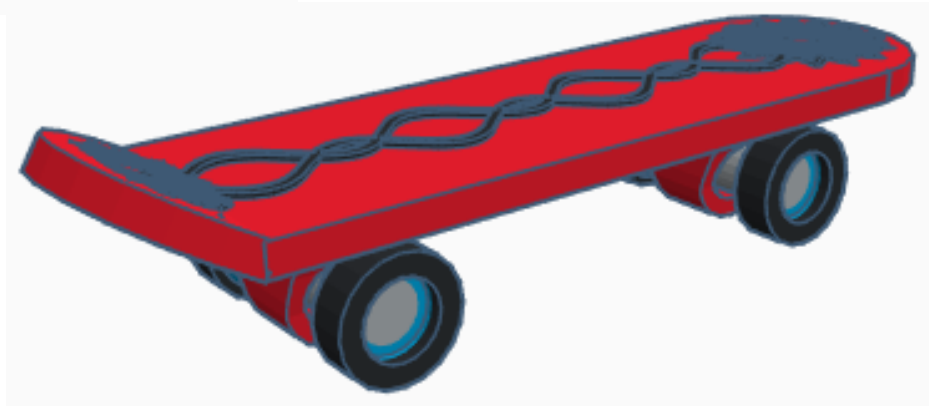
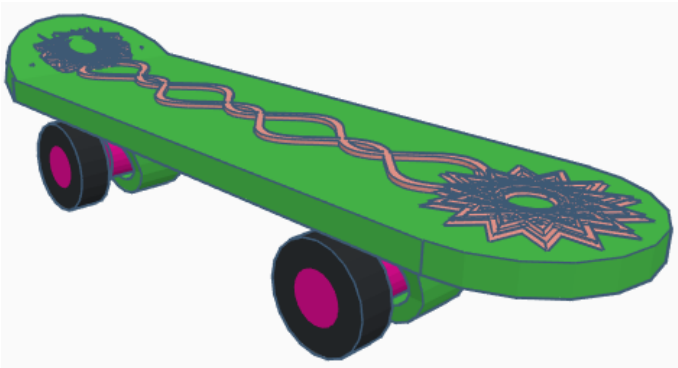




# Skateboard Project



## **Contents:**

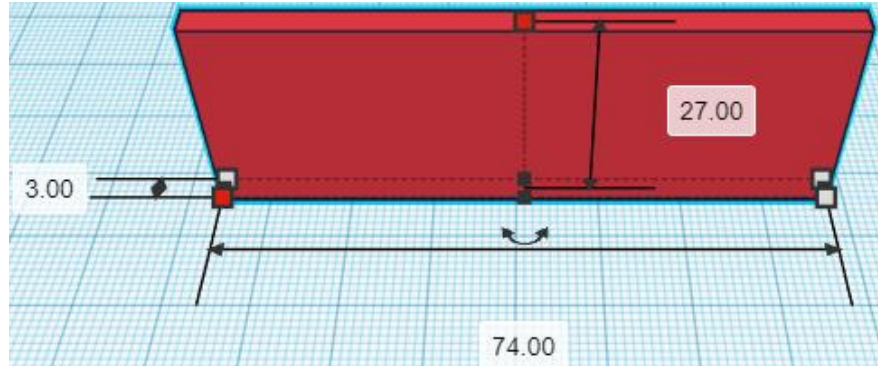
<b>Cover.....</b>	<b>1</b>
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# Skateboard:

## Board:

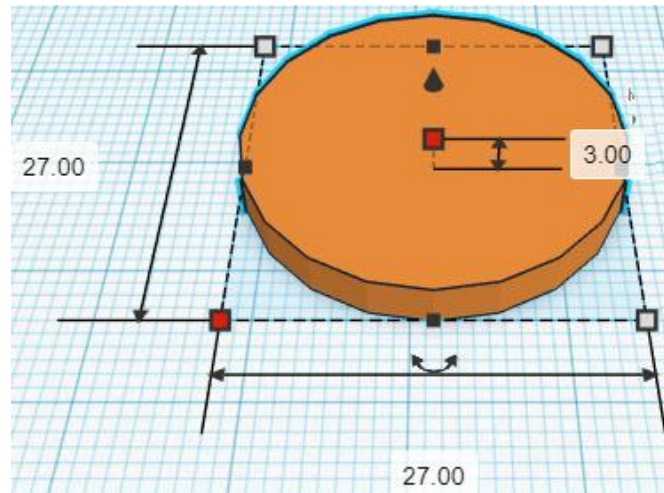
Bring in a Box, located in Basic Shapes on the left 2 shapes down.  
From now on this will be called the **Board**

Change the dimensions to  
74mm X direction,  
3mm Y direction, and  
27mm Z direction.

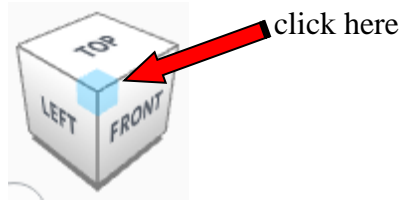


Bring in a Cylinder, located in Basic Shapes on the right 2 shapes down.  
From now on this will be called the **Board Back**

Change the dimensions to  
27mm X direction,  
27mm Y direction, and  
3mm Z direction.



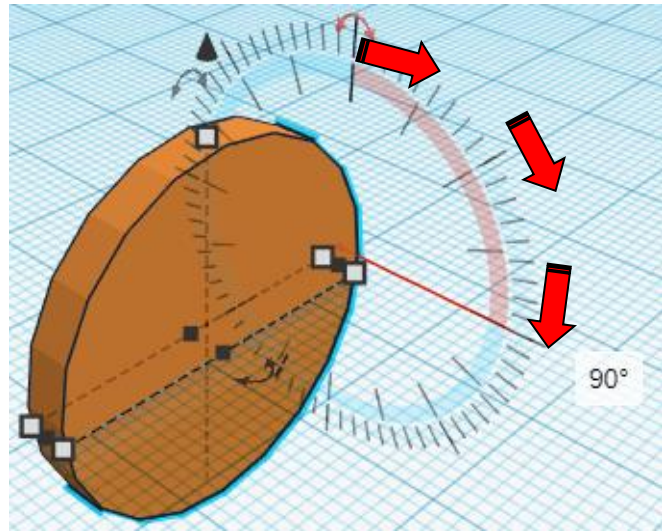
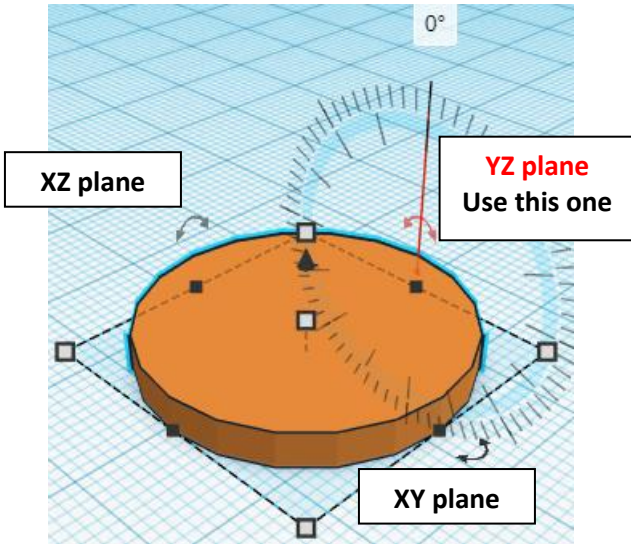
Go to TOP LEFT FRONT view for rotations



**Rotate** the Board Back clockwise 90 degrees in YZ plane.

Before

After

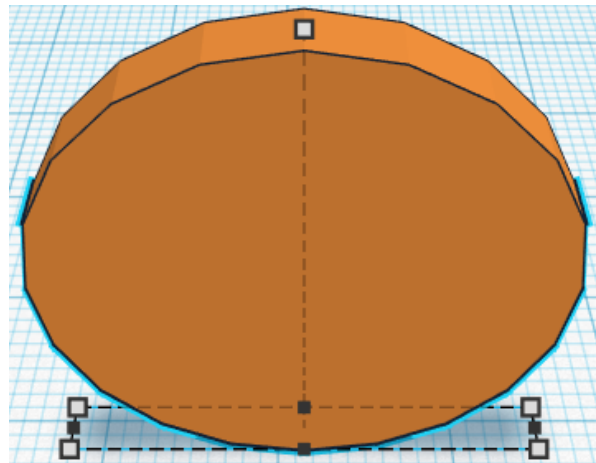
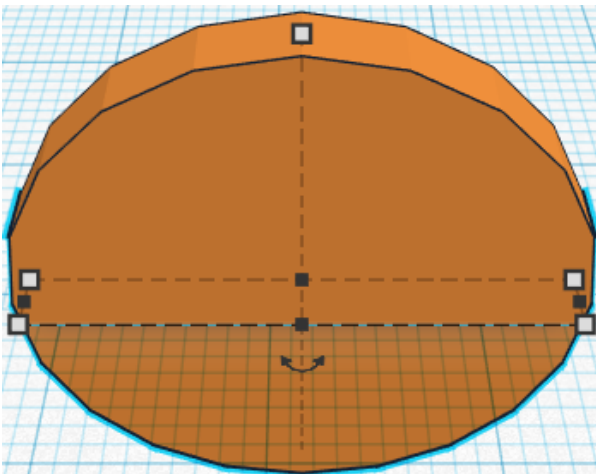


**Set on Workplane:**

Select the Board Back and type "d" to set the body on the work plane.

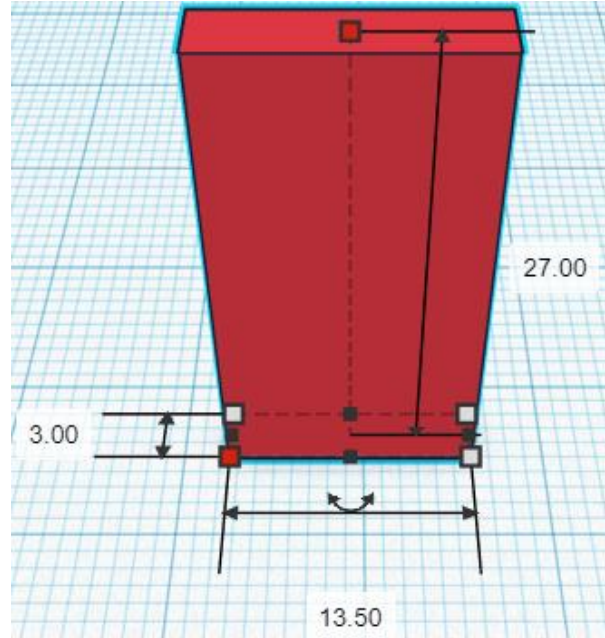
Before

After

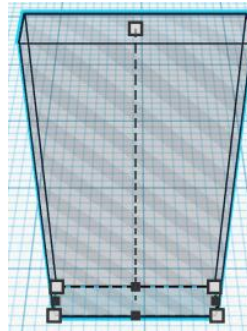


Bring in a Box, located in Basic Shapes on the left 2 shapes down.  
From now on this will be called the **Board Back Cutout**

Change the dimensions to  
13.50mm X direction,  
3mm Y direction, and  
27mm Z direction.

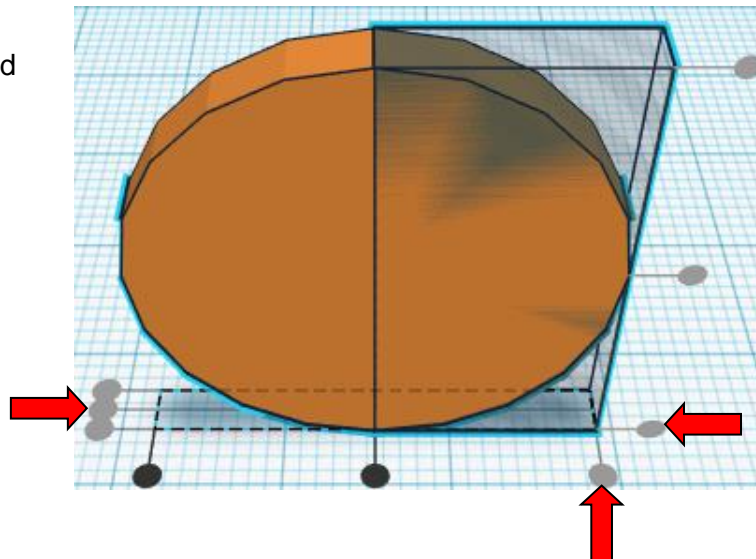


**Change** Board Back Cutout to **Hole** by  
selecting Board Back Cutout and typing "h".

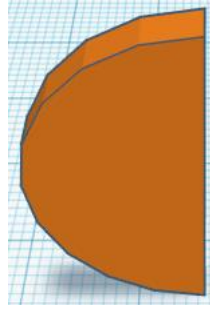


**Align** Board Back and Board Back Cutout

right in X direction,  
centered of Y direction, and  
bottom of Z direction.



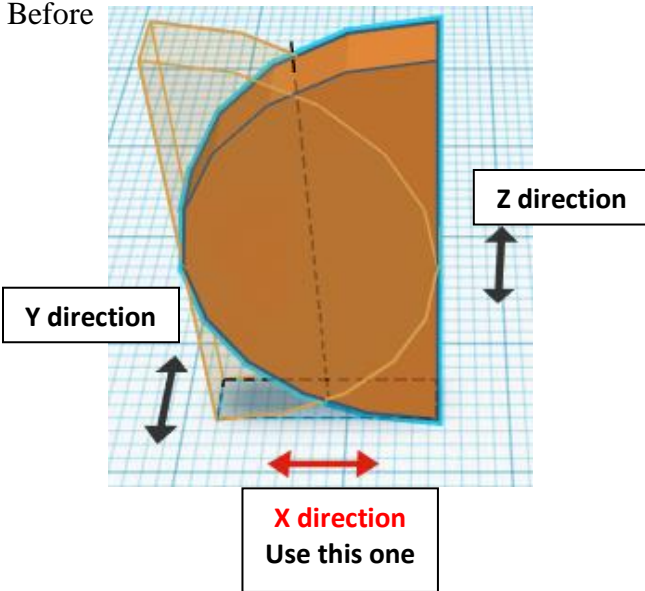
**Group** Board Back and Board Back Cutout  
From now on this will be called the **Board Back**



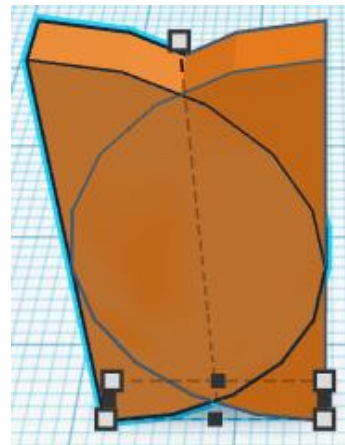
**Duplicate** Board Back 1 time

**Flip** Board Back in X direction.

Before



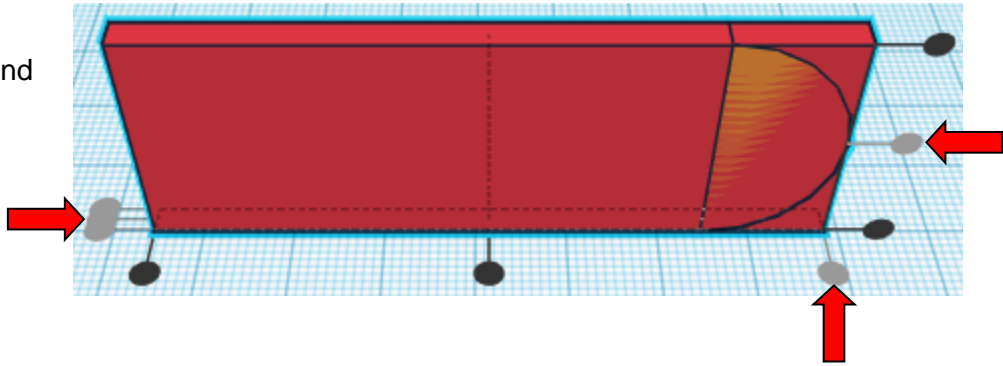
After



From now on this new flipped part will be called the **Board Front**

### Align Board and Board Front

right in X direction,  
centered of Y direction, and  
centered of Z direction.



### Move Board (Must be in home view for this to work!)

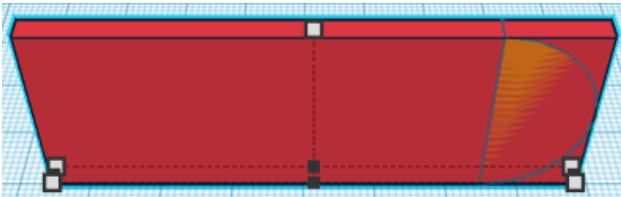
move left in negative X direction 13mm

**Hint:** Select Board and push left arrow key 13 times.

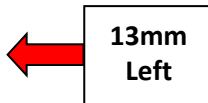
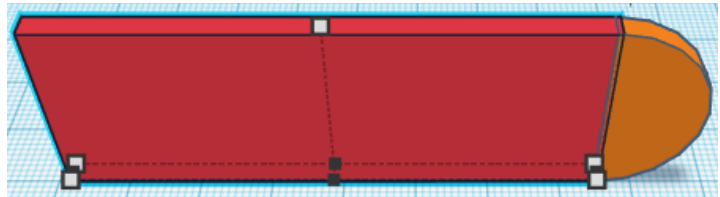
Or

Select Board and hold shift and push left arrow key 1 times,  
then release shift and push left arrow key 3 more times.

Before



After

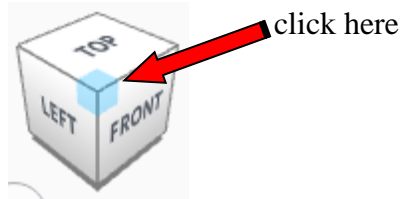


### Group Board and Board Front

From now on this will be called the **Board**

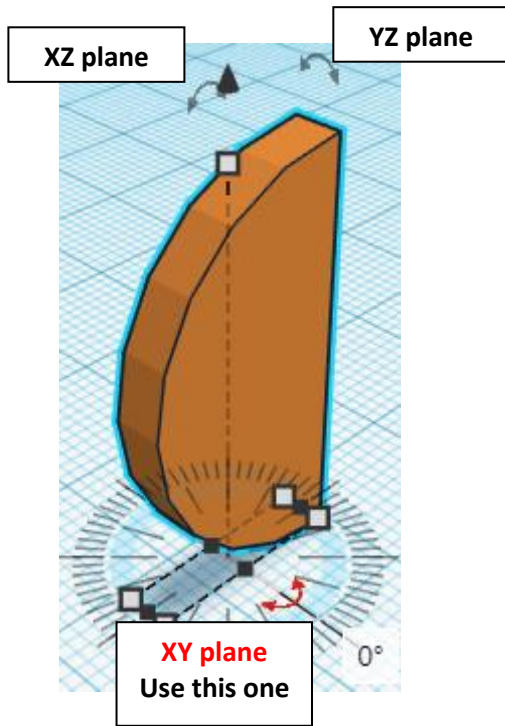


Go to TOP LEFT FRONT view for rotations

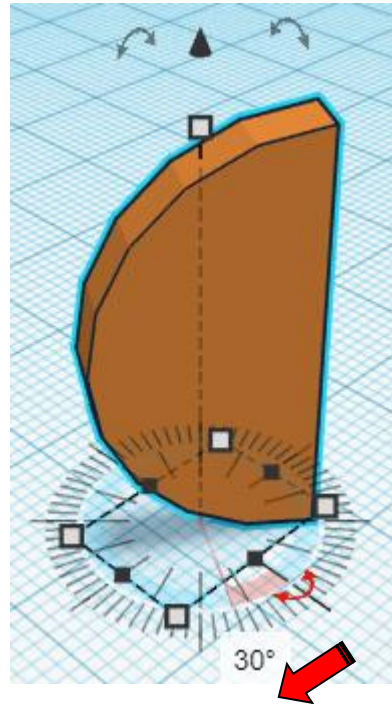


**Rotate** the Board Back clockwise 30 degrees in XY plane.

Before

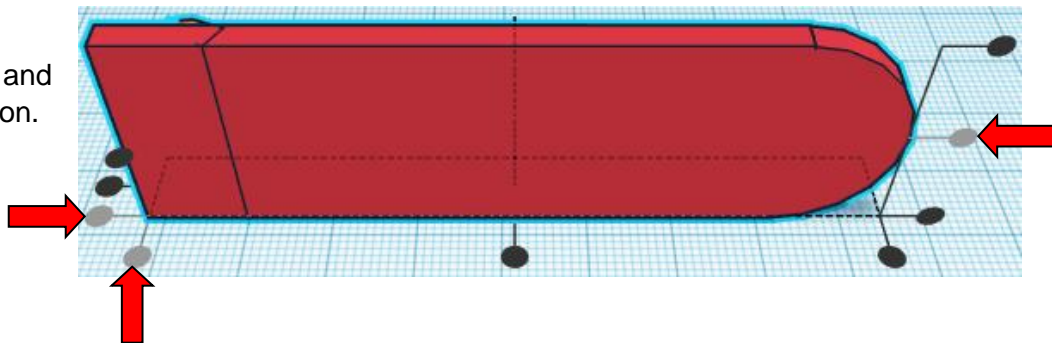


After



**Align** Board and Board Back

left in X direction,  
front of Y direction,  
and centered of Z direction.

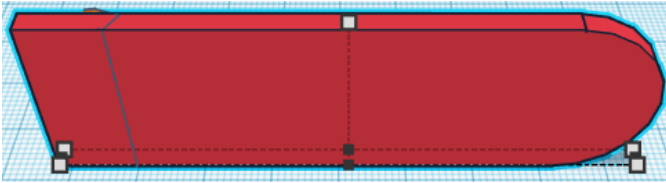




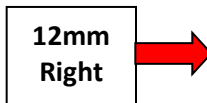
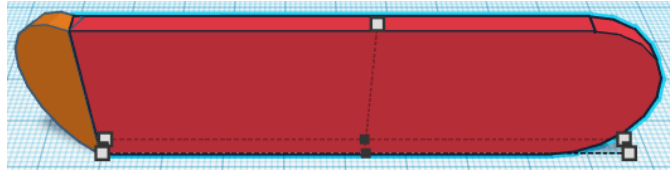
**Move Board** (Must be in home view for this to work!)  
move right in positive X direction 12mm

**Hint:** Select Board and push right arrow key 12 times.  
Or  
Select Board and hold shift and push right arrow key 1 times,  
then release shift and push right arrow key 2 more times.

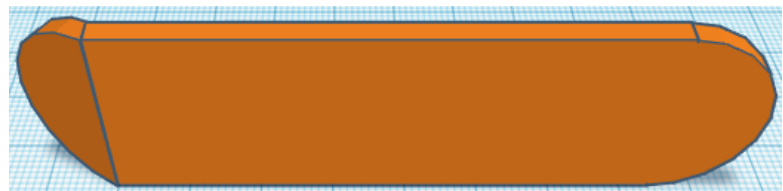
Before



After



**Group Board and Board Back**  
From now on this will be called the **Board**

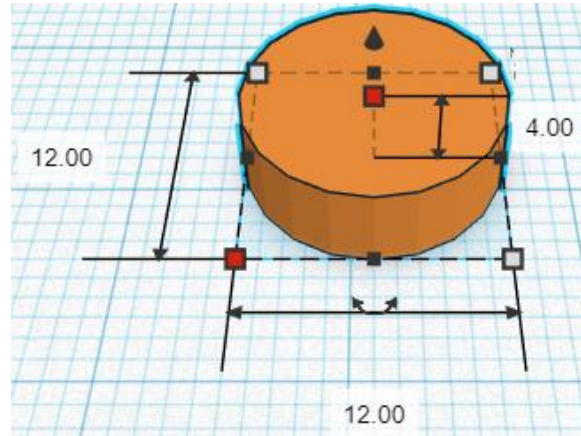


**You are done with the board, set it off to the side for now.**

## Wheels:

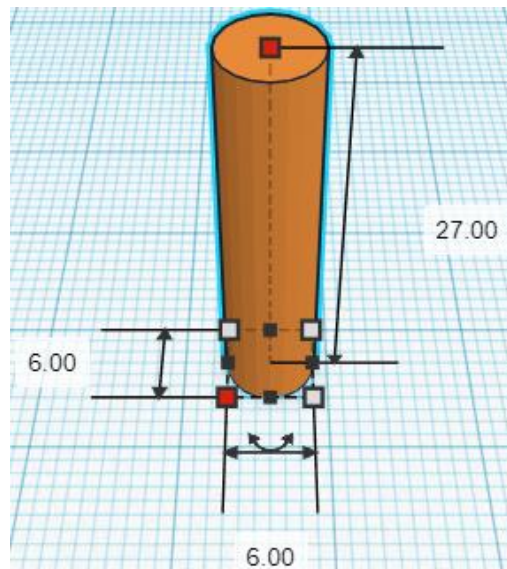
Bring in a Cylinder, located in Basic Shapes on the right 2 shapes down.  
From now on this will be called the **Bottom Wheel**

Change the dimensions to  
12mm X direction,  
12mm Y direction, and  
4mm Z direction.



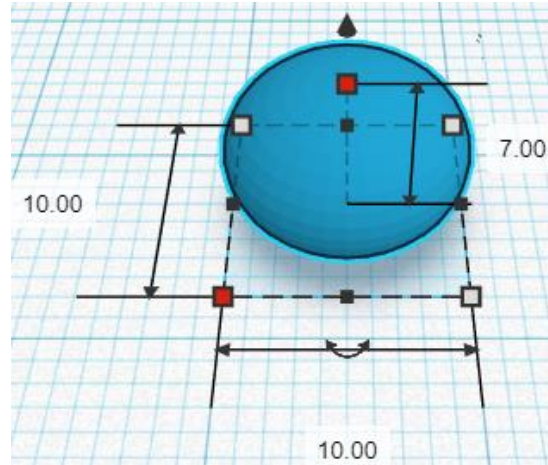
Bring in a Cylinder, located in Basic Shapes on the right 2 shapes down.  
From now on this will be called the **Wheel Axle**

Change the dimensions to  
6mm X direction,  
6mm Y direction, and  
27mm Z direction.



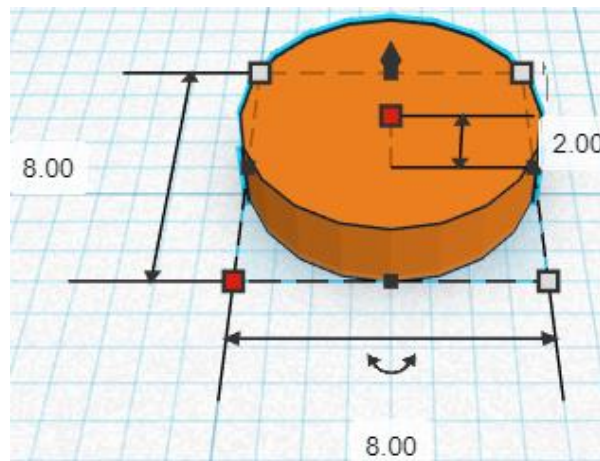
Bring in a Sphere, located in Basic Shapes on the left 3 shapes down.  
From now on this will be called the **Wheel Support**

Change the dimensions to  
10mm X direction,  
10mm Y direction, and  
7mm Z direction.

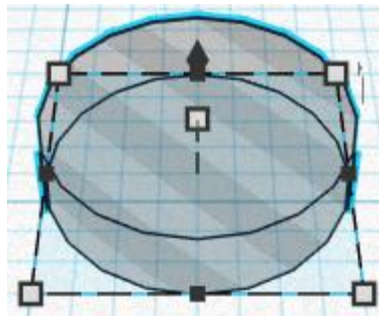


Bring in a Cylinder, located in Basic Shapes on the right 2 shapes down.  
From now on this will be called the **Wheel Cutout**

Change the dimensions to  
8mm X direction,  
8mm Y direction, and  
2mm Z direction.

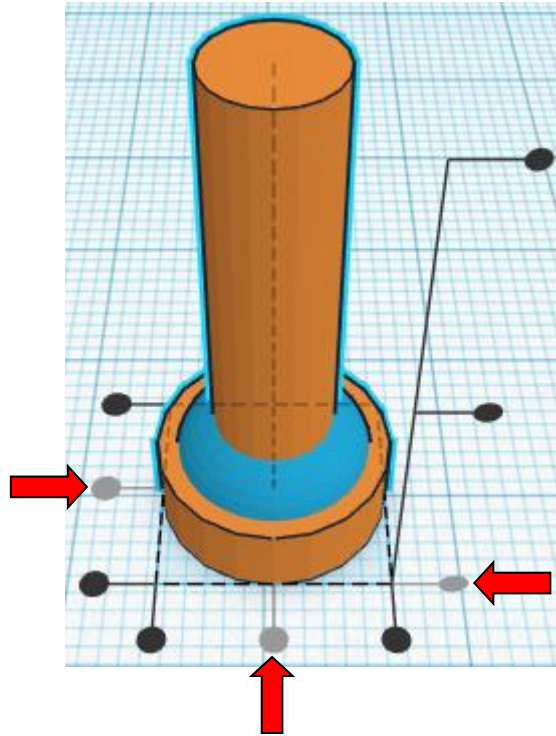


**Change Wheel Cutout to **Hole**** by  
selecting Wheel Cutout and typing "h".

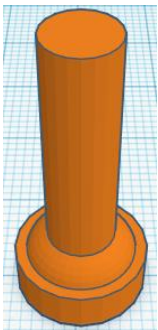


**Align Bottom Wheel and Wheel Axle and Wheel Support and Wheel Cutout**

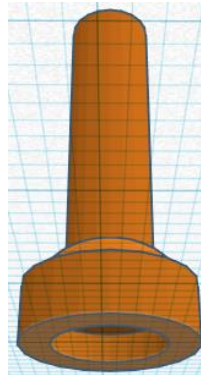
centered in X direction,  
centered in Y direction, and  
bottom in Z direction.



**Group Bottom Wheel and Wheel Axle and Wheel Support and Wheel Cutout**  
From now on this will be called the **Bottom Wheel**



Home  
View

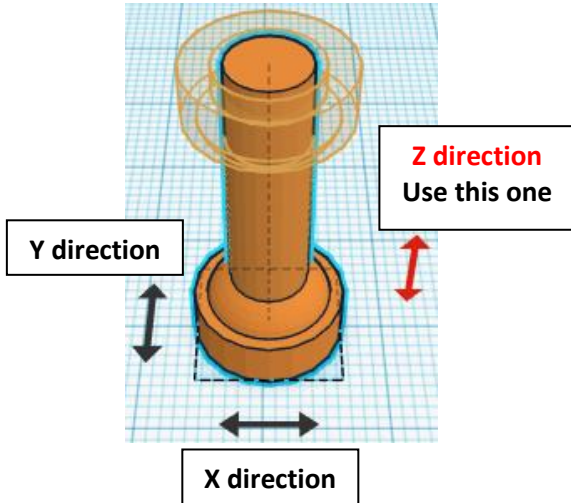


Underneath  
View

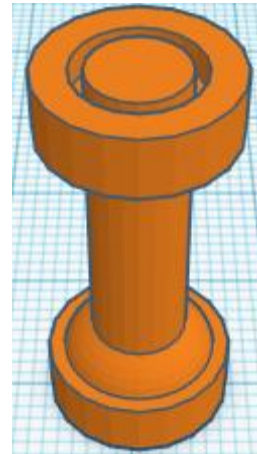
**Duplicate Bottom Wheel 1 time**

Flip Bottom Wheel in Z direction.

Before



After



From now on this new flipped part will be called the **Top Wheel**

You might have noticed that we have lost the wheel cutouts.

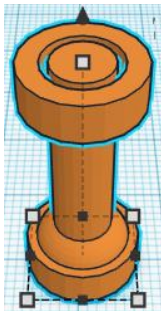
We want the wheel cutouts, so how do we get them back?...

If we ungroup all of the wheel parts, we will get the wheel cutouts back.

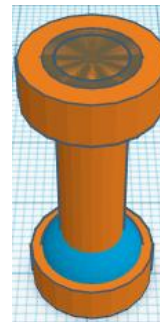
Then we can regroup all the wheel parts back together and it will give us the wheel cutouts back!

Select all parts of wheels and **Ungroup**.

Before

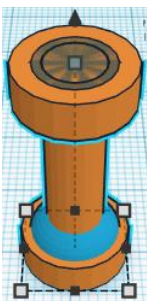


After

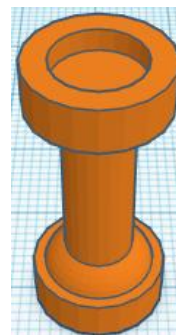


Select all parts of wheels and **Group**. From now on this will be called the **Wheels**

Before



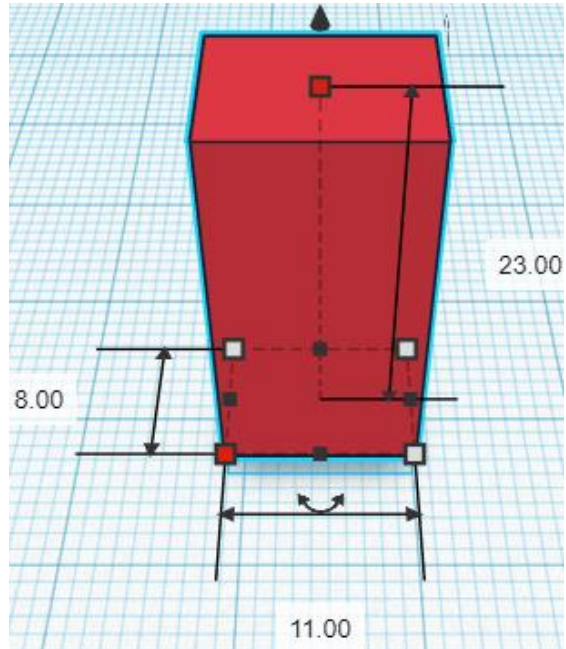
After



## Wheel Holder:

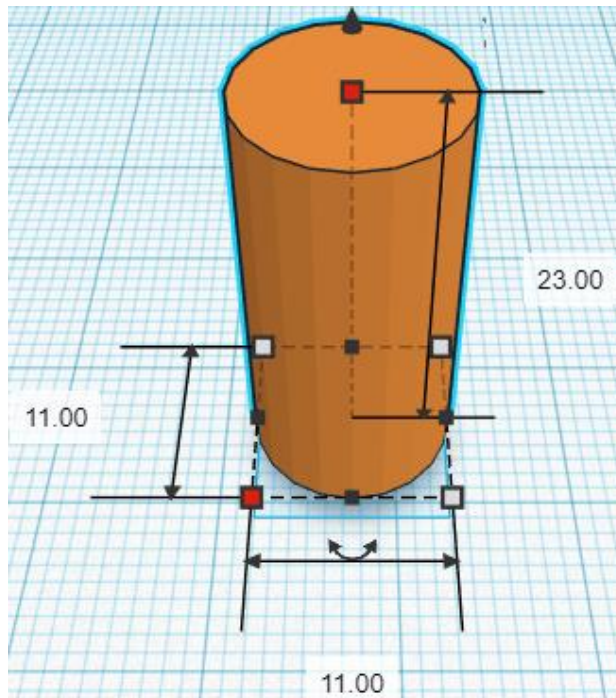
Bring in a Box, located in Basic Shapes on the left 2 shapes down.  
From now on this will be called the **Box**

Change the dimensions to  
11mm X direction,  
8mm Y direction, and  
23mm Z direction.



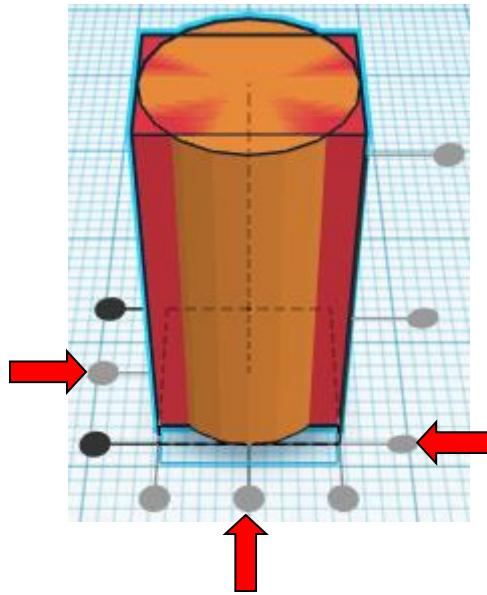
Bring in a Cylinder, located in Basic Shapes on the right 2 shapes down.  
From now on this will be called the **Cylinder**

Change the dimensions to  
11mm X direction,  
11mm Y direction, and  
23mm Z direction.



### Align Box and Cylinder

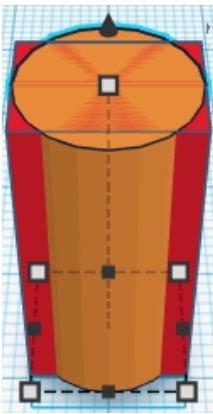
centered in X direction,  
centered in Y direction, and  
bottom in Z direction.



**Move Cylinder** (Must be in home view for this to work!)  
move forward in negative Y direction 4mm

**Hint:** Select Cylinder and push down arrow key 4 times.

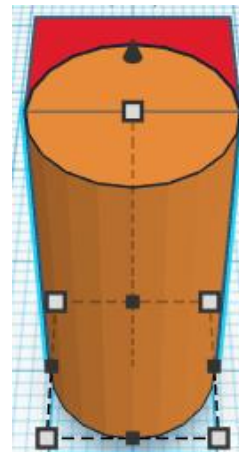
Before



4mm  
Forward

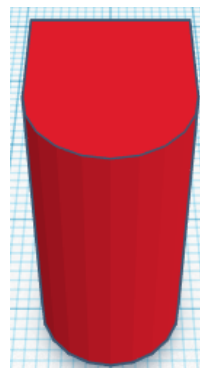


After



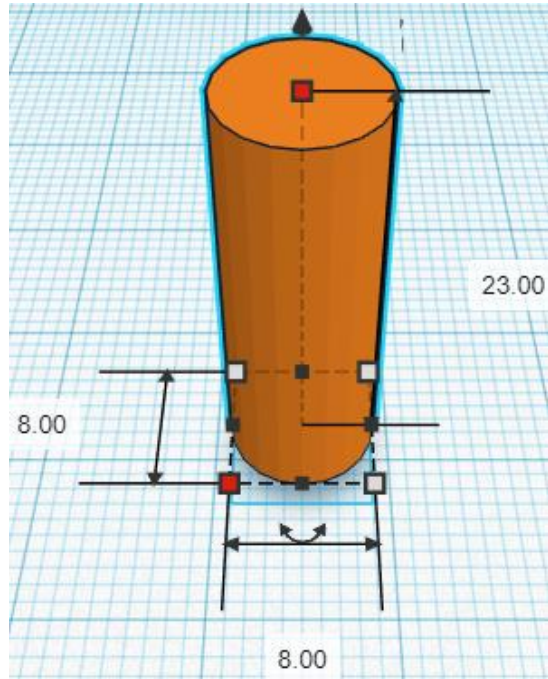
### **Group Box and Cylinder**

From now on this will be called the **Wheel Holder**

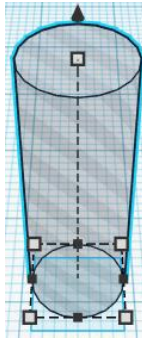


Bring in a Cylinder, located in Basic Shapes on the right 2 shapes down.  
From now on this will be called the **Axle Cutout**

Change the dimensions to  
8mm X direction,  
8mm Y direction, and  
23mm Z direction.



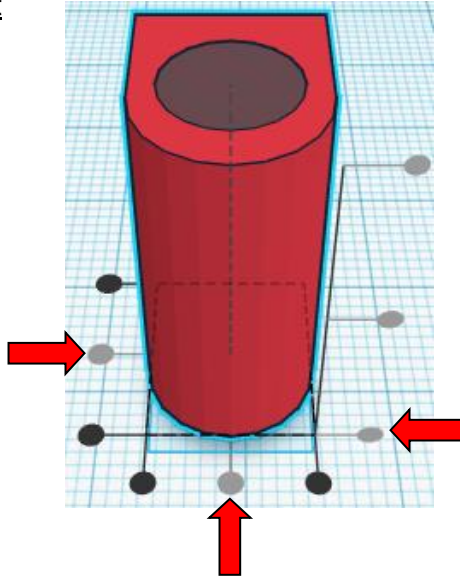
**Change Axle Cutout to **Hole**** by  
selecting Axle Cutout and typing "h".





**Align Wheel Holder and Axle Cutout**

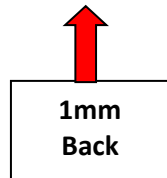
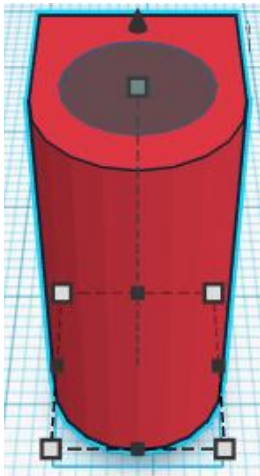
centered in X direction,  
centered in Y direction, and  
bottom in Z direction.



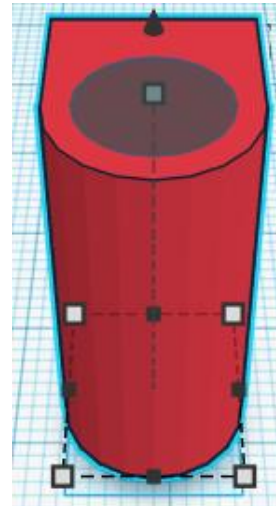
**Move Wheel Holder** (Must be in home view for this to work!)  
move back in positive Y direction 1mm

**Hint:** Select Wheel Holder and push up arrow key 1 times.

Before

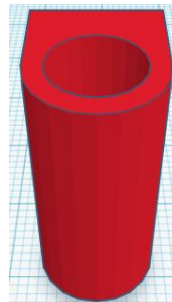


After



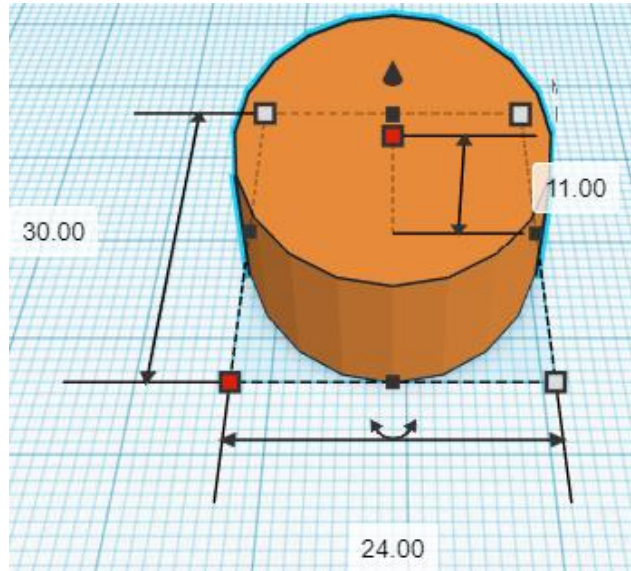
**Group Wheel Holder and Axle Cutout**

From now on this will be called the **Wheel Holder**

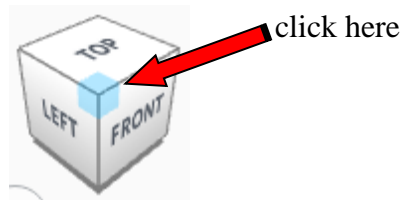


Bring in a Cylinder, located in Basic Shapes on the right 2 shapes down.  
From now on this will be called the **Wheel Cutout**

Change the dimensions to  
24mm X direction,  
30mm Y direction, and  
11mm Z direction.

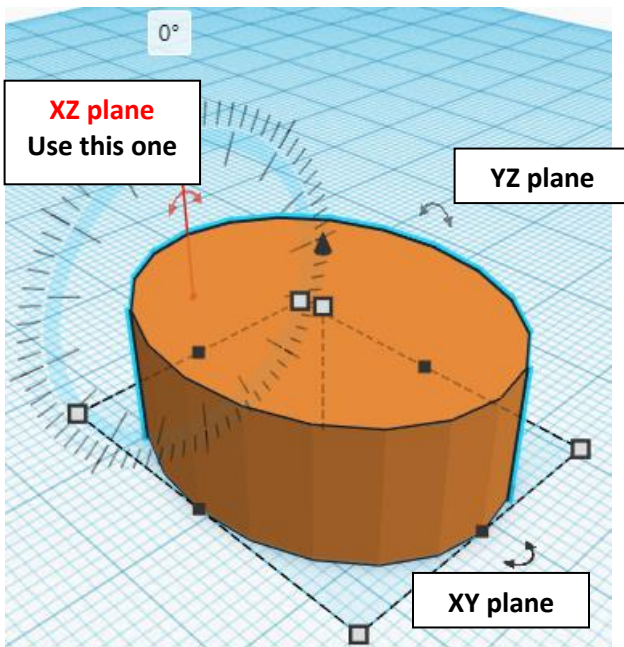


Go to TOP LEFT FRONT view for rotations

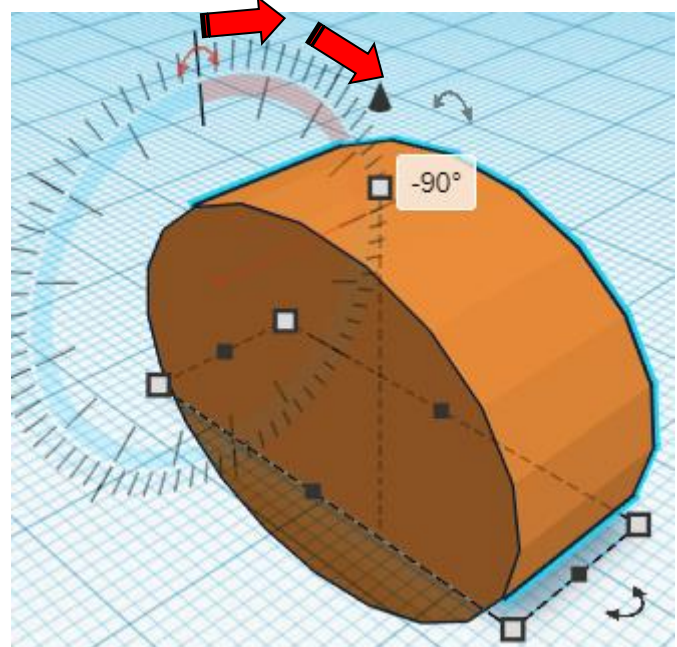


**Rotate** the Wheel Cutout clockwise 90 degrees in XZ plane.

Before



After



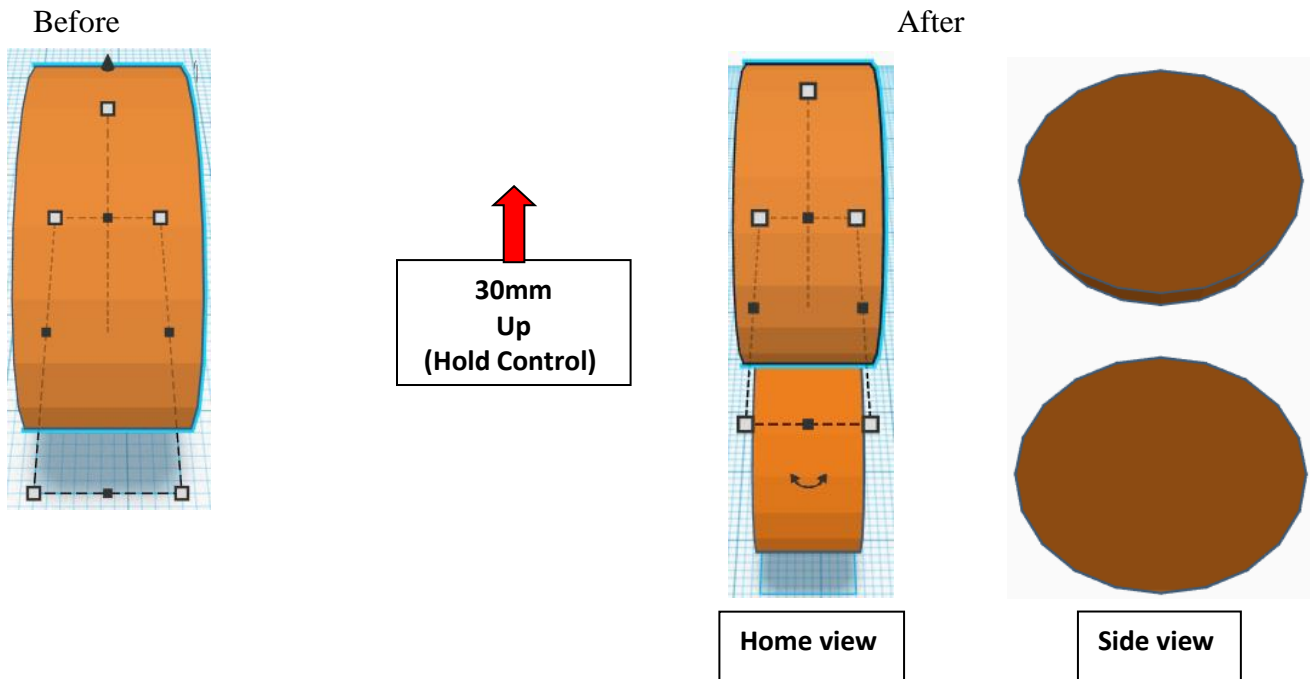
**Duplicate** Wheel Cutout 1 time

**Move** Wheel Cutout (Must be in home view for this to work!)  
move up in positive Z direction 30mm

**Hint:** Select Wheel Cutout and hold control and push up arrow key 30 times.

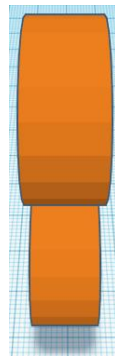
or

Select Wheel Cutout and hold control and hold down shift and push up arrow key 3 times.

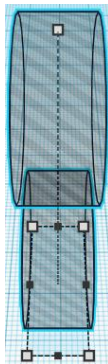


**Group** Wheel Cutouts

From now on this will be called the **Wheel Cutouts**

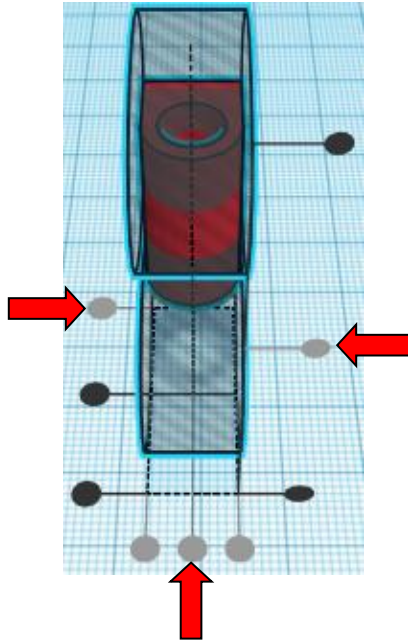


**Change** Wheel Cutouts to **Hole** by  
selecting Wheel Cutouts and typing "h".



**Align Wheel Holder and Wheel Cutouts**

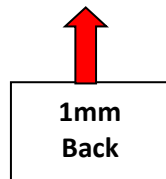
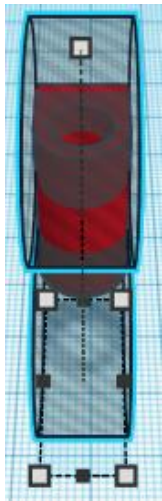
centered in X direction,  
back in Y direction, and  
centered in Z direction.



**Move Wheel Cutouts** (Must be in home view for this to work!)  
move back in positive Y direction 1mm

**Hint:** Select Wheel Cutouts and push up arrow key 1 times.

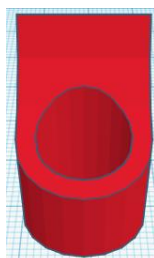
Before



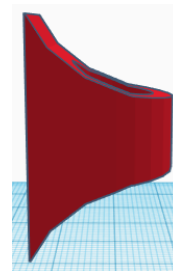
After



**Group Wheel Holder and Wheel Cutout**  
From now on this will be called the **Wheel Holder**



Home view

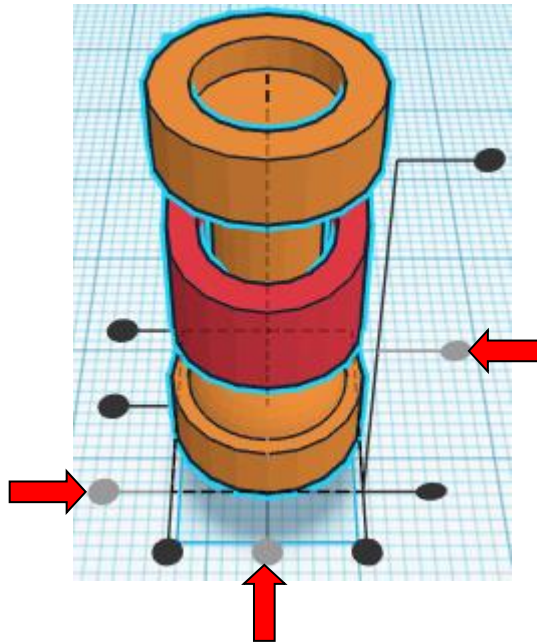


Side view

## Assembly the Skateboard:

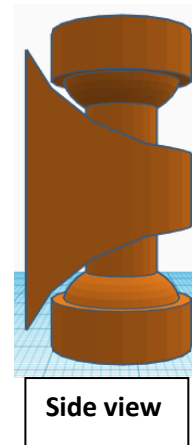
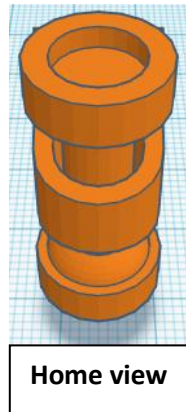
### Align Wheel Holder and Wheels

centered in X direction,  
front in Y direction, and  
centered in Z direction.



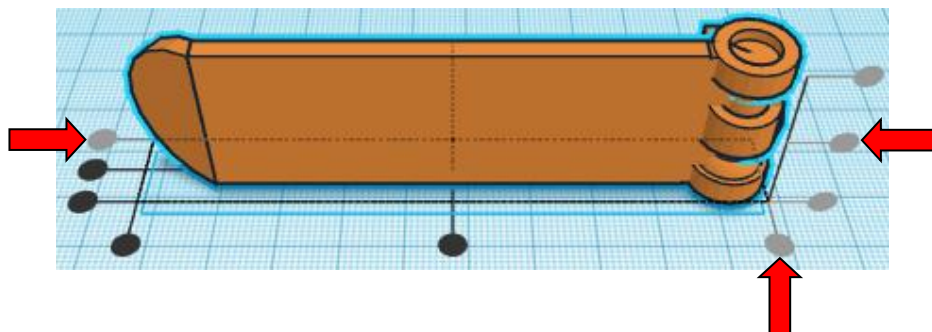
### Group Wheel Holder and Wheels

From now on this will be called the **Wheels**



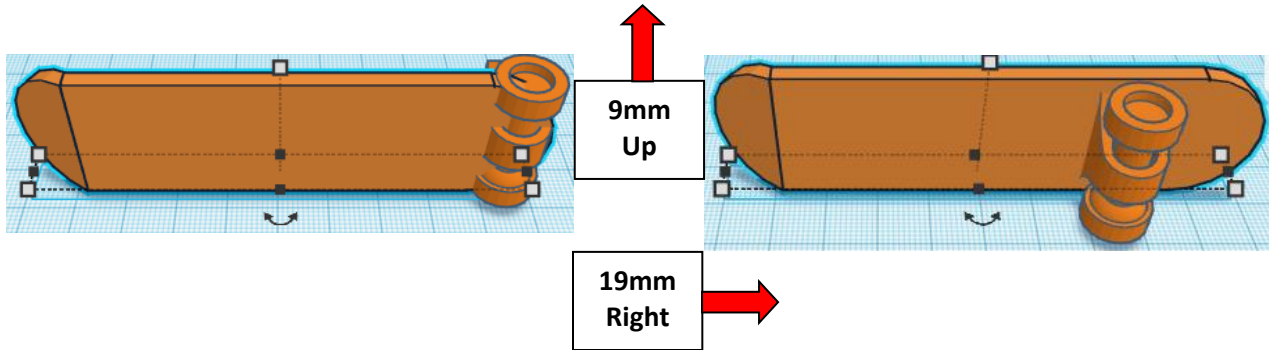
### Align Board and Wheels

right in X direction,  
back in Y direction, and  
centered in Z direction.



**Move Board** (Must be in home view for this to work!)  
move back in positive Y direction 9mm  
and  
move right in positive X direction 19mm

**Hint:** Select Board and push up arrow key 9 times.  
And  
Select Board and push right arrow key 19 times.  
or  
Select Board and hold down shift and push right arrow key 1 time. Then release shift and push right arrow key 9 more times.  
Before



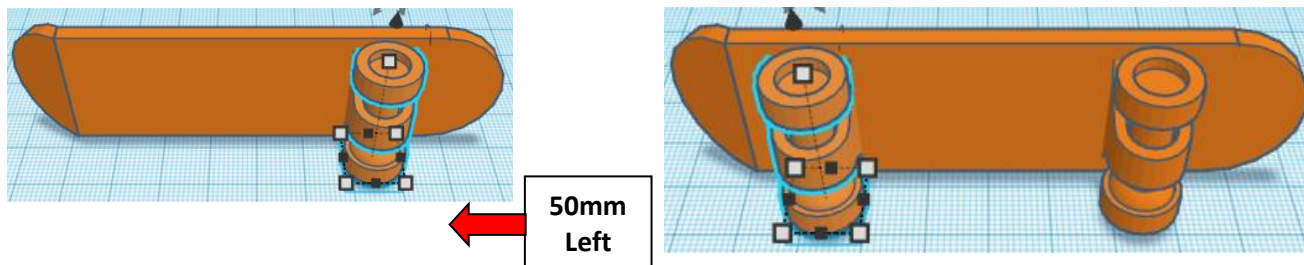
**Duplicate Wheels** 1 time

**Move Wheels** (Must be in home view for this to work!)  
move left in negative X direction 50mm

**Hint:** Select Wheels and push left arrow key 50 times.  
or  
Select Wheels and hold down shift and push left arrow key 5 times.

Before

After



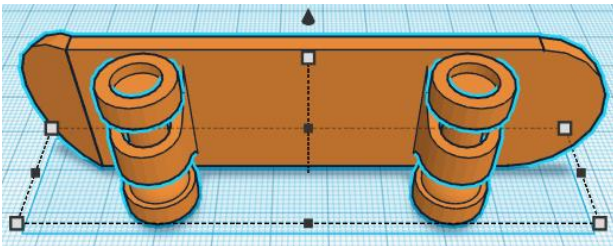
**Group** both sets of Wheels and Board  
From now on this will be called the **Skateboard**



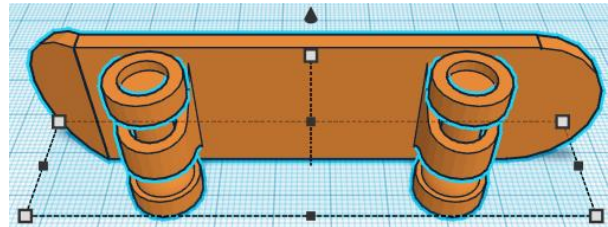
**Set on Workplane:**

Select the Skateboard and type "d" to set the body on the work plane.

Before

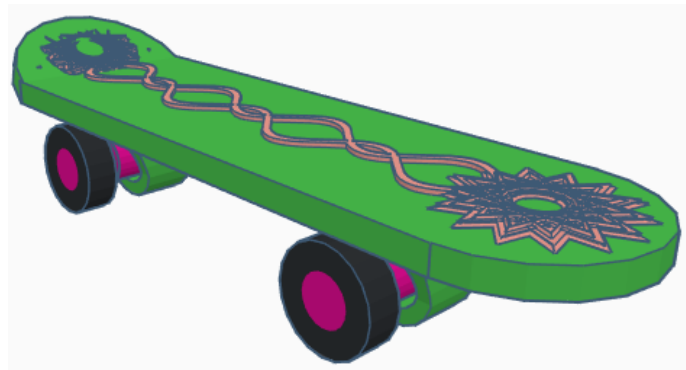
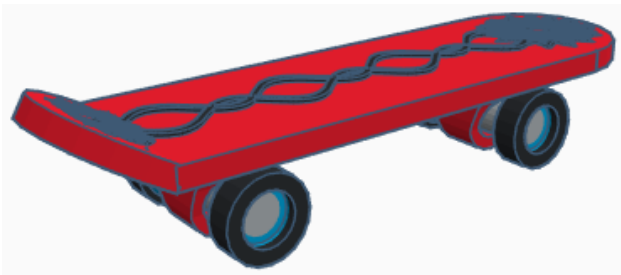


After



**You're are done! Print as one piece!**  
**Loosen the wheels and turn several times!!**

**Enjoy**

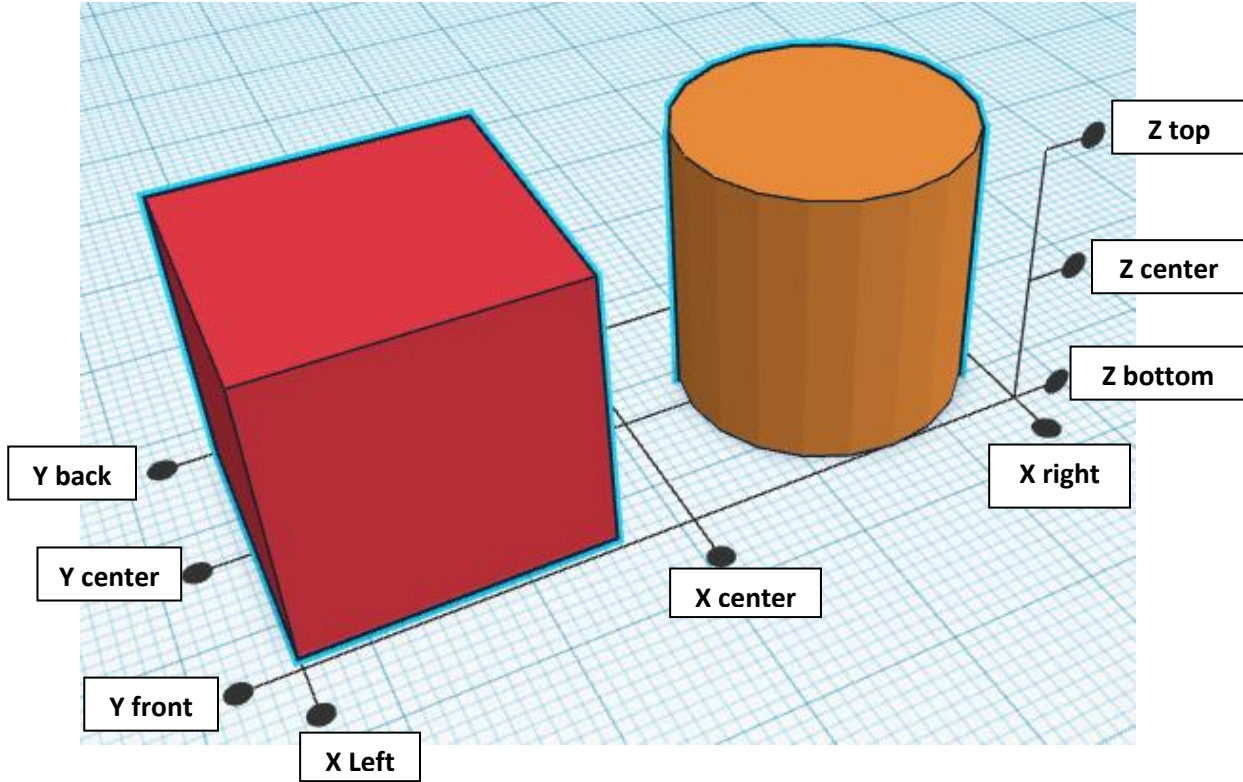


Reference to Aligning, Flip direction, Move direction, and Rotate direction.

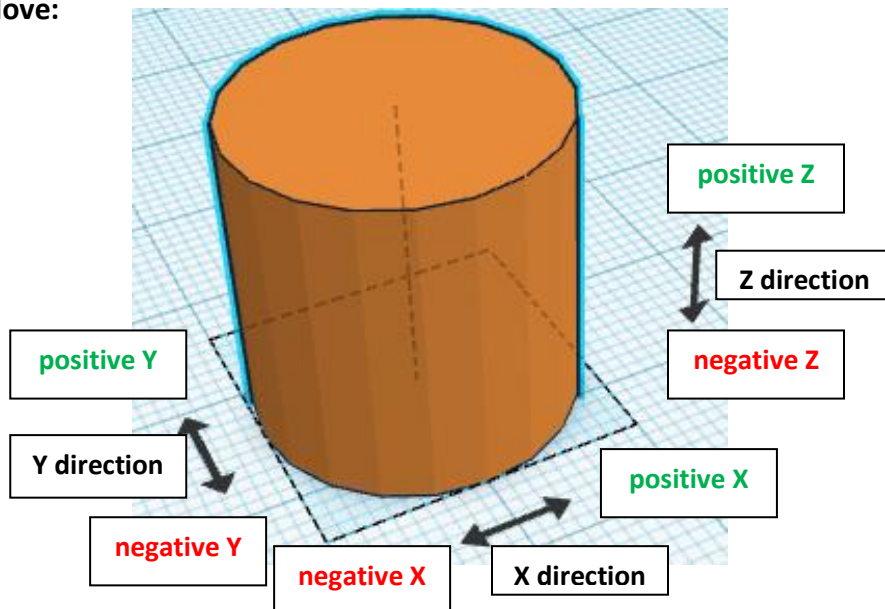
Always be in the "home view" when doing any of these!!!



Aligning:

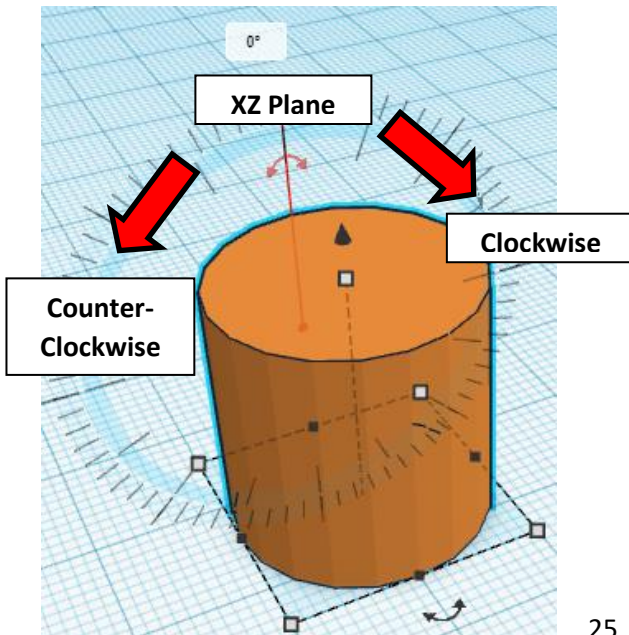
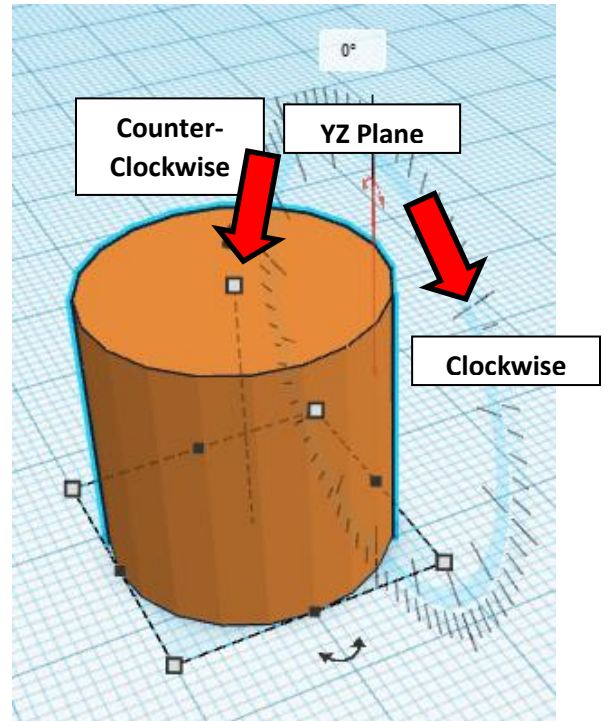
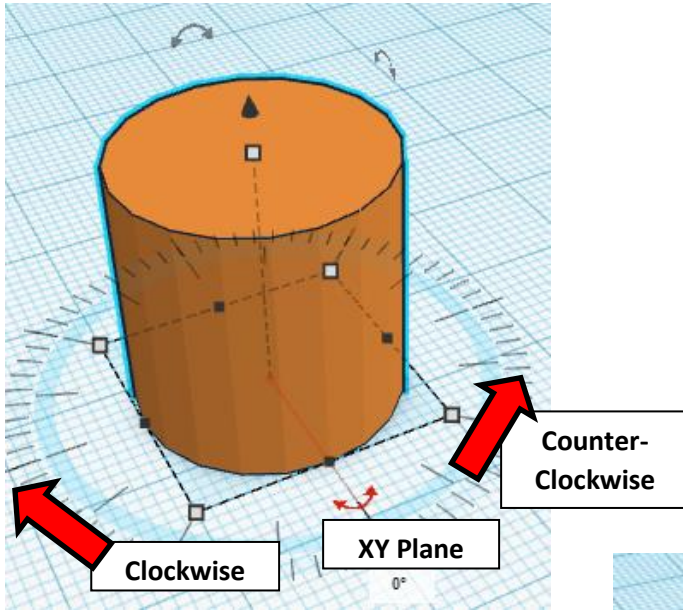


Flip or Mirror and Move:





Rotate:



# Tool Guide

## Most used Keyboard Shortcuts:

Transparency toggle	<b>T</b>	Duplicate object(s) in place.	<b>Ctrl</b> + <b>D</b>
Turn object(s) into <b>Holes</b>	<b>H</b>	Delete object(s)	<b>Del</b>
Turn object(s) into <b>Solids</b>	<b>S</b>	Undo action(s)	<b>Ctrl</b> + <b>Z</b>
<b>Align</b> object(s)	<b>L</b>	Zoom the view in or out	Mouse scroll wheel
<b>Flip/Mirror</b> object(s)	<b>M</b>	Zoom-in	<b>+</b>
<b>Drop</b> object(s) to workplane	<b>D</b>	Zoom-out	<b>-</b>
		Fit selected object(s) into view	<b>F</b>

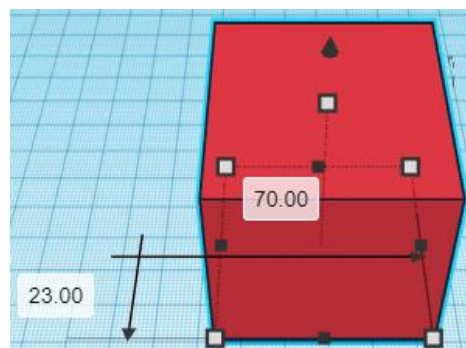
## Moving Object(s):

To move object(s) with mouse:

In XY Plane  
(left/right and forward/ backward)

Click and hold left mouse button on object.

Move mouse to desired location.

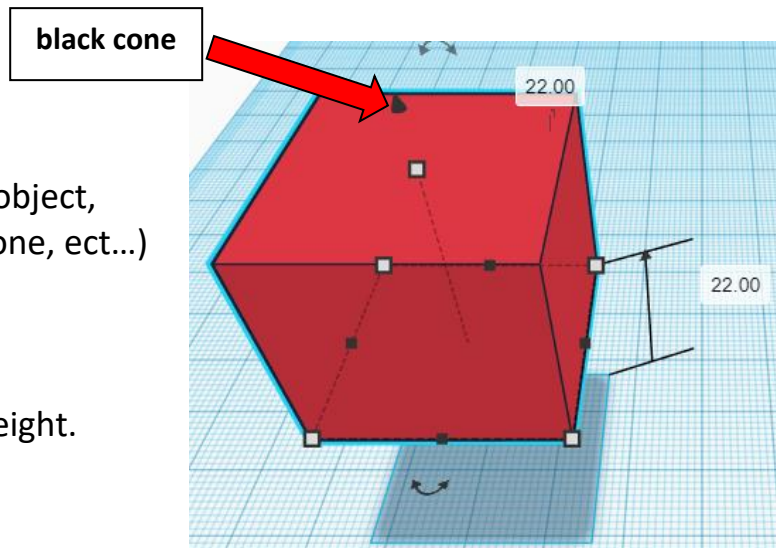


## Moving Object(s) continued:

### In Z direction (up/down)

Select object with left mouse button.  
Notice that several shapes appear on object,  
(white squares, black squares, black cone, ect...)

Click and hold left mouse button  
on the black cone at top of object.  
Move mouse up or down to desired height.



### To move object(s) with keyboard:

#### In XY Plane (left/right and forward/ backward)

Select object with left mouse button.

Use arrow keys to move the object in 1mm increments.



#### In XY Plane (fast) (left/right and forward/ backward)

Select object with left mouse button.

Hold shift key  
and use arrow keys to move the object in 10mm increments.



## Moving Object(s) continued:

### In Z direction (up/down)

Select object with left mouse button.



Hold control button and use up and down arrow keys to move the object in 1mm increments.

### In Z direction (fast) (up/down)

Select object with left mouse button.

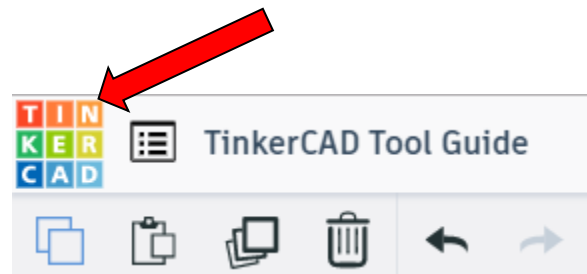


Hold control button and hold shift button and use up and down arrow keys to move the object in 10mm increments.

## Using on screen icons:

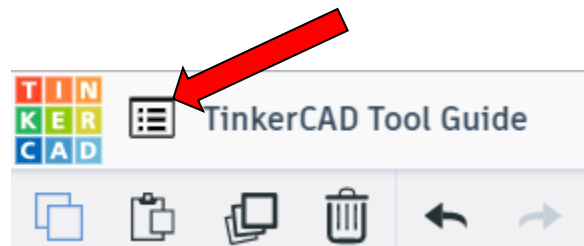
### TinkerCAD main screen:

(I know this doesn't look like an icon button, but it is)



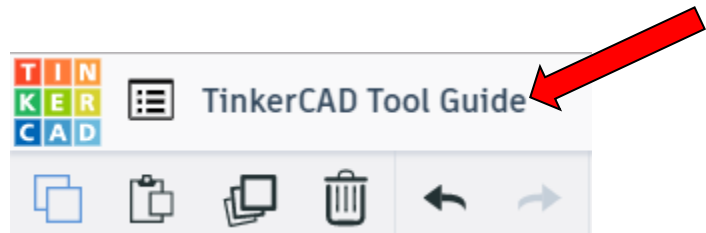
### My designs:

Pulls up menu of your designs.



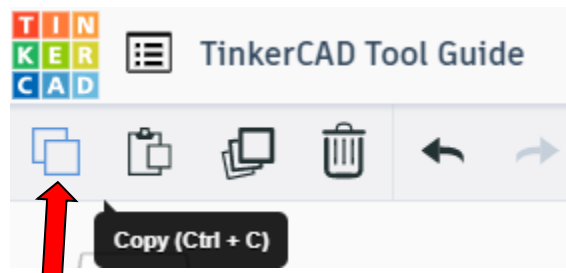
## Design name:

TinkerCAD automatically names your design a random name.  
Click here to change your design name.



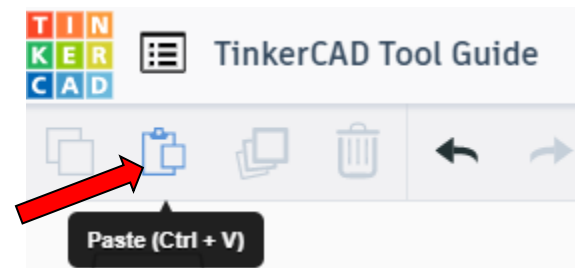
## Copy:

Select shape.  
Click copy or use ctrl + c  
Paste to copy or go into new design and paste to copy.



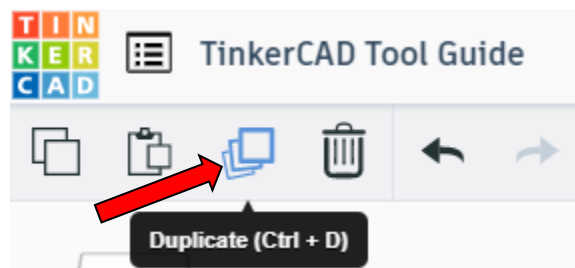
## Paste:

After using copy,  
click paste or use ctrl + v to paste.



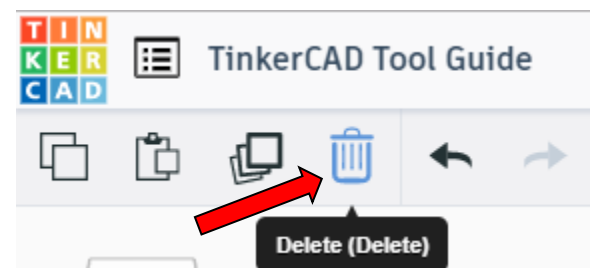
## Duplicate:

Similar to copy, but can't copy to other designs.  
Select shape.  
Click duplicate or use ctrl + d  
It will appear as if nothing happened, but if you move the shape you will see then duplicate underneath.



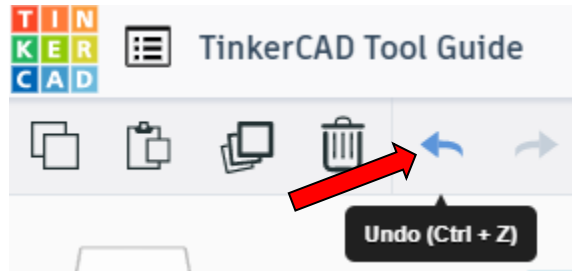
## Delete:

Select shape.  
Click delete or delete key.



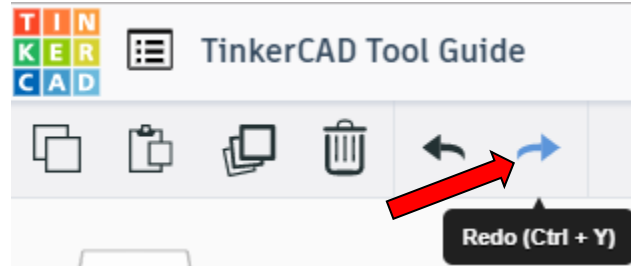
## Undo:

Click undo or use ctrl + z  
This will undo your last command.  
This can be repeated.



## Redo:

Click redo or use ctrl + y  
This will redo your last undo command,  
can only be used after using the  
undo command.



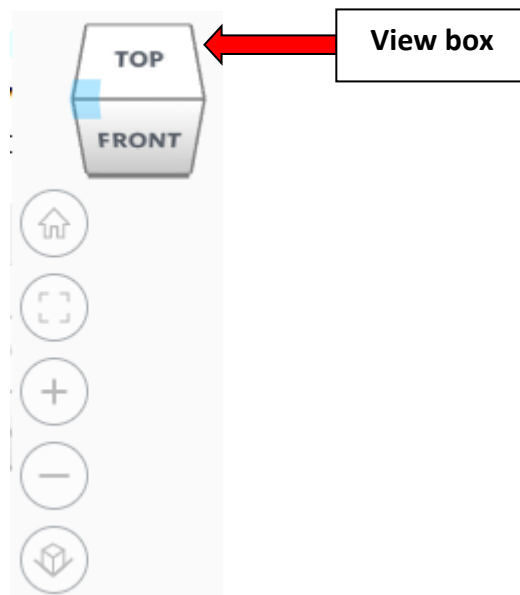
## Change View:

### To change view with mouse:

Right click and hold anywhere in work area. While holding right mouse button move mouse.  
This will change the view of the work area.

### To change view with icons:

Left click on view box.  
Where you click determines  
the view shown.

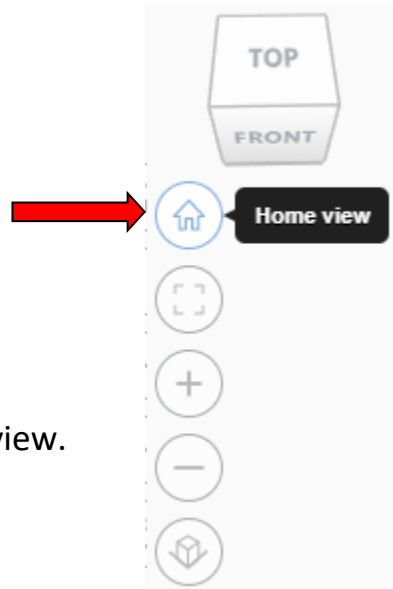


## Change view to home view:

Most TinkerCAD Tutorials only work while in home view.

Click on home view icon to go to the home view.

You can also use the view box between the top and front view to change to the home view.



## Fit all in view:

If you lose an object off the screen, you can click on Fit all in view to un-zoom to see all objects.

## Fit one or more object(s) in view:

If you want to only see one or more object(s) in the view then select the object(s) and click Fit all in view or click the "f" key. This will zoom in on the object(s).



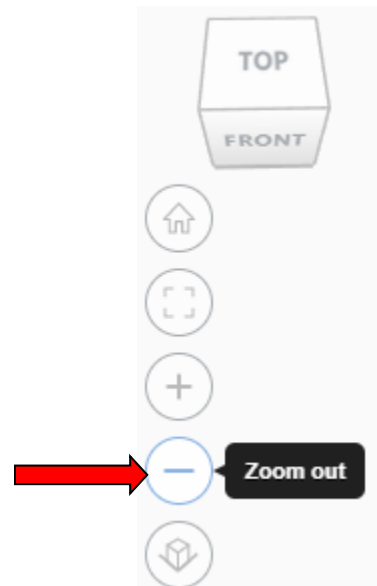
## Zoom in:

Click the Zoom in icon or click the "+" key to zoom in.



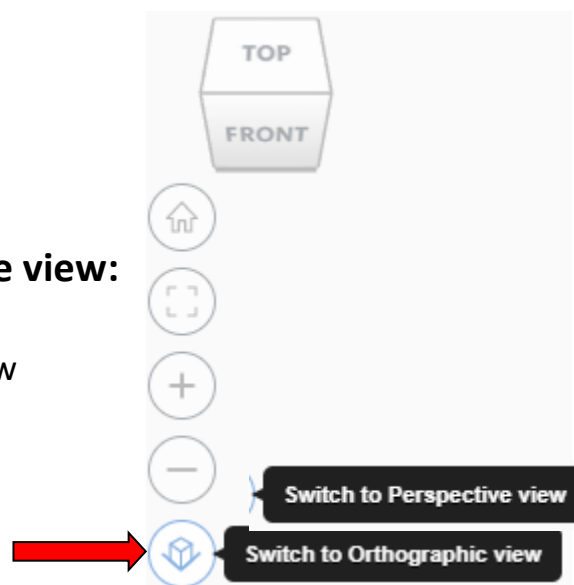
## Zoom out:

Click the Zoom out icon or click the “-” key to zoom out.



## Switching to orthographic and perspective view:

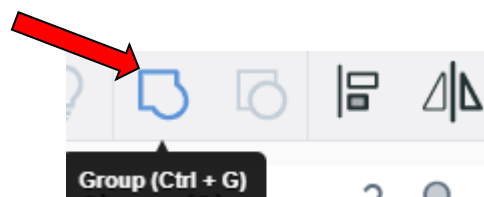
Click the Switch to orthographic/perspective view  
To change to your preferred view.



## Group:

To combine two or more objects into one object.

Select the objects to combine and click the  
Group button or click ctrl + G



## Ungroup:

After group objects, this will ungroup the object  
back to separate objects.

Select the objects to ungroup and click the  
ungroup button or click ctrl + shift + G





## Align:

To perfectly center objects to each other or  
To line up objects along their edges then use align.

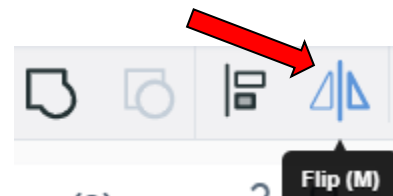
Select the objects to align and click the  
align button or click "L"



## Flip (Mirror):

This is mainly used for symmetric builds,  
you create one half, duplicate it, then flip it  
and move it in place and group it.



Select the objects to flip and click the  
flip button or click "M"



## Full list of Keyboard Shortcuts

### MOVING OBJECT(S)

(Using keyboard)

Move along X/Y axis  /  /  / 

Move along Z axis  +  / 

×10 Nudge along X/Y axis  +  /  /  / 

×10 Nudge along Z axis  +  +  / 

### KEYBOARD + MOUSE SHORTCUTS


(Press and hold the keys, then click and drag the mouse)

**Duplicate** dragged object(s)  + Drag left mouse button

**Select** multiple object(s)  + Left mouse button



45° rotation  (Hold while rotating)

Scale in one direction  + Hold side handle

Scale in two directions  + Hold corner handle

Uniform scale  + Hold corner handle


Uniform scale in all directions  +  + Corner handle

Uniform scale in all directions  +  + Top handle

### VIEWING DESIGNS

(With the help of a mouse or a mouse pad)

Orbit the view Right mouse button

Orbit the view  + Left mouse button

Pan the view  + Right mouse button

Pan the view  +  + left button

Zoom the view in or out Mouse scroll wheel

Zoom-in 


Zoom-out 



Fit selected object(s) into view 



### OBJECT SETTINGS

**Transparency** toggle 

Turn object(s) into **Holes** 



Turn object(s) into **Solids** 

**Lock** or **Unlock** object(s)  + 



**Hide** object(s)  + 

**Show all** hidden object(s)  +  + 



### TOOLS AND COMMANDS

**Copy** object(s)  + 




**Paste** object(s)  + 

**Duplicate** object(s) in place.  + 



**Delete** object(s) 

**Undo** action(s)  + 


**Redo** action(s)  + 

**Redo** action(s)  +  + 

**Group** object(s)  + 

**Un-group** object(s)  +  + 

**Align** object(s) 

**Flip/Mirror** object(s) 

**Select all** object(s)  + 

Place a **Ruler**  (  toggle midpoint/center )

Place a **Workplane**  ( press  to flip direction )

**Drop** object(s) to workplane 