**Blender: Modelling Tools, Tips & Tricks**

Note: Use this while modelling your Household Object!

**Step-By-Step Process: UV Unwrapping**

Add Your Texture Image as a Material

1. Make sure that your render engine is set to Cycles (not Blender Render)
2. Add a new Material
3. Click the Use Nodes button if it appears (if it does not, that means it is already selected)
4. Under Surface, click the small circle button beside Color
5. Select Image Texture from the pop-up menu
6. Click the Open button that appears
7. Navigate through the files on your computer to find your texture, click the file to select it, then press Open Image

Mark the Seams on Your Object

1. Switch to Edit Mode
2. Make sure that Edge Select is set as your selection method (in the panel at the bottom)
3. Select the edges of your object that you want to mark as seams (hold Shift to select multiple)
4. Press Ctrl + E, then Mark Seam (or Meshes > Edges > Mark Seam)

Unwrap Your Object

1. Stay in Edit Mode
2. Make sure that your entire object is selected (press A to select all)
3. Press U, then Unwrap (or Mesh > UV Unwrap > Unwrap)

Apply the Material in the UV Editor Window

1. Open the UV Editor Window by selecting UV Editing from the Screen Selection drop-down at the top of the 3D View window
2. Click the Browse Image to be Linked icon (looks like a sunset) and select the image you added as a Material from the pop-up menu
3. In the same Panel as the Browse Image to be Linked icon, move 6 buttons over and click the Keep UV and Edit Mode… button (looks like a cube, 2 vertices, and a mouse arrow). This will open up the Selection Type menu. Choose Face Select.
4. You can now interact with the separate faces in your UV Editor, just like you would in your 3D View. You can select (right-click), grab/move (G), rotate (R), or scale (S).

Close the UV Editor Window

1. Open the Default Window by selecting Default from the Screen Selection drop-down at the top of the 3D View window

**Step-By-Step Process: Free (aka polygon-by-polygon) Modeling**

1. Create a Plane object (Create > Mesh > Plane)
2. Change from Object to Edit Mode
3. Make sure the entire Plane object is selected, then press X (to delete) > Vertices
4. Press Ctrl + LMB to add a new vertex to this weird, empty object
5. Press Ctrl + LMB to add new vertices – they will automatically be connected by an edge

**Random Shortcut Keys**

* Tab key Toggle between Object and Edit Mode
* ESC key Cancel a transformation before you click to apply it
* A key Select/deselect all objects (object mode), vertices/edges/faces (edit mode)
* Shift + A Add/create mesh object
* B key Use Box Select to select multiple vertices
* Ctrl + RMB Use Freeform Select (and drag) to select multiple vertices
* P key Separate objects/parts of objects from one another (while both are selected)
* Shift + C Align 3D cursor at center

**Object Mode: Tools (Tool Panel or Mesh Button, at bottom of screen)**

* Duplicate Shift + D (then drag) Edit > Duplicate
* Delete X (then ok) Edit > Delete
* Smooth/Flat N/A Shading > Smooth/Flat

**Editing Mode: Mesh Tools (Tool Panel)**

* Extrude E (after selection) Add > Extrude Region
  + *While extruding (after pressing E), you may press S/R/G to transform your extrusion*
* Inset Faces I (after face selection) Add > Inset Faces
  + *Drag inwards to inset, and outwards to outset*
* Merge Vertices Alt + M (after selection) Mesh > Vertices > Merge
  + *You may merge multiple vertices into a single vertex in various locations (at center of vertices, at first vertex selected, at last vertex selected, at cursor – where the 3D cursor is currently located)*
* F (after selection) Add > Make Edge/Face
  + *Select the vertices surrounding the area to which you want to add an edge*
* Make Face F (after selection) Add > Make Edge/Face
  + *Select the edges surrounding the area to which you want to add a face*
* Subdivide N/A Add > Subdivide
  + *Select an edge/face, then Subdivide to create more vertices/edges/faces within*
* Edge Loops Alt + RMB (to select) Mesh > Edges > Edge Loops
  + *Once you select a vertex/edge/face, all vertices/edges/faces that are connected to the item from end-to-end will be selected*
  + *Hold down Alt + Shift + RMB (to select) to add to an existing selection*
* Edge Slide Ctrl + E > Edge Slide Mesh > Edges > Edge Slide
  + *Slide group of edge loops up/down a your model*
* Loop Cut & Slide Ctrl + R Add > Loop Cut & Slide
  + *Apply loop cut to model by clicking, then sliding into position, then hitting Enter*
* [Spin](https://www.youtube.com/watch?v=josd8aVbAiA) Alt + R Add > Spin
  + *Select all vertices you would like to spin, then adjust settings in the Spin Properties*
  + *Good for working with lines, rather than meshes*
  + *Good for creating custom cups, vases, etc. that require identical modelling 360◦*
  + *Make sure to select entire object and click “Remove Doubles” to erase extra vertices & seal object*
* Knife K (prior to selection) Add > Knife
  + Used for creating custom cuts, which will create custom edges
* Bisect N/A Add > Bisect
  + *Used for dividing edges/faces symmetrically*

**Step-By-Step Process: Proportional Editing in Edit Mode**

1. Turn on [Proportional Editing](https://www.blender.org/manual/editors/3dview/transform/transform_control/proportional_edit.html) by clicking the Proportional Editing button (looks like a tiny donut) on the bottom of the 3D View menu, then selecting Enable
2. By default, the falloff type is set to Smooth (most commonly used). You can change the type by clicking on the Falloff type button to the right of the Proportional Editing button.
3. Click on a vertex/edge/face and drag. The vertices/edges/faces surrounding it will move, as well

**Step-By-Step Process: Joining Separate Objects Together into 1 Model**

The Simple Way

\*Note: Joining your objects using this method works fine for Rendering purposes (basically it just allows you to move and edit your entire object – it is not a true joining of polygons).

1. Shift + Click (to select) all the objects you want to join.
2. Press Ctrl + J on your keyboard

The Boolean Way

\*Note: Joining your objects using this method works well for 3D Printing, since it allows you to hollow out your object so that you can apply added thickness without compromising your model’s integrity (structure, thickness, and “waterproofness”). This is also a great way of reducing the size of your model, since it allows you to get rid of any polygons that are not outwardly visible.

1. Position the two objects so that they are intersecting with one another. Make sure both are selected.
2. Add a Boolean Modifier.
3. Change the Operation to Union.
4. From the Object drop-down menu, choose the object that is not part of your primary selection (it will be highlighted in light, rather than dark, orange) that you want to join with the currently selected object.
5. Hit Apply to apply the modifier.
6. The objects should have now become unionized. Pull them upwards to reveal the original joined shape below. You can now delete this original shape, since it was only used as a template for your union.

\*Fun Fact: You can also use the Boolean Modifier to cut shapes into the objects within your model. To do this, simply utilize the Operation: Difference option.

The Merging Way *(happens after two objects have been joined, but are not fully touching)*

\*Note: Merging and Bridging are the only true way to join objects together, since this is the only way to make your object predictable and manifold (watertight). Merging is the best method to use if you’d like to join two objects together, but it takes significantly more time than the other three methods. Merging vertices allows you to select two vertices and turn them into a single vertex, connecting the two objects at the centermost point. Though for this method you need to join each set of (2) vertices individually, it will create a smoother join, overall. To merge the vertices of two objects together, you must make sure each loop has the same number of edges/vertices.

1. Make sure the two objects you want to align are lined up with one another, and almost touching, and that their outer edge loops have the same number of edges/vertices.
2. In Edit Mode, Shift + click to select the two vertices you would like to merge (one from one object’s outer loop, and one from the other object’s outer loop).
3. Select Mesh > Vertices > Merge > At Center (or Alt + M > At Center).
4. Rinse and repeat.

The Bridging Way

\*Note: Merging and Bridging are the only true way to join objects together, since this is the only way to make your object predictable and manifold (watertight). Bridging is a good method to use if you would like to merge two objects together quickly, by selecting the outermost edge loop on each object in Edit Mode (for example, if you want to connect a hand you modelled separately to the wrist of your base model, or a head to a neck). Bridging brings these two objects together by creating a loop of faces between the edge loops. This method is imperfect, and may require some point pulling to make the merge look natural. In order to bridge two edge loops, you must make sure that each loop has the same number of edges/vertices.

1. Make sure the two objects you want to align are lined up with one another, and almost touching, and that their outer edge loops have the same number of edges/vertices.
2. In Edit Mode and Edge Select Mode, Alt + Click to select the outermost edge loop of one object, then Shift + Alt + Click to add the outermost edge loop of the other object to the selection.
3. Mesh > Edges (Ctrl + E) > Bridge Edge Loops.
4. This will create small faces to bridge the gap between each loop of edges ☺