

REU Modeling Course - Part I

Blender

Program Introduction



Workshop Workflow

- **Compare/Introduce CAD Programs and Purposes**
- **Blender Interface**
- **Creating/Experimenting With Polygonal Models**
- **Today's Mini Creation**

“Flavors”

Digital Product Design (DPD)

Concept Design
Marketing
Engineering
Manufacturing

VRAC

Free-Form Modeling

Design and Modeling
Rendering and Animation

Other Visualization Format

Exchange/Conversion
Post Processing

CAD

**Free-Form
Modeling**

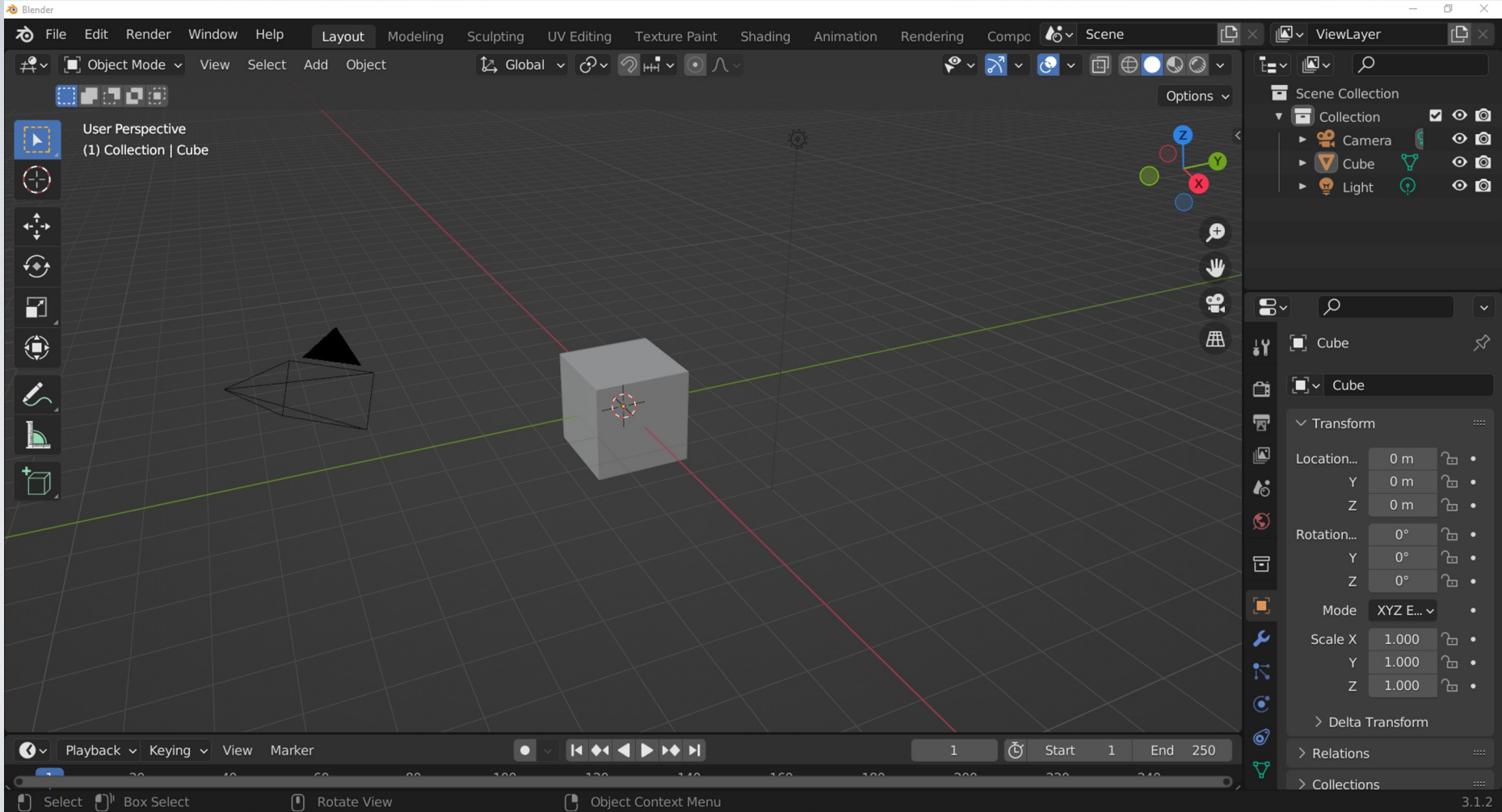
- **Design and Modeling**
 - **Direct modeling**
- **Scene Rendering and Animation**
 - **Examples:**
 - **Cinema 4D**
 - **3DS Max**
 - **Blender**
 - **Rhinoceros 3D**

“Other” Free-Form Modeling

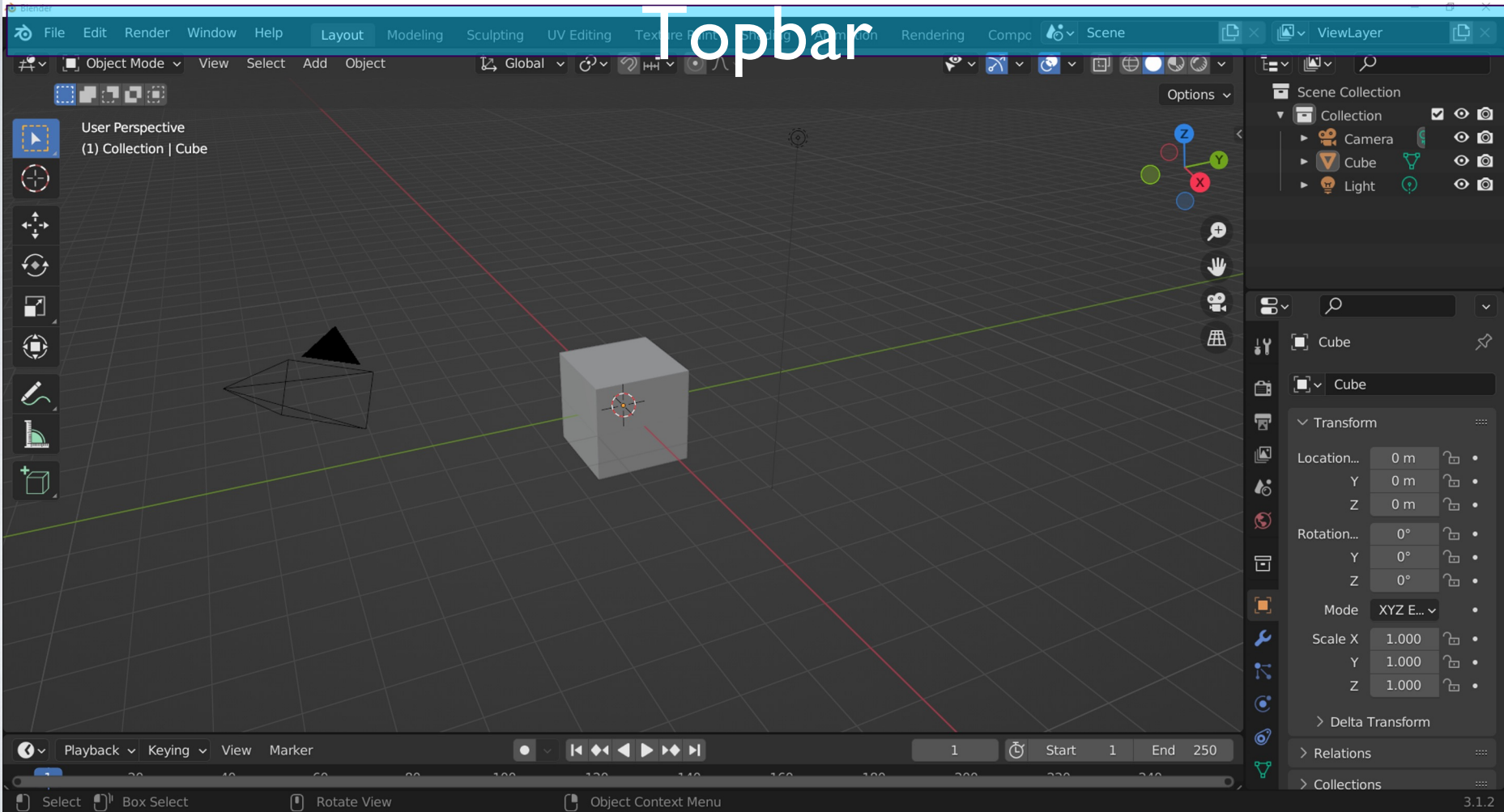
Other
Visualization
Format

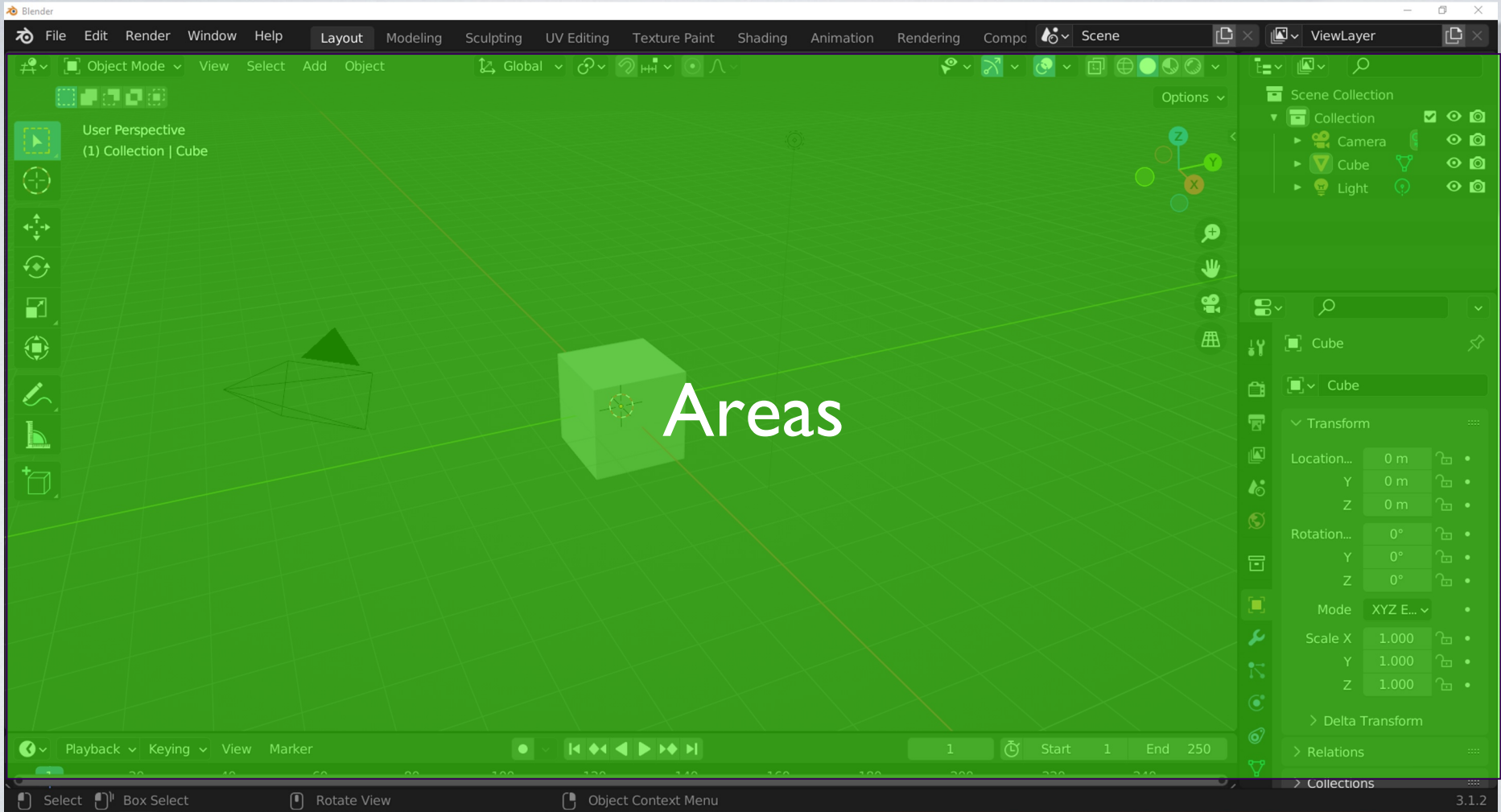
- **Conceptual Design:** ASDS, SpaceClaim
- **Visualization:** OpenSceneGraph, Unity, Unreal Engine
- **Mesh Edit/Repair:** Autodesk Meshmixer, Mesh lab





Topbar





Areas

Topbar



File Menu:

All things related to making/saving files

- Create New Scene
- Save Current Scene
- Copy Scene

Edit Menu:

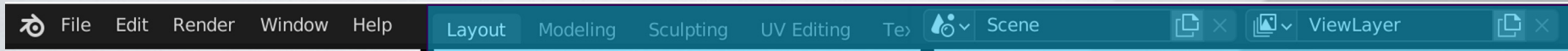
All things related to editing files

- Undo/Redo History
- Preferences

Render Window:

Not important now, but will come back to this in session 3

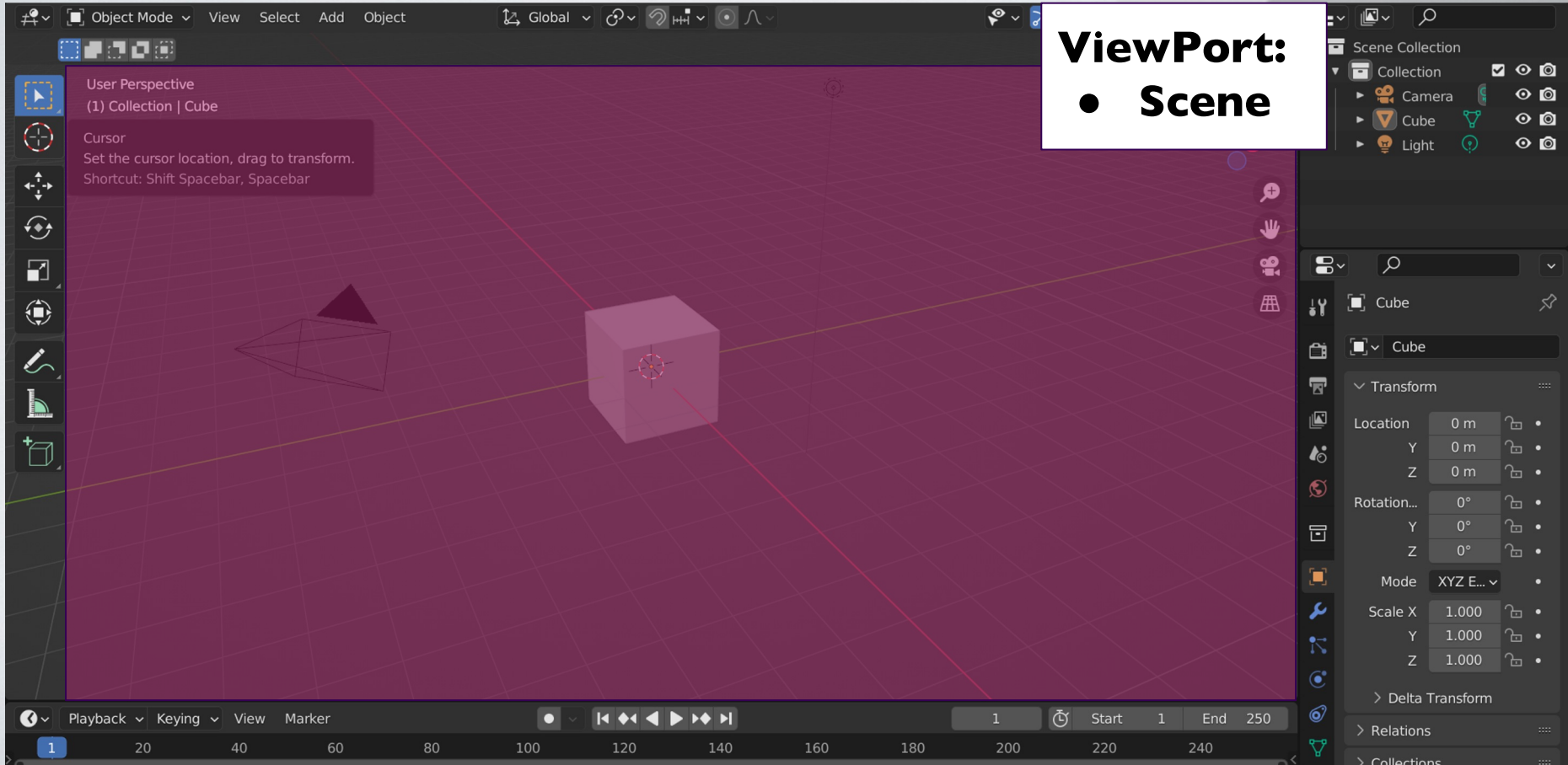
Topbar



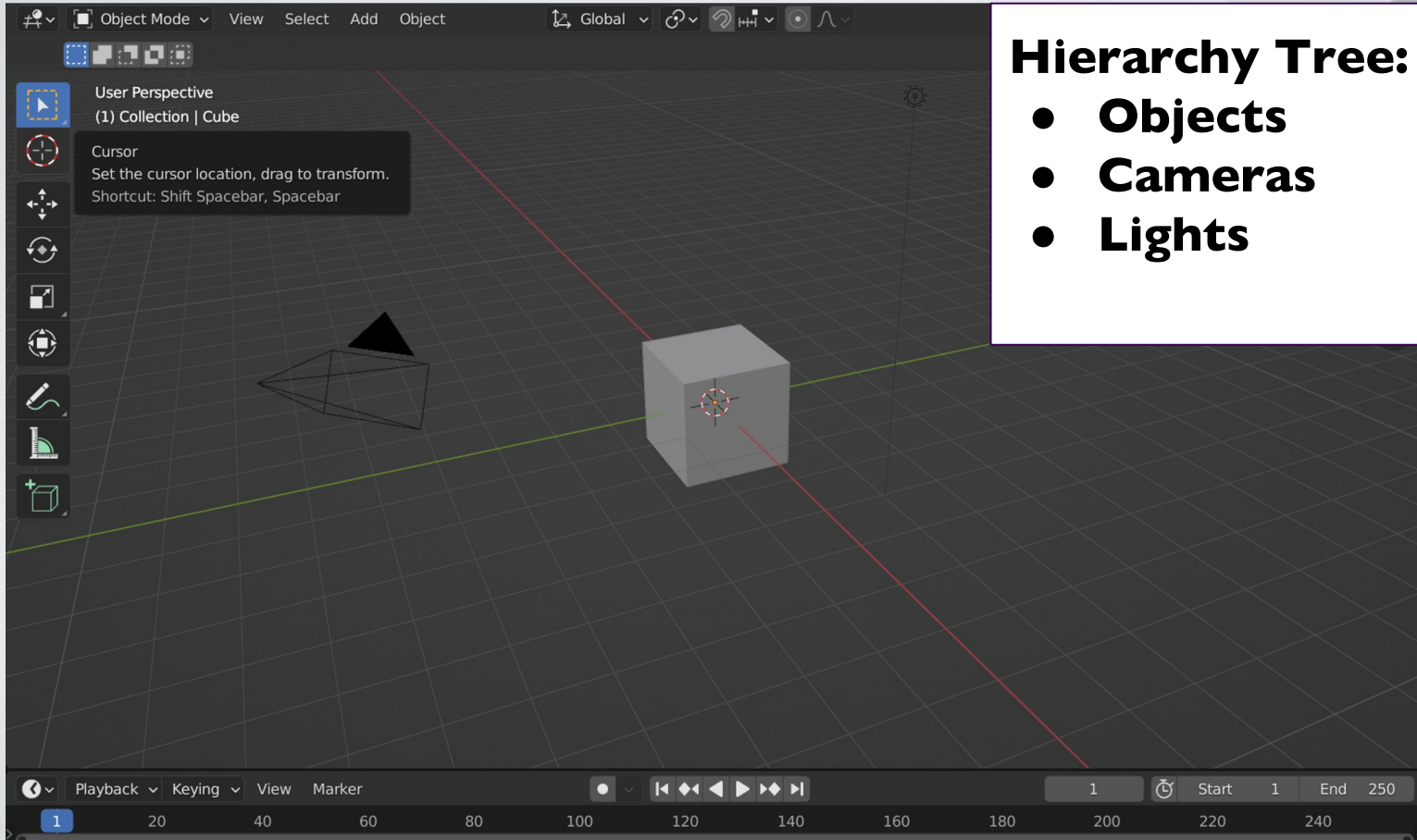
Workspaces:

Predefined window views for
different editing modes

Areas

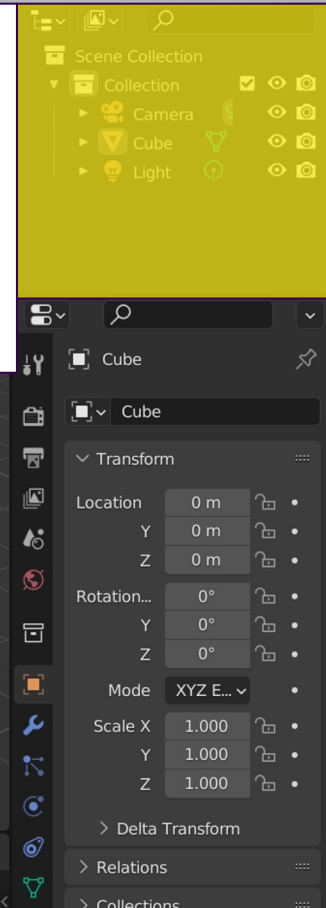


Areas

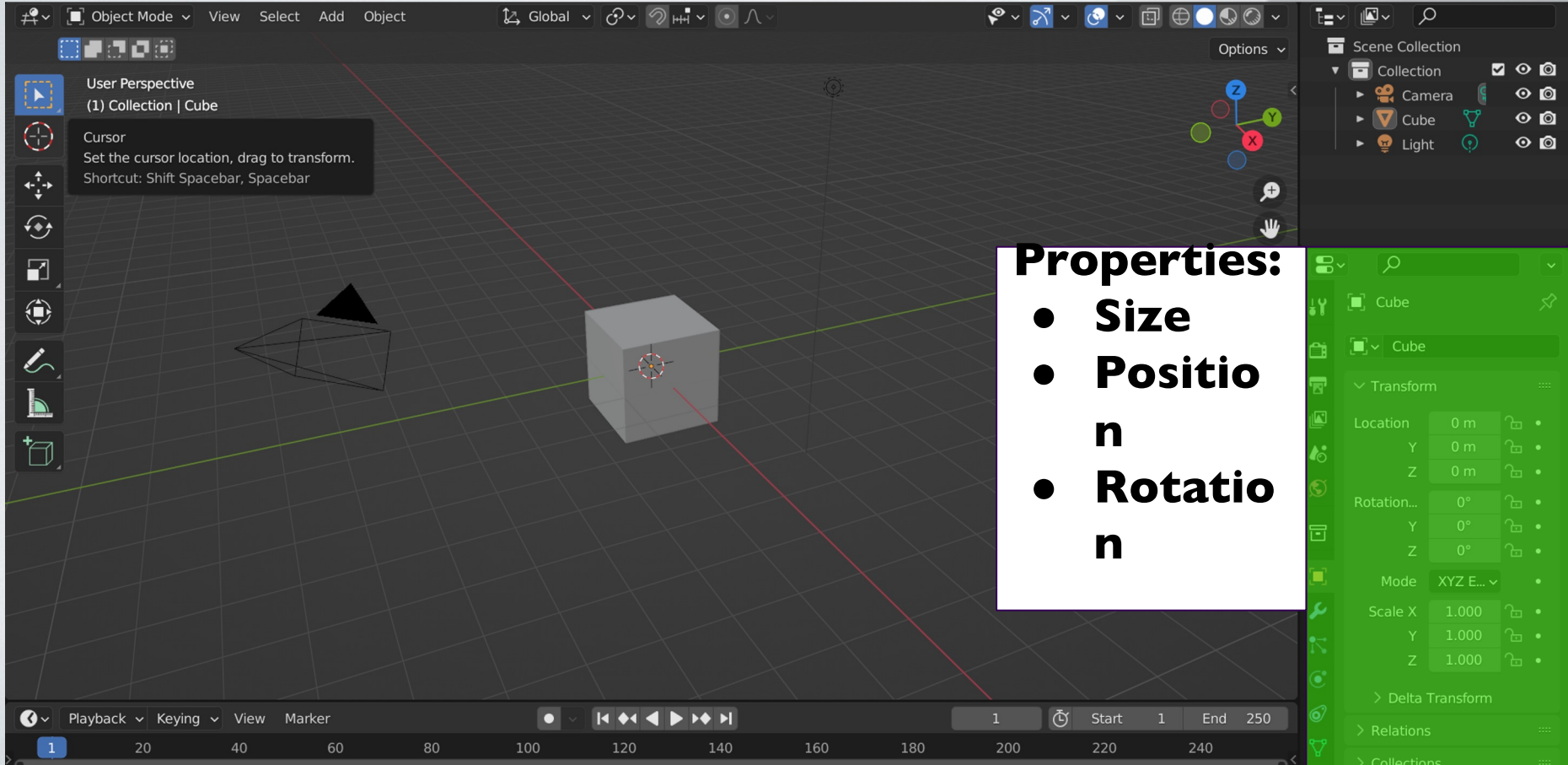


Hierarchy Tree:

- **Objects**
- **Cameras**
- **Lights**



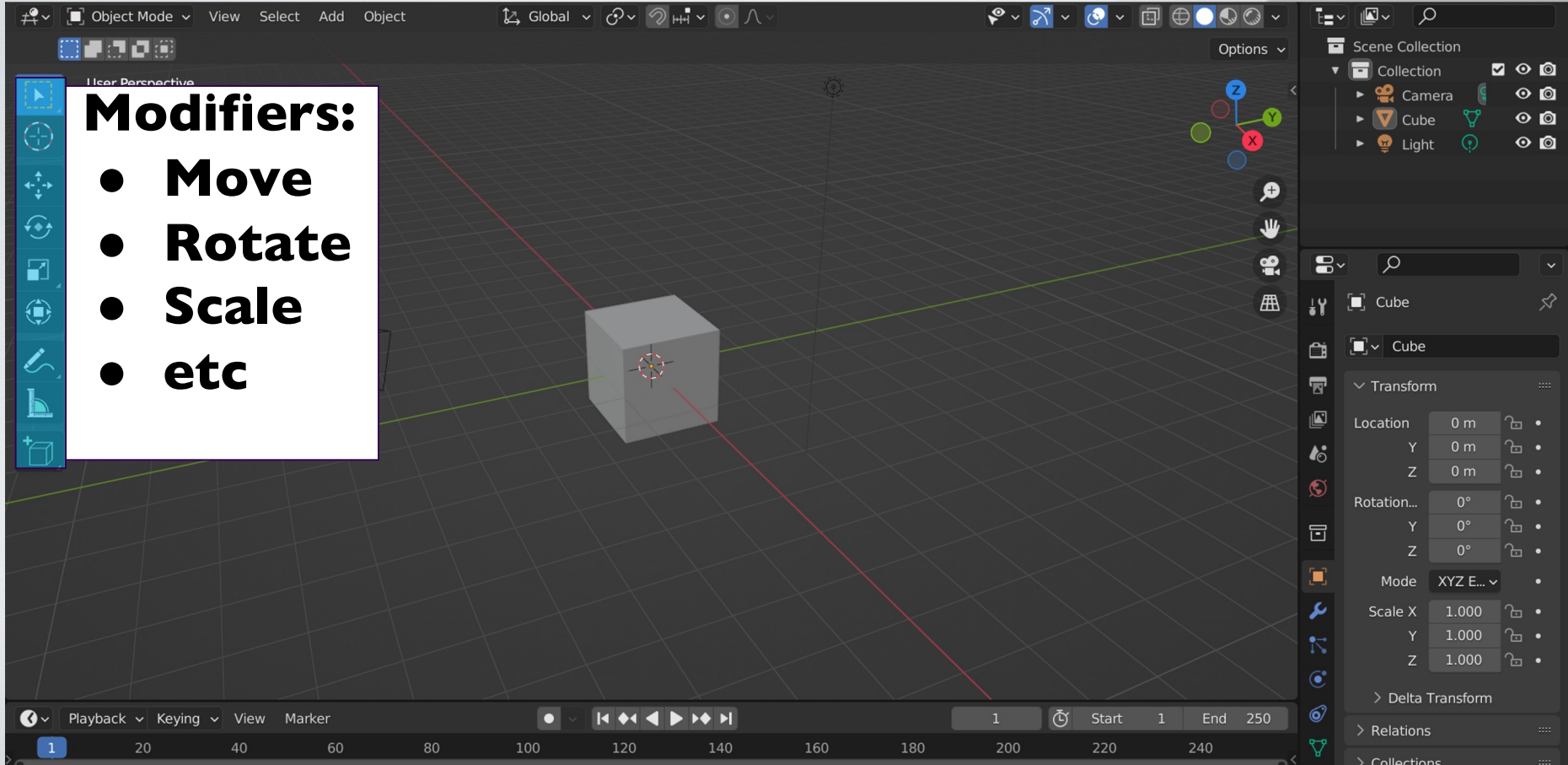
Areas



Areas

Modifiers:

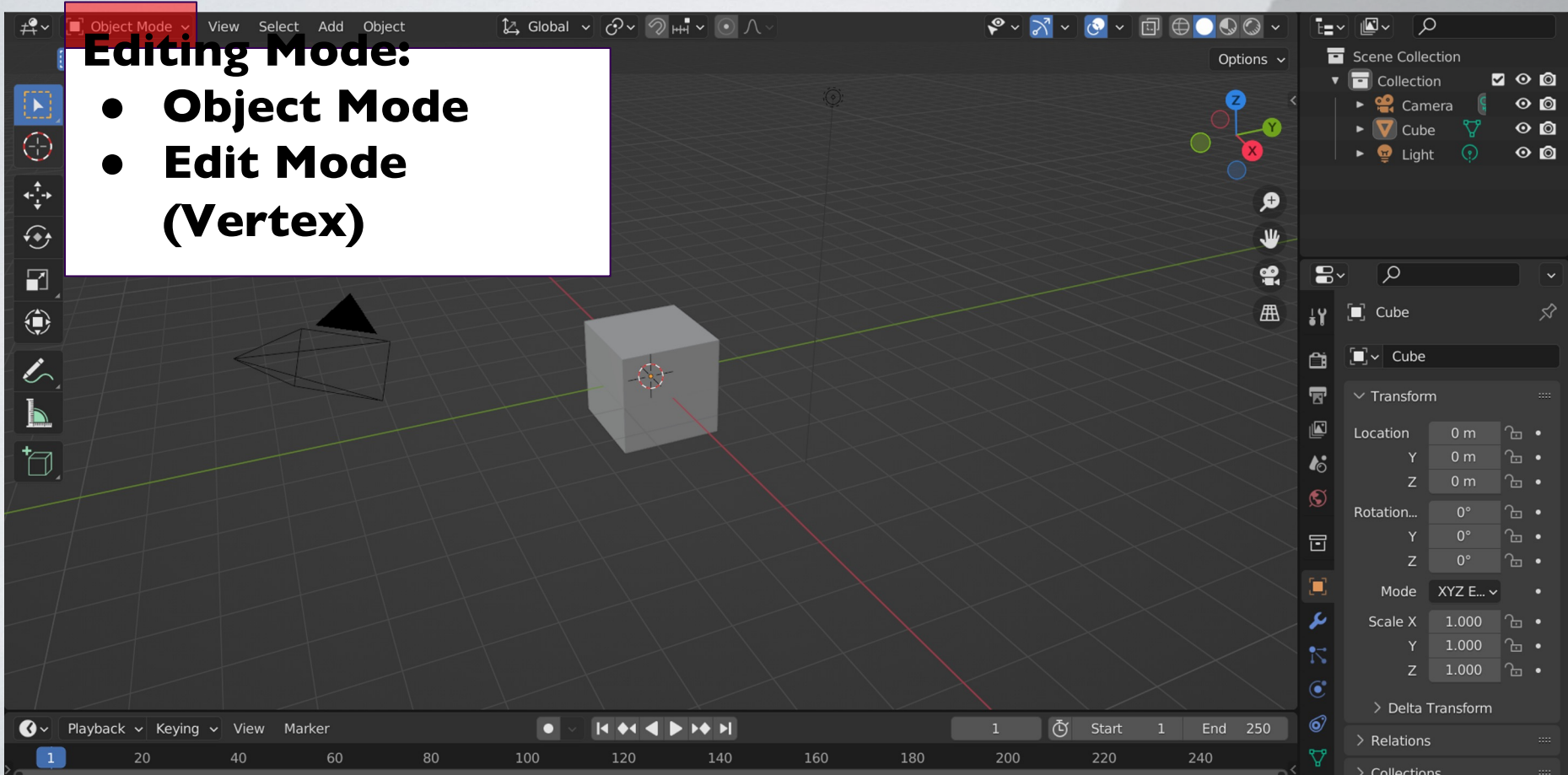
- Move
- Rotate
- Scale
- etc



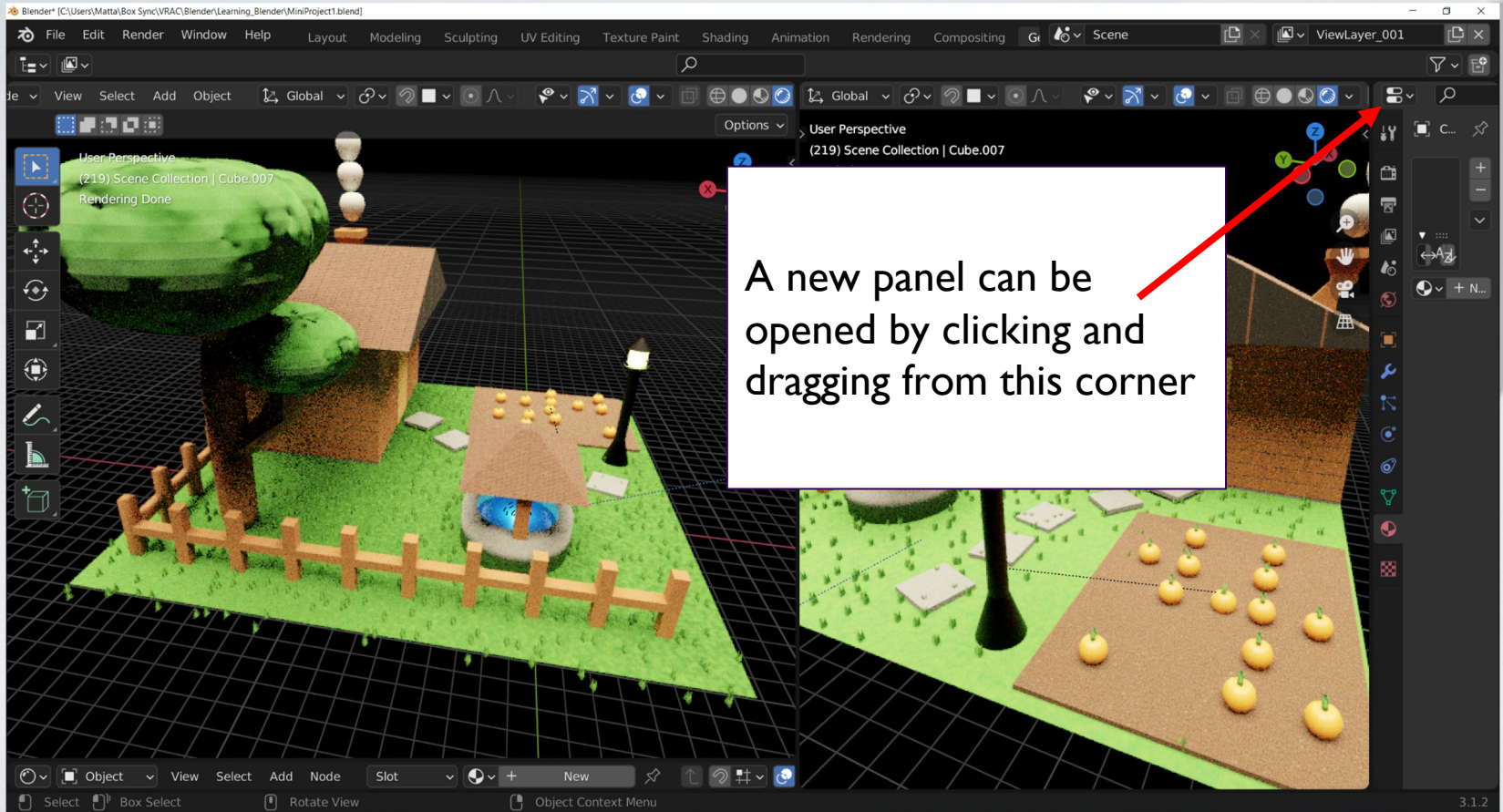
Areas

Editing Mode:

- Object Mode
- Edit Mode (Vertex)



Blender Viewports



Break Time!



Break the wrist, walk away.

Moving Around in Blender

(Almost identical to Solidworks)

Orbit: Middle mouse click and drag

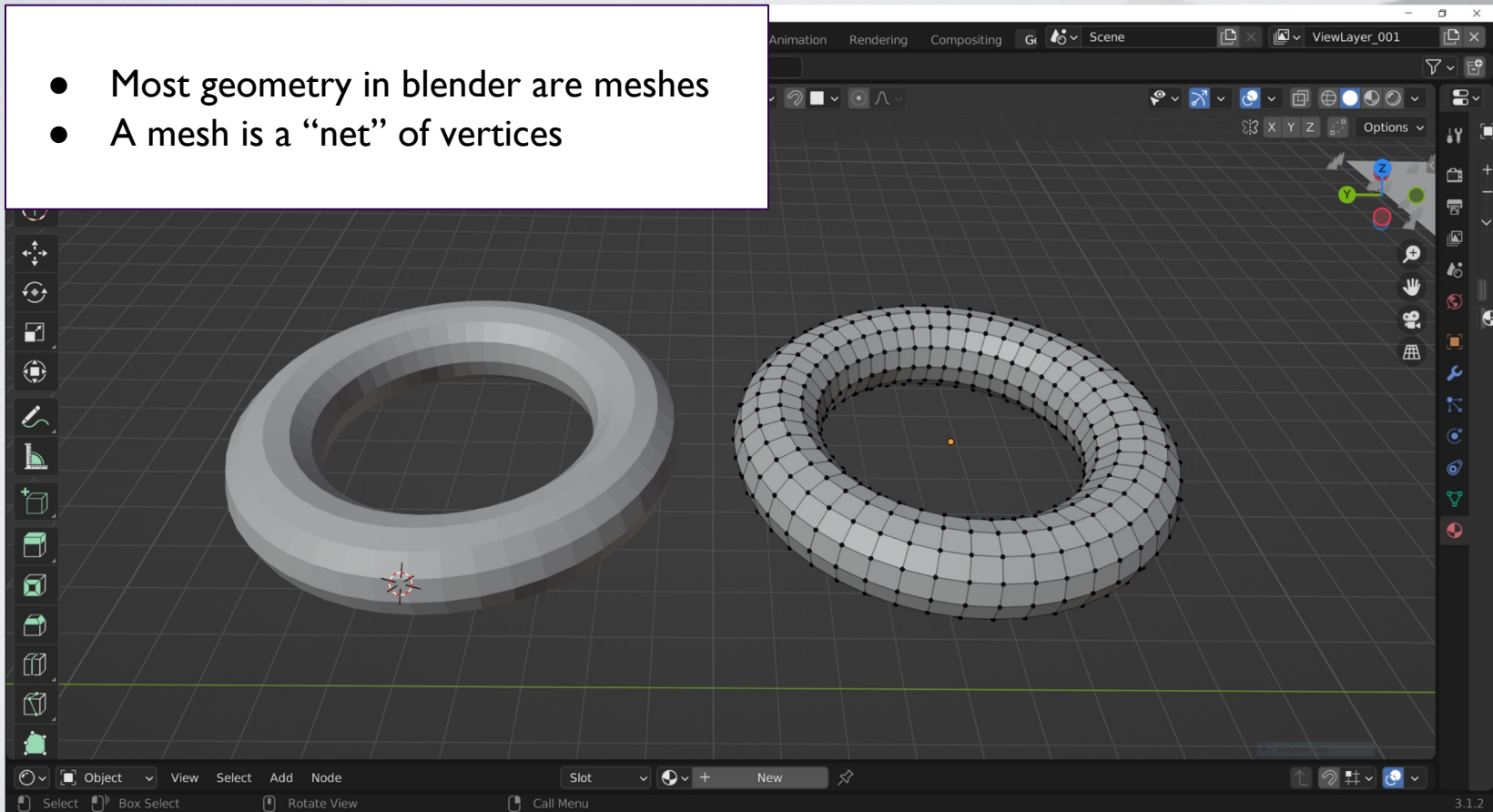
Traverse: Shift + Middle mouse click and drag

Zoom In/Out: Scroll middle mouse wheel

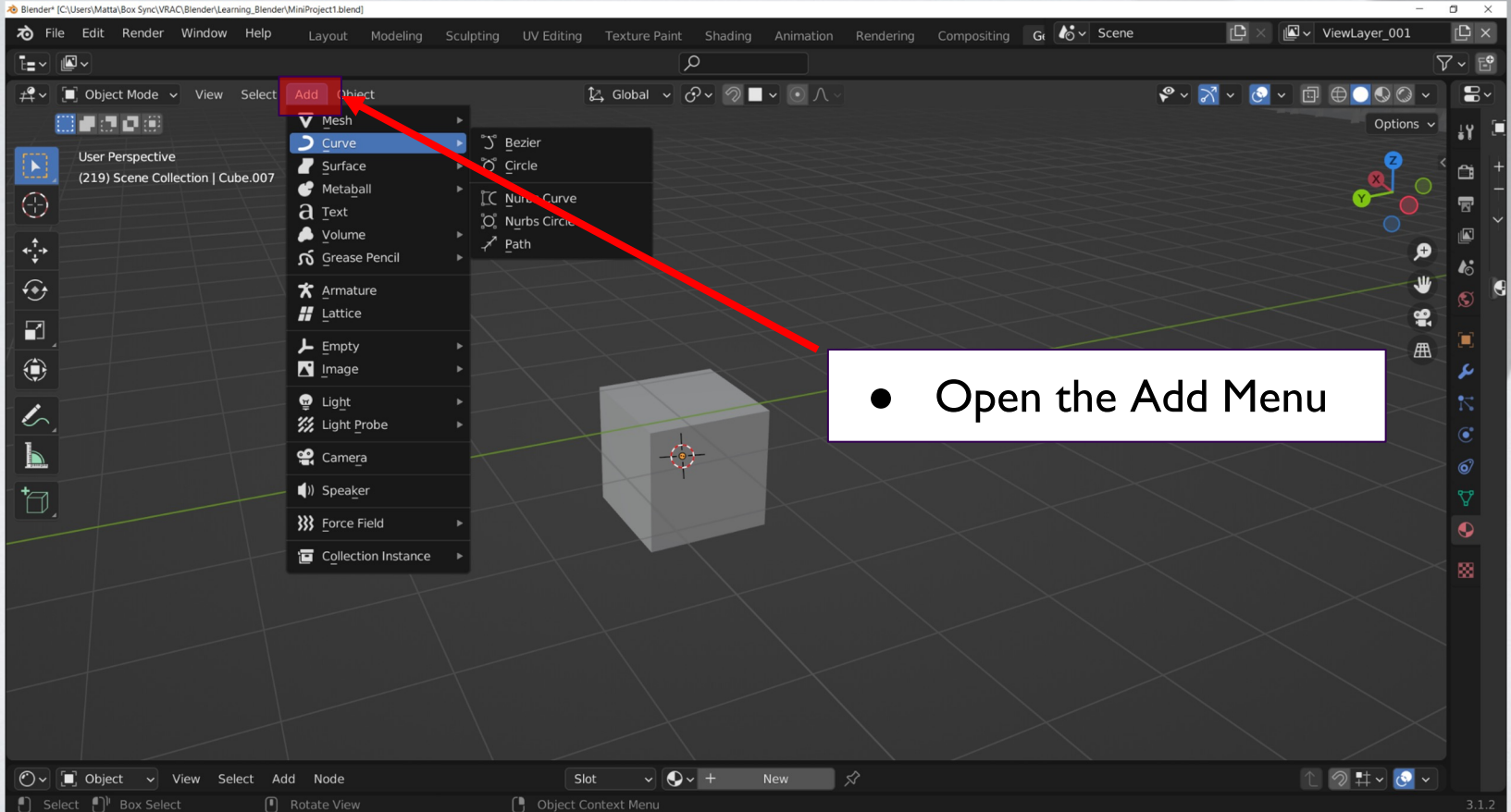
Select: Left mouse click and drag

What is a Mesh?

- Most geometry in blender are meshes
- A mesh is a “net” of vertices

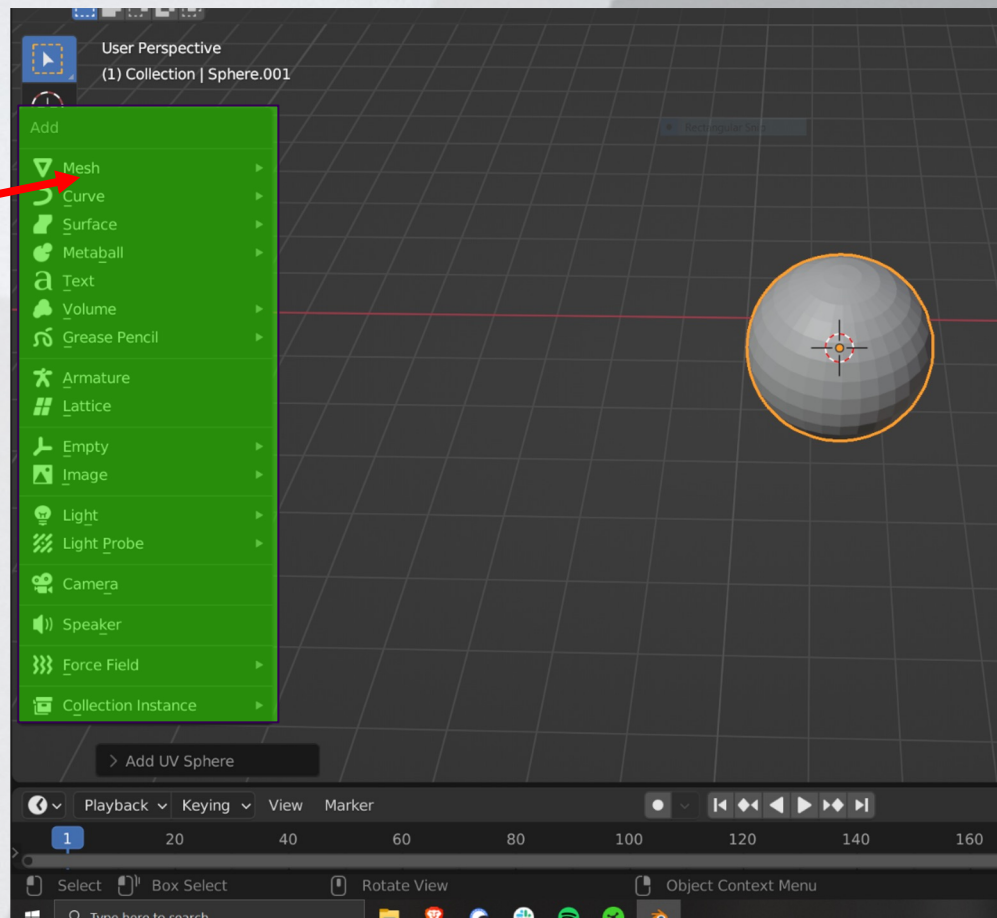


Creating Your First Mesh

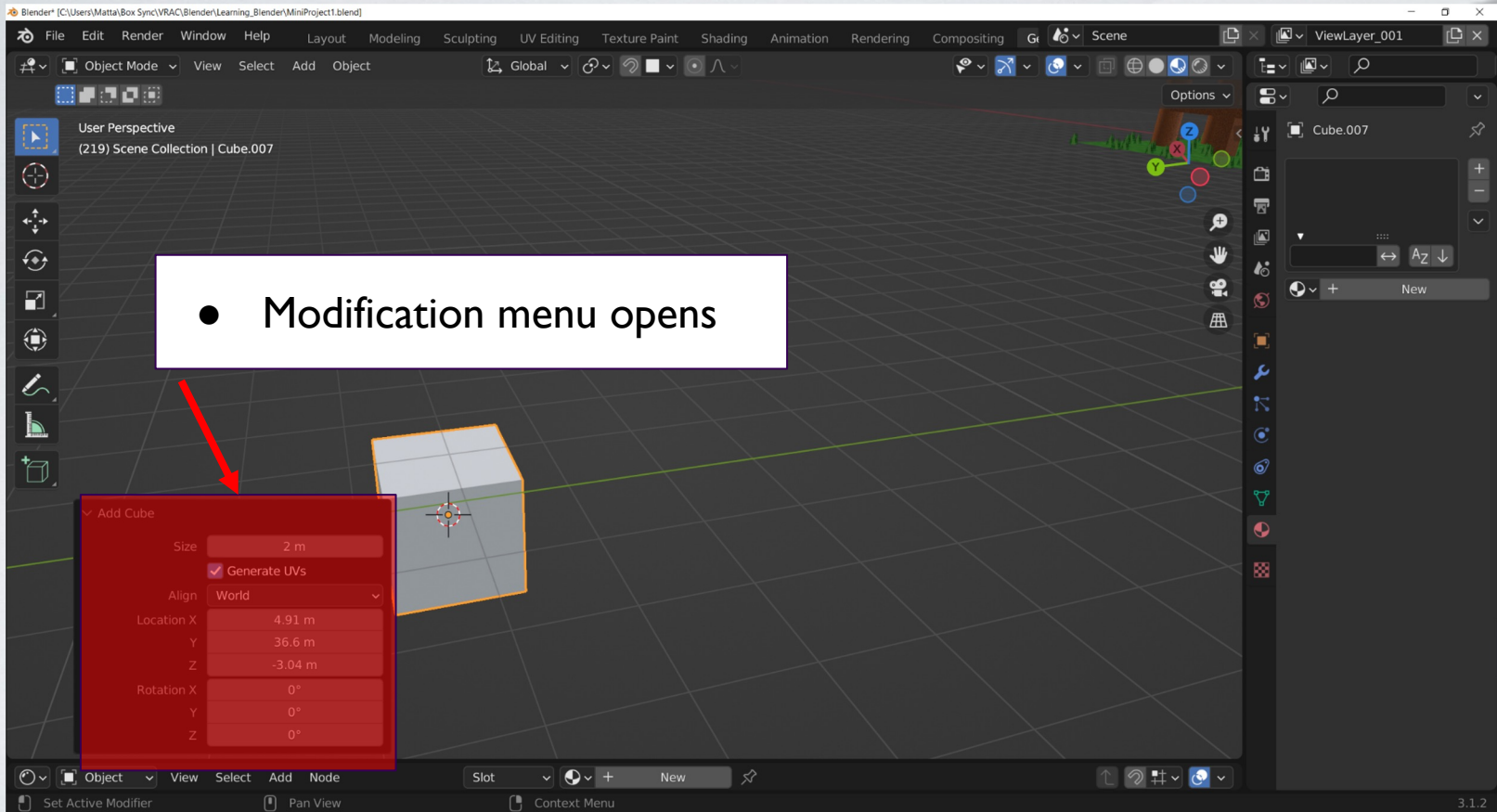


Creating Your First Mesh

- The “Add Menu” can also be opened with hot keys
- Hotkey: Shift + A
- Add Menu > Mesh > UV Sphere



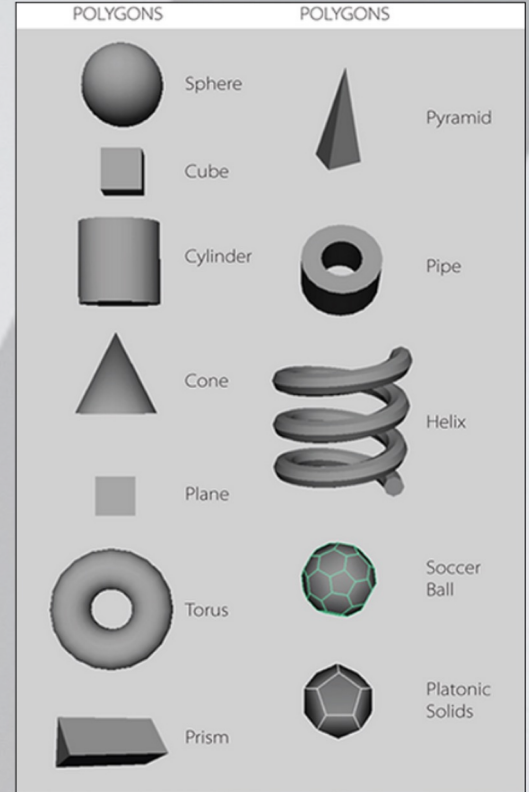
Creating Your First Mesh



- Modification menu opens

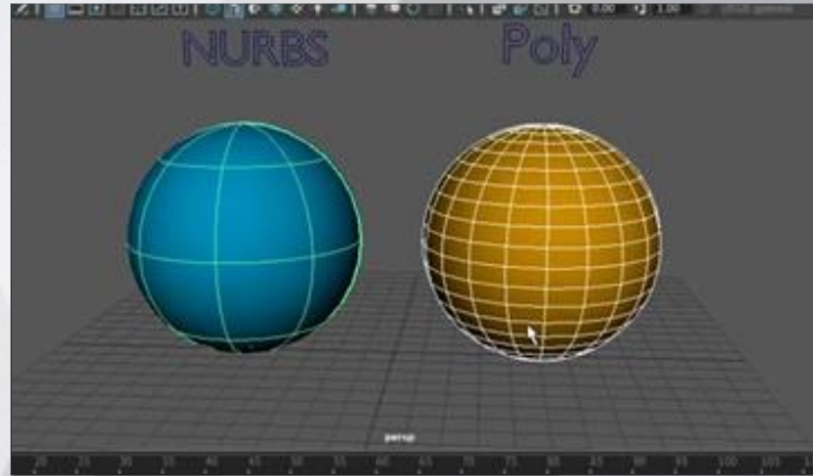
Polygon Models: Primitive Types

- **Polygon Primitives Include:** Sphere, cube, cylinder, cone, plane, torus (donut), prism, pyramid, pipe, helix, sphere, platonic solids.
- **Hotkey:** Shift + A (opens the add menu)



Polygons

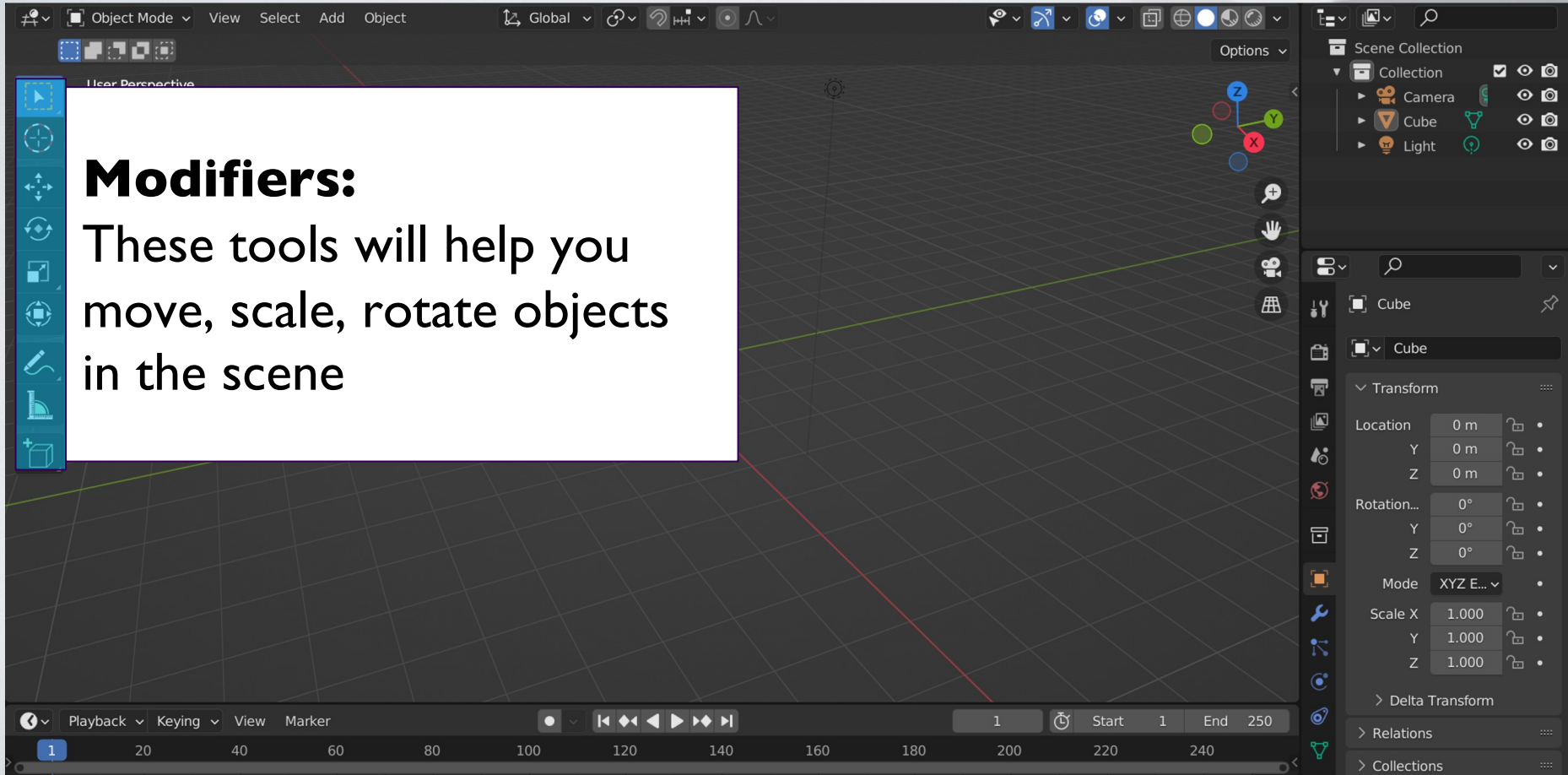
- **NURBS (Non-Uniform Rational B-Spline Surface)**
 - Less details for the same amount of curvature
 - Composed of curves rather than straight lines
 - Less flexible when it comes to modeling
- **Polygons**
 - This course deals almost entirely with Polygons
 - Used more frequently than NURBS
 - “Curves” are composed of many small straight lines.



Areas

Modifiers:

These tools will help you move, scale, rotate objects in the scene



Modifying Your Mesh

- **Move:**

- **Hotkey:** G

- **Scale:**

- **Hotkey:** S

- **Rotate:**

- **Hotkey:** R

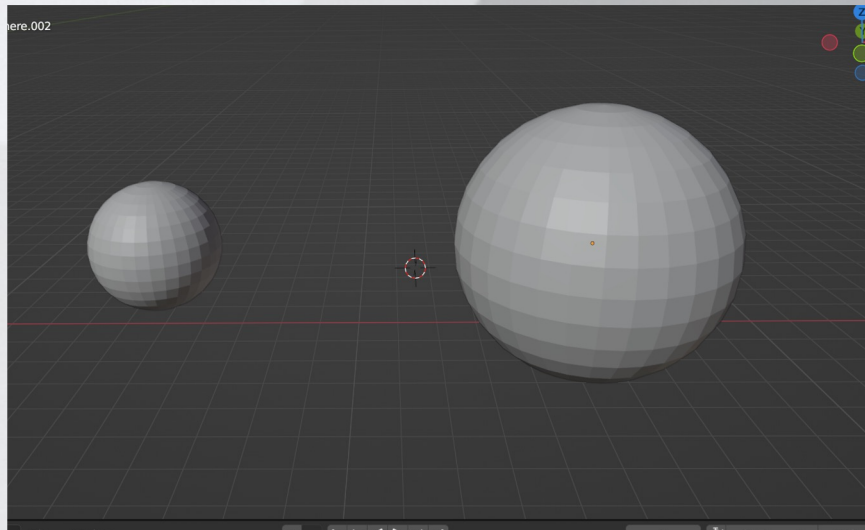
- **Duplicate:**

- **Hotkey:** Shift + D

- **Restrict Modification:**

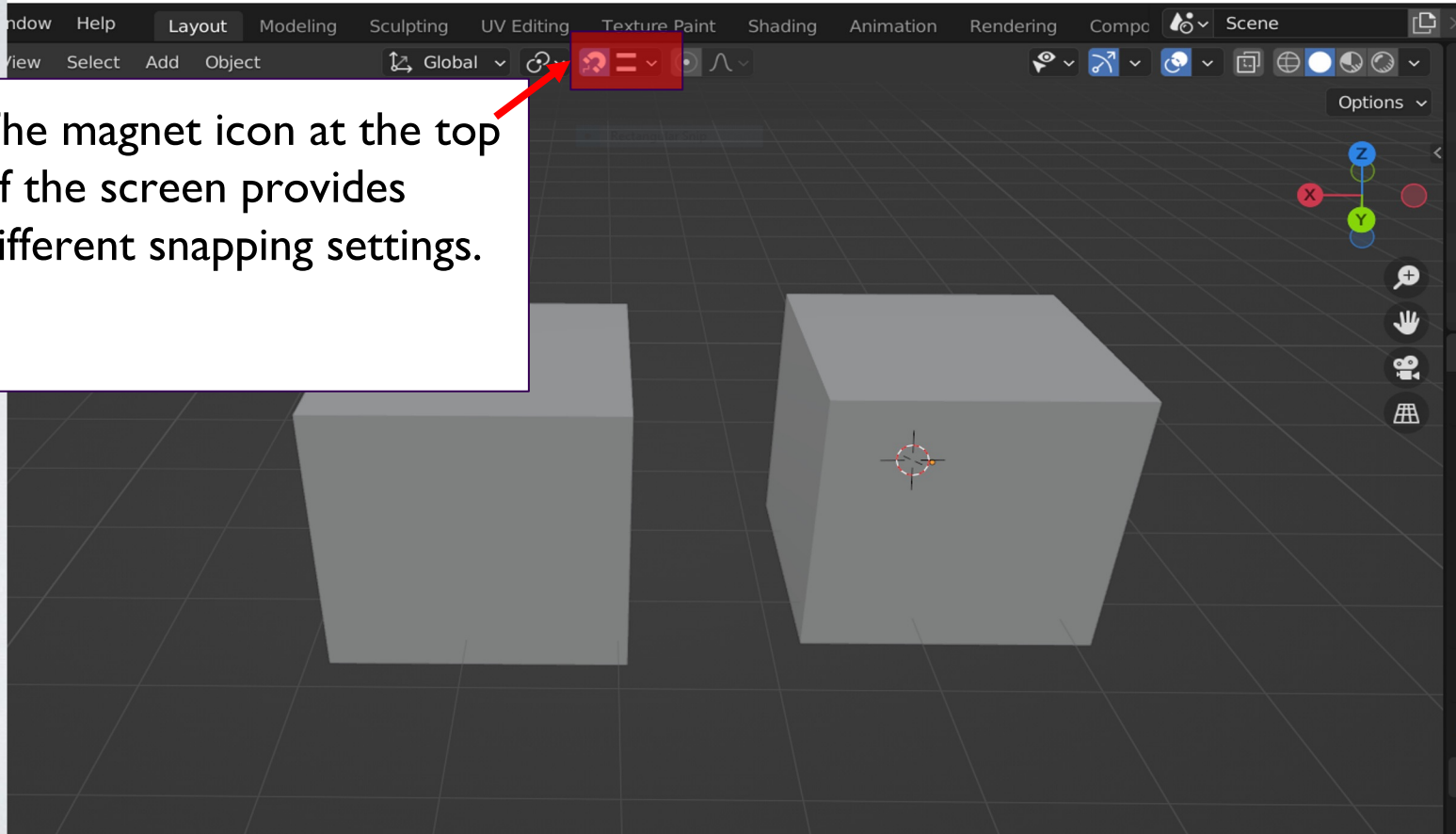
- To move, scale, etc along specific axis:
- Modifier followed by x/y/z (depending on axis you want to modify)

Scaling Example:



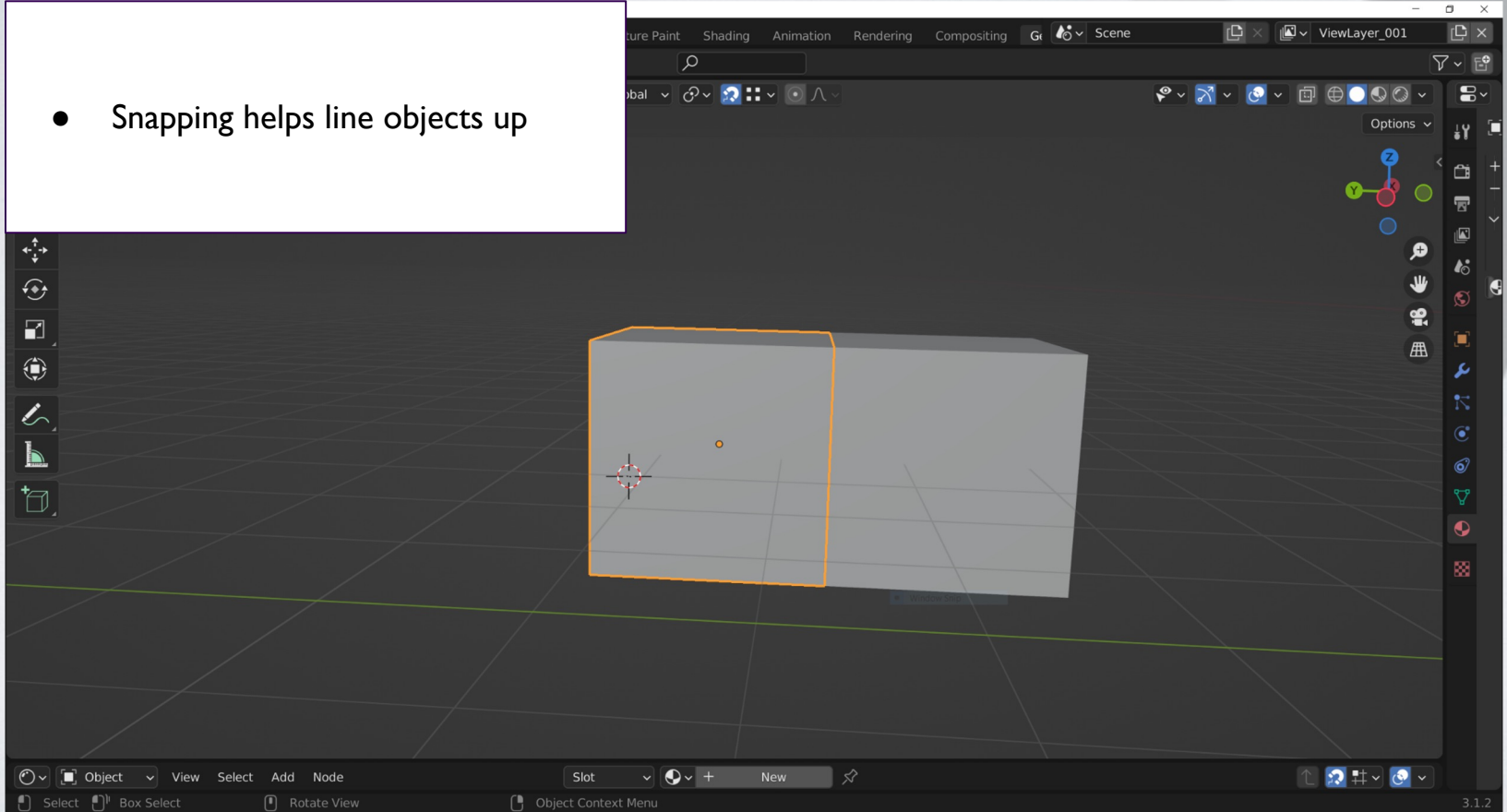
Snapping

The magnet icon at the top of the screen provides different snapping settings.

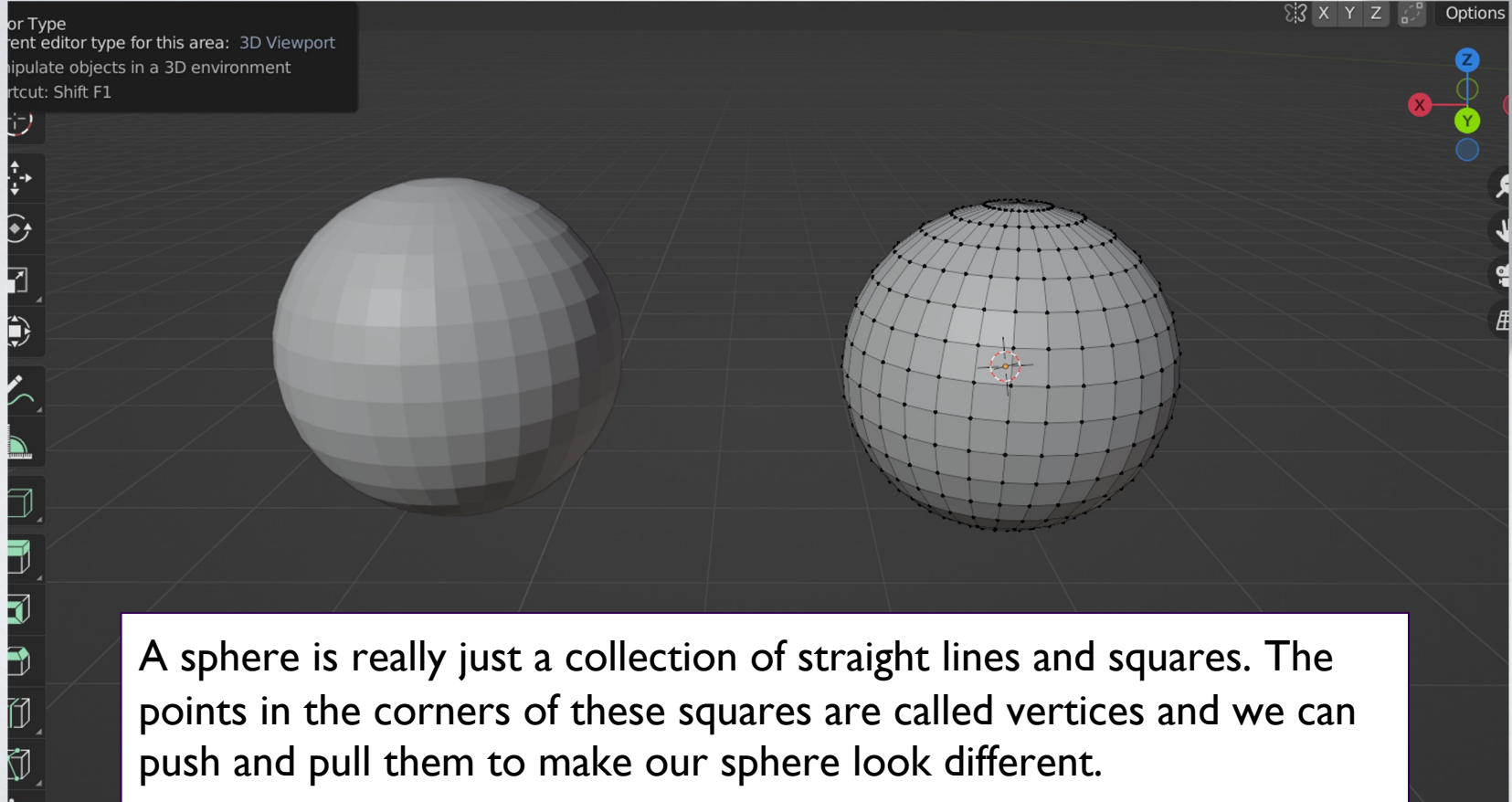


Snapping

- Snapping helps line objects up

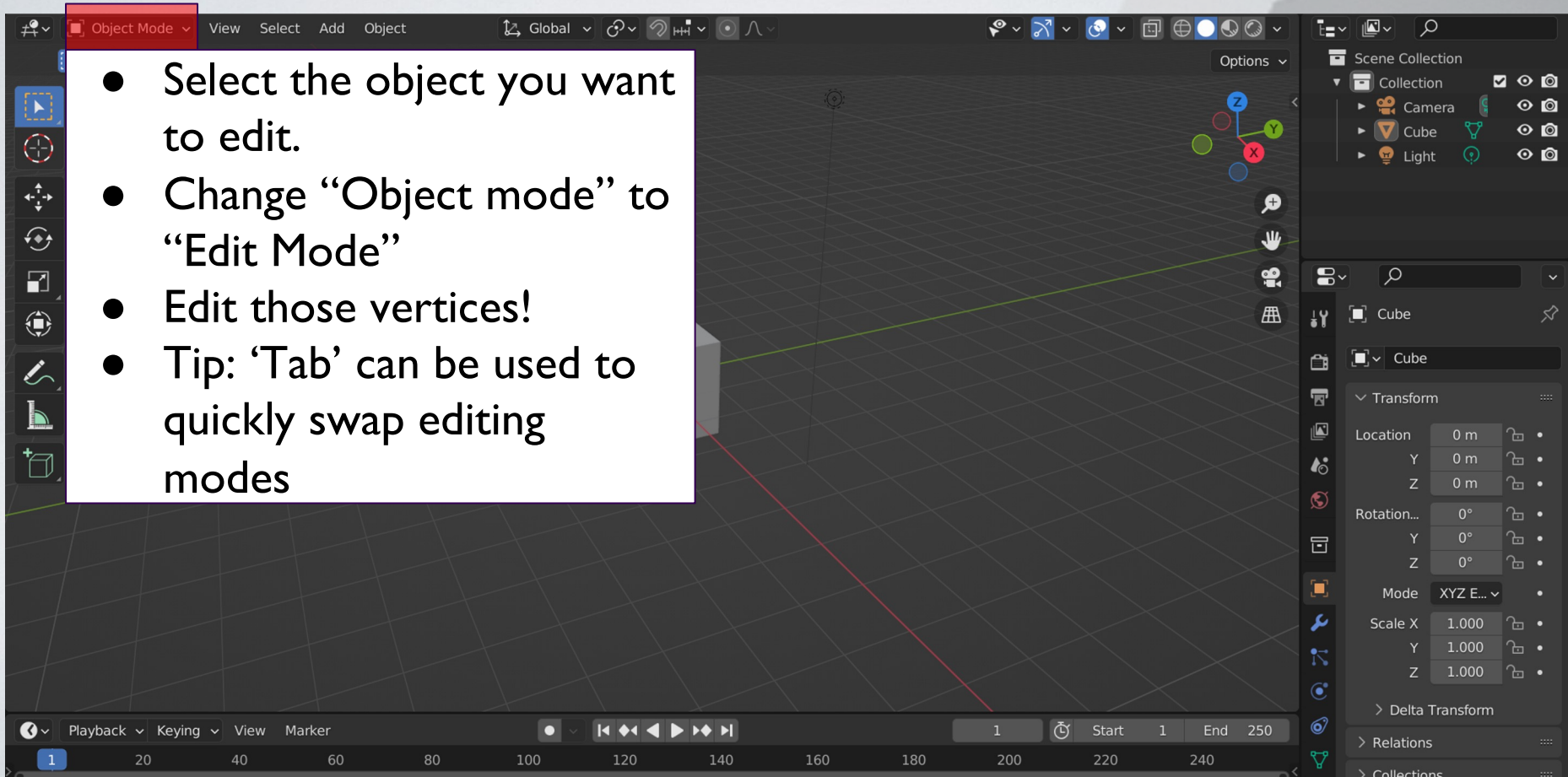


Modifying Vertices

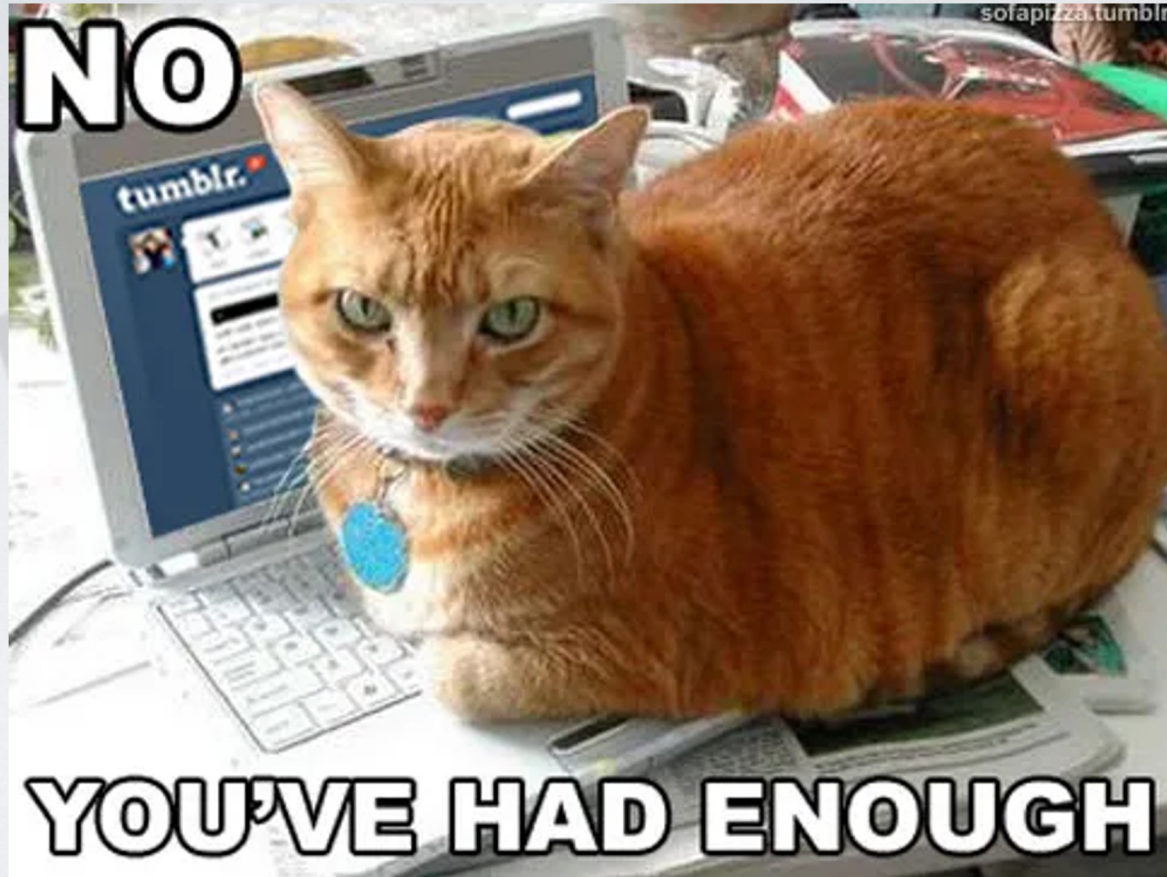


Vertex Editing:

- Select the object you want to edit.
- Change “Object mode” to “Edit Mode”
- Edit those vertices!
- Tip: ‘Tab’ can be used to quickly swap editing modes



Break Time!



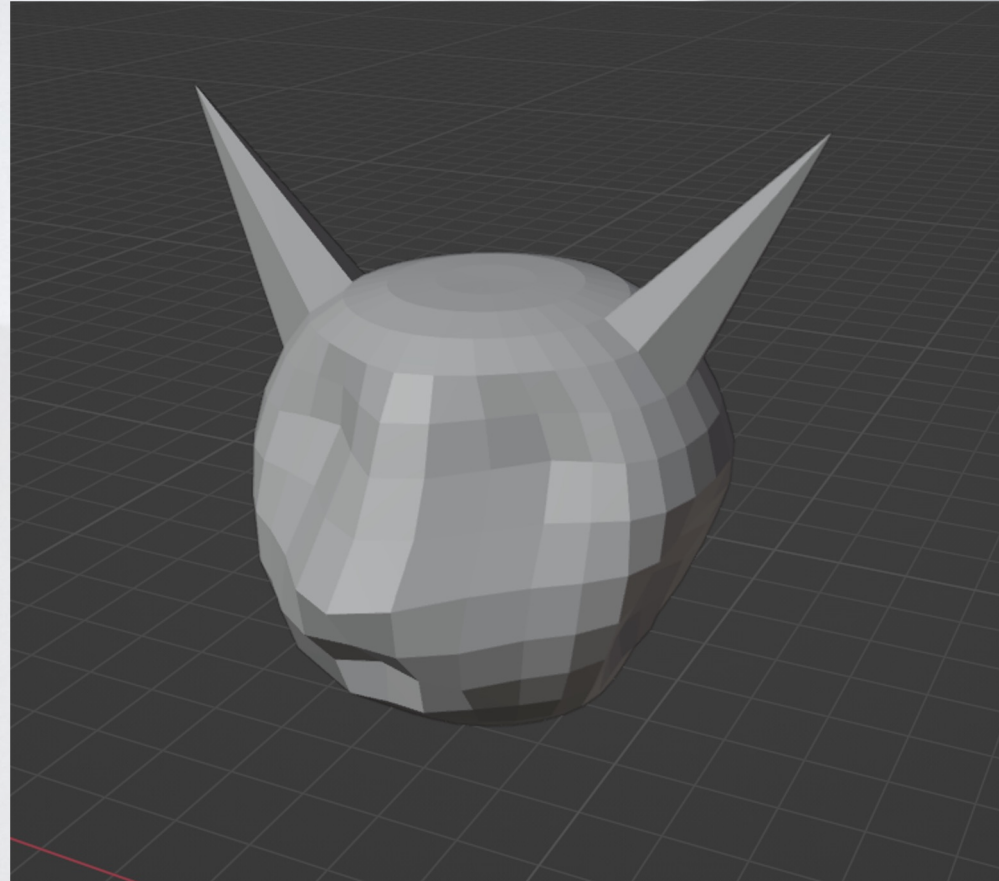
NO

YOU'VE HAD ENOUGH

Vertex Mini Activity

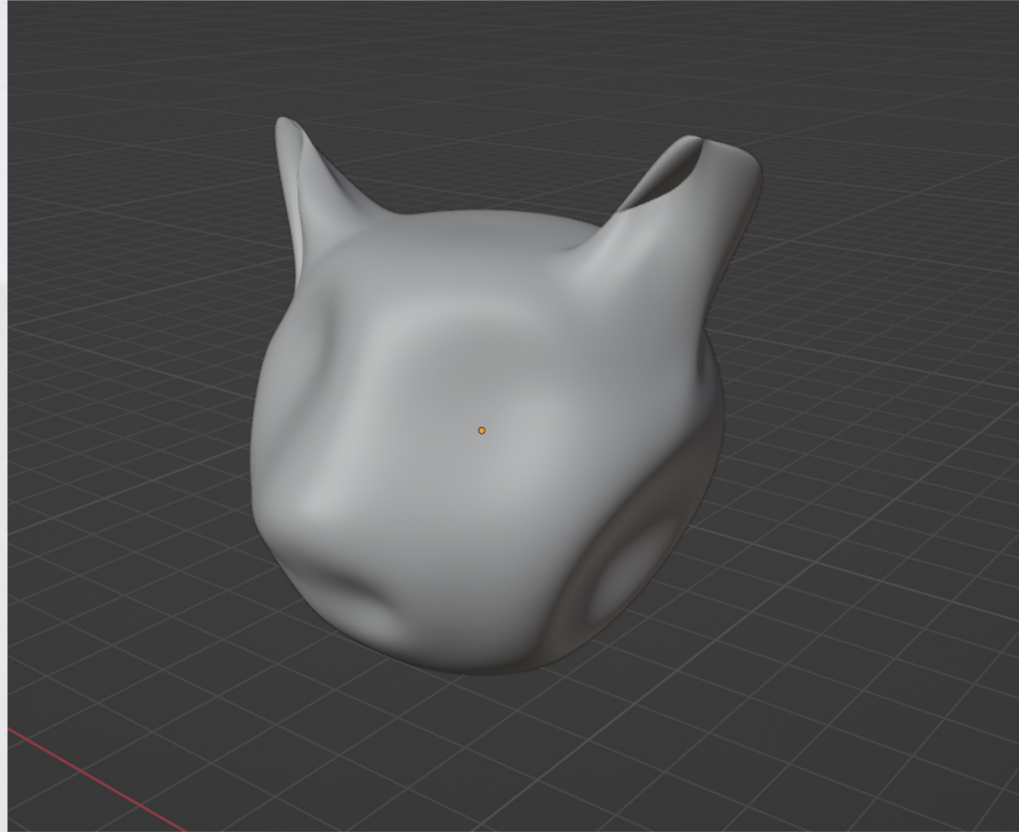
Mini Activity

- This cat face started out as just a sphere
- Edit a standard mesh shape into something fun
- Questions:
 - What happens if a vertex is deleted?
 - Can you add a vertex back once it is deleted?
 - What if you want more vertices?



Vertex Mini Activity (Bonus)

What if you wanted to smooth out your shape? How would you do that?



Today's Mini Creation

Stage I: 3 Objects

- Create a building
 - House
 - Shed
- Landscape/ground
- Yard feature
 - Wagon
 - Tree/bush

Stage II: 2 Objects

- Landscaping feature
 - Rocks
 - Walking path
- Details to building:
 - Door
 - Roof

Stage III: 2 Objects

- More details
 - Cow
 - Water well
- Details to building:
 - Windows
 - Chimney

Today's Mini Creation Inspiration

