LMMFE Laboratory for Multimedia

BLENDER 2.8

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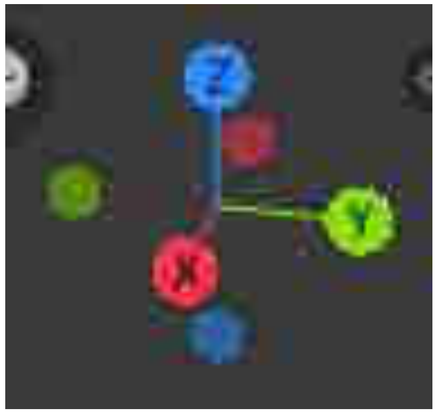
Workspace

- cube
- camera
- light source

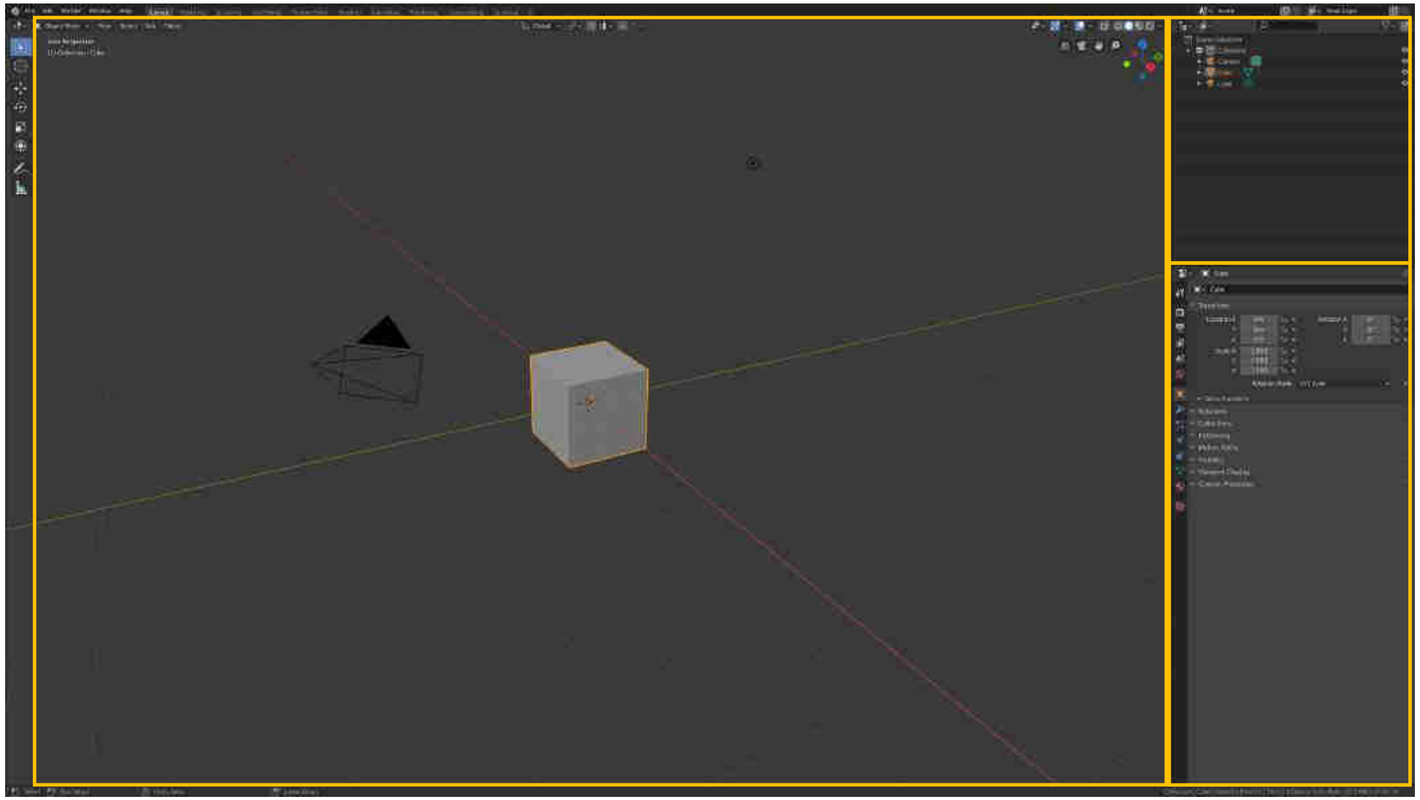
- different layouts
- custiomizing layouts

- orientation
- axis
  - X – red
  - Y – green
  - Z – blue



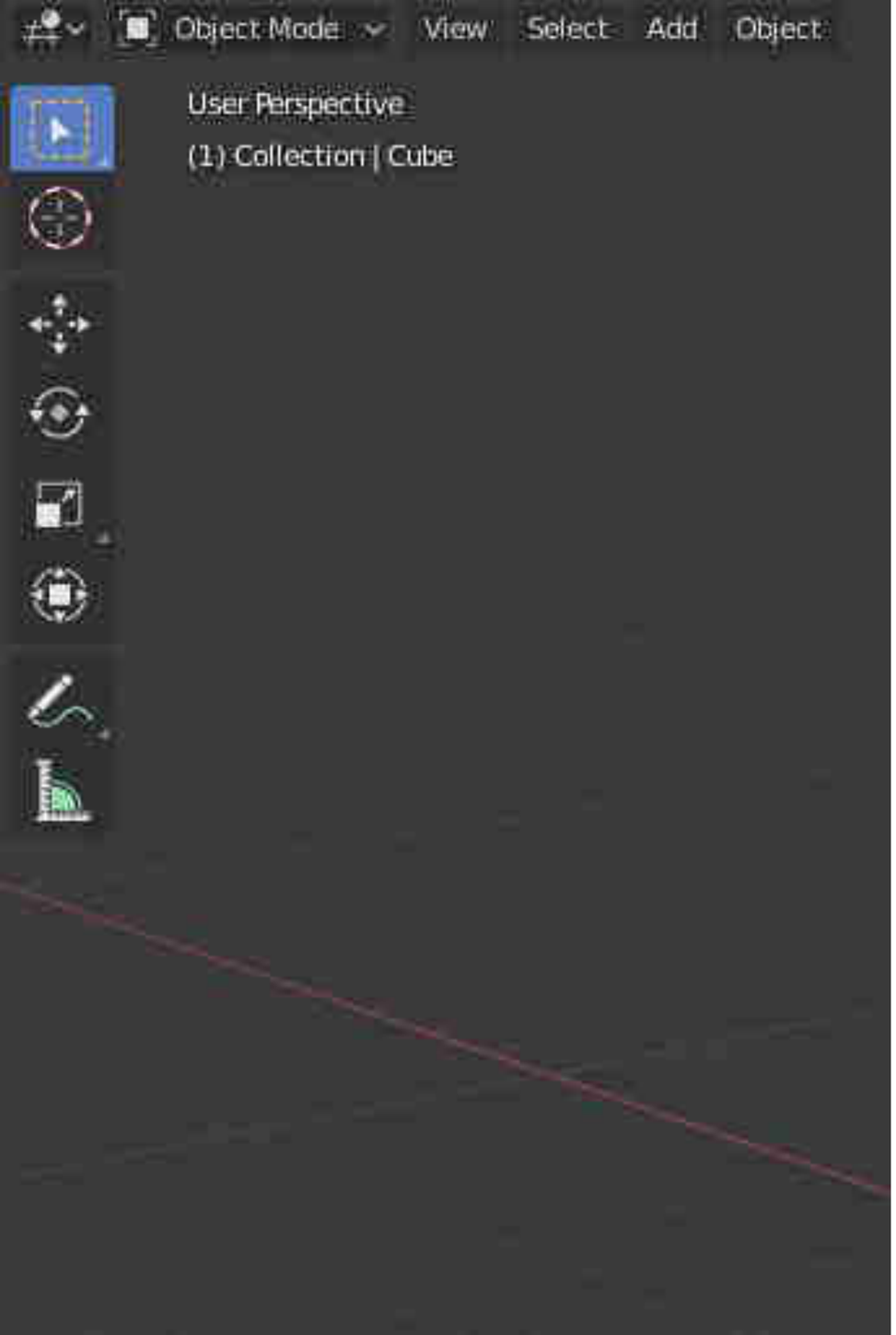
Editor type windows

- fully adjustable
- most important
  - 3D view
  - outliner
  - properties



Properties

- workspace
- render
- output
- view layer
- scene
- world
- object
- modifiers
- particles
- physics
- object constraints
- object data
- materials
- textures



LMMFE

T-menu

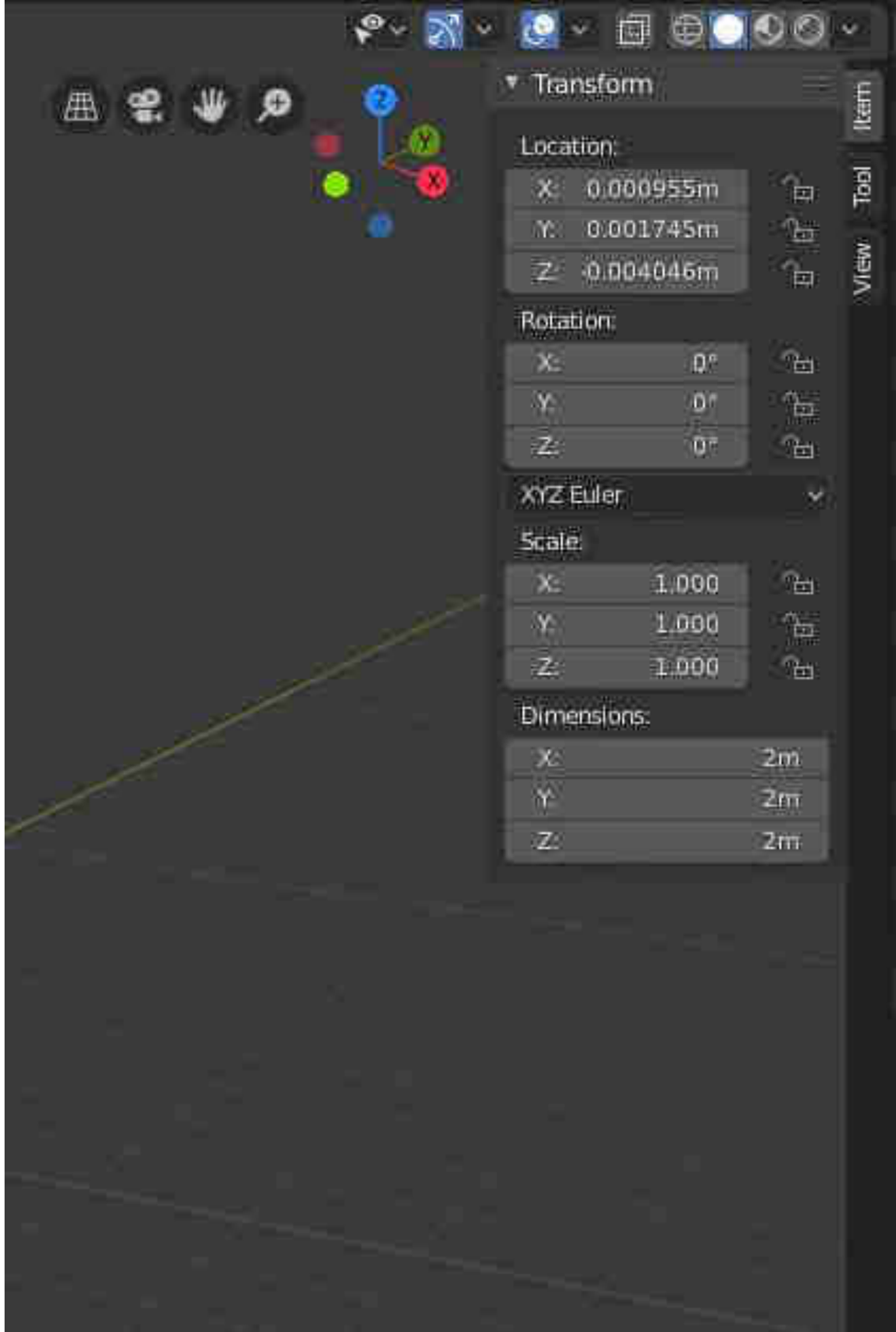
- options depend on the current mode
- show / hide with shortcut ***T***

- select box
- cursor
- move, rotate, scale, transform
- annotate and measure

N-menu

- options depend on the current mode
- show / hide with shortcut ***N***

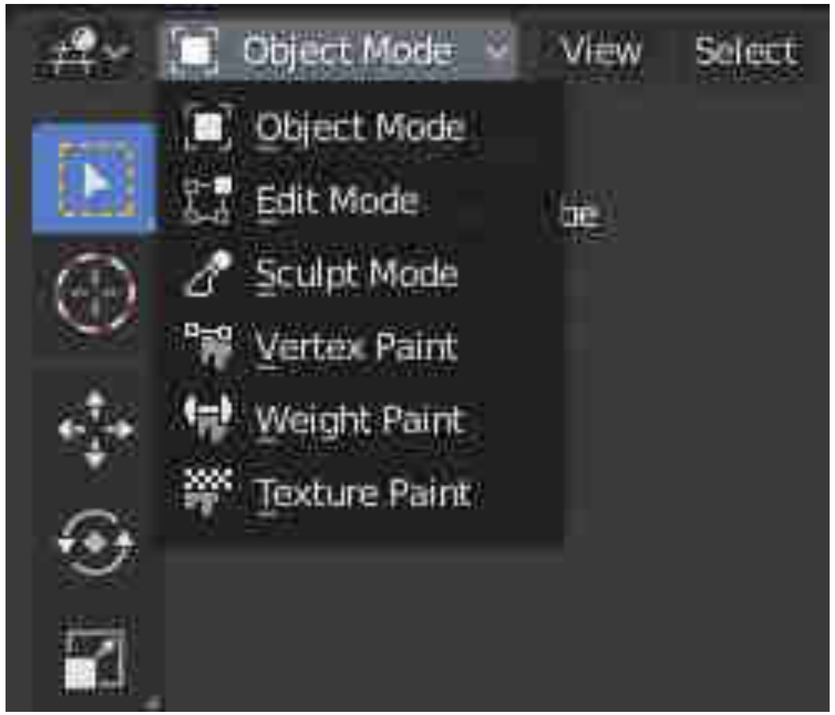
- item
- tool
- view



MODES

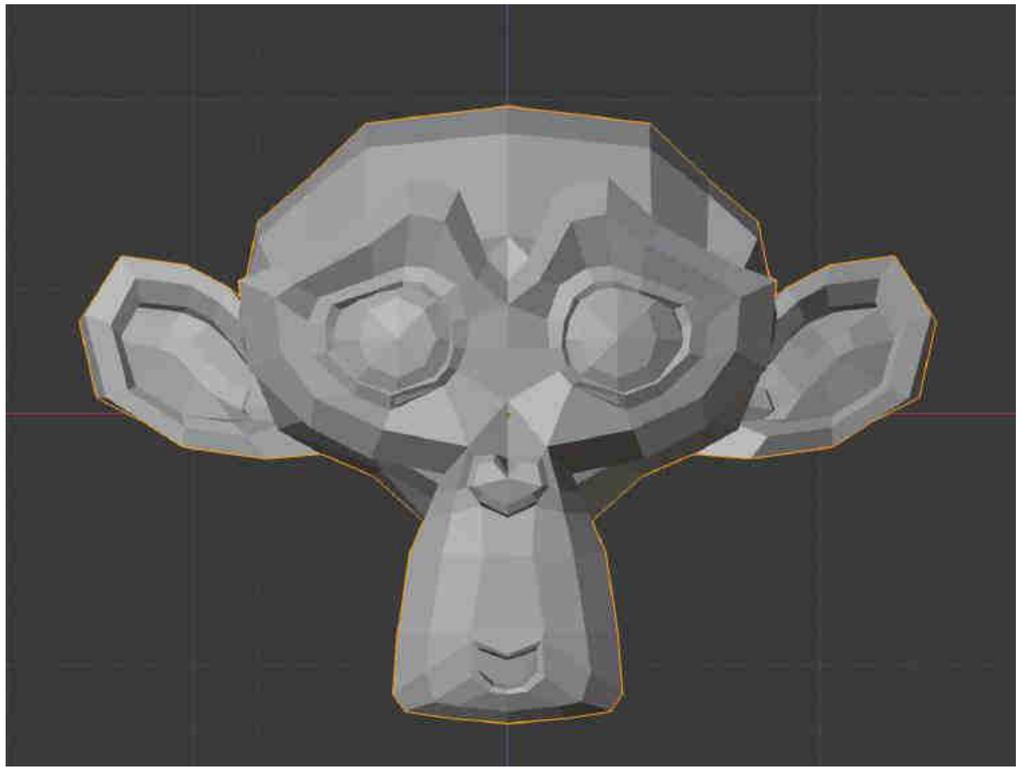
3D view

- object mode
- edit mode
- sculpt mode
- vertex paint
- weight paint
- texture paint



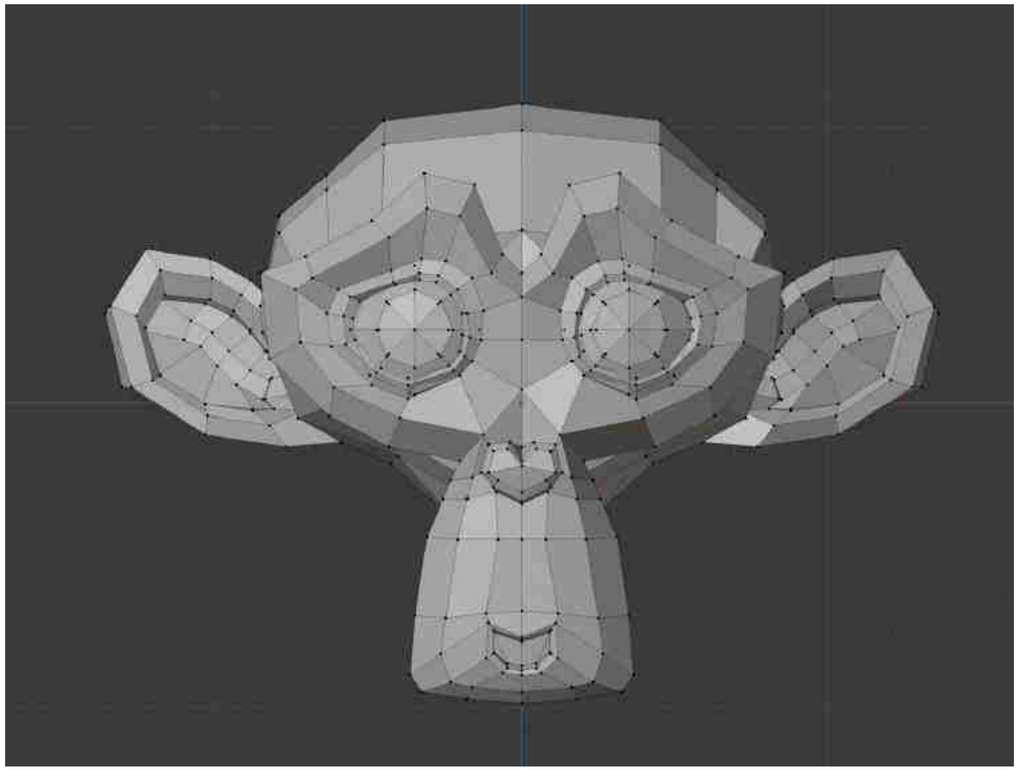
Object mode

- adding new objects
- manipulation of entire object
- limited options of manipulation
  - translation
  - rotation
  - scalation
- joining objects
- applying modifiers
- setting up the whole scene



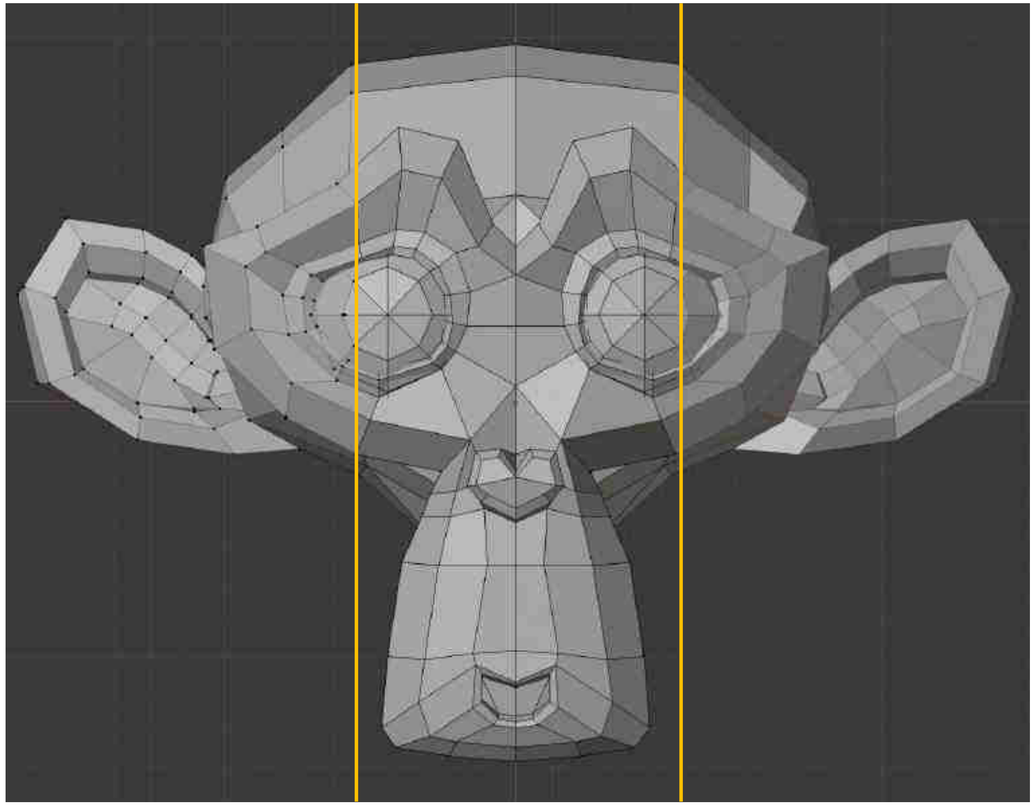
Edit mode

- creating detailed polygon mesh
- Influences only object's geometry and not on it's global properties (location)
- select certain parts of the model
  - vertices
  - edges
  - faces
- assigning materials to certain parts of model



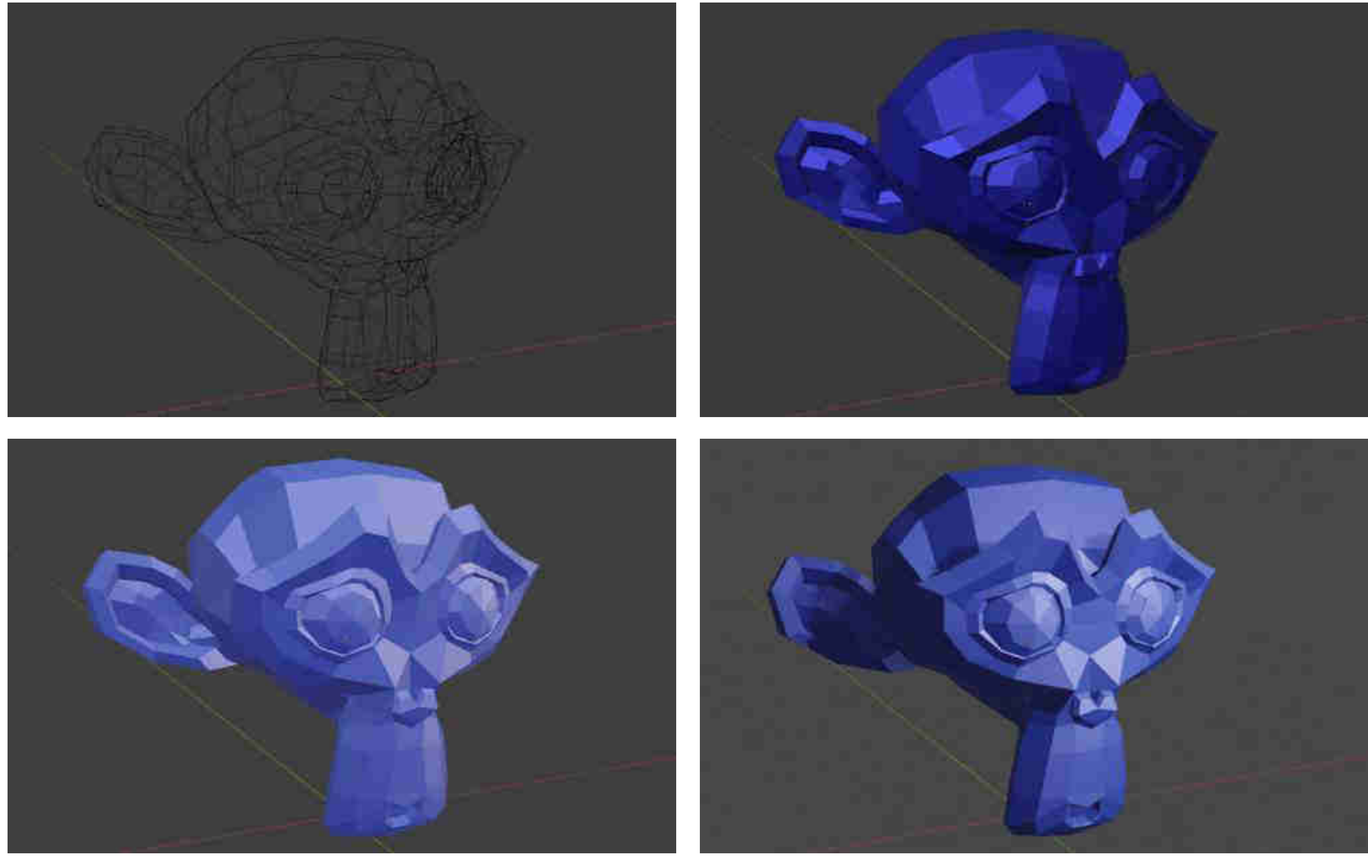
Switching between modes

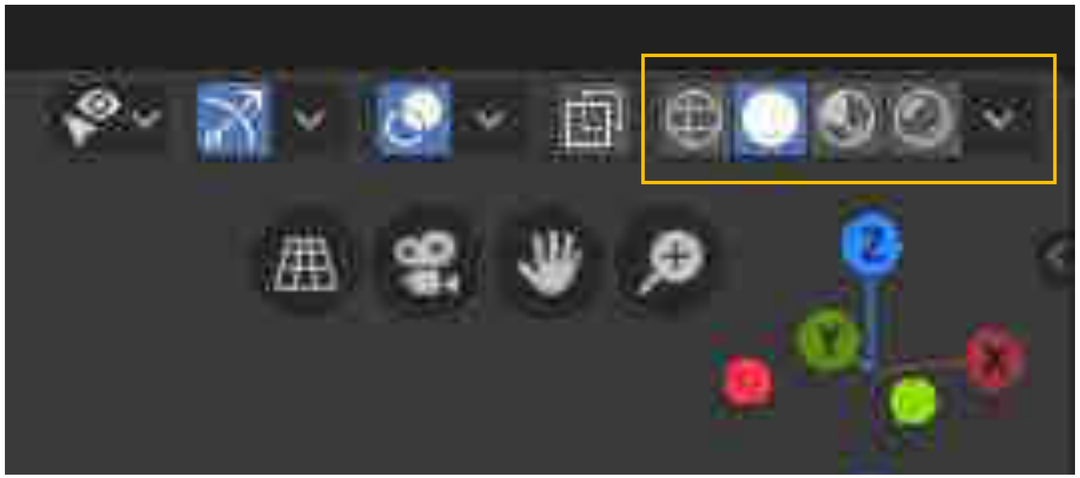
- **TAB** => switching between object and edit mode
- different selection modes (edit mode)
  - vertex select => ***1***
  - edge select => ***2***
  - face select => ***3***
- selection in top left menu



Viewport shading

- four options
  - wireframe
  - solid
  - look dev
  - render
- select in top right menu
- select in circular menu => ***Z***





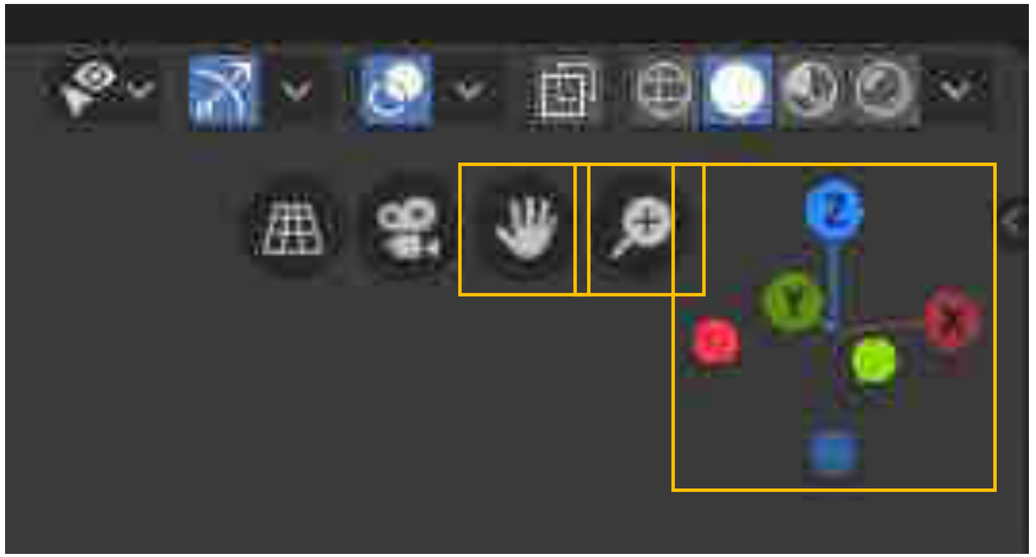
Adjusting view

- **1** => front view
- **3** => right view
- **7** => top view
- **CTRL + 1** => back view
- **CTRL + 3** => left view
- **CTRL + 7** => bottom view
- **5** => swap between perspective and orthographic view
- **9** => opposite view
- ***0*** => camera view

Adjusting view (mouse)

- left button – selection
- movements (magic mouse)
  - scroll – rotation around object
  - scroll + **SHIFT** – moving view
  - scroll + **CTRL** – zoom in/out
- movements (3 button mouse)
  - hold scroll – rotation aroung the object
  - hold scroll + **SHIFT** – moving view
  - scroll – zoom in/out

- same functionality can be achieved by using buttons in top right menu

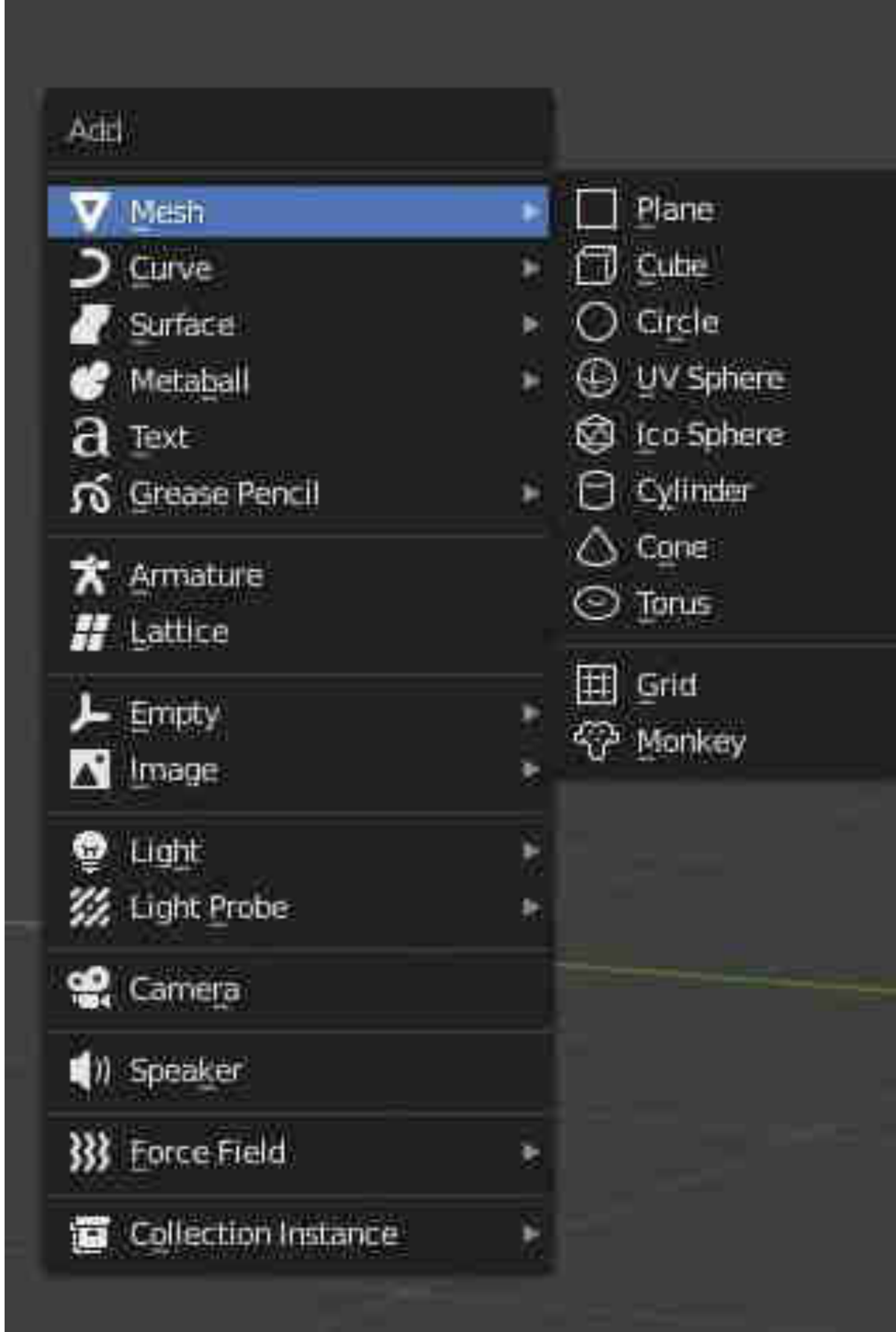


MODIFYING OBJECT

basic approach and tools

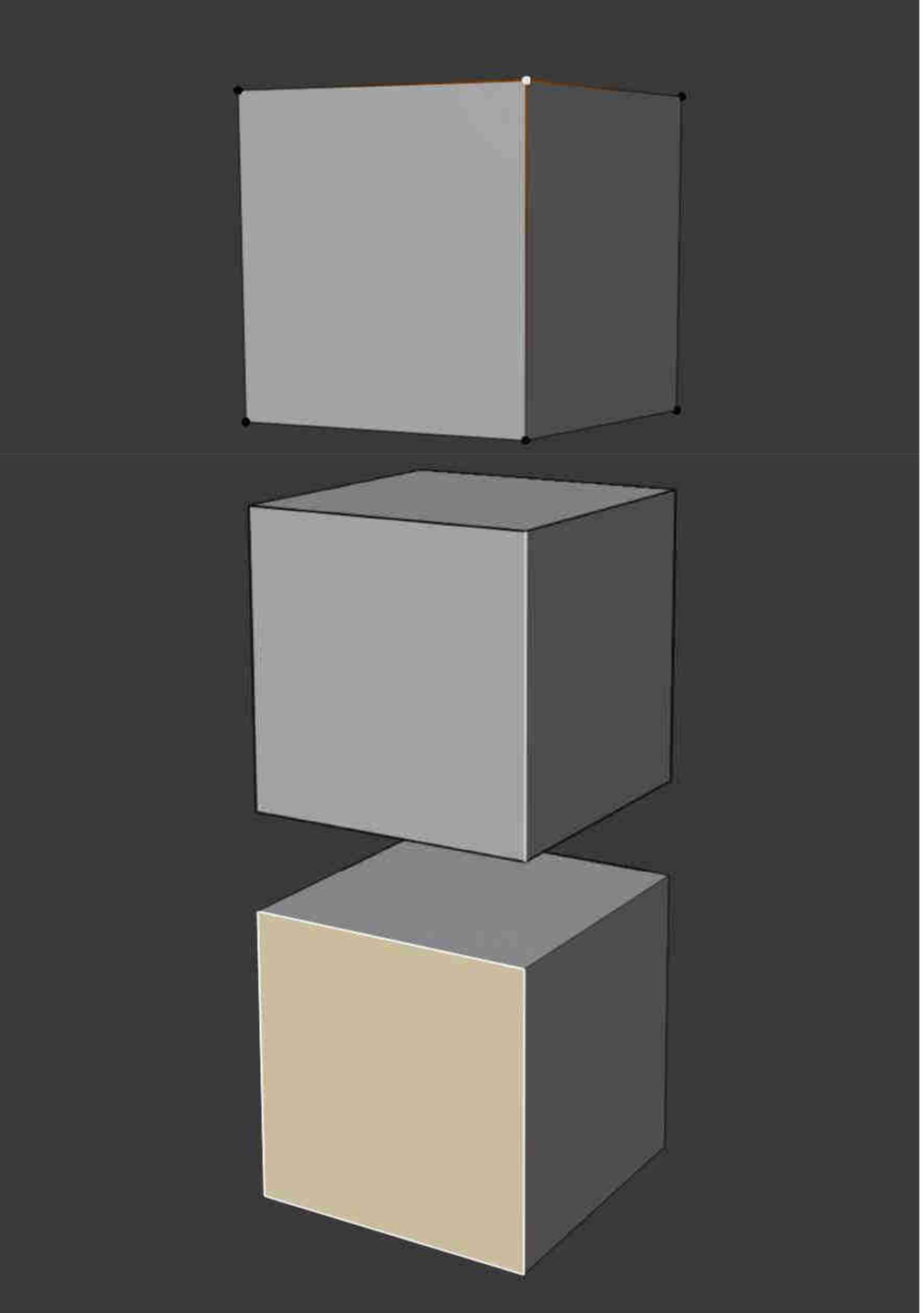
Adding new object

- in OBJECT mode
- shortcut – **SHIFT + A**
- select appropriate object in the menu



Adding new object

- object appears on the location of cursor
- bbefore adding new object, cursor's position should be in the center
- shortcut – **SHIFT + S -> cursor to world origin**



Adjusting selection

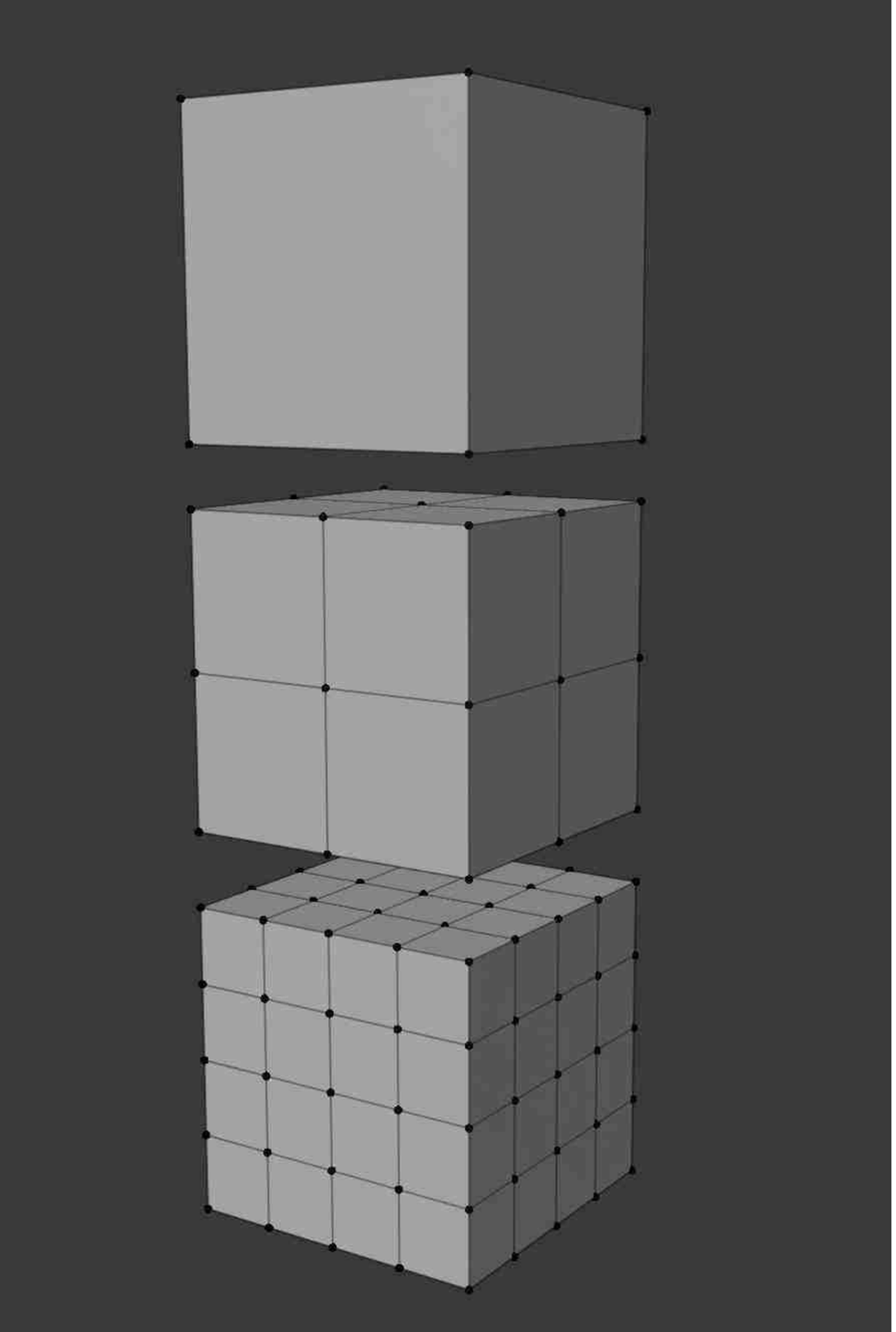
- components of polygon mesh
  - vertex
  - edge
  - face
- different selection modes (edit mode)
  - vertex select => ***1***
  - edge select => ***2***
  - face select => ***3***

Transform options

- transform options
  - translation (default mode, after selection)
  - rotation => **R**
  - scaling => **S**
- transforming variations
  - free movement => **G**
  - one axis movement => **X / Y / Z**

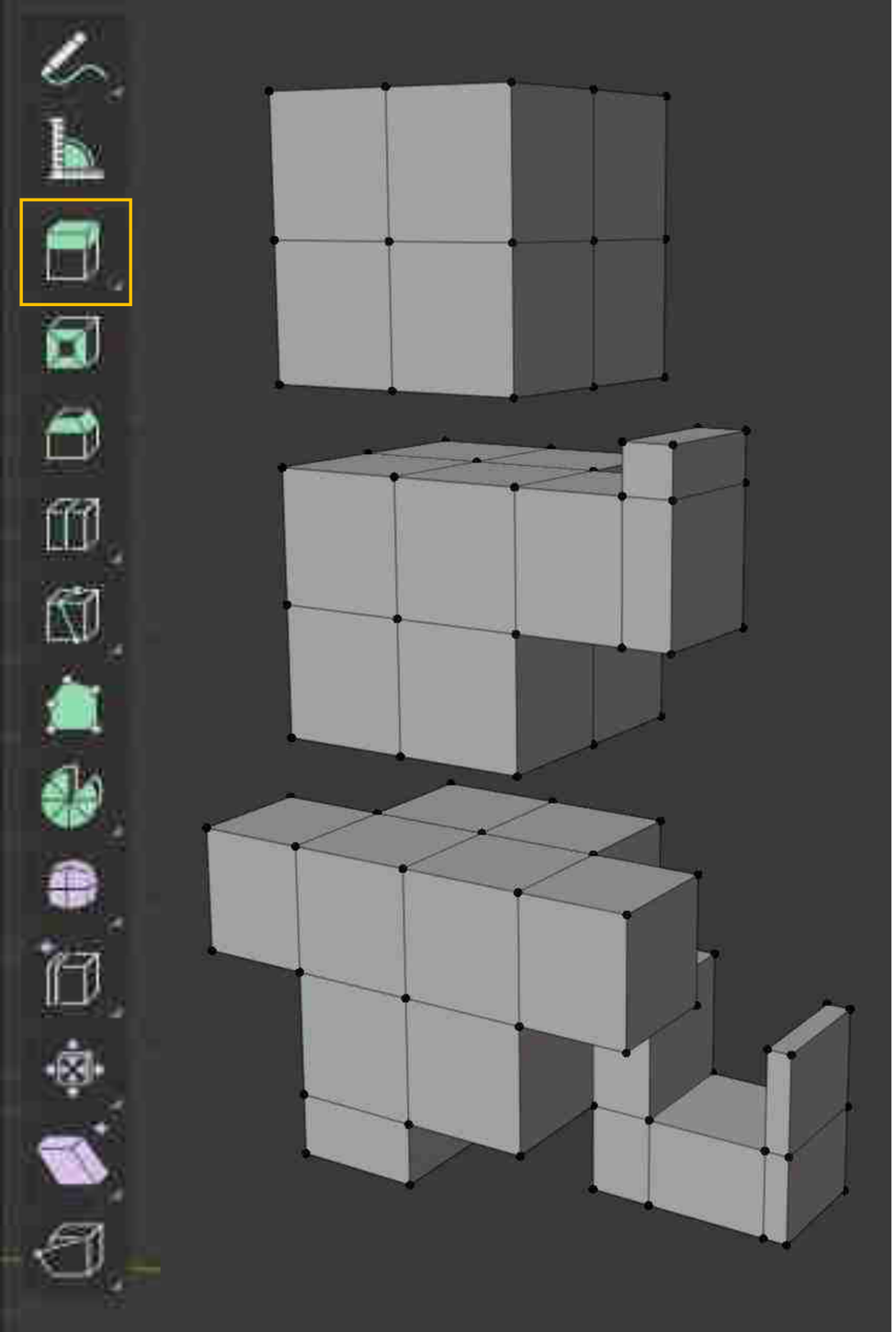
Tools

- extrude
- inset
- bevel
- loop cut
- knife
- smooth
- subdivide
- fill
- bridge
- merge
- delete in dissolve



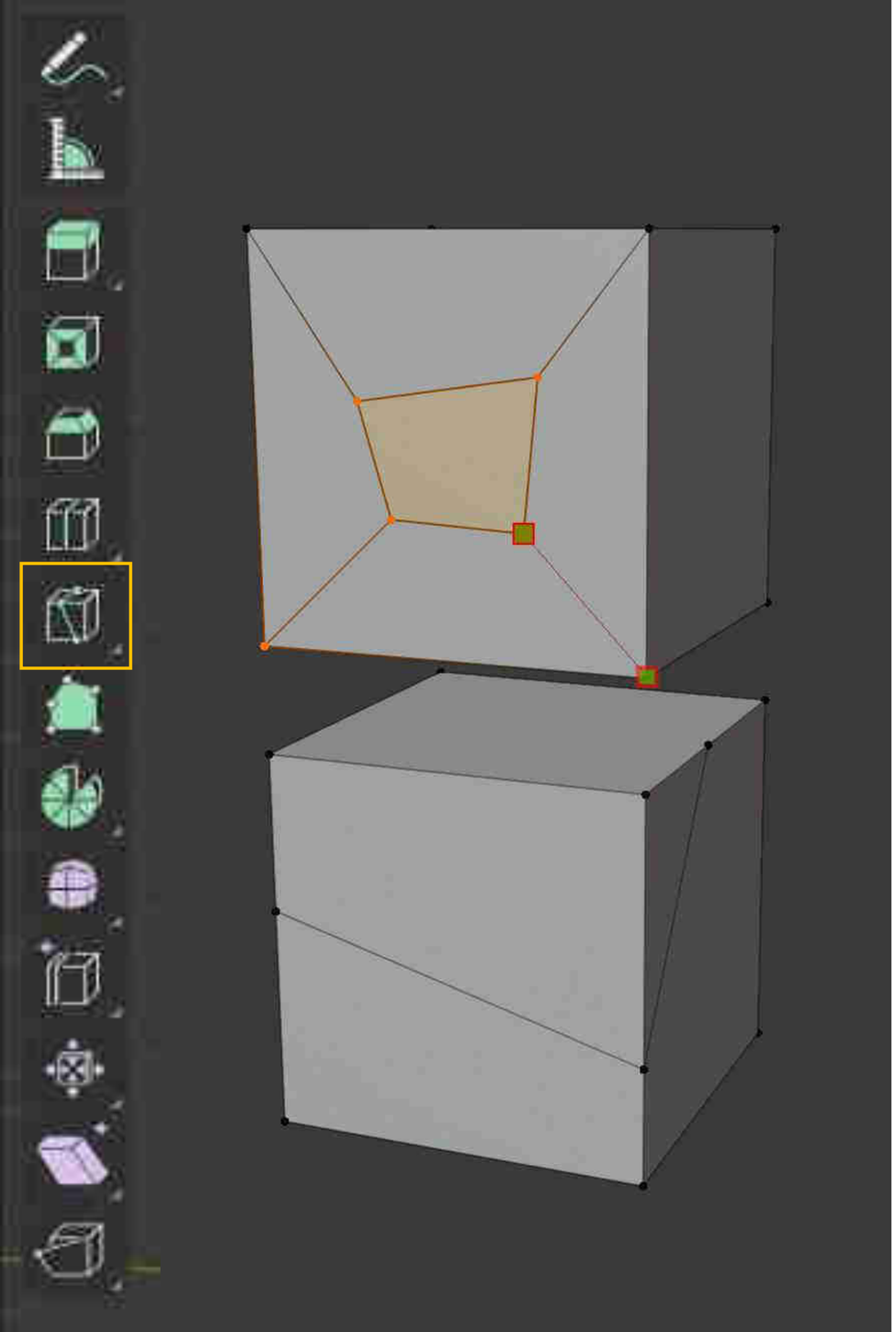
Subdivide

- splits selected edges and faces by cutting them in half
- adds resolution to the mesh
- not in T-menu, no shortcut
- right click => subdivide



Extrude

- shortcut – **E**
- advanced extrude options – **ALT + E**
- create new geomerty based off of already present one
- one of most important tools

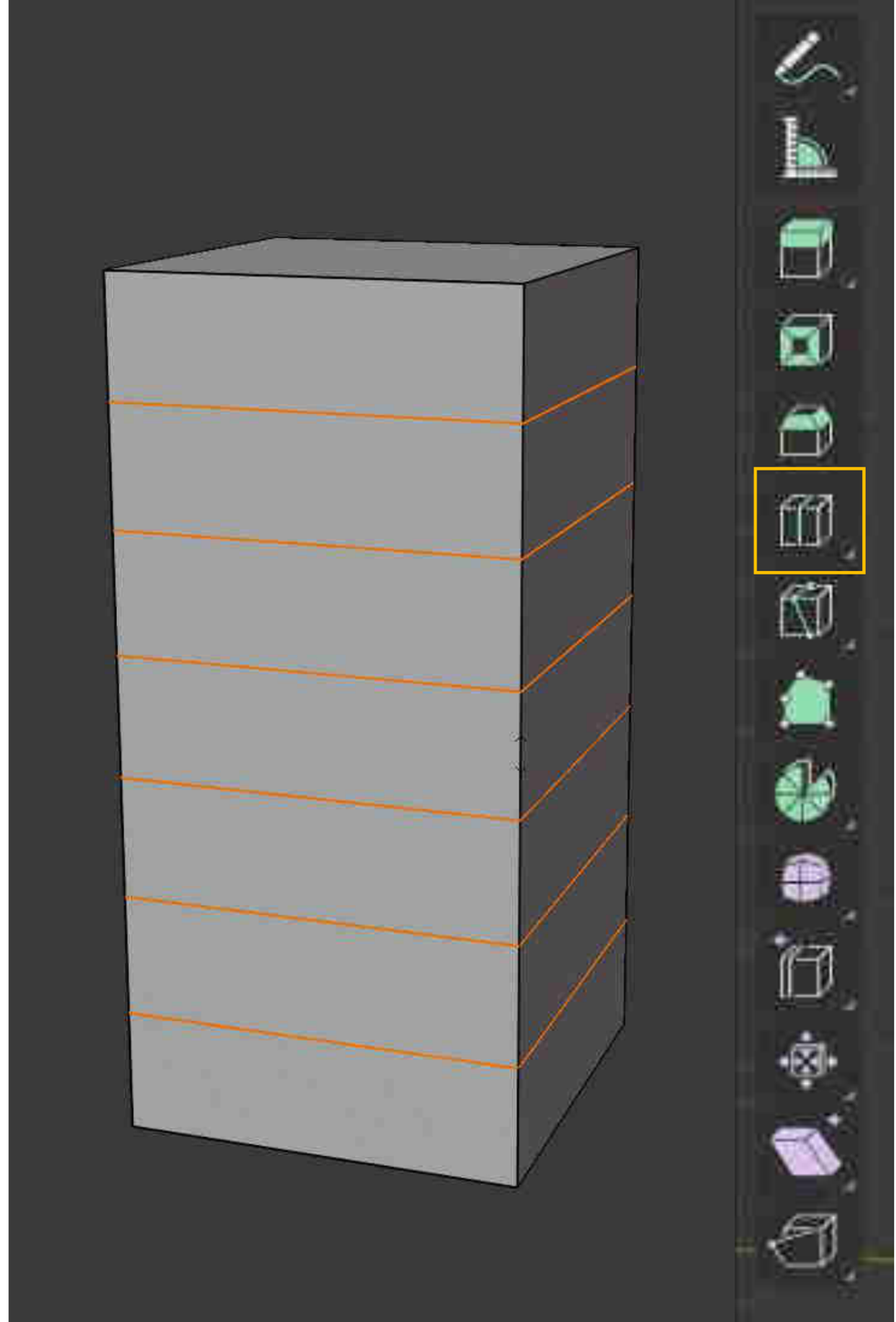


Knife

- shortcut – **K**
- interactively subdivide (cut up) geometry
- achieved by drawing lines or closed loops

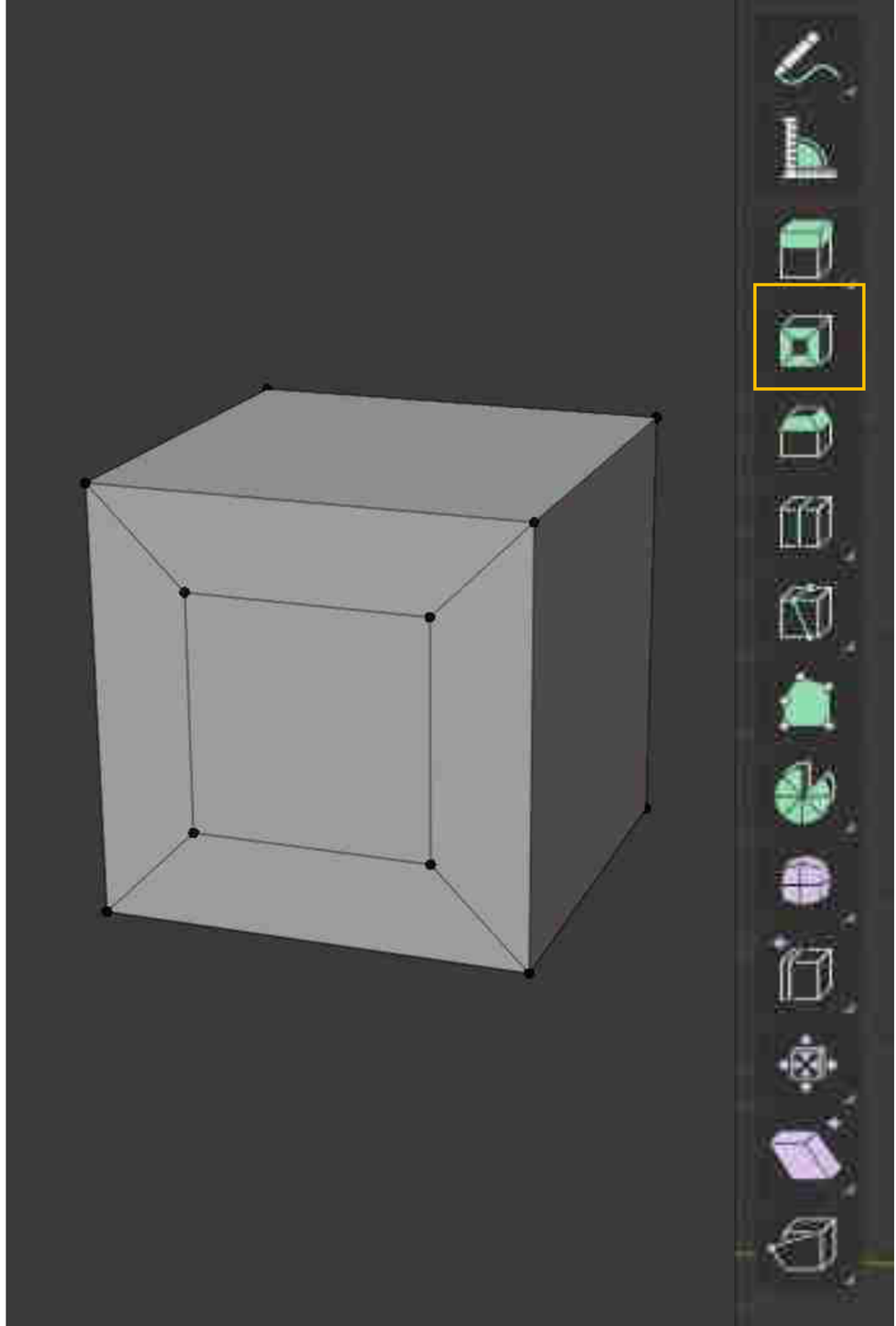
Loop cut

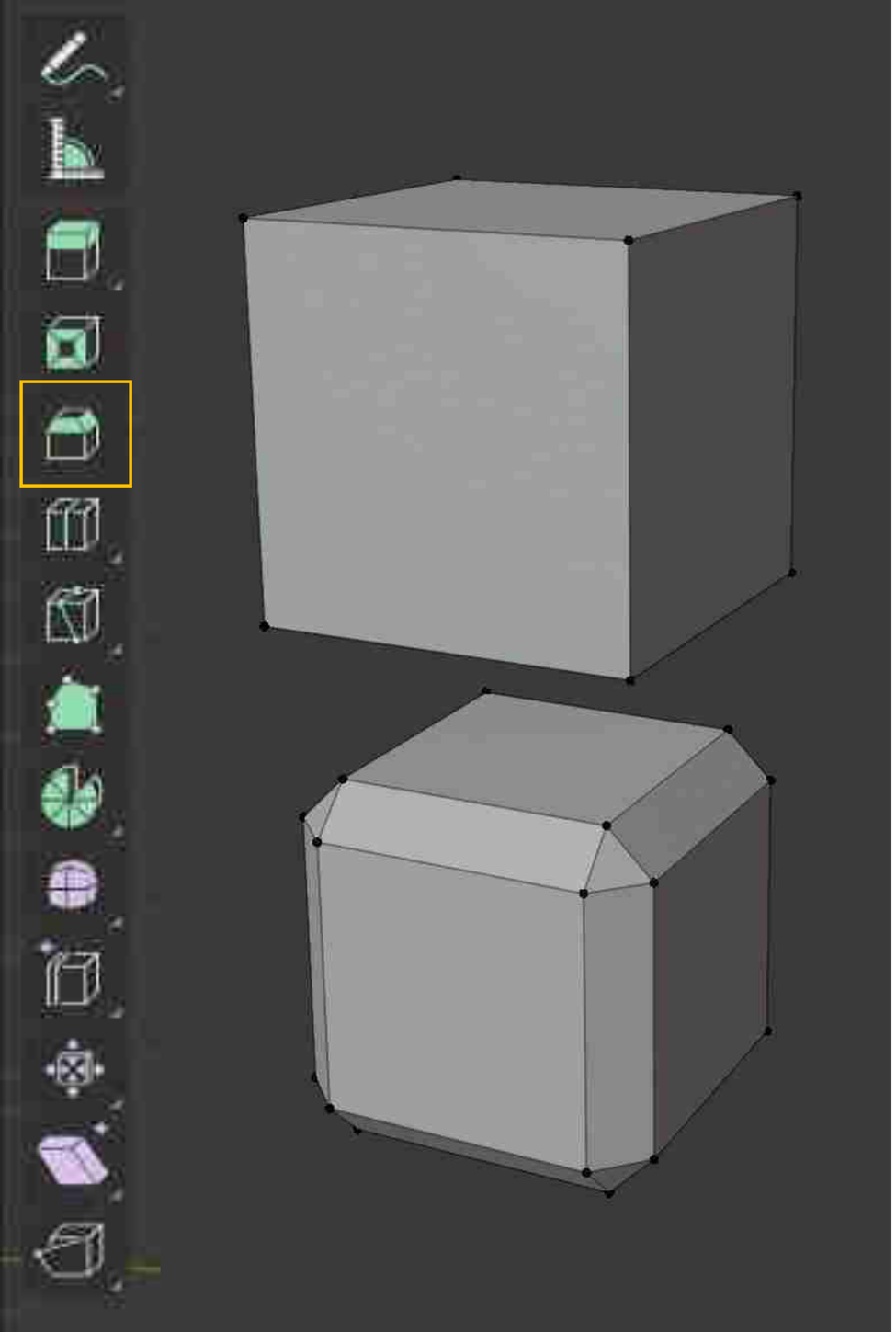
- shortcut – **CTRL + R**
- creates a loop of edges and cuts right though the object
- slide = move the loop to desired position
- multiple loops – **CTRL + R** + scroll wheel OR type number of loops



Inset

- shortcut – **I**
- takes currently selected faces and creates an inset of them
- adjustable thickness and depth
- similar to loop cut



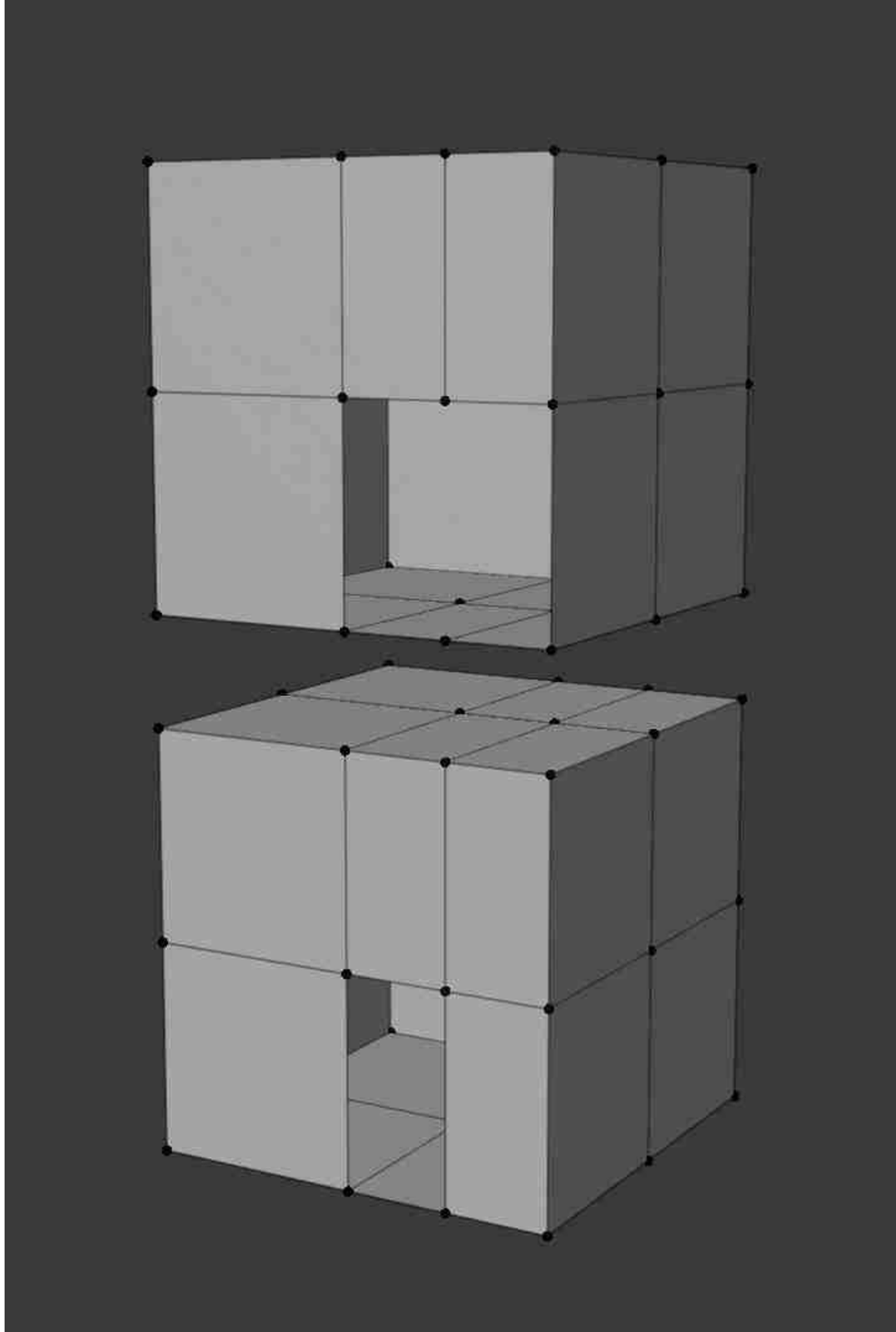


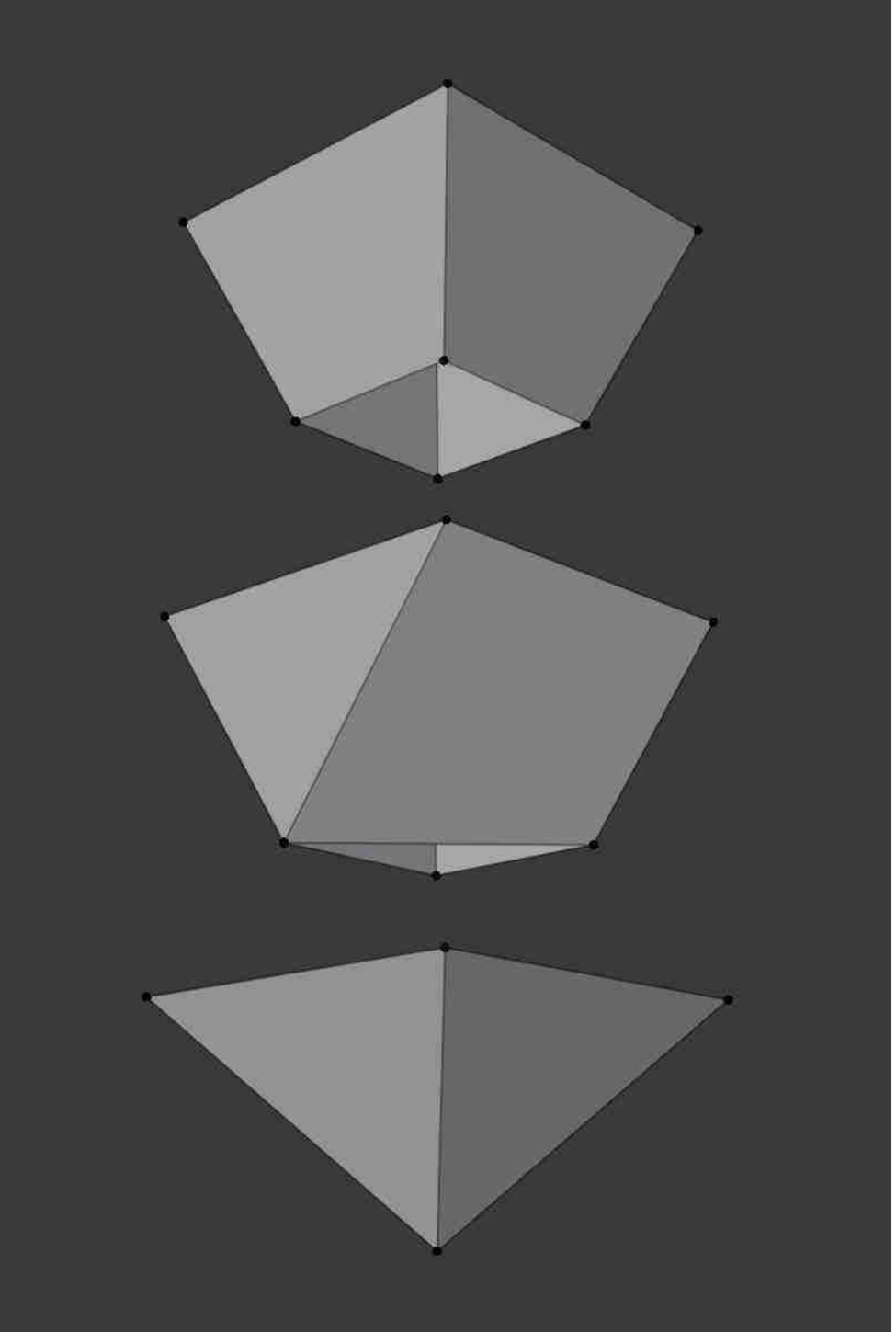
Bevel

- shortcut – **CTRL + B**
- create rounded edges on geomerty
- useful for giving realism to non-organic models

Fill

- shortcut – **F**
- creates geometry by filling in the selection
- before filling in, vertices or edges must be selected
  - 2 vertices selected => makes edge
  - multiple vertices / edges selected => makes face



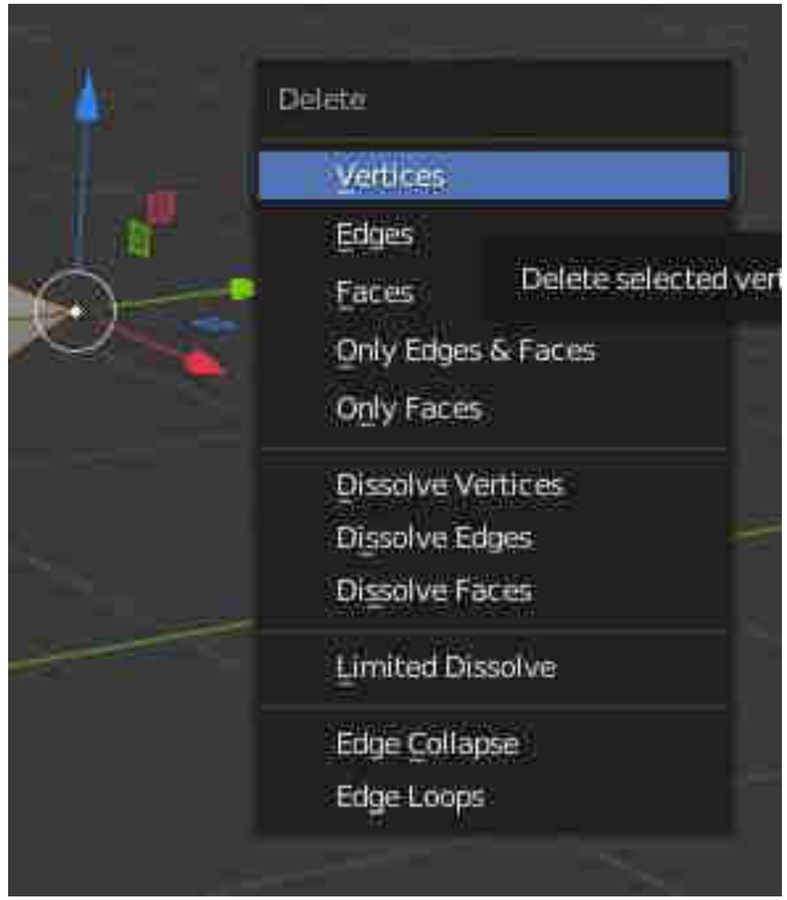


Merge

- shortcut – **ALT + M**
- merge two or more vertices
- different merging options
  - at first vertex selected
  - at last vertex selected
  - at center of all vertices
  - at cursor location
  - collapse

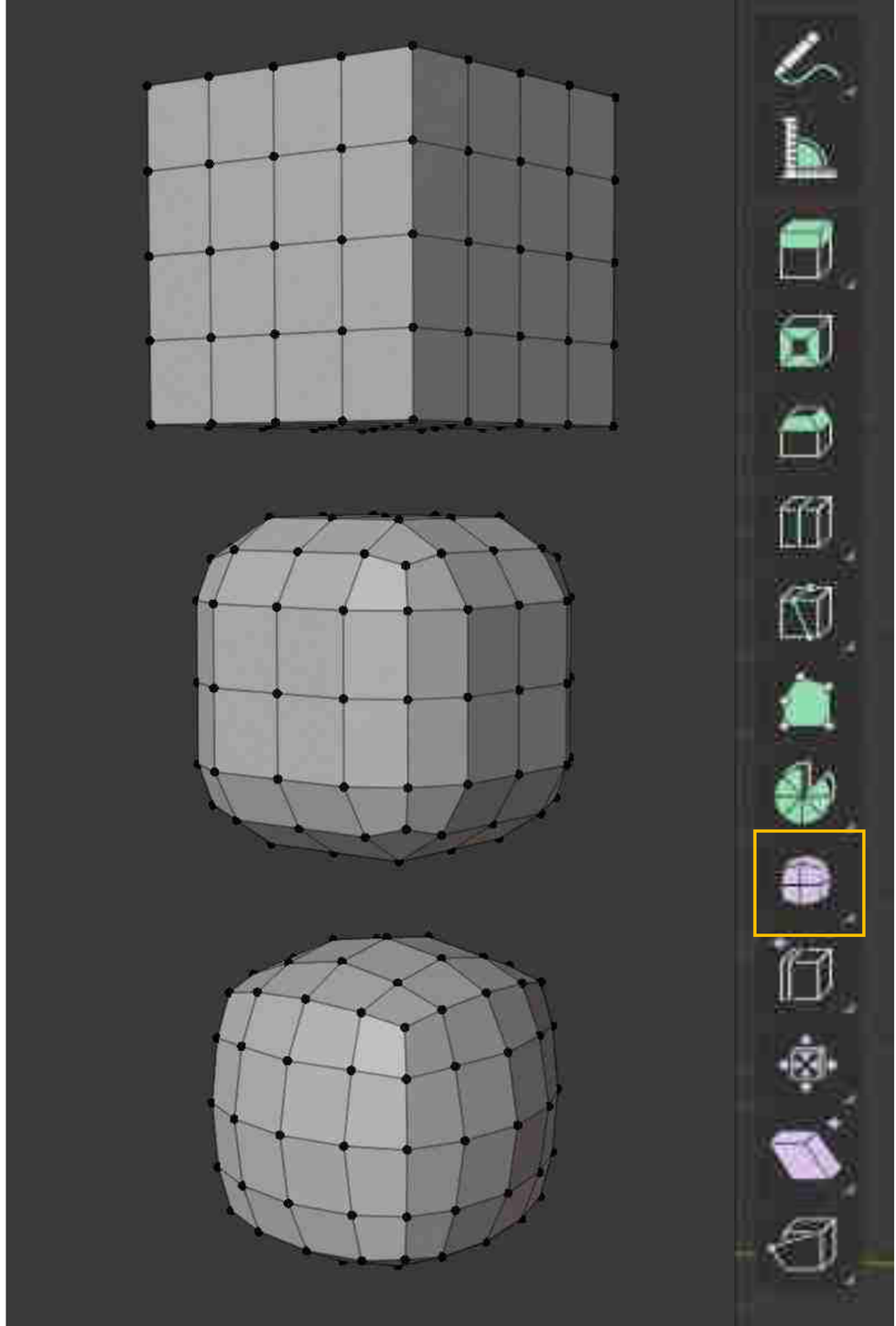
Delete & dissolve

- shortcut – **X**
- to remove components
- DELETE selected vertices/edges/faces
  - can be limited to whichever geometry is preferred
  - leaves holes in geometry
- DISSOLVE removes selected geometry and fills in surrounding geometry



Smooth

- no shortcut
- smooths the selected vertices by averaging the angles between the faces
- click and drag to adjust the amount of smoothing

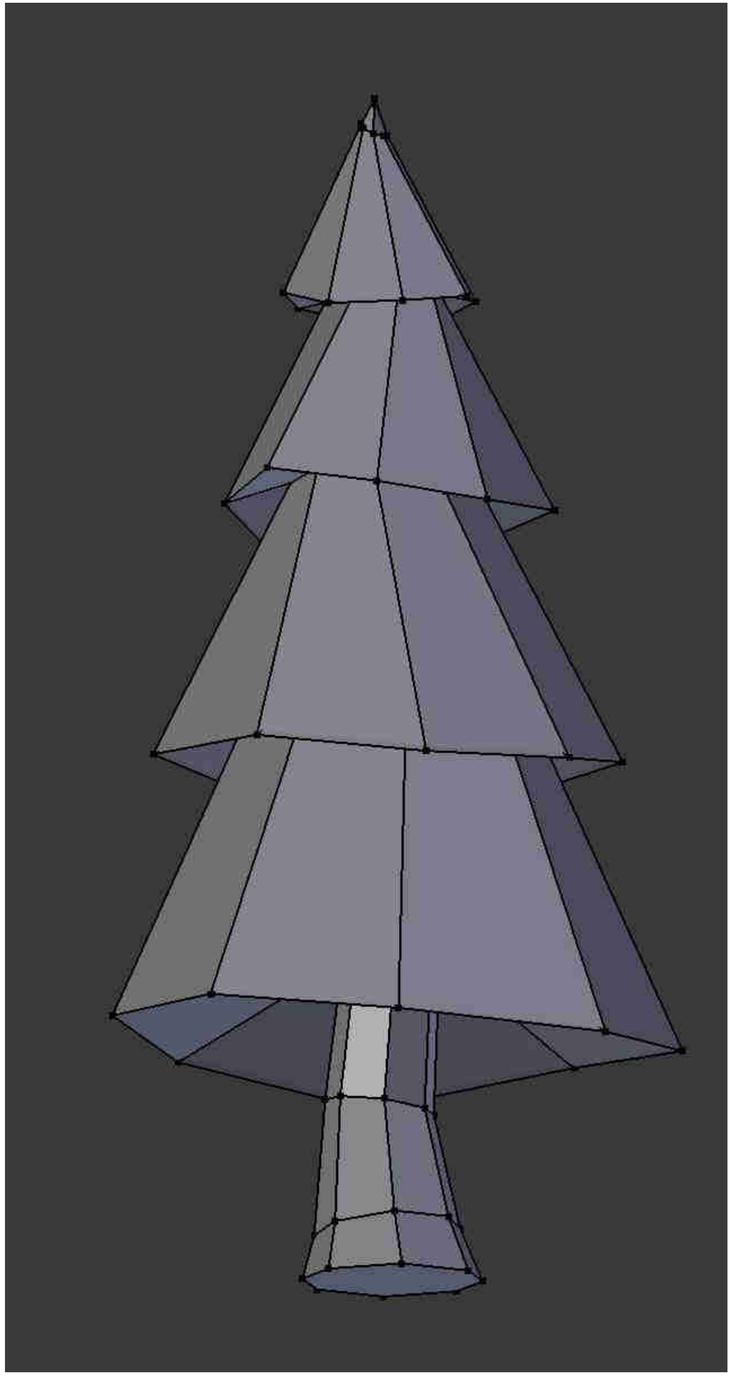


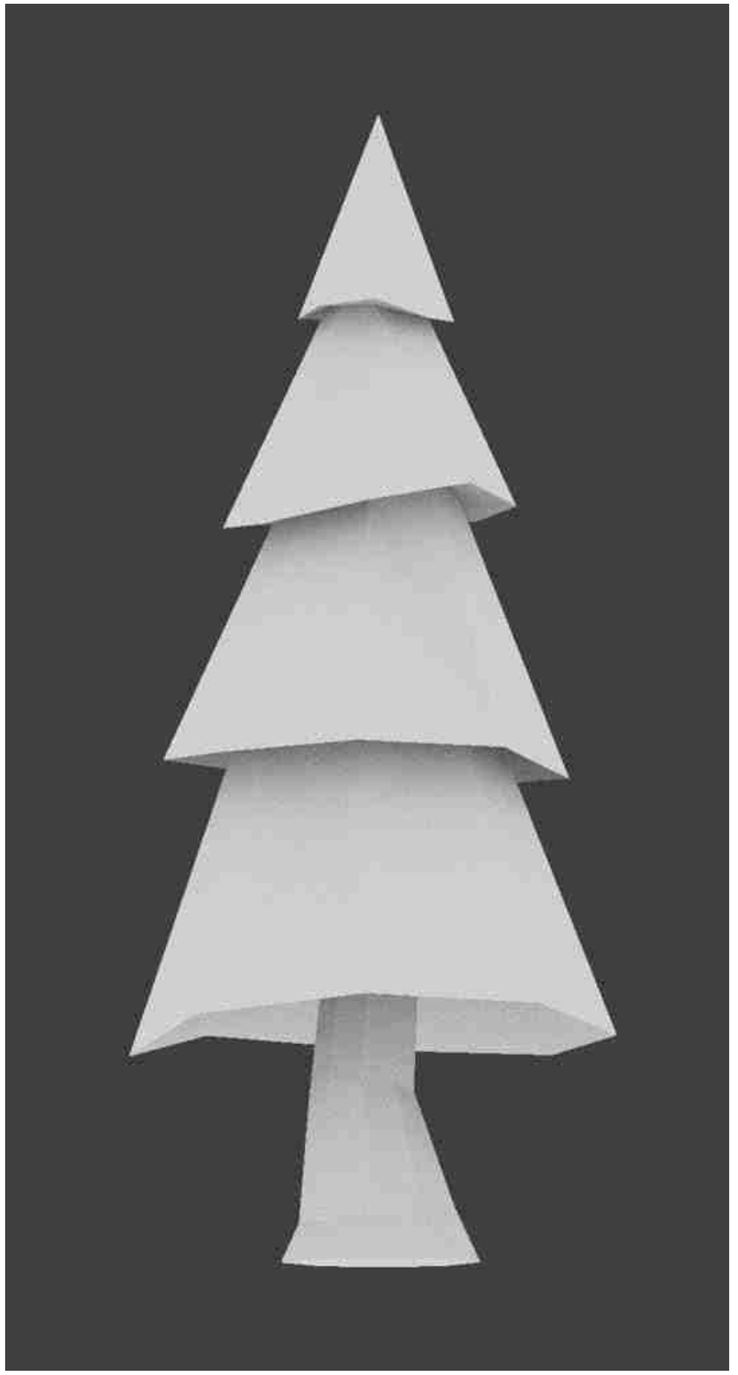
Multiple selection

- *useful once there's a complex model*
- **ALT + (mouse click)** => select edge loop
- **SHIFT + (mouse click)** => select multiples with mouse
- **CTRL + + / -** => additionally select neighboring geometry
- **A** => select all
- **ALT + A** => deselect all
- **B + (drag mouse)** => select all geometry inside drawn square
- **C + (drag mouse)** => select all geometry inside circle
- **CTRL + (drag mouse)** => select all geometry inside drawn loop

LOW POLY SPRUCE

guided modeling

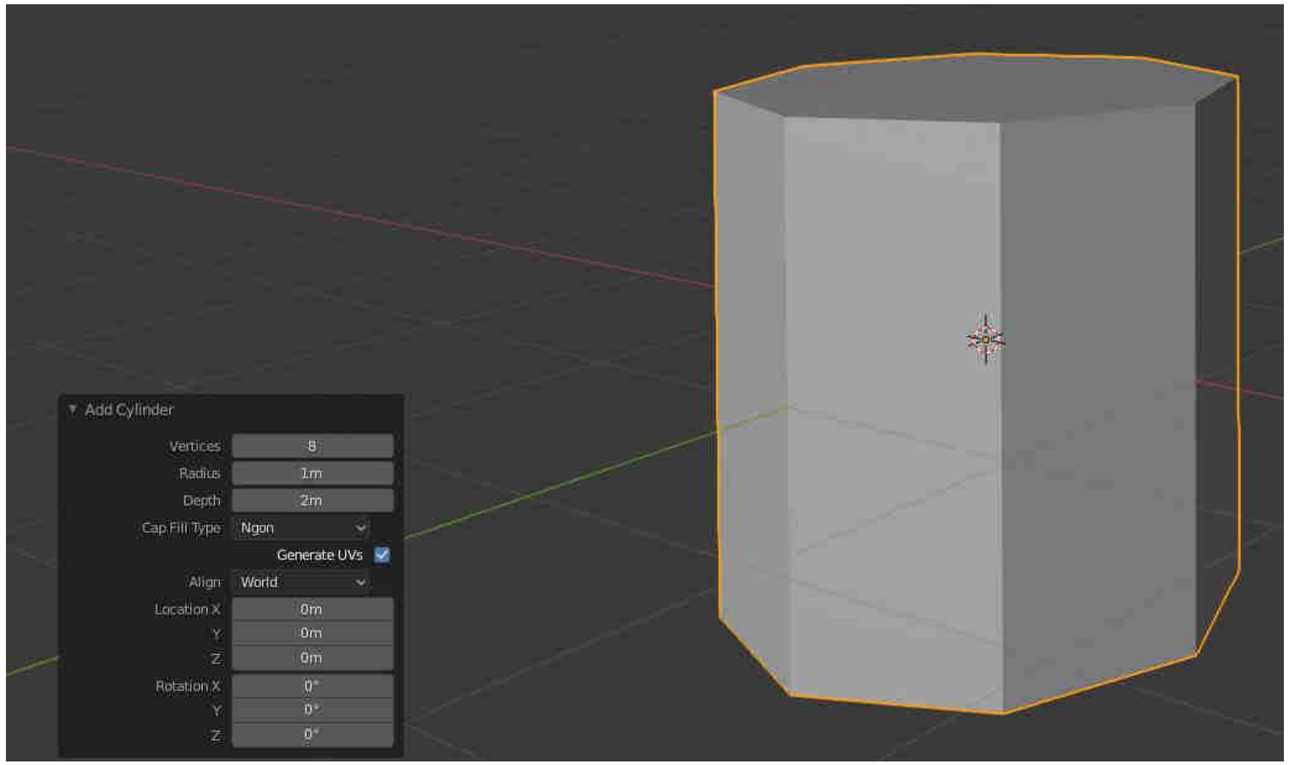


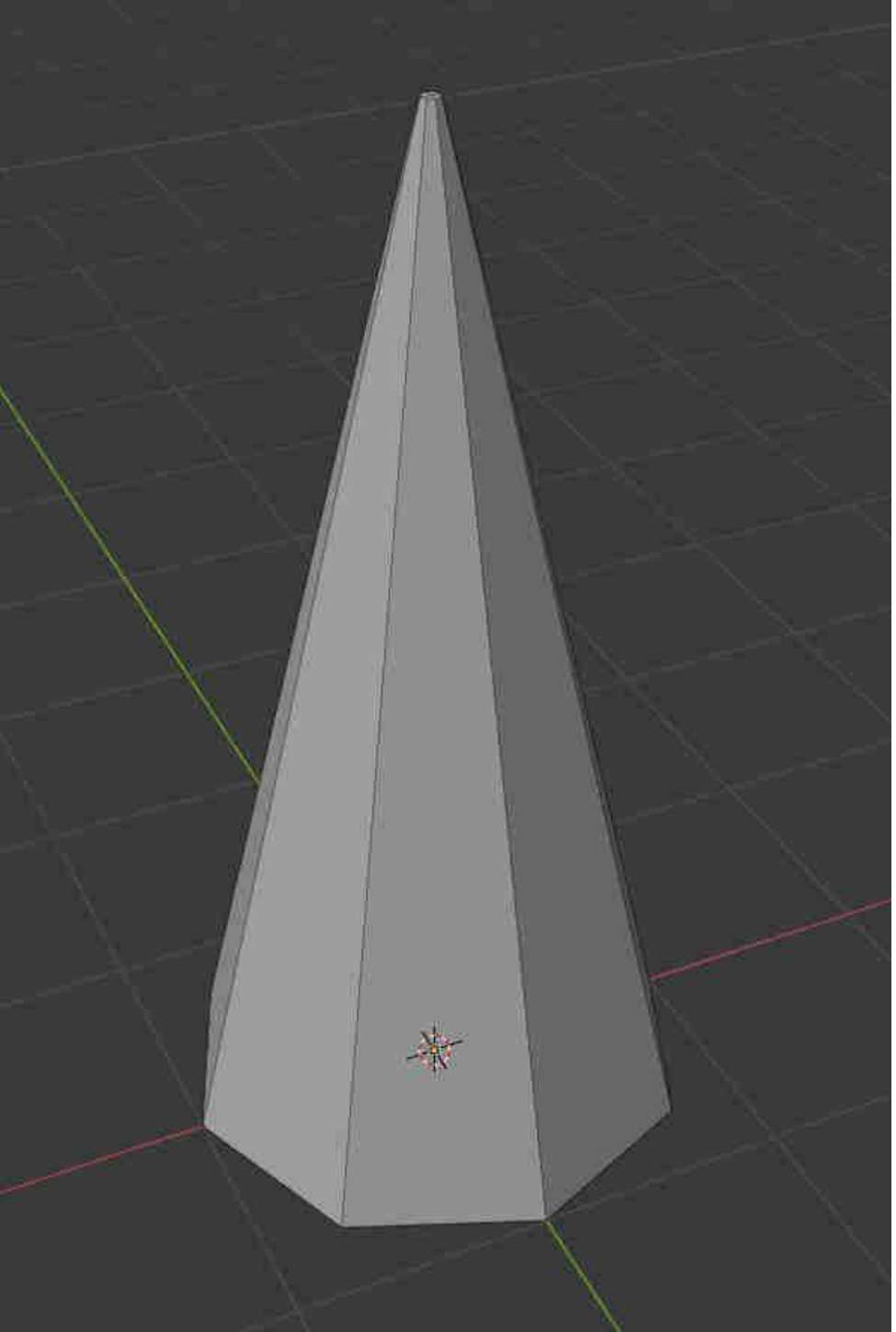


Spruce – base outline

- **SHIFT + S** -> world origin
- **SHIFT + A** => add new object
- START OBJECT = cylinder,

  8 vertices





Spruce – canopy outline

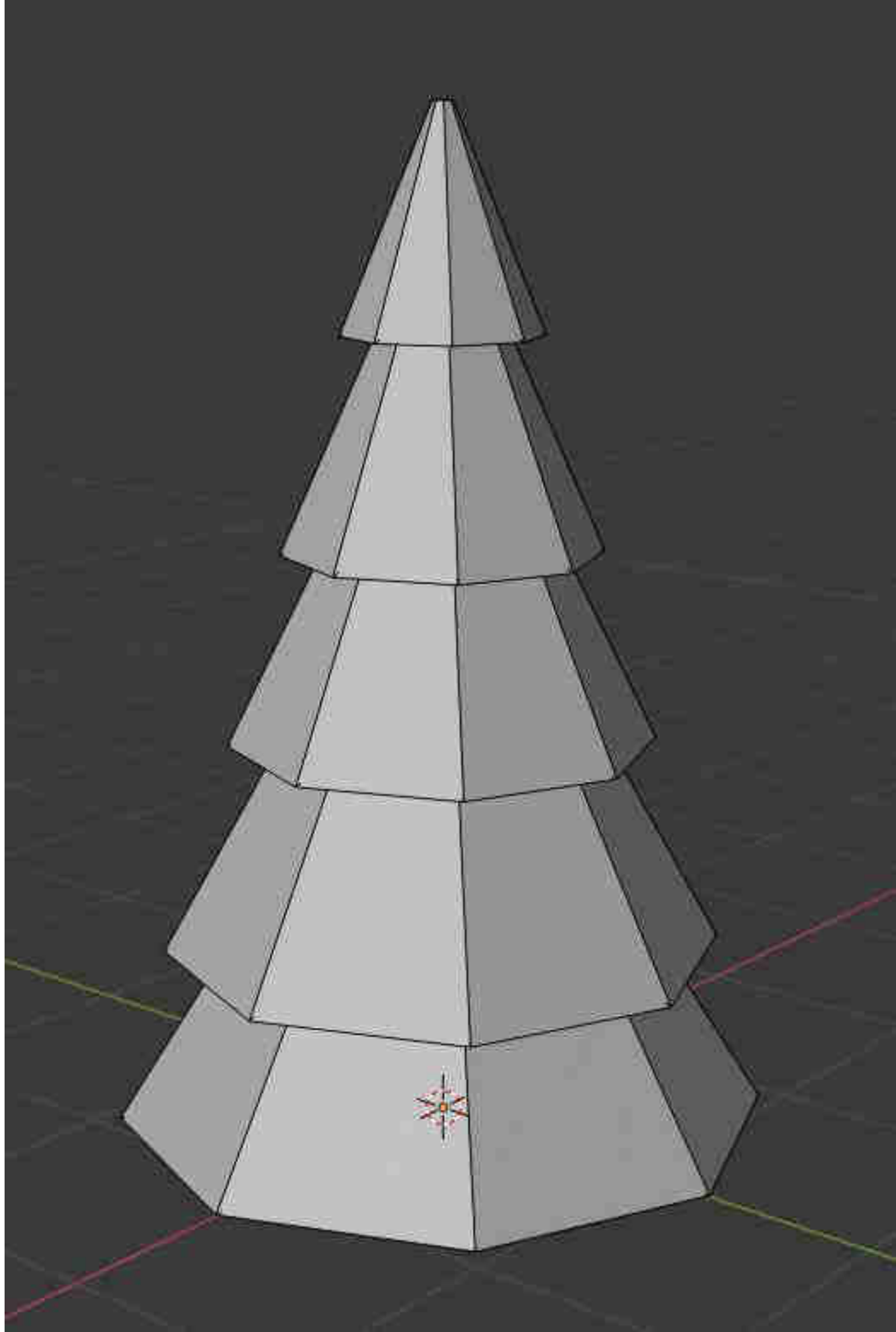
- **1** => front view
- **A** => select whole object
- **S + Z** => scale on Z axis

- select top face
- **S** => scale down

Spruce – canopy

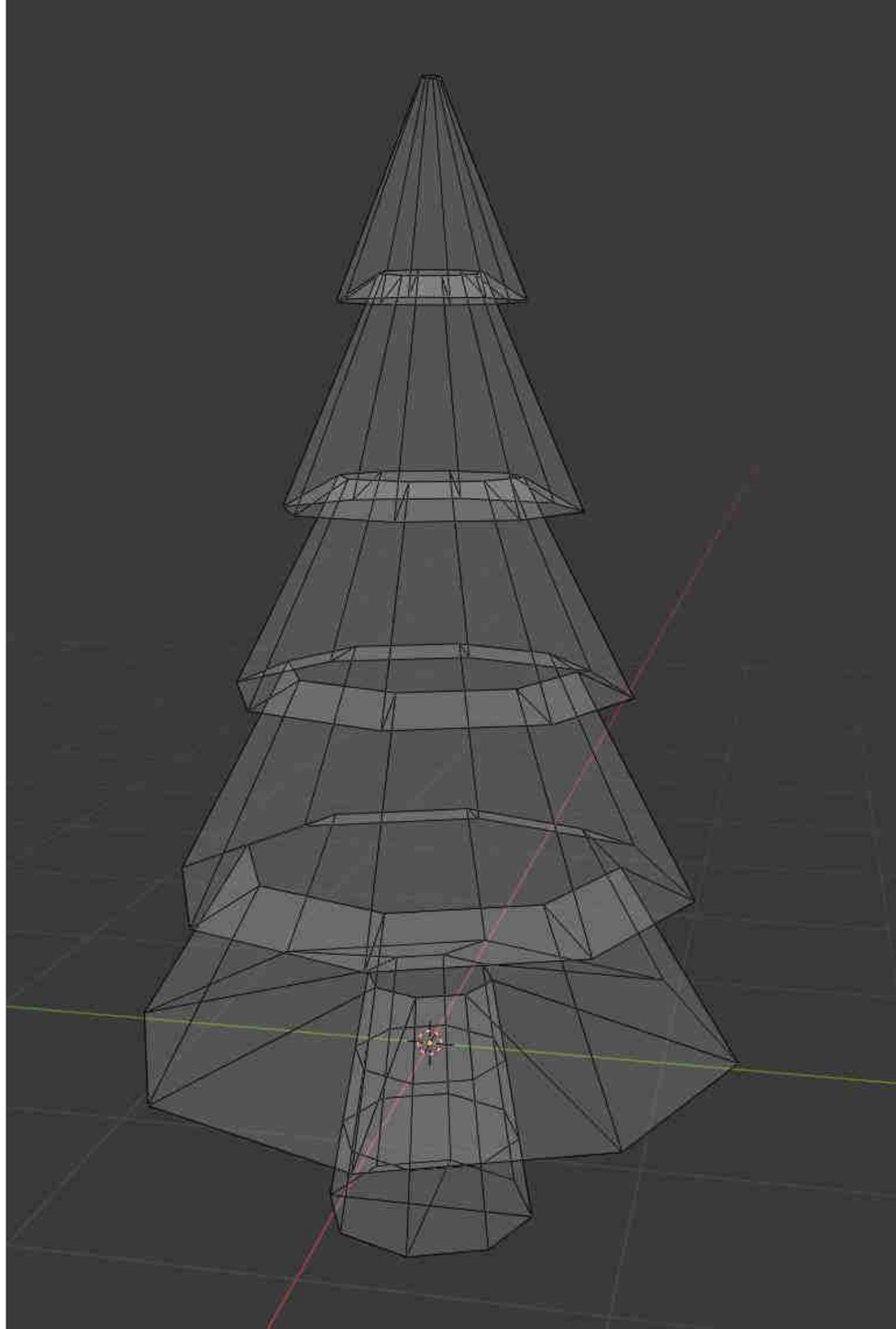
- **CRTL + R** => add 4 loop cuts

- add new loop, directly above first one
- *while new loop is selected:*
- **S** => scale out
- move down (blue arrow)
- *repeat for all four loops :)*



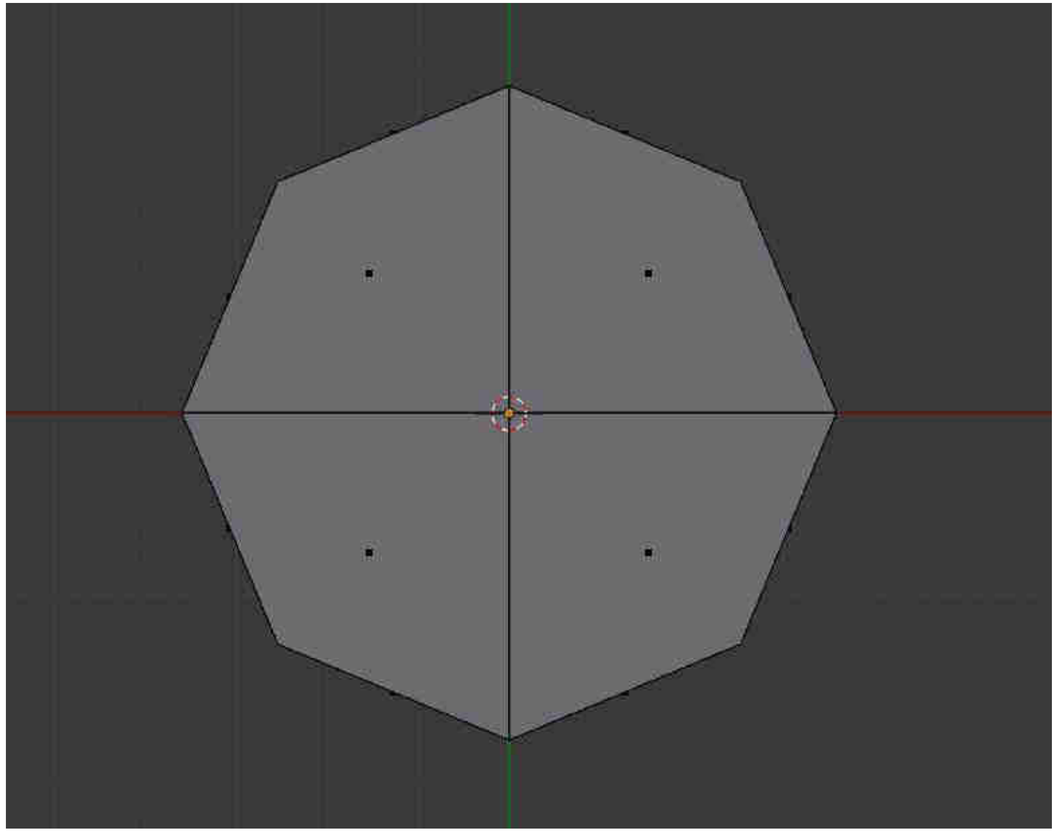
Spruce – trunk

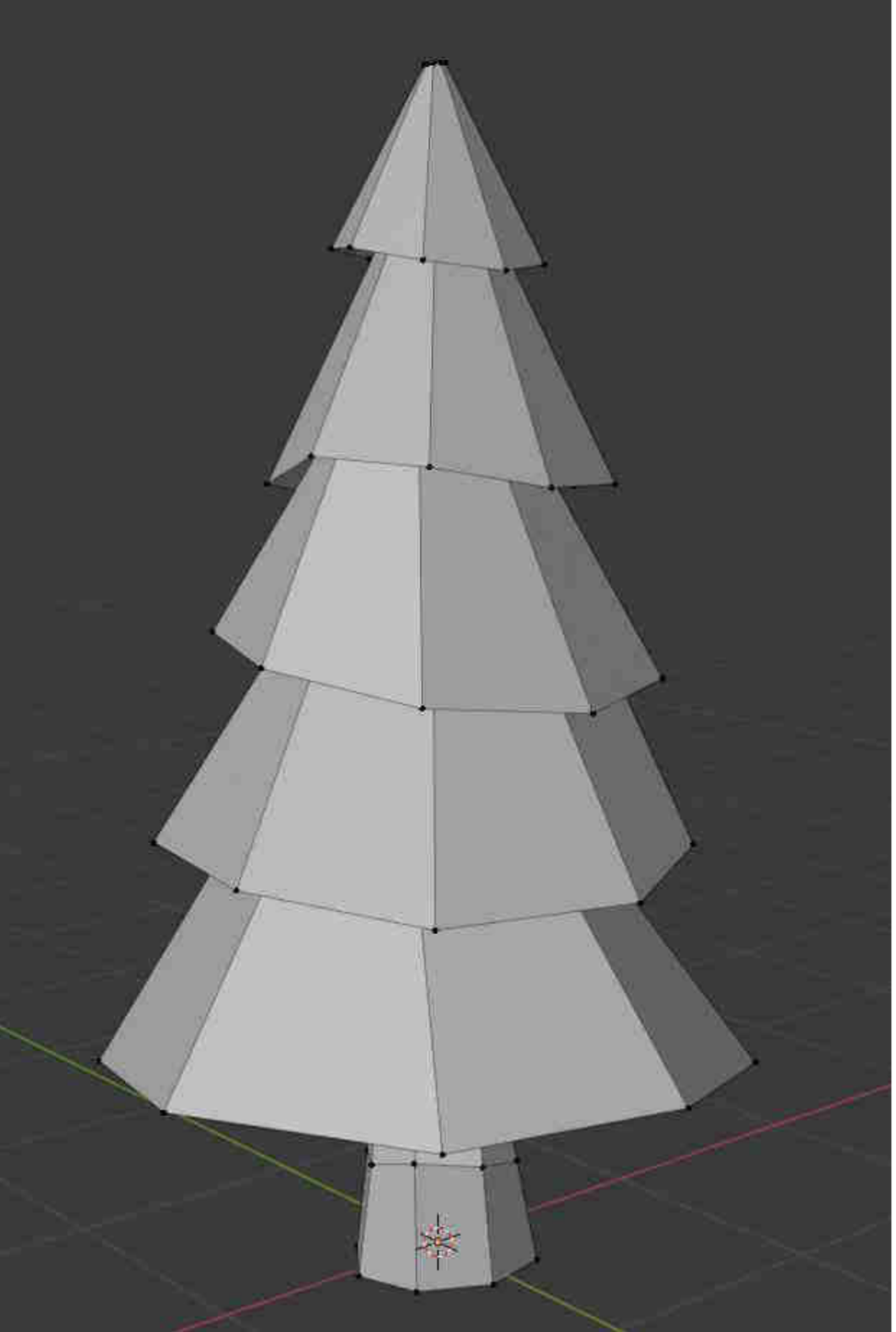
- **SHIFT + 7** (bottom view)
- select bottom face
- **I** => inset
- **E** => extrude down
- **CTRL + R** => add two loop cuts



Spruce – fixing geometry

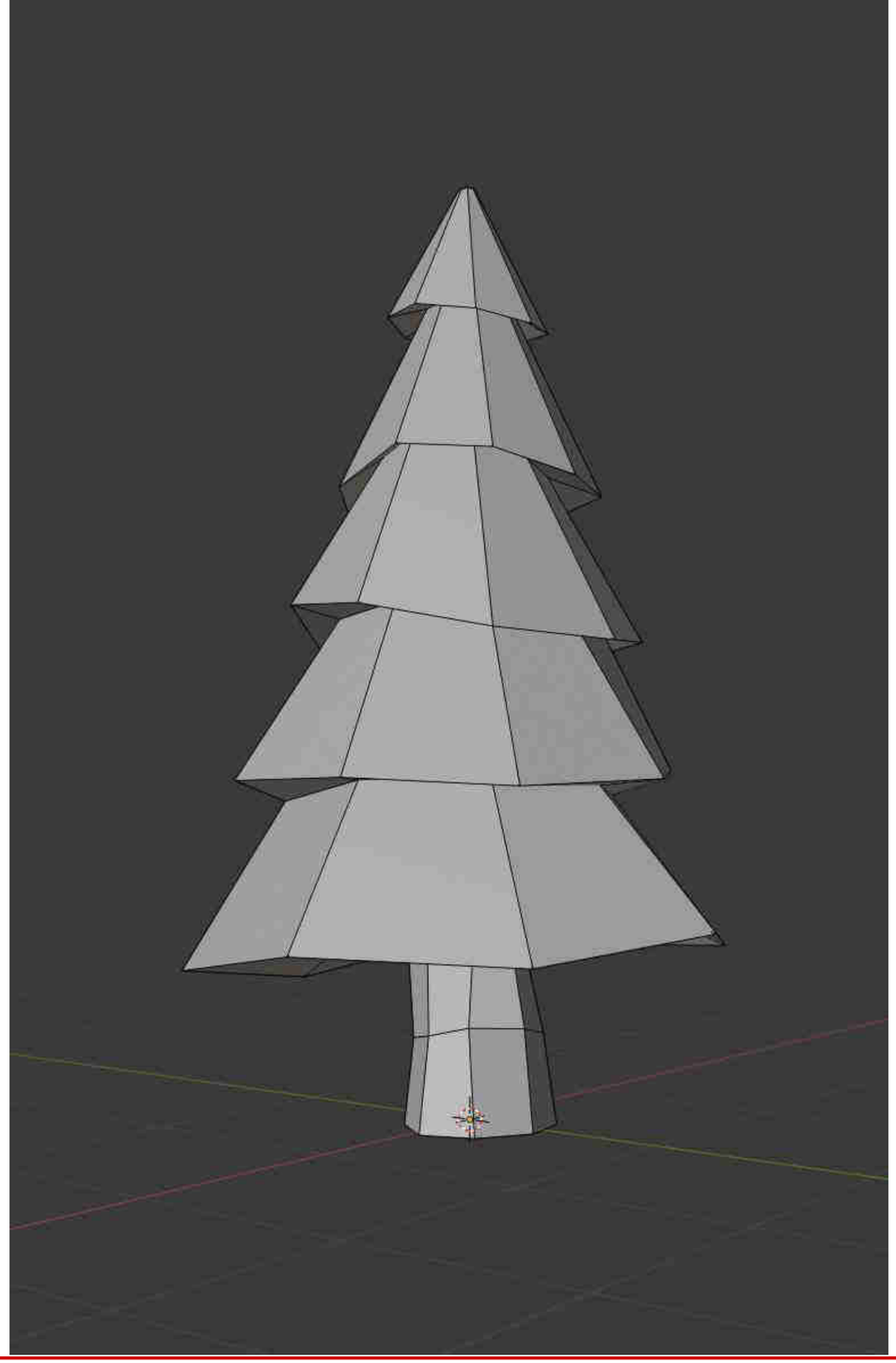
- *fix top and bottom face=> each face should be a quad (4 vertices) and not 8*
- **K** => knife
- cut up a cross => *we get four faces, each with four vertices*

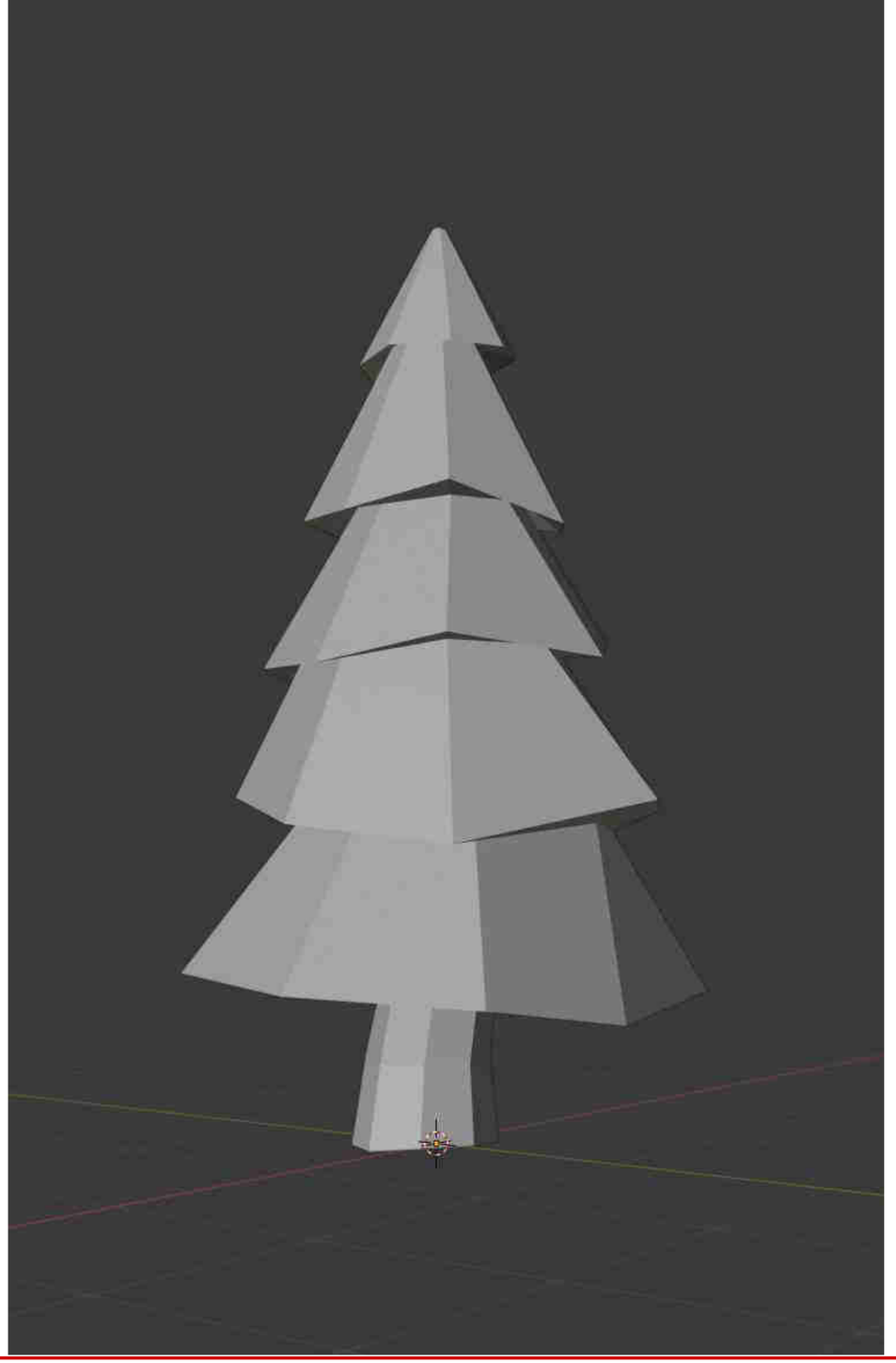




Spruce - details

- **S** = scale
- **R** = rotate
- + move vertices
- *use proportional editing =>* ***O***





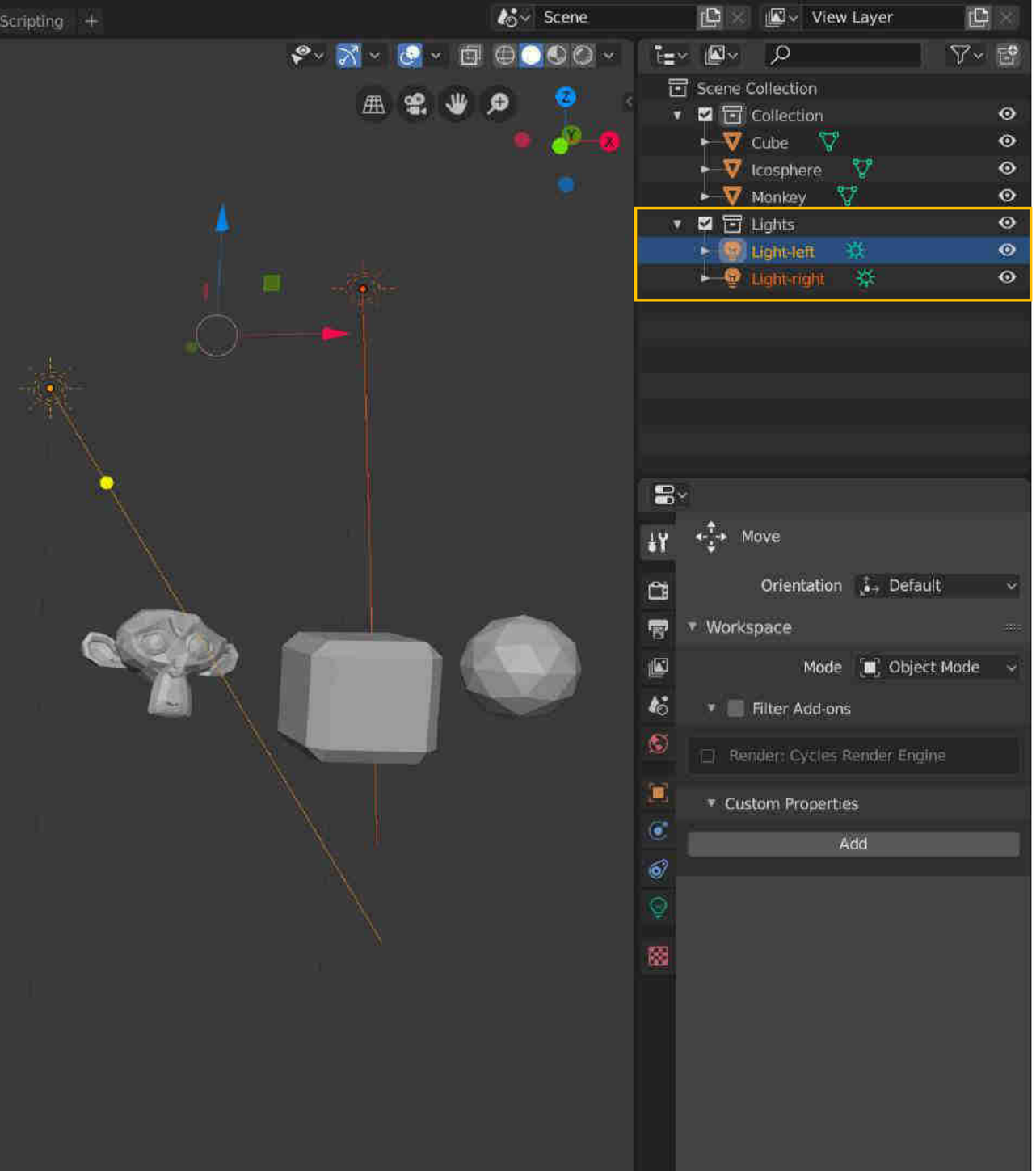
Collections

- objects are stored in *main database*
- from database they are referenced in *scenes*
- part of *scene collection*
- all scene objects belong to this special collection

Collections

- make your own collections
- better organization
- result is a clear and flexible way to arrange objects

- named and sorted hierarchically
- nested collections



Adding collections

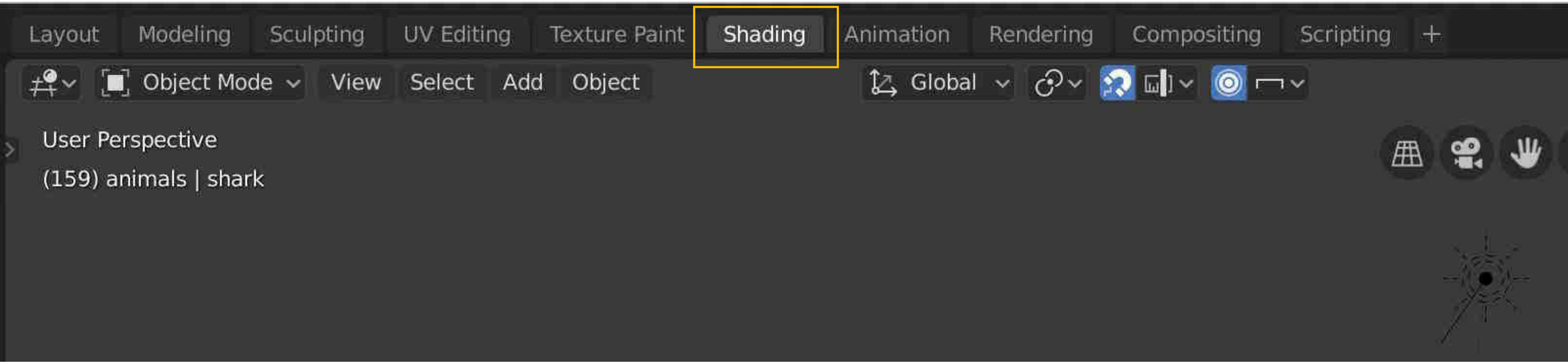
- select objects in scene which you want to group together
- shortcut – ***M***
- new collection => name collection
- add to existing collection

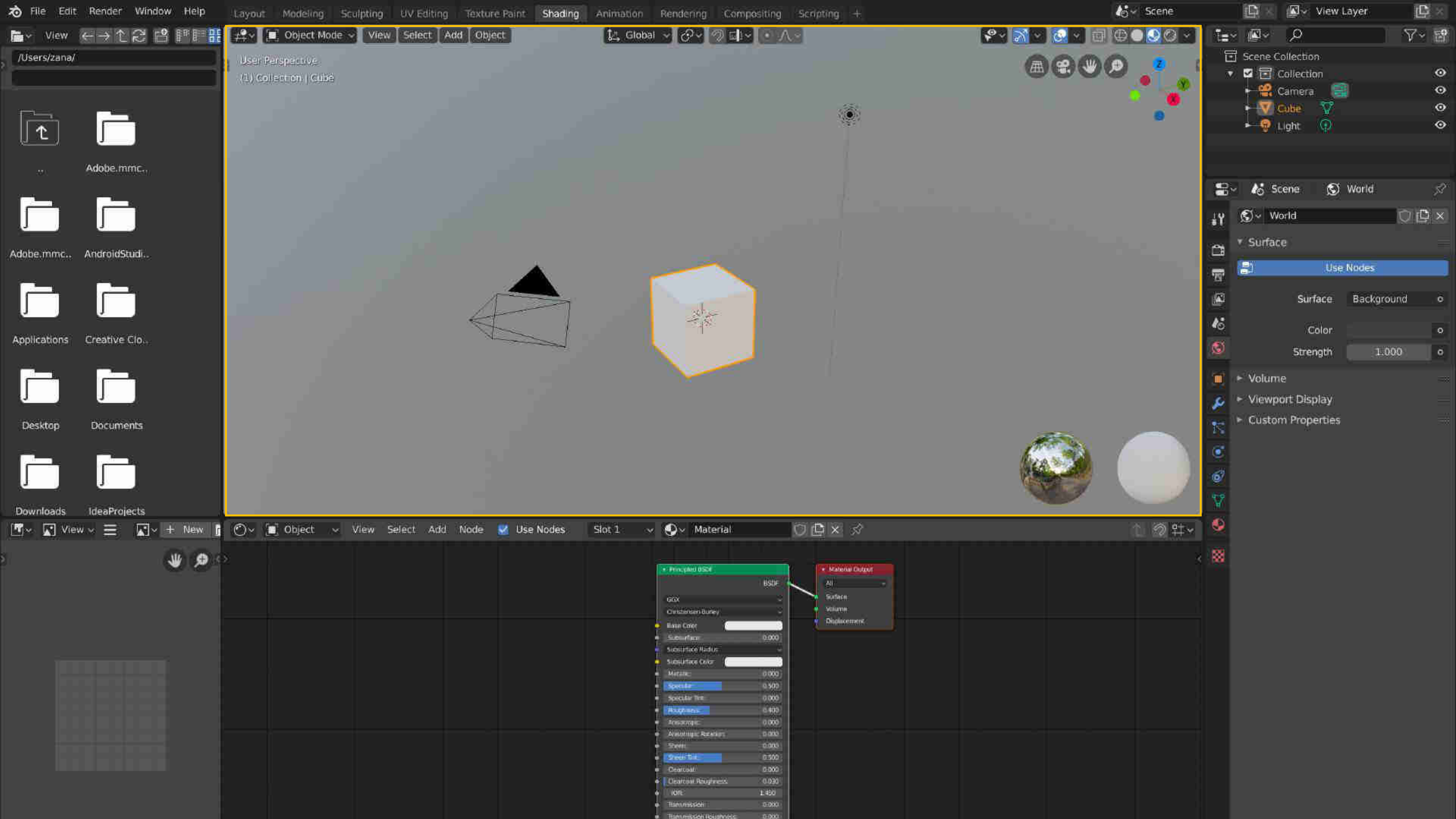
ADDING COLORS

materials

Shading

- Premade window layouts – easier to access Blender's functions
- shading layout for adding colors




File Edit Render Window Help
Layout Modeling Sculpting UV Editing Texture Paint Shading Animation Rendering Compositing Scripting
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Light
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Surface Background
Color
Strength 1.000
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Viewport Display
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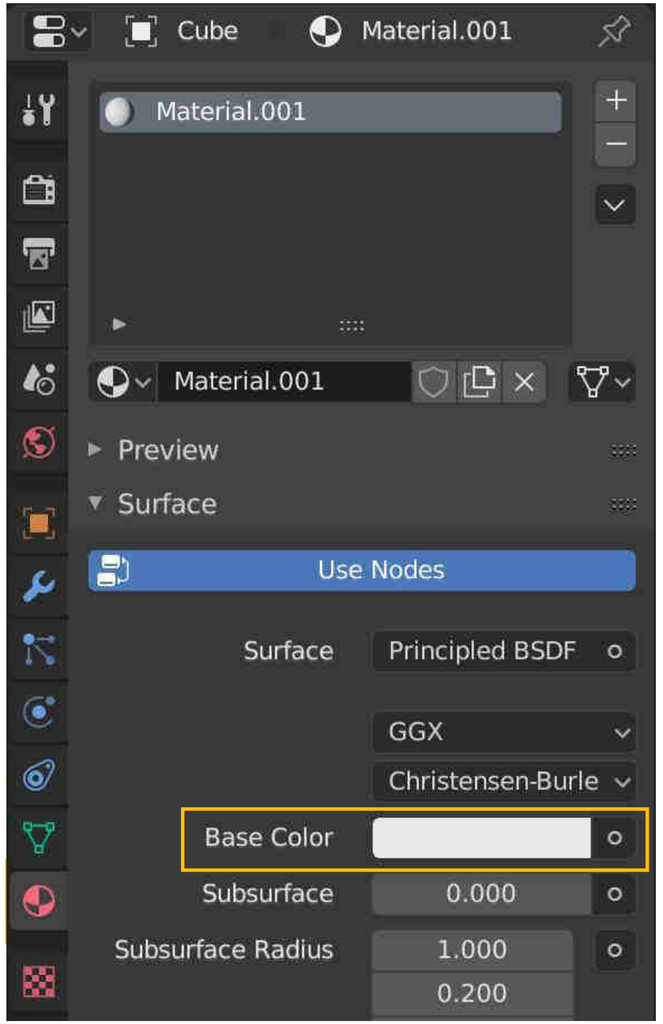
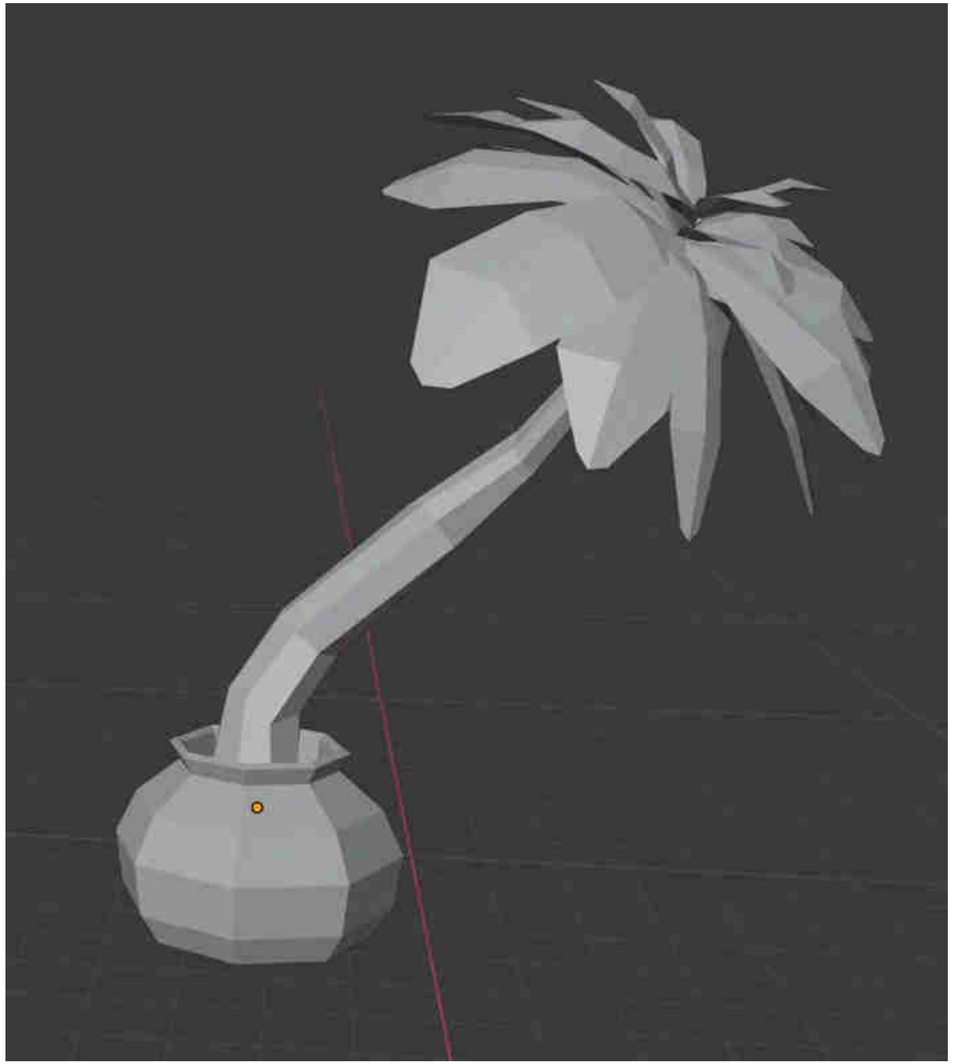
View New
Object View Select Add Node Use Nodes Slot 1 Material
Principled BSDF
BSDF
GGX
Christensen-Burley
Base Color
Subsurface 0.000
Subsurface Radius
Subsurface Color
Metallic 0.000
Specular 0.500
Specular Tint 0.000
Roughness 0.400
Anisotropic 0.000
Anisotropic Rotation 0.000
Sheen 0.000
Sheen Tint 0.500
Clearcoat 0.000
Clearcoat Roughness 0.030
IOR 1.450
Transmission 0.000
Material Output
All
Surface
Volume
Displacement

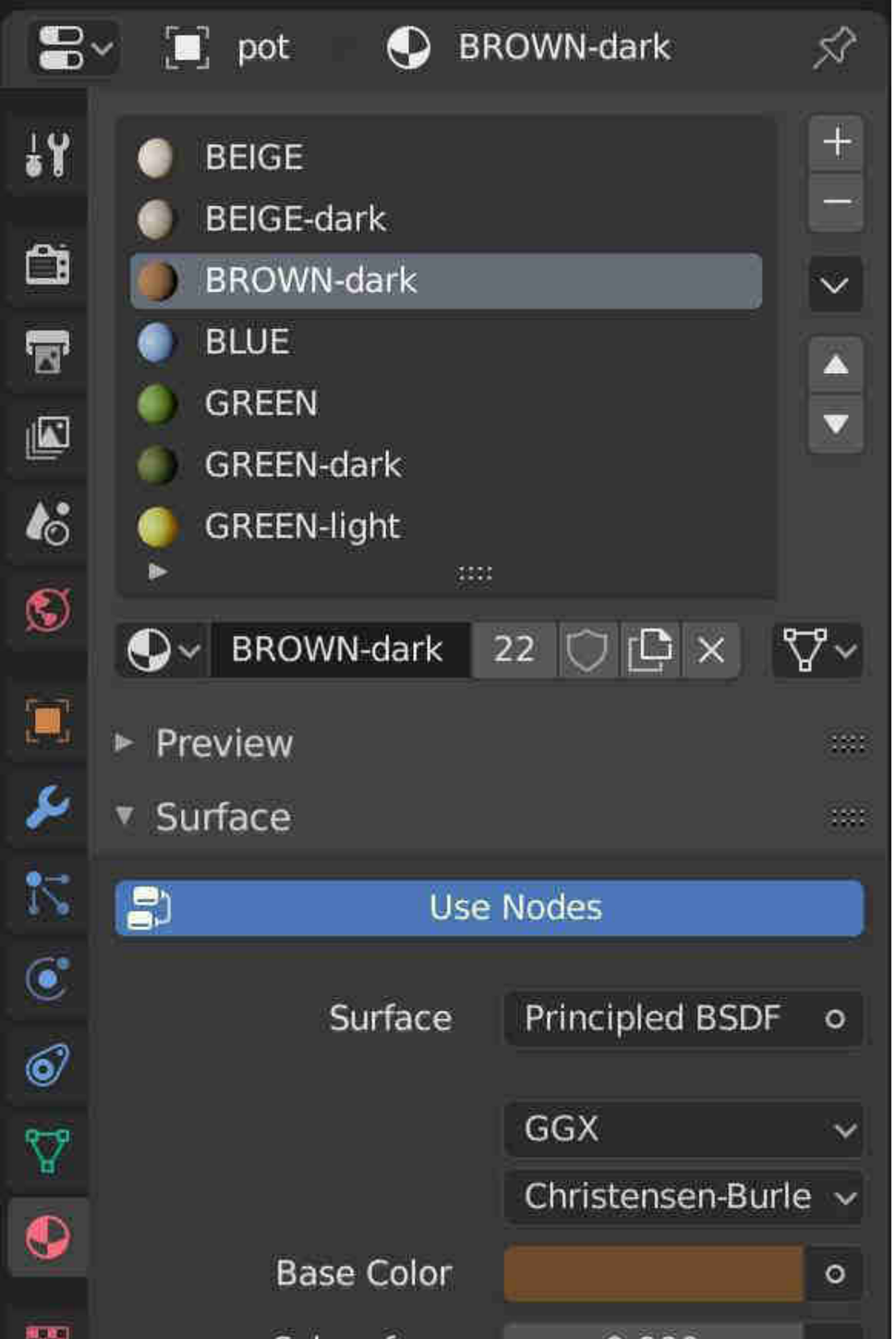
Adding new material

- material tab
- empty space – materials don’t exist yet
- concept of assigning slots
  - create new slot for material
  - create the material for created slot
- choose base color by clicking the white square



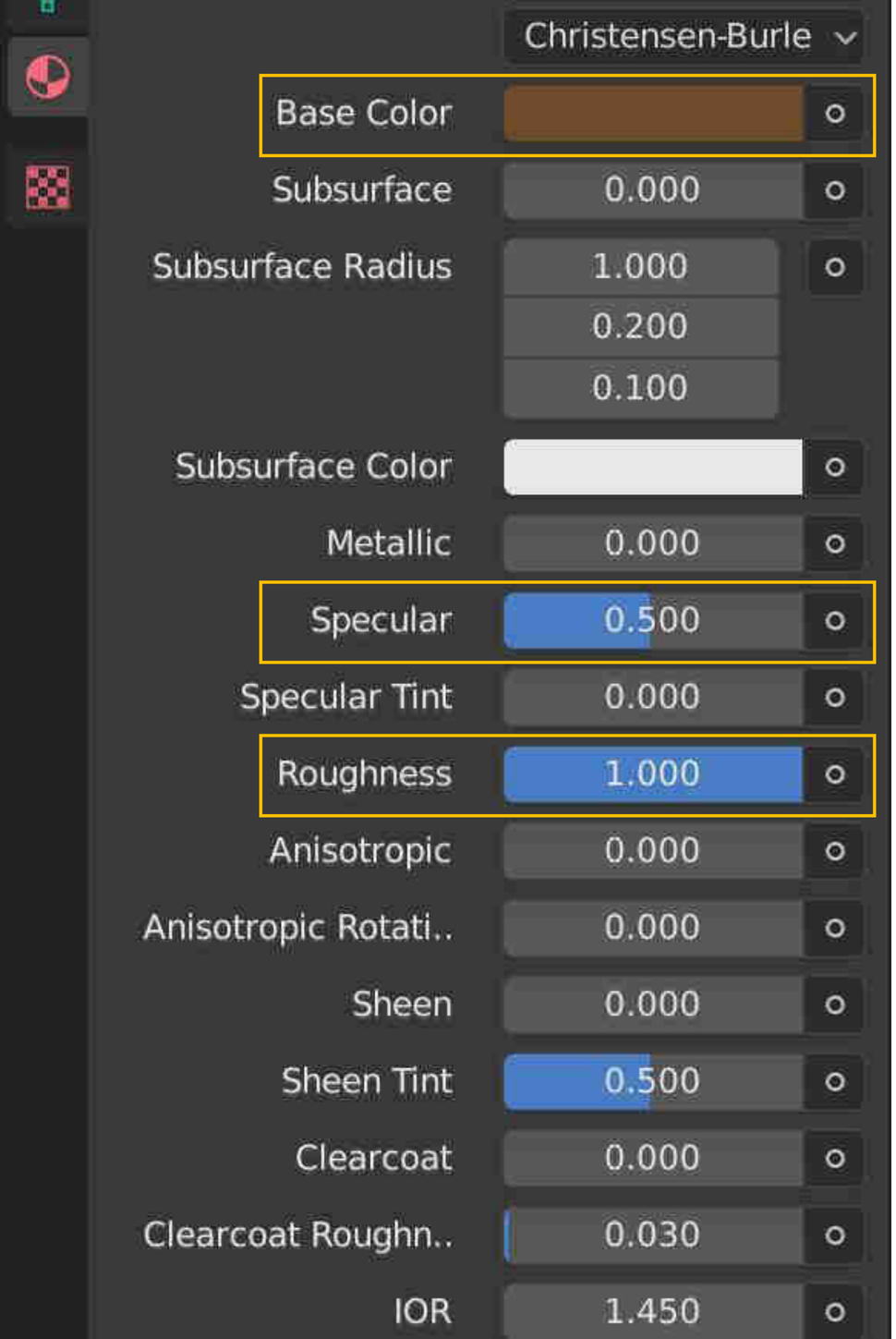
Multicolored object





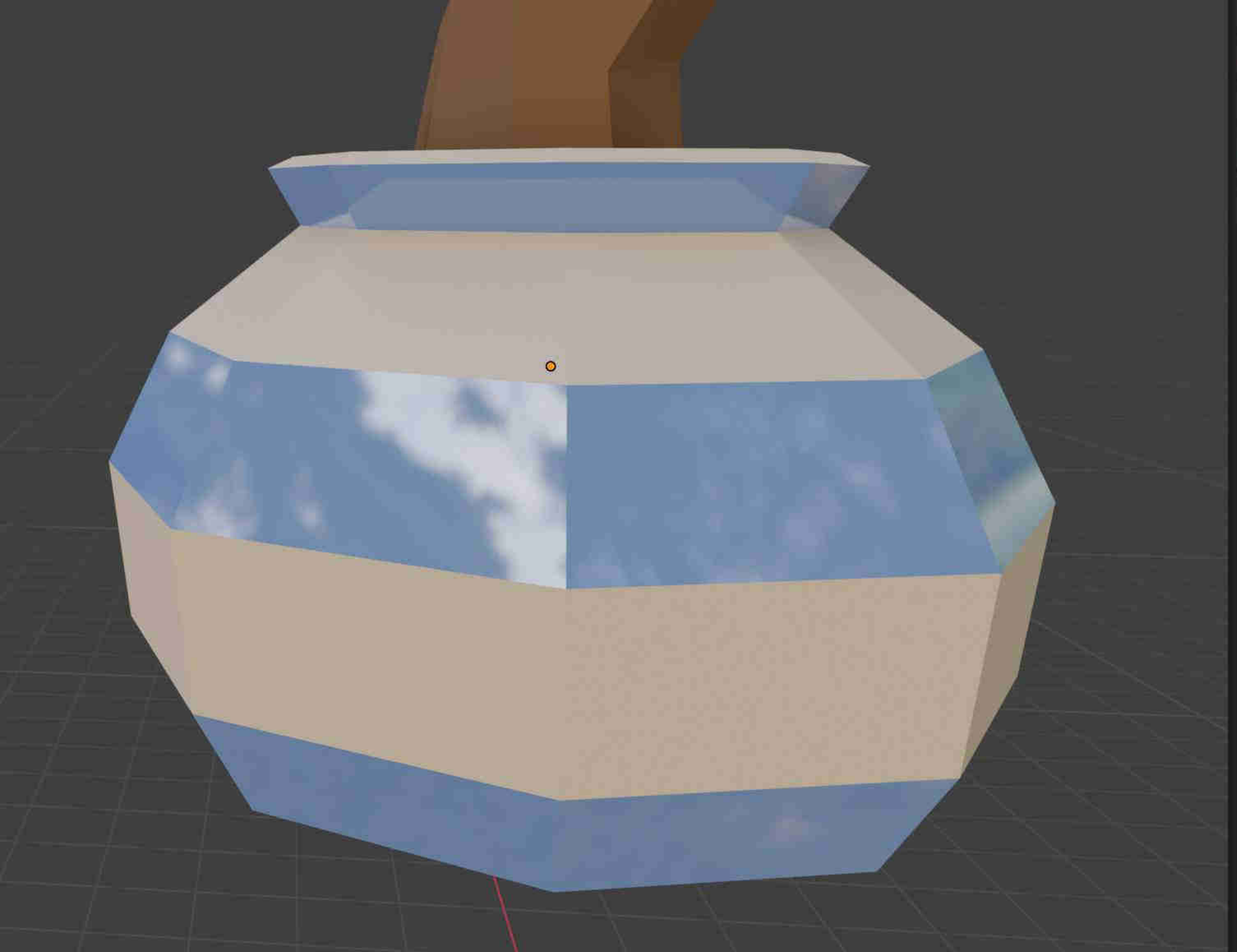
Materials

- creation of different materials
- Correctly naming created materials
- A lot of options – which are important?

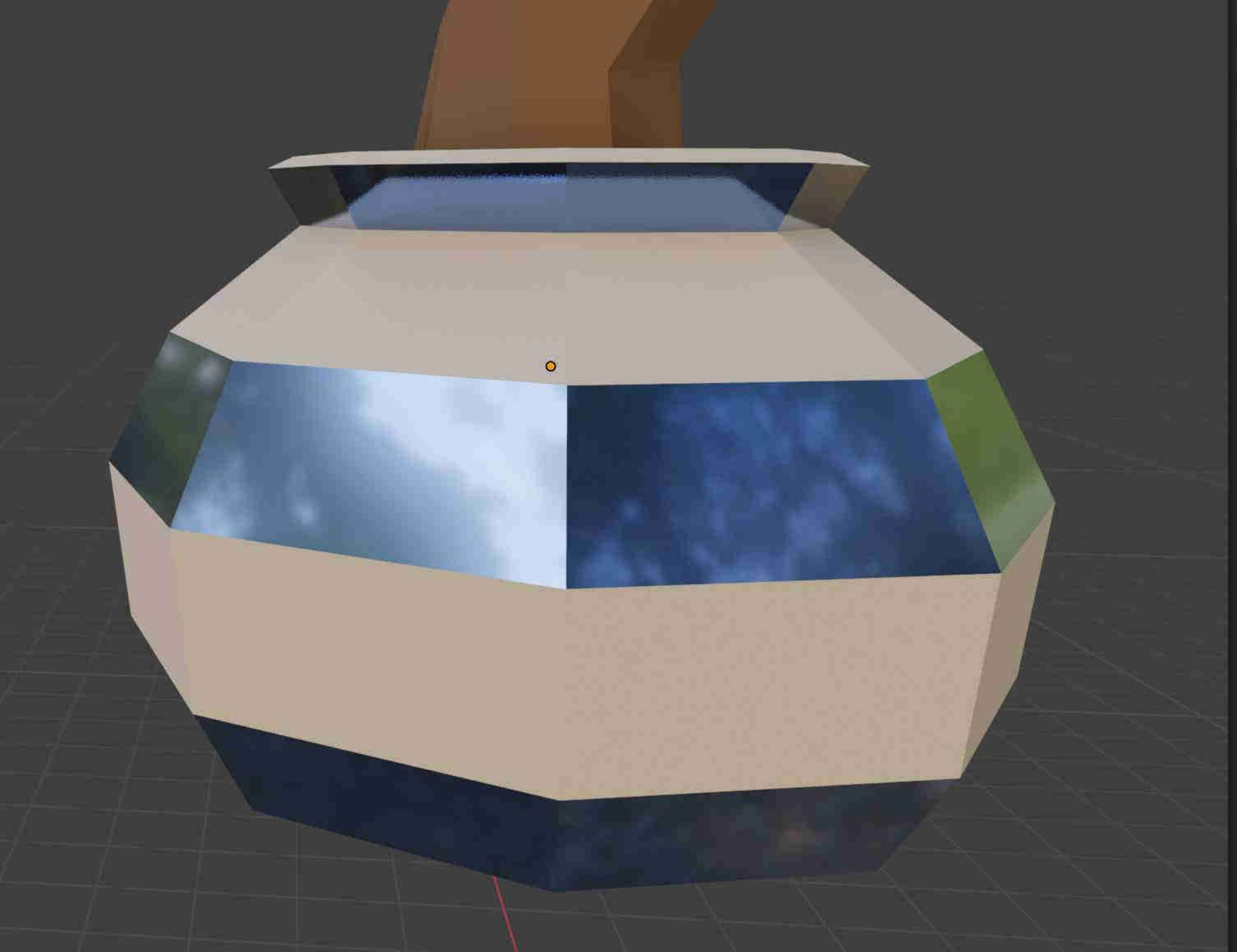


Materials

- base color
- specular – defines level of reflectivity
  - 0 => no reflections
  - 1 => maximum reflectivity
- roughness – defines the sharpness of edges
  - 0 => sharp mirror like reflections
  - 1 => blurred edges



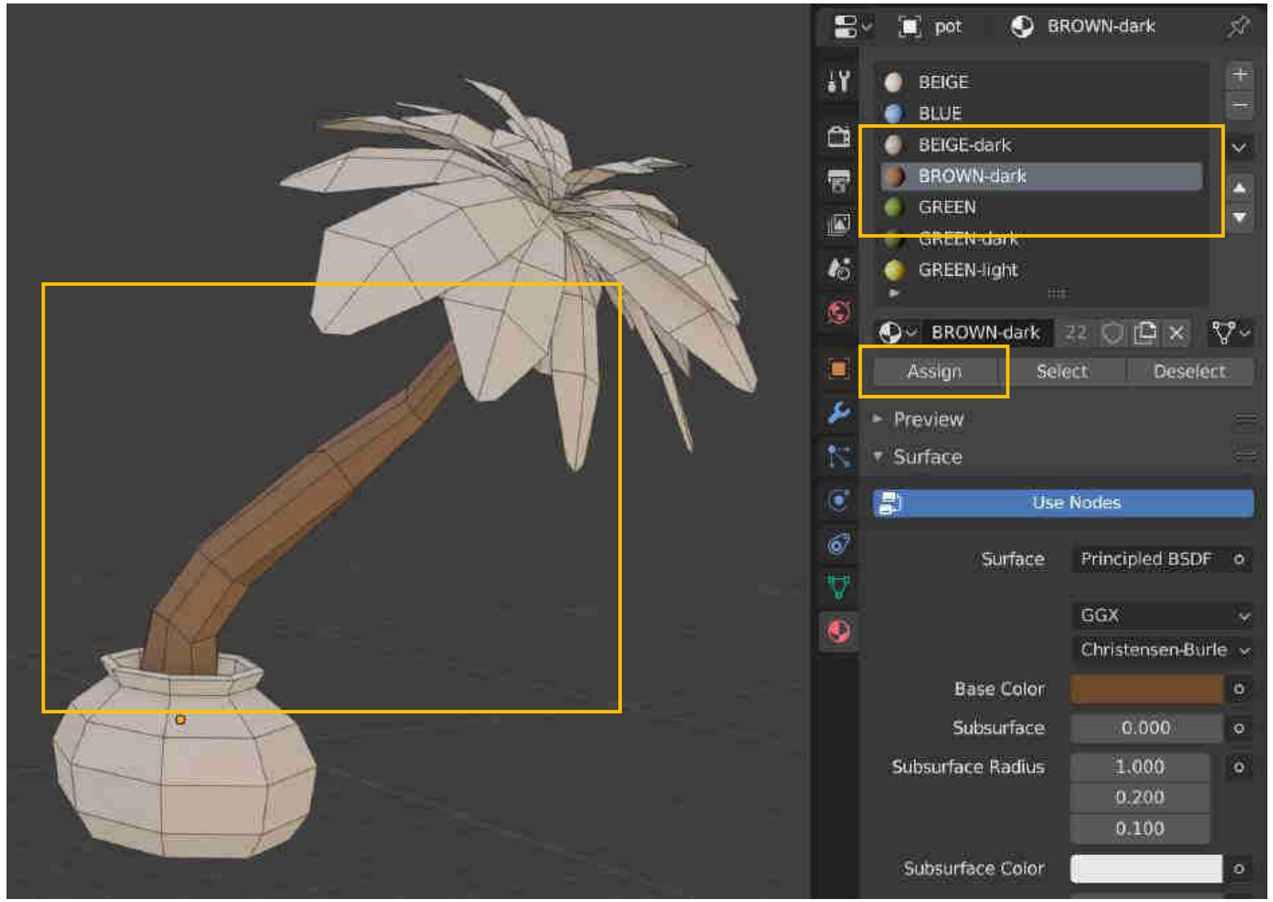
Surface	Principled BSDF
	GGX
	Christensen-Burle
Base Color	
Subsurface	0.000
Subsurface Radius	1.000
	0.200
	0.100
Subsurface Color	
Metallic	0.000
Specular	1.000
Specular Tint	0.000
Roughness	0.000
Anisotropic	0.000
Anisotropic Rotati..	0.000
Sheen	0.000
Sheen Tint	0.500
Clearcoat	0.000
Clearcoat Roughn..	0.030
IOR	1.450
Transmission	0.000
Transmission Rou..	0.000
Emission	



Surface	Principled BSDF
	GGX
	Christensen-Burle
Base Color	
Subsurface	0.000
Subsurface Radius	1.000
	0.200
	0.100
Subsurface Color	
Metallic	1.000
Specular	1.000
Specular Tint	0.000
Roughness	0.116
Anisotropic	0.000
Anisotropic Rotati..	0.000
Sheen	0.000
Sheen Tint	0.500
Clearcoat	0.000
Clearcoat Roughn..	0.030
IOR	1.450
Transmission	0.000
Transmission Rou..	0.000
Emission	

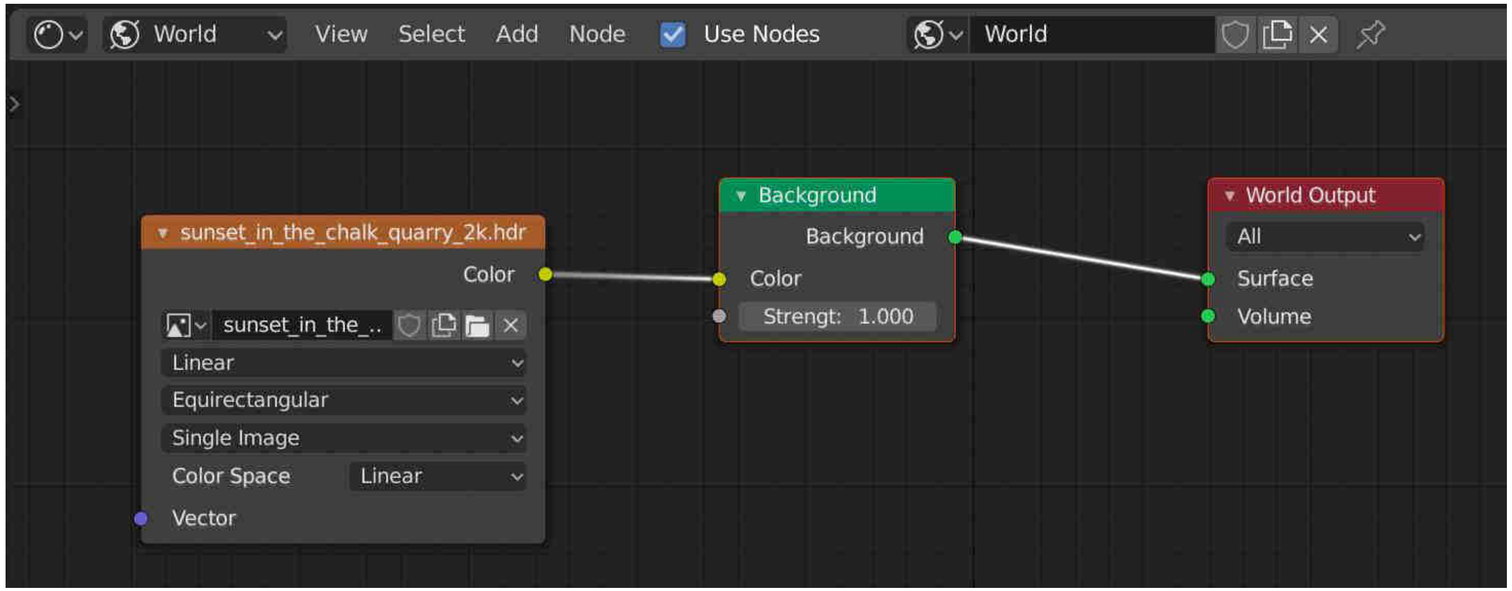
Adding materials to faces

- edit mode (**TAB**)
- select faces the material will be assigned to
- select material
- button assign



Adding HDRI

- shading => world tab
- add new node => ***SHIFT + A > texture > environment texture***
- select HDRI image (***open***)
- connect added node with background node



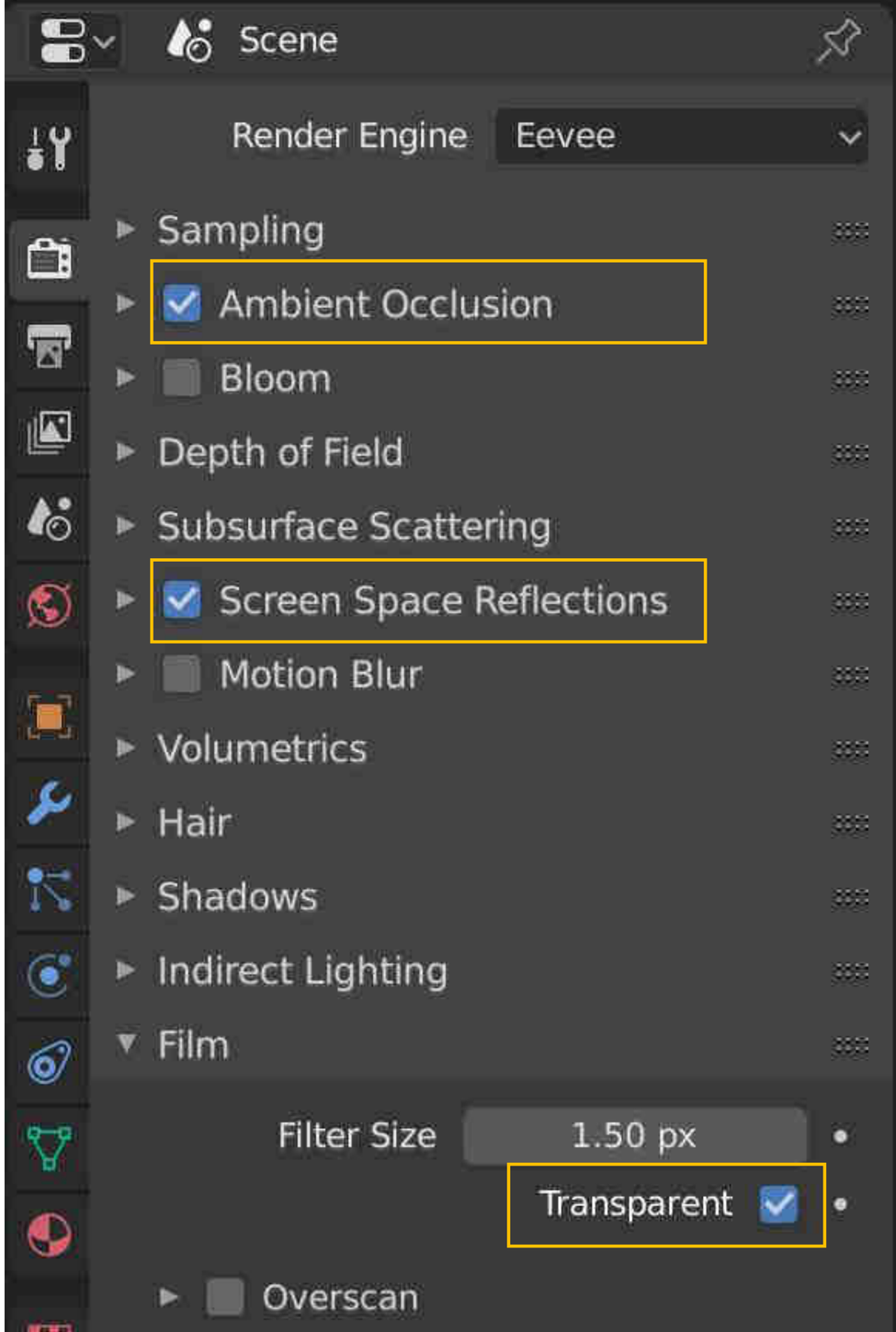
Background

- HDRI is by default shown in your background and in final render
- we want transparent background
- How can we achieve this?

Transparent background

- render => film => transparent

- *While we're at it* – also check:
  - Ambient Occlusion
  - Screen Space Reflections



RIGGING

adding armature

Rigging

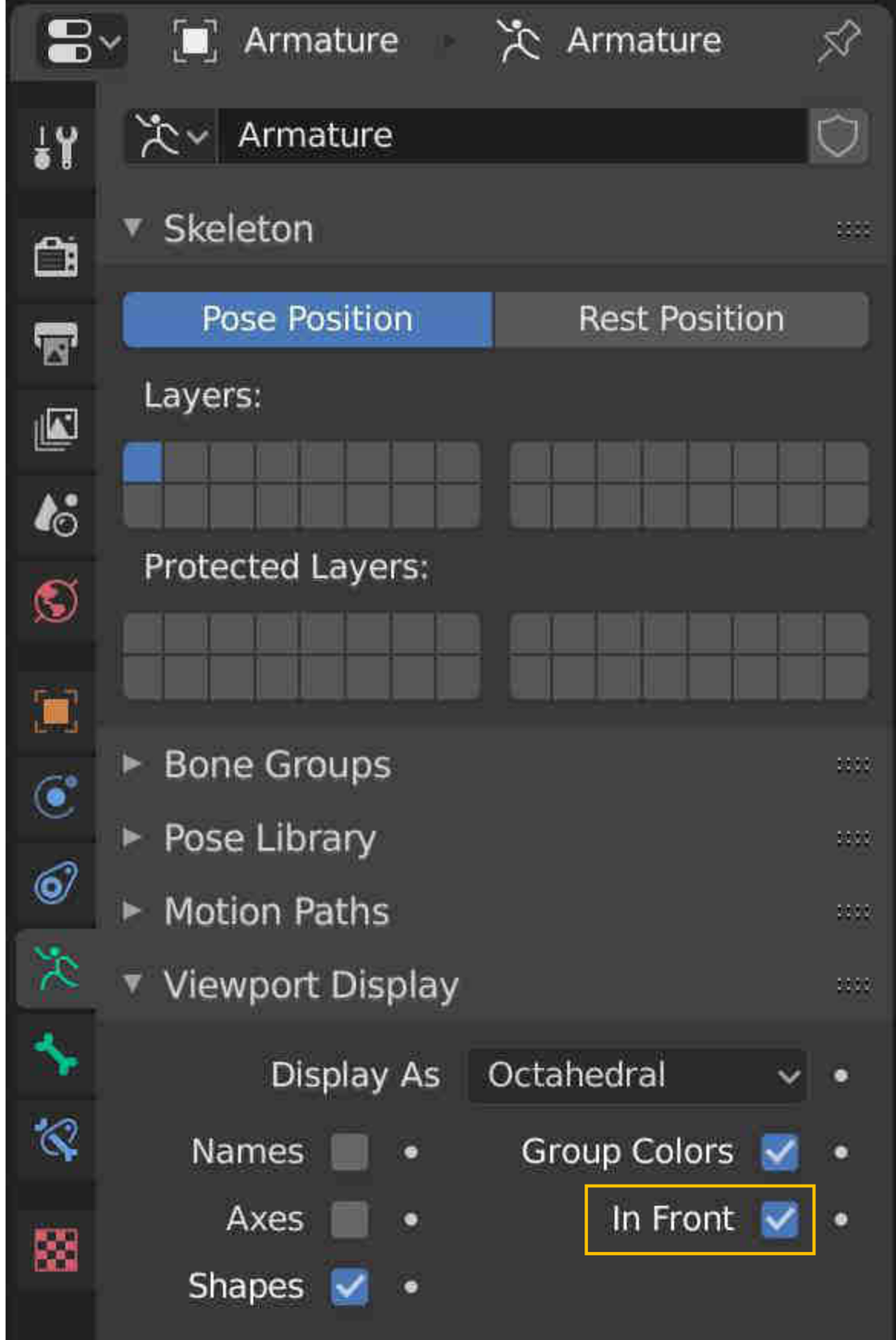
- process of creating bone structure
- manipulating 3D model
- simplifies animation process

- finished 3D model
- construct skeleton
- binding model and skeleton

Armature

- prepare workspace
- OBJECT mode
- **SHIFT + S -> cursor to world origin**

- adding a bone (**SHIFT + A -> armature**)
- properties => armature => “in front”



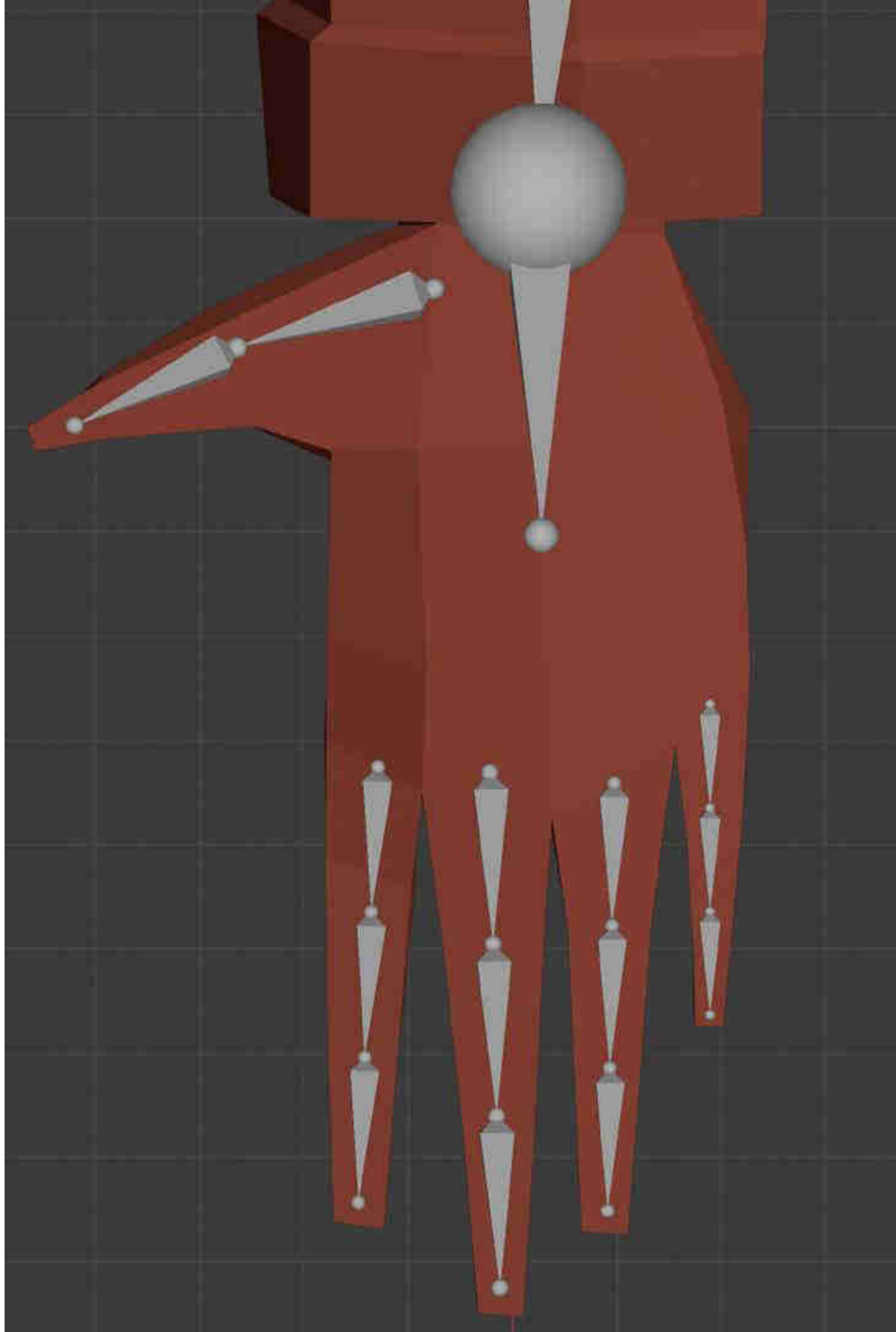
Armature

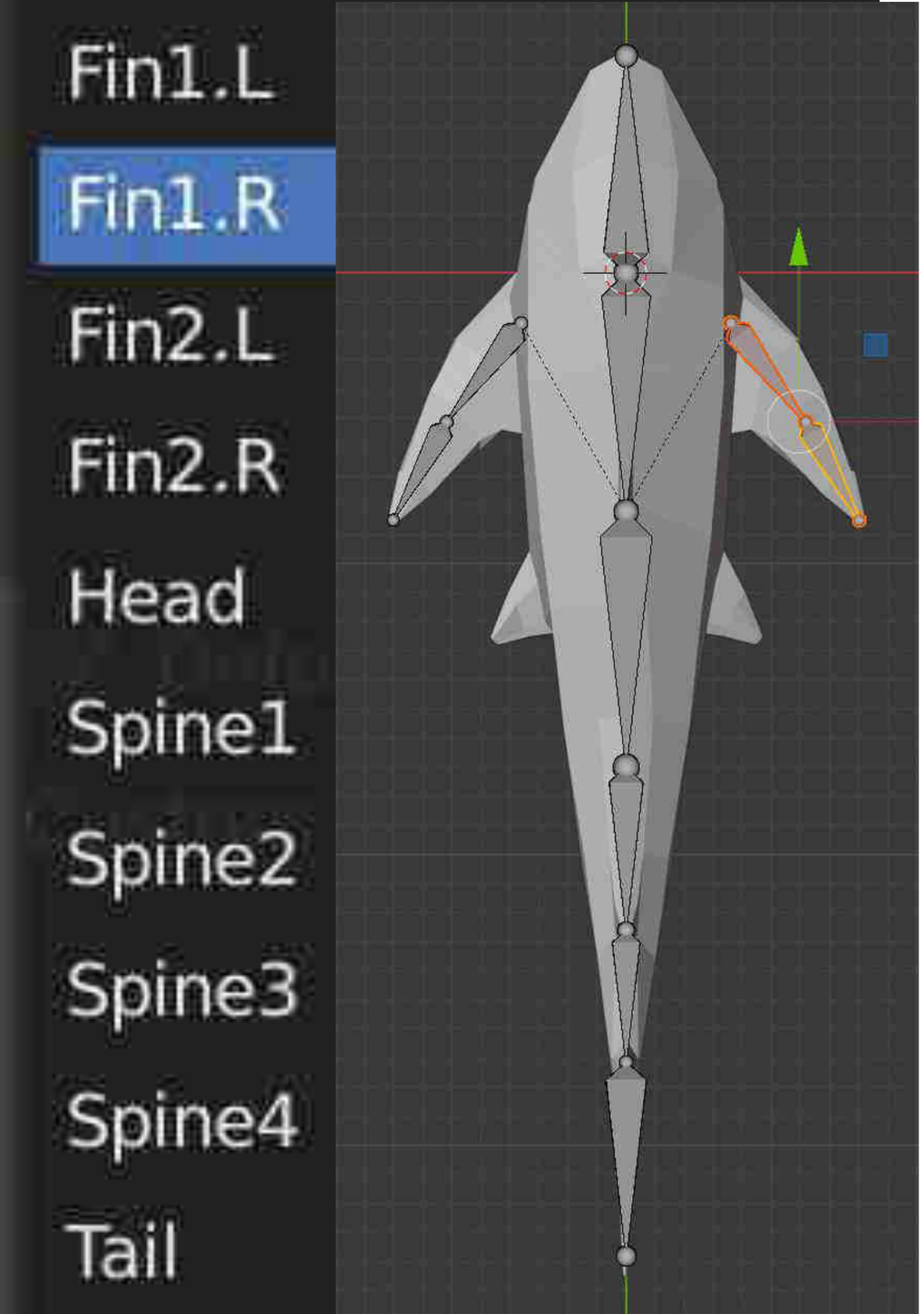
- duplicate (**SHIFT + D**)
- add parent (**CTRL + P -> keep offset**)
- clear parent (**OPTION + P -> clear parent**)
- extrude (**E**)
- rotate (**R**)
- scale (**S**)

- *correctly naming the bones (".L" or ".R")*

Armature – human

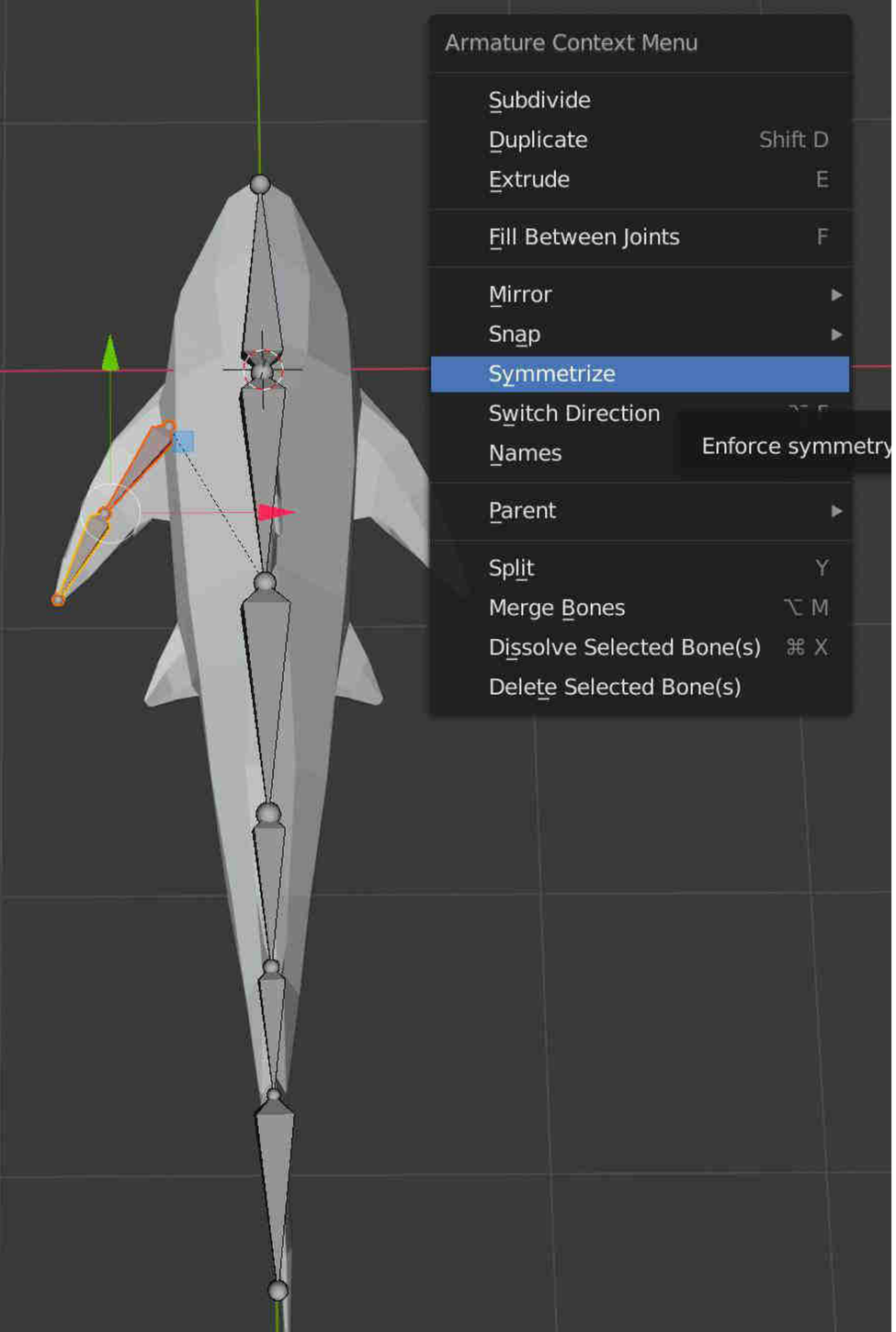
- same process for spine and head
- arms and legs consist of 3 bones
- example of hand armature





Bone naming

- bone + number
  - spine => *spine1, spine2, spine3*
  - *neck, head*
- bone + number + ".L" / ".R"
  - arms, legs => *arm1.R, leg1.L*
  - fingers => *pointer2.R*
  - fins, ears, wings ... => *fin1.L*

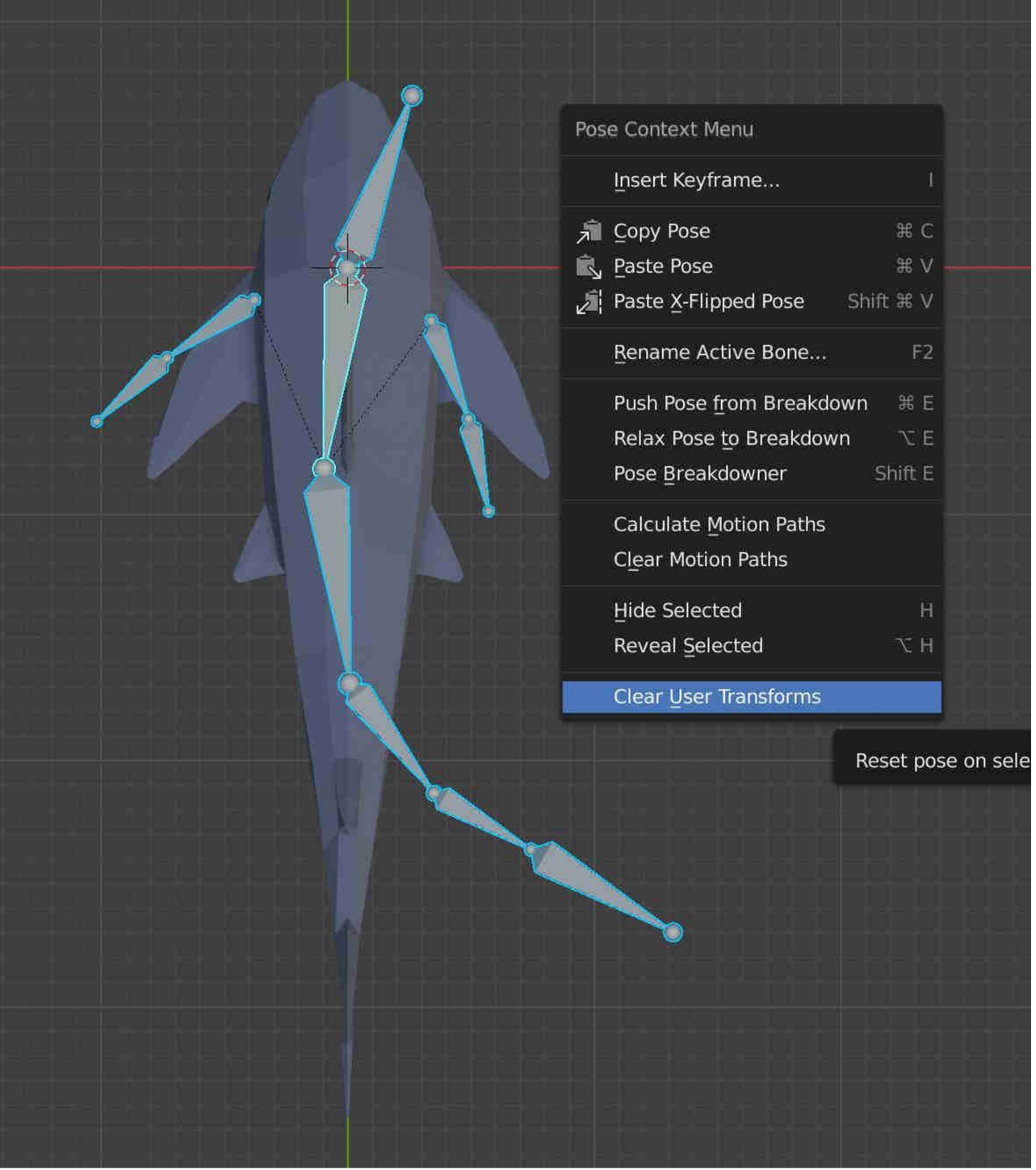


Symmetrize

- mirroring one side of armature
- presumption:
  - cursor is in center (**SHIFT + S -> cursor to world origin**)
  - correctly set origin of object AND armature (**right click -> set origin -> origin to geometry**)
- select bones you want to mirror (**B**)
- mirror (**right click-> symmetrize**)

Pose mode

- third mode dedicated to the process of posing
- used to change bone position
- if model is not rigged, only the armature moves
- to test if bone connections are correct



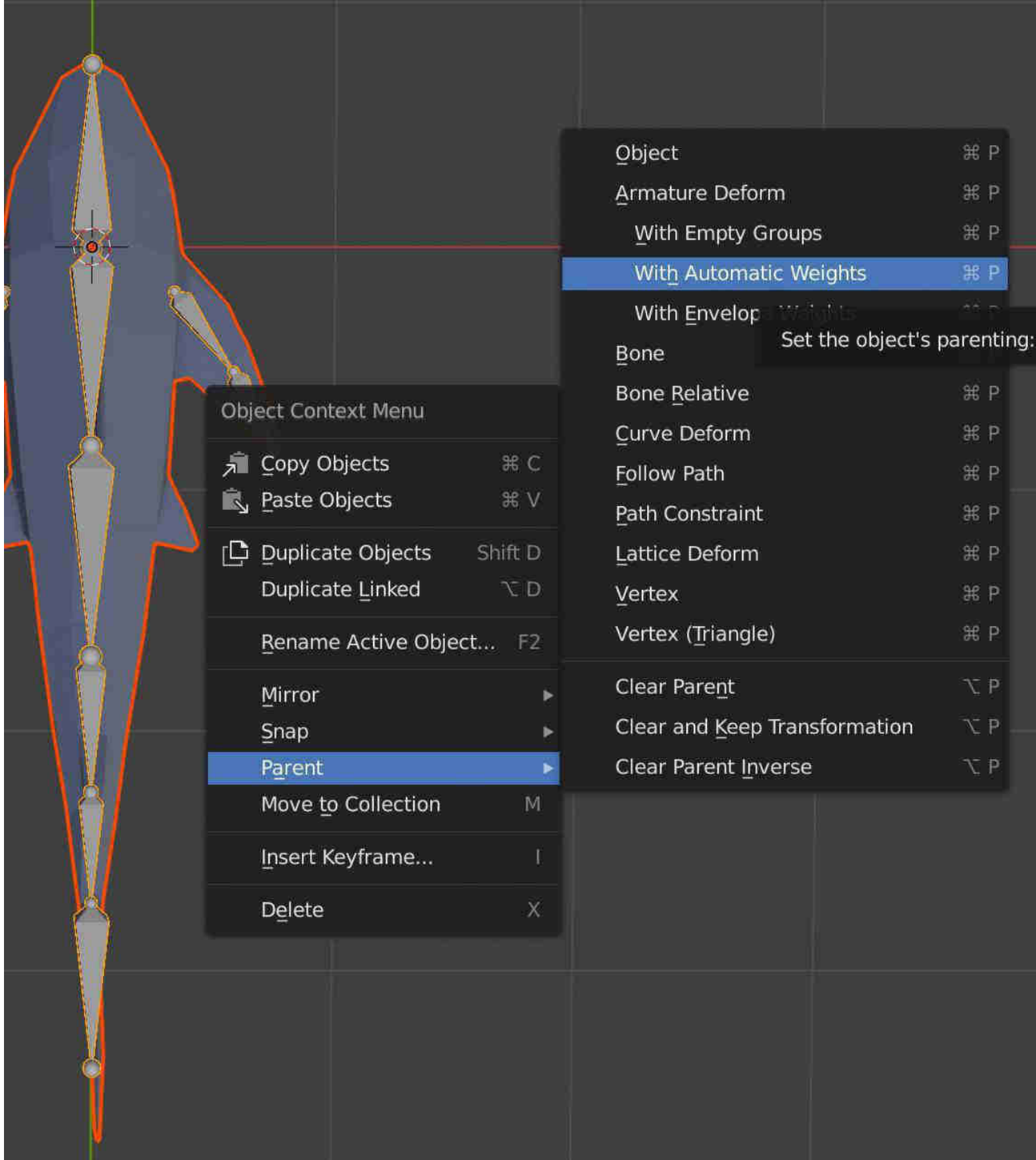
Clear user transforms

- you can’t correctly rig posed armature
- solution: transform the armature back to it’s original position
- function “clear user transforms”

LMMFE

Binding model and armature

- Select model and then the armature (**SHIFT**)
- Join them (**right click -> parent -> with automatic weights**)
- check bound model in POSE mode



SHAPE KEYS

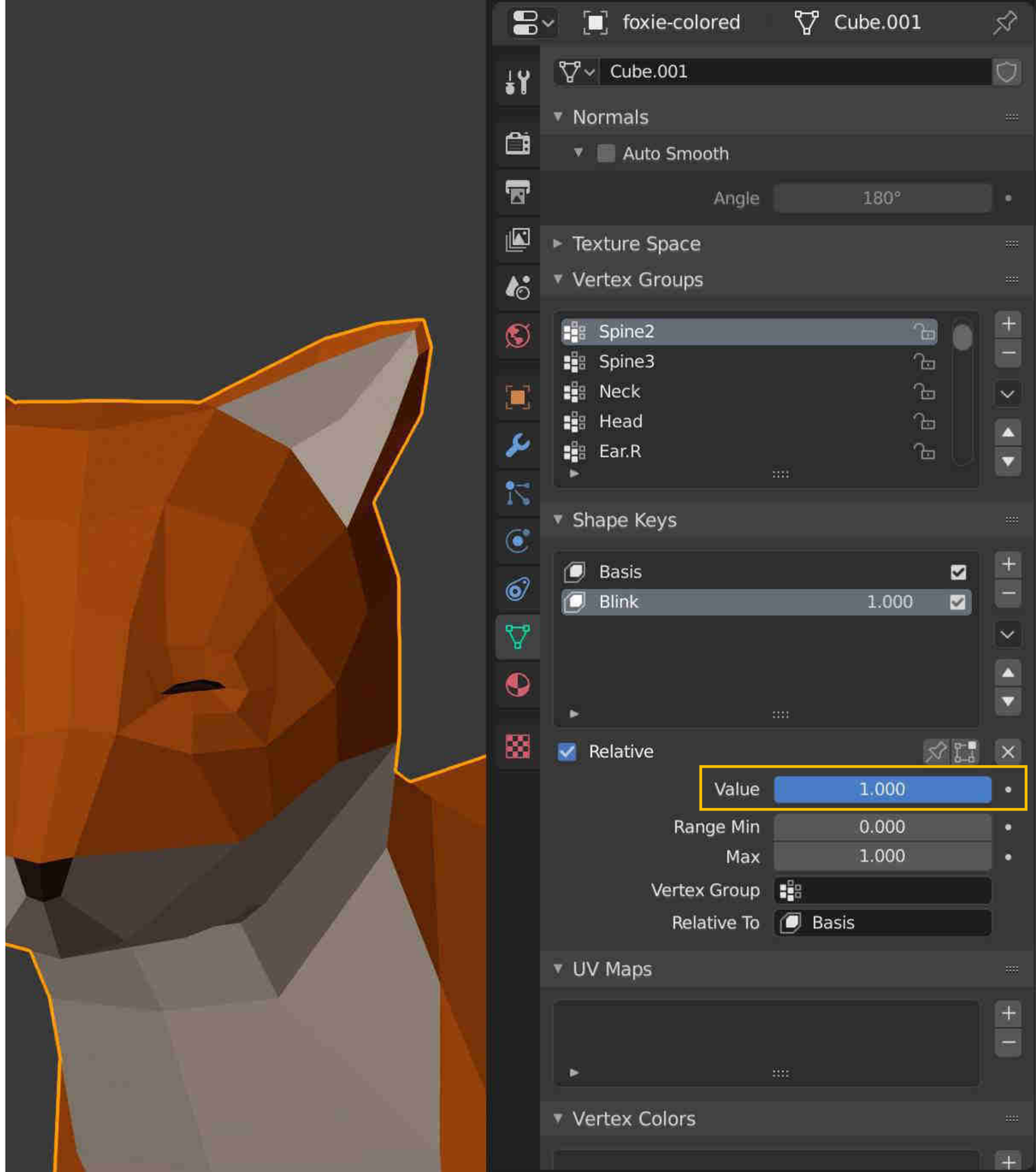
Shape keys

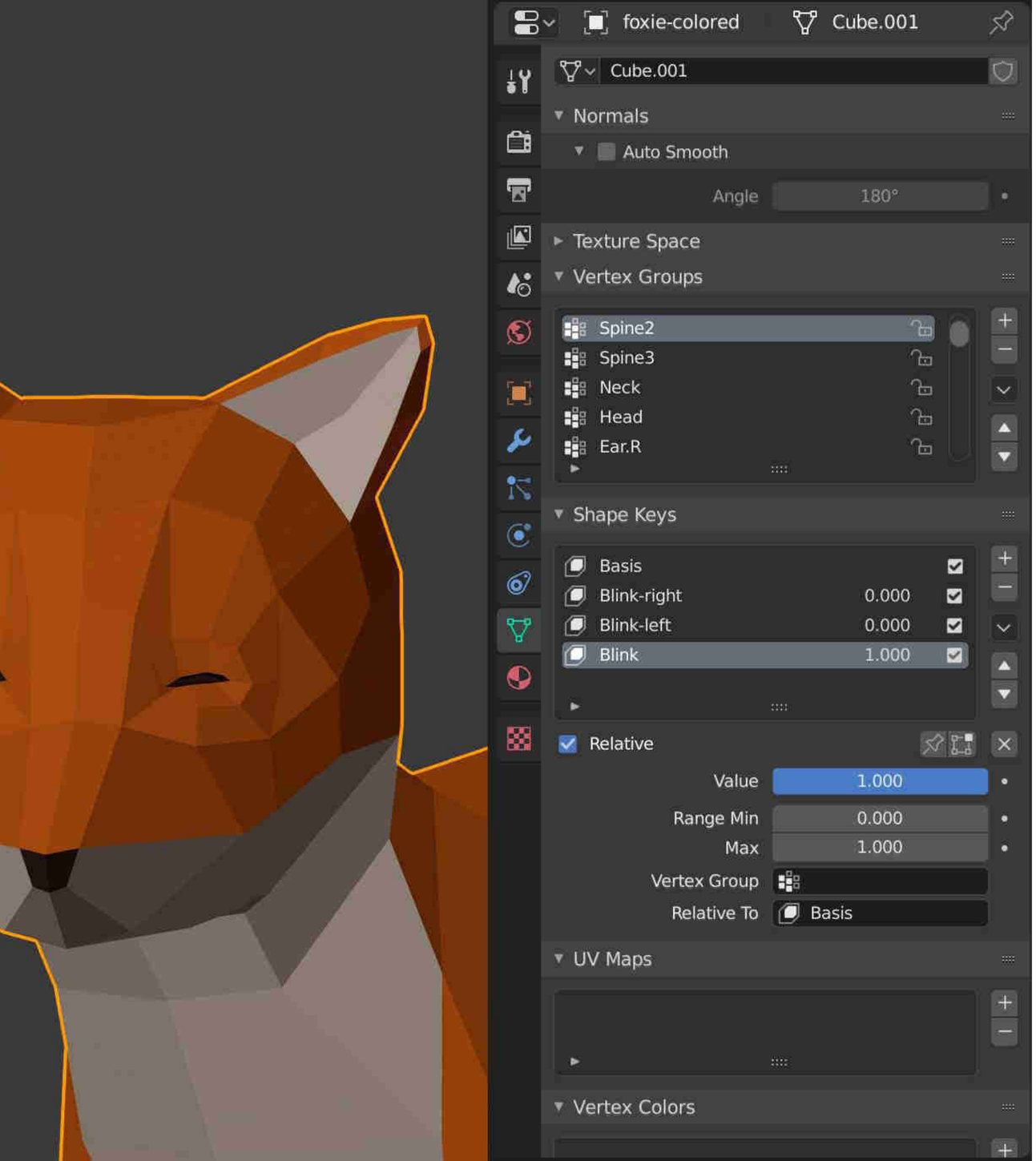
- deforming object in new shapes
- storing positions of vertices
- creating facial expressions
- fixing artefacts
- original polygon mesh => basis shape

LMMFE

Shape keys

- properties => data => shape keys
- create BASIS shape key
- new shape key (**+**) & rename
- EDIT mode => move the vertices
- OBJECT mode => slider (0-1)



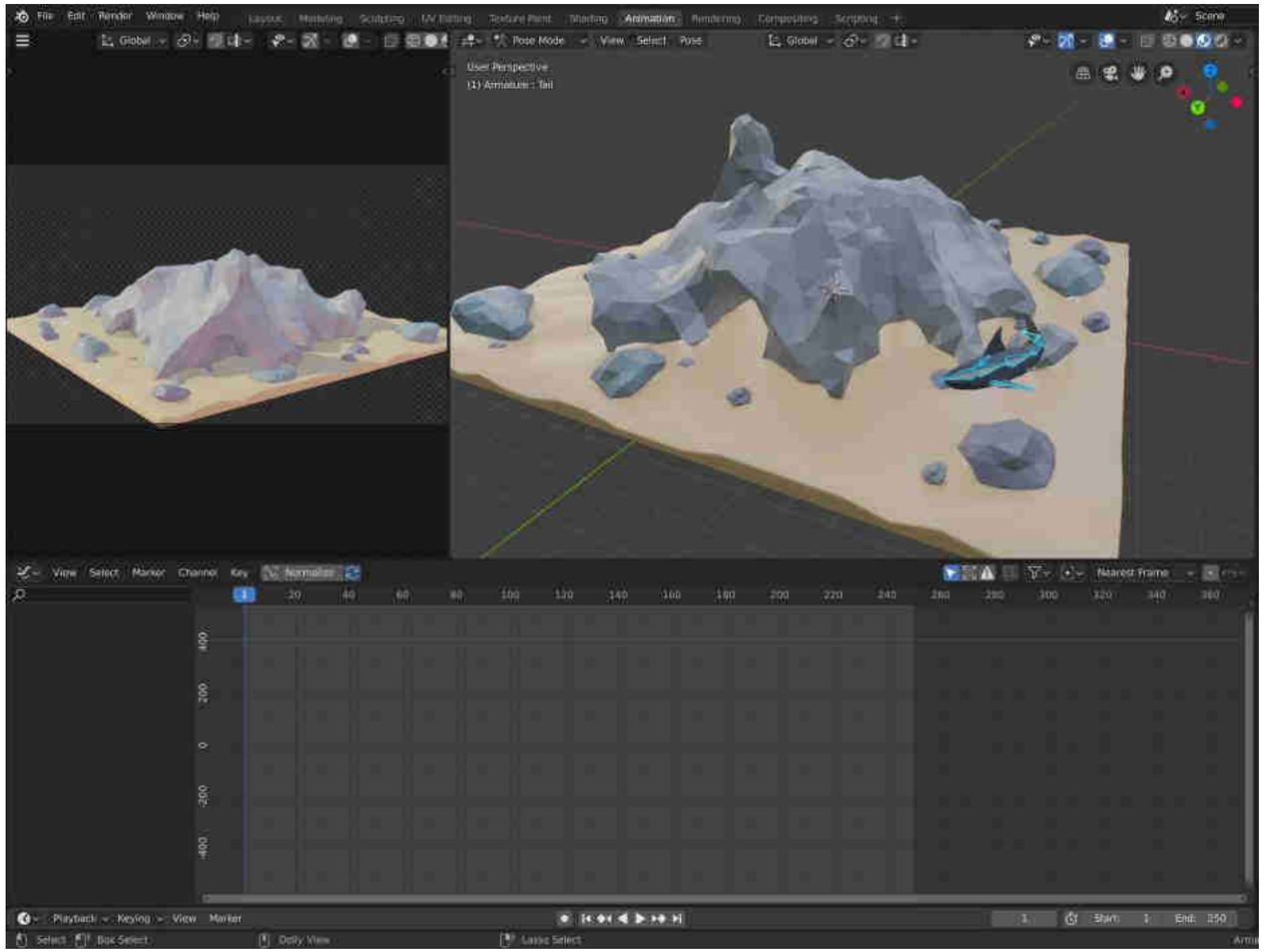


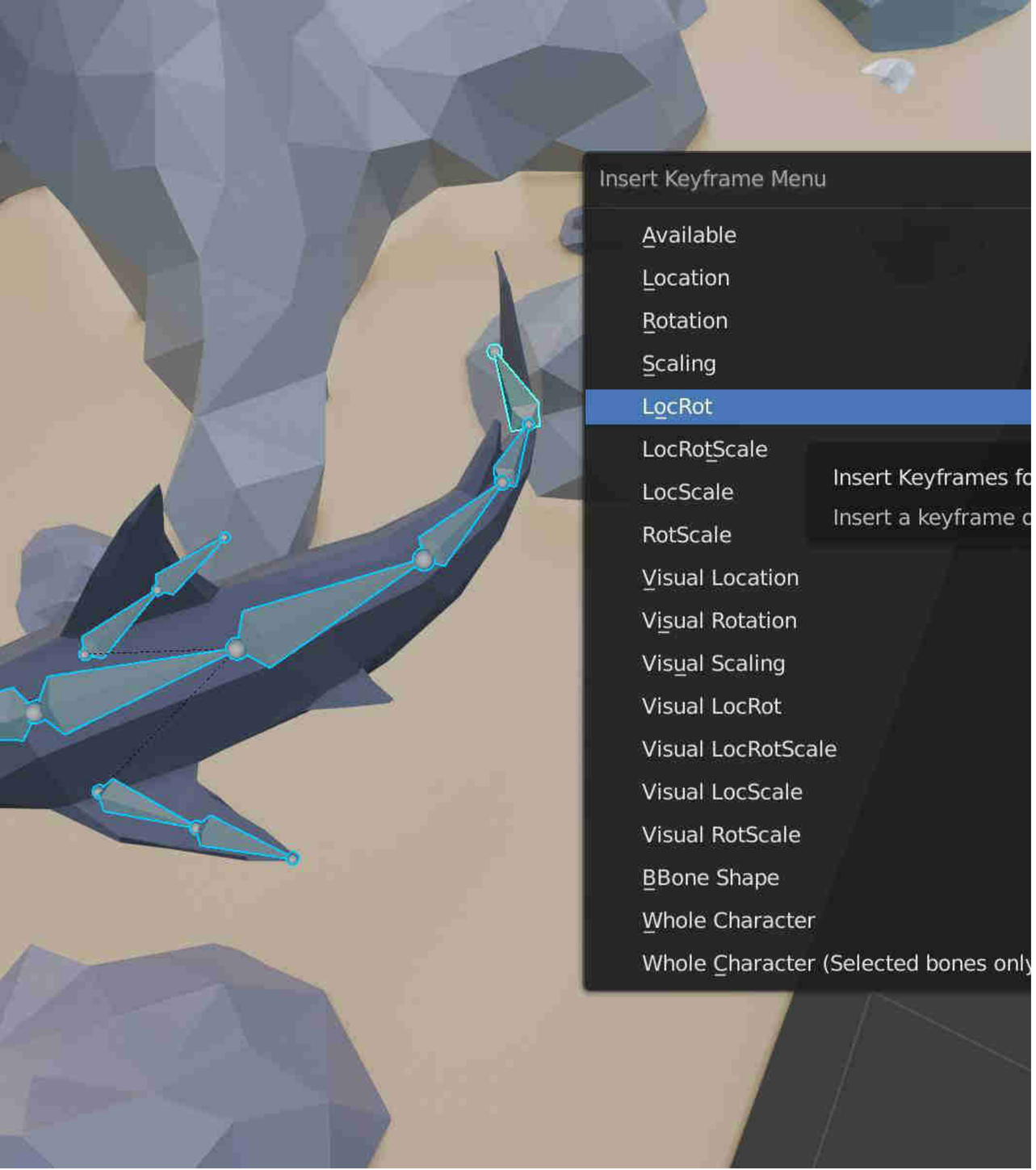
Additional options

- mirroring shape keys
  - shape key => value to 1
  - triangle => new shape from mix
  - triangle => mirror shape key
- combining shape keys
  - multiple shape keys => value to > 0
  - triangle => new shape from mix

Animation

- changing the object over time
- achieved with use of keyframes
- KEYFRAME = marker of time which stores information
- interpolated animation



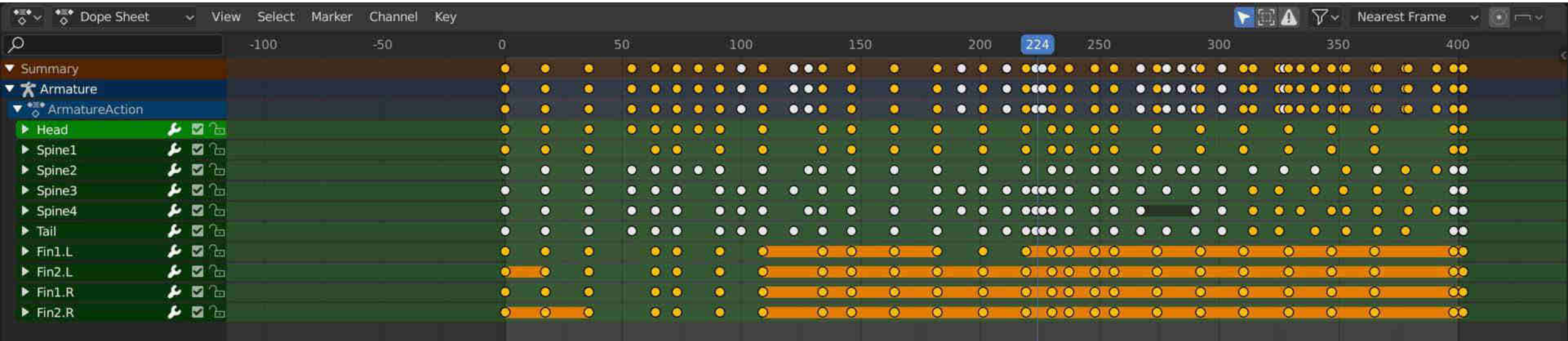


Keyframes

- add keyframe (**I -> LocRot**)
- delete keyframe (**X**)
- editing keyframes in
  - graph editor
  - dope sheet

Animation process

- first / last frame
- rough animation, fine animation, adding details
- checking progress => play / pause on timeline



Shape key animation

- properties => data => shape keys
- set value on slider
- hover the mouse over slider
- add keyframe (**I**)