

3D Modeling with Blender



Taught by Halima Haruna & Sara Morrell
HIST 7250 Topics in Public History
Professor Parr
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*Feel free to ask questions at any point
during the presentation!*

Virtual Collections and 3D Objects

- How does the experience of virtual reality or 3D objects differ from looking at a picture of the object?
- What could 3D objects contribute to virtual historical collections?

Example: Smithsonian 3D Digitization



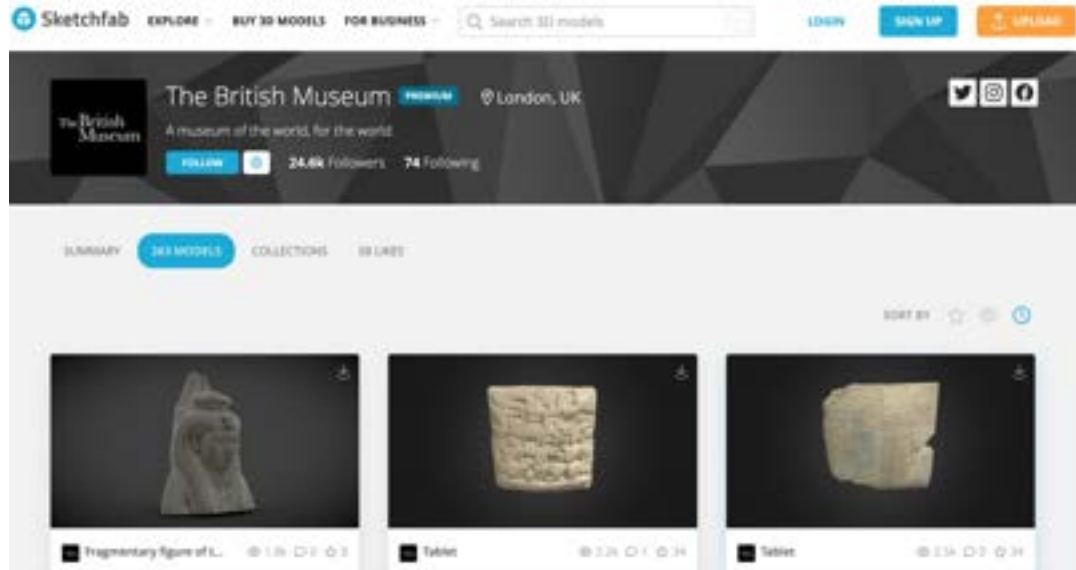
Tusk



Explore the Smithsonian's 3D digital content at <https://3d.si.edu/>

- What did you notice about the 3D models of these objects?

Example: The British Museum 3D Models



Explore the British Museum's 3D models at <https://sketchfab.com/britishmuseum/models>

- How do you think the 3D models augment the museums' collections?

Workshop agenda

- Objectives
- Introduction to Blender
 - What is this tool?
 - Important Vocab
 - Navigation
 - Editing an OBJ file in Blender
- Import, move, and manipulate an object in Blender

Slides, handouts, and data available at

<https://bit.ly/sp25-parr-hist7250-blender>

What is Blender?

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Definition

- Blender is a free and open source 3D creation suite.
- It supports the entirety of the 3D pipeline—modeling, rigging, animation, simulation, rendering, compositing and motion tracking, even video editing and game creation.
- It works equally well across operating systems - Linux, Windows, and Mac.
- It is supported by the Blender Foundation (2002)

Development

Blender is open source and run under a General Public License, meaning the public can change its code and distribute their own versions of the software.

Use

Blender can be used commercially by artists, by studios to make animation films or VFX, by game artists to work on commercial games, by scientists for research, and by students in educational institutions.

Important questions

Important questions to keep in mind as we move forward:

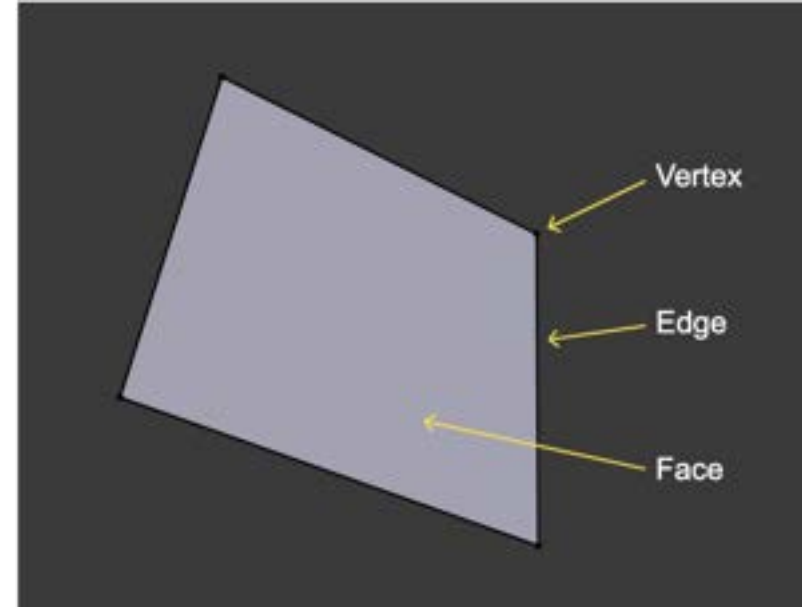
- Which object attributes are the most important to capture?
- What is the purpose of the 3D model? Who is the audience?

Important vocabulary (1/2)

- **Object**: “Container for a type (mesh, curve, surface, metaball, text, armature, lattice, empty, camera, light) and basic 3D transform data.”
- **Mesh**: “Type of object consisting of Vertices, Edges and Faces.”
- **Render**: “The process of computationally generating a 2D image from 3D geometry.”

Important vocabulary (2/2)

- **Vertex**: “A point in 3D space containing a location. Vertices are the terminating points of Edges.”
- **Edge**: “Straight segment (line) that connects two Vertices, and can be part of a Face.”
- **Face**: “Mesh element that defines a piece of surface. It consists of three or more Edges.”



“Example of mesh structure”

Installing Blender

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Installation Steps



Site:

www.blender.org/download/

Viewport & Navigation

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Viewport



Once you have installed Blender, and opened the application, you will see this screen.

It is called the “3D viewport.”

Click on any point and the open message will close.

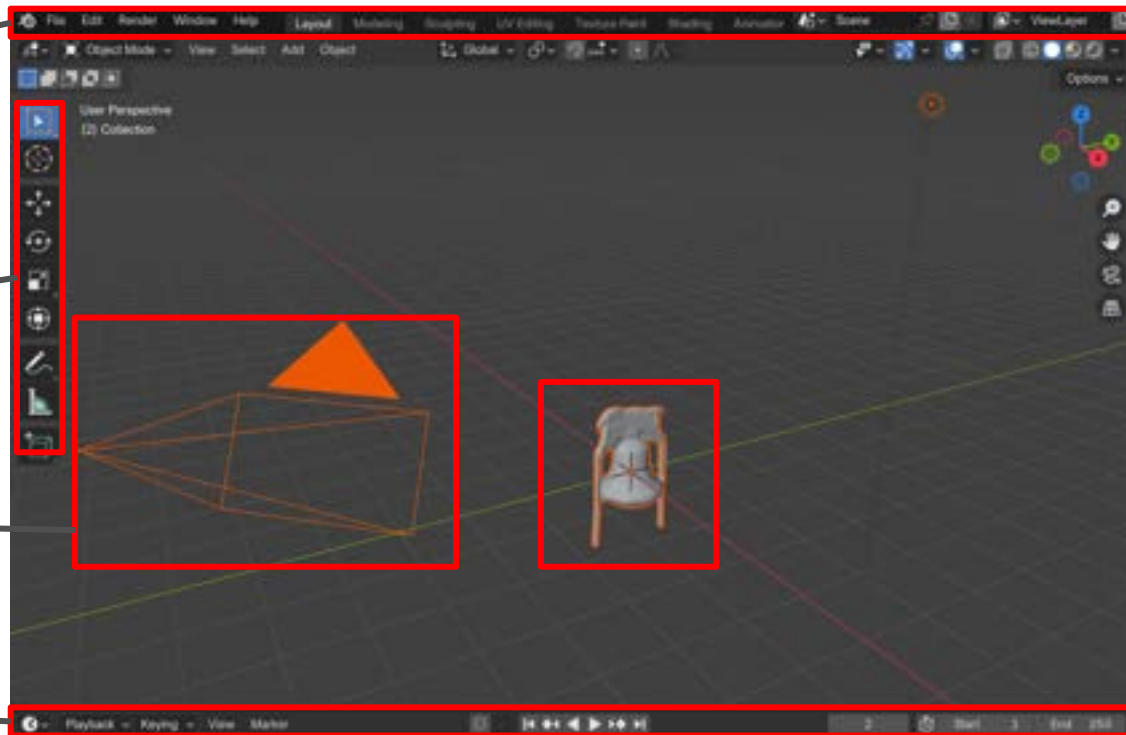
Viewport: Main Window (1/2)

Menu and
Workspace menu

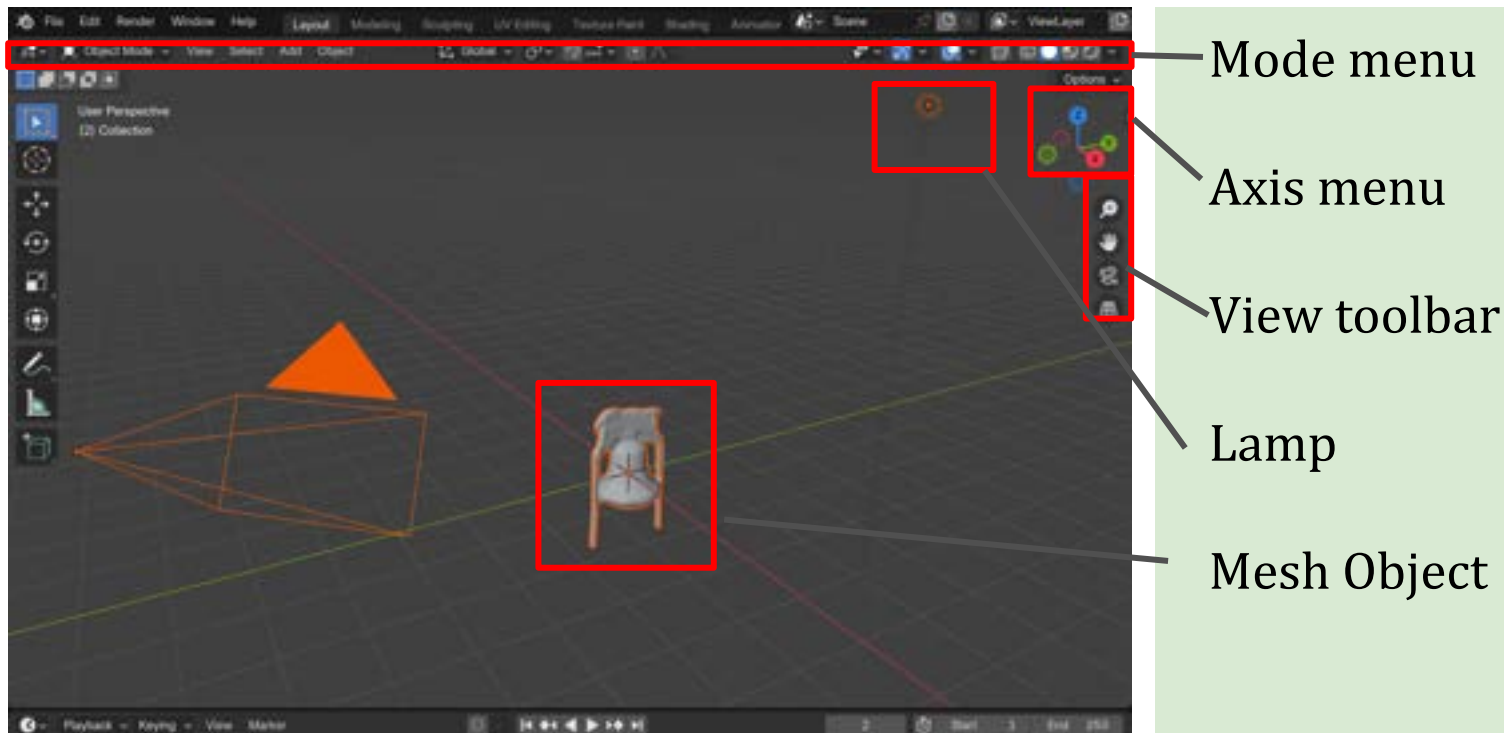
Function toolbar

Camera

Timeline



Viewport: Main Window (2/2)

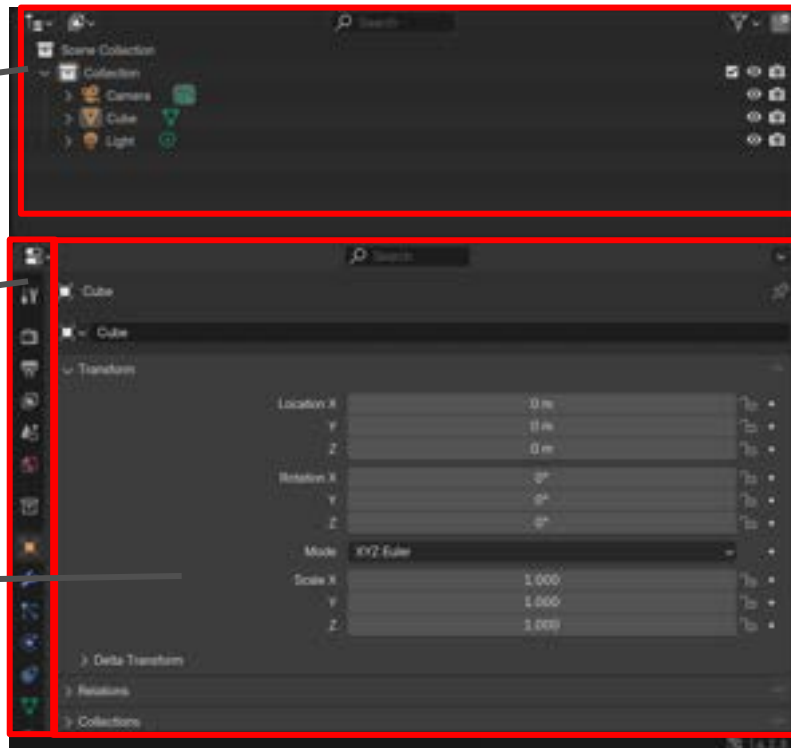


Viewport: Side Panel

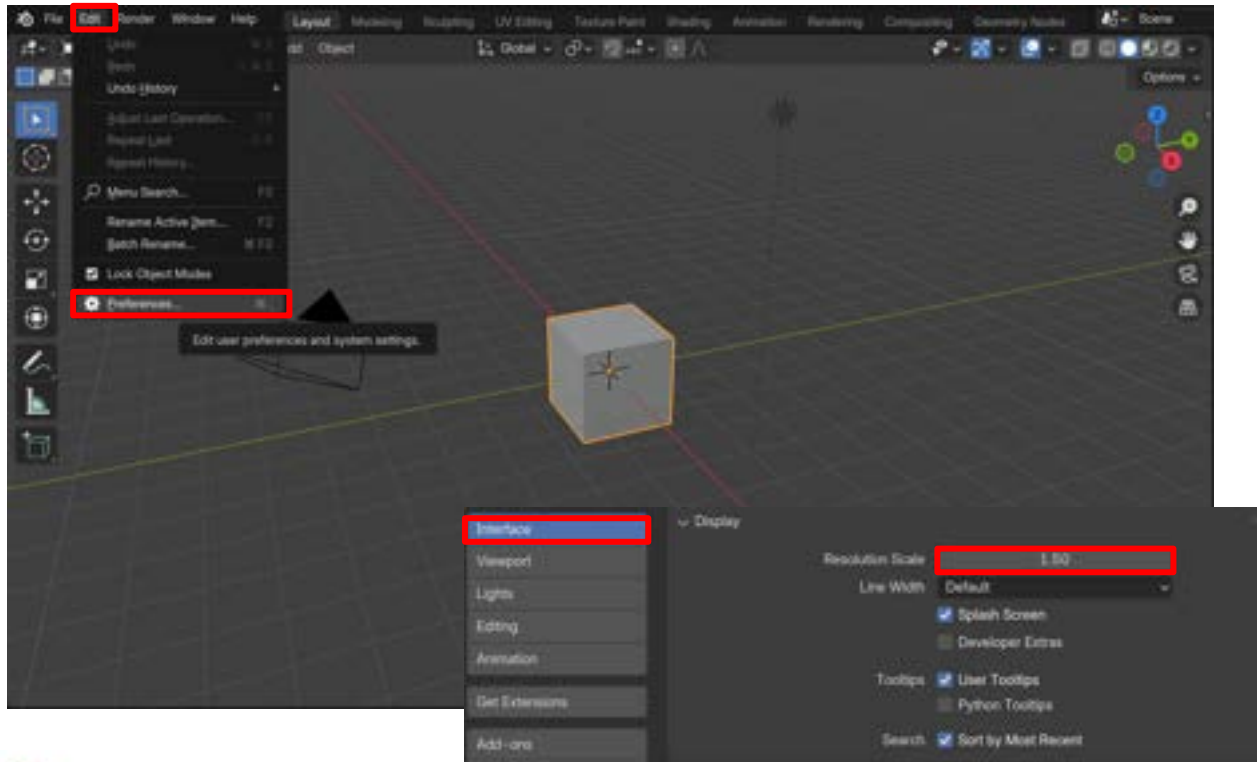
Scene Collection (all the items in the viewport at that particular time)

Editor type menu

Editor types including Properties, Materials etc.



Change Resolution



You can change how big the buttons are by going to Edit > Preferences > Interface > Resolution Scale.

Navigation: Zoom

If you have a mouse with a middle scroll button, you can scroll back and forth to zoom.

You can also use the magnifying glass button to zoom by pressing and holding the button with the left click button on your mouse, and moving your mouse back and forth.



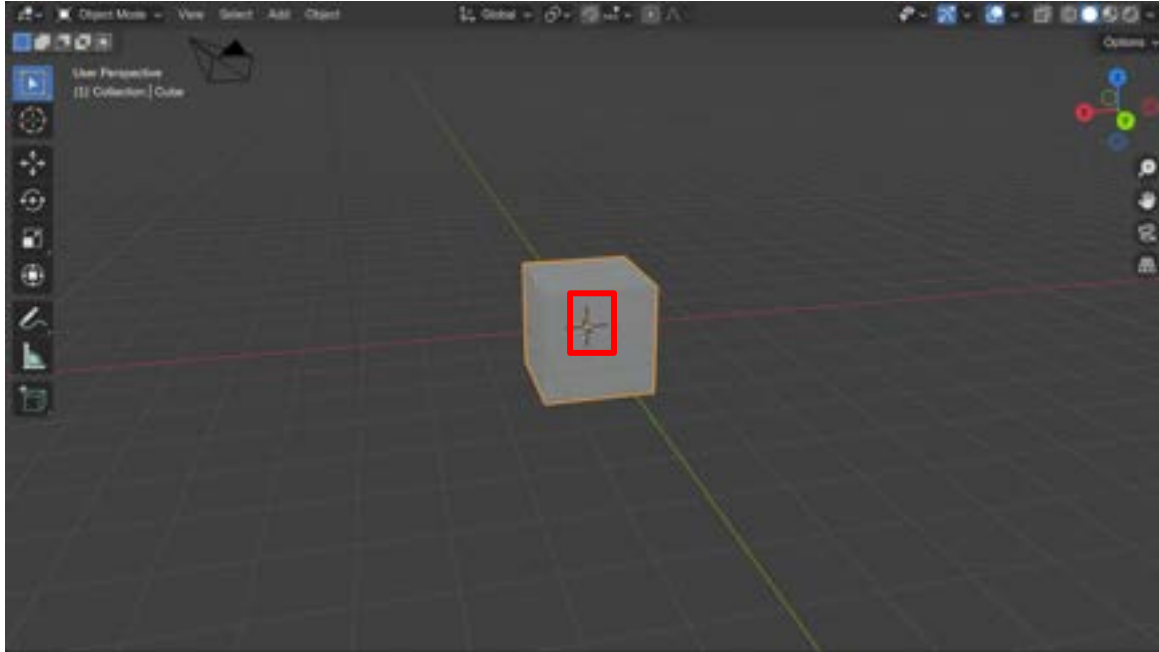
Navigation: Pan or Moving the View

If you have a mouse with a middle scroll button, you can press and hold the middle button while moving the mouse left to right to pan/move the view.

You can also use the hand button to pan by pressing and holding the button with the left click button on your mouse, and moving your mouse.



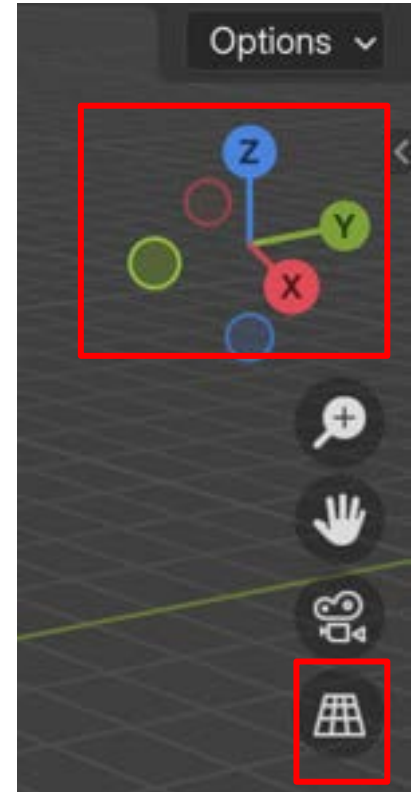
Navigation: Center Point



Each object has a center point which is the anchorpoint for any transformations we make on the object. The center point is the small orange point you see on the object.

Navigation: Ortho & Perspective Views

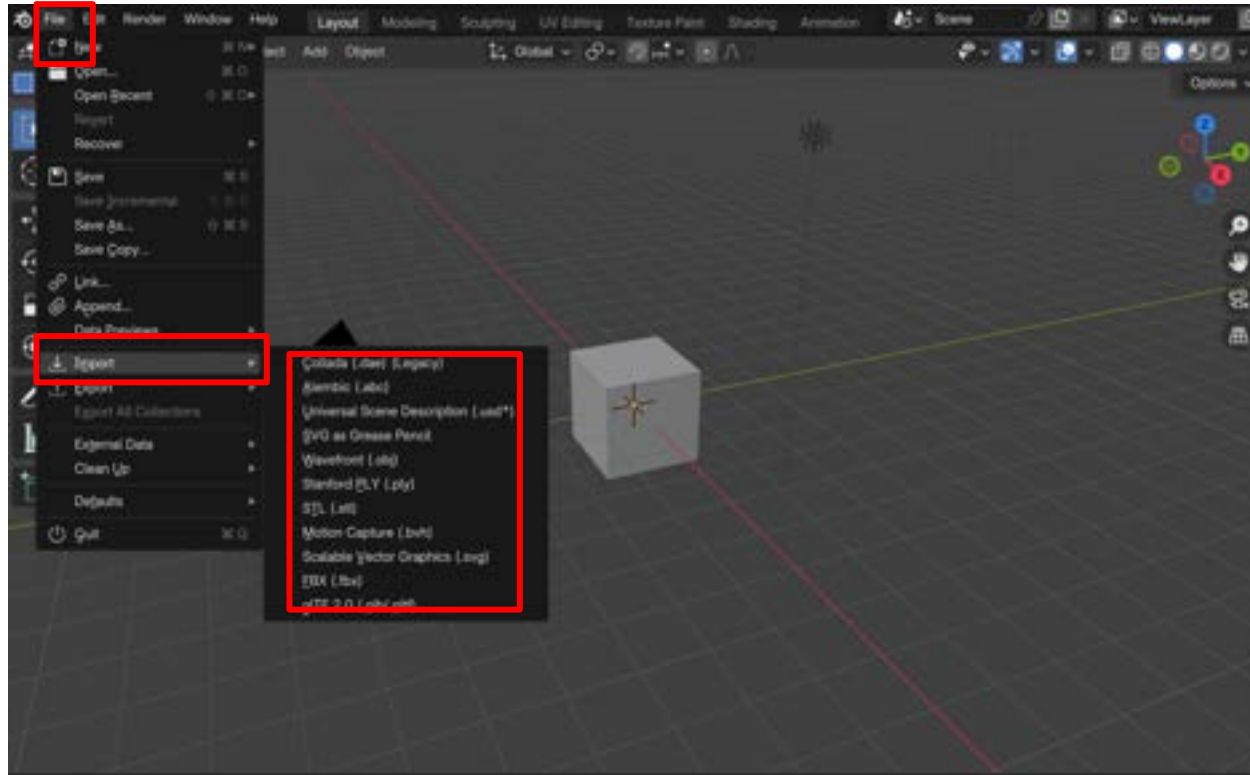
To switch between orthographic and perspective views, left click the grid button. You can also click on the axis keys (X, Y, or Z).



Object Mode

*Feel free to ask questions at any point
during the presentation!*

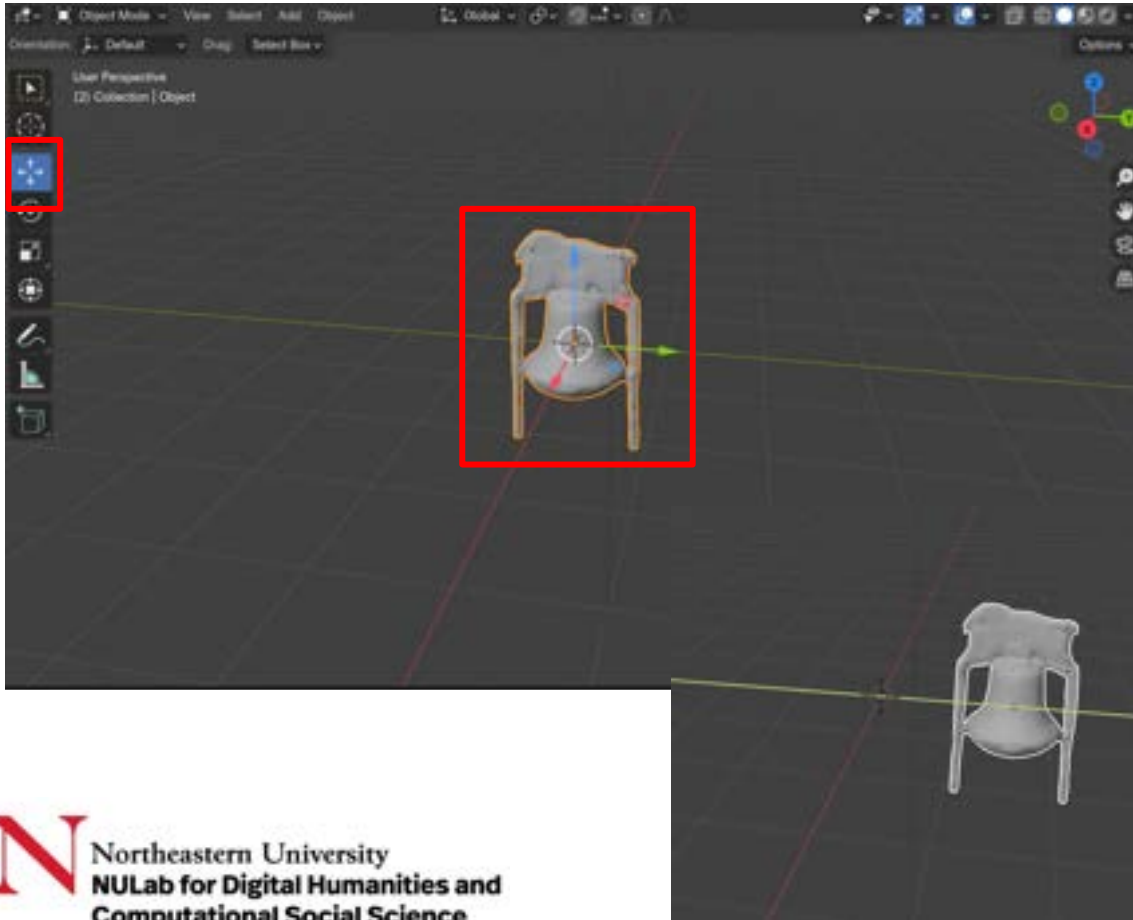
Function: Import File



You can import a file into the 3D environment by using the Import function.

In the toolbar, you can use the following dropdown menu: File -> Import

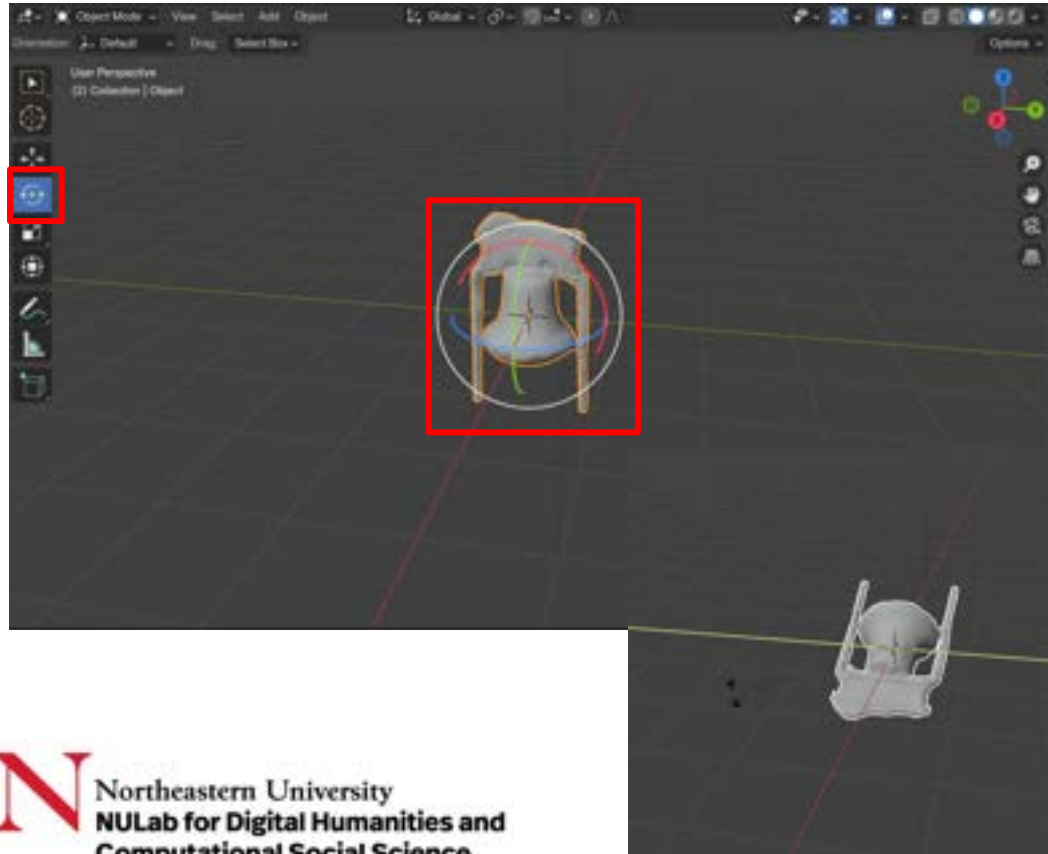
Moving: Grab Function



When you have an object selected, you can **grab** the object by using the 4-directional arrow button.

You can also grab objects along a plane axis by hitting the Letter G key and then the letter key that corresponds to the axis you would like to move the object along.

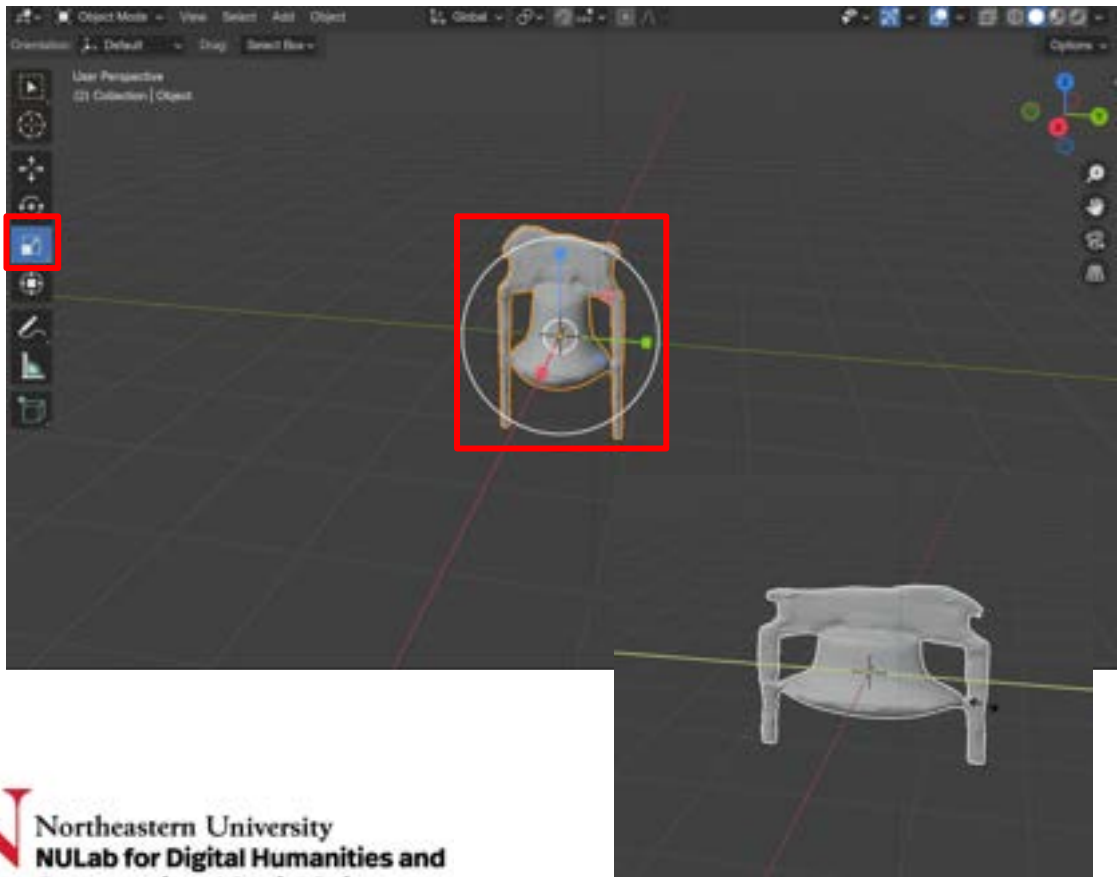
Moving: Rotate Function



When you have an object selected, you can **rotate** the object by using the anti-clockwise arrow button.

You can also rotate objects along a plane axis by hitting the Letter R key and then the letter key that corresponds to the axis you would like to rotate the object on.

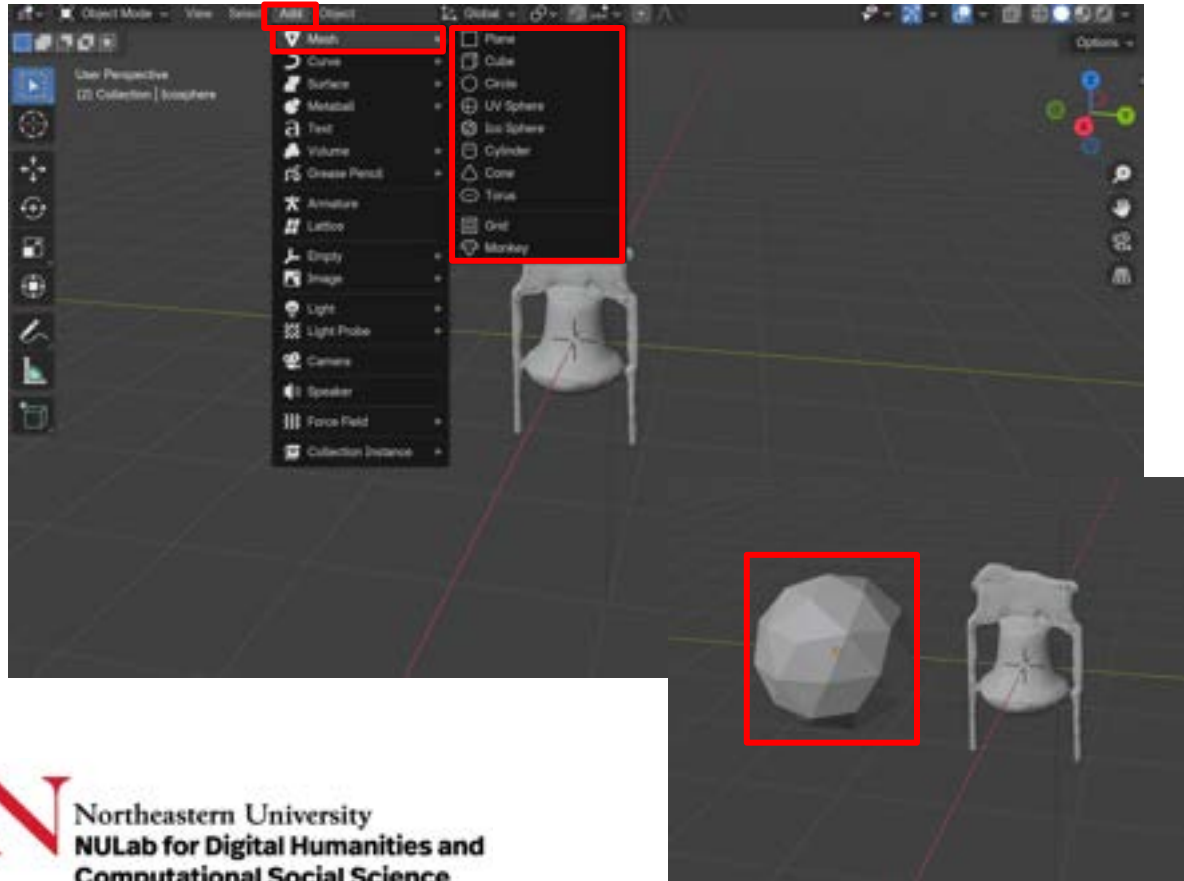
Moving: Scale Function



When you have an object selected, you can **scale** the object by using the square and outward arrow button.

You can also scale objects along a plane axis by hitting the Letter S key and then the letter key that corresponds to the axis you would like to rotate the object on.

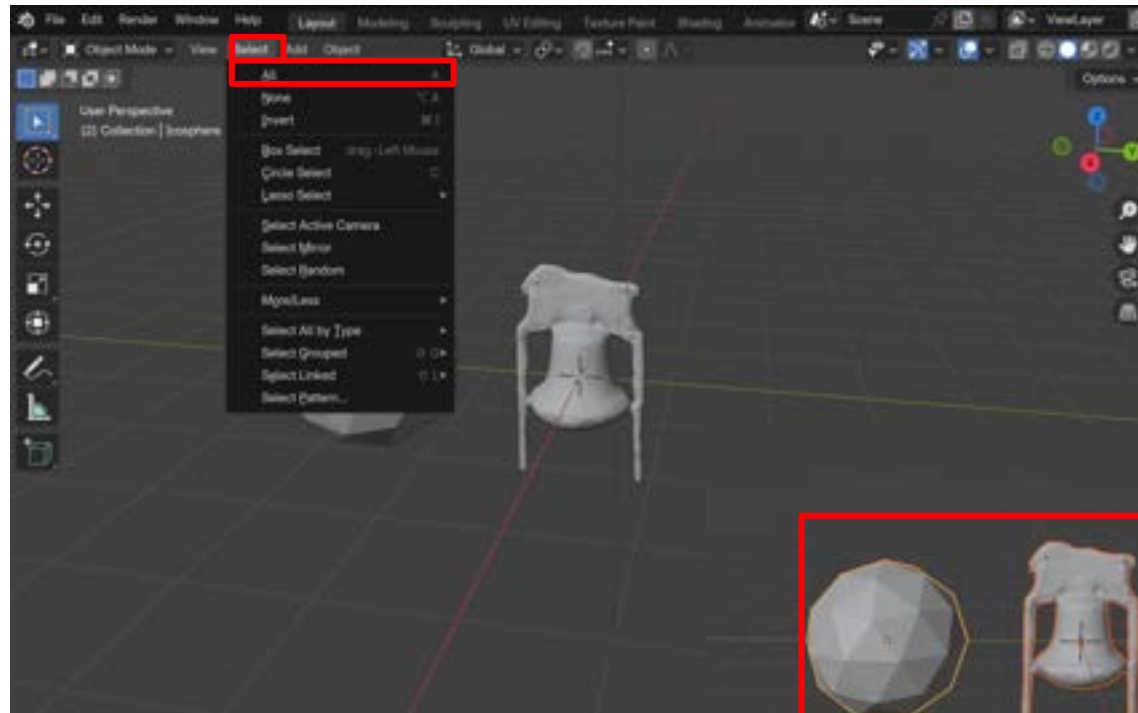
Adding New Objects



You can add a new object to the environment by using the Add -> Mesh menu in the toolbar. You can select a basic form that closely matches your desired outcome.

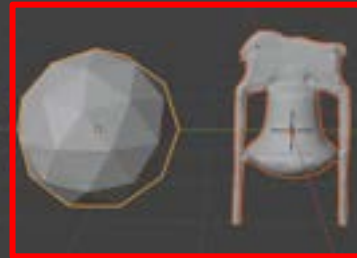
Shortcut is Shift + Letter A keys.

Function: Select All



To select all the objects in the environments, use the Select -> All dropdown in the tool bar.

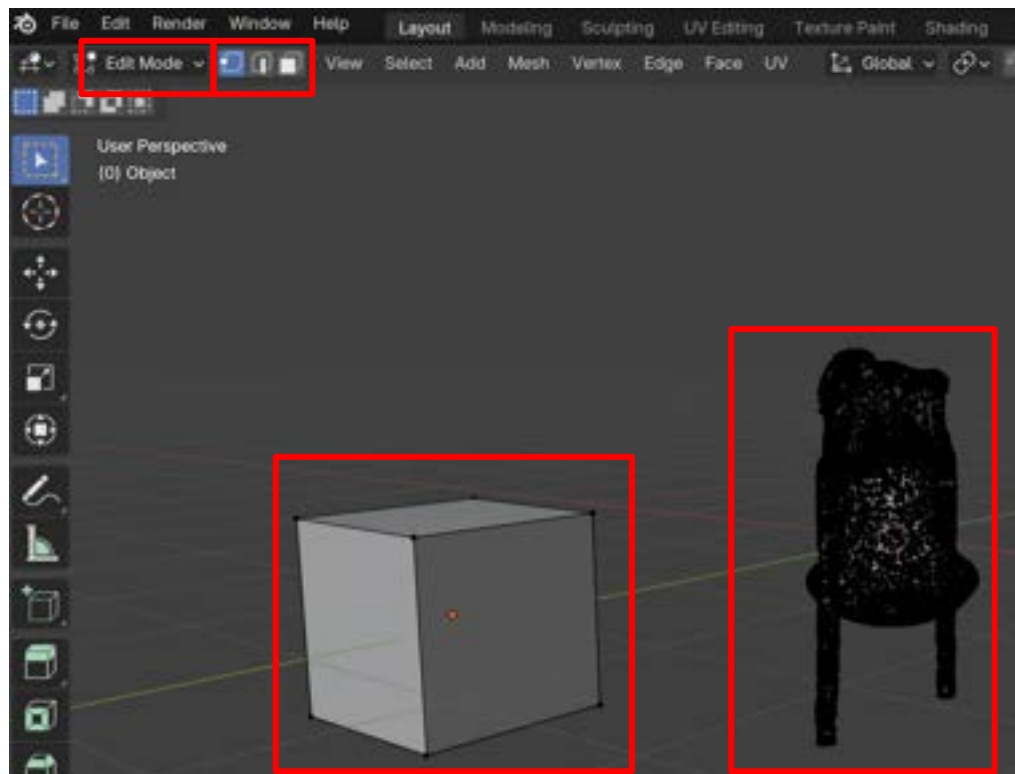
The shortcut is the Letter A key.



Edit Mode

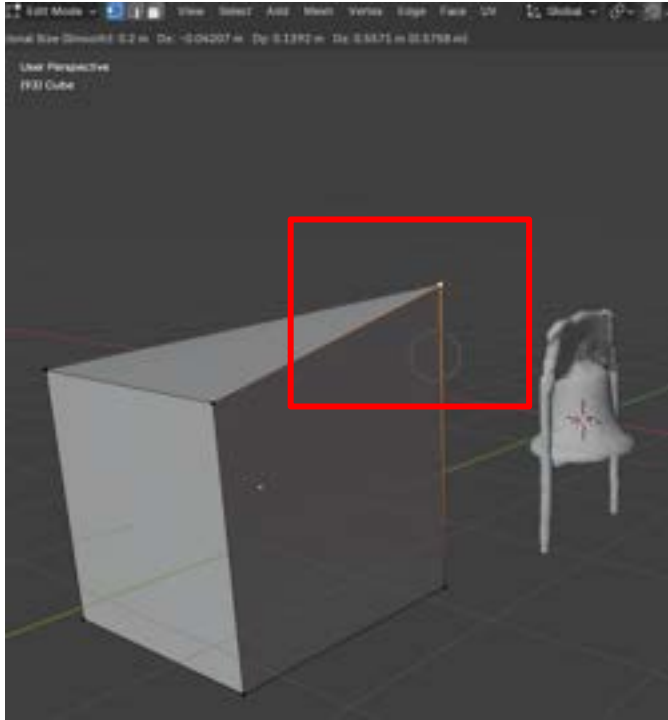
*Feel free to ask questions at any point
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Edit Mode Introduction



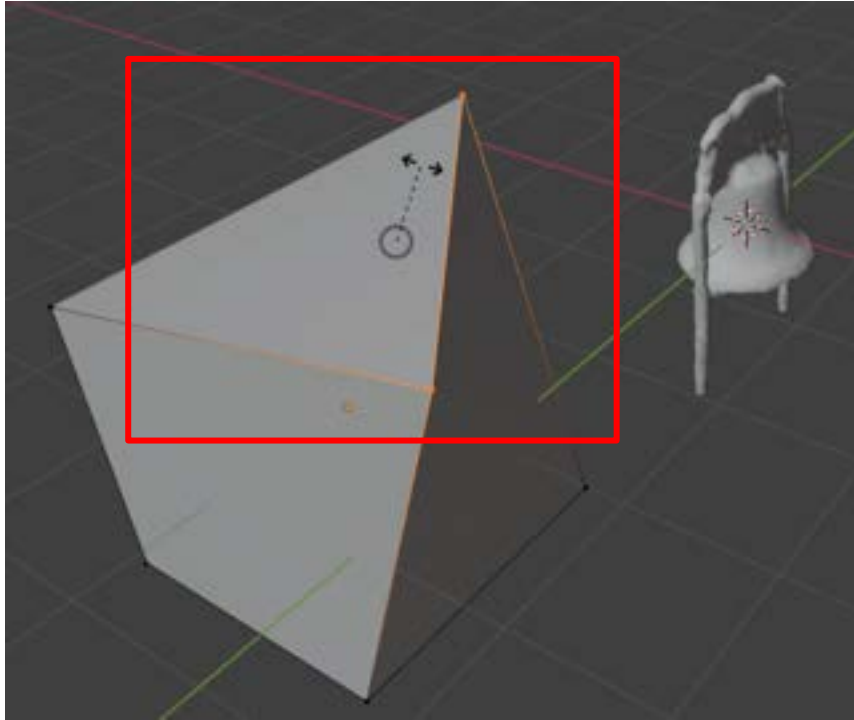
Objects are composed of a mesh of vertices. Edit mode allows you to see and edit those vertices. Select modes (to the right of edit mode) allow you to select individual vertices, connections between vertices, or whole faces of vertices for editing.

Vertices: Grab Function



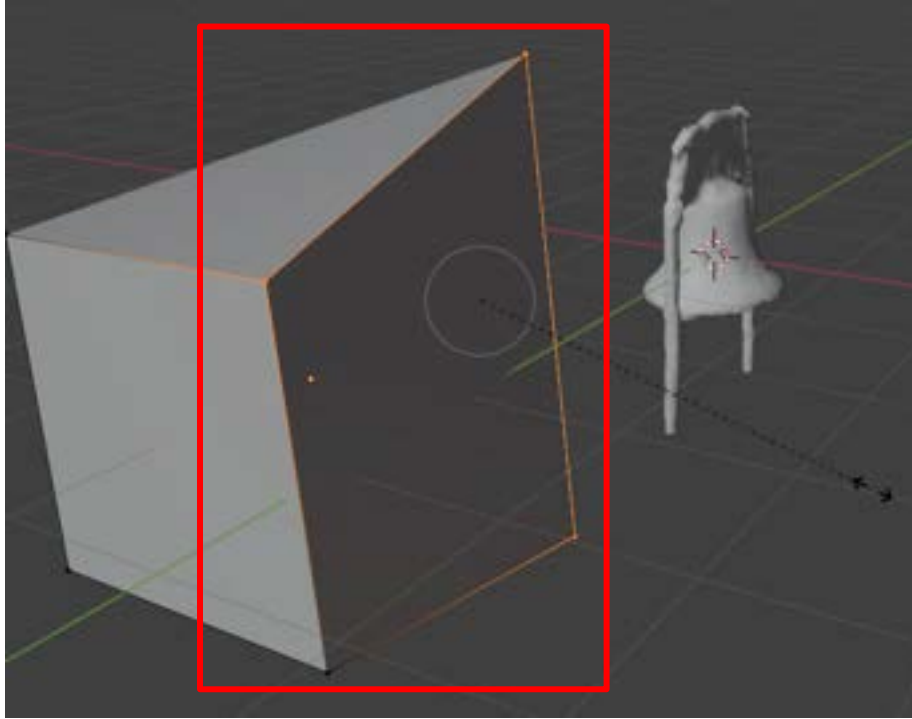
To move a vertex or group of vertices, click on the vertices and click G. This will allow you to move the selected vertices. To confirm the movement, click again with your mouse.

Vertices: Rotate Function



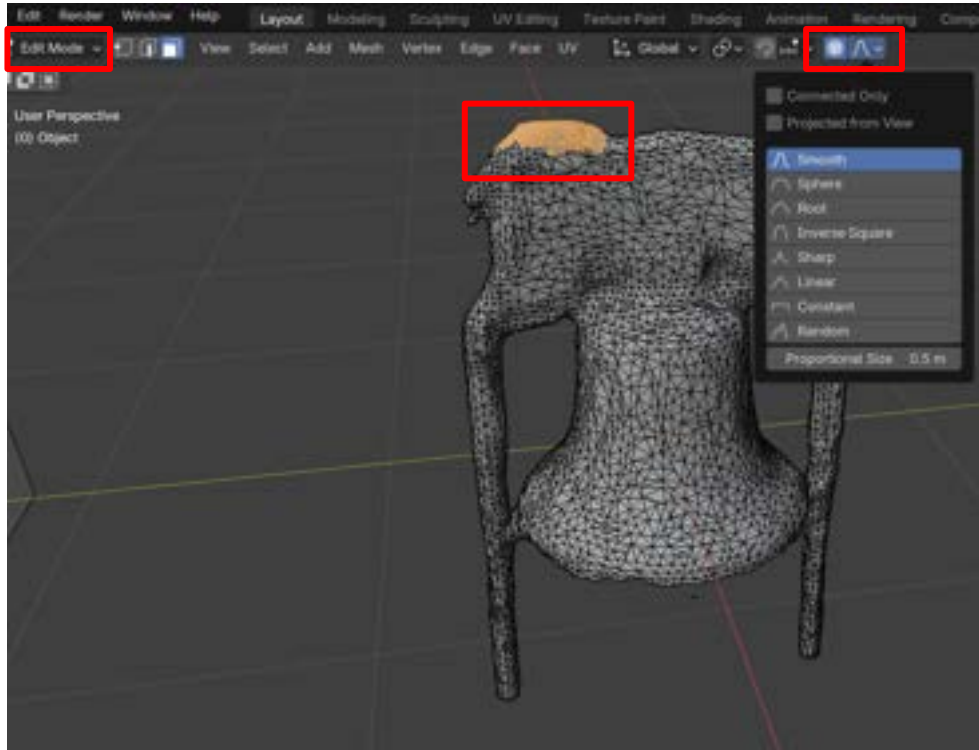
To rotate a vertex or group of vertices, click on the vertices and click R. This will allow you to rotate the selected vertices. To confirm the rotation, click again with your mouse.

Vertices: Scale Function



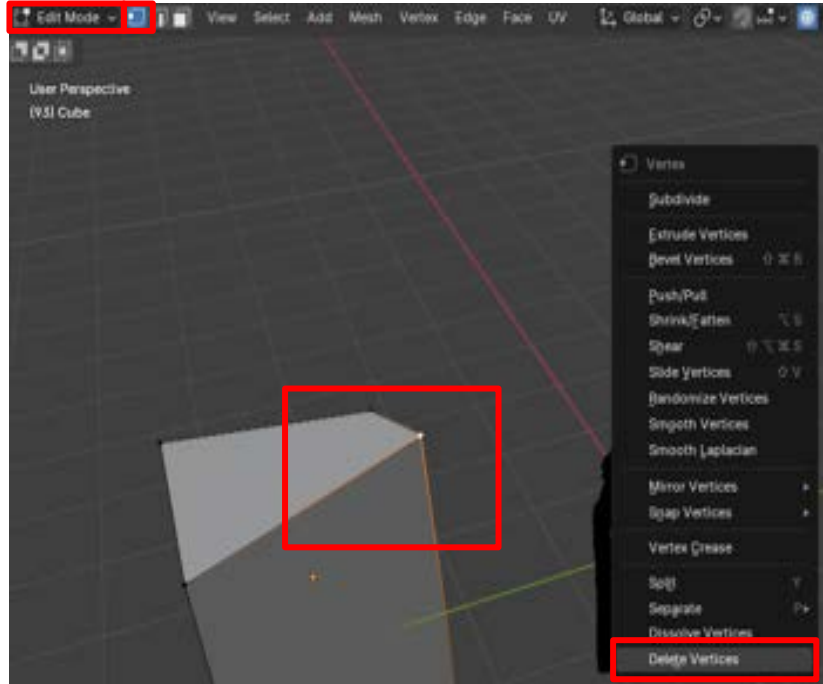
To scale a vertex or group of vertices, click on the vertices and click S. This will allow you to scale the selected vertices. To confirm the scaling, click again with your mouse.

Vertices: Proportional Edit

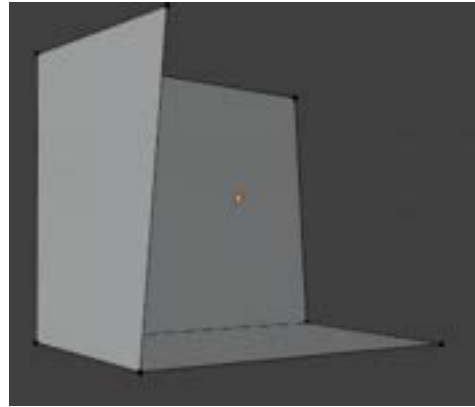


To create smoother adjustments to objects you can use proportional editing. Select Proportional Editing (represented by a circle) then select the vertices and make your edits.

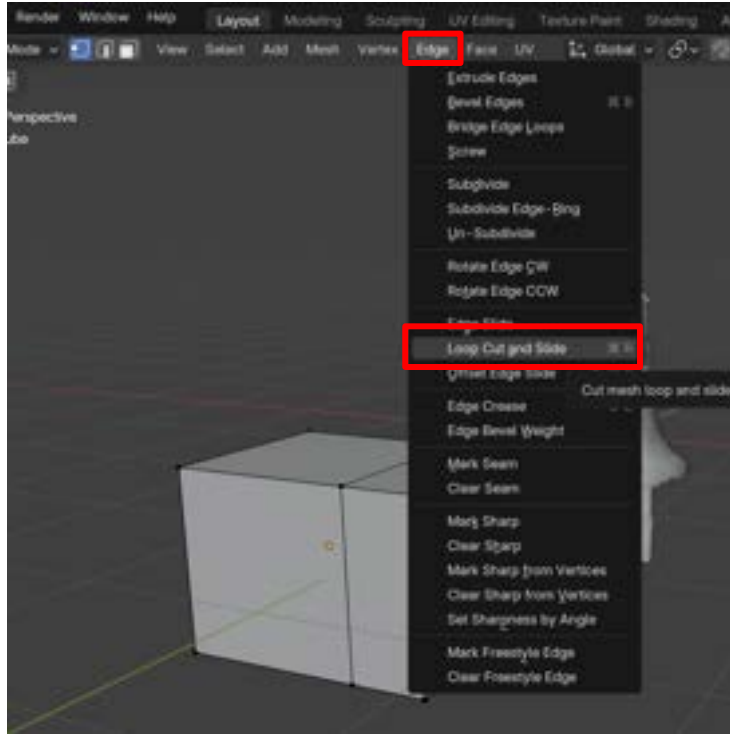
Vertices: Delete



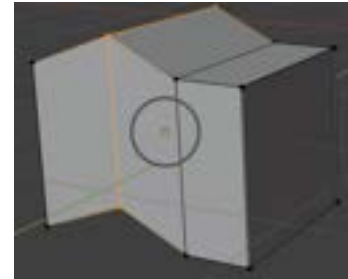
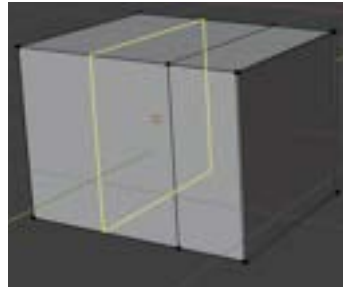
To delete vertices on an object go to Edit Mode and select vertices. Then left click and select Delete Vertices



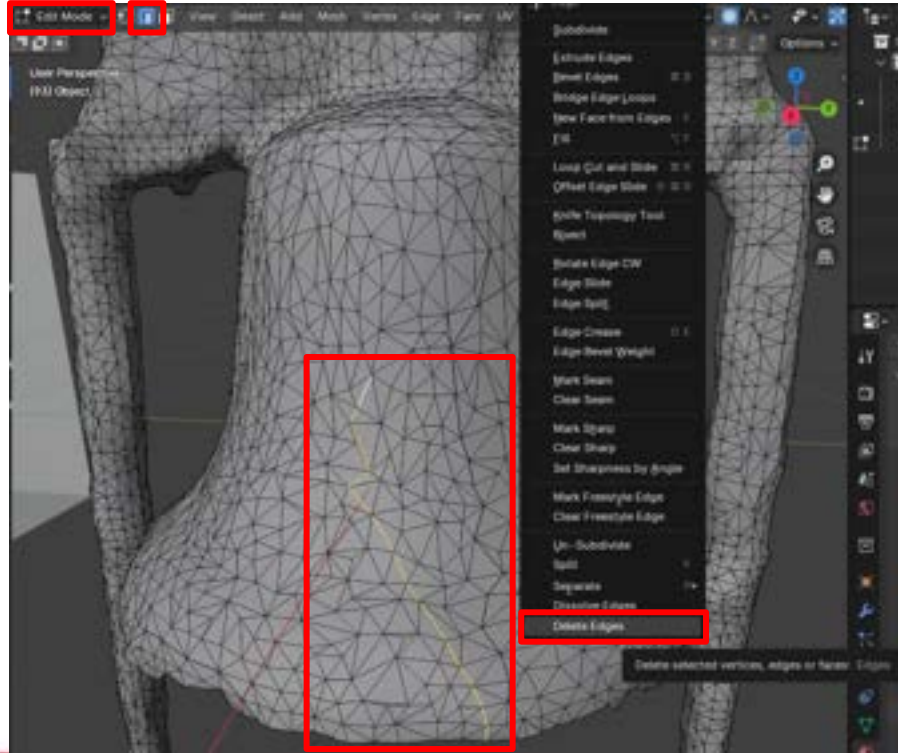
Vertices: Loop Cuts



To insert a new edge loop, go to Edge > Loop Cut and Slide while in Edit Mode. This creates more vertices you can use to edit your object.

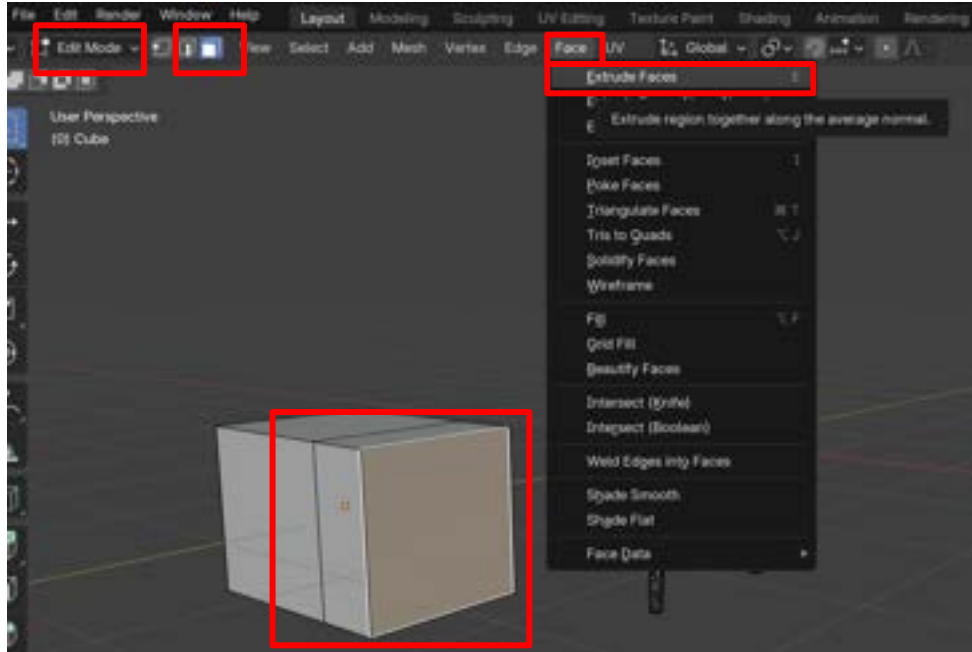


Edges: Delete



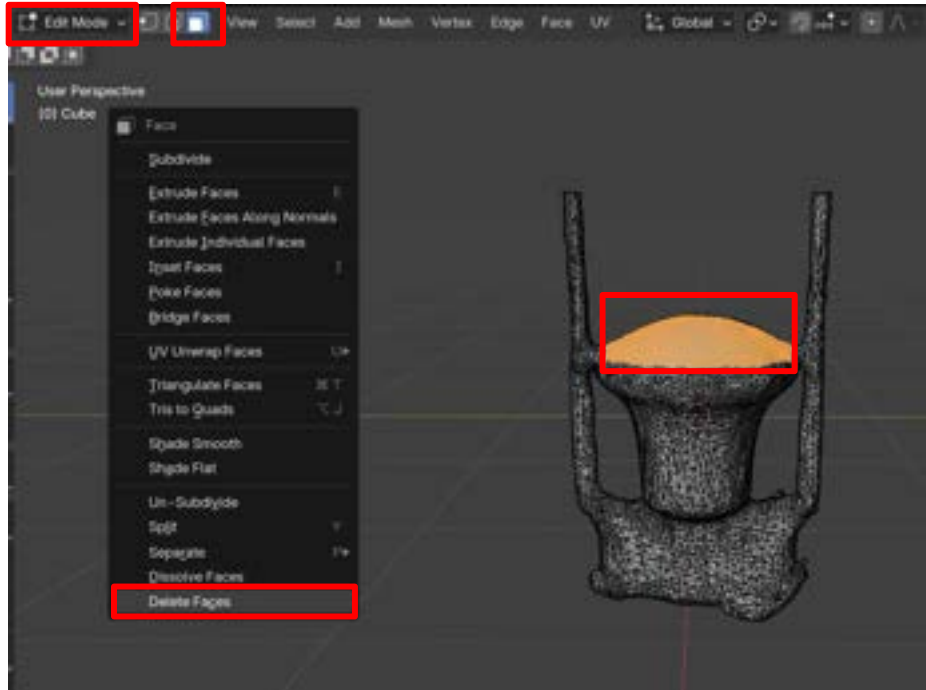
To delete edges on an object go to Edit Mode and select edges. Then left click and select Delete Edges.

Faces: Extrude



In Edit Mode, click the Face Select mode. Then select Face > Extrude Faces and move your cursor to change the selected face's extrusion, click to confirm the change.

Faces: Delete

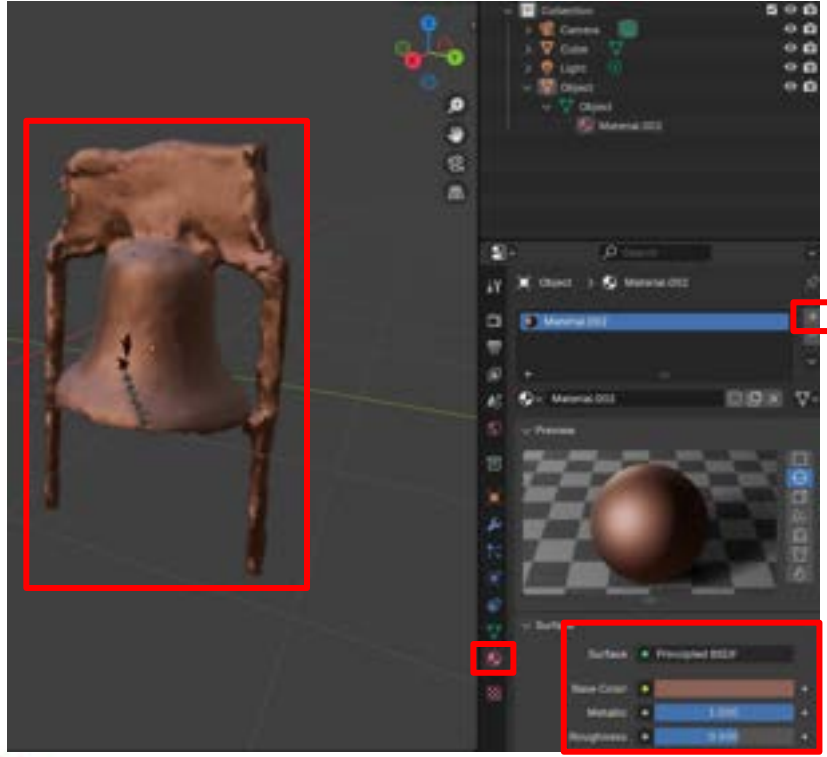


To delete faces on an object go to Edit Mode and select faces. Then left click and select Delete Faces

Materials

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Changing Surface Appearance

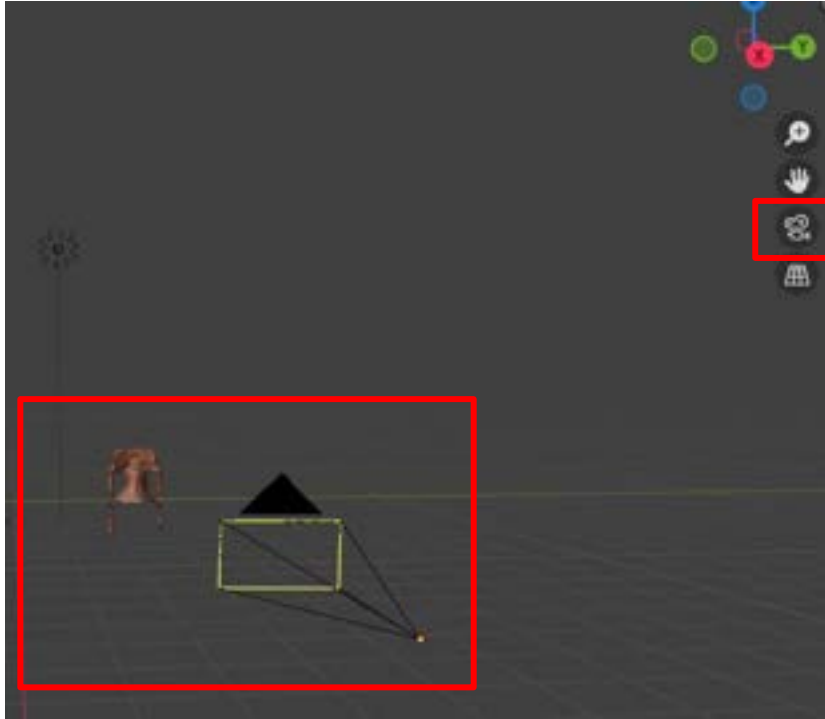


To change surface material go to Object Mode and select the object. Then go to the Material Properties panel. Add a material using the '+' button and select its Base Color and its metallic and roughness levels.

Rendering

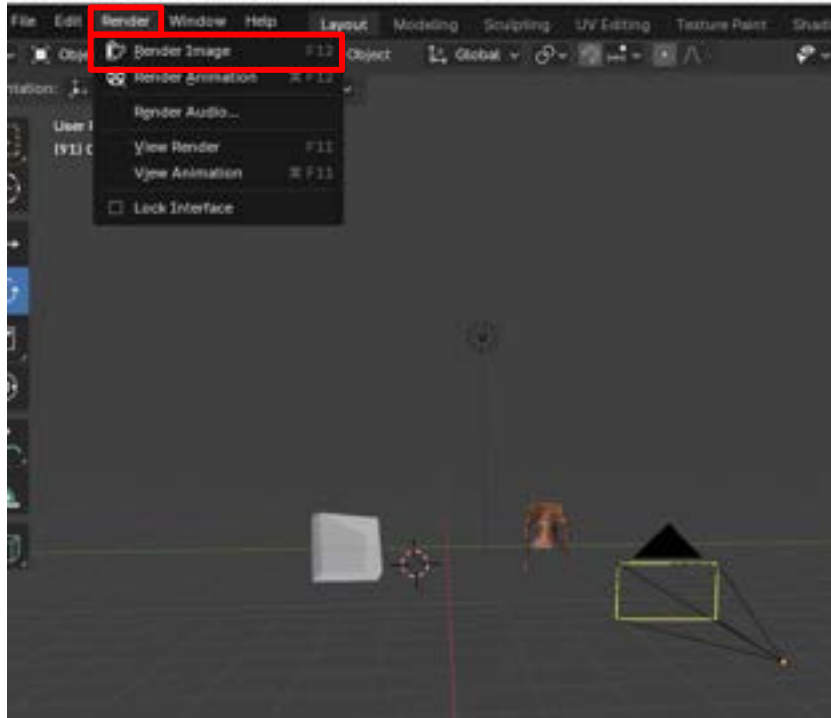
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Align the Camera



Align the camera so that it is pointed at the object. You can use the camera button on the right to check alignment.

Render the Image



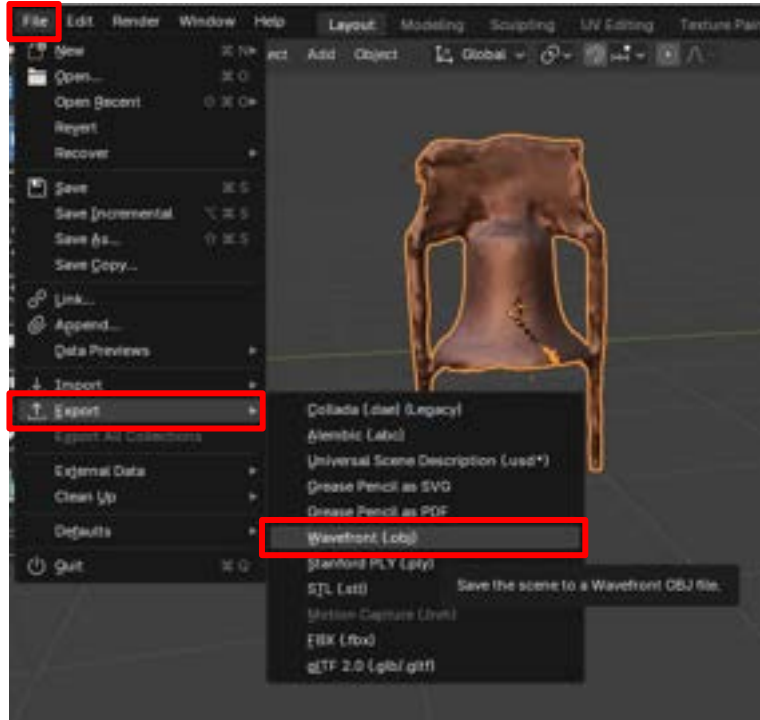
Select Render and then Render Image.



Export

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Export as OBJ



To export your scene as a OBJ file go to File > Export > Wavefront (.obj)

Your turn!

Try out the below:

- Import an object file
- Move and edit the object
- Edit the object vertices
- Change the surface color of the object
- Export the object

Post-exploration group discussion

- What did you notice while you explored the functions in Blender?
- What functions were weird/tricky?
- How might you use 3D modeling in the future?

Thank you!

—Developed by Halima Haruna and Sara Morrell

- For more information on the DITI, please see: <https://bit.ly/diti-about>
- Schedule an appointment with us! <https://bit.ly/diti-meeting>
- If you have any questions, contact us at: nulab.info@gmail.com
- We'd love your feedback! Please fill out a short survey here: <https://bit.ly/diti-feedback>