

Modeling

Anuj Agrawal

Dan Bibyk

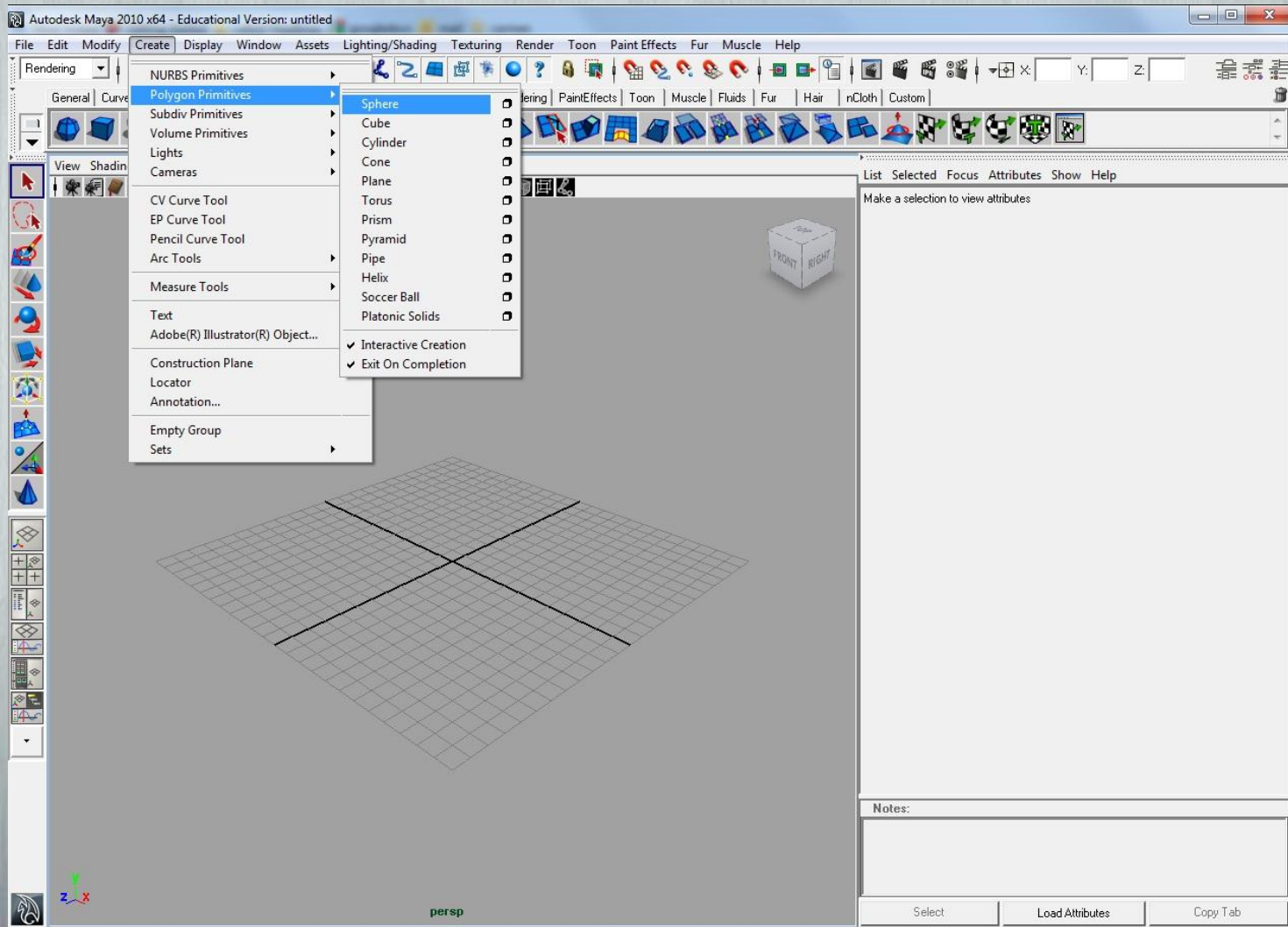
Joe Pompeani

Hans Winterhalter

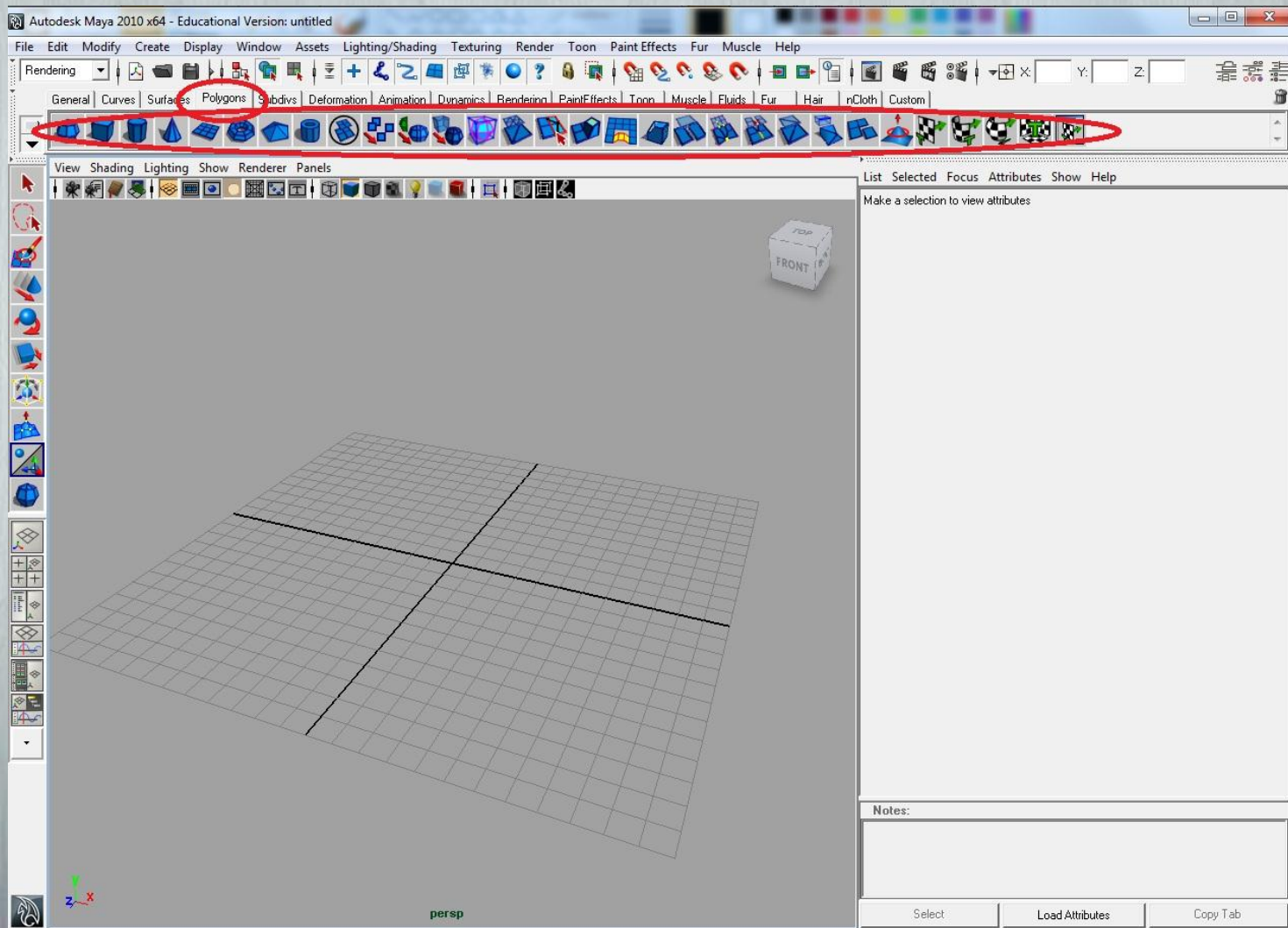
Modeling

- Joe
 - Polygon Models
 - NURBS
 - Subdivision Surfaces
 - Locators
- Hans
 - Splitting polygons, joining objects, extruding faces
 - Extrude, Loft, Revolve, Trim, Fillet Blend Surfaces
 - Instances vs. Copies
- Dan
 - Textures & Material Properties
 - Manipulating & Deformers
- Anuj
 - Hierarchical Modeling
 - Grouping and Parenting
 - Kinematic Chains and IK Handles

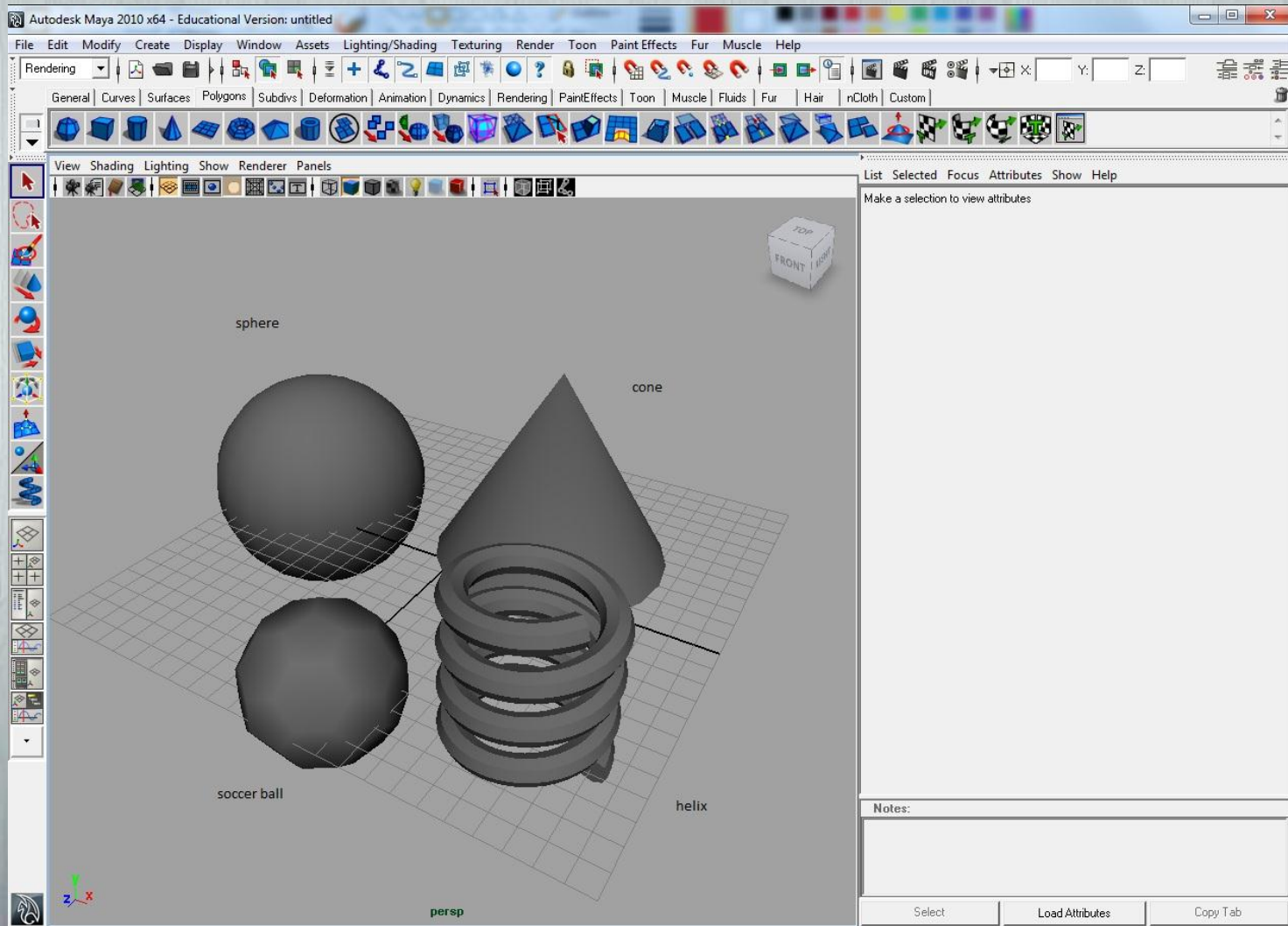
Polygon Primitives



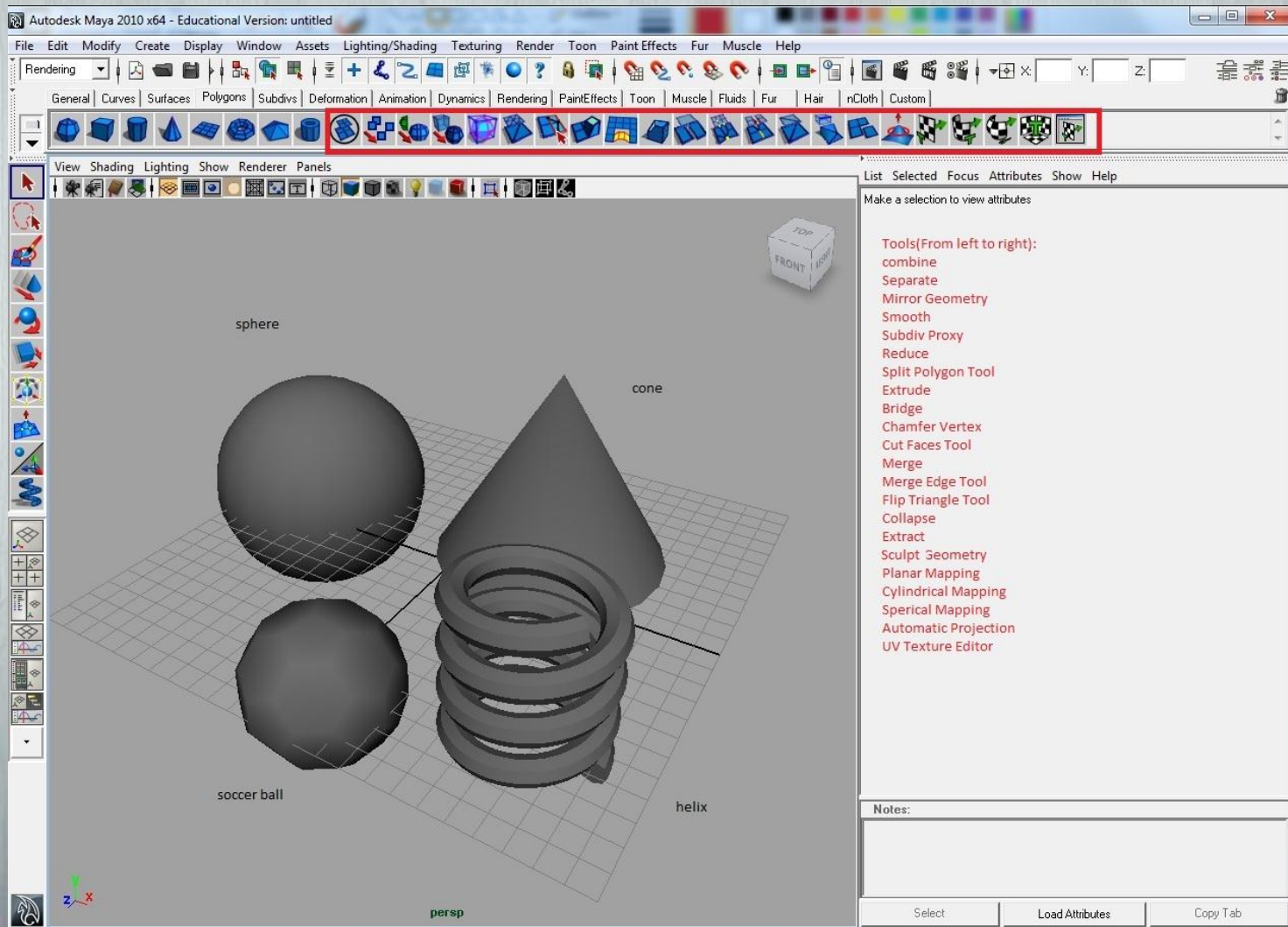
Polygon Primitives



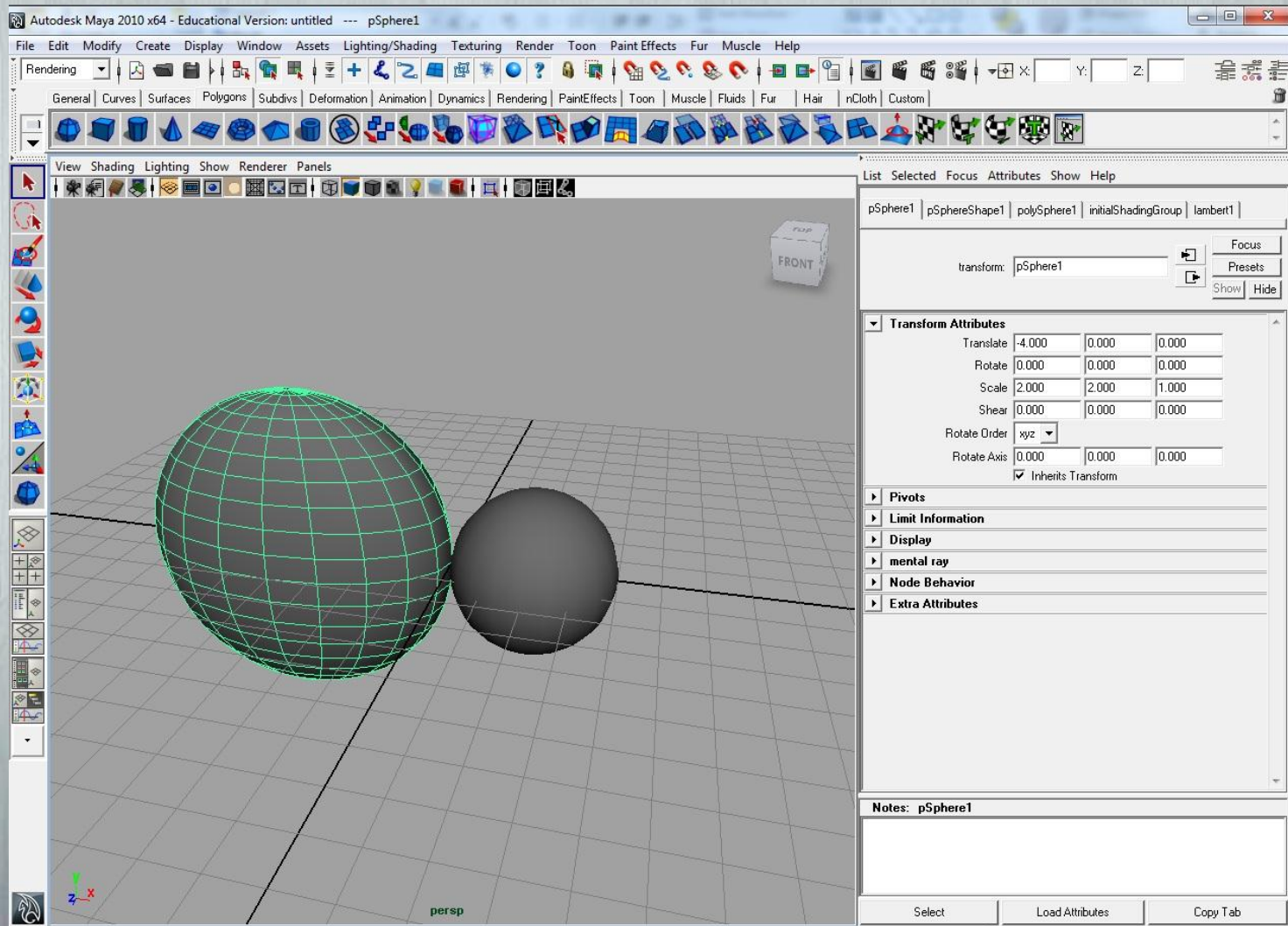
Polygon Primitives



Polygon Primitives

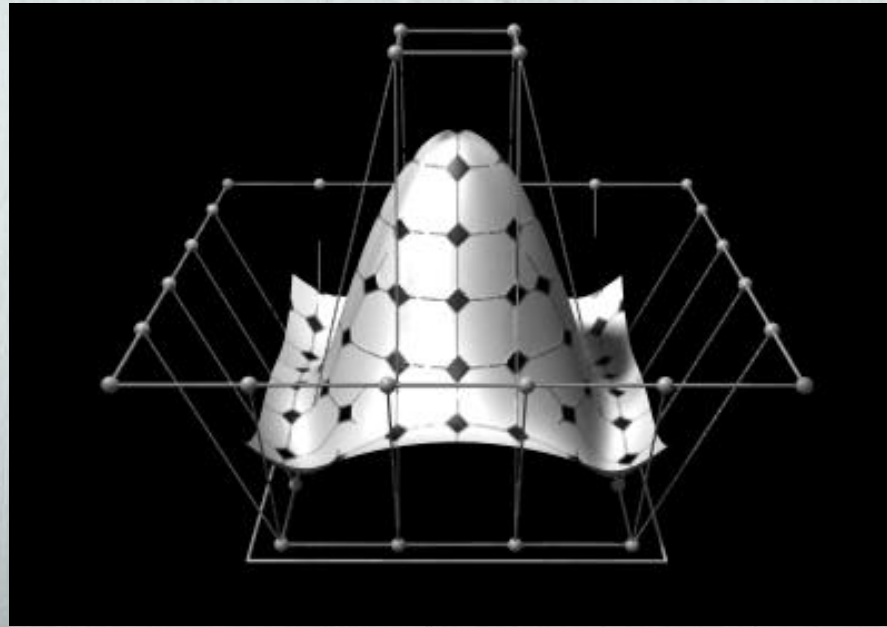


Polygon Primitives



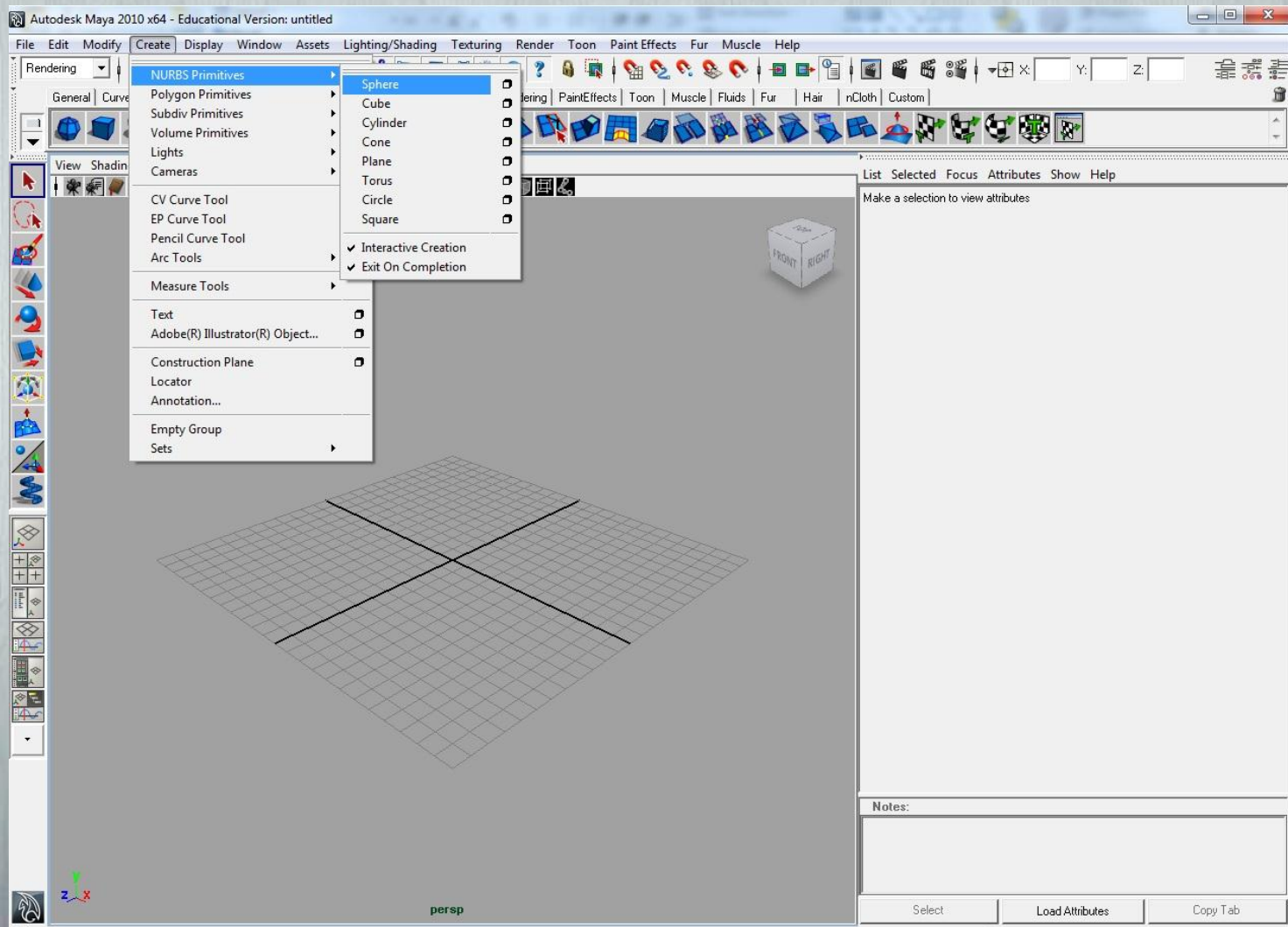
NURBS

- Non-Uniform Rational Basis Spline

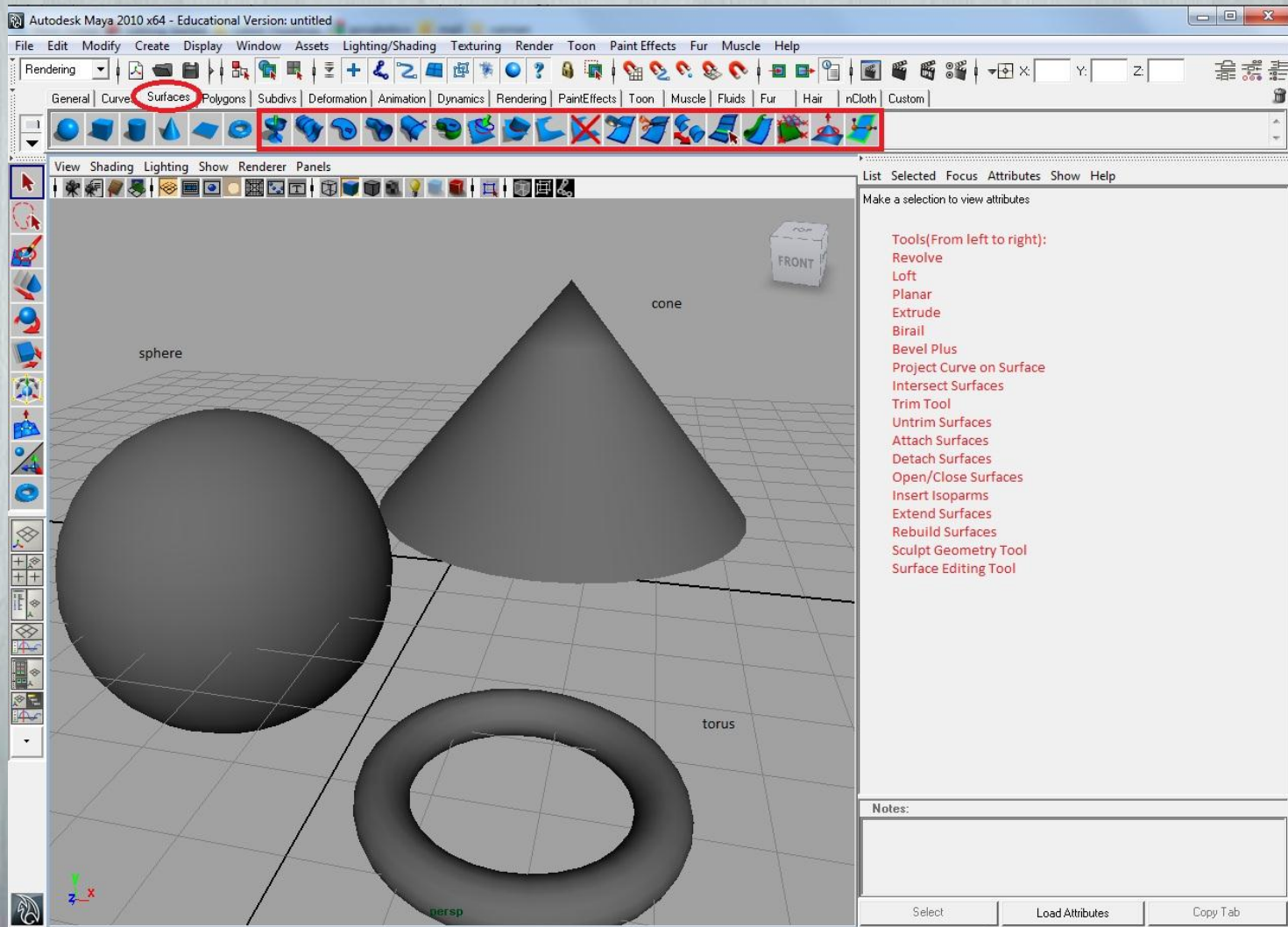


http://en.wikipedia.org/wiki/File:NURBS_3-D_surface.gif

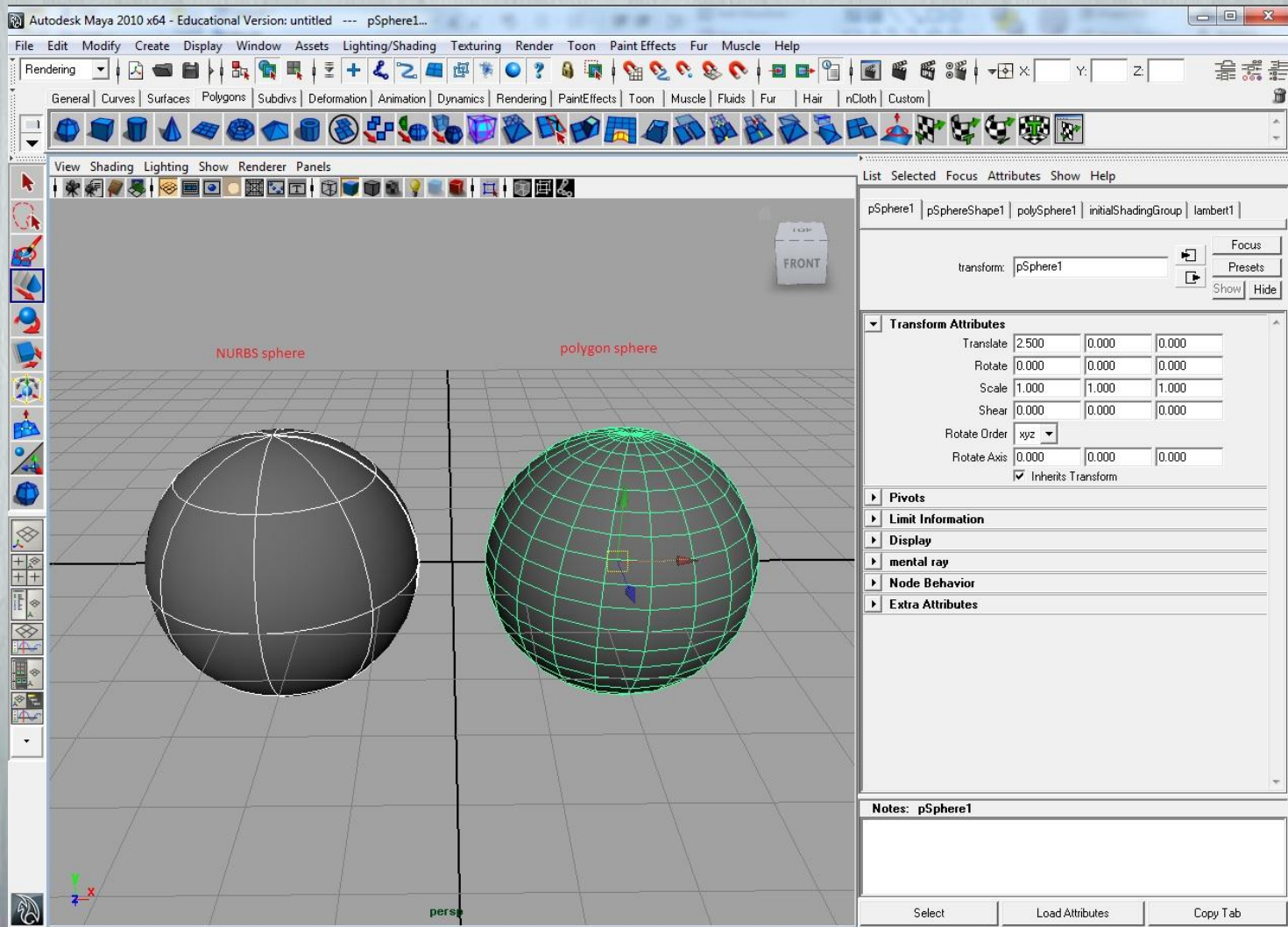
NURBS



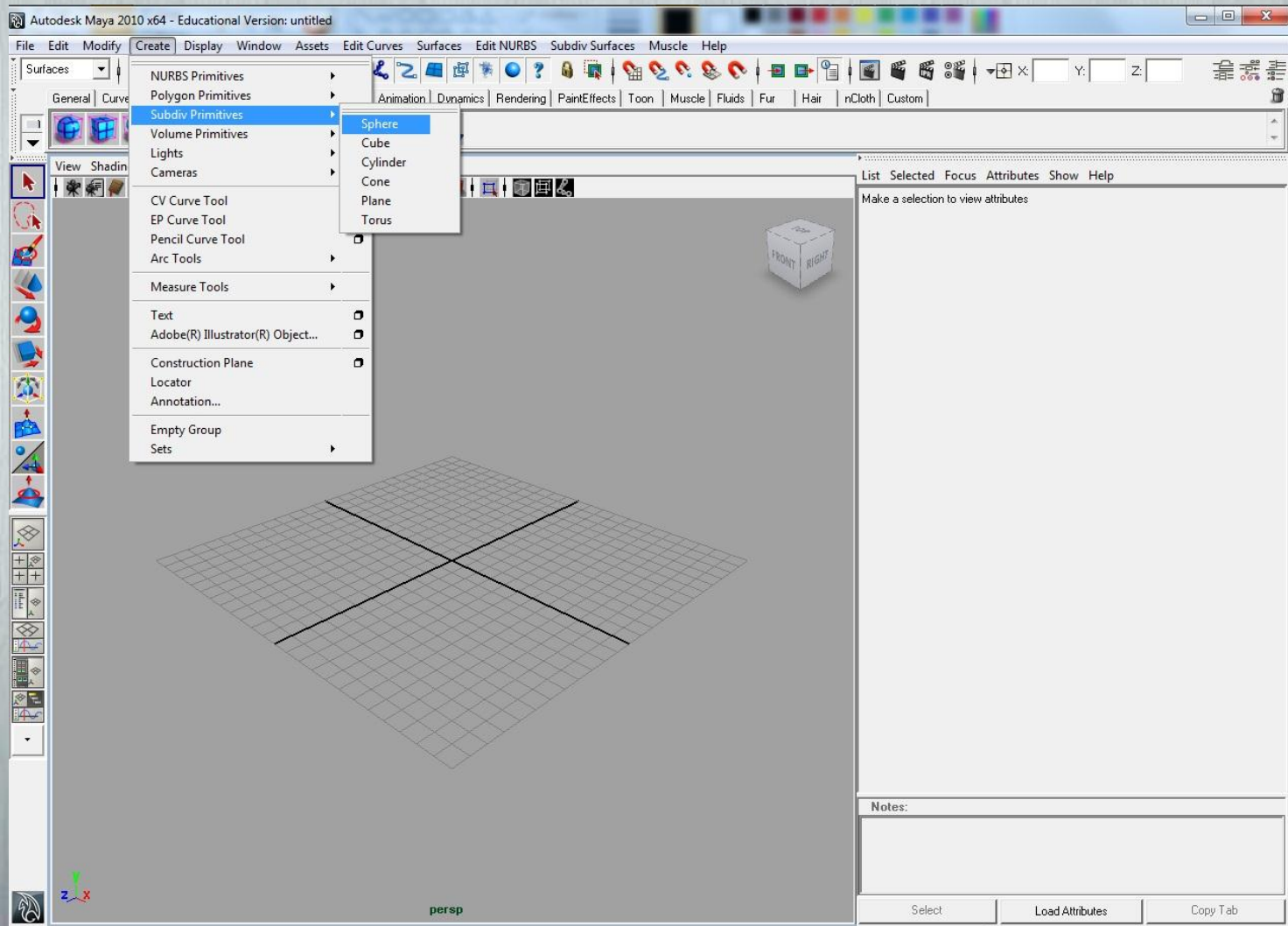
NURBS



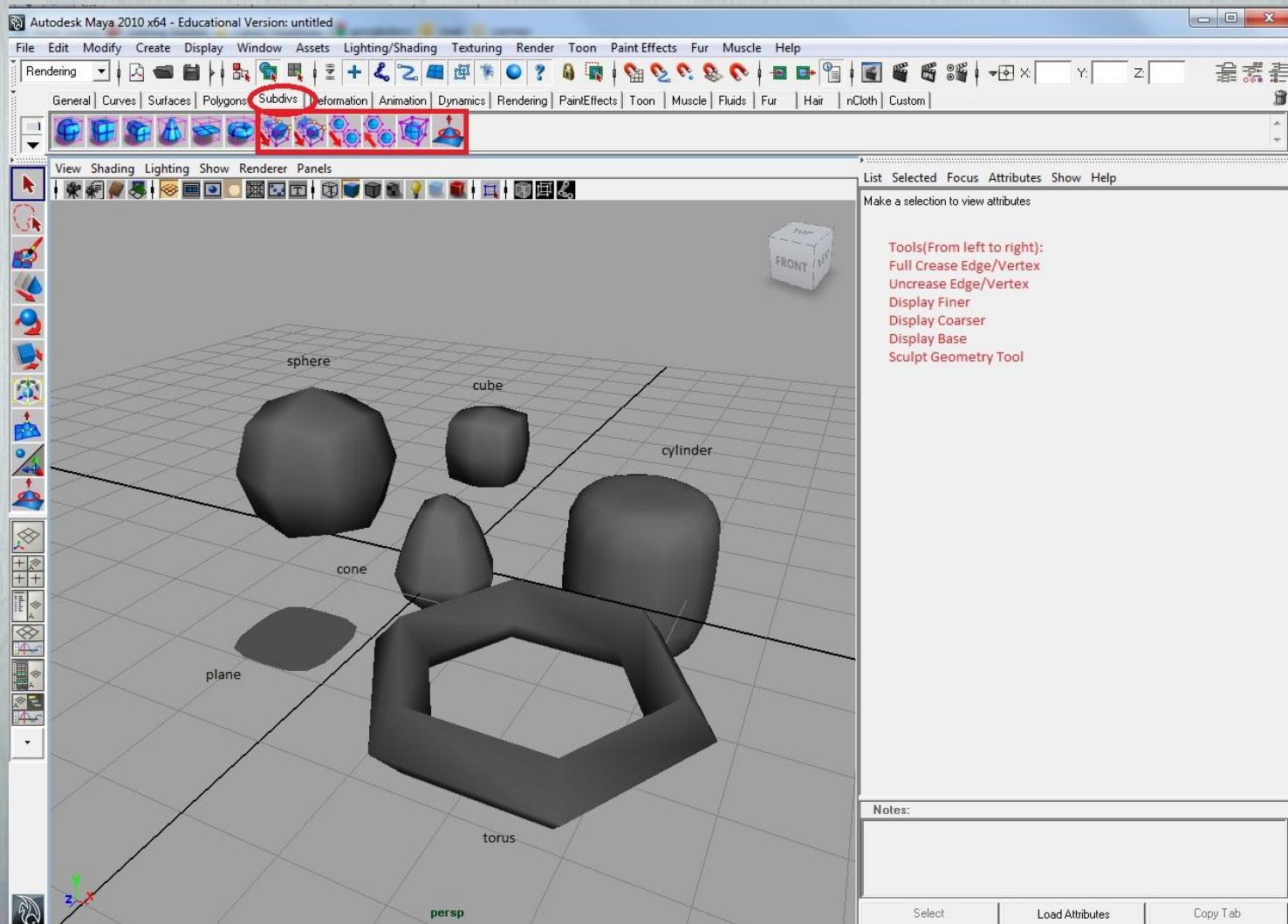
NURBS



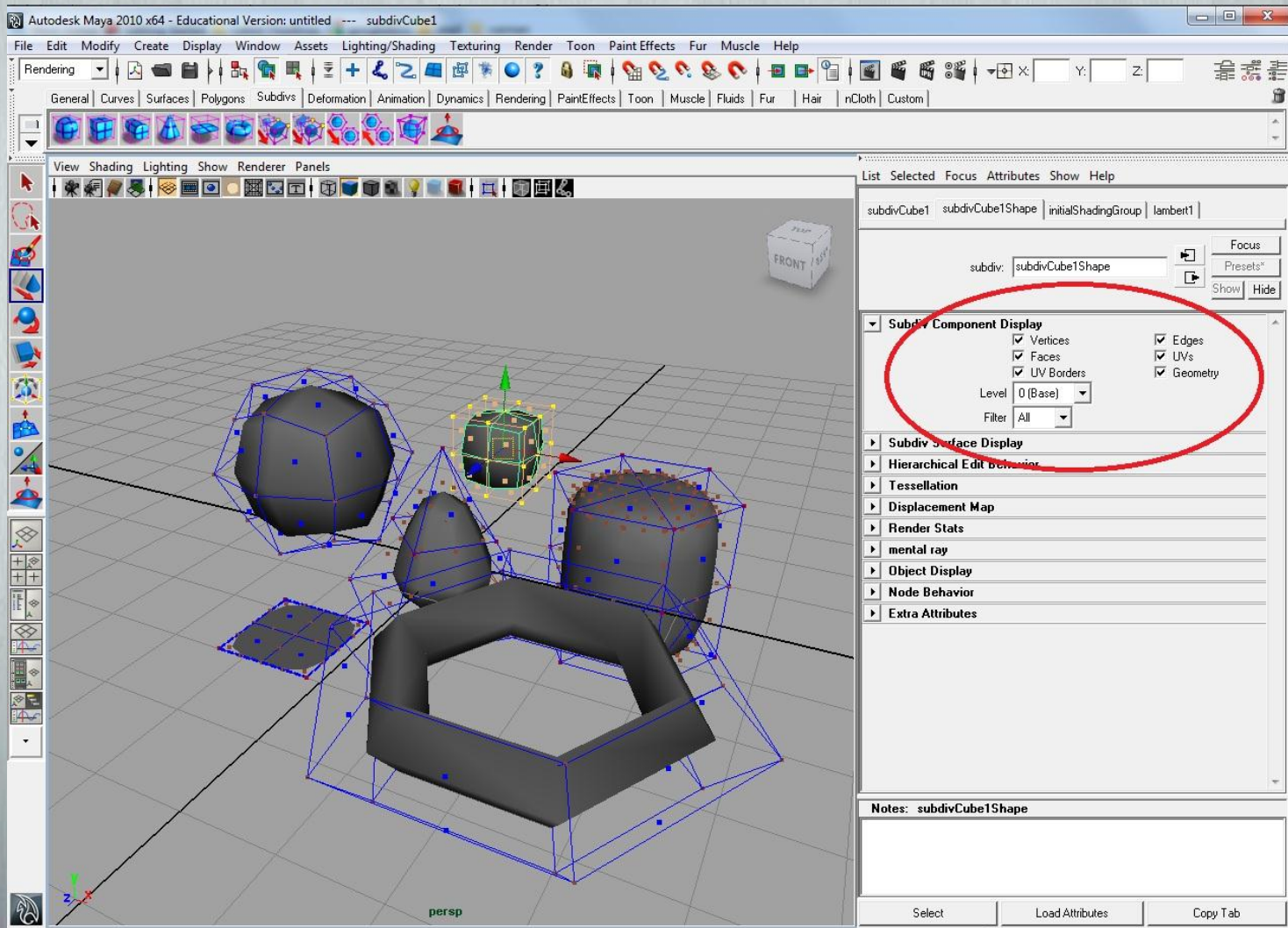
Subdivision Surfaces



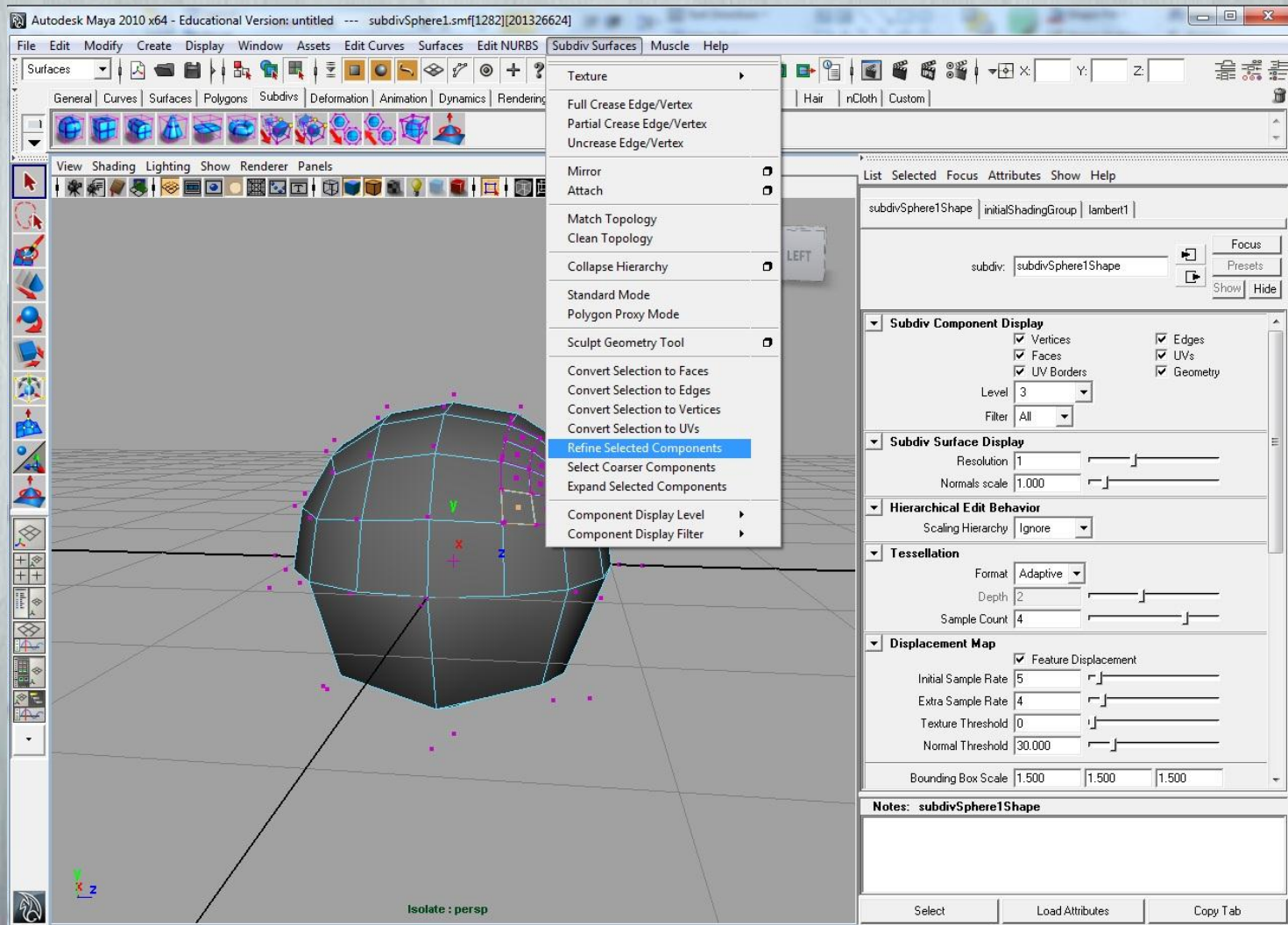
Subdivision Surfaces



Subdivision Surfaces

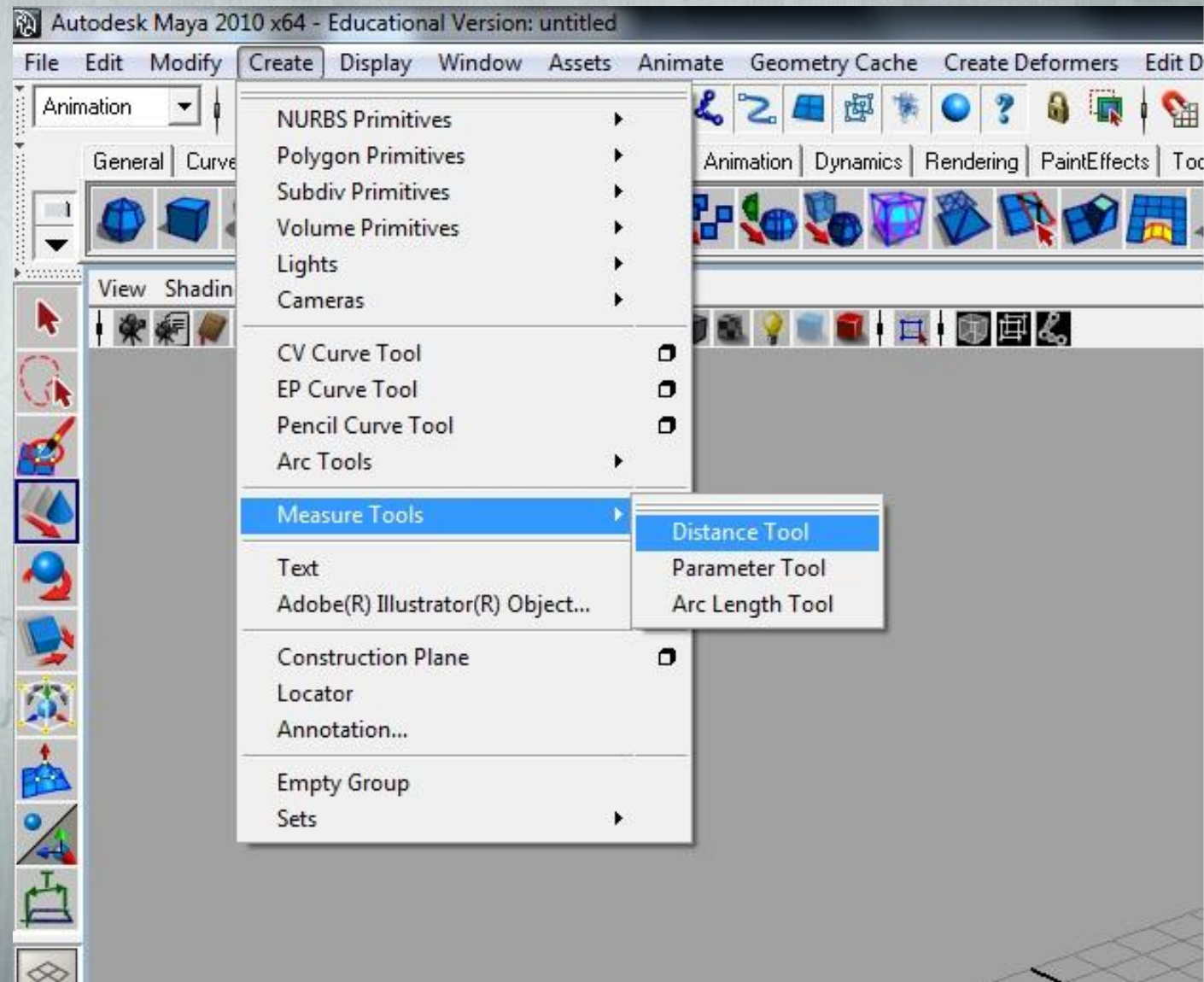


Subdivision Surfaces

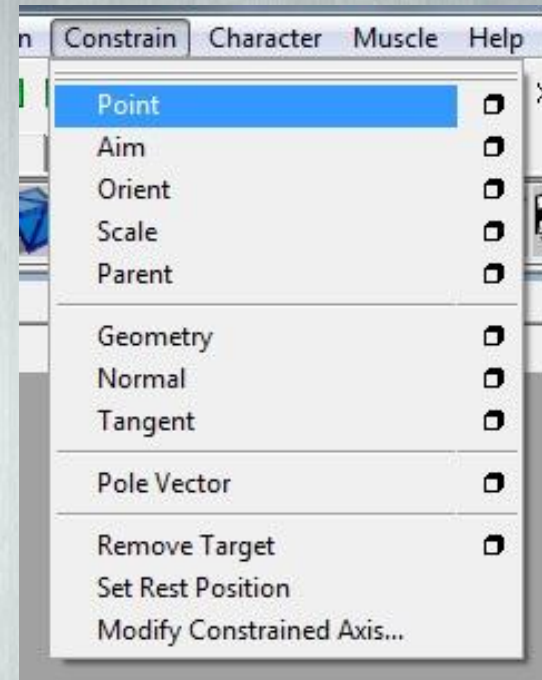
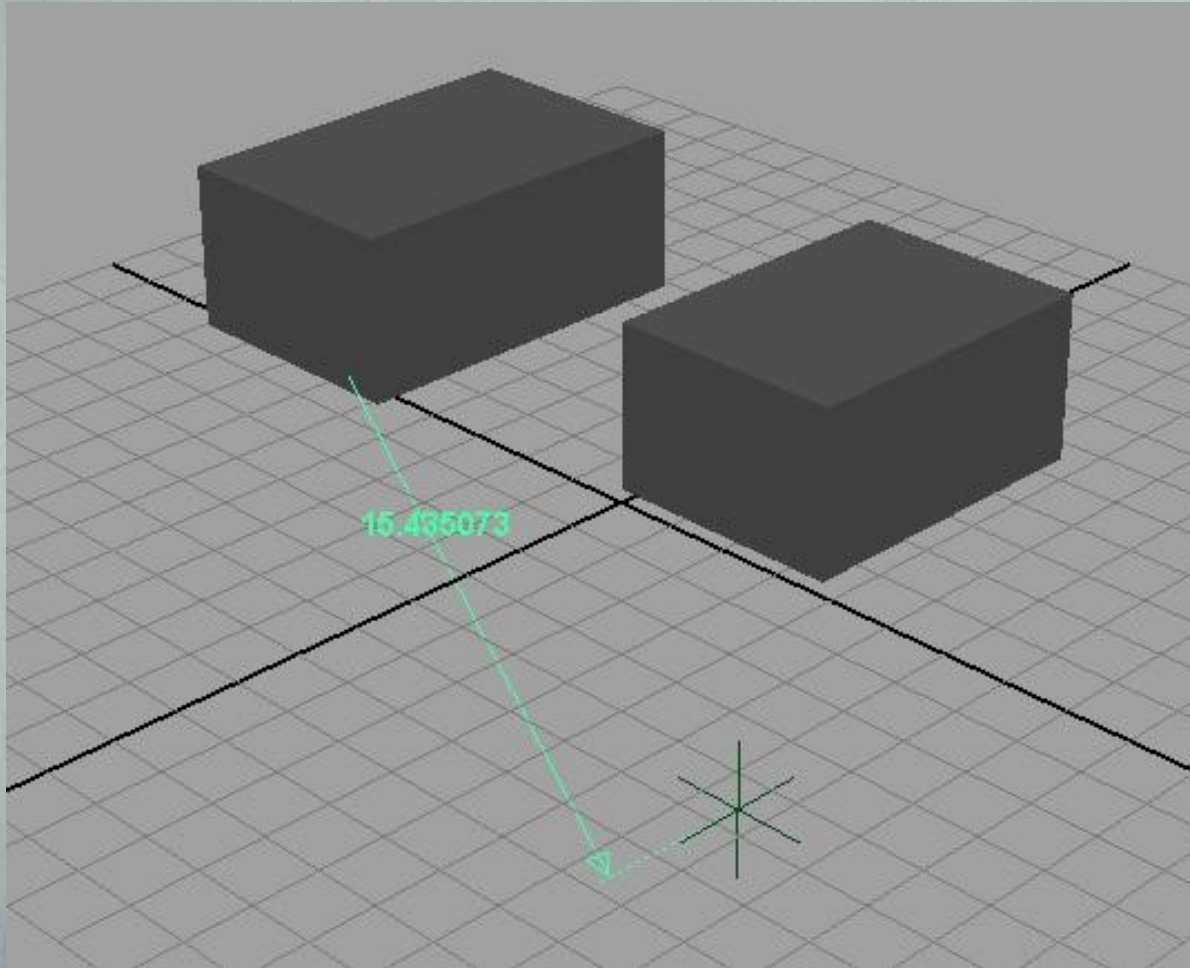


Locators

- Locators are used to find the distance between points
- Can be constrained to objects

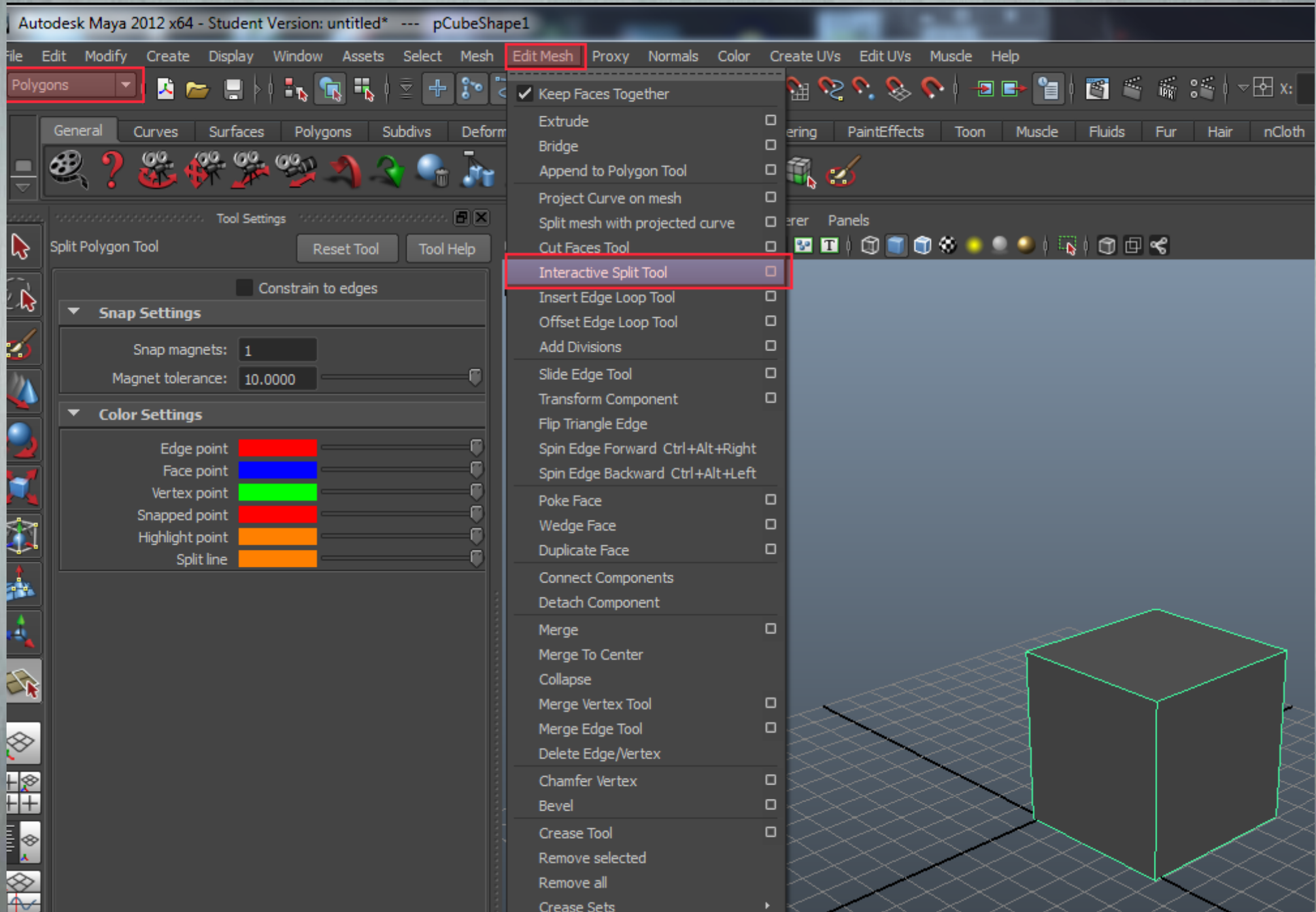


Locators

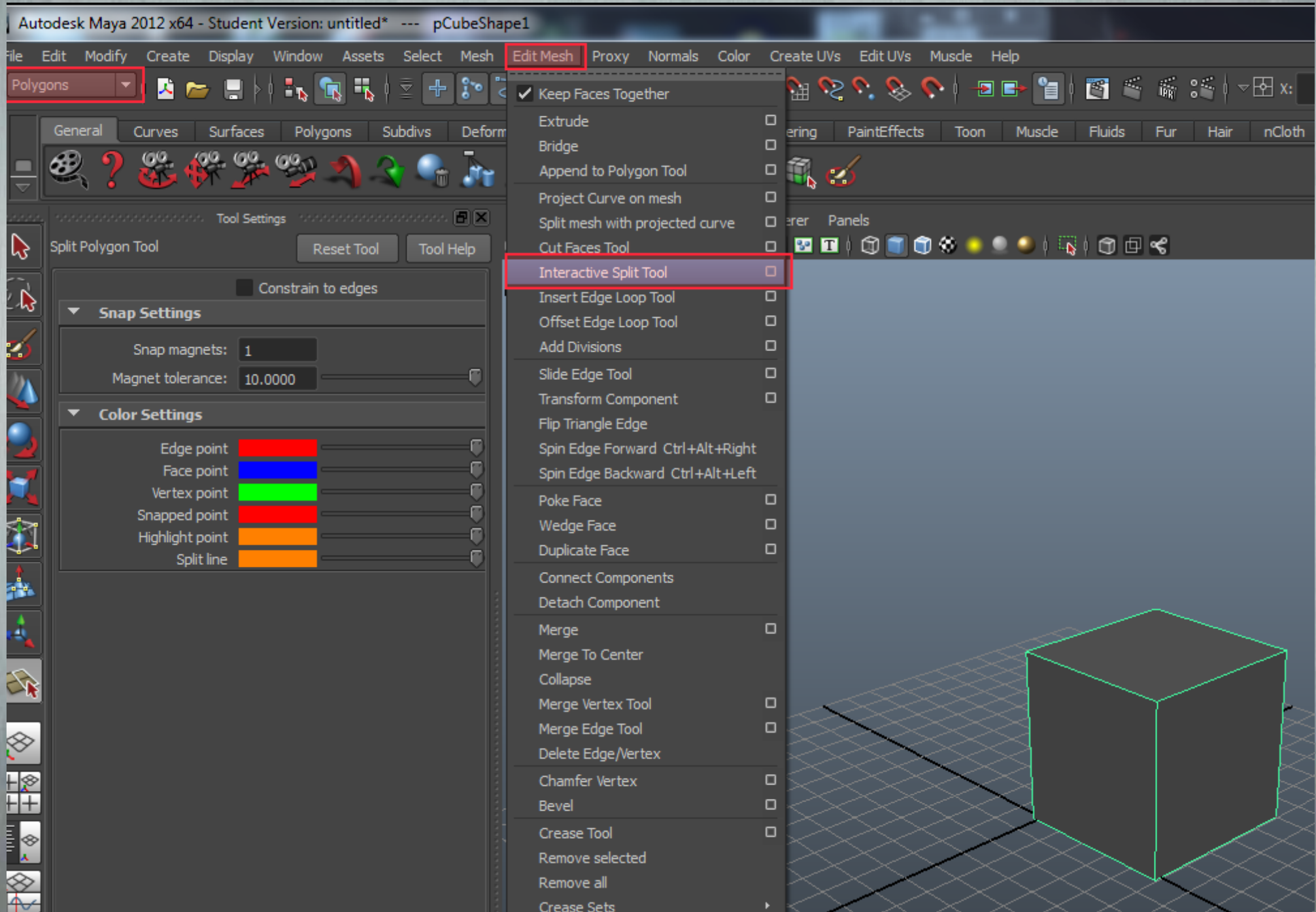


Locators can show the distance between objects

Splitting Polygons



Splitting Polygons



Split Polygon Tool

Reset Tool

Tool Help

Constrain to edges

▼ Snap Settings

Snap magnets: 1

Magnet tolerance: 5.0000

▼ Color Settings

Edge point



Face point



Vertex point



Snapped point



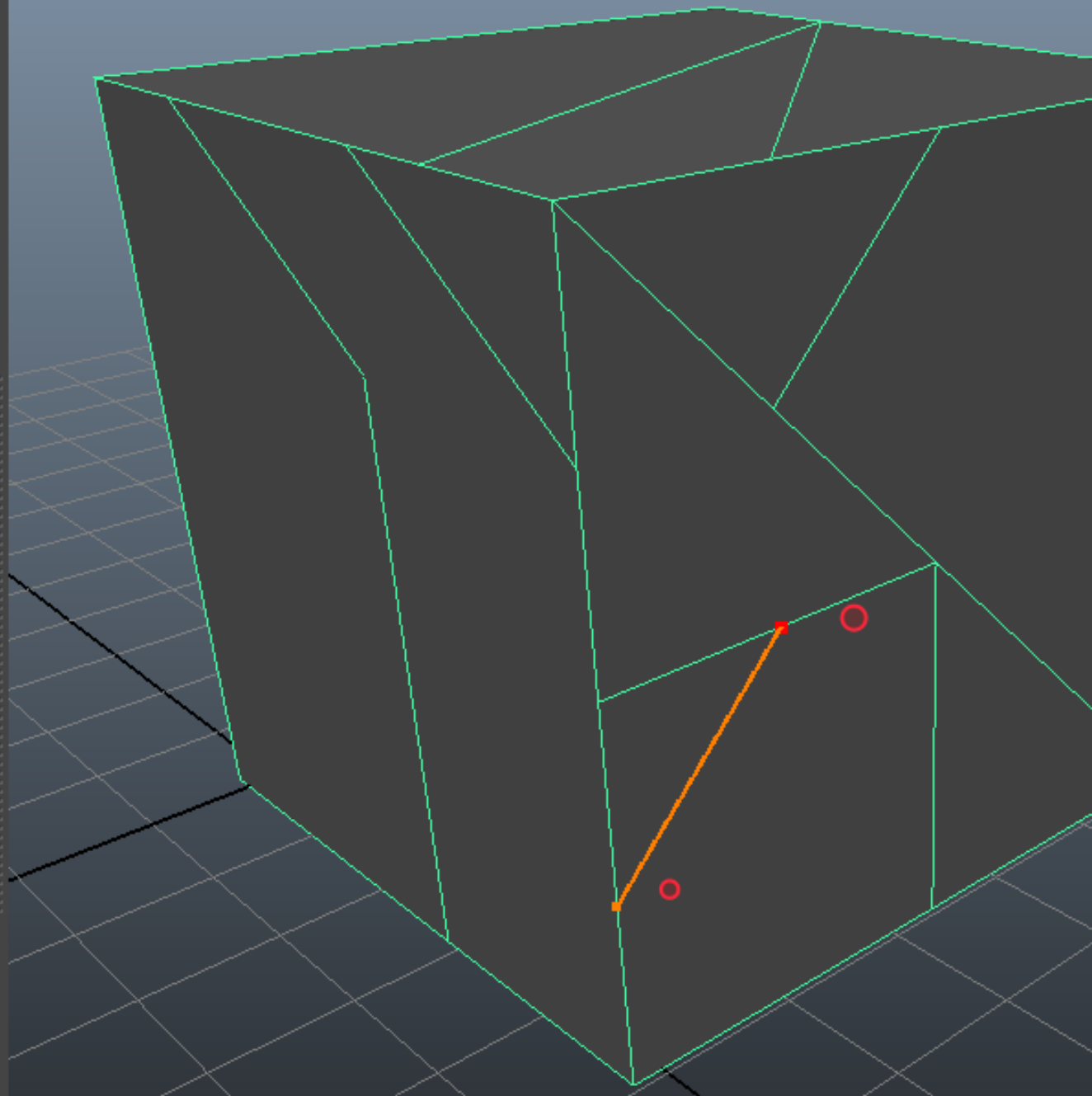
Highlight point



Split line



12



Reset Tool

Tool Help

Constrain to edges

Snap Settings

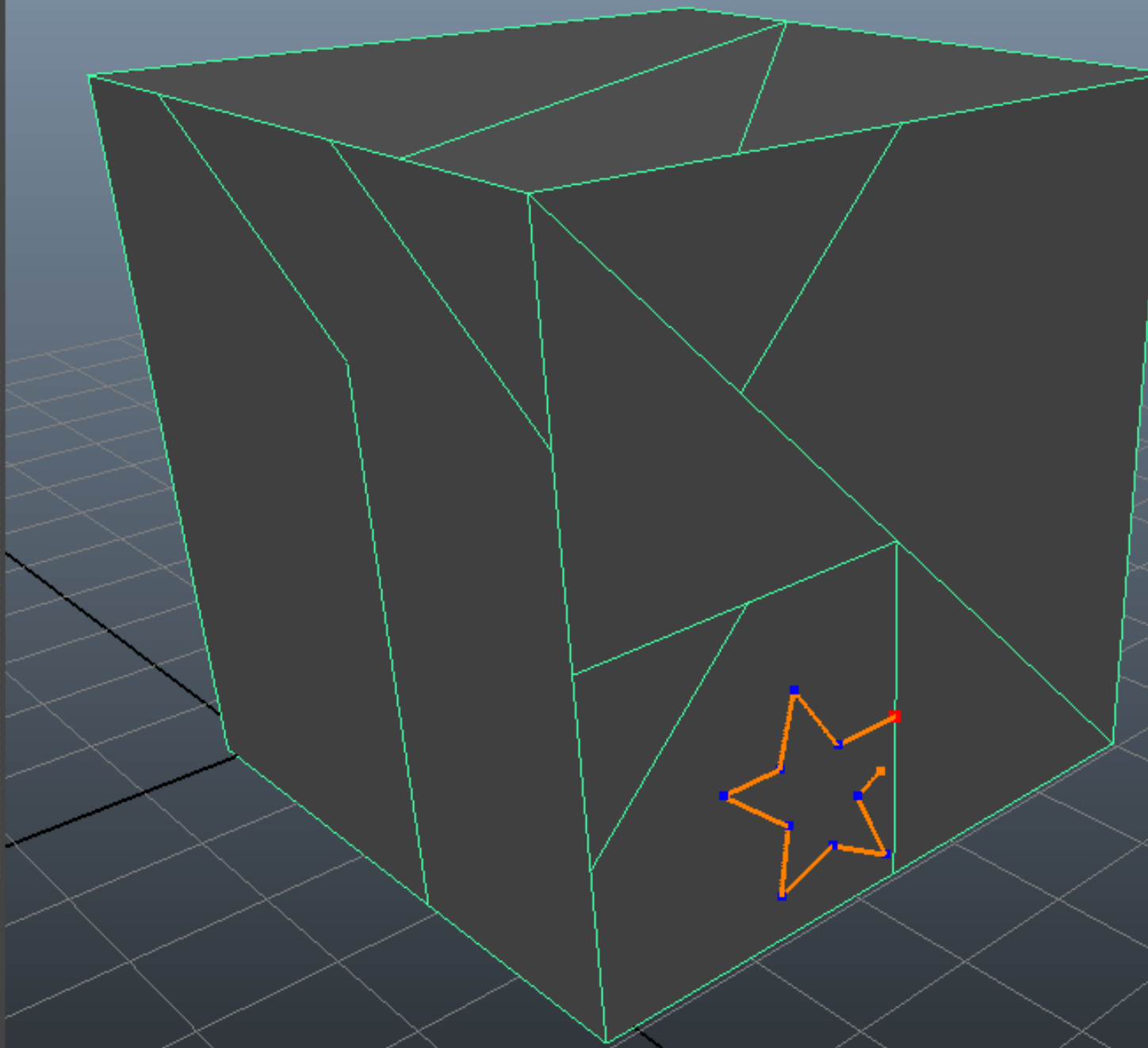
Snap magnets: 1

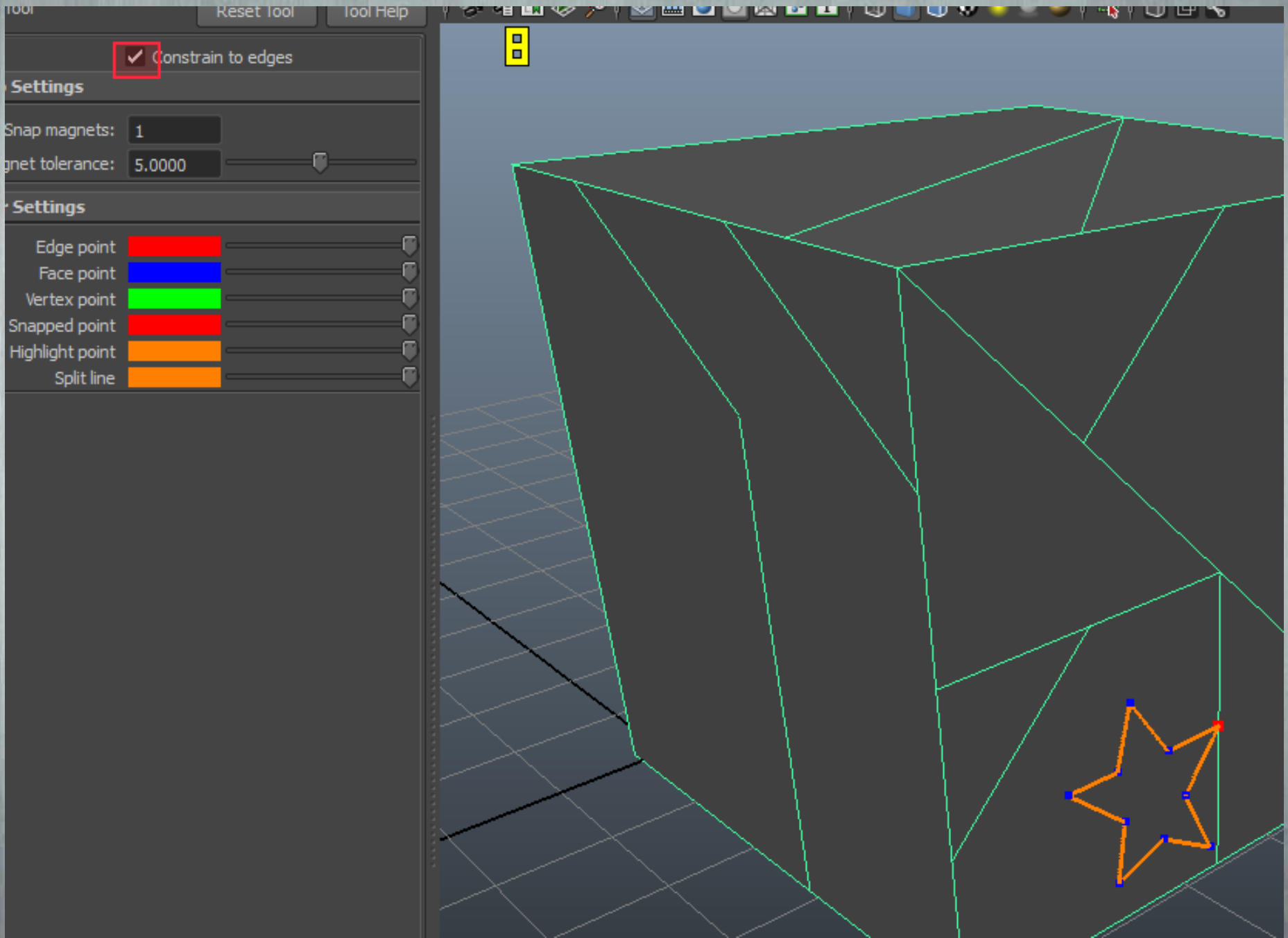
Magnet tolerance: 5.0000

Color Settings

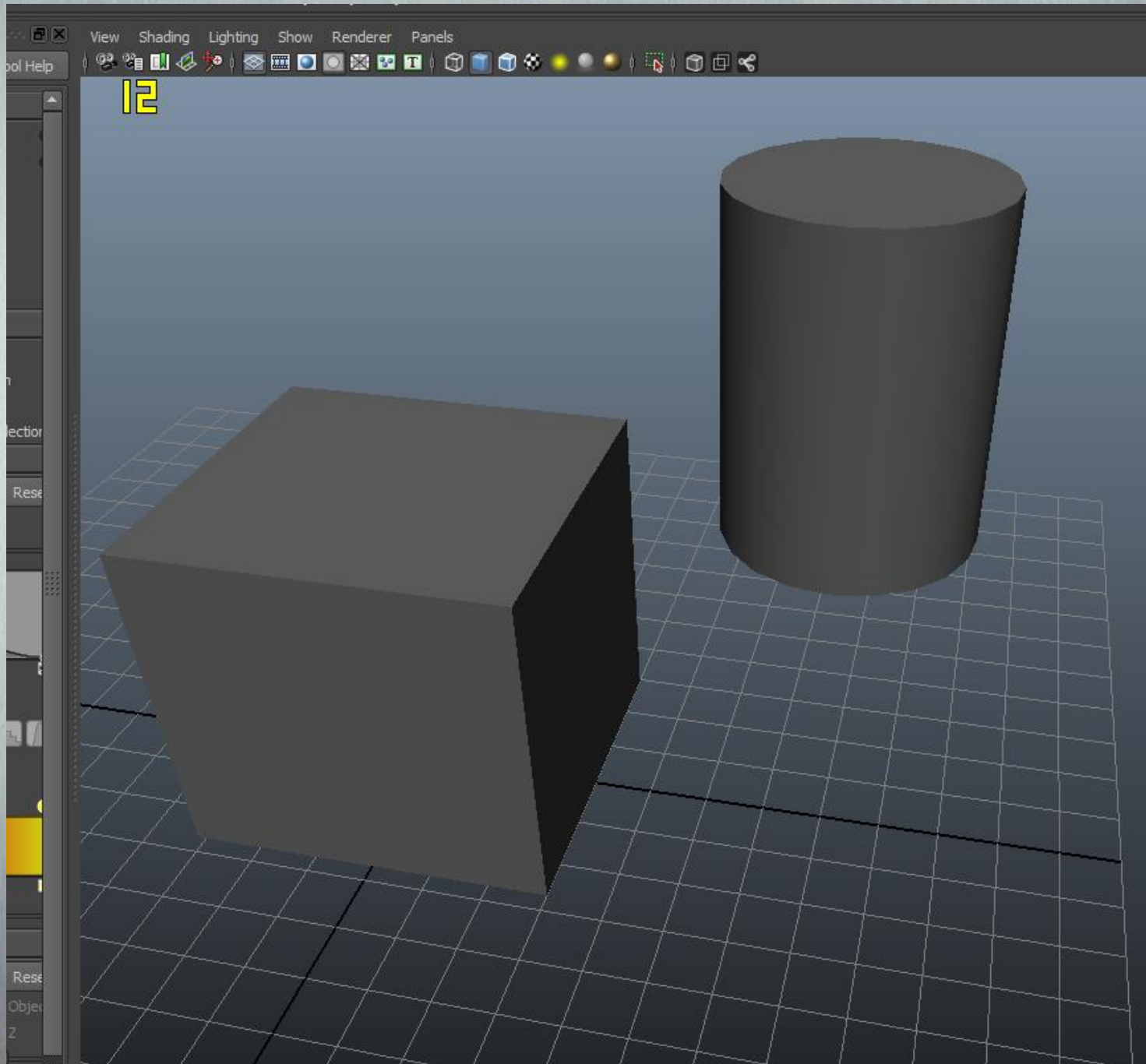
- Edge point
- Face point
- Vertex point
- Snapped point
- Highlight point
- Split line

16

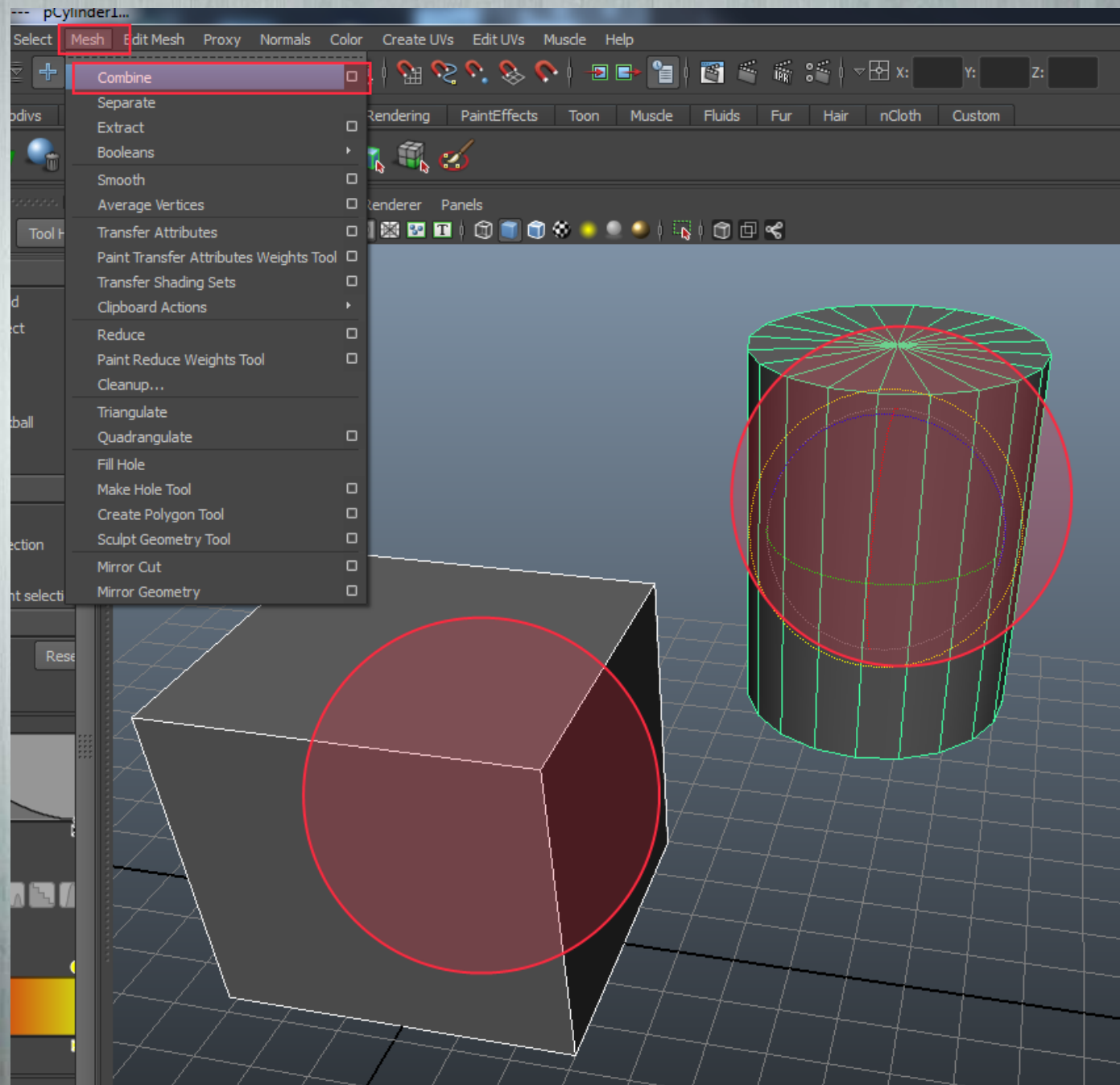


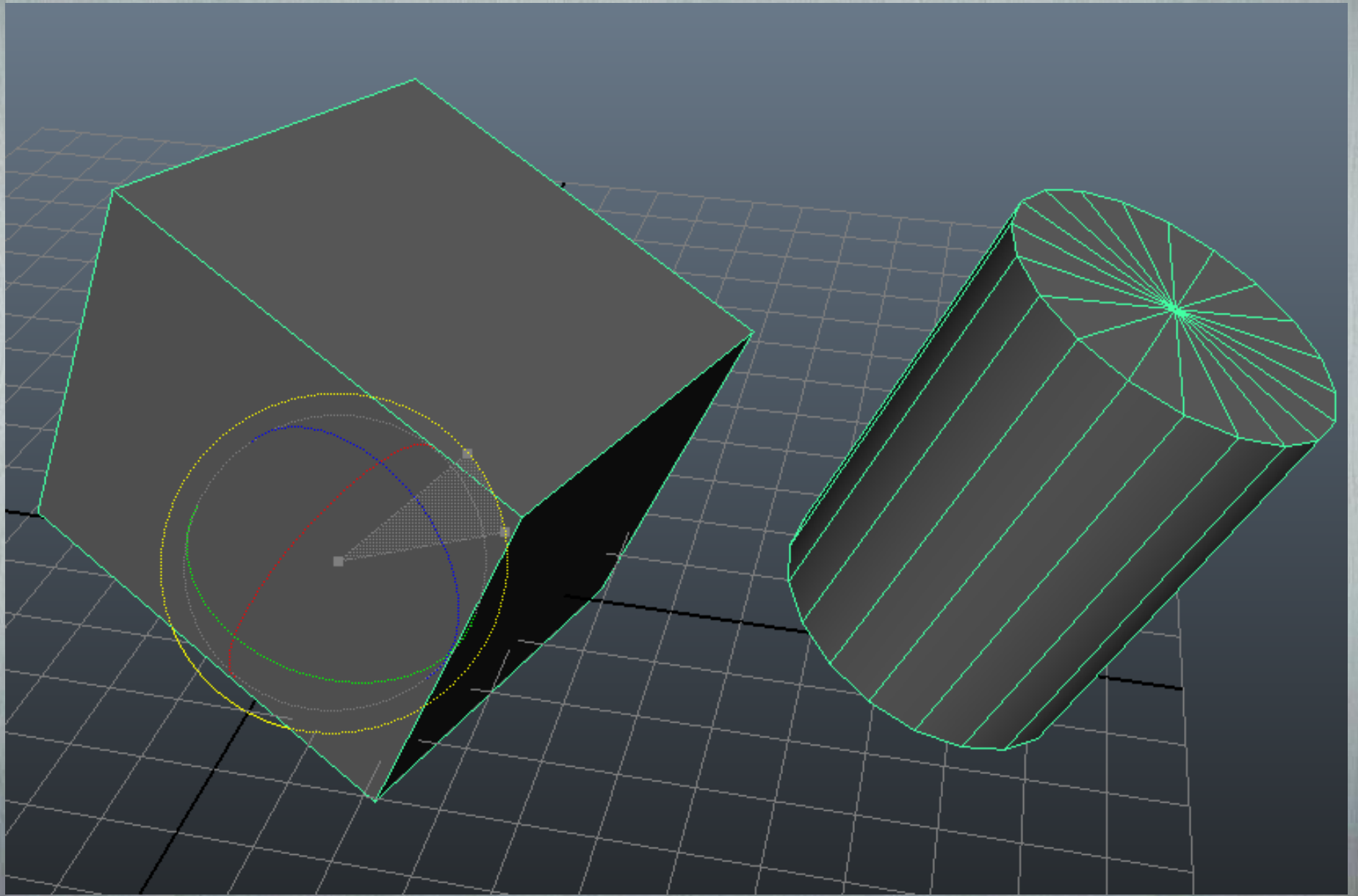


Joining Objects

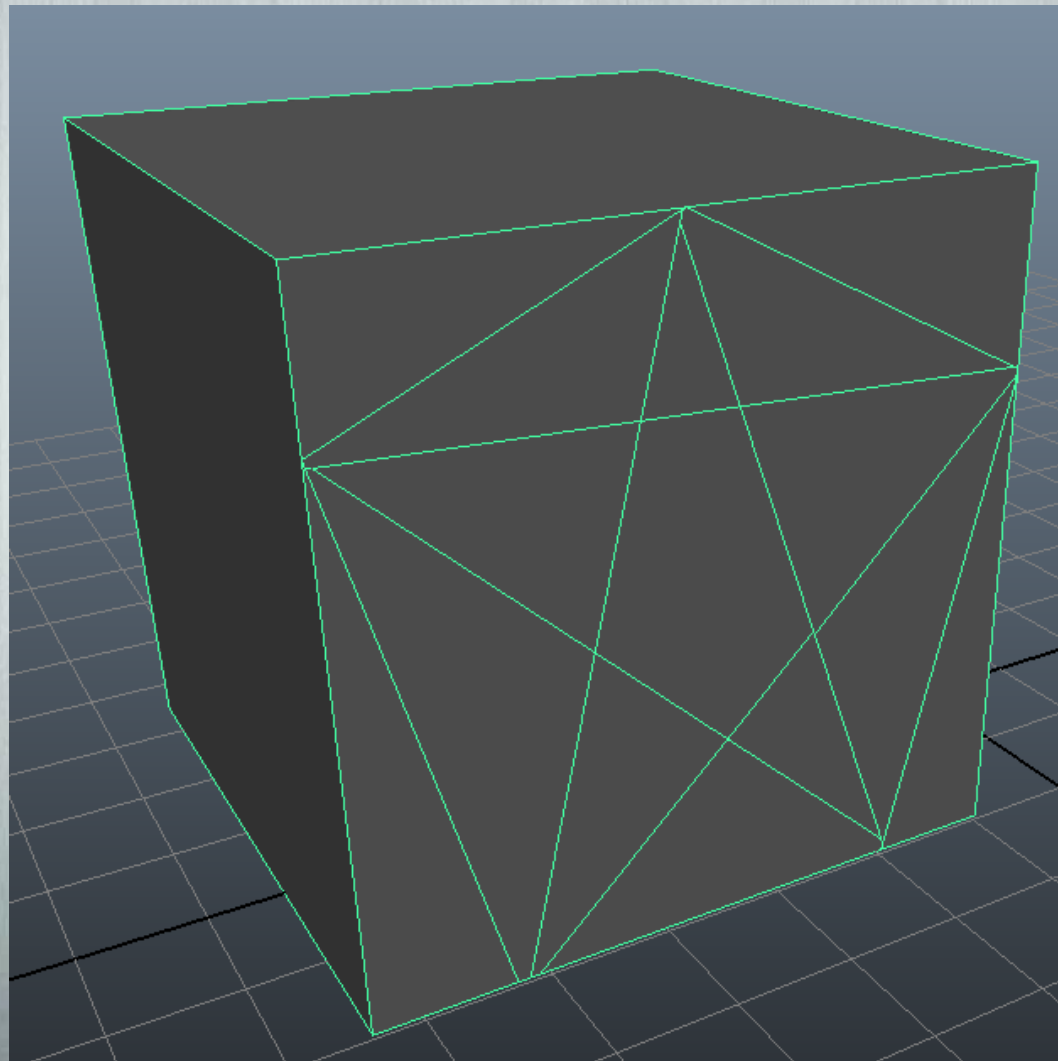


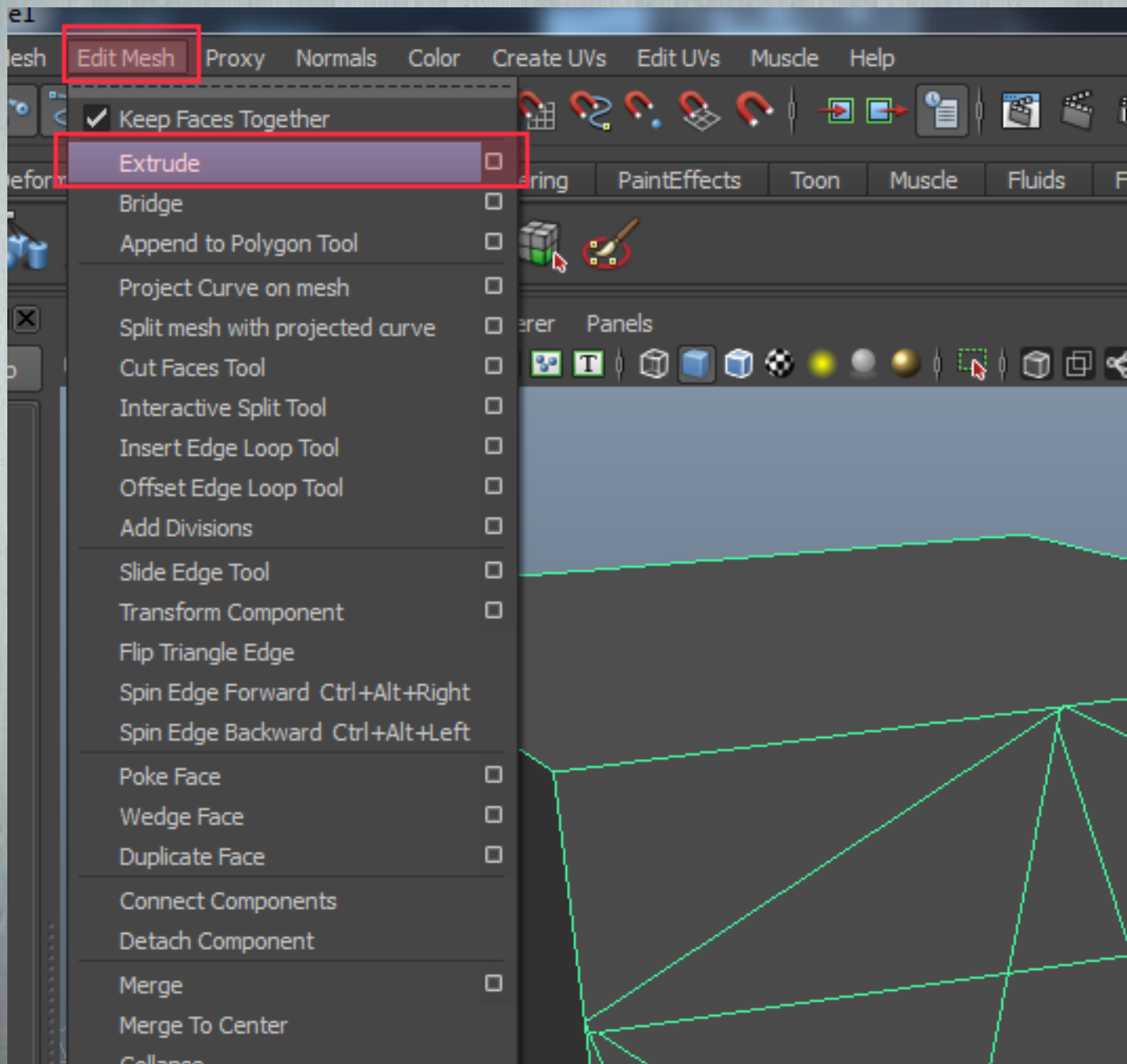
- Click both objects (shift+click)
- Combine

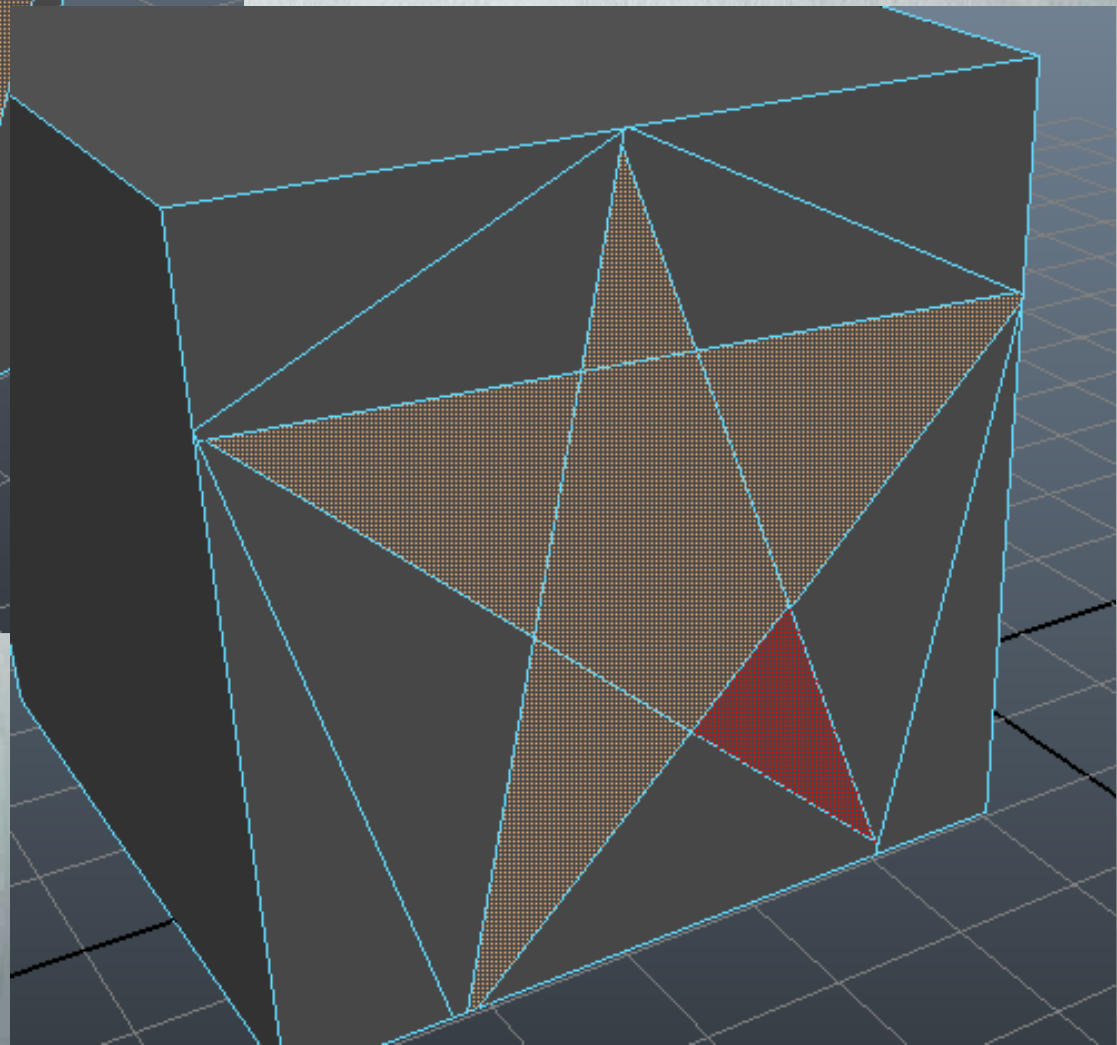
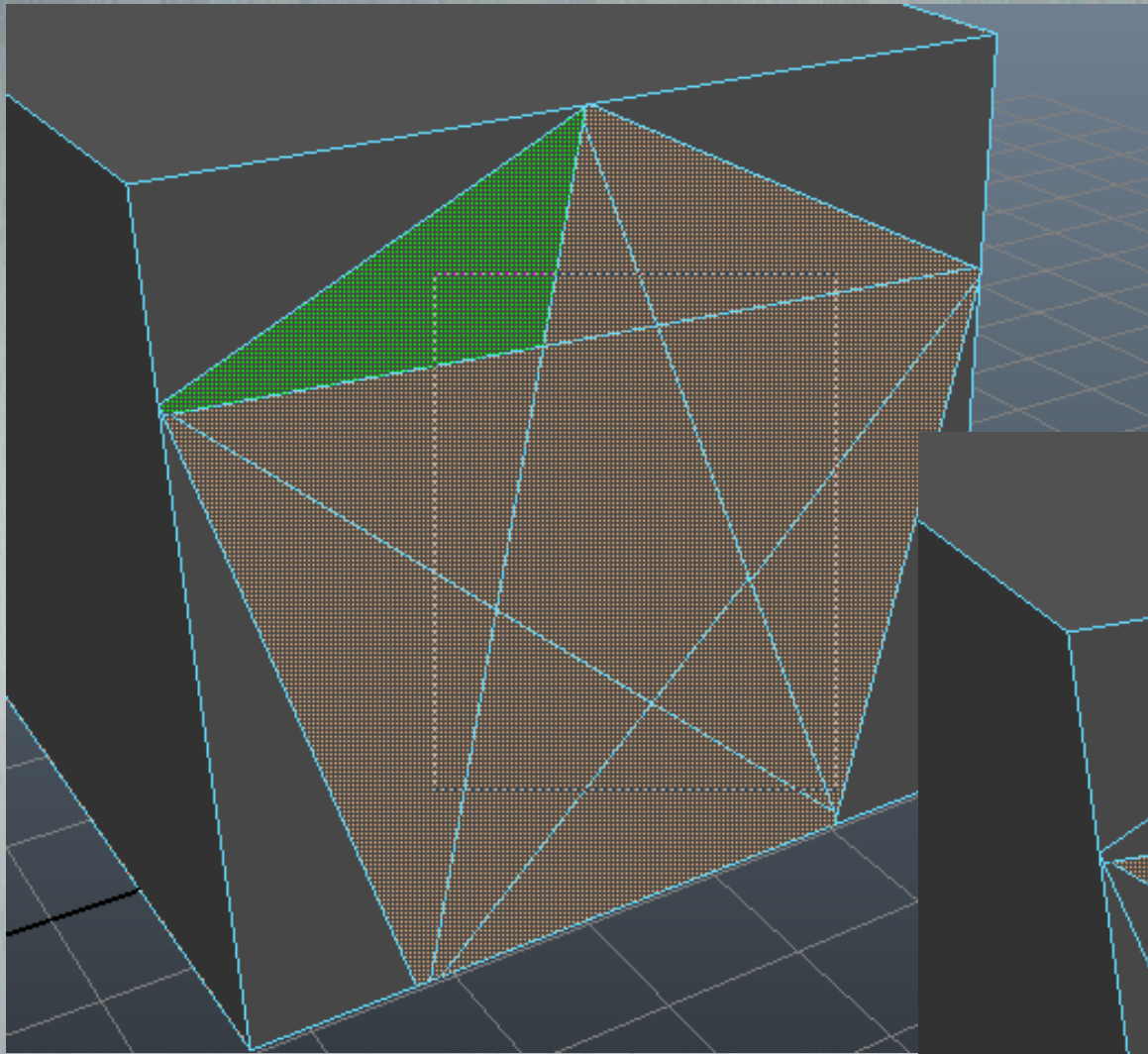


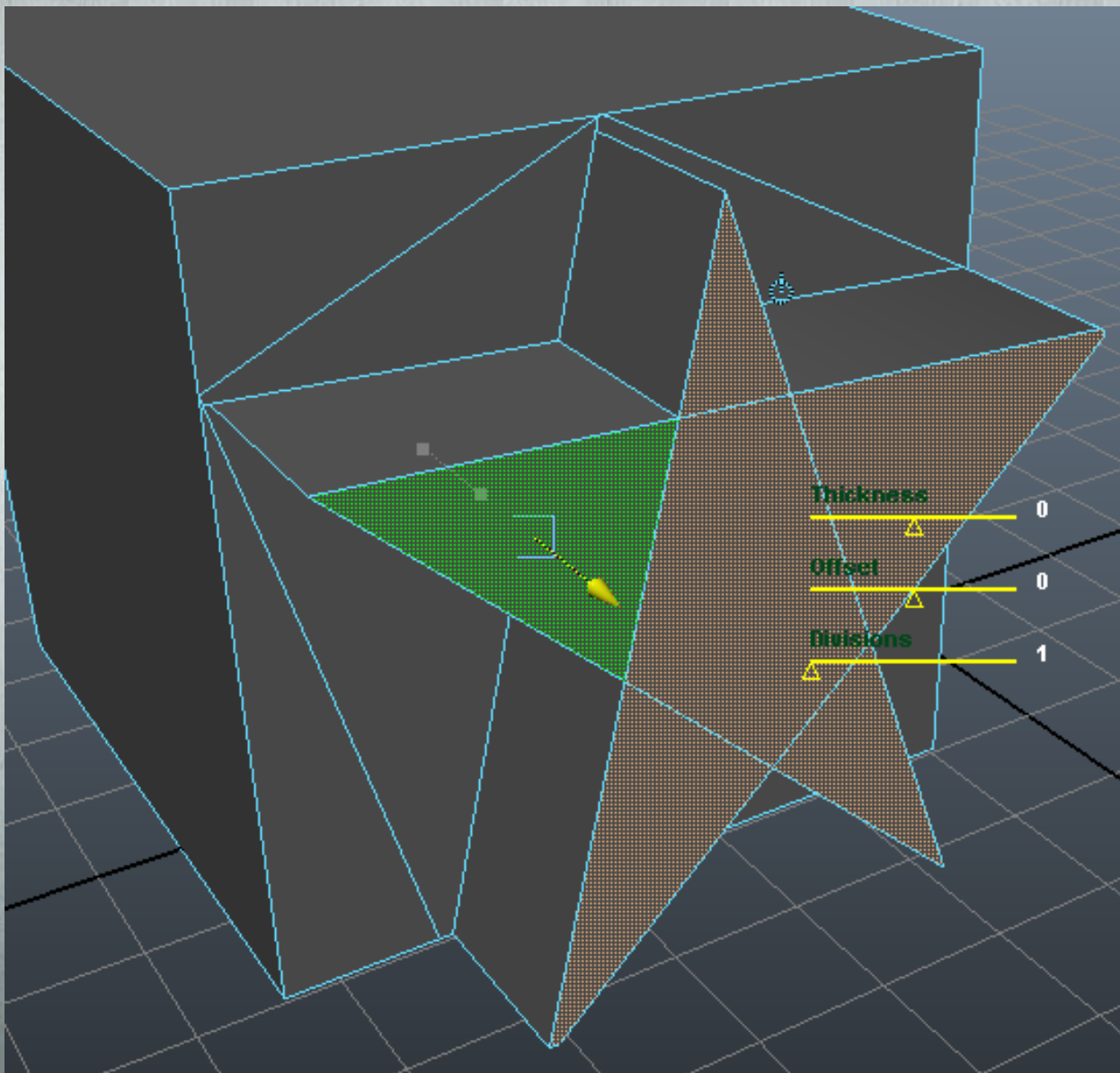


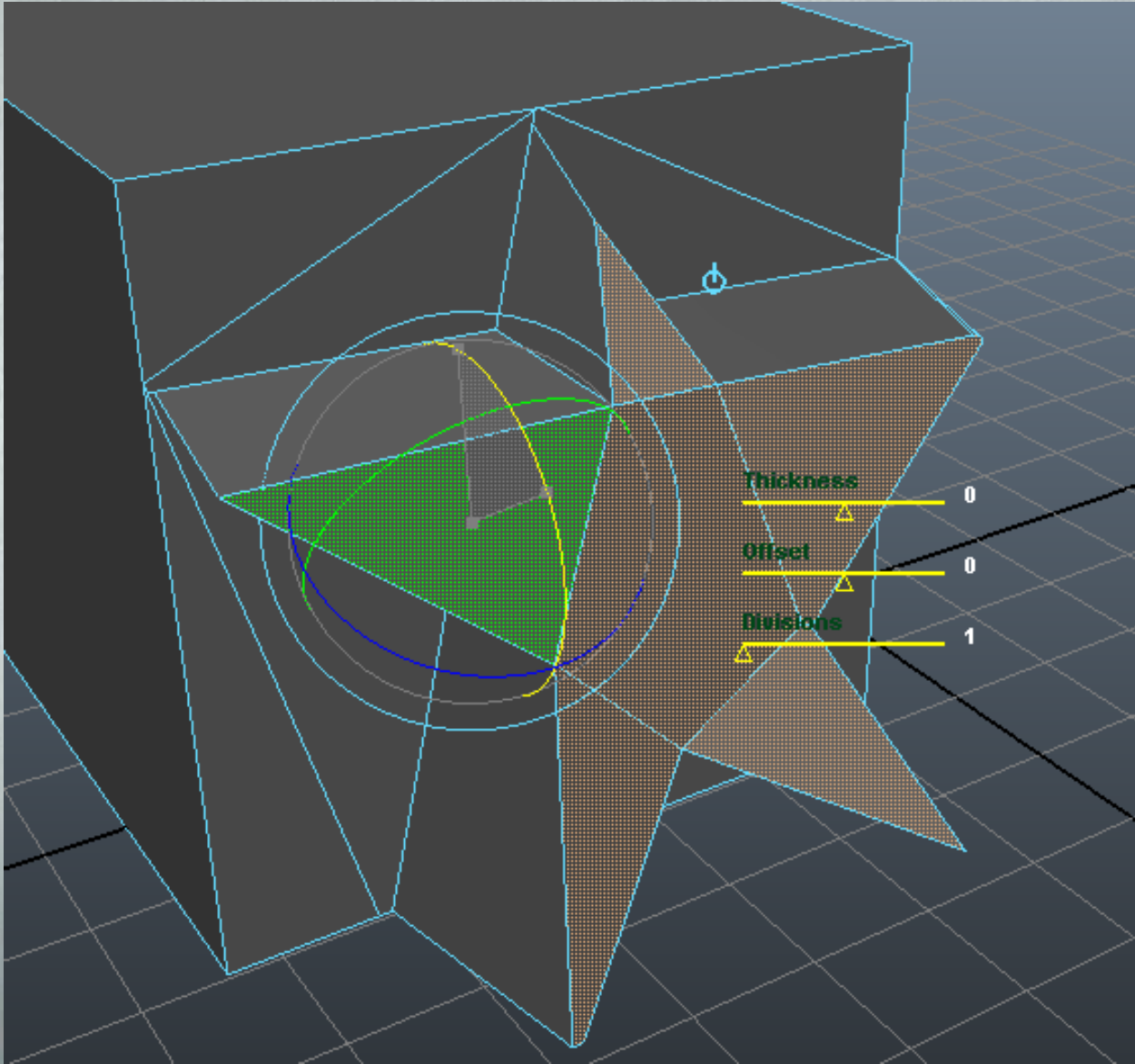
Extruding Faces





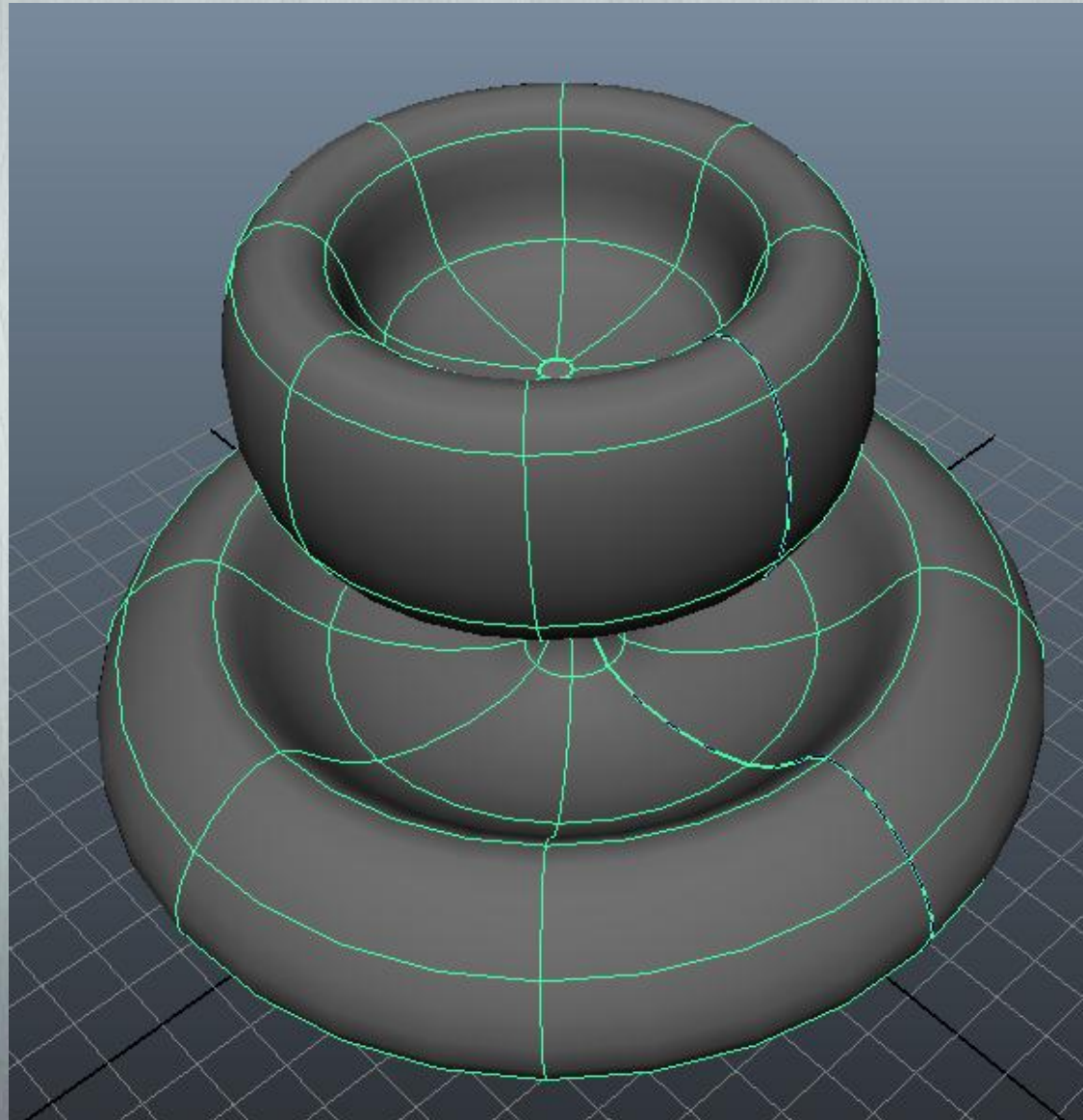


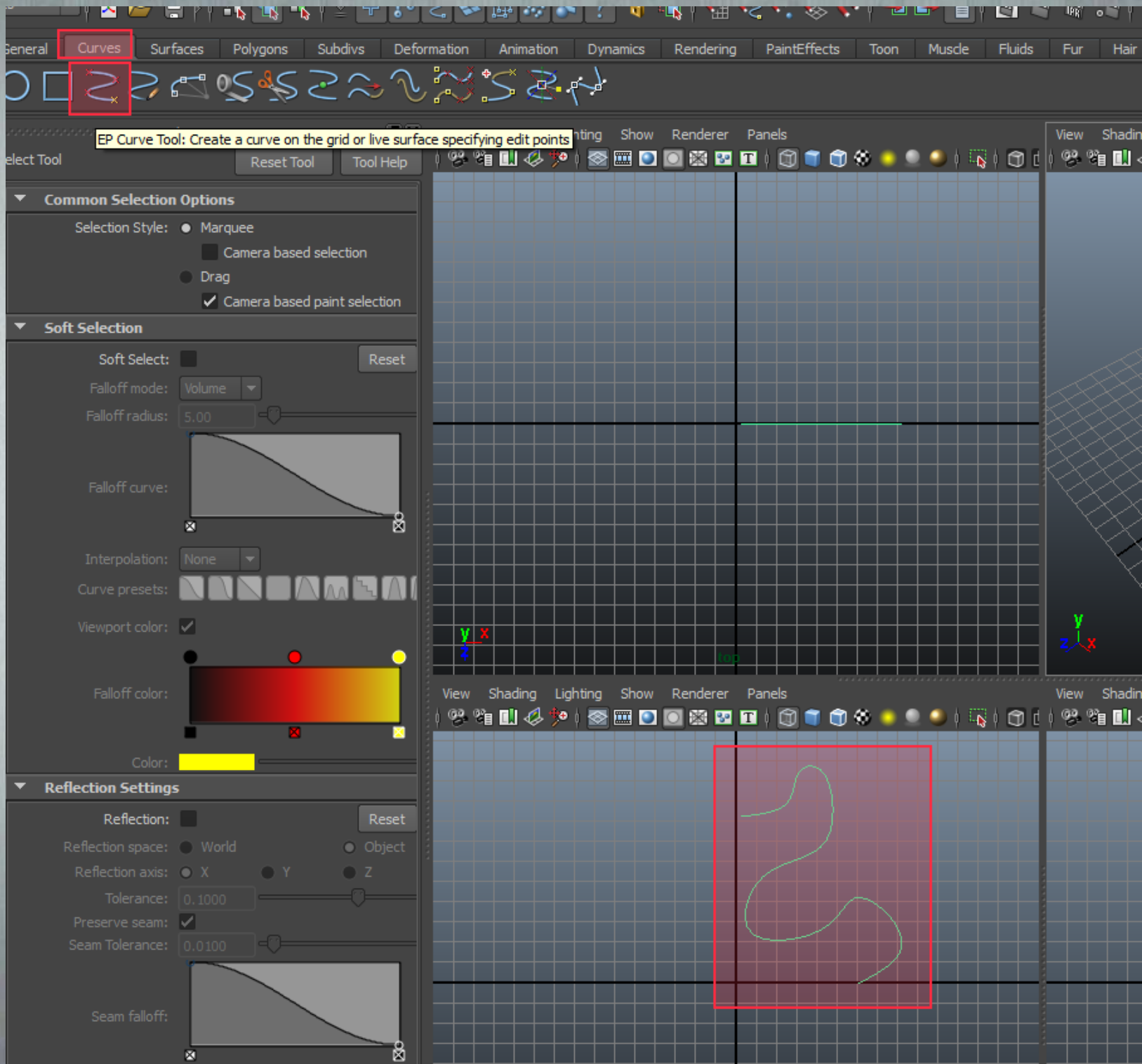


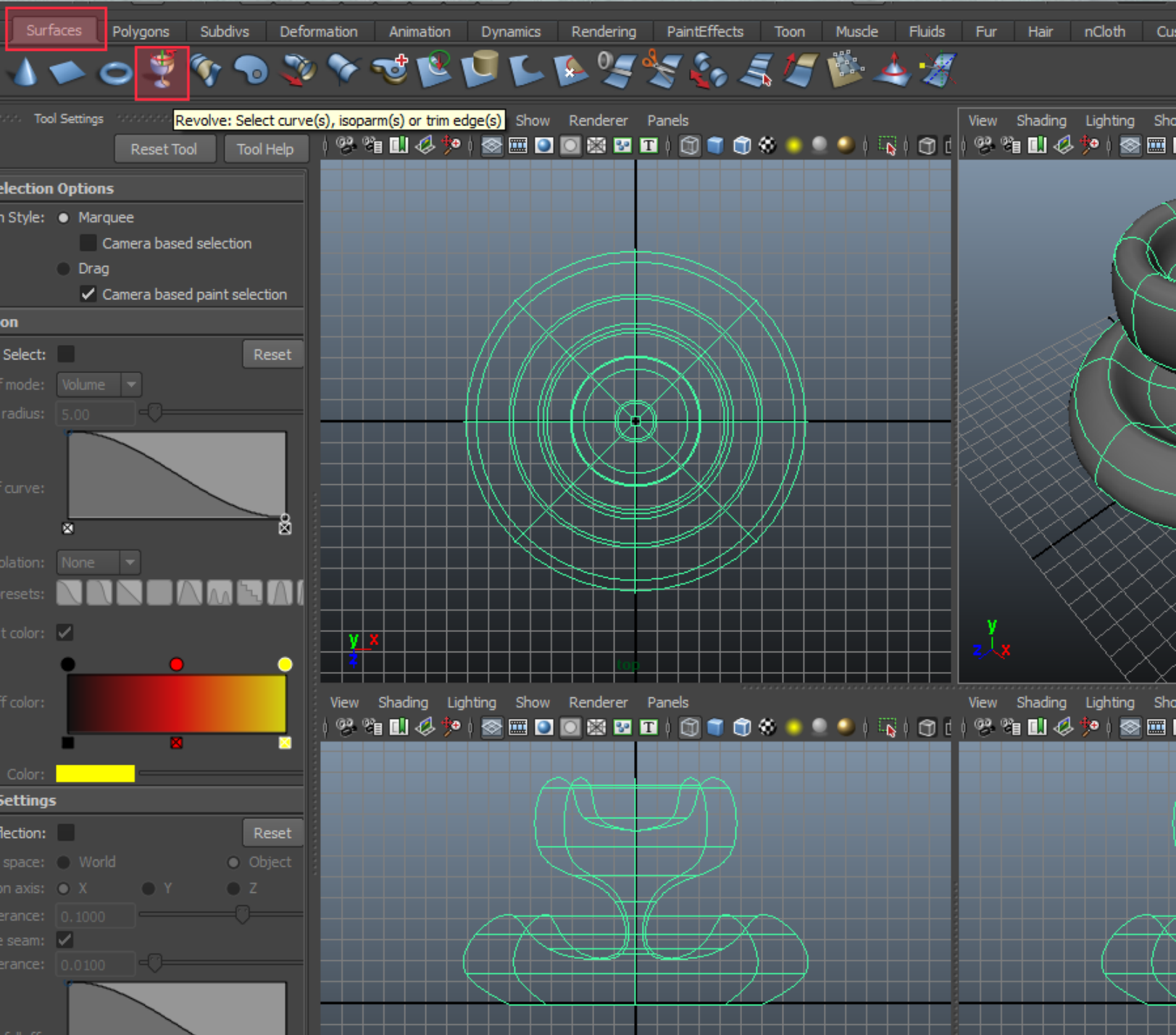


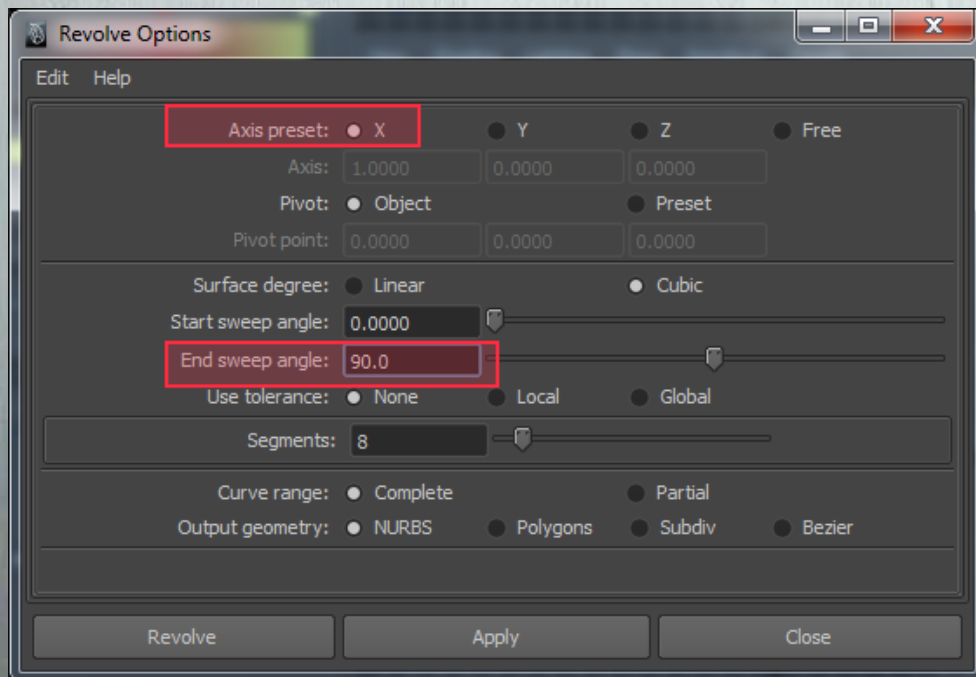
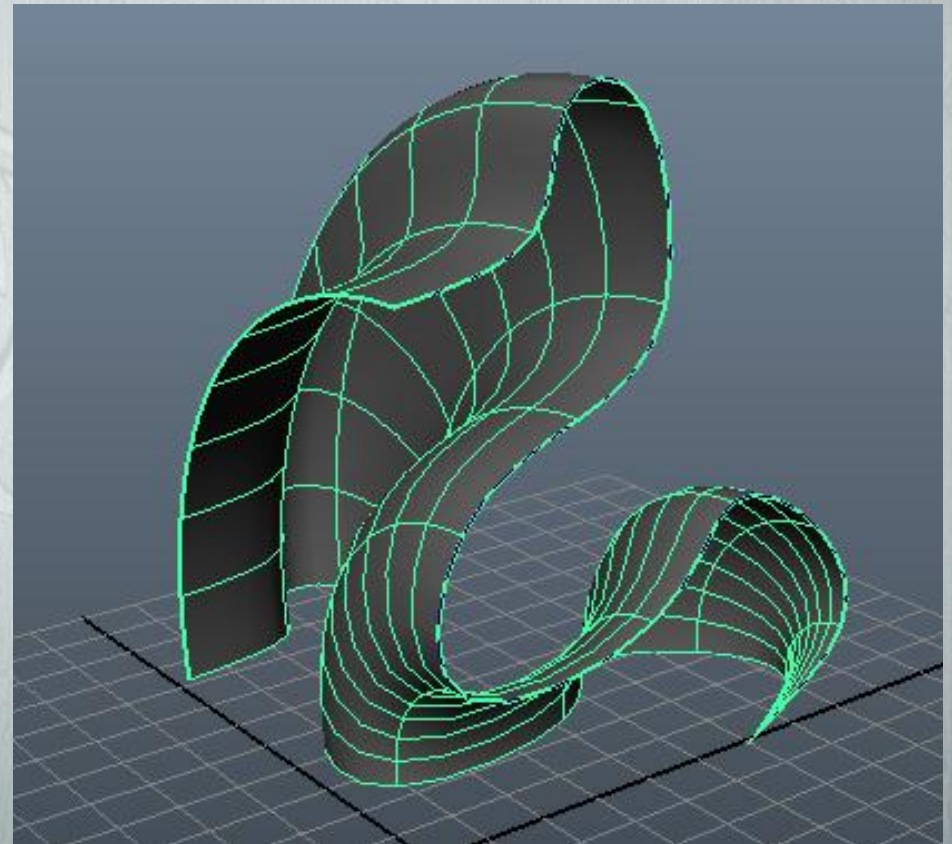
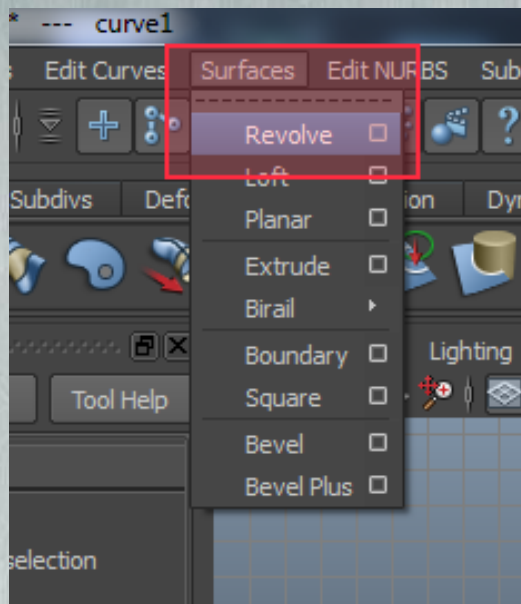
Thickness 0
Offset 0
Divisions 1

Revolve

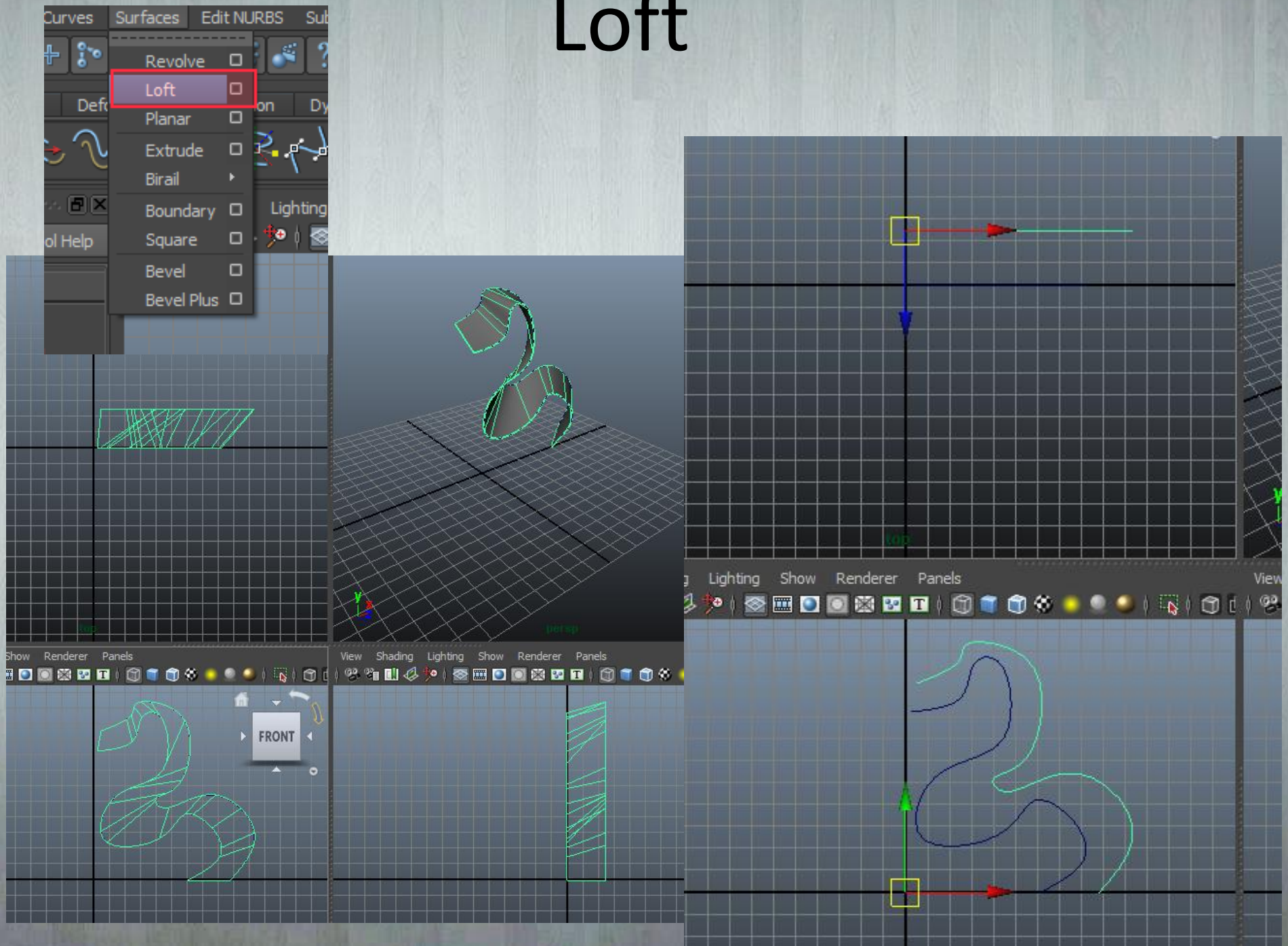


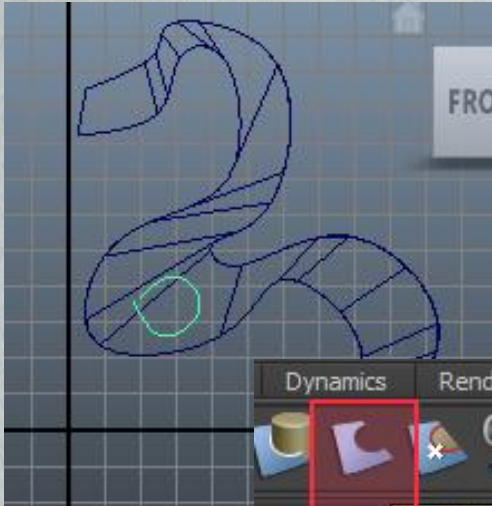






Loft

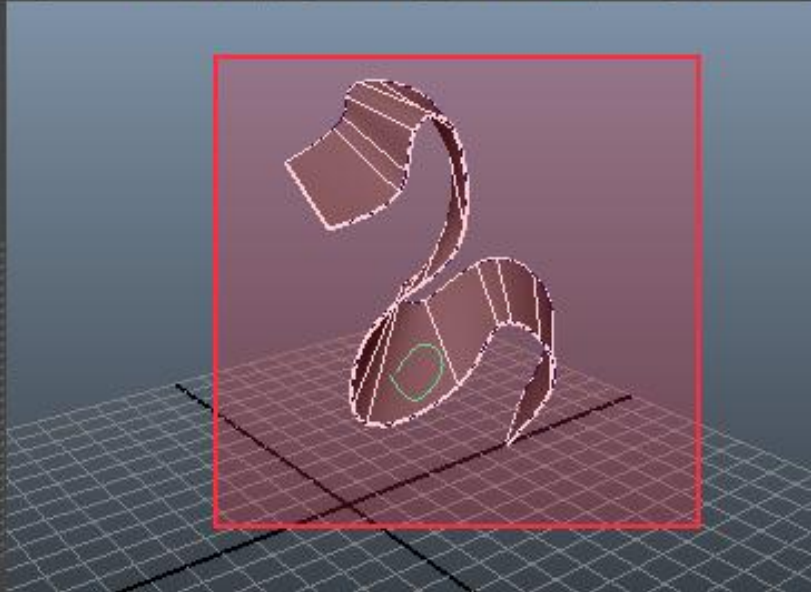
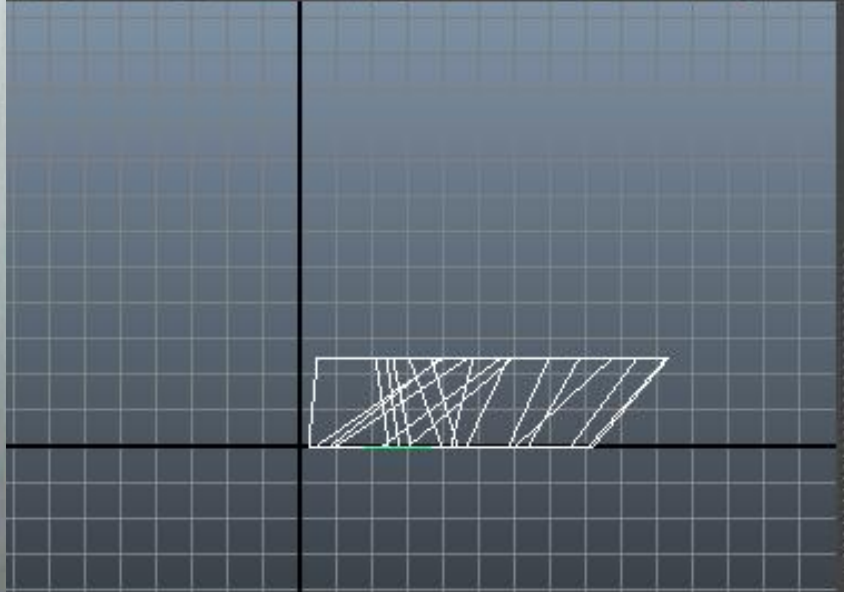




Dynamics Rendering PaintEffects Toon Musde Fluids Fur Hair nCloth Custom

hting Show **Trim Tool: Select a surface with a curve on it** View Shading Lighting Show Renderer Panels

This block contains the software's toolbar and menu system. The top row lists various tool categories: Dynamics, Rendering, PaintEffects, Toon, Musde, Fluids, Fur, Hair, nCloth, and Custom. Below these are icons for different tools, with a red box highlighting a specific icon. A tooltip for the 'Trim Tool' is visible, stating 'Trim Tool: Select a surface with a curve on it'. The bottom row contains icons for view manipulation, shading, lighting, and rendering options.



Instances vs Copies

- Think of copies as completely fresh objects taking form of copied object
- Instances have geometry dependent on original
- Copies can be assigned shader independently

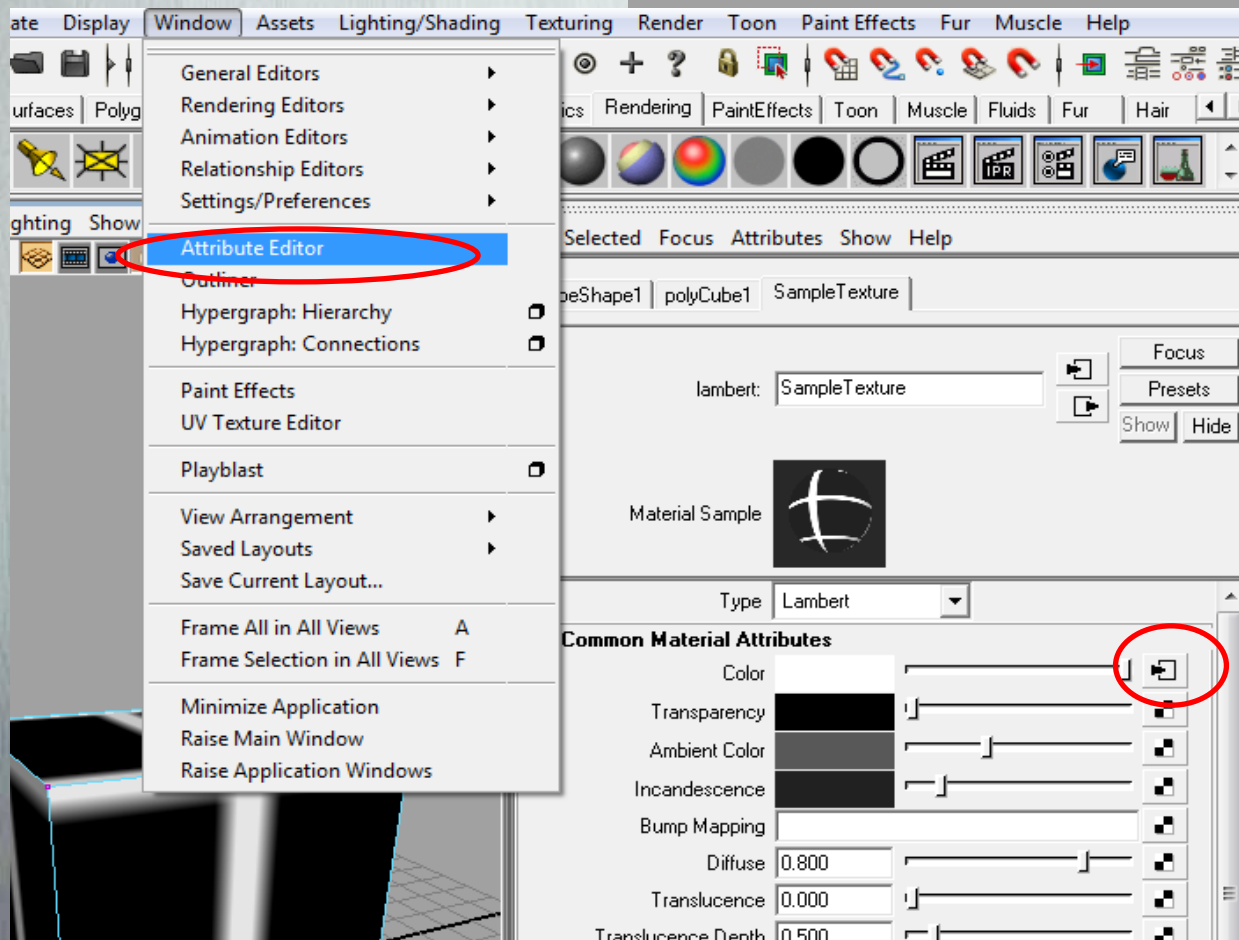
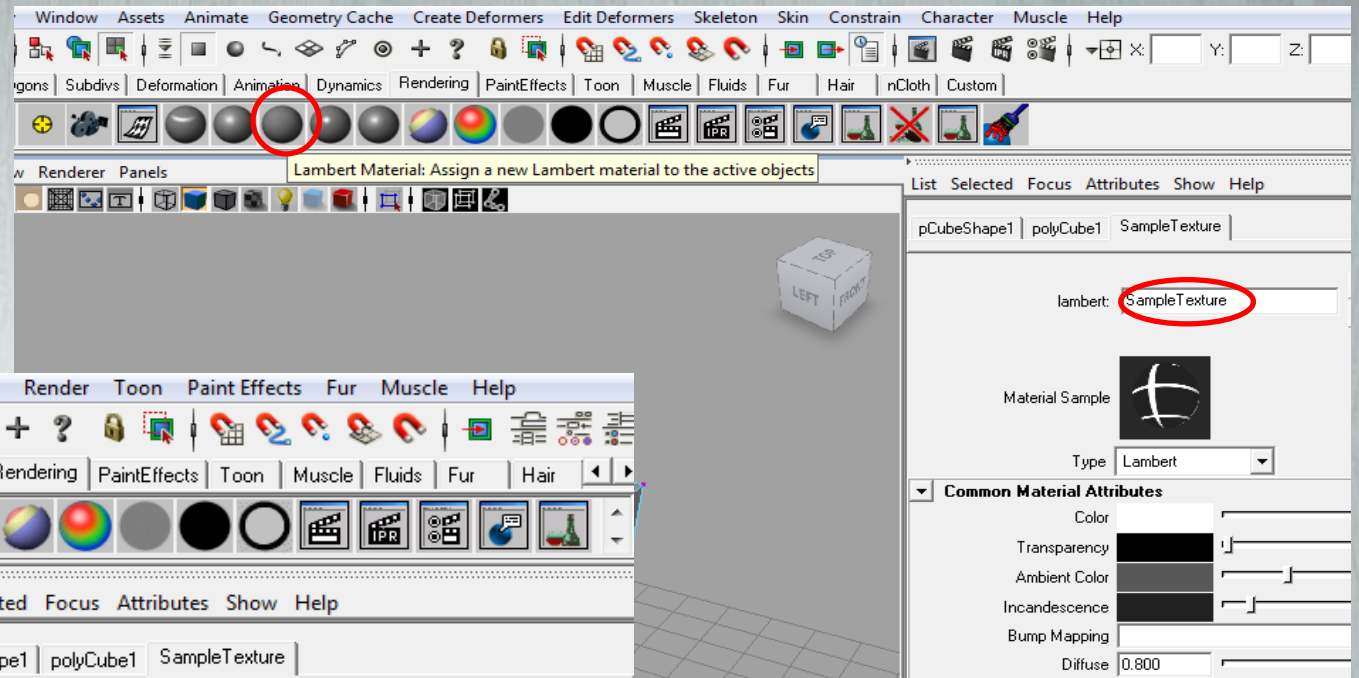
Texture Mapping

- The projection of a 2D image onto the surface of a 3D object.
- Can be done through Maya's stock texture library, custom manipulated textures, or imported images (.jpg, .png, etc).
- Advanced texturing involves features like custom UV coordinates and 3D layered textures (ex. Bump maps).



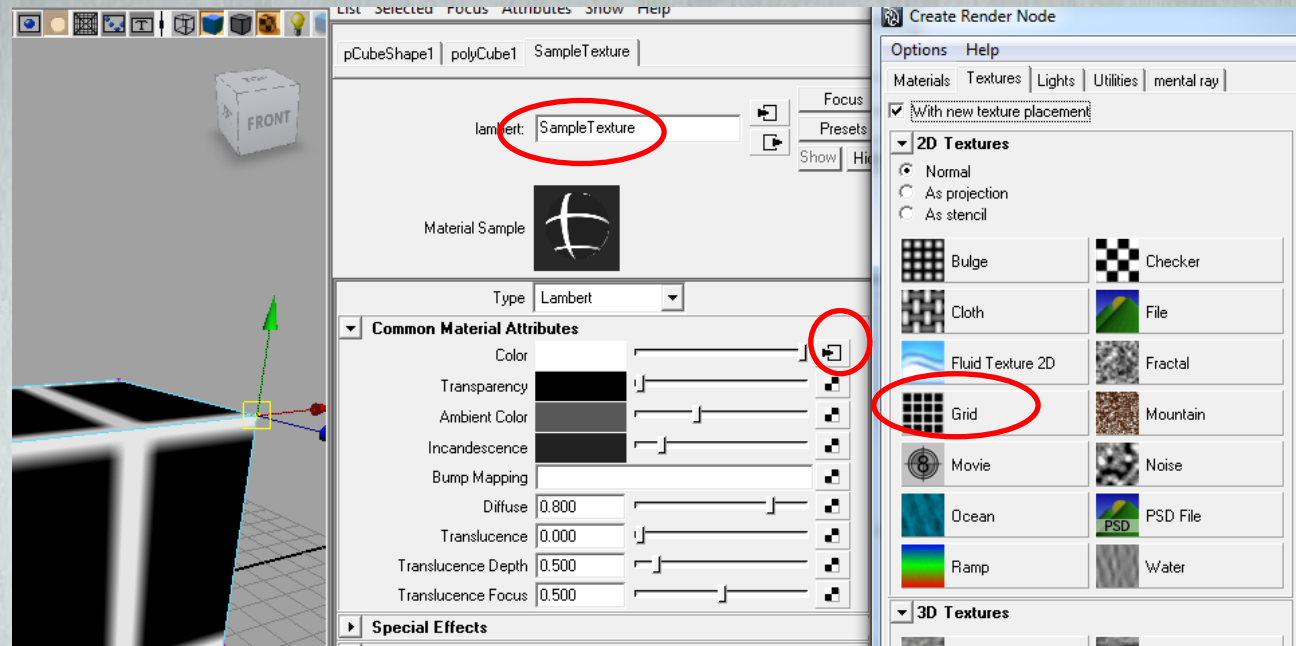
Setting Up Textures in Maya

- In Render panel, select shader (ex. Lambert).

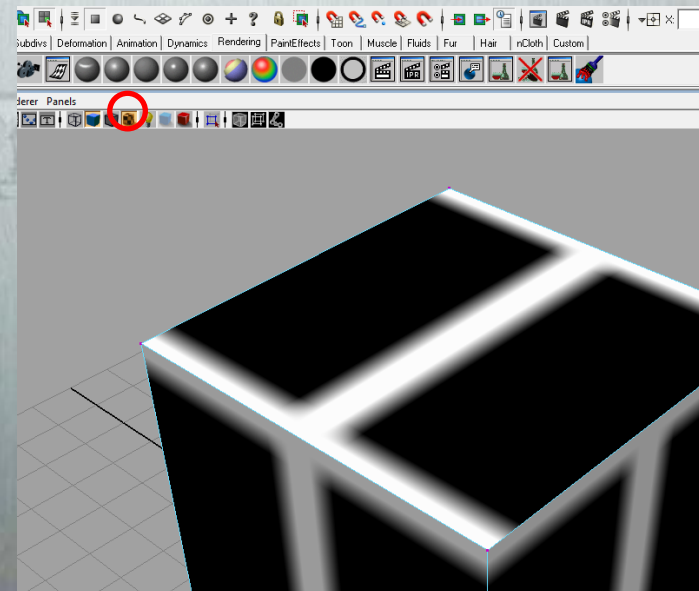


- In attributes click on right box next to "Color" to change texture image.

Selecting an Image

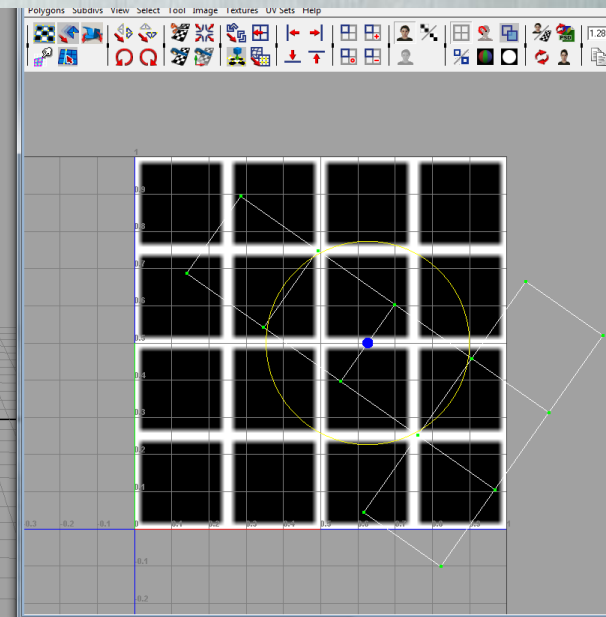
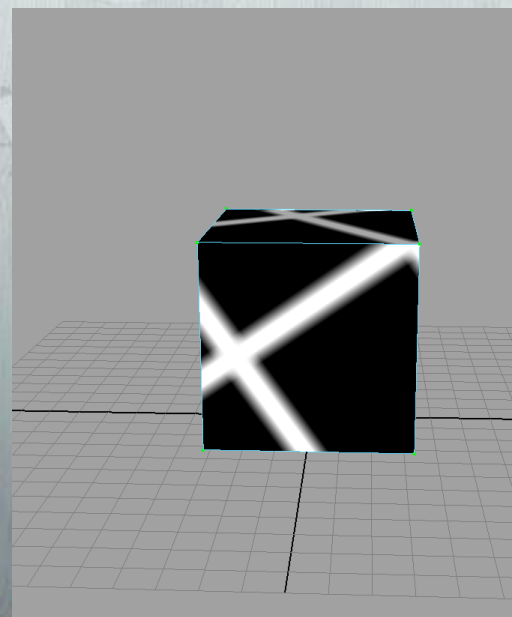
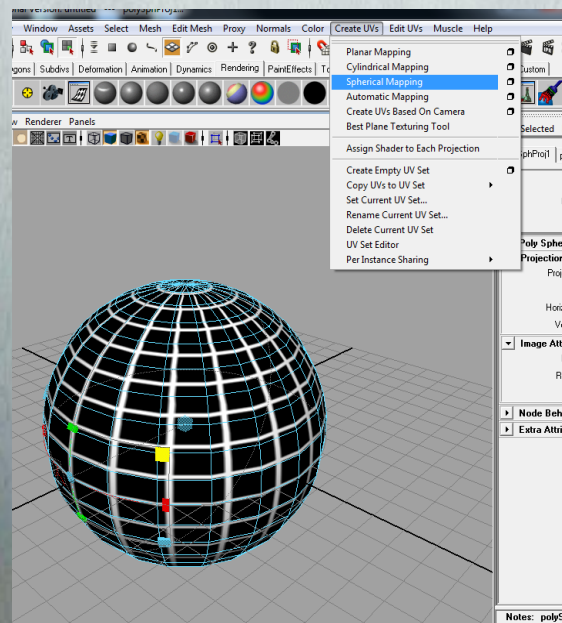
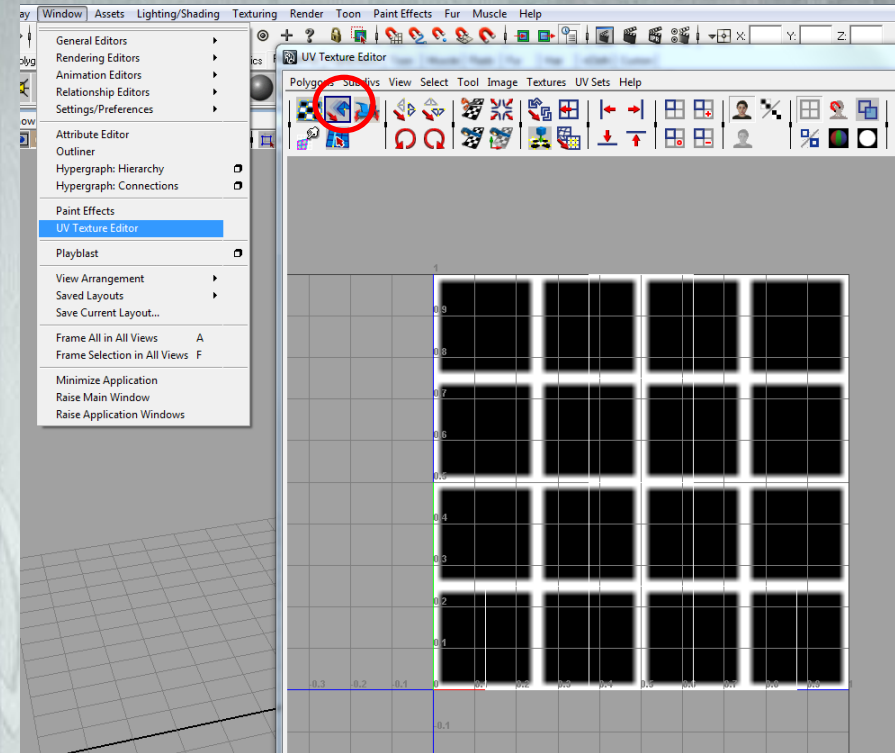


- Select stock texture or choose “File” for imported texture.



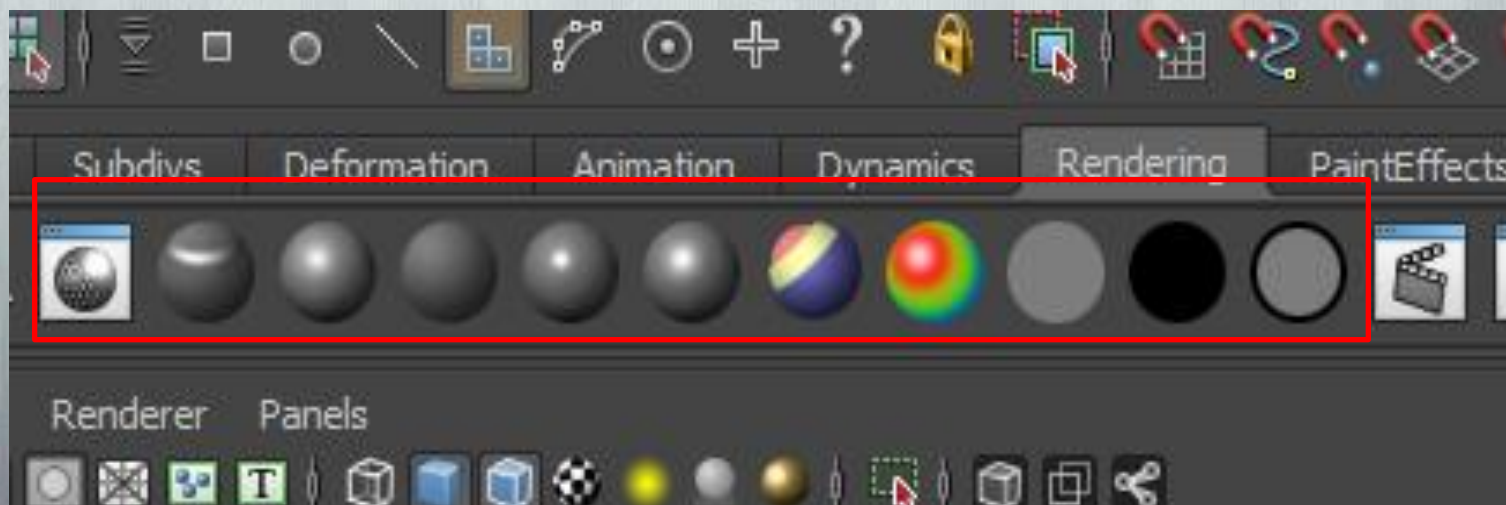
Mapping UV Coordinates

- Go to Window > UVTexture Editor or select Create UVs in Polygons panel.
- UV options include Planar, Cylindrical, Spherical and Automatic Mapping.
- “Move UV Shell Tool” can manipulate geometry to coordinates of texture image.



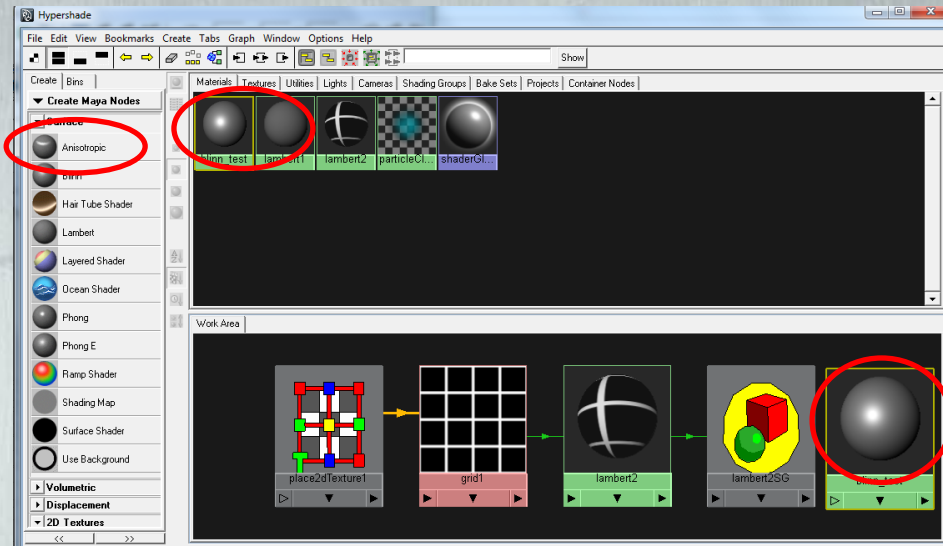
Materials - Overview

- Materials/Shaders control the appearance of a 3D objects surface in lighting and rendering (result of raytracing).
- In Maya, most materials are controlled by networks of nodes determining different aspects.
- Regular surface materials:
 - Lambert (default), Phong/PhongE, Blinn, Anisotropic
- Others:
 - Layered Shaders, Shading Maps, Bump Maps, etc.

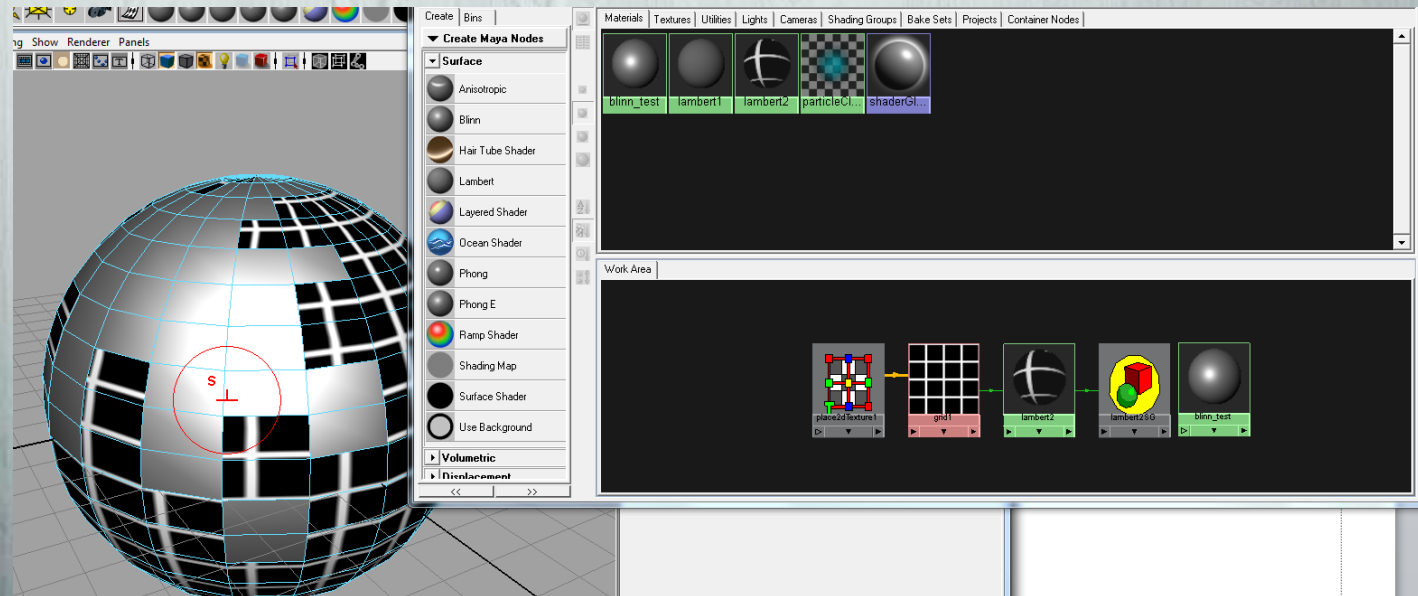


Materials – Hypershade Menu

- Right-click Materials Panel > Graph > Graph Materials on selected objects.
- Work area displays network of materials applied to object.

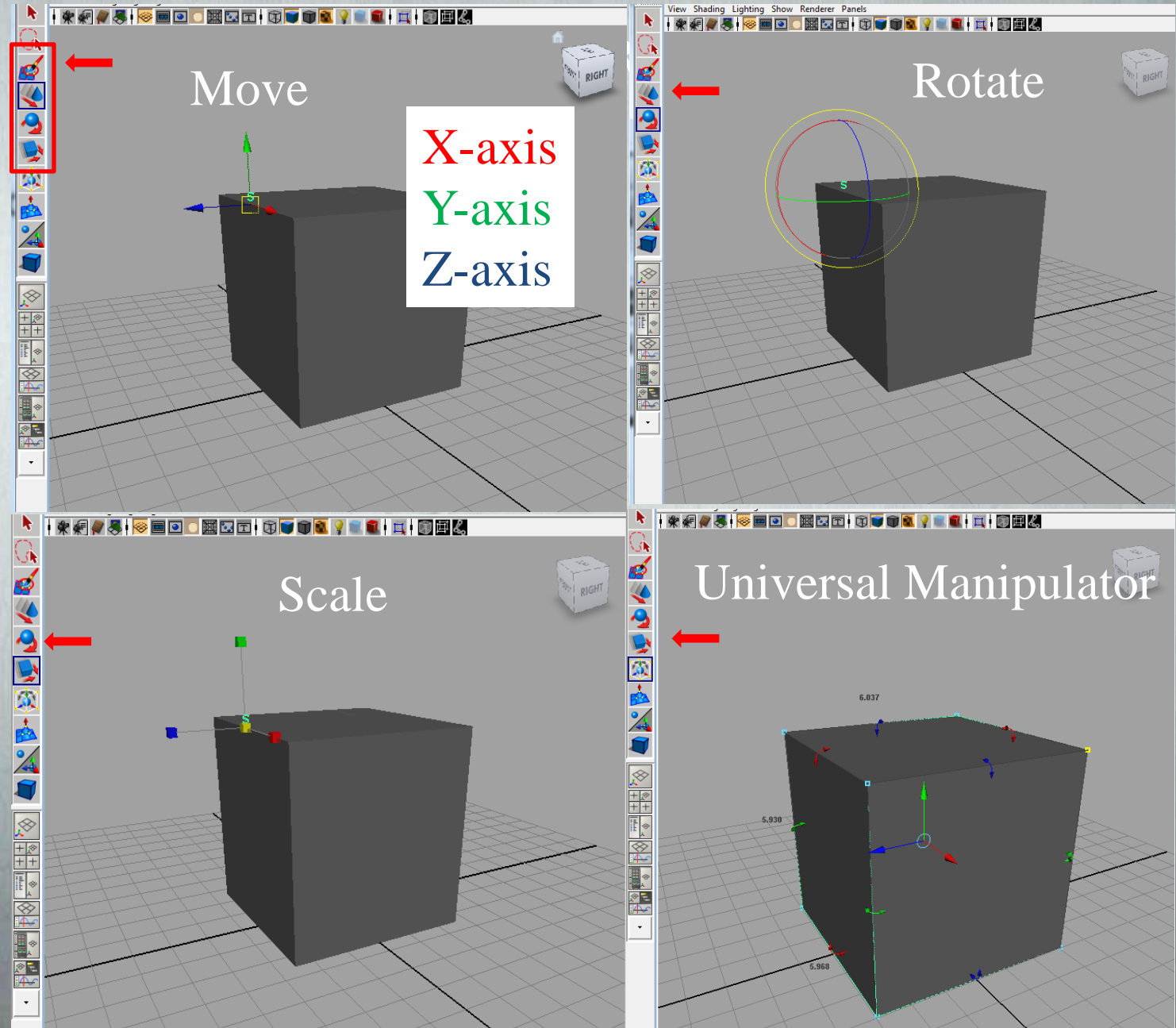


- Right click material for additional options (ex. Assign material to selection or paint assign shader.)



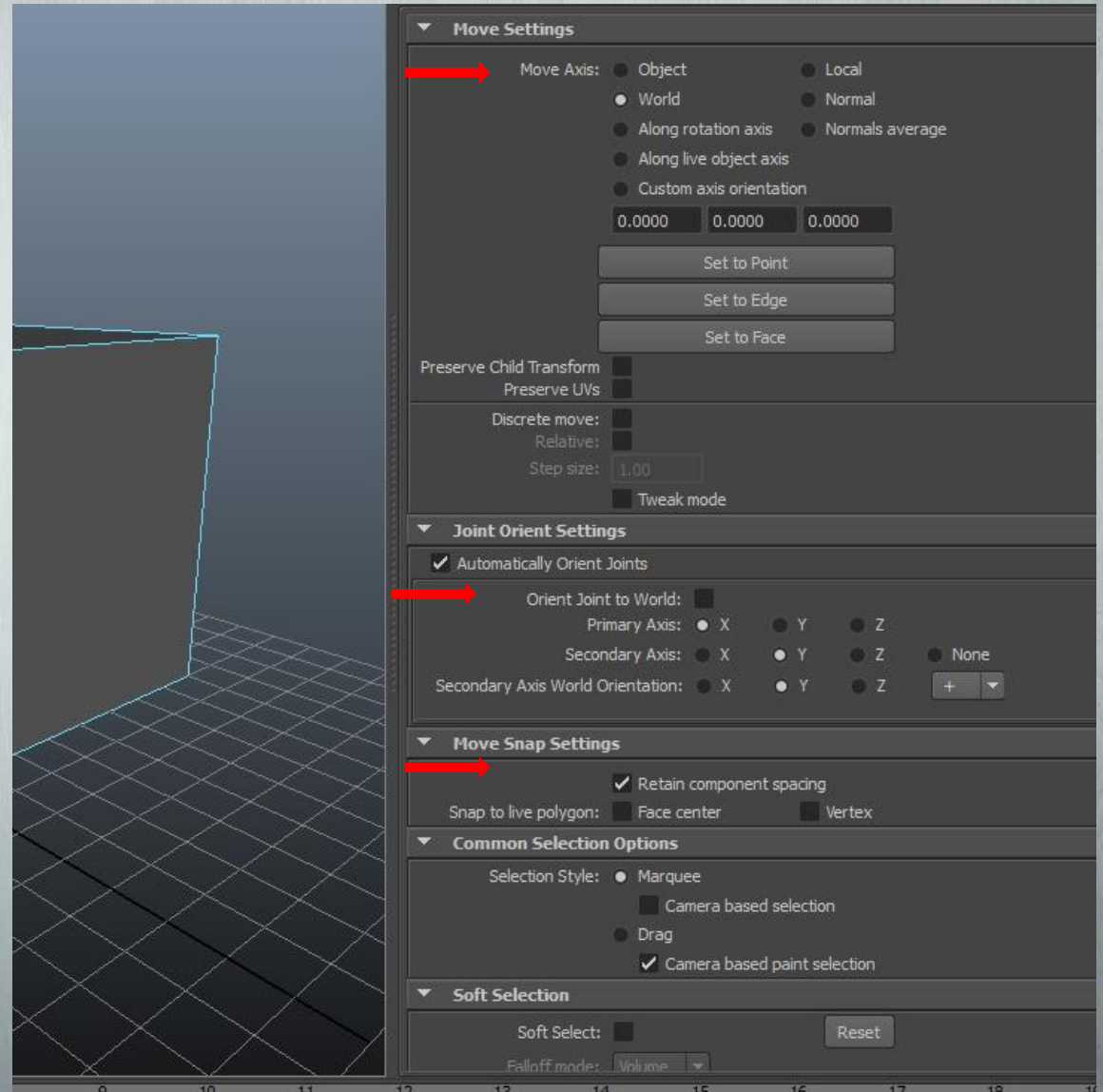
Manipulators – Basic

- All basic manipulators rely on click-and-drag axis controls.
- Axis and transformation paths depend on tool settings.
- All can be applied to edges, faces and whole objects.
- Move transformations can be done to vertices.



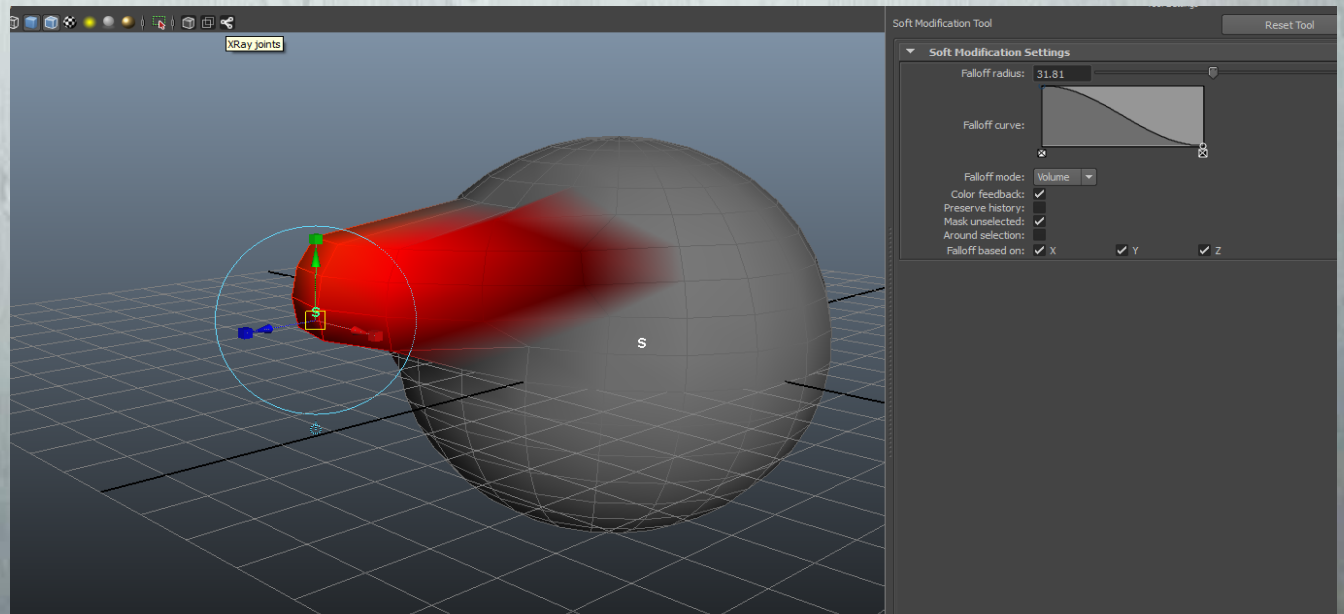
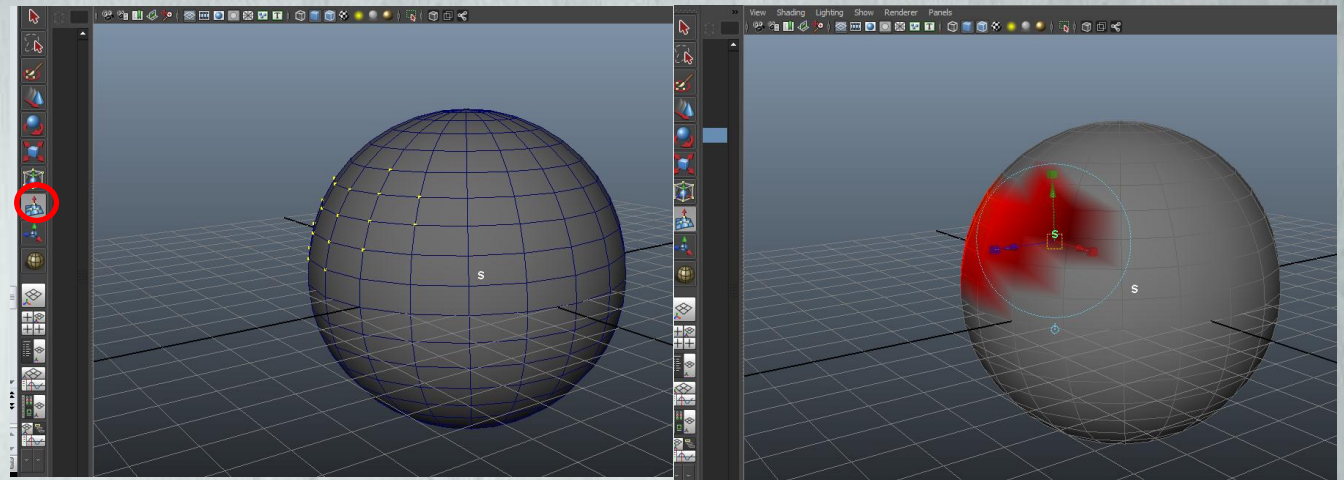
Manipulator Settings

- Move Axis
 - Determines axis of X,Y,Z plane based on object, world or custom coordinates.
- Joint Orient Settings
 - Determines rotation point, useful for setting up pivot points on hierarchical objects.
- Move Snap Settings
 - Objects can be limited to placement on grid or other object coordinates.



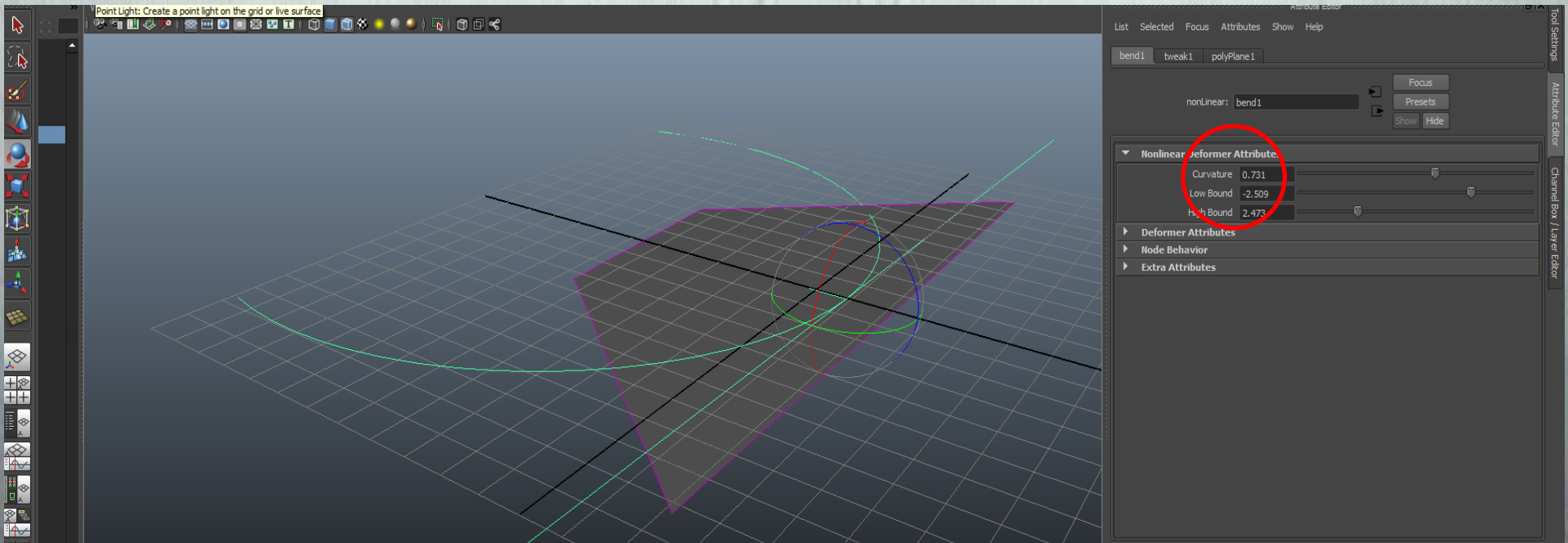
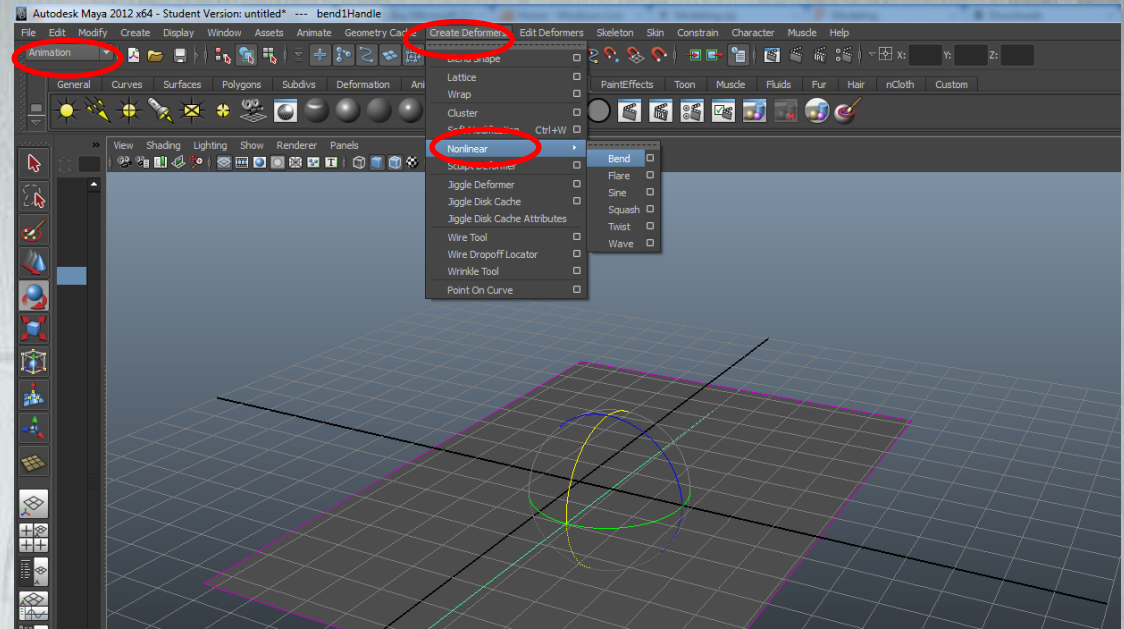
Other Manipulators – Soft Select

- Can be applied to vertices, edges, and faces.
- Allows for “sculpted” manipulation of polygons.
- Falloff settings in control panel set shape of the transformation.



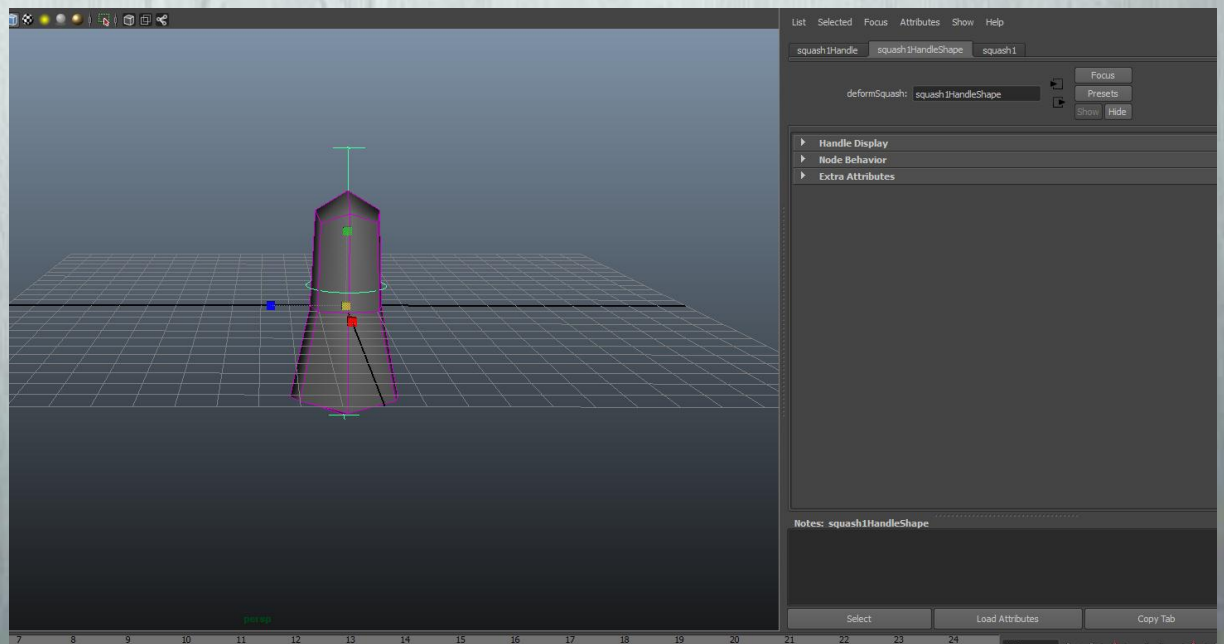
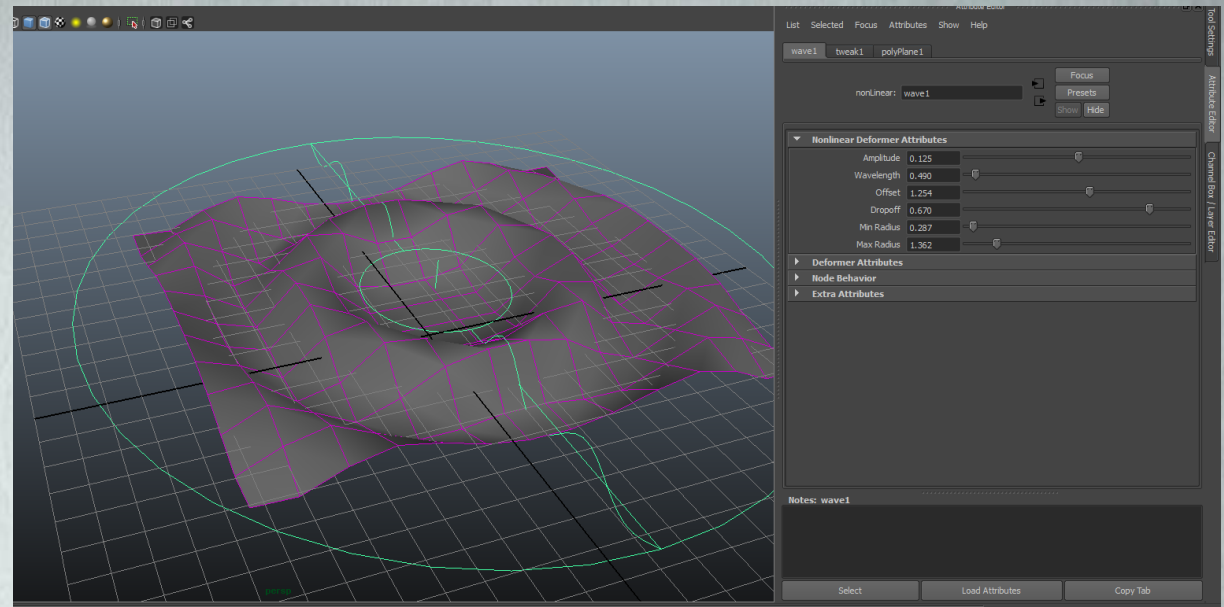
Deformers

- Used by animators for non-linear bending/twisting motions.
- Used by modelers to manipulate geometry smoothly.
- Ex: non-linear bend to plane



Deformers

- Ex.1: Wave deformation to plane.
- Ex.2: Squash deformation applied to NURB cube.
- Other deformers:
 - Cluster: batch vertices/other data types for manipulation. Useful for animating isolated parts.
 - Sculpt: Organic-style manipulation of geometry.
 - Jiggle: used for rippling deformations in motion



Hierarchical Modeling

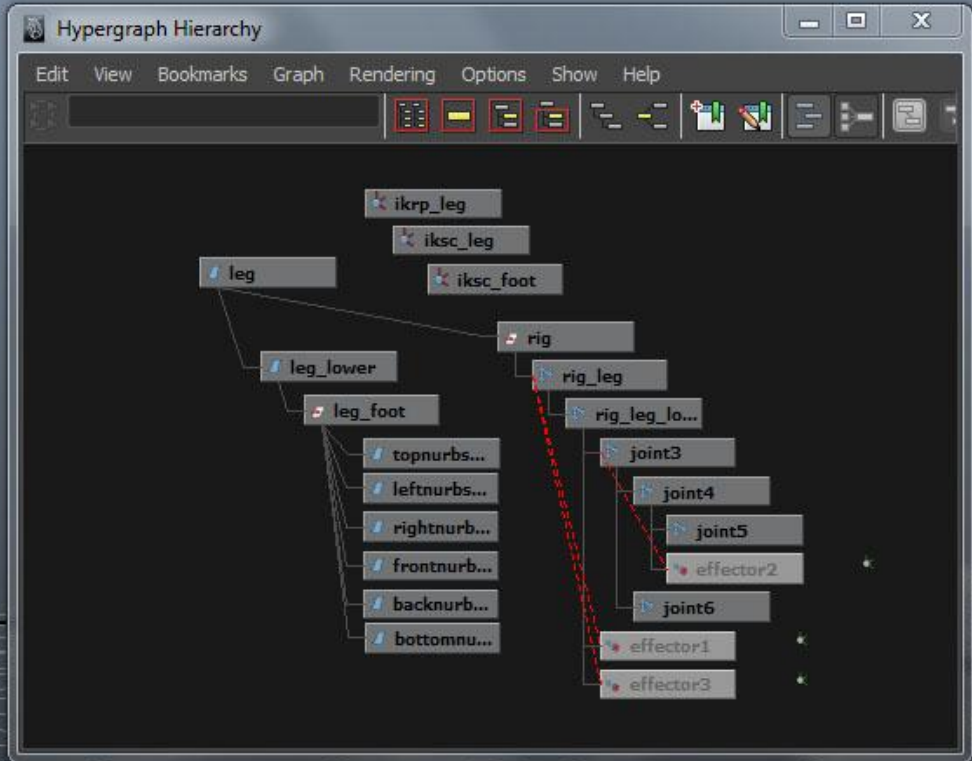
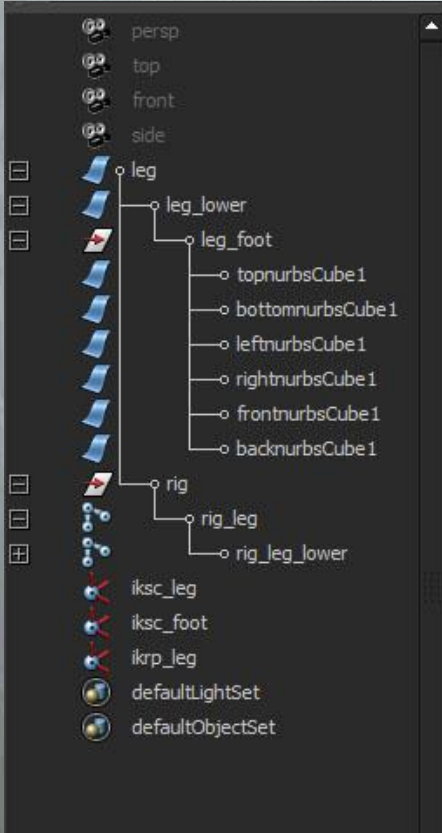
- Node is unit of information
 - Sphere = creation node + transform node + shape node
- Hierarchy is a grouping of child nodes under parent nodes
- View in the Outliner and Hypergraph.
- Parenting is not Grouping
 - Parenting transformations are automatically applied to all children nodes
 - Limbs
 - Joints
- Grouping is not Parenting
 - Grouping involves independent objects sharing a pivot
 - Solar System

Hierarchical Viewing

Outliner

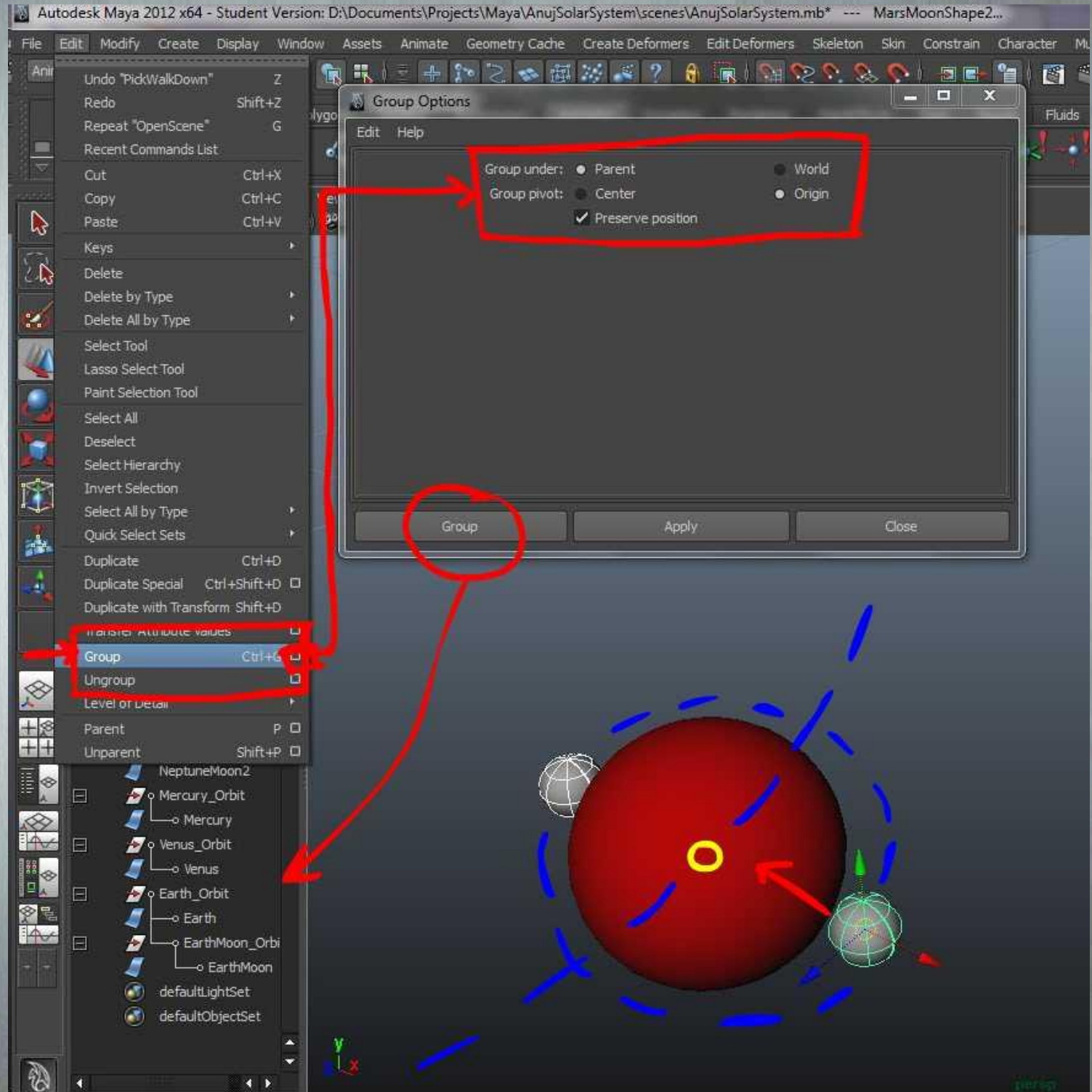
Hypergraph

Leg Model

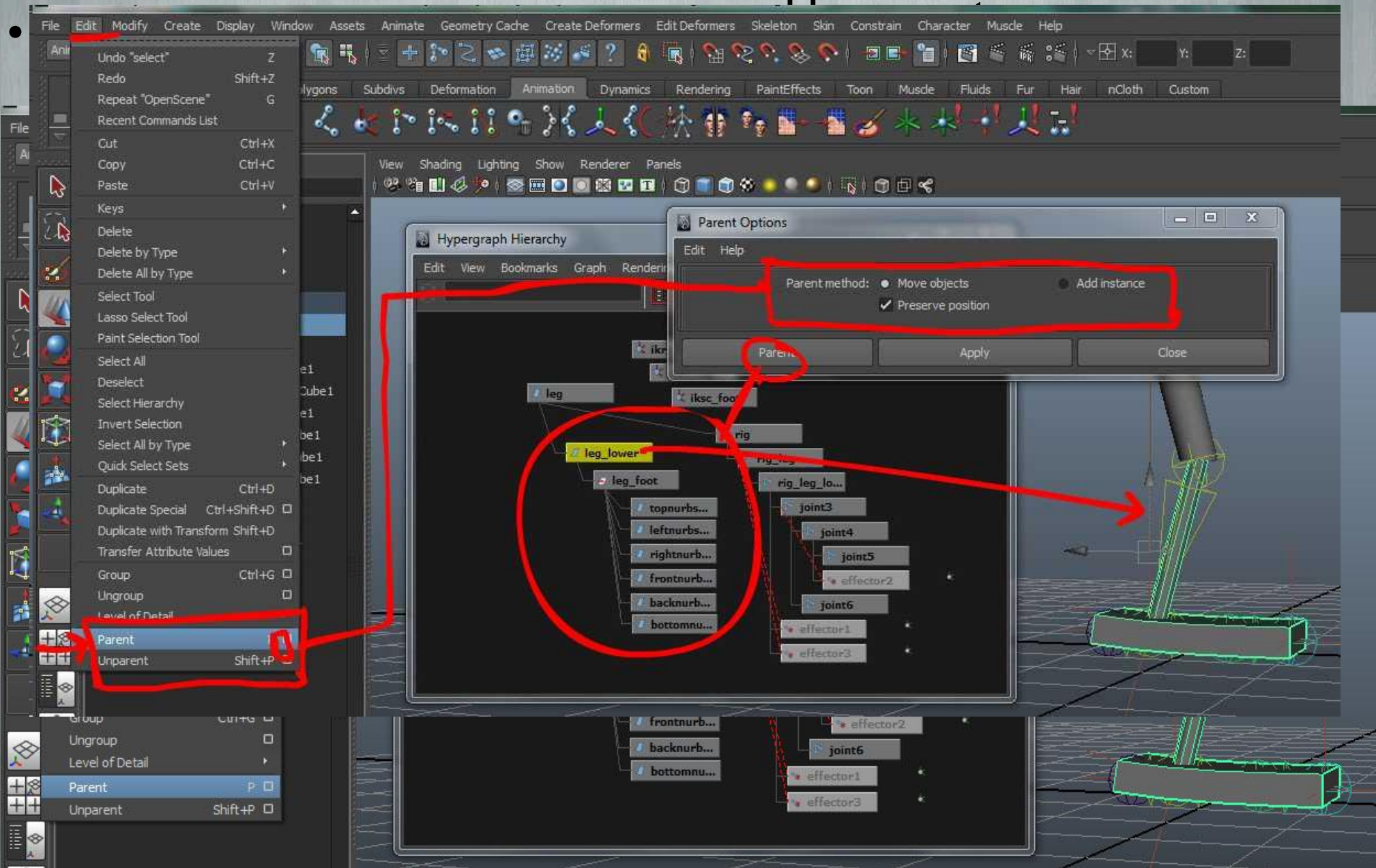


Grouping

- Create Group Node
- With Shared Pivot Point
- Apply changes to Pivot Point
- Ungroup
- Solar System



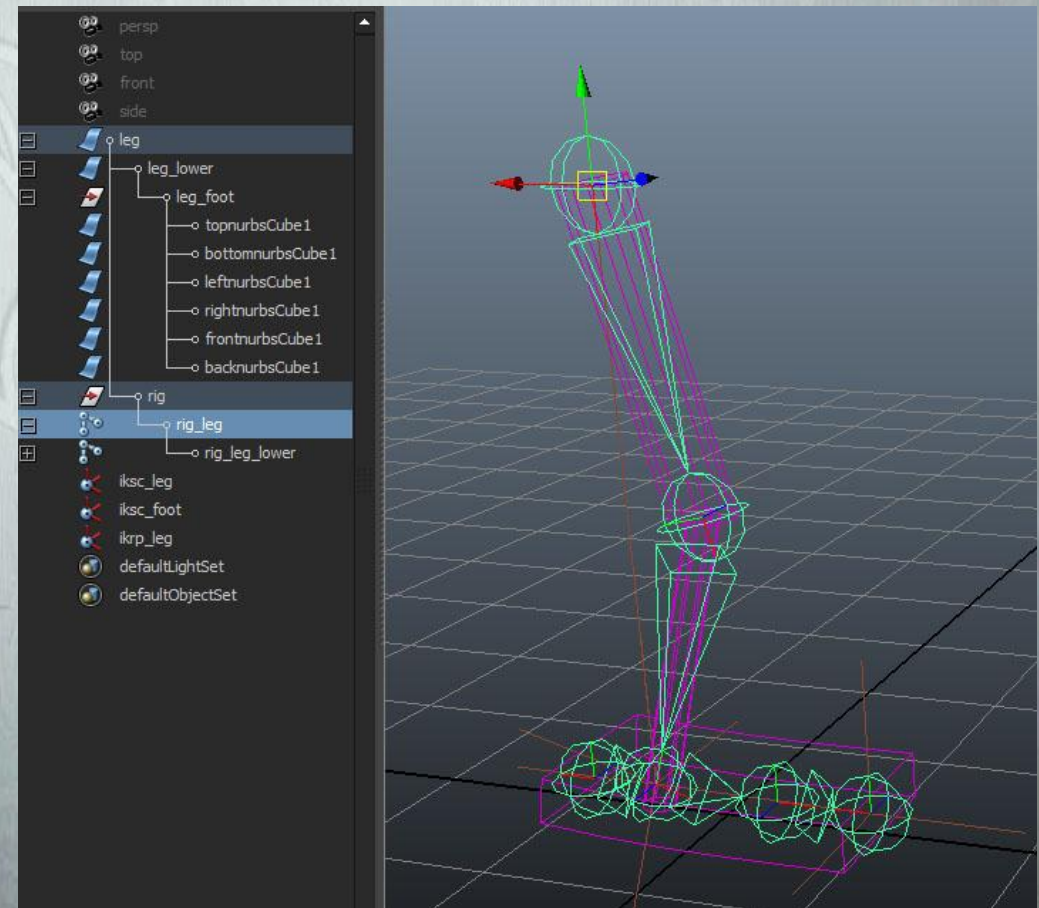
Parenting



Kinematic Chains and IK Handles

- Rigid body segments connected by joints
 - Limbs
- Forward Kinematics (FK)
 - Every Joint
- Inverse Kinematics (IK)
 - Highest Joint to Lowest
 - Faster
 - ->
- Single Chain (SC)
- Rotate Plan (RP)
- Spline

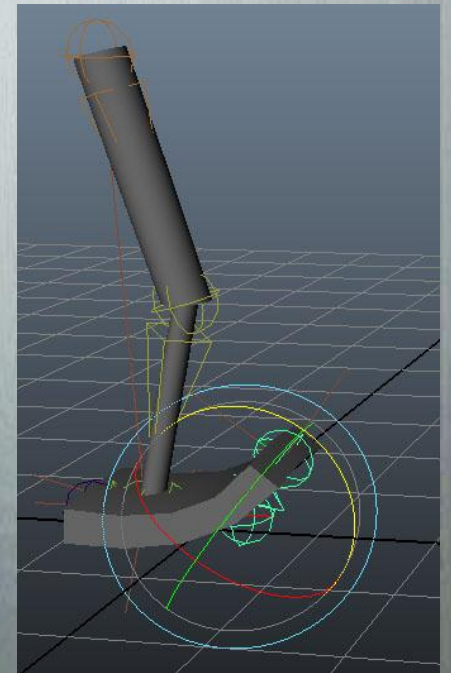
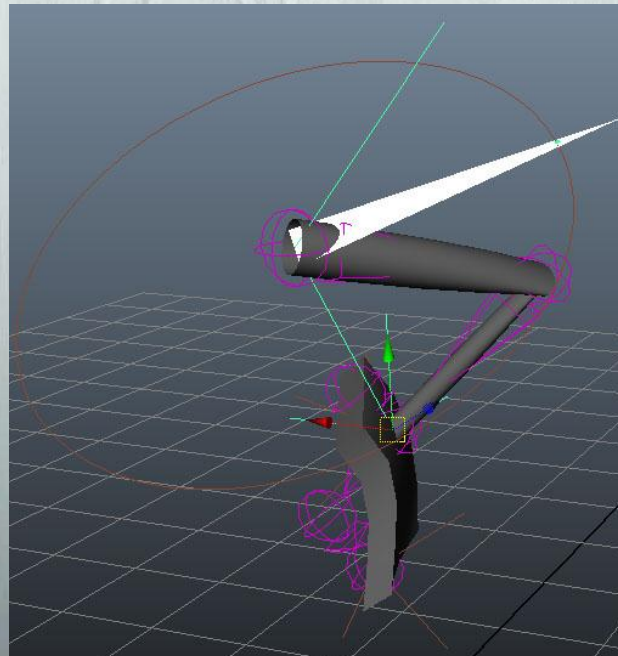
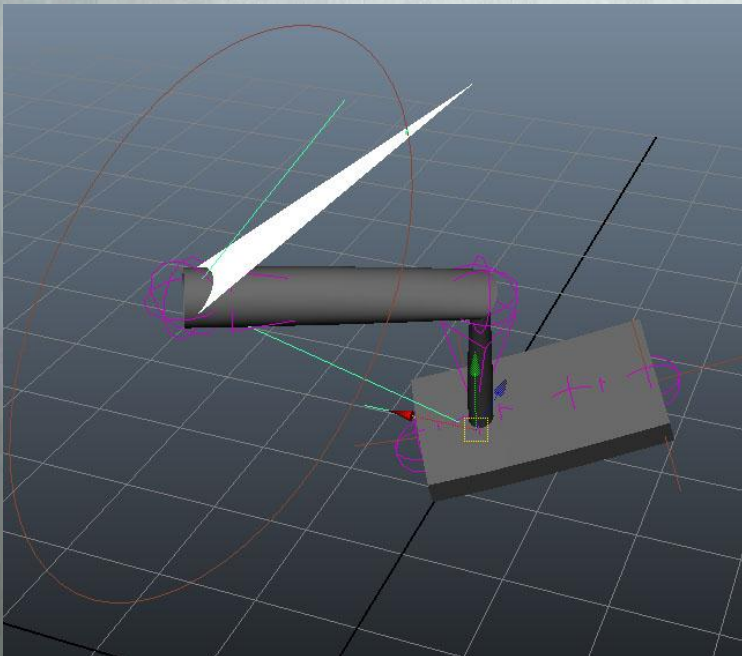
"Rigging"



IK Handles

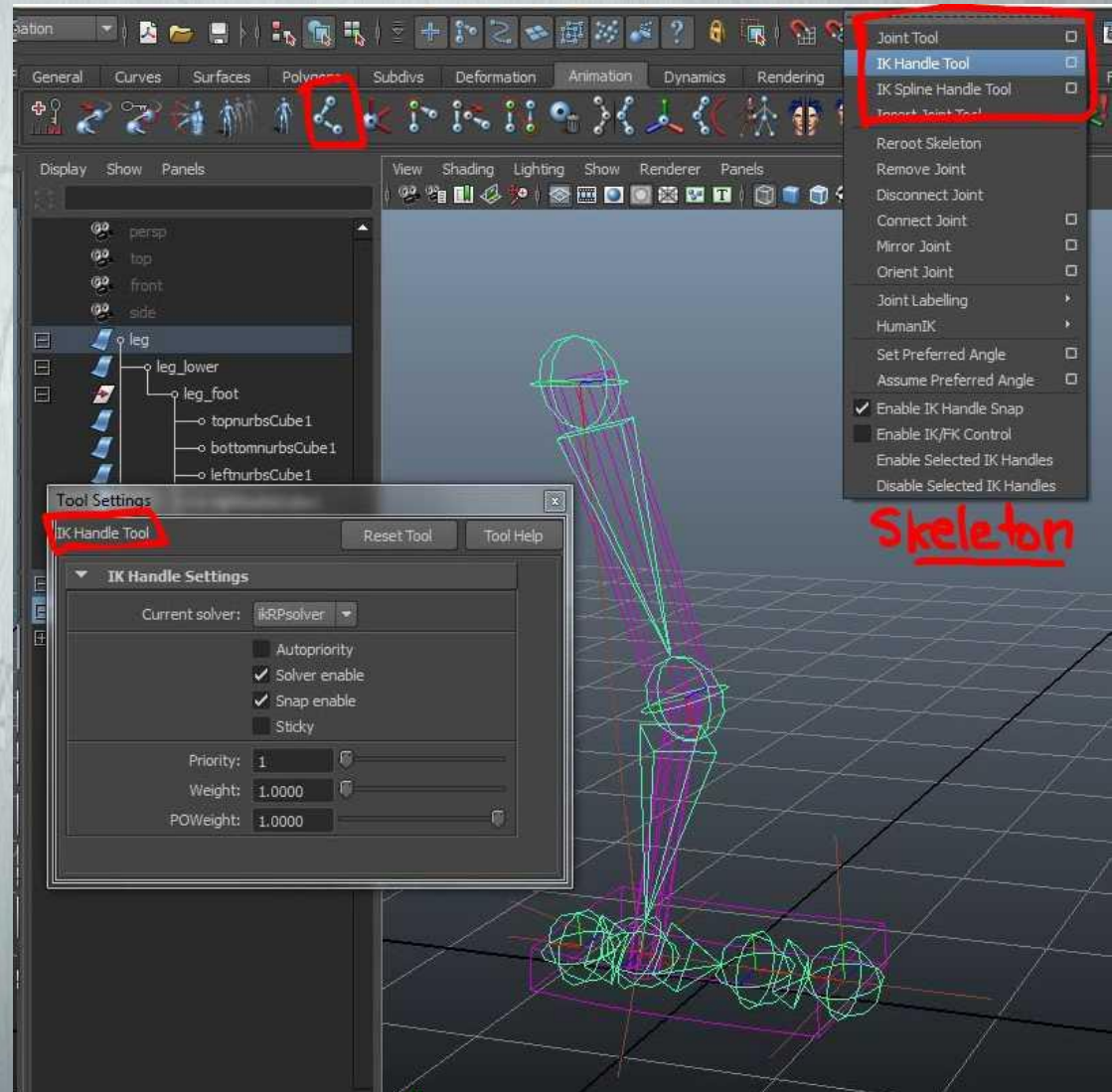
- Three Kinds of Handles
 - Single Chain (SC)
 - Articulated features with joints between root joints

- Spline Handle
 - Curvy, Twisty shapes
- Rotate Plane (RP)
 - Pole Vector
 - Twist



IK Handles: How To

- Skeleton >
 - Joint Tool
 - IK Handle Tool
 - ikSCsolver (SC)
 - ikRPsolver (RP)
 - IK Spline Handle Tool
 - Spline
- Click first Joint location
- Shift-Click next (or last) joint location
- Press Enter to complete





Questions/Comments

Thank you!