

INTRODUCTION TO 3D MODELLING

 Makerspace Sessions



SESSION PLAN

What is Tinkercad

Tinkercad Tools

Rook Tutorial

Further Information

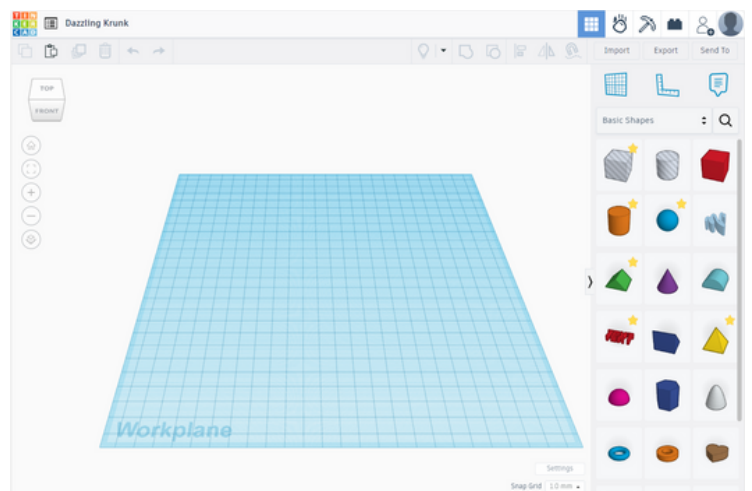


WHAT IS TINKERCAD

Tinkercad is a free web app for 3D design, electronics, and coding.

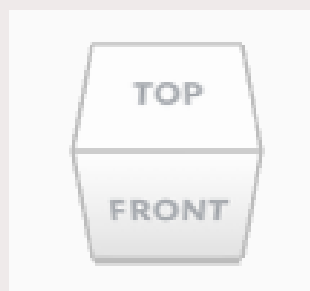


The Workplane



This is the Tinkercad workplane.

This space can be navigated with the mouse by:



This box, found in the top left corner of the workplane, shows the orientation of your workplane.

Roll forward and back to zoom in and out

Click and drag to select a group of objects

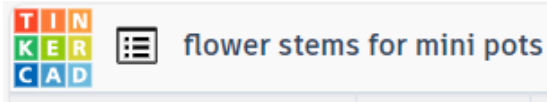


Click and drag to keep the same view by change the location of the workplane.

Click and drag to change the viewing angle of the workplane.

TINKERCAD TOOLS

Top Tool Bar Tools



NAME OF THE CREATION

In the top left corner of the screen, next to the Tinkercad logo, is a place holder name for the project. Click on this name and type in the new name of the project. We recommend typing your first name.



GROUPING TOOL

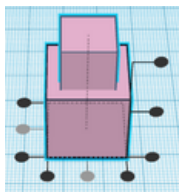
Groups two or more shapes together so they can be moved as a whole.

Note: Colour choices of shapes will be saved upon grouping but cannot be individually adjusted.



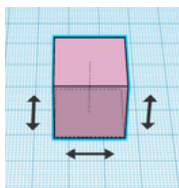
UNGROUPING TOOL

Restores the grouped shapes back to their individual pieces.



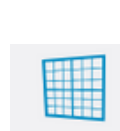
ALIGN TOOL

Produces a grid of nodes around a given object that can be used to align 2 or more objects along the desired axis.



FLIP TOOL

When selected allows the object the be flipped along the axis lines: X, Y and Z.



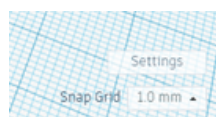
WORKPLANE TOOL

This allows you to add another workplane into your model that you can build upon.



RULER TOOL

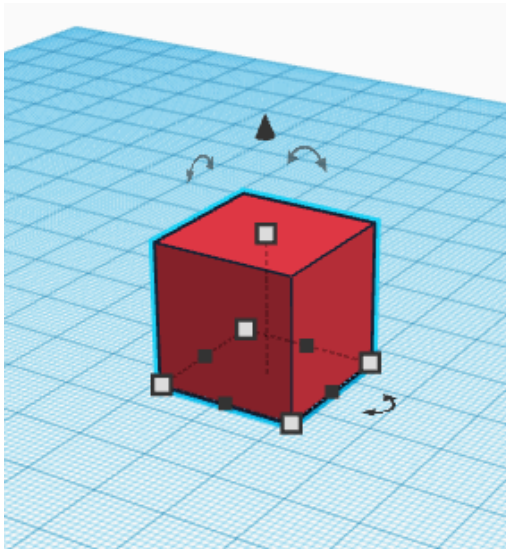
Allows you to make precise measurements on your model.



GRID MEASUREMENTS

Allows you to create to exact ratio dimensions.

Shape Tools



NODES

White Boxes:

Vertices that can be pulled to create the size you desire. The node in the centre of the box indicates the height, nodes on the corners indicates length and width.

Black Boxes:

Indicate sides that can be adjusted one at a time.

Black Triangle:

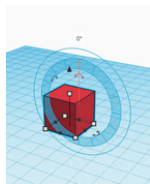
Is a node that can be clicked and dragged in order to raise or lower the height of the object.

Note: In 3D printing you cannot print something that is in the air.

ROTATION ARROWS

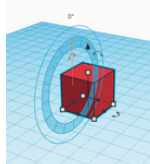
When you click on a curved arrow, as pictured, a wheel will appear. You can then drag the object in the direction you desire. The closer to the centre of the wheel your mouse is the more segmented your rotation and the further out the more fluid the rotation.

Note: Try to make sure your object is the correct size you need as your object may become skewed if you try to change the size after you have rotated it.



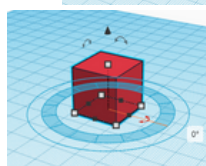
TOP ROTATION ARROW

Rotates left and right



SIDE ROTATION ARROW

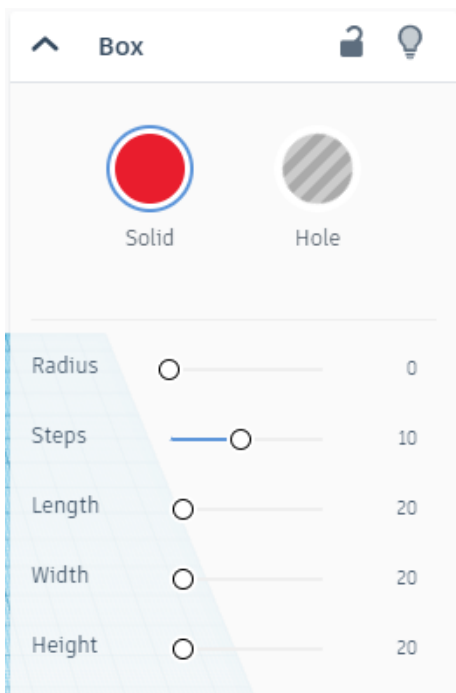
Rotates forward to back



BOTTOM ROTATION ARROW

Rotates the object on it's base

Shape Tools



SHAPE OPTIONS

This box will appear whenever you have a shape selected.

Solid and Hole:

The shape has 2 options:

Solid is where the shape is a solid object.

You can change the colour of a solid object by clicking on the coloured circle.

Hole is negative space, which means where it is put will create a void or hole.

Radius:

The internal measurement of the object that can be used to add curvature to the shape.

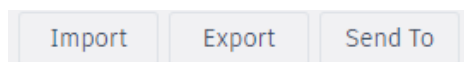
The higher the number the more curved the edge, the lower the sharper the edge.

Steps:

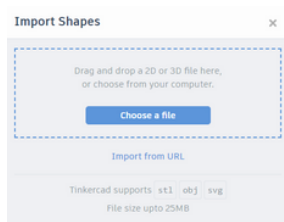
Relate to how smooth or angular a shape can be. The more steps the smoother the object.

Length, Width and Height:

This is the specific size dimensions of the selected object.

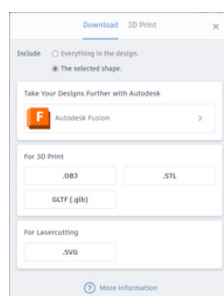


Save Options



IMPORT

You can add a model from somewhere else into the workplane. As long as it is and STL, OBJ or SVG file extension and is less than 25MB in size.



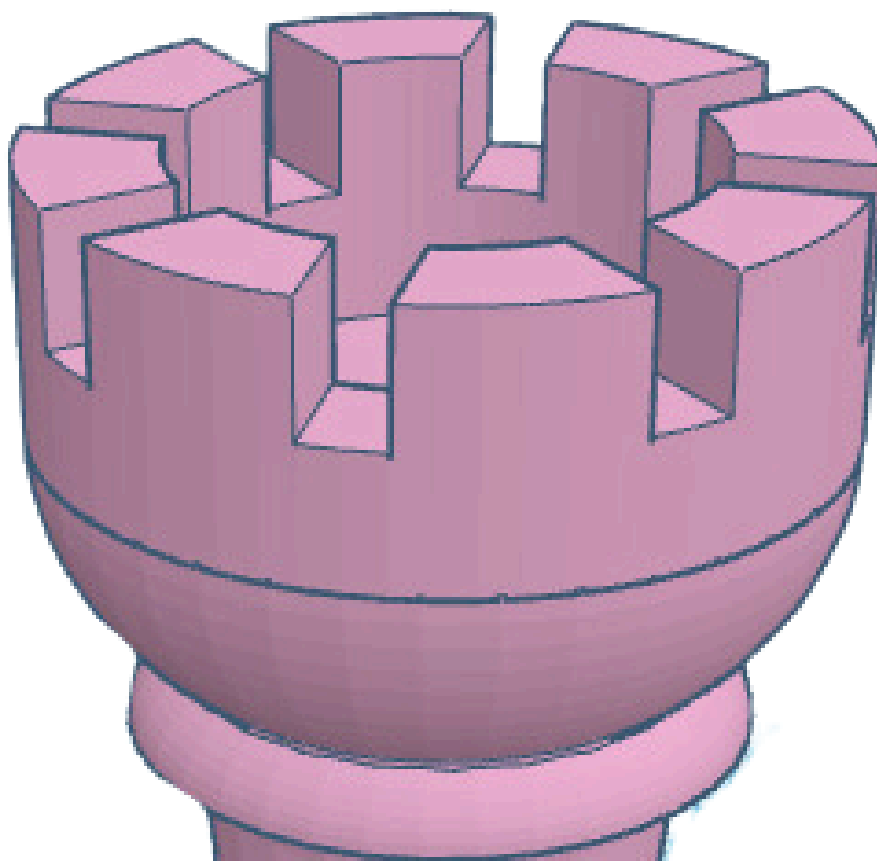
EXPORT

You can work on your creation in other programs or to USB.

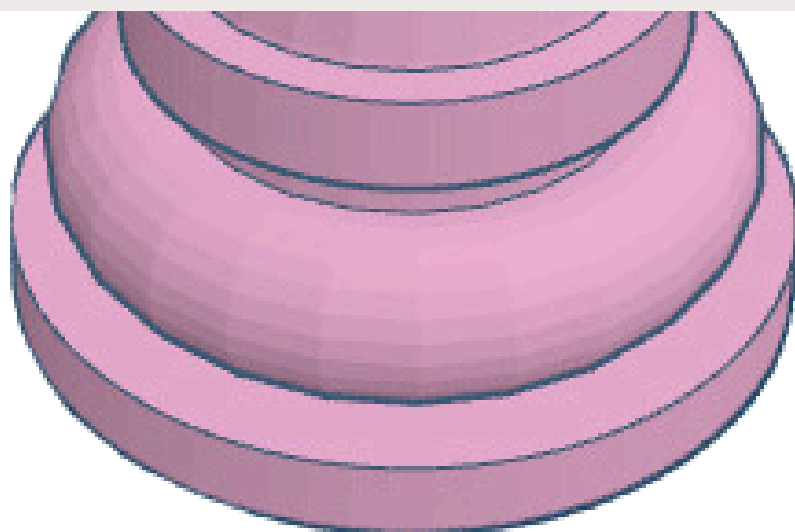
We recommend:

STL - used for slicing to 3D printers

OBJ - can also be used for 3D Printers but also other design programs



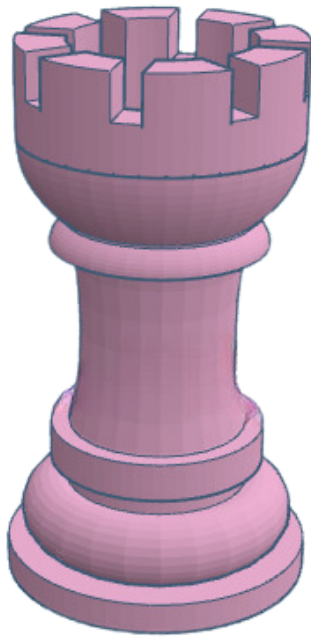
3D MODELLING TUTORIAL



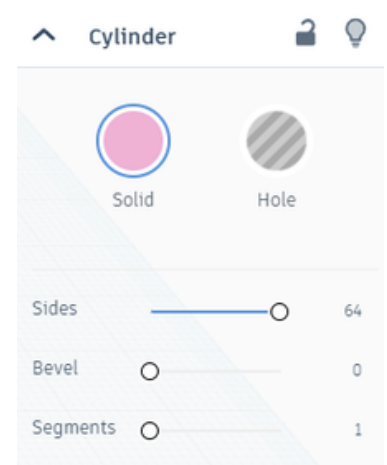
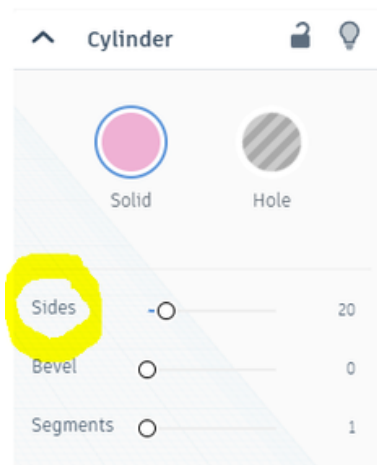
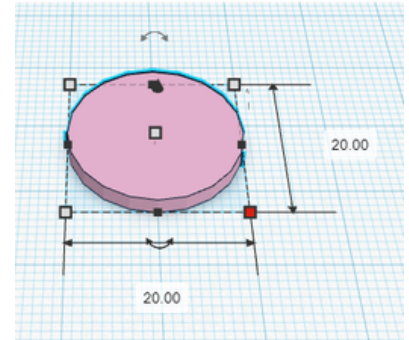
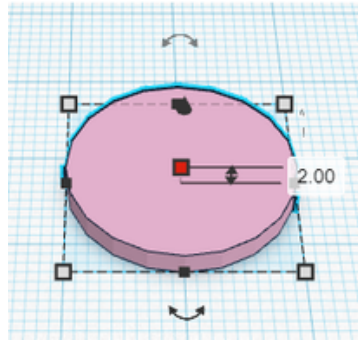
ROOK



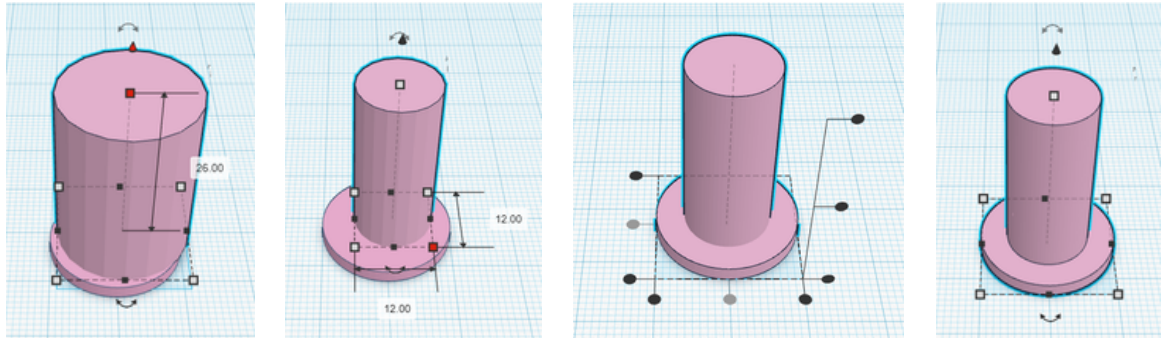
Directions



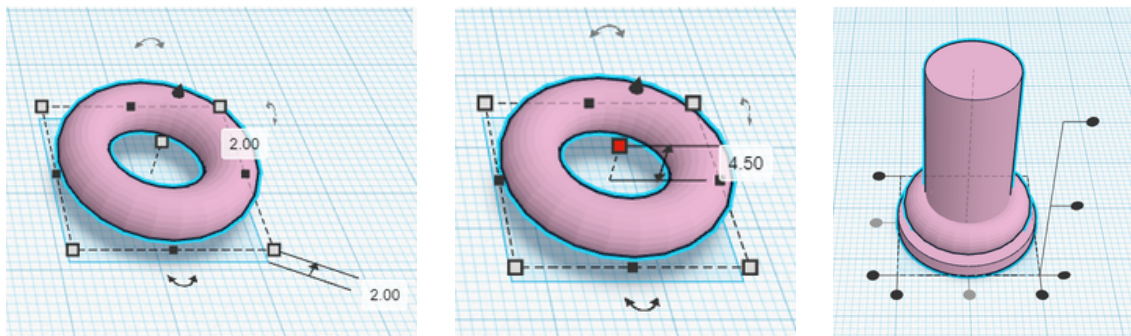
- 1 Start by selecting a cylinder and dragging it to the workplane. Change the height to 2.00, but leave the other dimensions the same (20 x 20). In the Shape options window, drag the sides slider up to 64. This gives a smoother finish to the model. This will serve as the base of the rook.



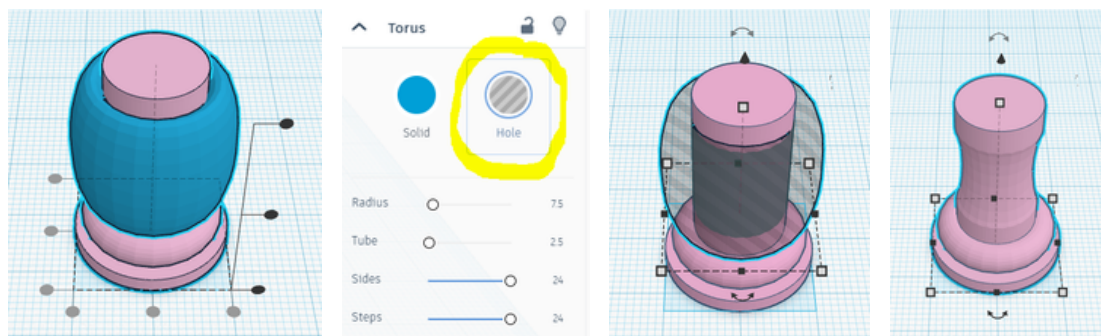
- 2 Bring another cylinder to the workplane and place it on top of the base. Change the height to 26, and the other dimensions to 12 by 12. Remember to make it smoother using the 'sides' slider in the shape options. Select the objects you want to group by holding down the shift key and clicking on the objects. Then select the align tool from the top tool bar. Click on the middle circular node of the length and width (not height) to align the two objects to the centre. Then group the objects.



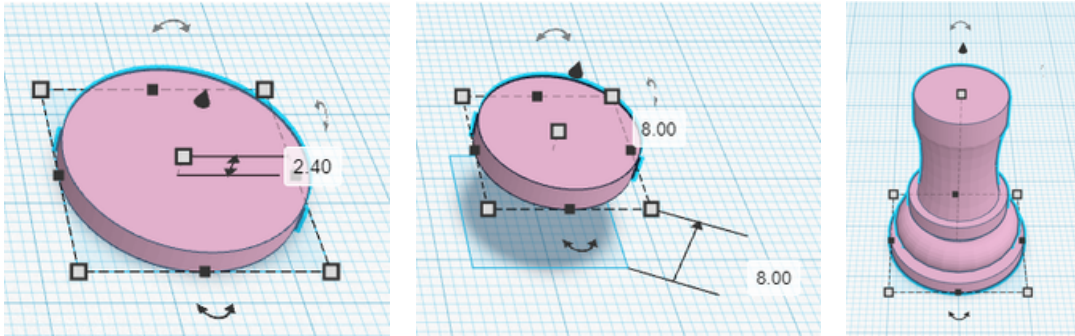
- 3 Select a torus shape and place it beside your model. Then move it up 2.00 from the workplane by using the black triangle or typing in the measurement. Change the height to 4.5 and the other dimensions to 18 by 18. Align and group it with the other object.



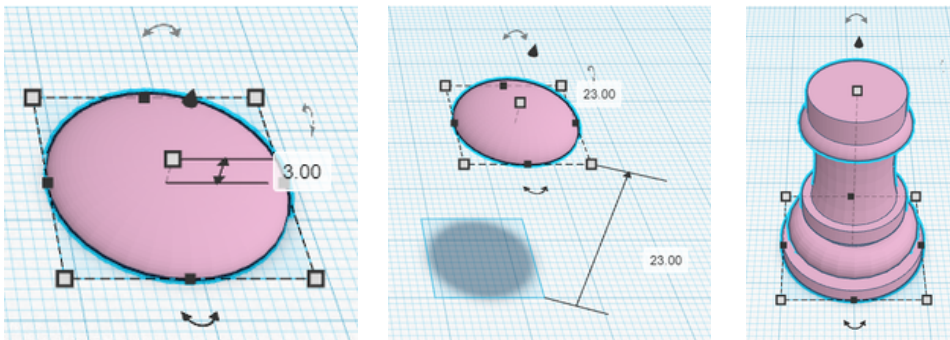
- 4 To make the curve on the centre pillar, bring another torus to the workplane and set the height to 18, and the others to 20 by 20. Move it 8.00 off the workplane and align it with the other object. Before grouping, turn it into a hole in the shape options. After turning it into a hole, group it with the other object.



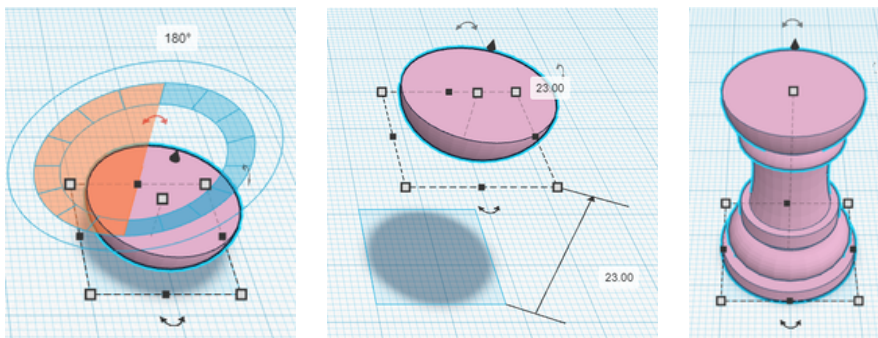
- 5 To create some detail, bring a cylinder to the workplane. Change the height to 2.4, and the other dimensions to 14 by 14. Make it 8.00 off the workplane, then align and group it with the others.



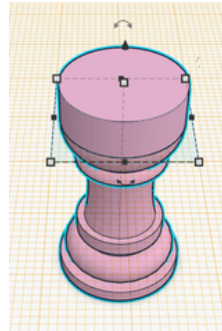
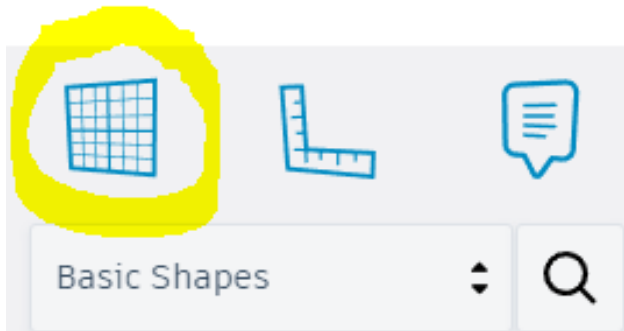
- 6 Now add a half sphere to the workplane. Change the height to 3 and the other sides to 14 by 14. Make it 23 off the workplane, then align and group.



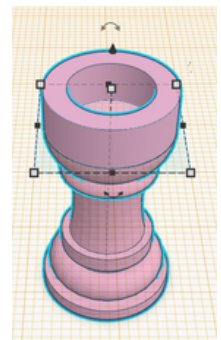
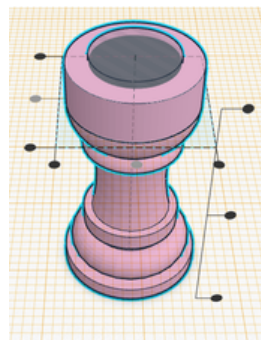
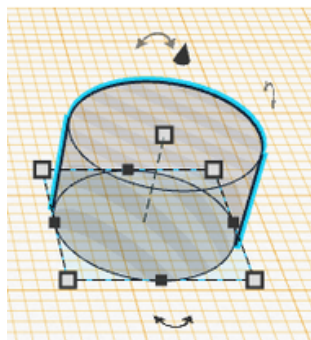
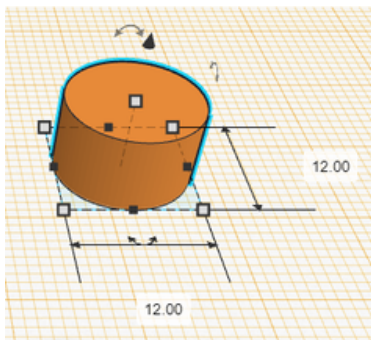
- 7 Add another half sphere to the workplane, setting the height to 7 and the other sides to 18 by 18. Rotate it 180 degrees so the flat side is facing up, then make it 23 off the workplane. Align and group it to the other object. It's starting to look like a chess piece now!



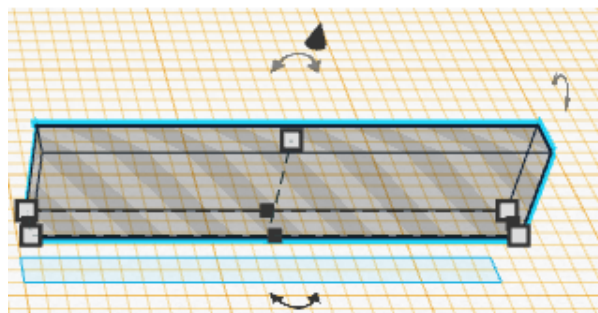
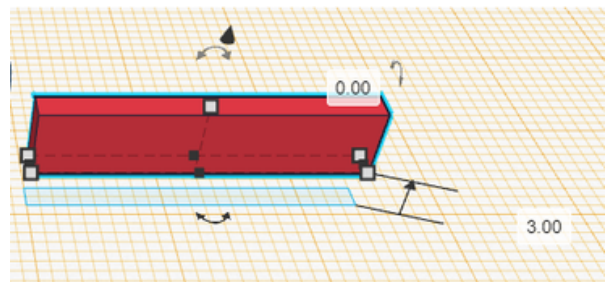
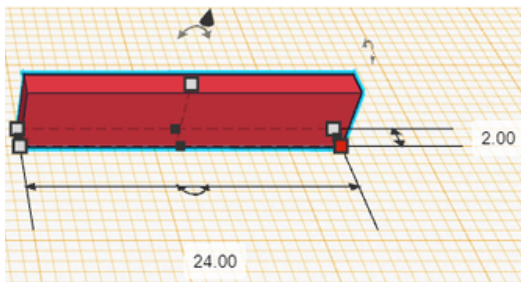
- 8 You can change the workplane to the top of the object now, but you don't have to. Bring a cylinder to the top of the object (it's 30 above the workplane). Change the height to 6 and the other dimensions to 18 by 18, then align and group.



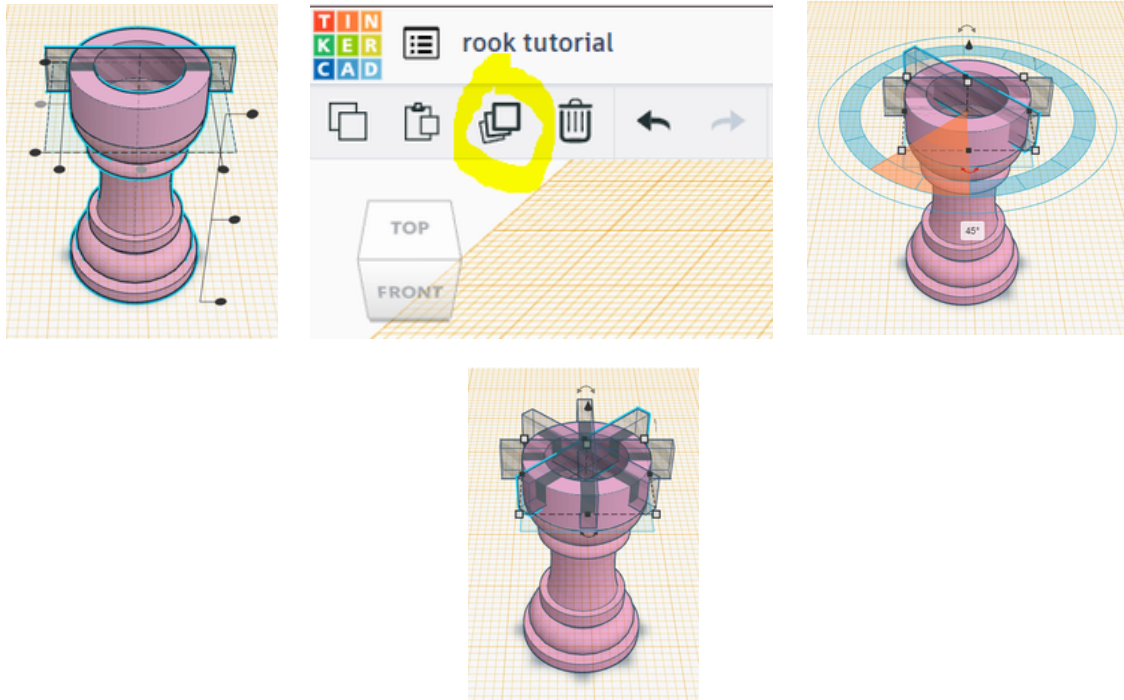
- 9 Bring another cylinder to become the hole of the rook battlements to the same height (on the new workplane or just 30 from the old). Set the height to 7 and the other dimensions to 12 by 12. Change it to a hole object before aligning and grouping it.



- 10 Bring a box to the workplane and change the height to 5, and the other dimensions to 2 by 24. Make it 3.00 above the new workplane (or 33 if you didn't make a new workplane) and turn it into a hole shape.



- 11 The last step is a little tricky, so make sure to follow the instructions exactly. Align the rectangular hole with the rook, but don't group it yet! Press the duplicate button in the top left corner (the sticky notes looking thing next to the trash can). Rotate the duplicated box 45 degrees on the horizontal plane, and make sure you don't click anywhere else. Now, click the duplicate button two more times. This will create more boxes on 45-degree angles.



- 12 Now you can group all of the holes with the chess piece. Wait until it loads and now you have a rook!



Congratulations!

Thank you for participating and completing our 3D Modelling session. Please see the further information page for more experiences with Ipswich Libraries Makerspaces, or speak with a Makerspace Officer!

FURTHER INFORMATION

Ipswich Libraries Makerspaces offer a whole lot more!



3D PRINTING SESSIONS

Learn the basics of 3D Printing! During this session, you will be able to pick out your very own model from the 3D Gallery and be guided through the preparation process for a 3D print. Once the set-up is complete, your model will be added to the 3D Print Queue and you will be able to collect it once contacted by Makerspace staff.

(Suitable for adults and children, 8 years and up)

Duration: 45 minutes · Price: Free

Available at Springfield and Ipswich Makerspaces



MAKERSPACE CHALLENGES

Compete in the ultimate Makerspace Challenge to test your creative skills! Challenges change regularly and can be completed using the technology and software currently available in the Ipswich Libraries Makerspaces. Challenges are held in 2 different mediums:

paper crafting and 3D modelling

View the current challenges online or come into a makerspace to find out more! Price: Free

Available at Springfield and Ipswich Makerspaces



ASK - A - CHAMPION

Want to find more about creativity and innovation in the Makerspace? Want to learn more about our 3D Printers? or just have a general question or comment about the Makerspaces? Get in contact by clicking on the Ask-a-Champion link on the website or typing in the link below and a Makerspace Champion will be in contact with you.

<https://www.ipswichlibraries.com.au/ask-a-champion/>

EXPLORE MORE POSSIBILITIES!

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