# One piece
Catapult

Contents:

Disclaimer:
Locations of objects move on a regular basic in TinkerCAD. Although locations of objects are stated, that is the location at the time of publication. This publication has no association with TinkerCAD and does not control when TinkerCAD moves objects.

To accommodate for objects moving locations, it is suggested to add the most used objects to "Favorites". This acts as a shortcut to the object no matter where it is moved to. To add objects to Favorites, hover the mouse over the object and in the upper right corner, an outlined star will appear. Click on the star changing it to yellow in color. The object will now appear in the Favorites area.
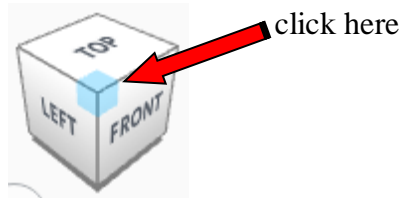
Trigger:

Bring in a Roof, located in Basic Shapes on the left 3 shapes down.
From now on this will be called the **Tigger Base.**

Change the dimensions to
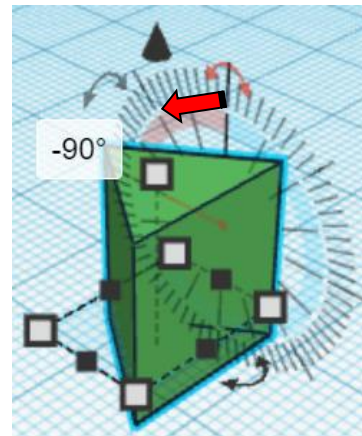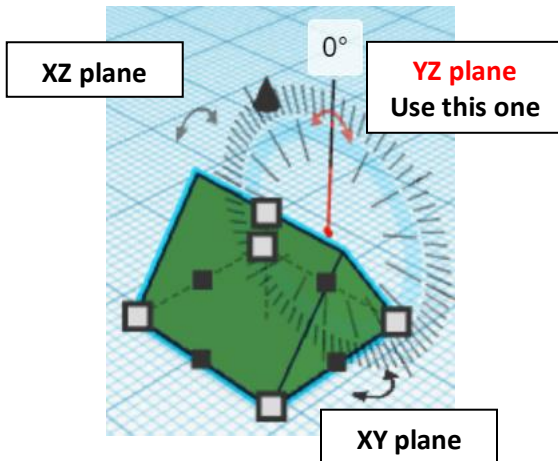14mm X direction,
15mm Y direction, and
10mm Z direction.
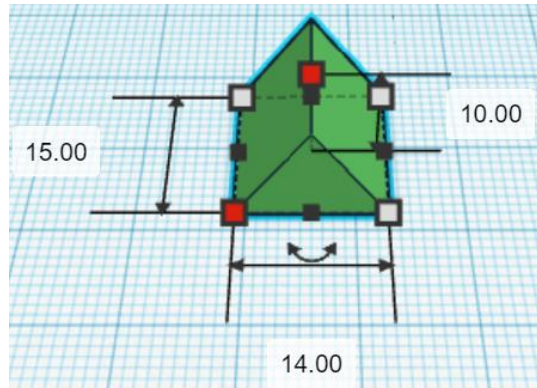
Go to TOP LEFT FRONT view for rotations   click here

Rotate the <u>Trigger Base</u> counter-clockwise 90 degrees in YZ plane.
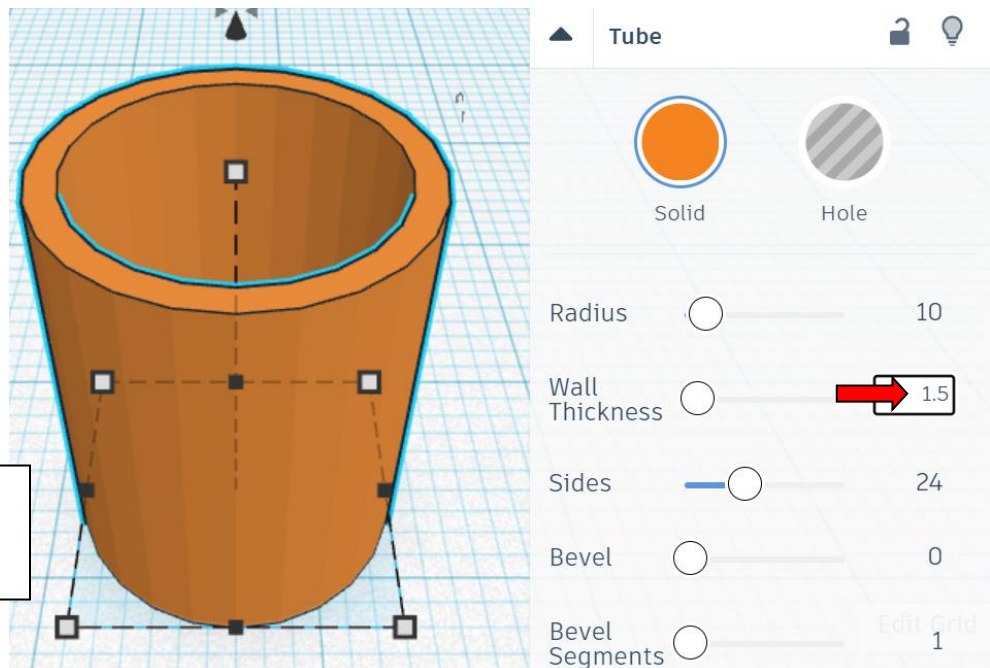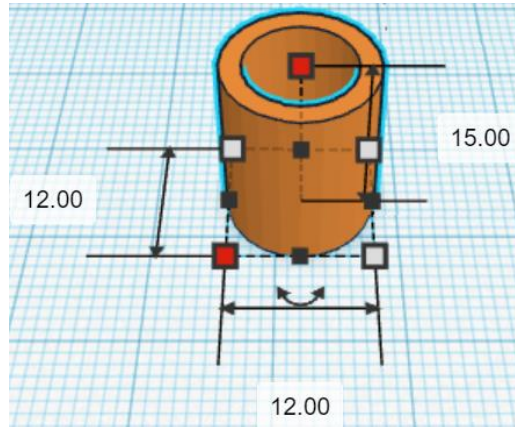
Before   After

Bring in a Tube, located in Basic Shapes in the center 6 shapes down.
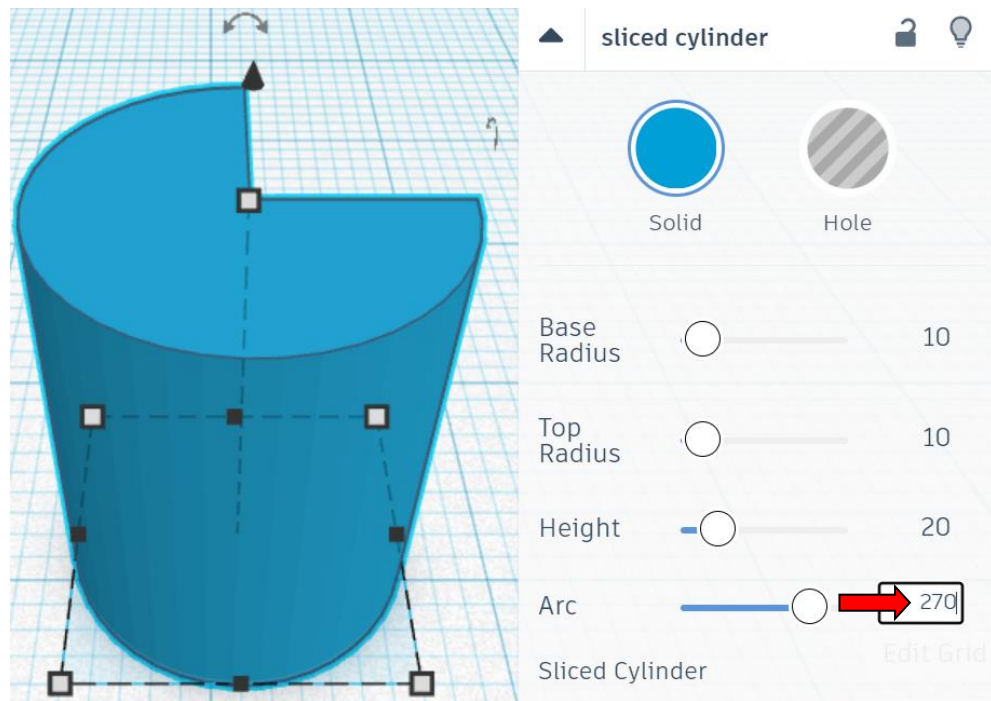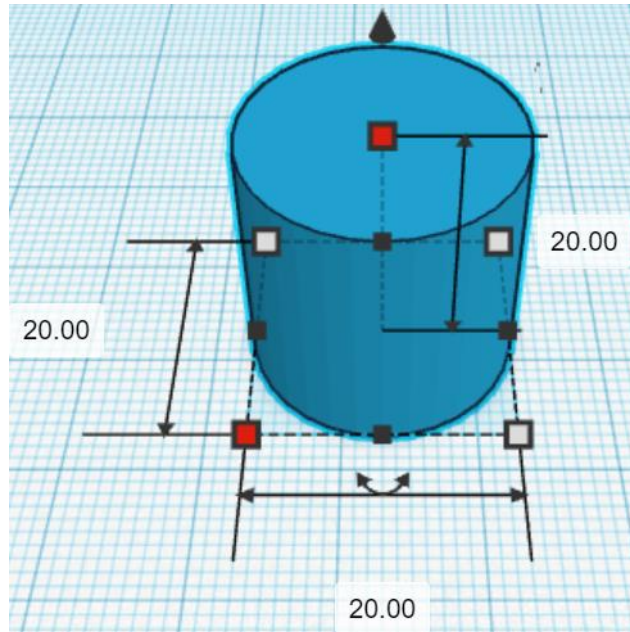From now on this will be called the **Bend 1.**

Change the dimensions to
12mm X direction,
12mm Y direction, and
15mm Z direction.

15.00

12.00

12.00

Change Shape settings to:

Wall Thickness from 2.5 to 1.5

Tube

Solid   Hole

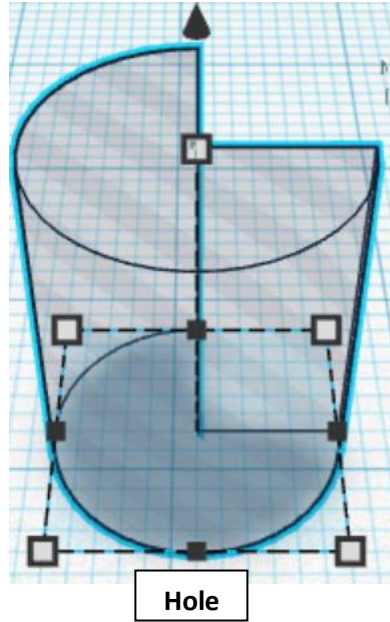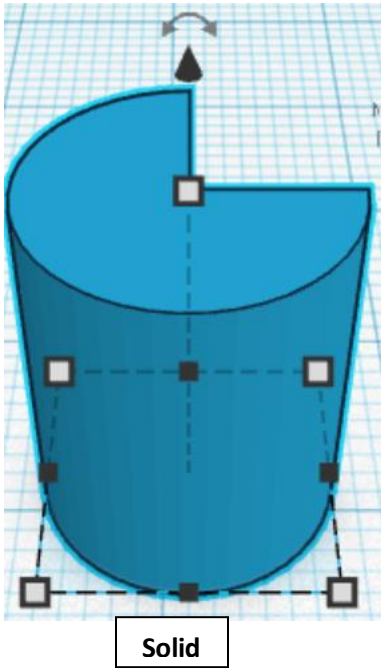|		
Radius		10
Wall Thickness		1.5
Sides		24
Bevel		0
Bevel Segments		1

Bring in a Sliced Cylinder, located in Shape Generators, switch to All, on the right 18 shapes down.
(Things in All move each time that TinkerCad adds items to All, so the location may move.)
From now on this will be called the **Bend Cutout**.

Change the dimensions to
20mm X direction,
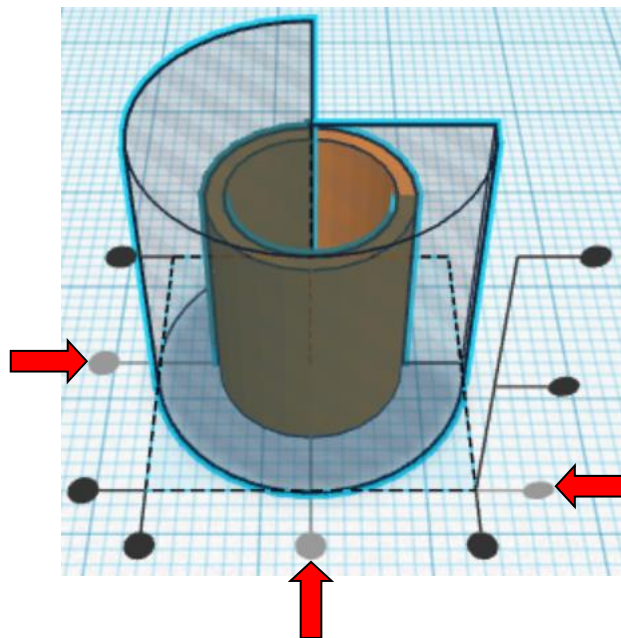20mm Y direction, and
20mm Z direction.

20.00

20.00

20.00

Change Shape settings to:

Arc from 360 to 270

sliced cylinder

Solid   Hole

Base
Radius   10

Top
Radius   10

Height   20

Arc   270

Sliced Cylinder

Change Bend Cutoff to **Hole** by selecting Bend Cutoff and typing "h".
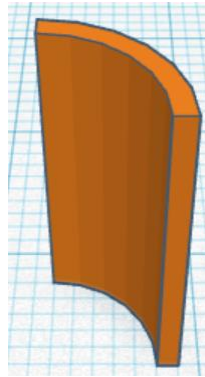

Solid

Hole

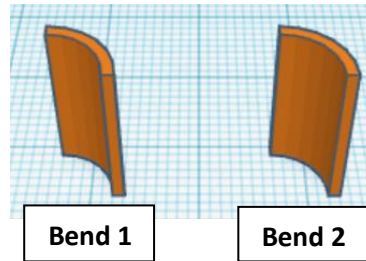**Align** Bend 1 and Bend Cutoff

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

Group Bend 1 and Bend Cutoff
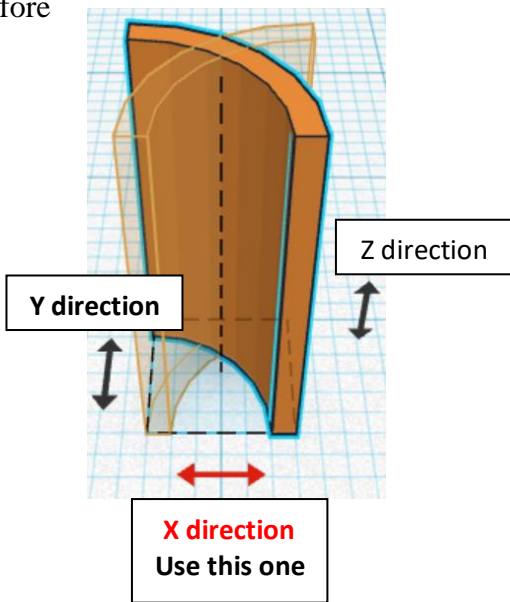From now on this will be called the **Bend 1**

Duplicate Bend 1 (1) time
Move Duplicate to the side
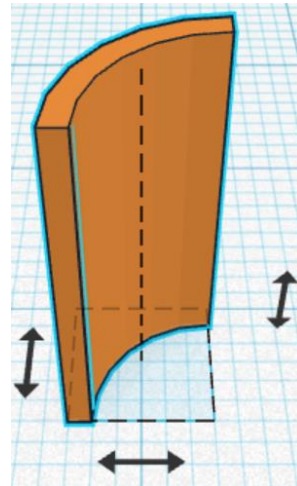From now on this Duplicate will be called the **Bend 2**

Bend 1   Bend 2

Flip Bend 1 in X direction.
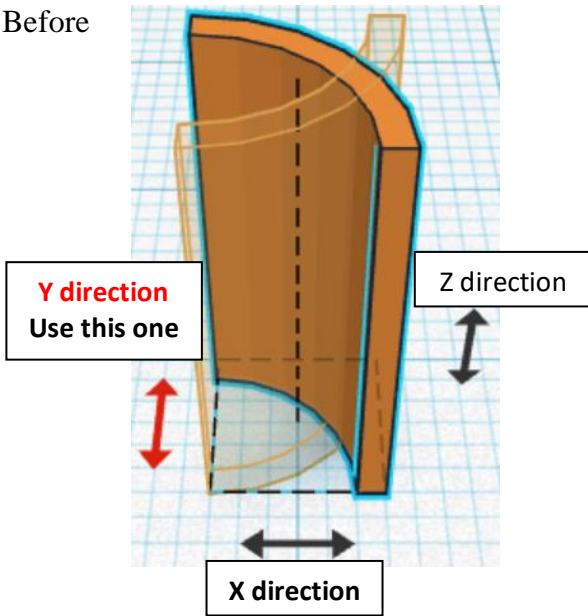
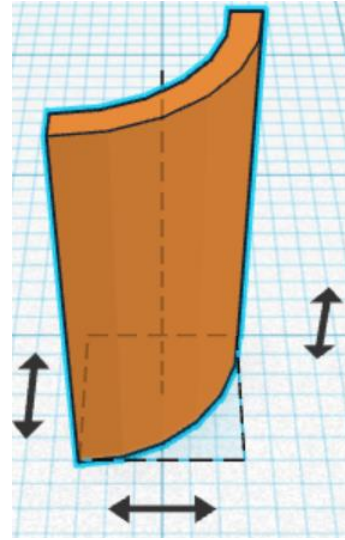Before   After

Z direction

Y direction

X direction
Use this one

Flip Bend 2 in Y direction.

Before   After
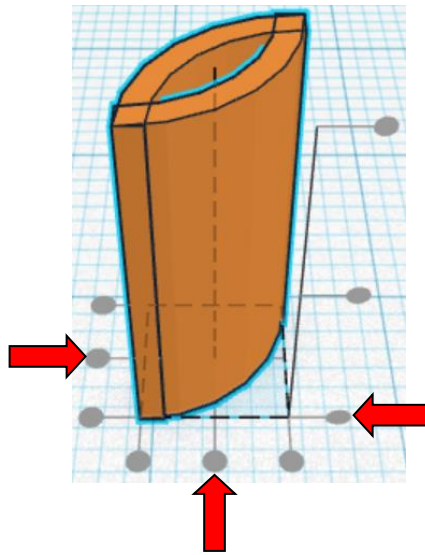
Y direction
Use this one

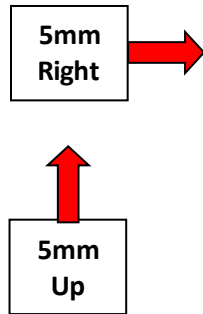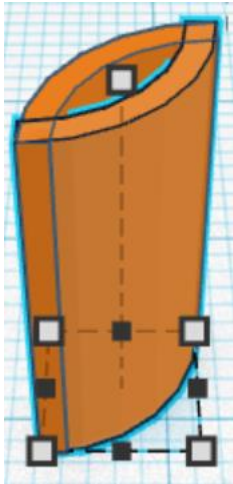Z direction

X direction

Align Bend 1 and Bend 2

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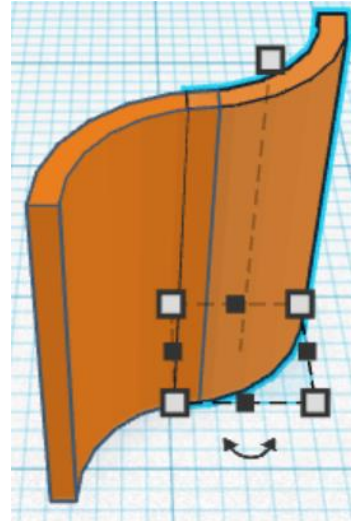centered of Y direction, and
bottom of Z direction.

8

Move Bend 2 (Must be in home view for this to work!)
move right in positive X direction 5mm
and
move back in positive Y direction 5mm

Hint: Select Bend 2 and push right arrow key 5 times.
         and
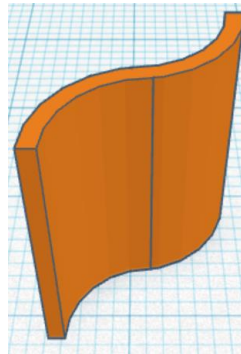   Select Bend 2 and push up arrow key 5 times.
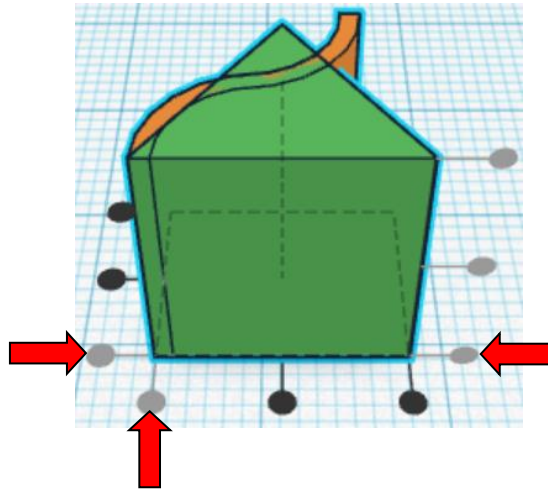
Before

5mm
Right

5mm
Up

After

Group Bend 1 and Bend 2
From now on this will be called the **Bends**

Align <u>Trigger Base</u> and <u>Bends</u>

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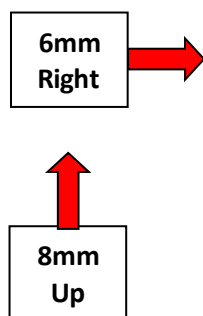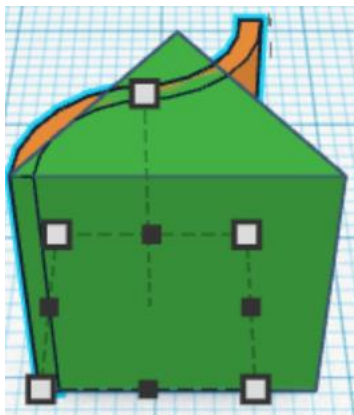

Move <u>Bends</u>   (Must be in home view for this to work!)
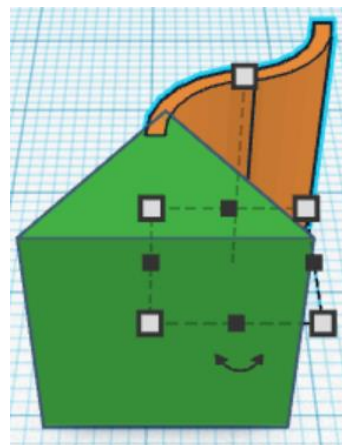move right in positive X direction 6mm
and
move back in positive Y direction 8mm

Hint: Select <u>Bends</u> and push right arrow key 6 times.
      and
      Select <u>Bends</u> and push up arrow key 8 times.

Before

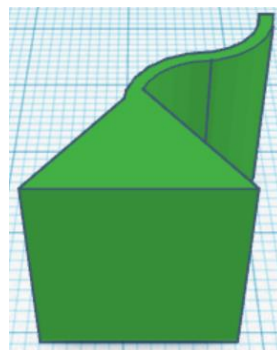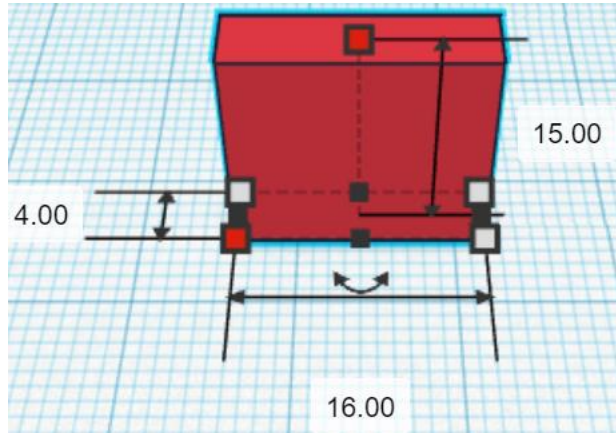6mm
Right

8mm
Up

After

Group <u>Trigger Base</u> and <u>Bends</u>
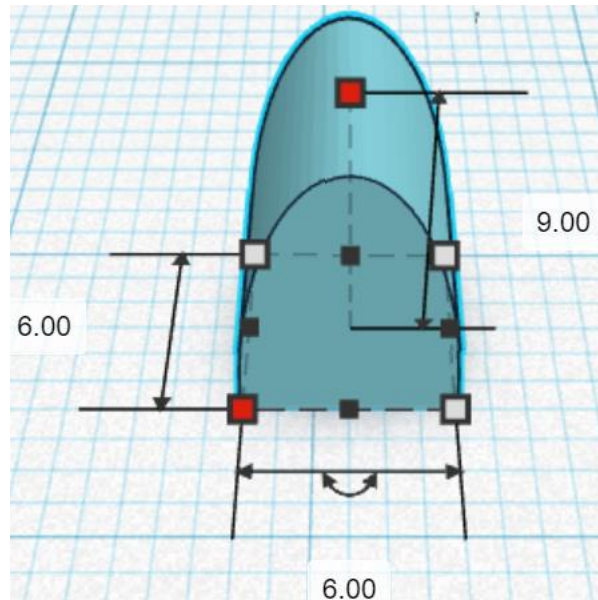From now on this will be called the **Trigger Base**

Bring in a Box, located in Basic Shapes on the right 1 shape down.
From now on this will be called the **Launcher Holder Top.**

Change the dimensions to
16mm X direction,
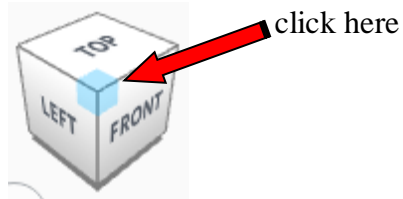4mm Y direction, and
15mm Z direction.

Bring in a Round Roof, located in Basic Shapes on the right 3 shapes down.
From now on this will be called the **Launcher Holder Pin.**

Change the dimensions to
6mm X direction,
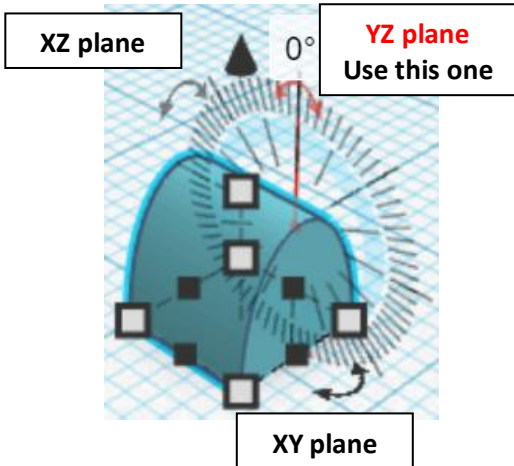6mm Y direction, and
9mm Z direction.
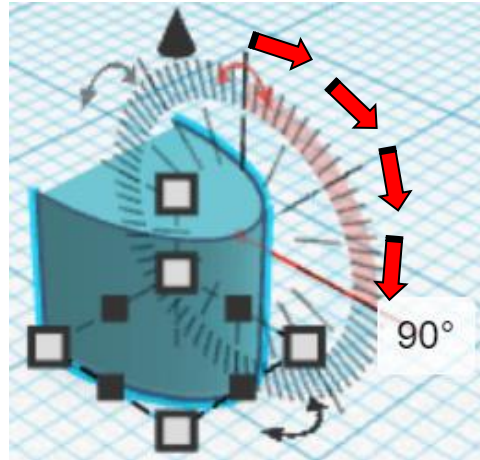
Go to TOP LEFT FRONT view for rotations click here

Rotate the Launcher Holder Pin clockwise 90 degrees in YZ plane.

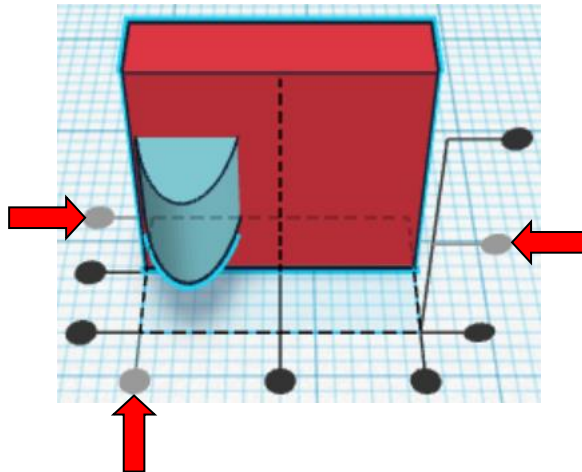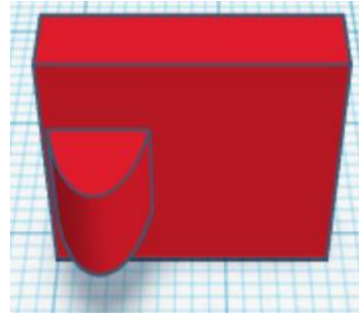Before   After

Align Launcher Holder Top and Launcher Holder Pin

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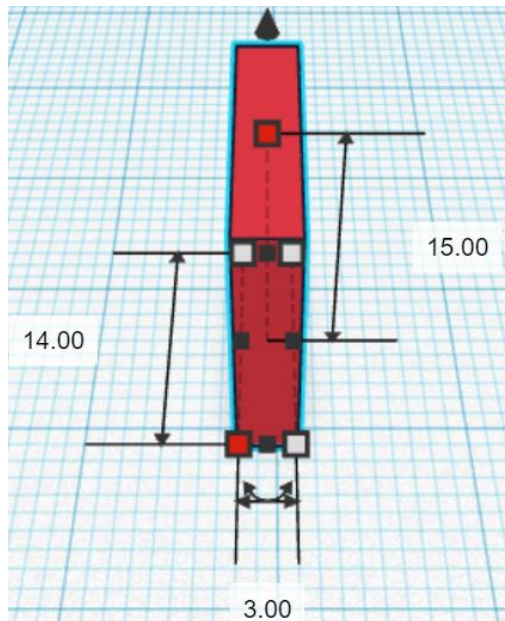back of Y direction, and
centered of Z direction.

Group Launcher Holder Top and Launcher Holder Pin
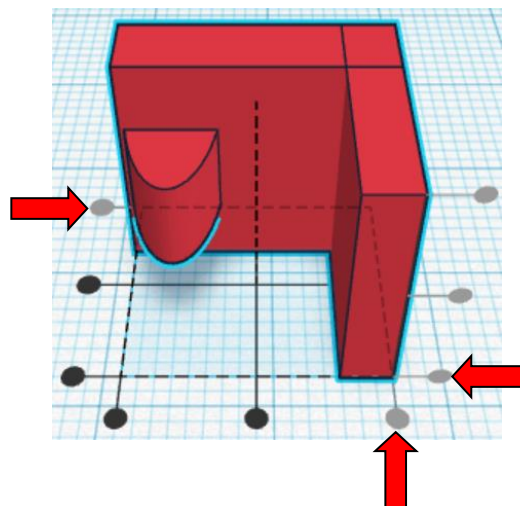From now on this will be called the **Launcher Holder**

Bring in a Box, located in Basic Shapes on the right 1 shape down.
From now on this will be called the **Launcher Holder Side.**

Change the dimensions to
3mm X direction,
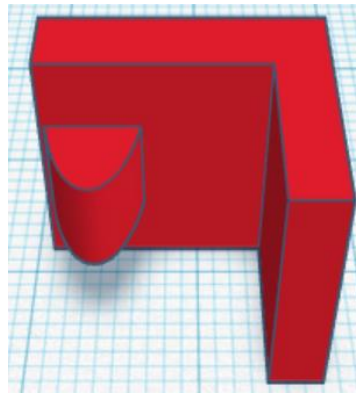14mm Y direction, and
15mm Z direction.
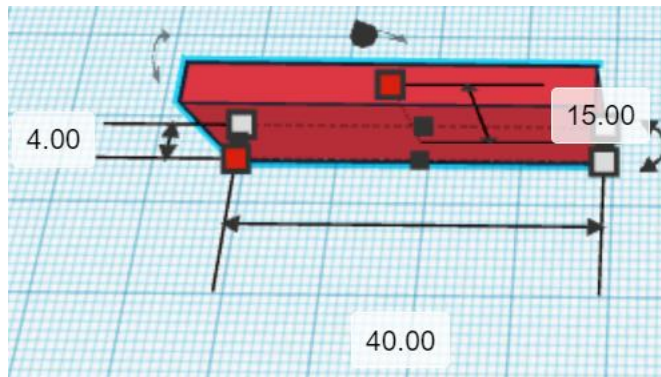

Align Launcher Holder and Launcher Holder Side

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

Group Launcher Holder and Launcher Holder Side
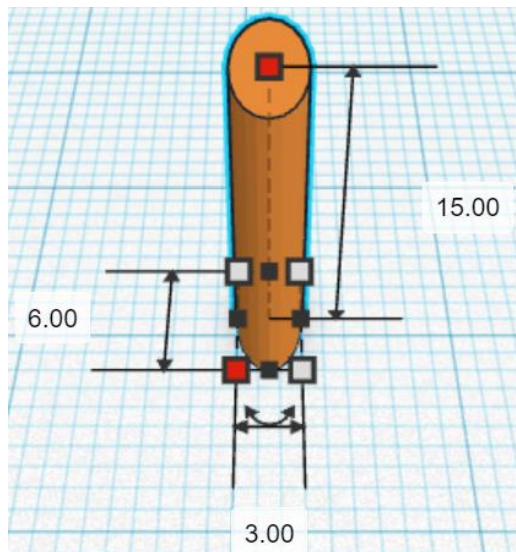From now on this will be called the **Launcher Holder**

Bring in a Box, located in Basic Shapes on the right 1 shape down.
From now on this will be called the **Launcher Release.**

Change the dimensions to
40mm X direction,
4mm Y direction, and
15mm Z direction.

Bring in a Cylinder, located in Basic Shapes on the left 2 shapes down.
From now on this will be called the **Grip 1.**

Change the dimensions to
3mm X direction,
6mm Y direction, and
15mm Z direction.

Duplicate <u>Grip 1</u> (1) time
From now on this Duplicate will be called the **Grip 2**

Move <u>Grip 2</u>   (Must be in home view for this to work!)
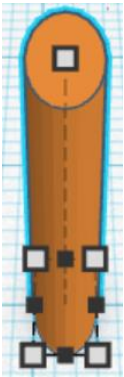move right in positive X direction 10mm

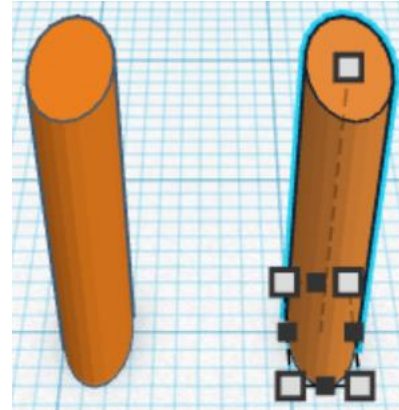**Hint:** Select <u>Grip 2</u> and push right arrow key 10 times.
   or
   Select <u>Grip 2</u> and hold shift and push right arrow key 1 time.

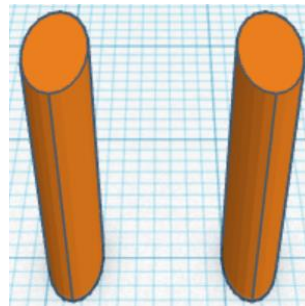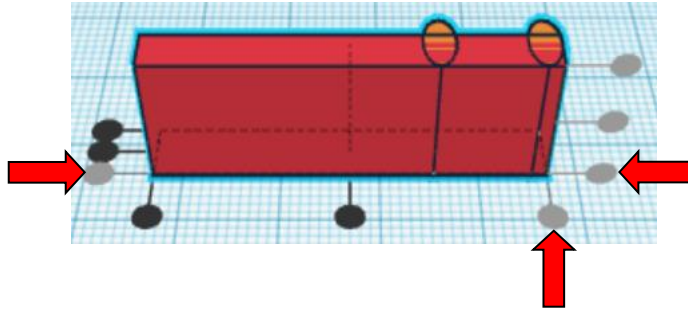Before   After

10mm
Right

Group <u>Grip 1</u> and <u>Grip 2</u>
From now on this will be called the **Grips**
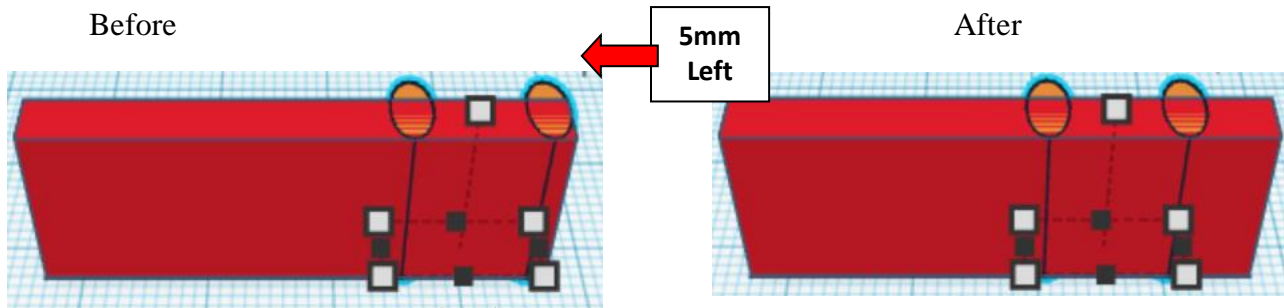
Align <u>Launcher Release</u> and <u>Grips</u>

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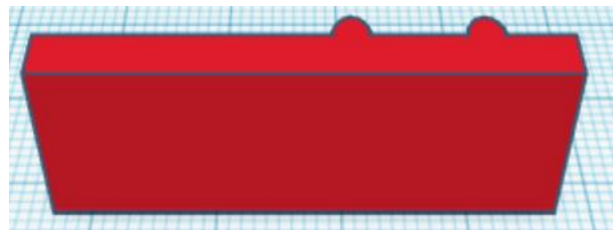front of Y direction, and
bottom of Z direction.

Move <u>Grips</u>   (Must be in home view for this to work!)
move left in negative X direction 5mm

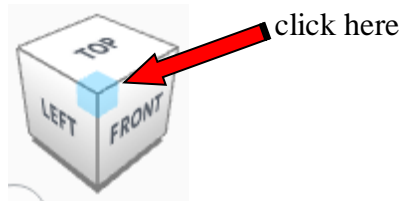**Hint:** Select <u>Grips</u> and push left arrow key 5 times.

Before   5mm Left   After

Group <u>Launcher Release</u> and <u>Grips</u>
From now on this will be called the **Launcher Release**

Go to TOP LEFT FRONT view for rotations click here

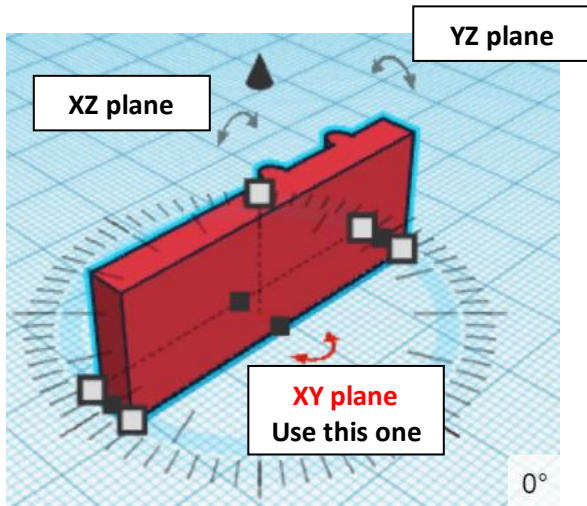**Rotate** the <u>Launcher Release</u> counter-clockwise 60 degrees in XY plane.
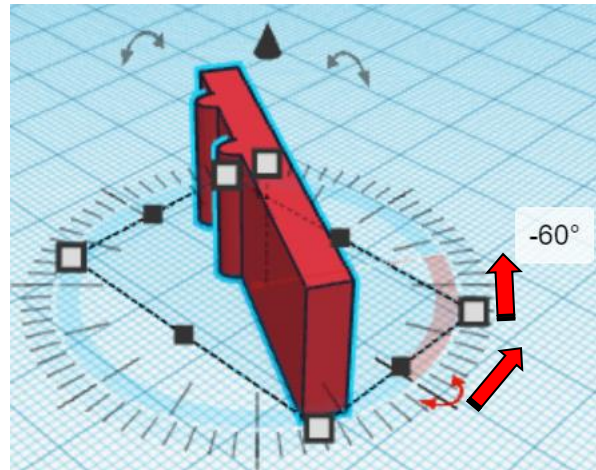
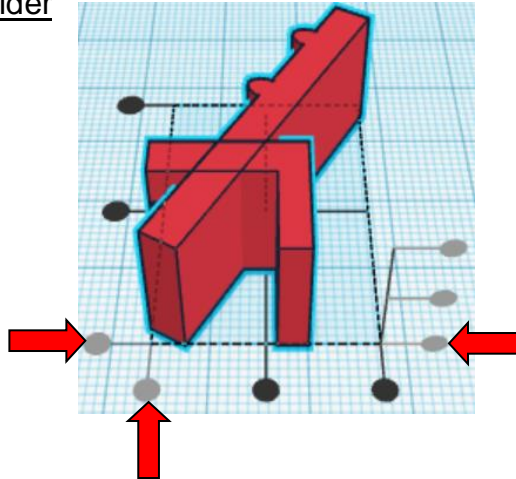Before   After
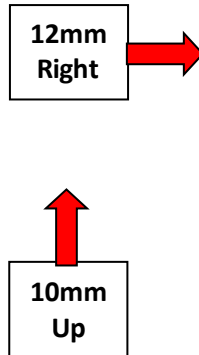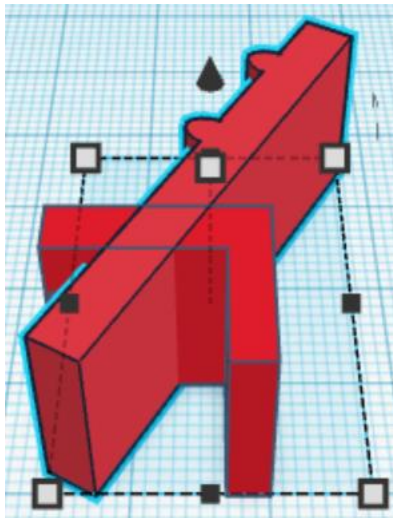

Align <u>Launcher Release</u> and <u>Launcher Holder</u>

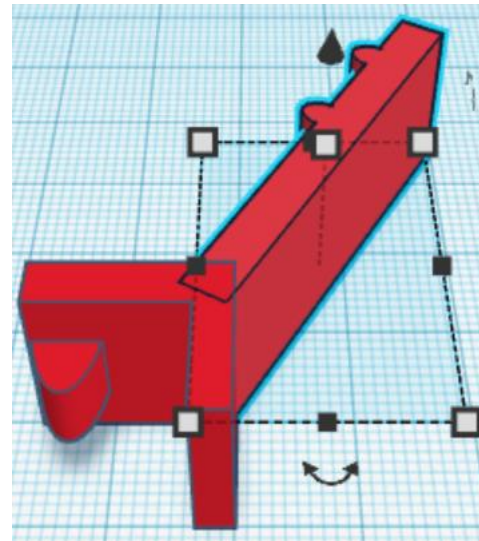left in X direction,
front of Y direction, and
bottom of Z direction.

Move Launcher Release   (Must be in home view for this to work!)
move right in positive X direction 12mm
and
move up in positive Y direction 10mm

Hint: Select Launcher Release and push right arrow key 12 times.
        And
        Select Launcher Release and push up arrow key 10 times.
        Or
        Select Launcher Release and hold shift and push right arrow key 1 time.
        Then release shift and push right arrow key 2 more times.
        And
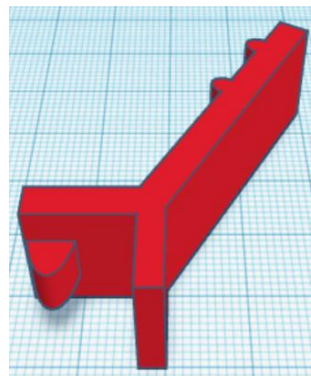   Select Launcher Release and hold shift and push up arrow key 1 time.
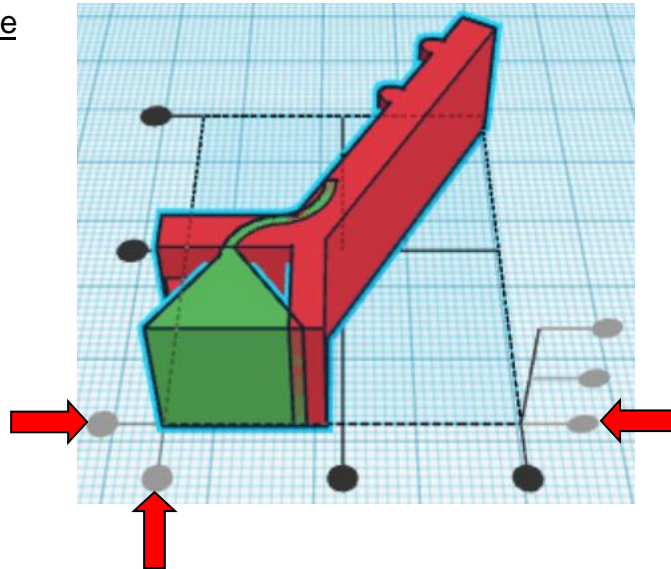
Before   After

12mm
Right

10mm
Up

Group Launcher Release and Launcher Holder
From now on this will be called the **Launcher Release**

Align Launcher Release and Trigger Base

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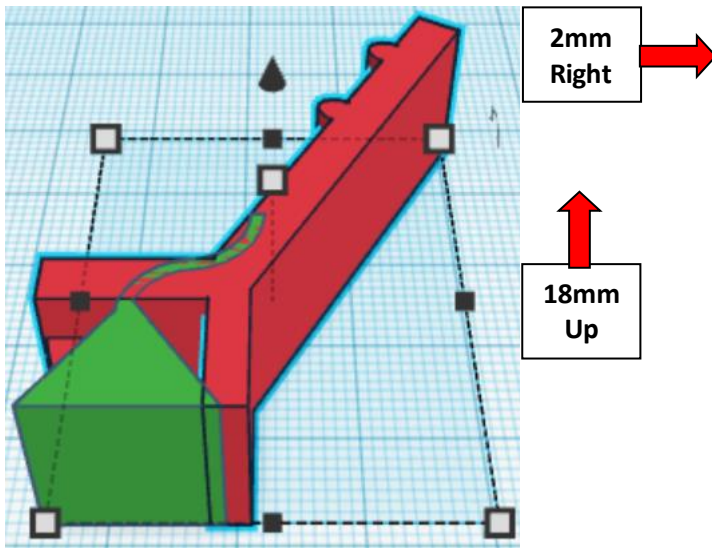bottom of Z direction.

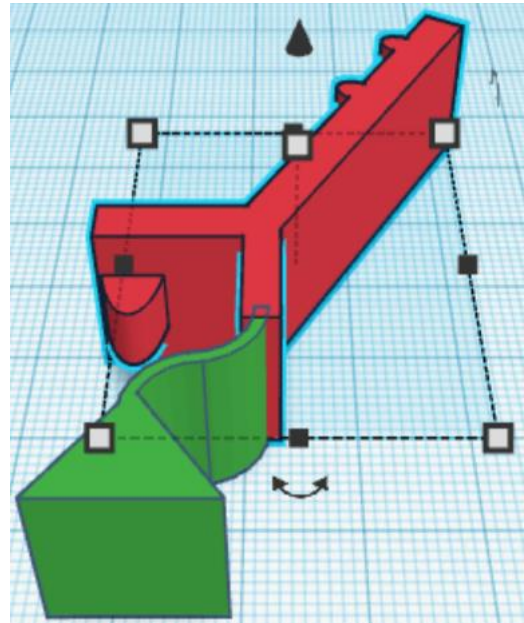**Move** Launcher Release   (Must be in home view for this to work!)
move right in positive X direction 2mm
and
move up in positive Y direction 18mm

Hint: Select Launcher Release and push right arrow key 2 times.
    And
    Select Launcher Release and push up arrow key 18 times.
    Or
    Select Launcher Release and push right arrow key 2 times.
    And
    Select Launcher Release and hold shift and push up arrow key 1 time.
    Then release shift and push up arrow key 8 more times.
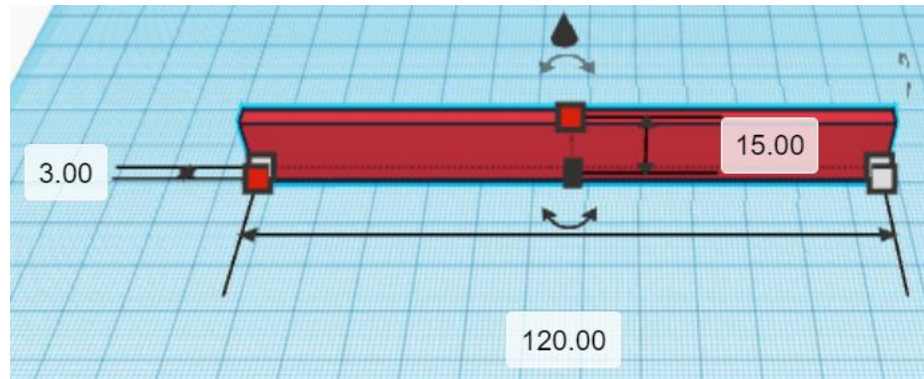
Before   After

2mm Right

18mm Up

19
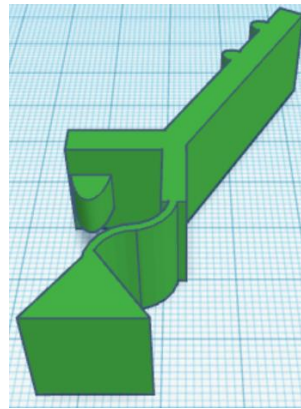
Group Launcher Release and Trigger Base
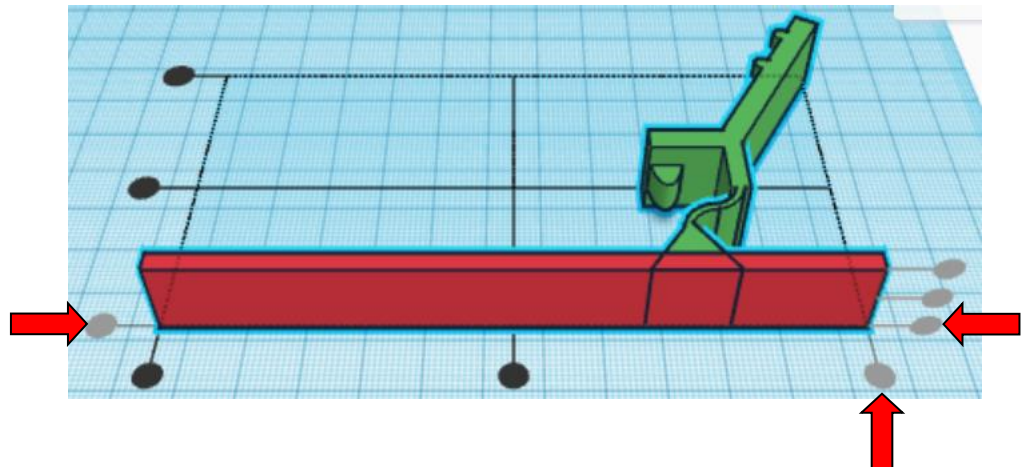From now on this will be called the **Trigger**

Base:
Bring in a Box, located in Basic Shapes on the right 1 shape down.
From now on this will be called the **Base.**

Change the dimensions to
120mm X direction,
3mm Y direction, and
15mm Z direction.
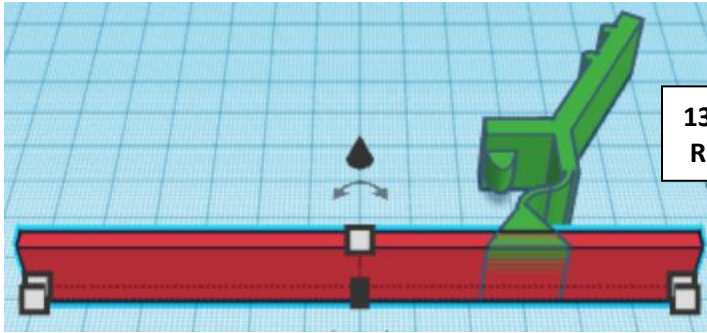

Align Base and Trigger

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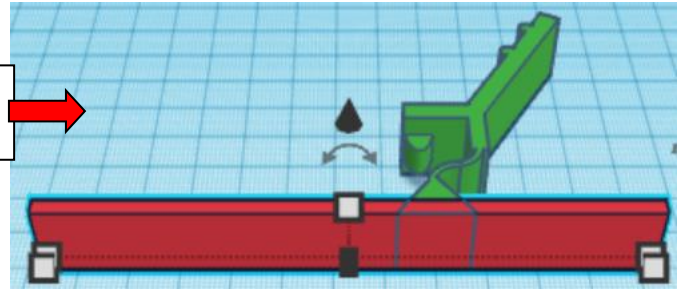front of Y direction, and
bottom of Z direction.

Move Base   (Must be in home view for this to work!)
move right in positive X direction 13mm

Hint: Select Base and push right arrow key 13 times.
       Or
       Select Base and hold shift and push right arrow key 1 time.
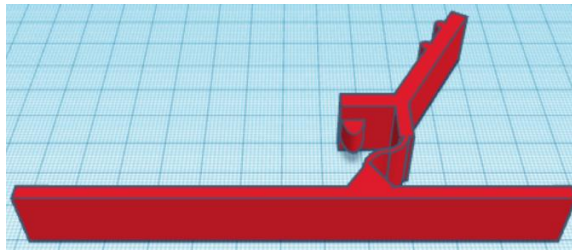   Then release shift and push right arrow key 3 more times.

Before   After
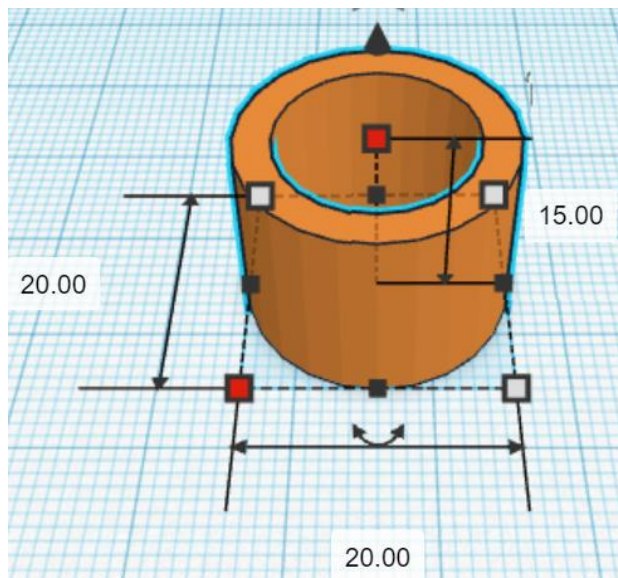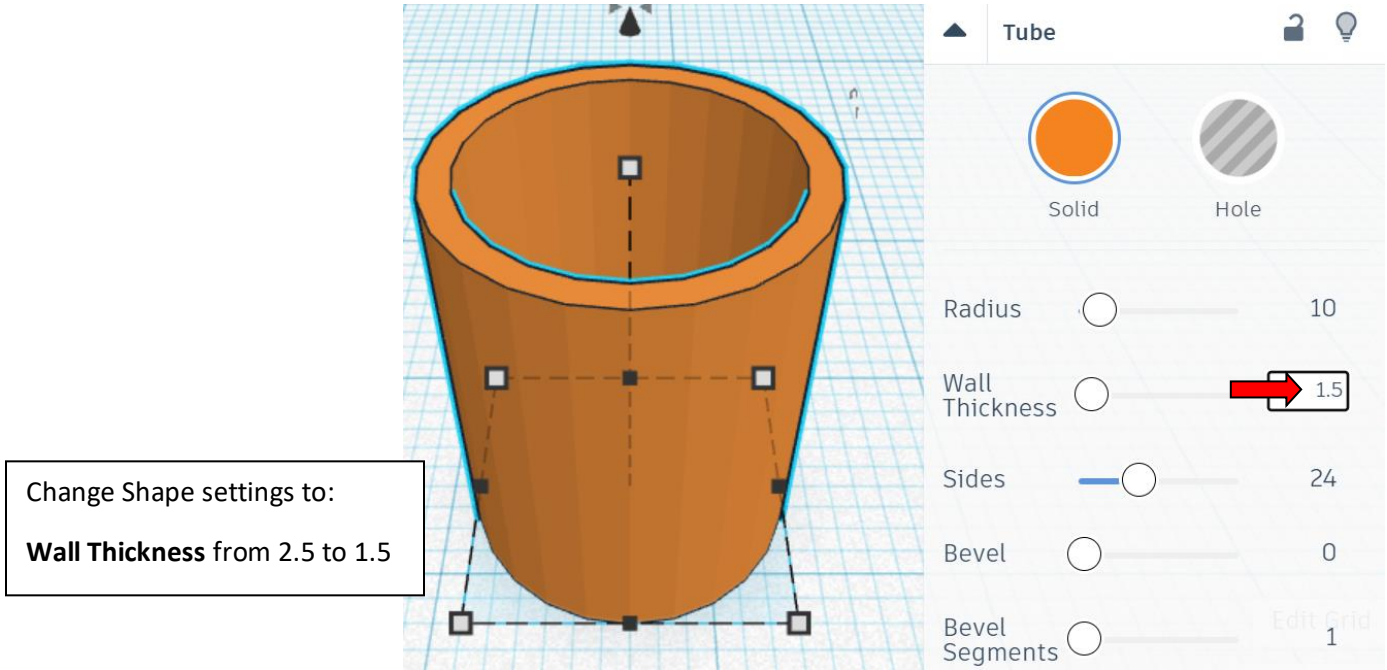

Group Base and Trigger
From now on this will be called the **Catapult**

Bring in a Tube, located in Basic Shapes in the center 6 shapes down.
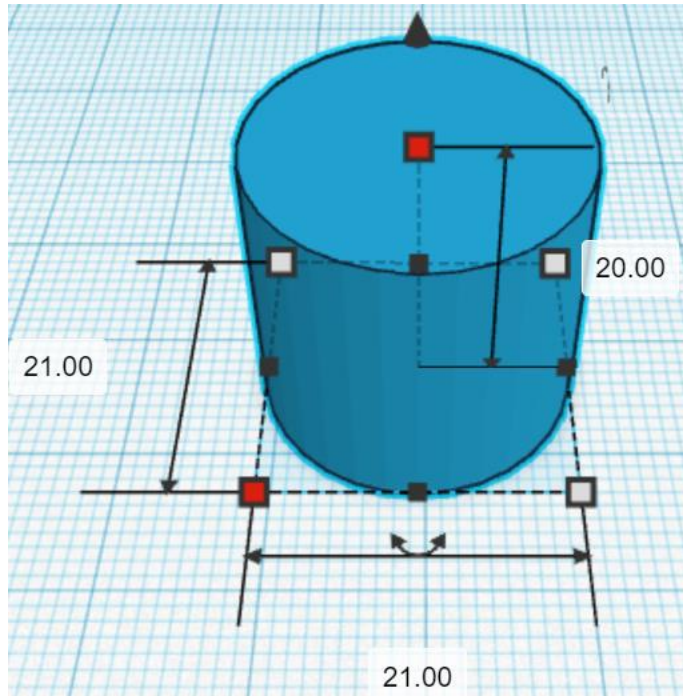From now on this will be called the **Bend 3.**

Change the dimensions to
20mm X direction,
20mm Y direction, and
15mm Z direction.

Tube

Solid   Hole

Radius   10

Wall Thickness   1.5

Sides   24

Bevel   0

Bevel Segments   1

Edit Grid

Change Shape settings to:
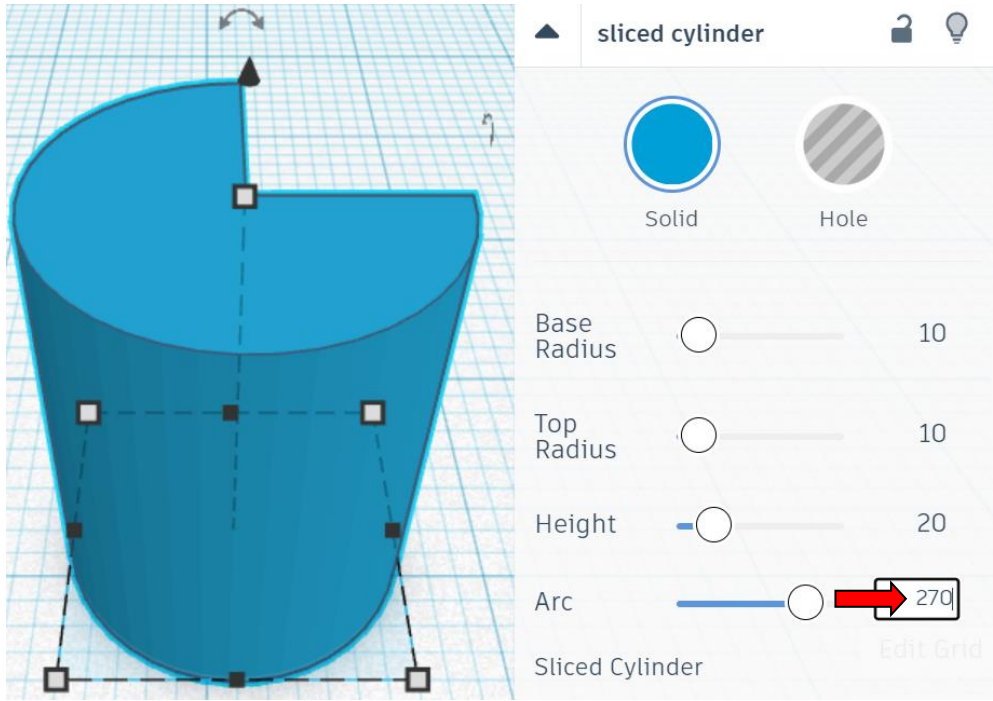
Wall Thickness from 2.5 to 1.5

Bring in a Sliced Cylinder, located in Shape Generators, switch to All, on the right 18 shapes down.
(Things in All move each time that TinkerCad adds items to All, so the location may move.)
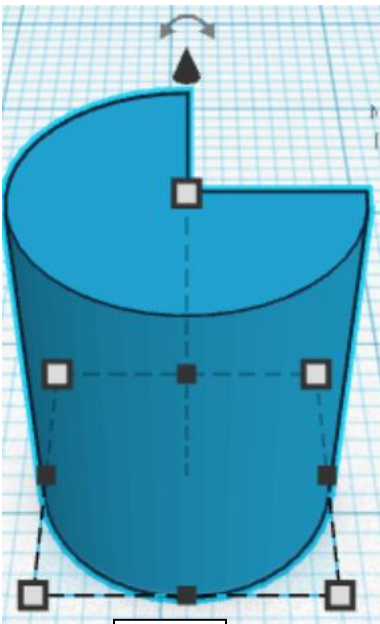From now on this will be called the **Bend 3 Cutout**.

Change the dimensions to
21mm X direction,
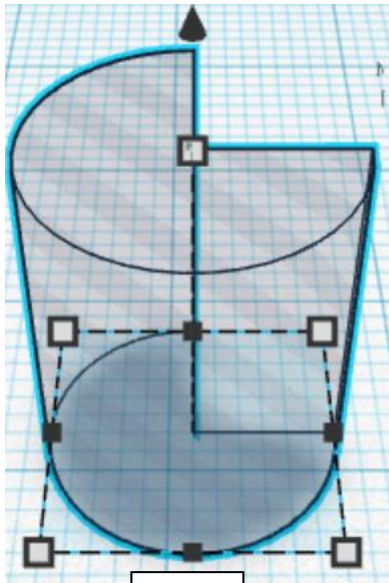21mm Y direction, and
20mm Z direction.

21.00

20.00

21.00

Change Shape settings to:

Arc from 360 to 270

sliced cylinder

Solid   Hole

Base Radius   10

Top Radius   10

Height   20

Arc   270

Sliced Cylinder

Change Bend Cutoff to **Hole** by selecting Bend Cutoff and typing "h".
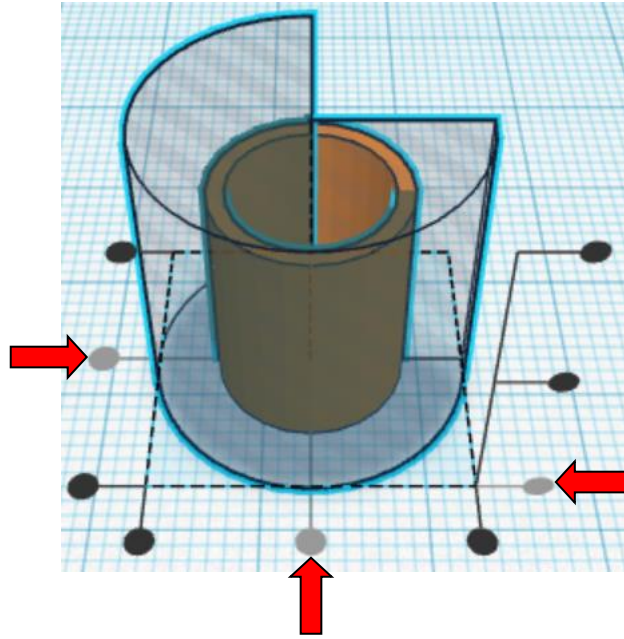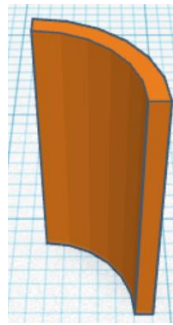

Solid

Hole

Align Bend 3 and Bend Cutoff

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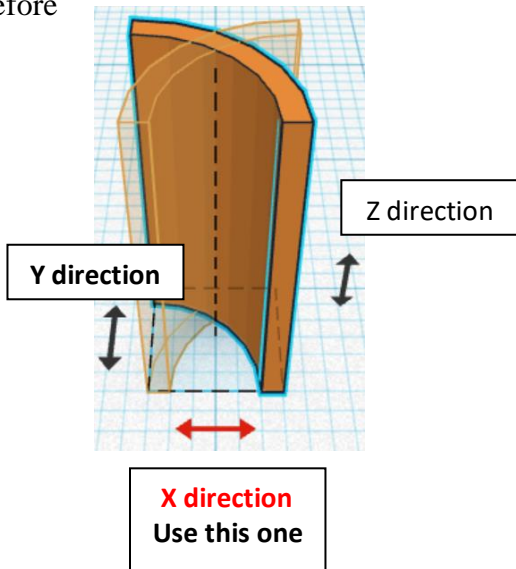centered of Y direction, and
bottom of Z direction.

Group Bend 3 and Bend Cutoff
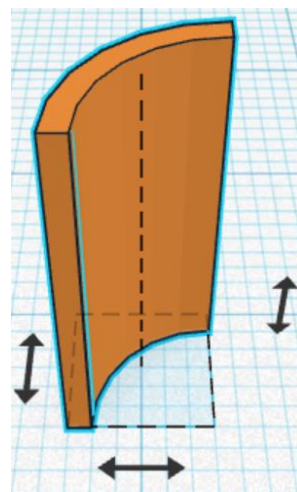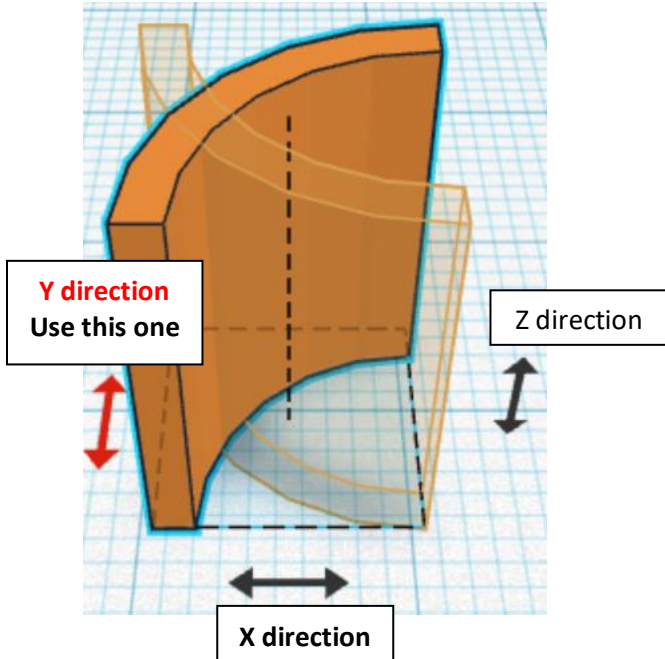From now on this will be called the **Bend 3**

Flip Bend 3 in X direction.

Before

Z direction

Y direction

X direction
Use this one

After

Flip Bend 3 in Y direction.

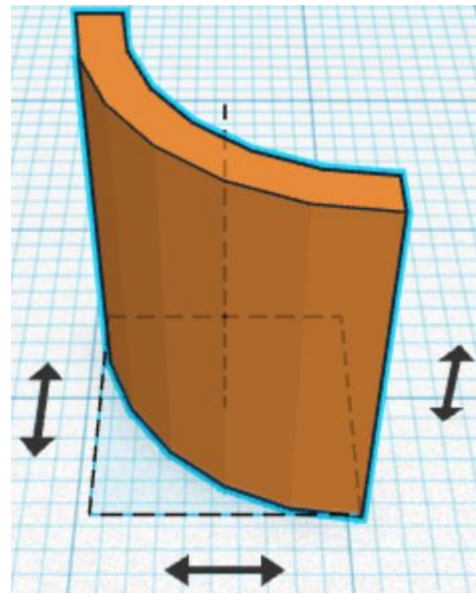Before   After

Y direction
Use this one

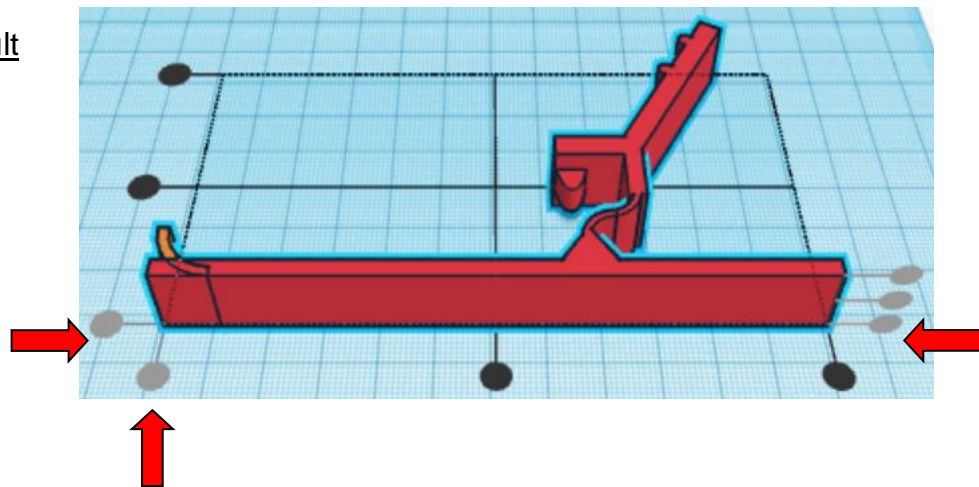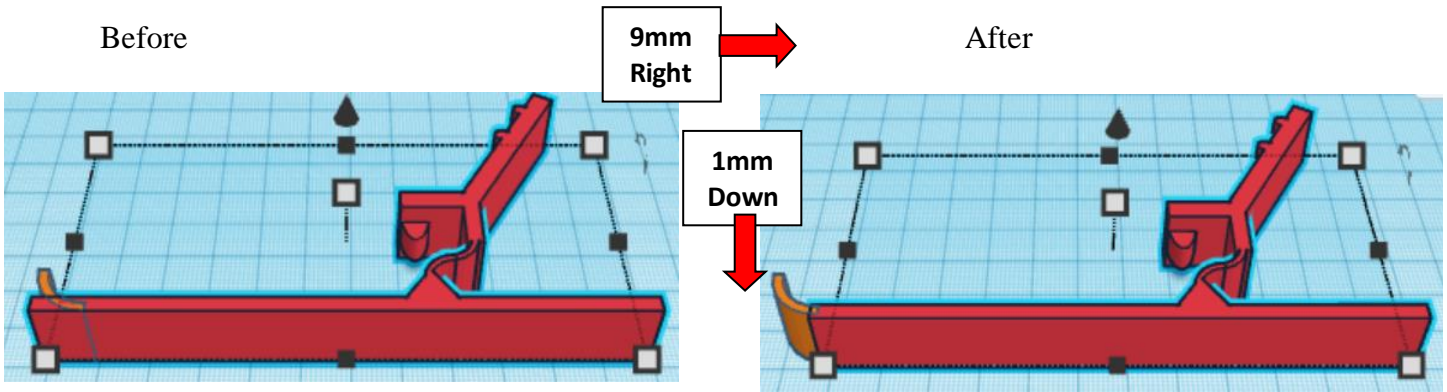Z direction

X direction

Align Bend 3 and Catapult

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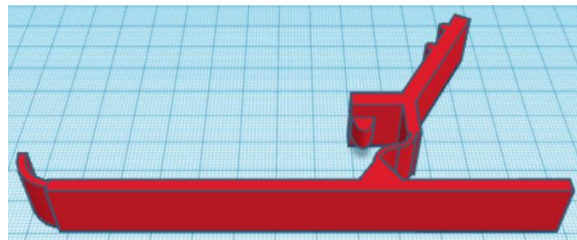bottom of Z direction.

Move Catapult   (Must be in home view for this to work!)
move right in positive X direction 9mm
and
move down in negative Y direction 1mm

Hint: Select Catapult and push right arrow key 9 times.
     And
     Select Catapult and push down arrow key 1 time.

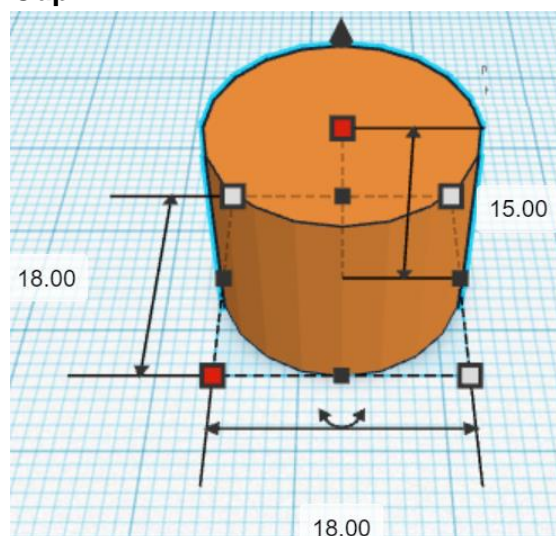| Before	9mm Right	After
	1mm Down	

Group Bend 3 and Catapult
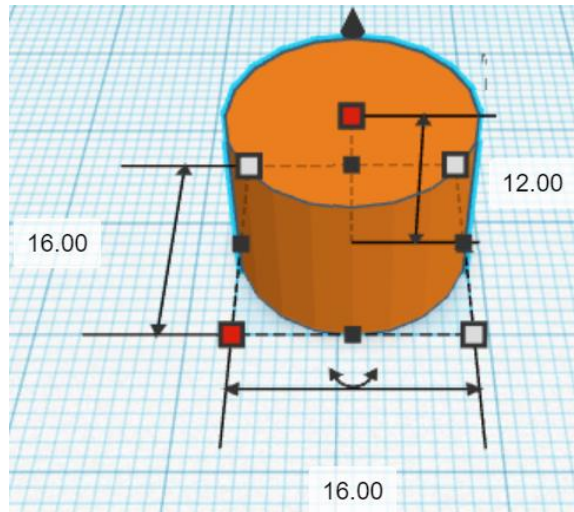From now on this will be called the **Catapult**

Launcher:

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

Change the dimensions to
18mm X direction,
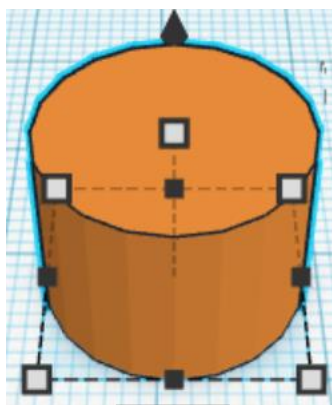18mm Y direction, and
15mm Z direction.

15.00

18.00

18.00

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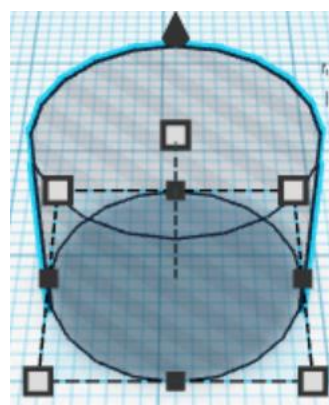From now on this will be called the **Cup Cutout.**

Change the dimensions to
16mm X direction,
16mm Y direction, and
12mm Z direction.

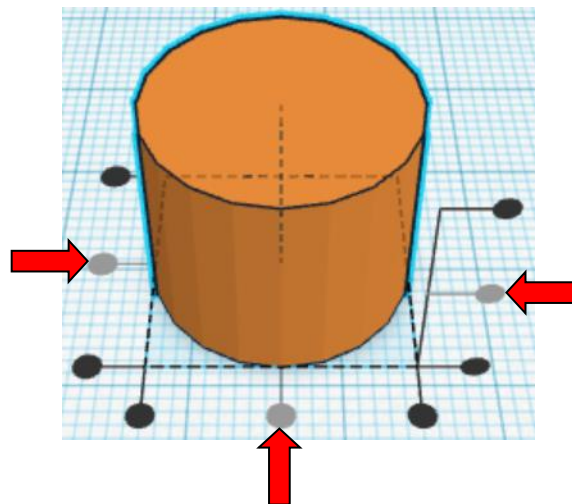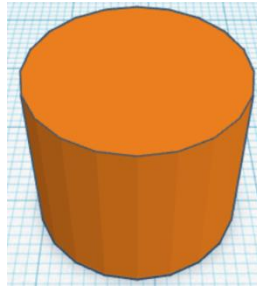**Change** Cup Cutoff to **Hole** by selecting Cup Cutoff and typing "h".

Solid	Hole

Align Cup and Cup Cutoff

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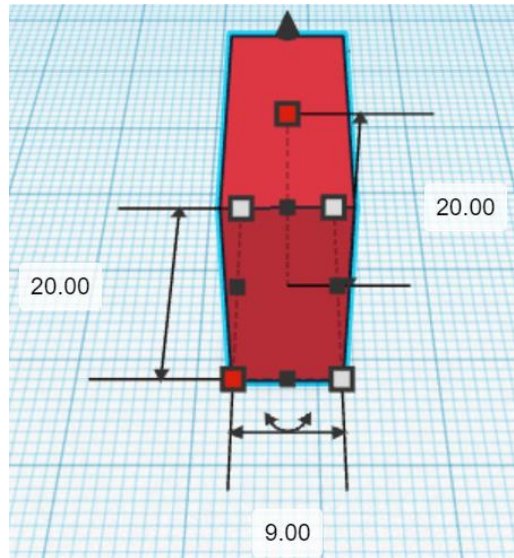centered of Y direction, and
centered of Z direction.

Group Cup and Cup Cutoff
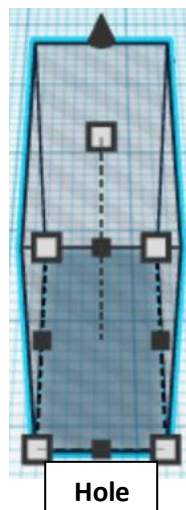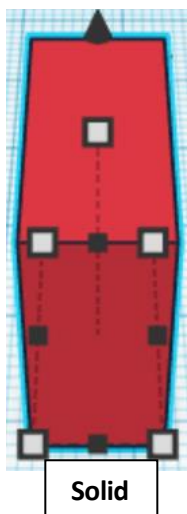From now on this will be called the **Cup**

Bring in a Box, located in Basic Shapes on the right 1 shape down.
From now on this will be called the **Cup Top Cutout.**

Change the dimensions to
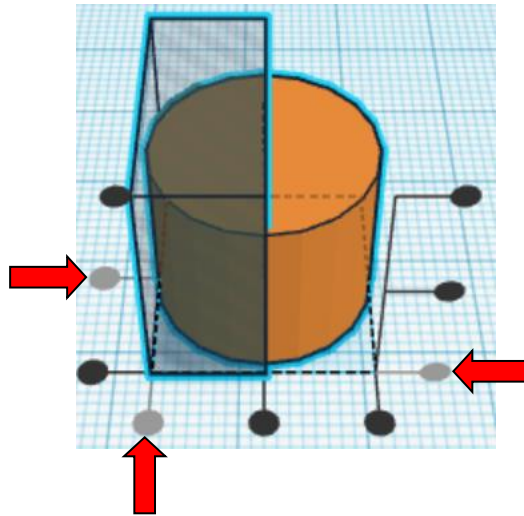9mm X direction,
20mm Y direction, and
20mm Z direction.

20.00

20.00

9.00

Change Cup Top Cutoff to **Hole** by selecting Cup Top Cutoff and typing "h".
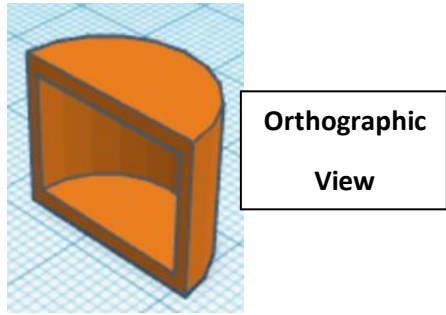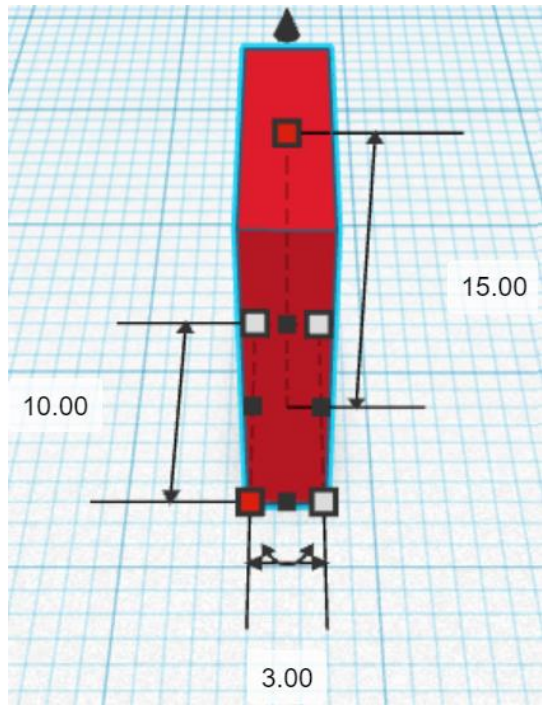

Solid

Hole

Align Cup and Cup Top Cutoff

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

Group Cup and Cup Top Cutoff
From now on this will be called the **Cup**


Orthographic

View

Bring in a Box, located in Basic Shapes on the right 1 shape down.
From now on this will be called the **Pin Catch.**

Change the dimensions to
3mm X direction,
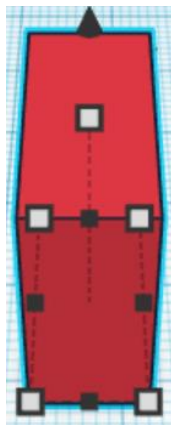10mm Y direction, and
15mm Z direction.

15.00

10.00

3.00

Bring in a Box, located in Basic Shapes on the right 1 shape down.
From now on this will be called the **Pin Catch Cutout.**

Change the dimensions to
3mm X direction,
8mm Y direction, and
11mm Z direction.
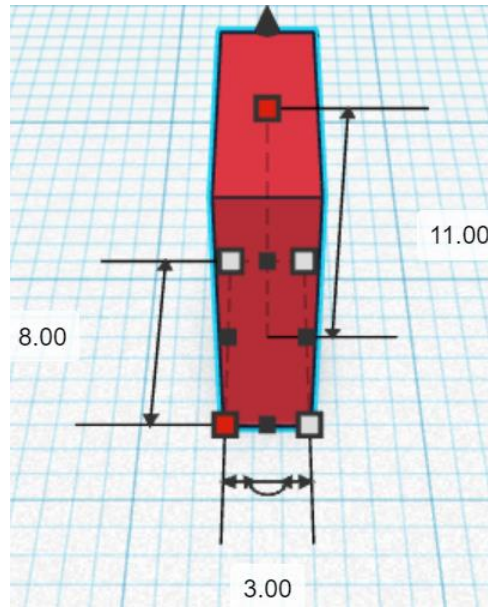
Change Pin Catch Cutoff to **Hole** by selecting Pin Catch Cutoff and typing "h".
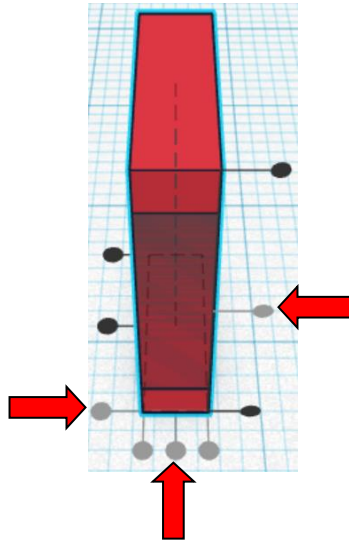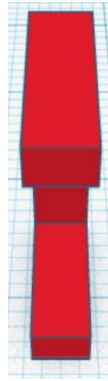

Solid

Hole

Align Pin Catch and Pin Catch Cutoff

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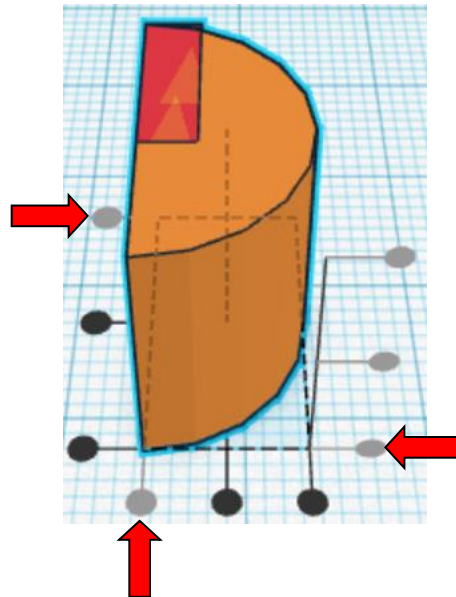front of Y direction, and
centered of Z direction.

Group Pin Catch and Pin Catch Cutoff
From now on this will be called the **Pin Catch**

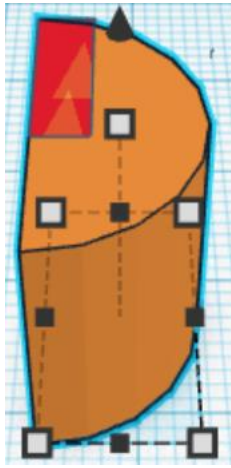**Align** Pin Catch and Cup

left in X direction,
back of Y direction, and
bottom of Z direction.

Move Cup   (Must be in home view for this to work!)
move down in negative Y direction 9mm

Hint: Select Cup and push down arrow key 9 times.

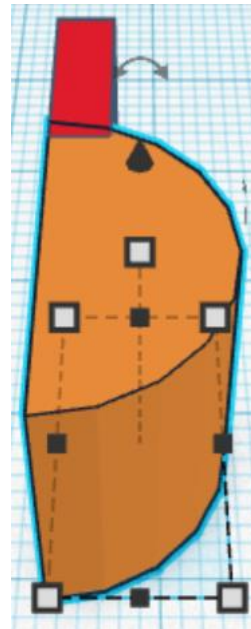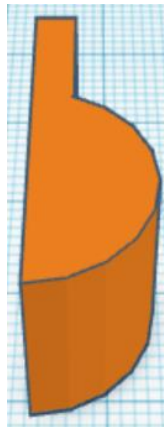Before   After
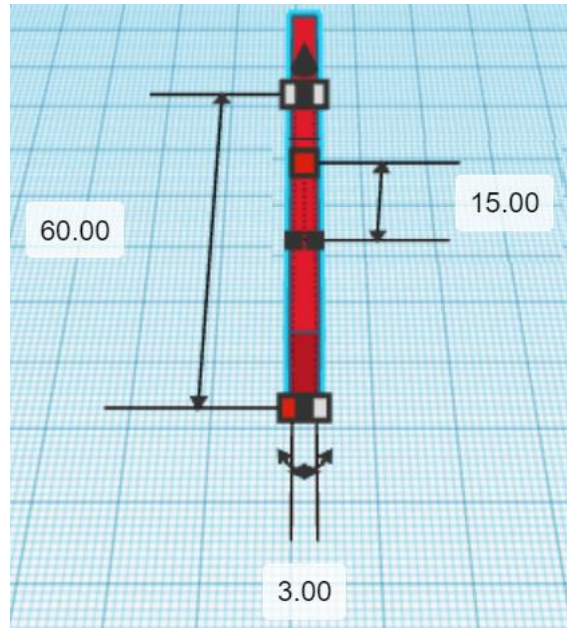

9mm
Down

Group Pin Catch and Cup
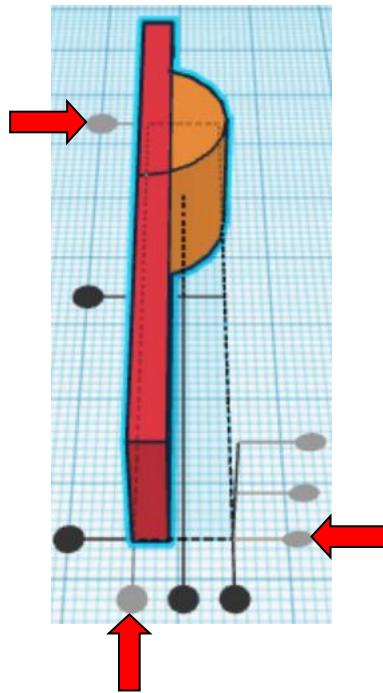From now on this will be called the **Cup**

Bring in a Box, located in Basic Shapes on the right 1 shape down.
From now on this will be called the **Cup Arm.**

Change the dimensions to
3mm X direction,
60mm Y direction, and
15mm Z direction.

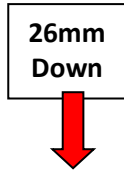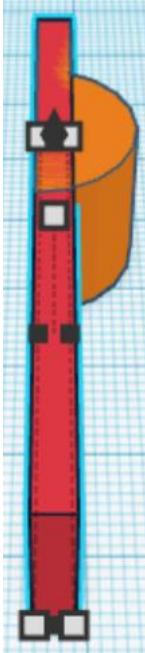**Align** Cup and Cup Arm

left in X direction,
back of Y direction, and
bottom of Z direction.

Move Cup Arm   (Must be in home view for this to work!)
move down in negative Y direction 26mm

Hint: Select Cup Arm and push down arrow key 26 times.
       Or
       Select Cup Arm and hold shift and push down arrow key 2 times.
       Then release shift and push down arrow key 6 more times.
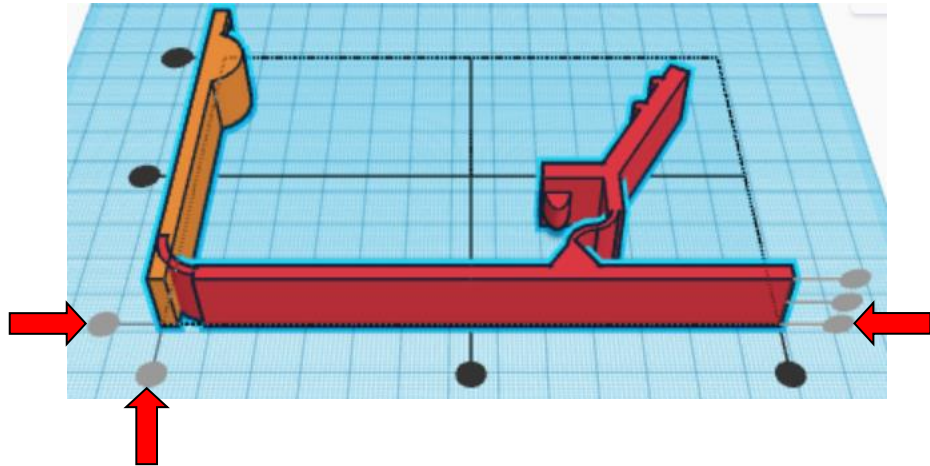

Before   After

**26mm
Down**

Group Cup and Cup Arm
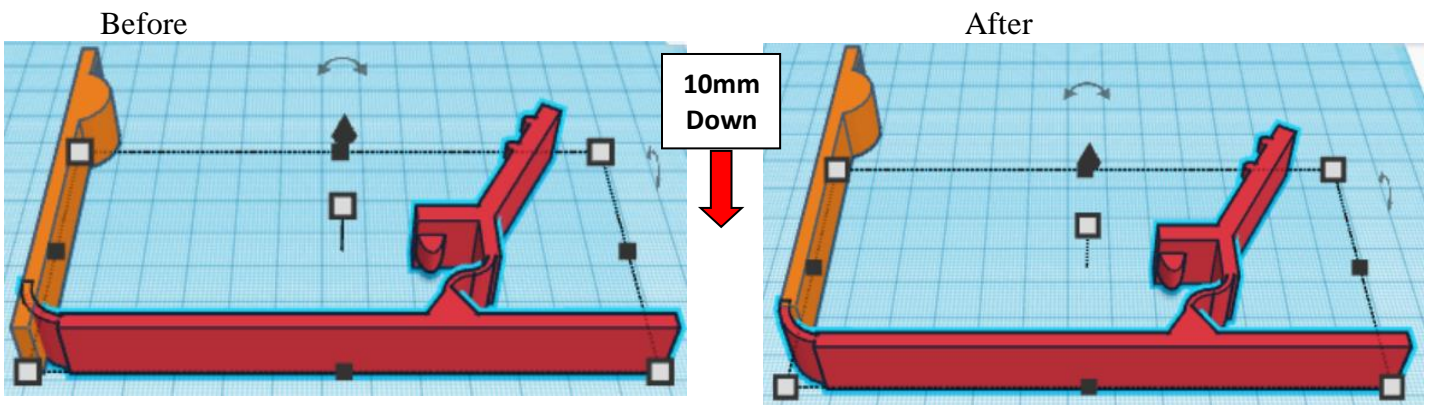From now on this will be called the **Cup**

Align Cup and Catapult

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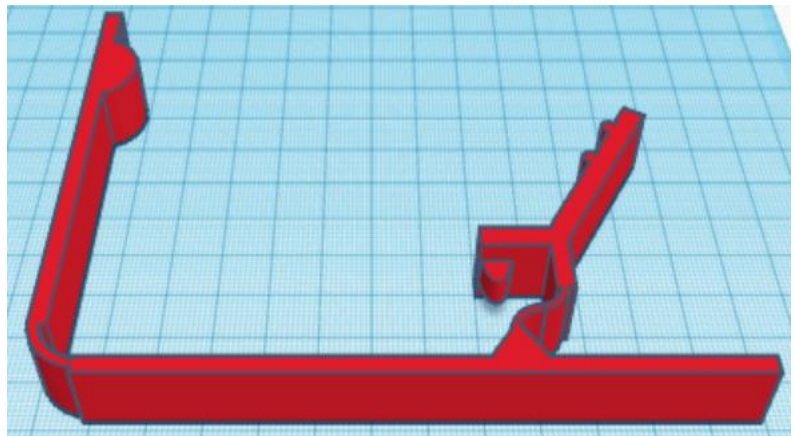front of Y direction, and
bottom of Z direction.

Move Catapult   (Must be in home view for this to work!)
move down in negative Y direction 10mm

Hint: Select Catapult and push down arrow key 10 times.
Or
Select Catapult and hold shift and push down arrow key 1 time.

Before   After

**10mm
Down**

Group Cup and Catapult
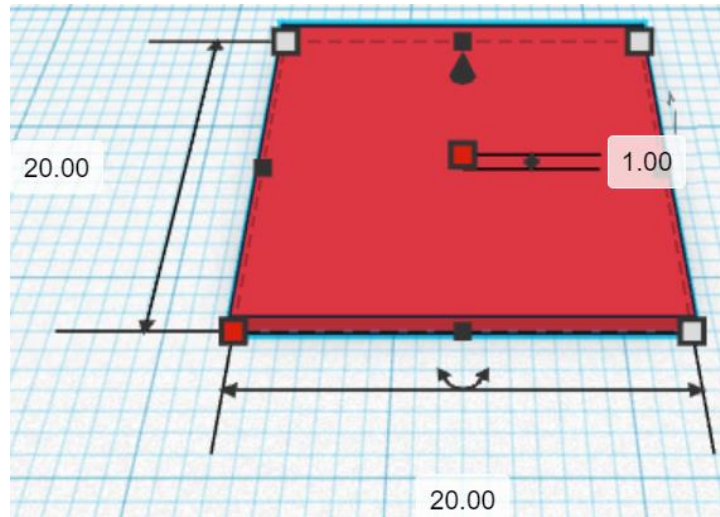From now on this will be called the **Catapult**

Set on Workplane:

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

Balls:

Bring in a Box, located in Basic Shapes on the right 1 shape down.
From now on this will be called the **Ball Cutout.**

Change the dimensions to
20mm X direction,
20mm Y direction, and
1mm Z direction.

Duplicate Ball Cutout (1) time
From now on this Duplicate will be called the **Ball Cutout Top**

Move Ball Cutout Top   (Must be in home view for this to work!)
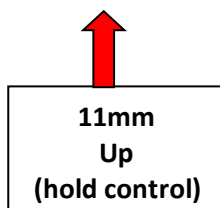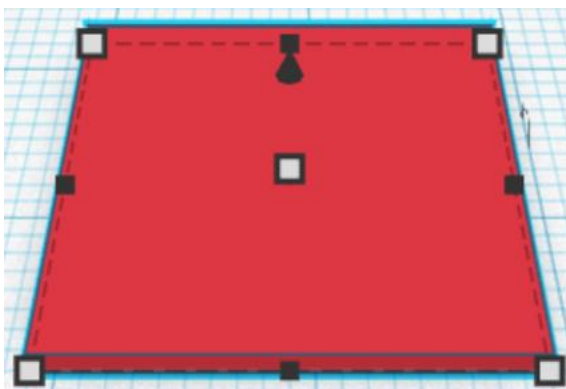move up in positive Z direction 11mm

Hint: Select Ball Cutout Top and hold control and push up arrow key 11 times.
Or
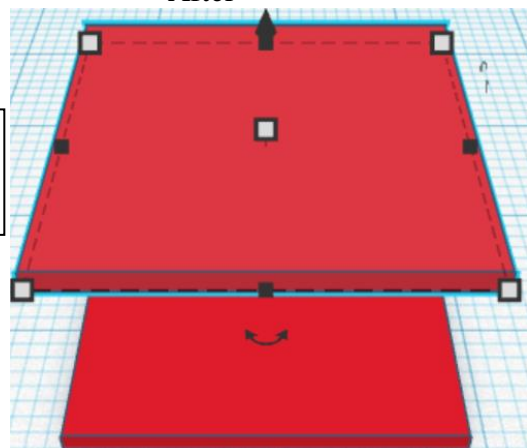Select Ball Cutout Top and hold control and hold shift and push up arrow key 1 time.
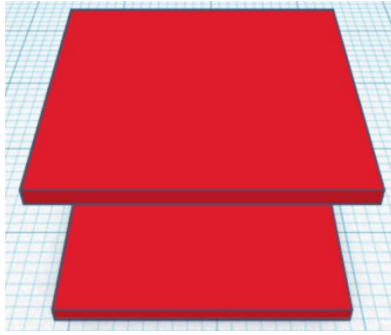Then release shift and push up arrow key 1 more time.
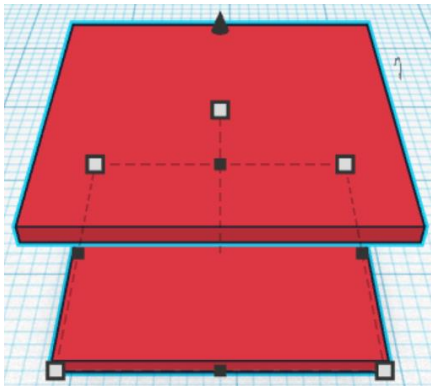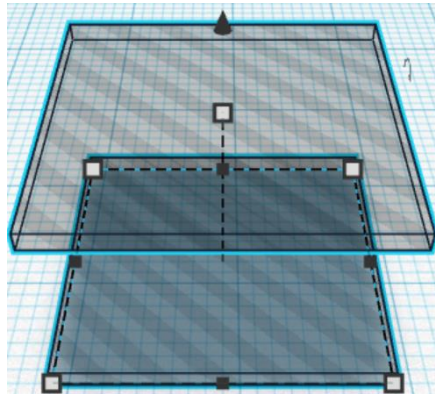
Before   After

**11mm
Up
(hold control)**

Group <u>Ball Cutout</u> and <u>Ball Cutout Top</u>
From now on this will be called the **Ball Cutout**

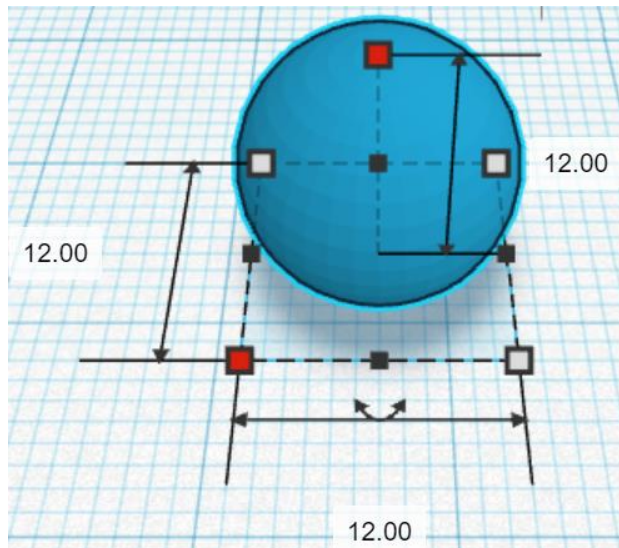**Change** <u>Ball Cutoff</u> to **Hole** by selecting <u>Ball Cutoff</u> and typing "h".
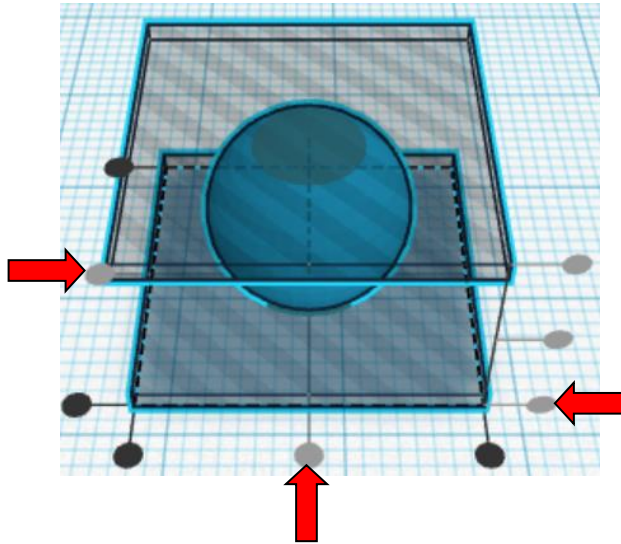

Solid

Hole

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

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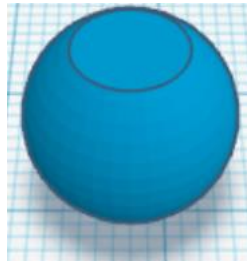12mm Y direction, and
12mm Z direction.

Align Ball and Ball Cutout

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

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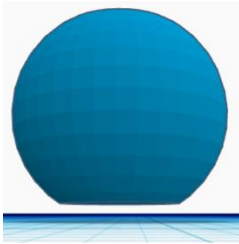From now on this will be called the **Ball**

Set on Workplane:

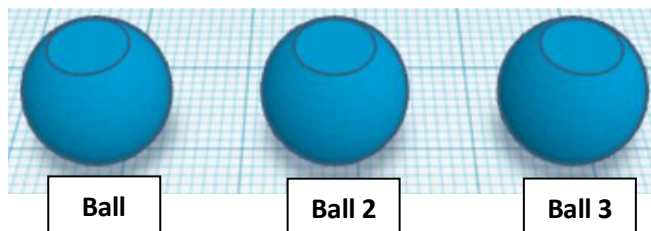Select the Ball and type "d" to set the body on the work plane.

Before   After

Duplicate Ball (2) times
Move Duplicates to the side
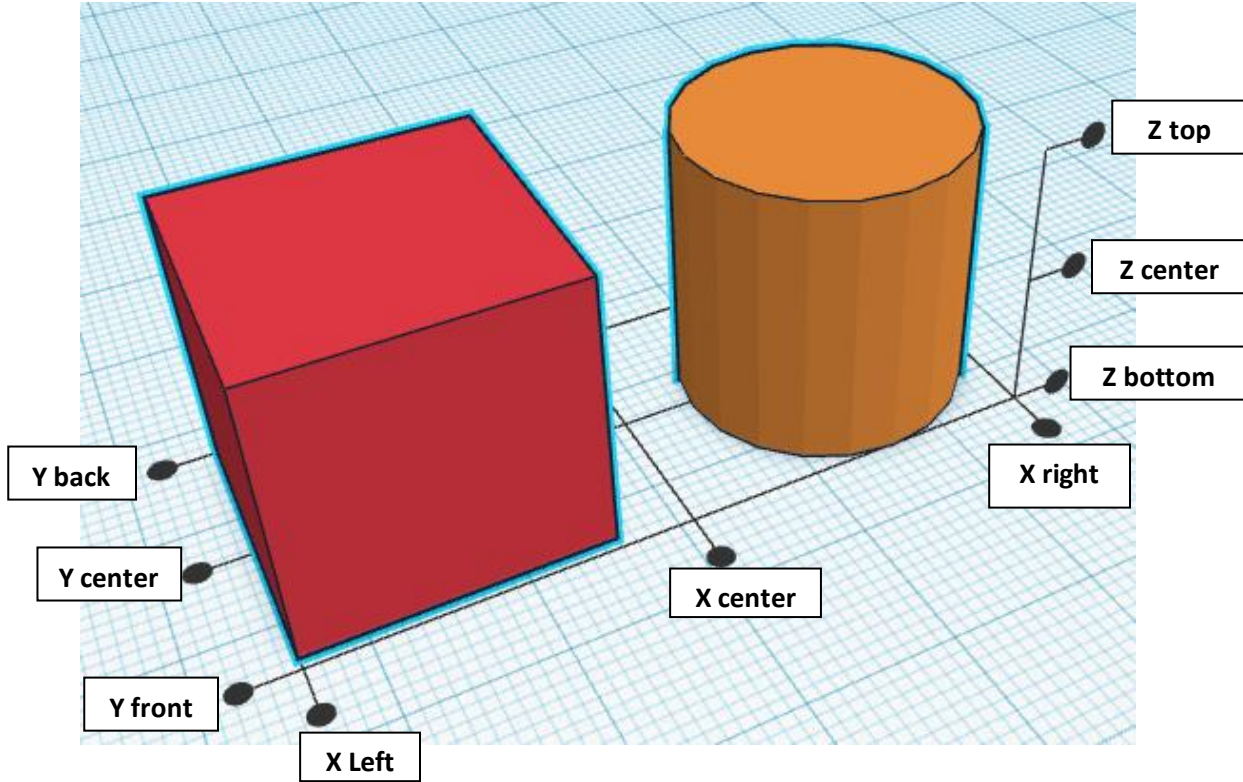From now on this Duplicate will be called the **Ball 2** and **Ball 3**

| Ball | Ball 2 | Ball 3 |

You are done, print and enjoy!

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

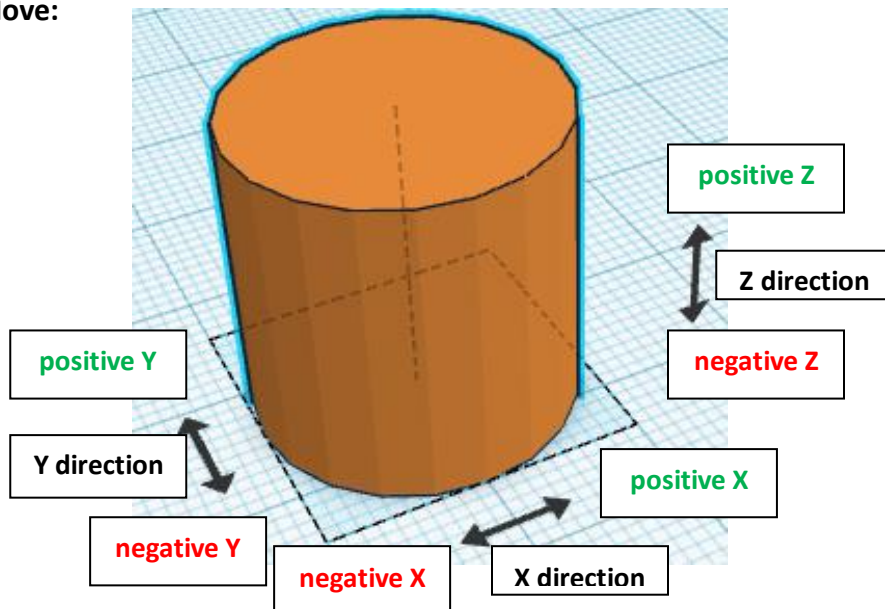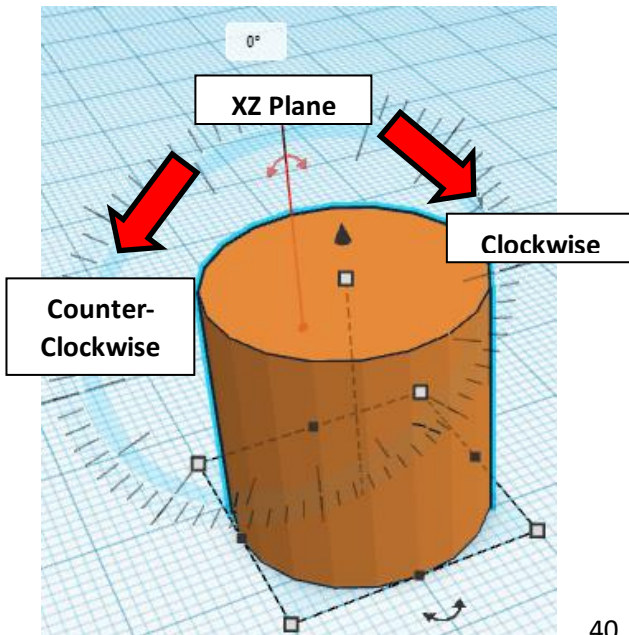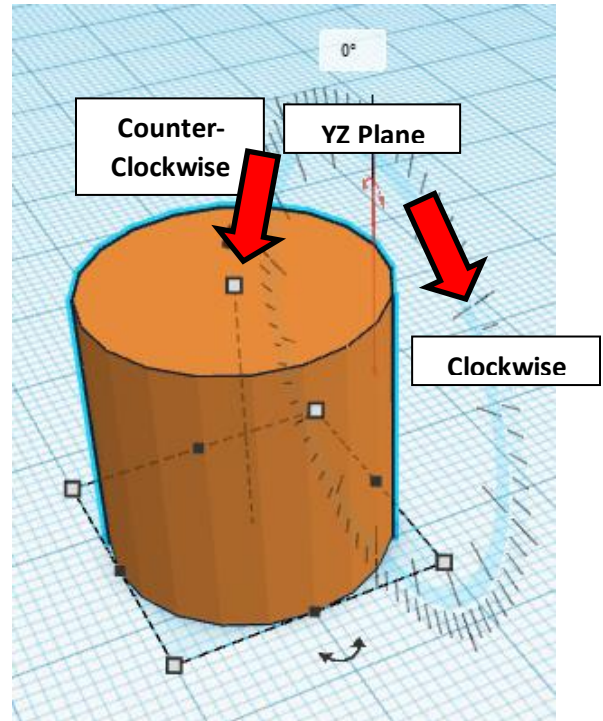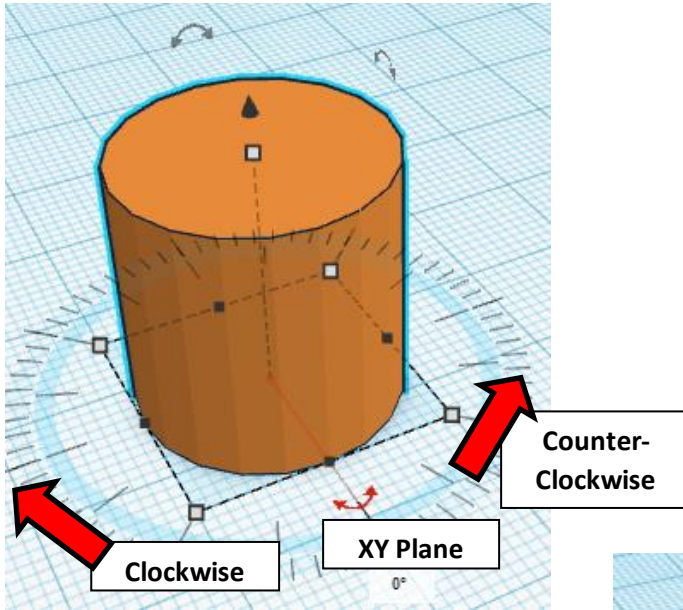**Always be in the "home view" when doing any of these!!!**

Home view

Aligning:

- Z top
- Z center
- Z bottom
- X right
- X center
- X Left
- Y back
- Y center
- Y front

Flip or Mirror and Move:

- positive Z
- Z direction
- negative Z
- positive Y
- Y direction
- negative Y
- positive X
- X direction
- negative X

Rotate:

Counter-Clockwise

Clockwise

XY Plane

0°

0°

Counter-Clockwise

YZ Plane

Clockwise

0°

XZ Plane

Clockwise

Counter-Clockwise

40

TinkerCAD
Tool Guide

Most used Keyboard Shortcuts:

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

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.

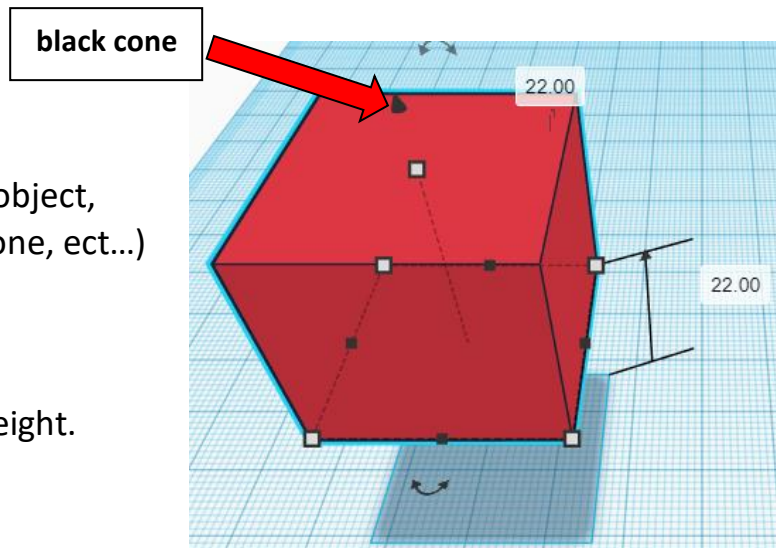Move mouse to desired location.

70.00

23.00
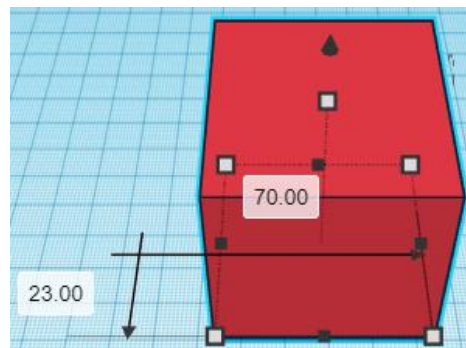
Moving Object(s) continued:

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 <u>black cone</u> at top of object.
Move mouse up or down to desired height.

black cone

22.00

22.00

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 <u>1mm</u> 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 <u>10mm</u> increments.

Shift

+

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 <u>1mm</u> increments.

In Z direction (fast)
(up/down)

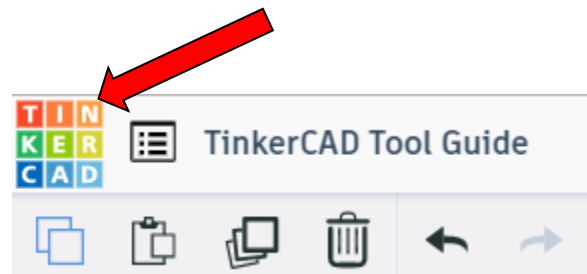Select object with left mouse button.

Hold control button and hold shift button
and use up and down arrow keys to move the object in <u>10mm</u> increments.
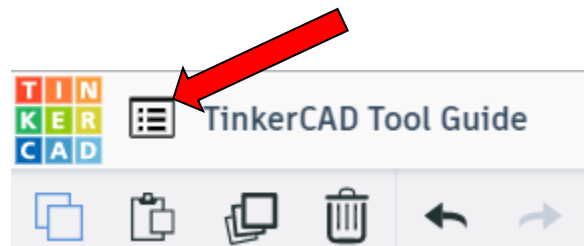
Using on screen icons:

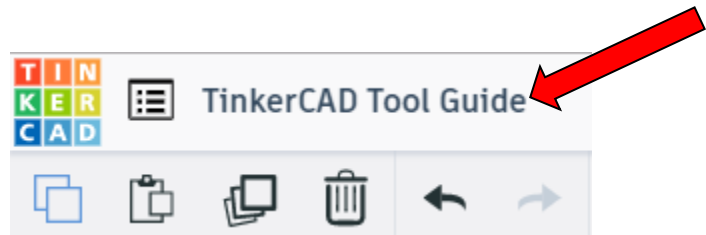**TinkerCAD main screen:**

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

TinkerCAD Tool Guide

My designs:

Pulls up menu of your designs.

TinkerCAD Tool Guide

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
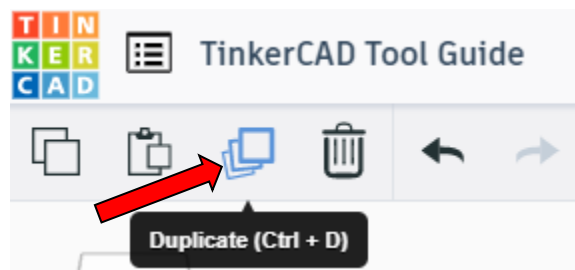Paste to copy or go into new design
and paste to copy.
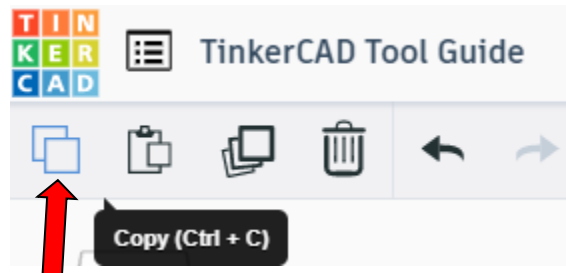
Paste:

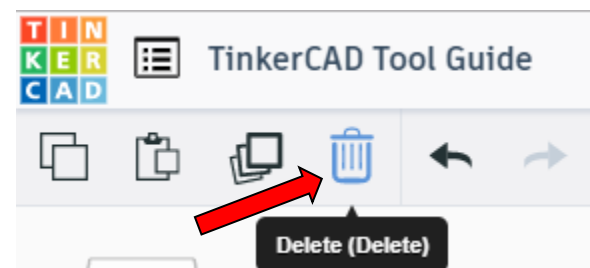After using copy,
click paste or use ctrl + v to paste.
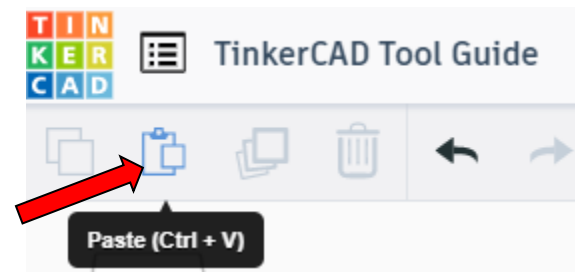
Duplicate:

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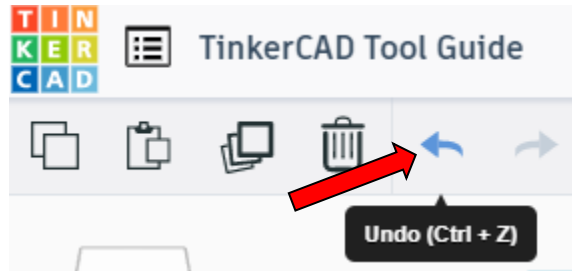It will appear as if nothing happened,
but if you move the shape you will
see then duplicate underneath.

Delete:

Select shape.
Click delete or delete key.

44

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.
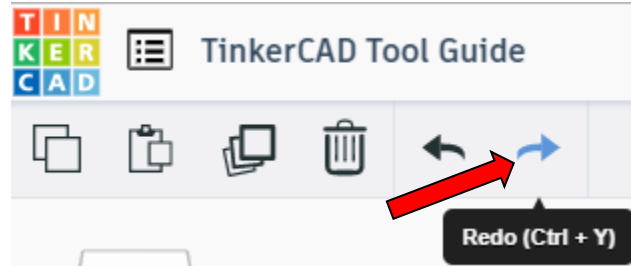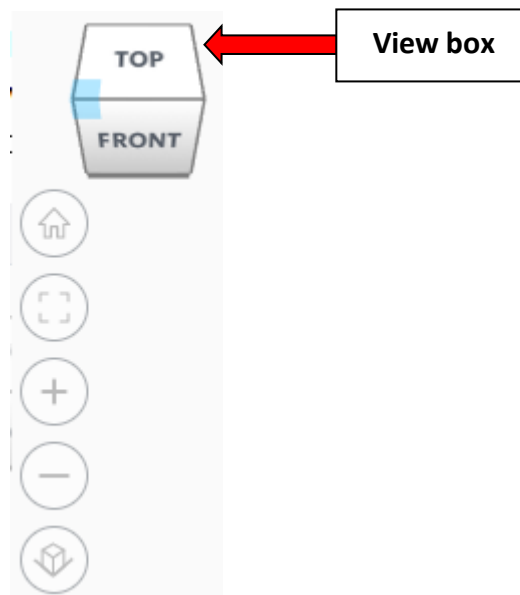

Change View:

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.

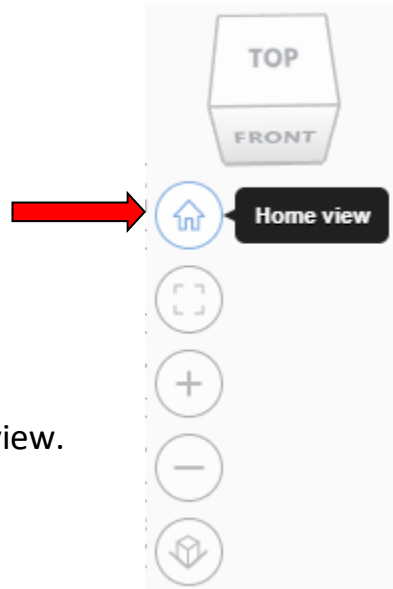## To change view with icons:

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
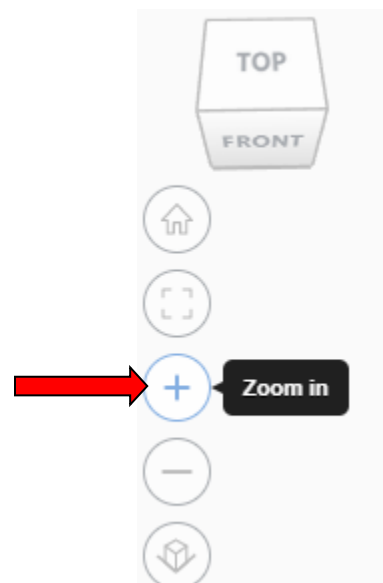Fit all in view to un-zoom to see all objects.

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.
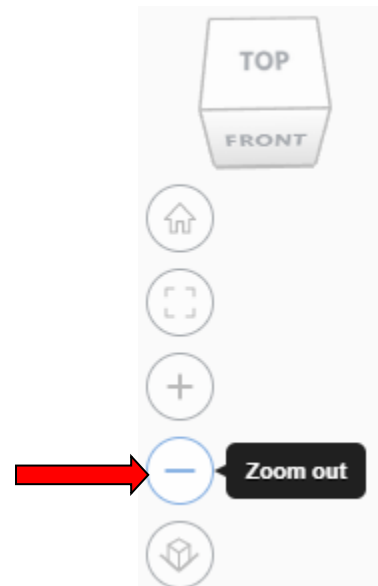
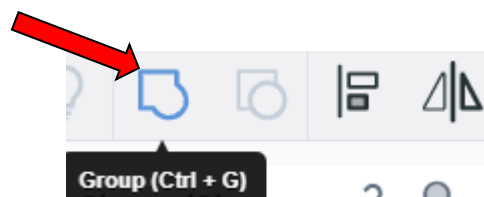## Switching to orthographic and perspective view:

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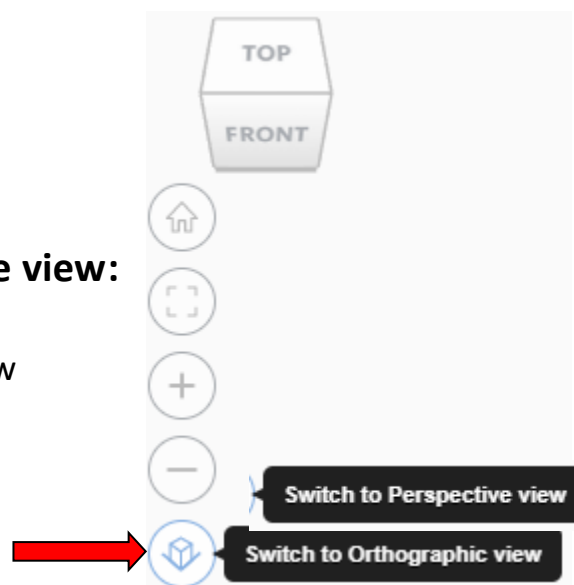
Group:

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"
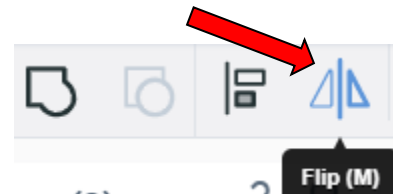
Full list of Keyboard Shortcuts

MOVING OBJECT(S)
(Using keyboard)

Move along X/Y axis	← / ↑ / ↓ / →
Move along Z axis	Ctrl + ↓ / ↑
×10 Nudge along X/Y axis	Shift + ← / ↑ / ↓ / →
×10 Nudge along Z axis	Ctrl + Shift + ↓ / ↑

KEYBOARD + MOUSE SHORTCUTS
(Press and hold the keys, then click and drag the mouse)

Duplicate dragged object(s)	Alt + Drag left mouse button
Select multiple object(s)	Shift + Left mouse button
45° rotation	Shift (Hold while rotating)
Scale in one direction	Alt + Hold side handle
Scale in two directions	Alt + Hold corner handle
Uniform scale	Shift + Hold corner handle
Uniform scale in all directions	Alt + Shift + Corner handle
Uniform scale in all directions	Alt + Shift + Top handle

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

Orbit the view	Right mouse button
Orbit the view	Ctrl + Left mouse button
Pan the view	Shift + Right mouse button
Pan the view	Ctrl + Shift + left button
Zoom the view in or out	Mouse scroll wheel
Zoom-in	+
Zoom-out	–
Fit selected object(s) into view	F

OBJECT SETTINGS

Transparency toggle	T
Turn object(s) into **Holes**	H
Turn object(s) into **Solids**	S
Lock or **Unlock** object(s)	Ctrl + L
Hide object(s)	Ctrl + H
Show all hidden object(s)	Ctrl + Shift + H

TOOLS AND COMMANDS

Copy object(s)	Ctrl + C
Paste object(s)	Ctrl + V
Duplicate object(s) in place.	Ctrl + D
Delete object(s)	Del
Undo action(s)	Ctrl + Z
Redo action(s)	Ctrl + Y
Redo action(s)	Ctrl + Shift + Z
Group object(s)	Ctrl + G
Un-group object(s)	Ctrl + Shift + G
Align object(s)	L
Flip/Mirror objects(s)	M
Select all object(s)	Ctrl + A
Place a **Ruler**	R (Shift toggle midpoint/center)
Place a **Workplane**	W (press Shift to flip direction)
Drop object(s) to workplane	D