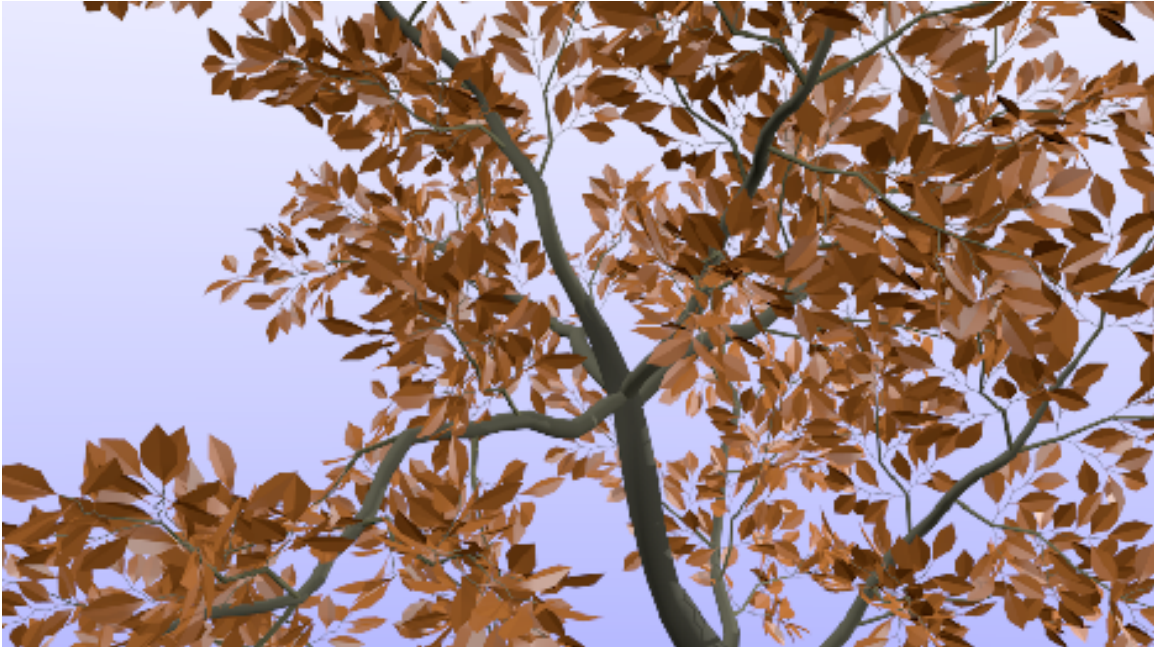
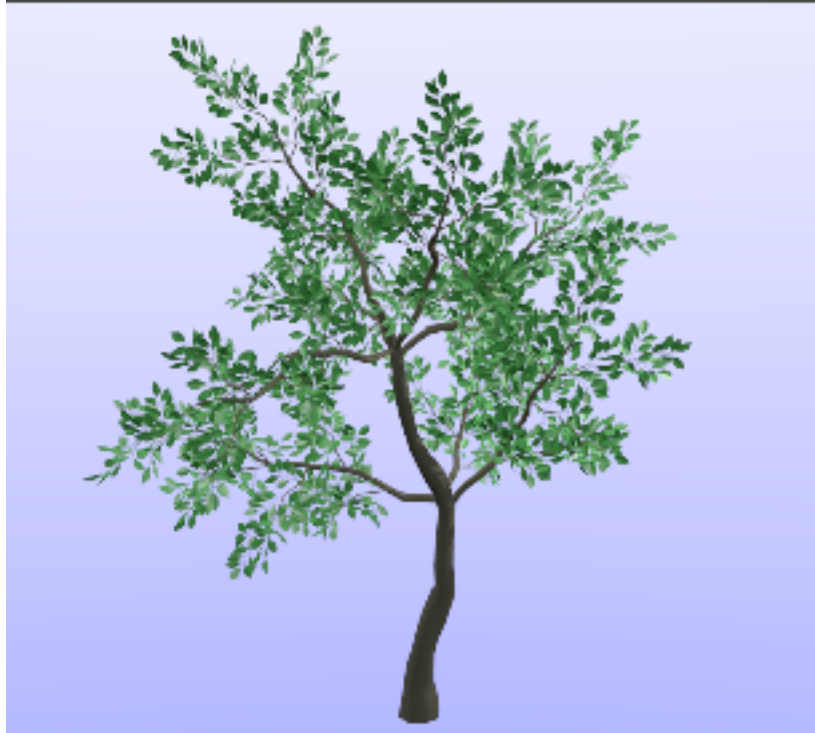


Course: 3D Design  
Title: Deciduous Trees  
Blender: Version 2.6X  
Level: Beginning  
Author; Neal Hirsig ([nhirsig@tufts.edu](mailto:nhirsig@tufts.edu))  
(June 2012)

## Deciduous Trees





In general, modeling trees is a long and somewhat tedious undertaking. Usually, each tree contains thousands of individual elements. In many instances, trees are included in a model as an accent to the main focus adding a sense of atmosphere rather than being the main focus of the completed model itself. For this reason, many 3D software products include some sort of “procedural” modeling method of generating trees, which eases the task of tree modeling.

There are indeed a number of Blender scripts available (one built-into the Blender 2.6X download) to do this as well as many tree modeling applications whose exported files can be imported into Blender.

In this tutorial we will model a deciduous (leaf bearing) tree with an eye toward keeping the model as low in polygon face count as possible and maintaining as much modeling flexibility as possible, so that the completed model can be re-fashioned into other types of deciduous trees with a minimum of effort.

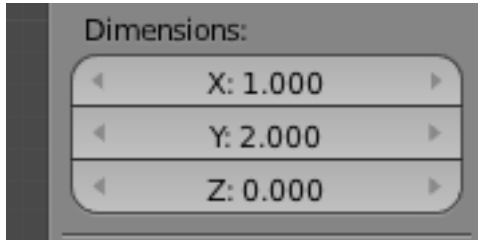
The process begins with the smallest of tree elements – the leaf, and builds to the largest of tree elements – the trunk.

## **Leaf:**

Open a new Blender file. Delete the default cube object if it exists. Select the Blender camera and the default Lamp object and place them on Layer 5 (MKEY).

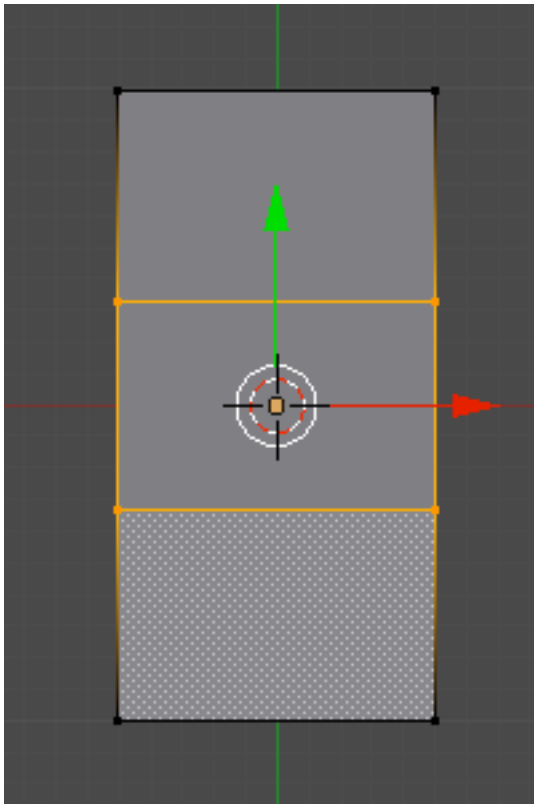
Press the NKEY to open up the right Properties panel. Go to top view. Press NUMPAD-5 to go into orthographic projection (if you are in perspective)

In Top View, add a plane object. Set the X Dimension to 1

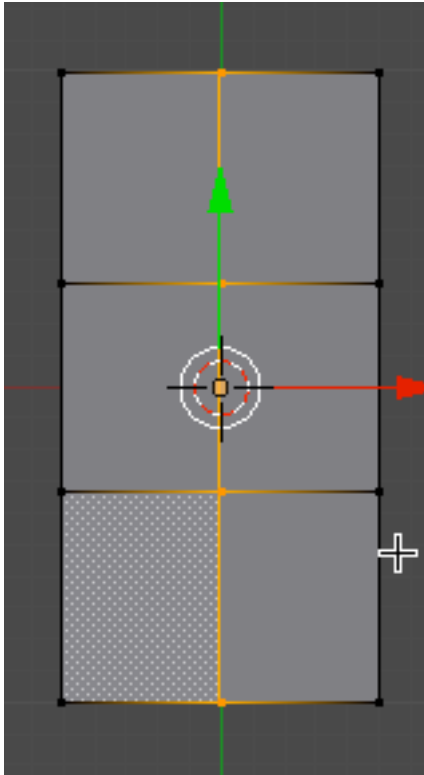


Go to edit mode.

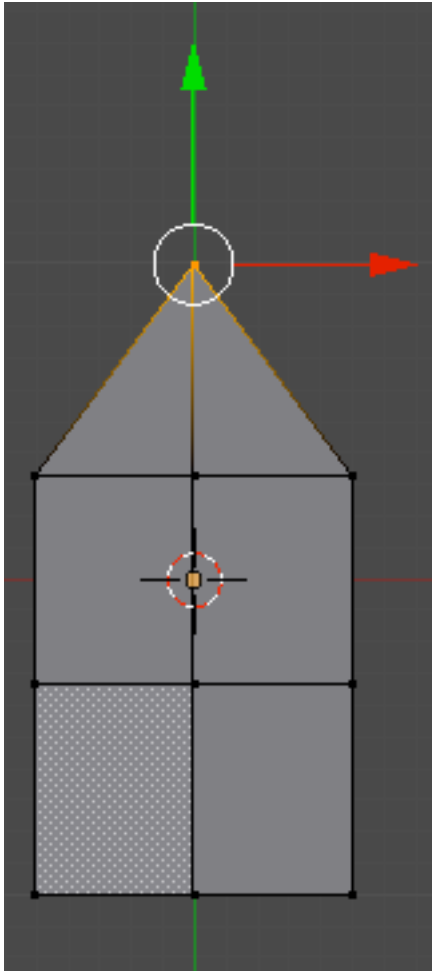
Press CTRL-R (Loop cut and slide) and using your center scroll wheel make 2 edge cuts as shown below.



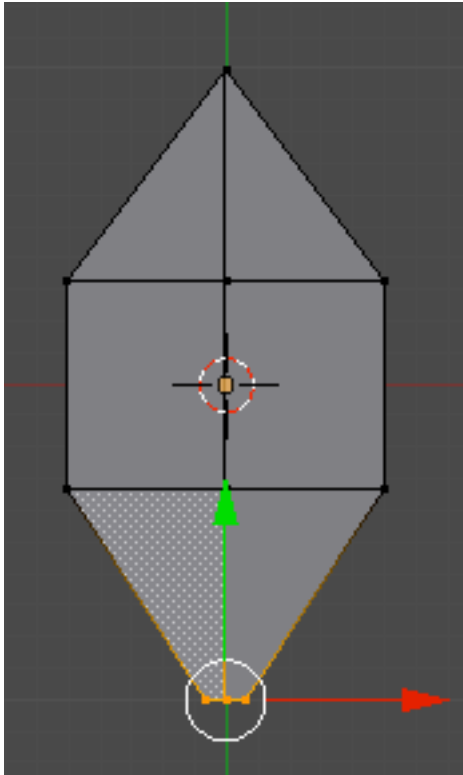
Press CTRL-R (loop cut and slide) and make a vertical edge cut as shown below).



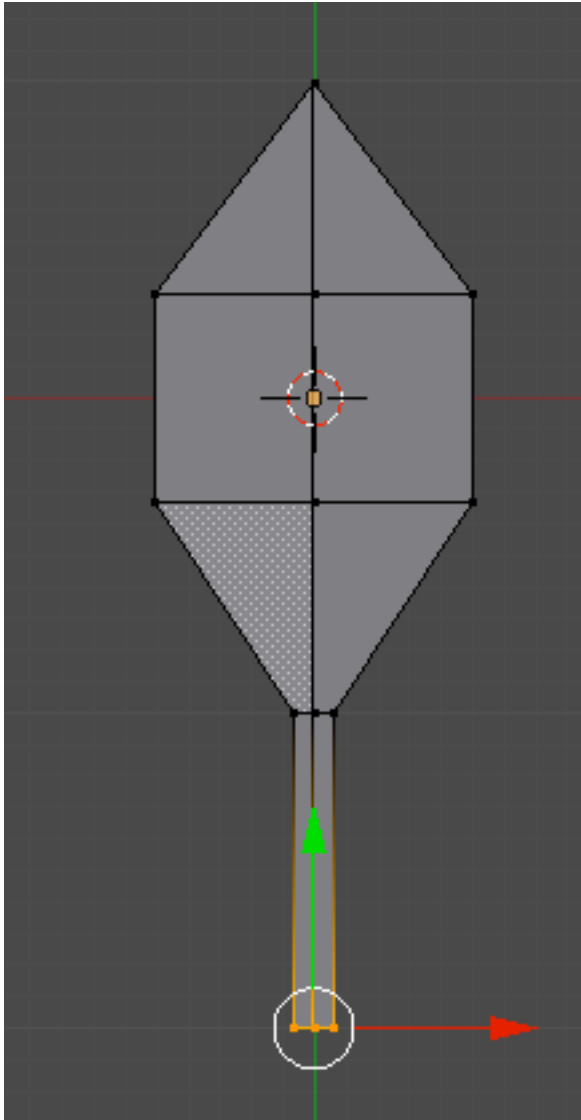
Select the top 2 vertices, Press CTRL-V then Merge at Center.



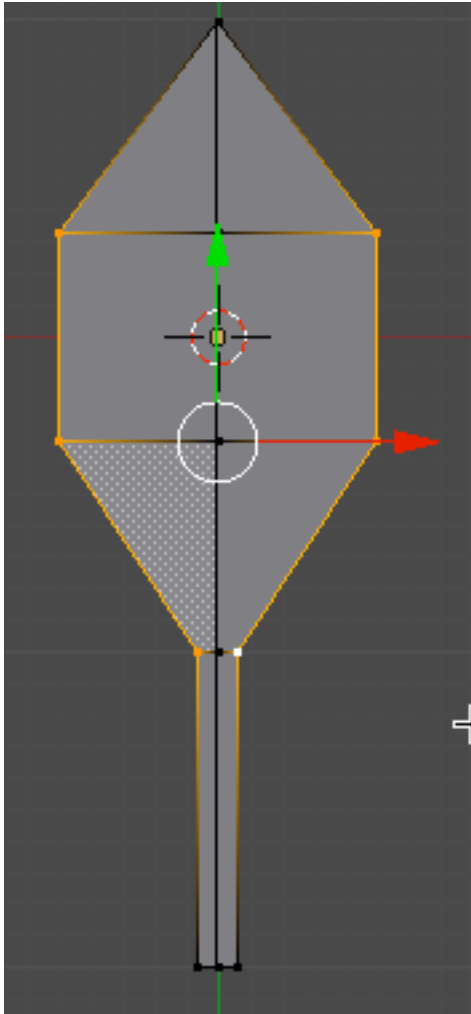
Select the 2 bottom vertices and scale them in as shown below.



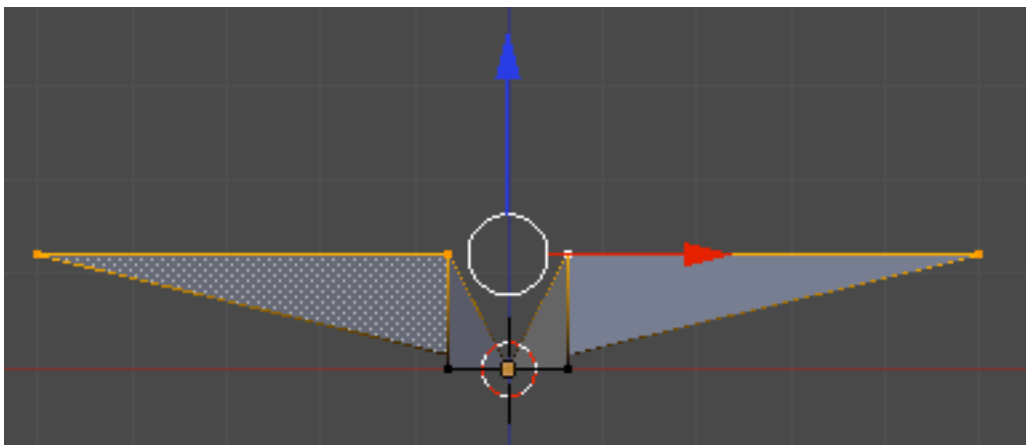
Extrude the 2 bottom edges along the Y-Axis and adjust the resultant shape as shown below:



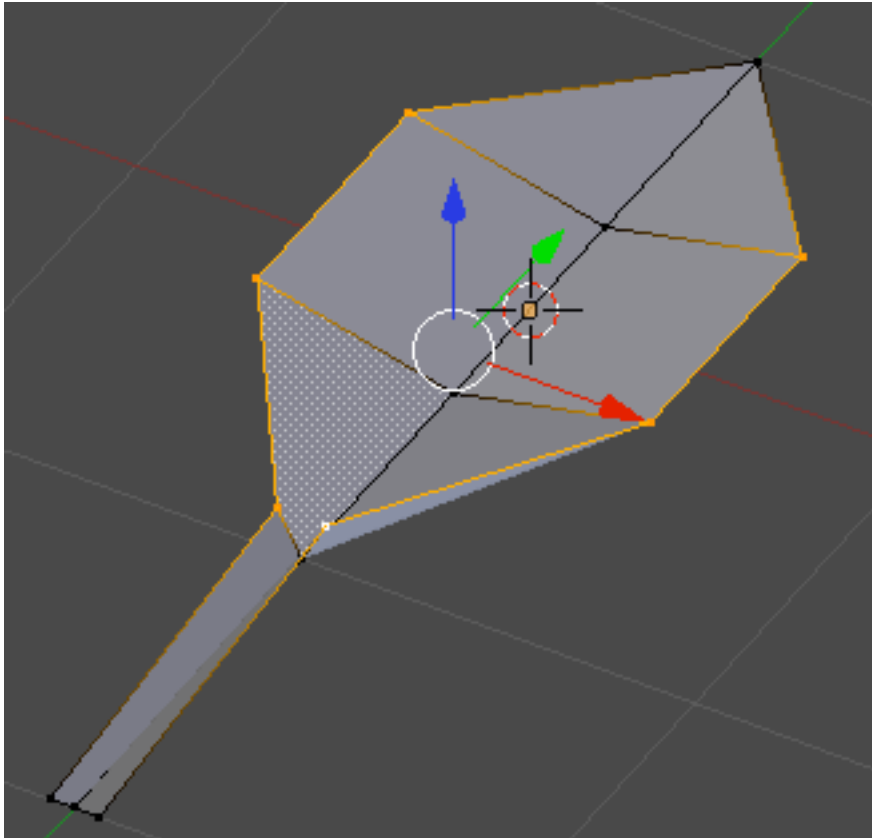
Select the 6 outside vertices as shown below:



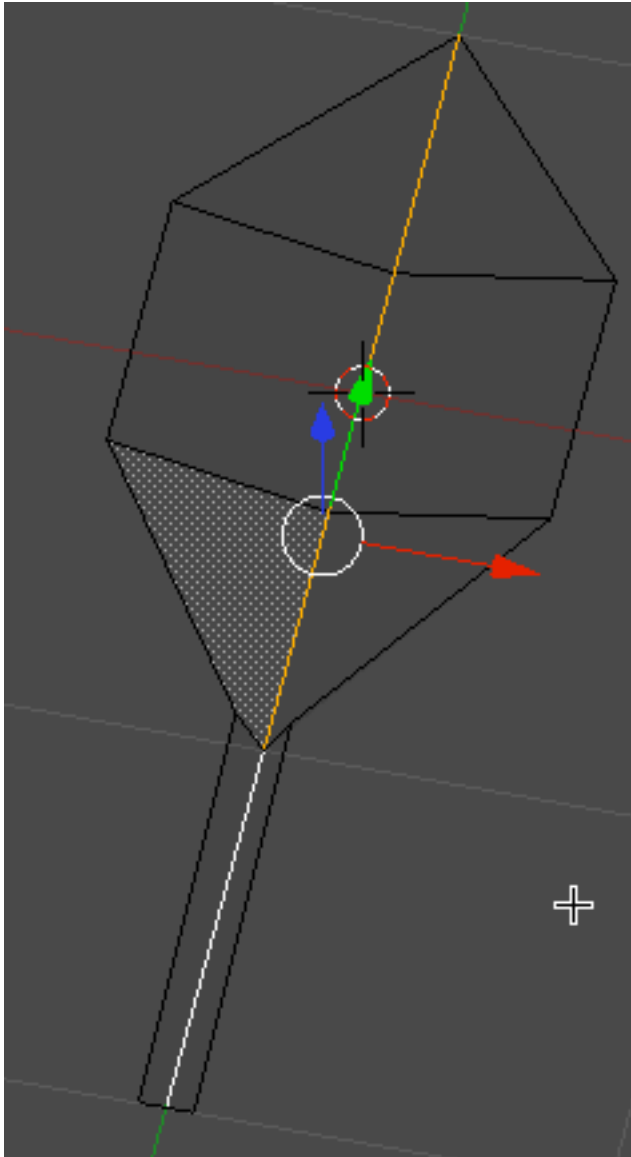
Switch to front view and move them up a bit (giving the leaf part some shape) as shown below:



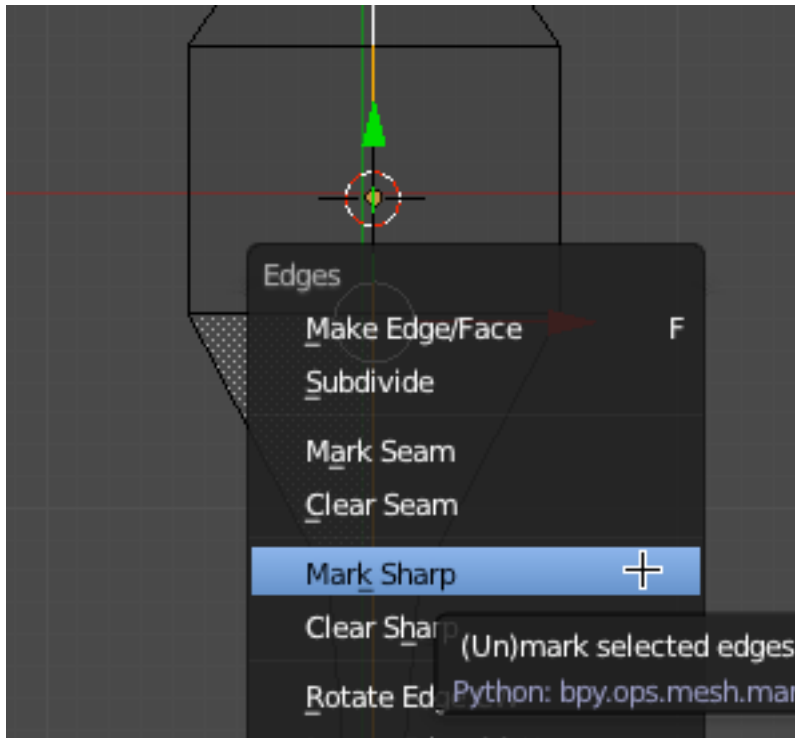




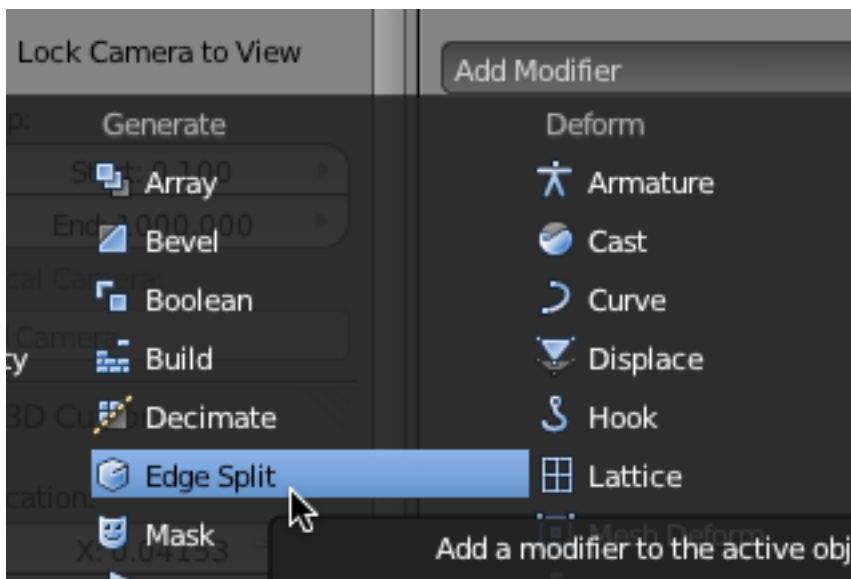
Switch to wireframe. Go to edge select mode (CTRL-TAB) and select the center edges.



With the center edges selected, press CTRL-E and select “Mark Sharp”.

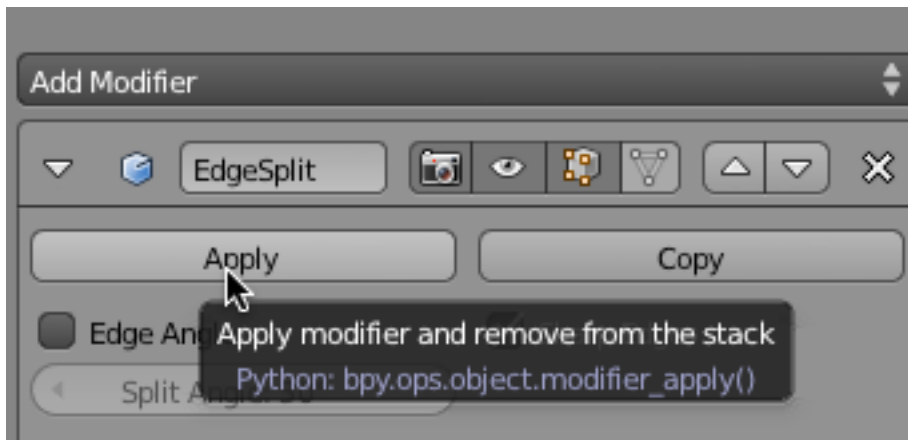


This will leave a sharp seam here. TAB out of Edit mode. With the plane object selected, go to the Modifiers Editor and add an Edge Split Modifier.

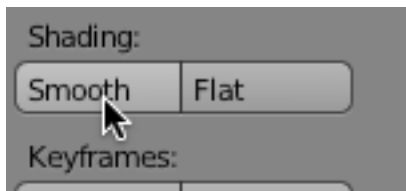


Uncheck the “Edge Angle” box leaving only the “Sharp Edges” box checked.

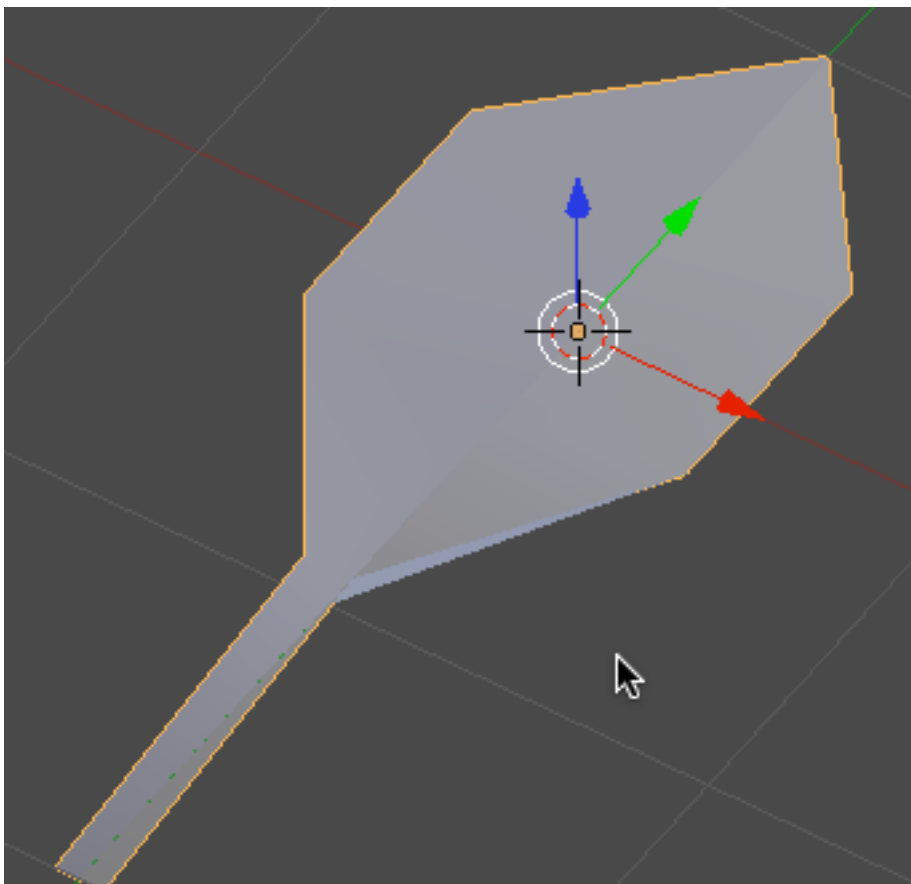
**Then press the Apply button.**



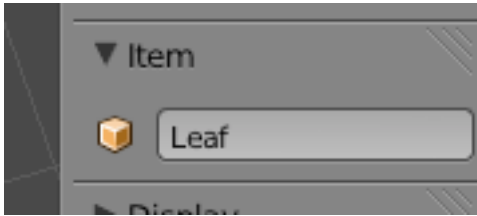
In the tool panel on the left press the Smooth button.



The object should now have a sharp edge in the center.

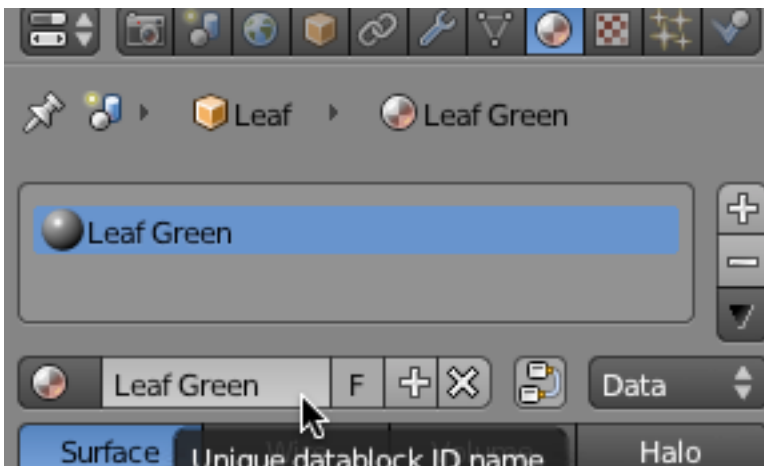


Name this object “Leaf”.



Save your Blend file.

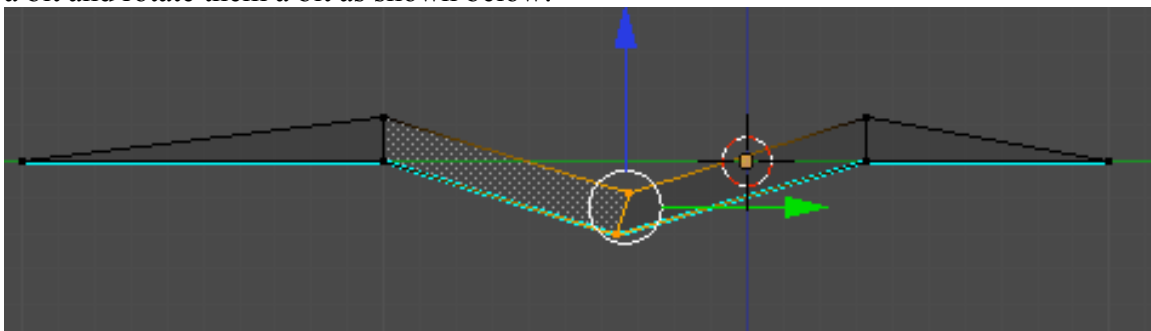
Go the Materials Editor. Click New. Name this material Leaf Green.



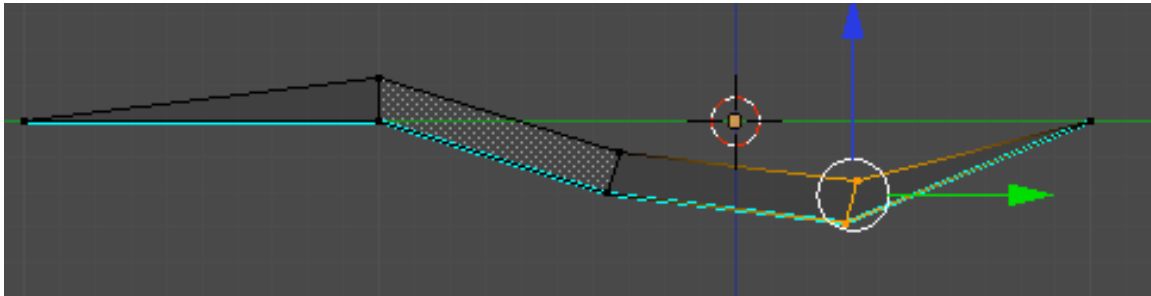
Click on the Diffuse color swatch and set the color sliders to R= .1, G= .5 and B=.1 creating a medium green color.

Since all of our tree leaves will be based off this single leaf you can at any time go back and adjust the color of all the leaves by adjusting the “Leaf” material. For instance you may want to use an orange or yellowish color for autumn leaves.

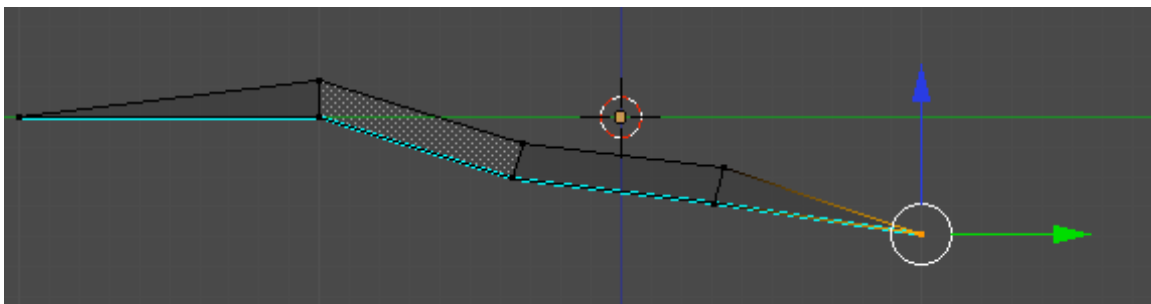
We need to give our leaf object a bit more shape. Switch to side view. **Go to wireframe.** Go to vertex select mode (CTRL-TAB). Box select the middle vertices, move them down a bit and rotate them a bit as shown below:



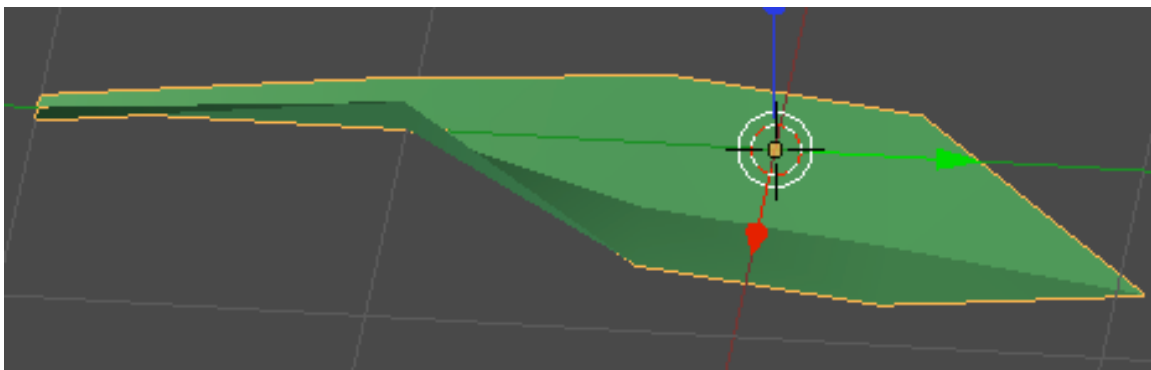
Box select the set of vertices to the right of center, move them down a bit and rotate them as shown below:



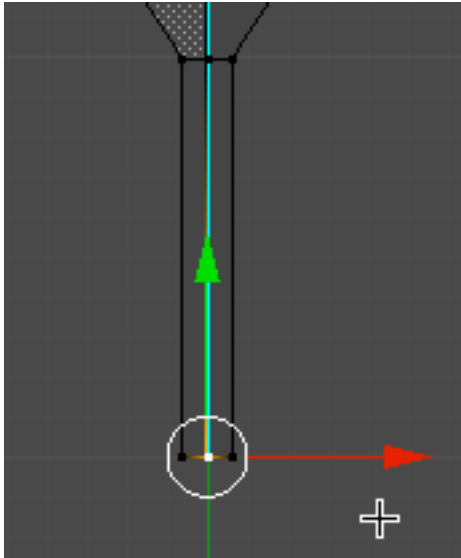
Box select the last set of vertices and move them down a bit as shown below:



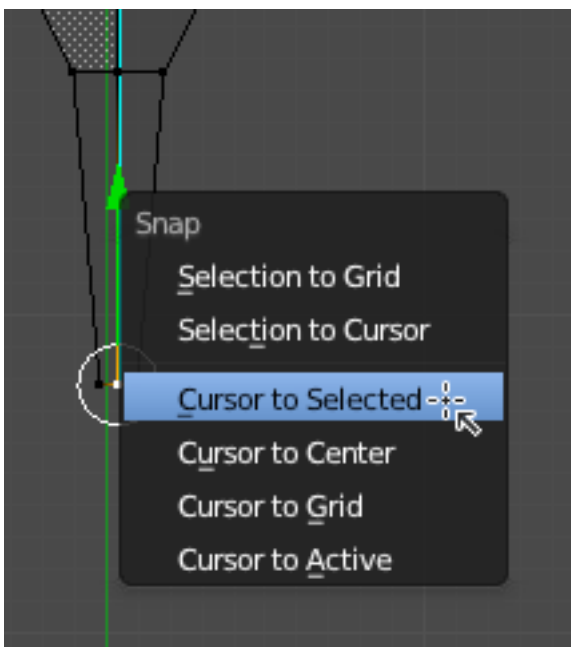
TAB out of edit mode, Go to solid shading mode. The leaf object should now look something like shown below:



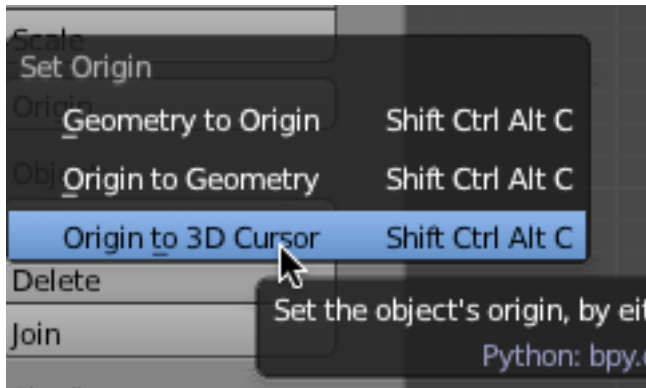
Switch to top view. Go to wireframe and then TAB into edit mode. Select the bottom center vertex of the leaf object.



We need to make the leaf object's center pivot point correspond to this vertex so that we can later easily rotate the leaf in any direction. With this bottom vertex selected, press SHIFT\_S. This brings up the snap menu. Choose "Cursor to Selected".

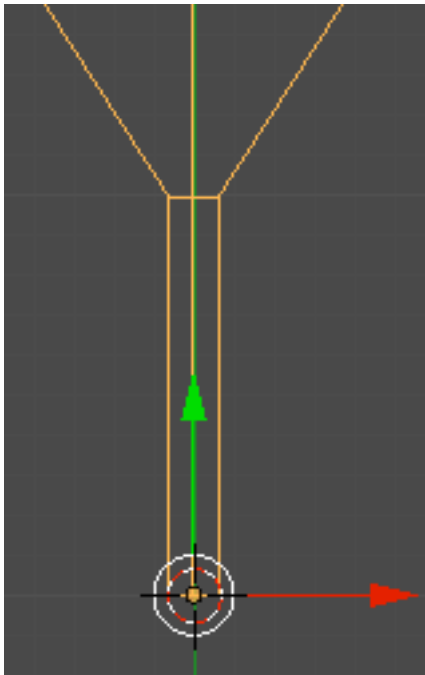


This places the 3D cursor at the same point in space as the selected vertex. TAB out of edit mode. Now press the Origin button in the tool panel on the left and select Origin to 3D cursor.



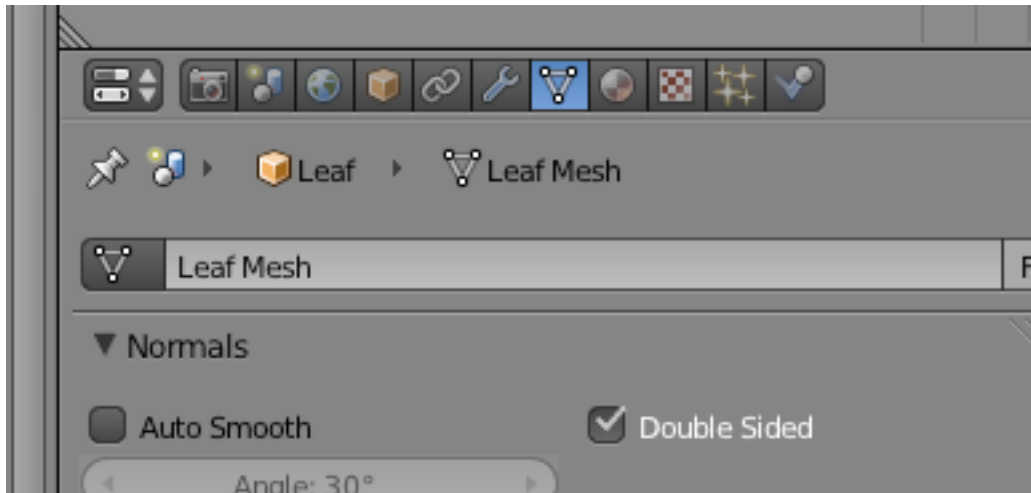
This moves the object's origin point (pivot) to the position of the 3D cursor (which is the same as the bottom center vertex).

Any rotation we now do to the leaf object will pivot around that point.



Finally, Go to the Object Data editor. Change the name of the mesh to “Leaf Mesh”. This will allow us later to alter the mesh structure of leaves on an existing tree by simply replacing the mesh.

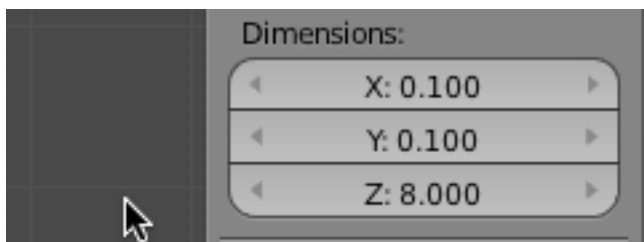




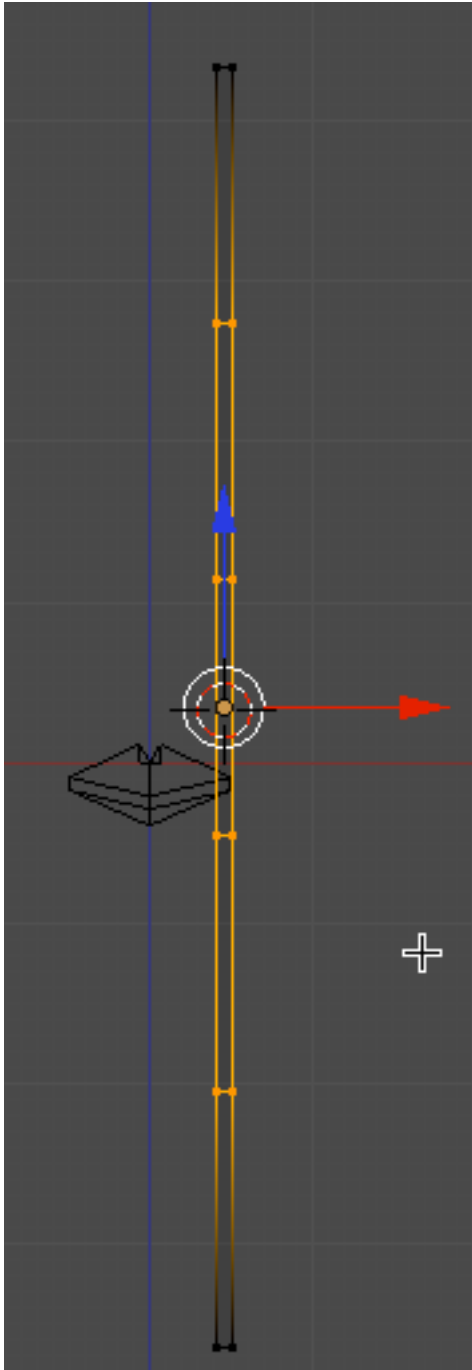
Save your Blender file.

## Twig:

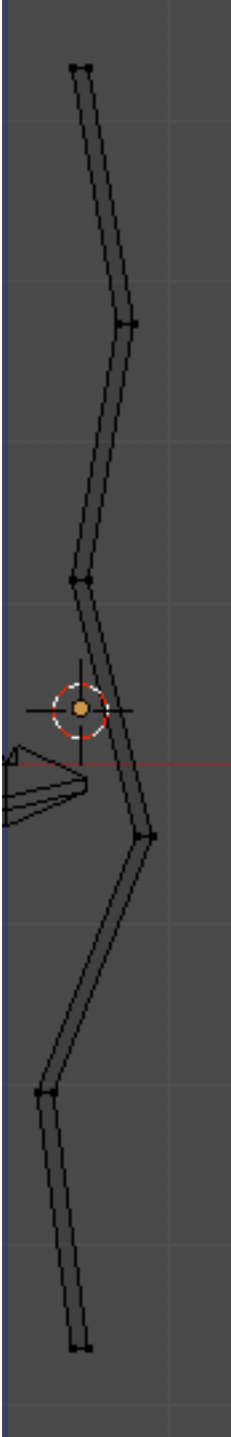
Switch to front view. Add a cube object. Set the Dimensions to X= .1, Y=.1 and Z= 8



TAB into edit mode and press CTRL-R (loop cut and slide) and using your scroll wheel create 4 horizontal edge cuts as shown below.



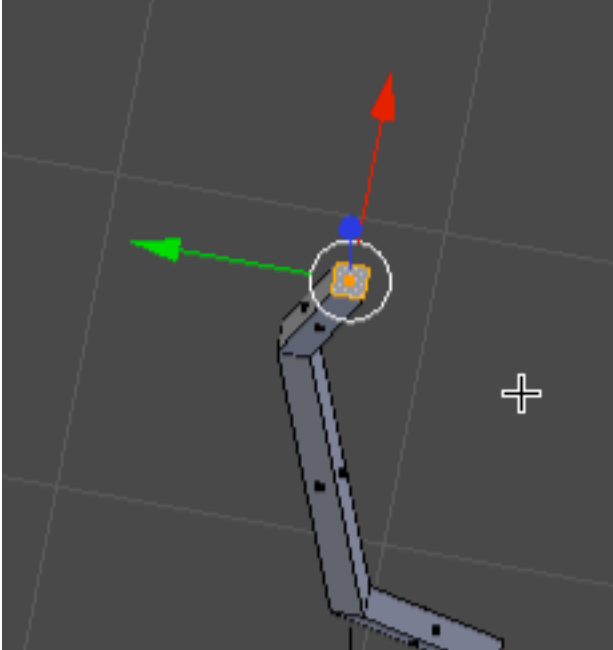
Box select each segment and move it to create an angled twig object as shown below:



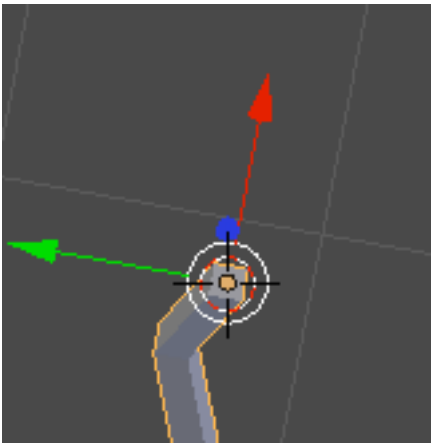
Switch to side view and as we did with the leaf, manually adjust the vertices to add a bit of shape to the twig as shown below:



Go to solid shading view. Rotate your view so you can see the top. Go to Face select (CTRL-TAB). Select the top face.



Press SHIFT-S and snap your 3D cursor to this face. TAB out of edit mode and press Origin and set the Origin to the 3D cursor. (Same as we did with the leaf object).



Name this object “Twig”. Save your Blend file.

With the Twig object selected, go to the Materials editor, click New and name this material “Trig Brown”.



Click on the Diffuse color swatch and set the color sliders to R= .25, G= .25 and B=.15 making a brownish color.

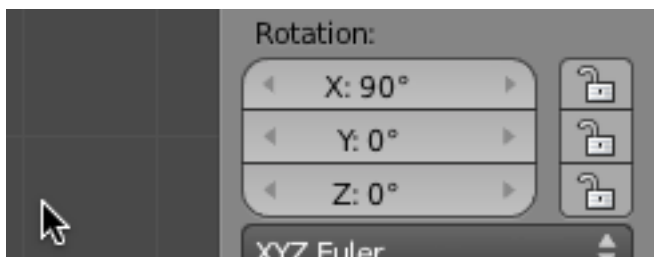
In the Specular panel, set the specular intensity to 0.



Save your Blender file.

## Twig/Leaf Assembly:

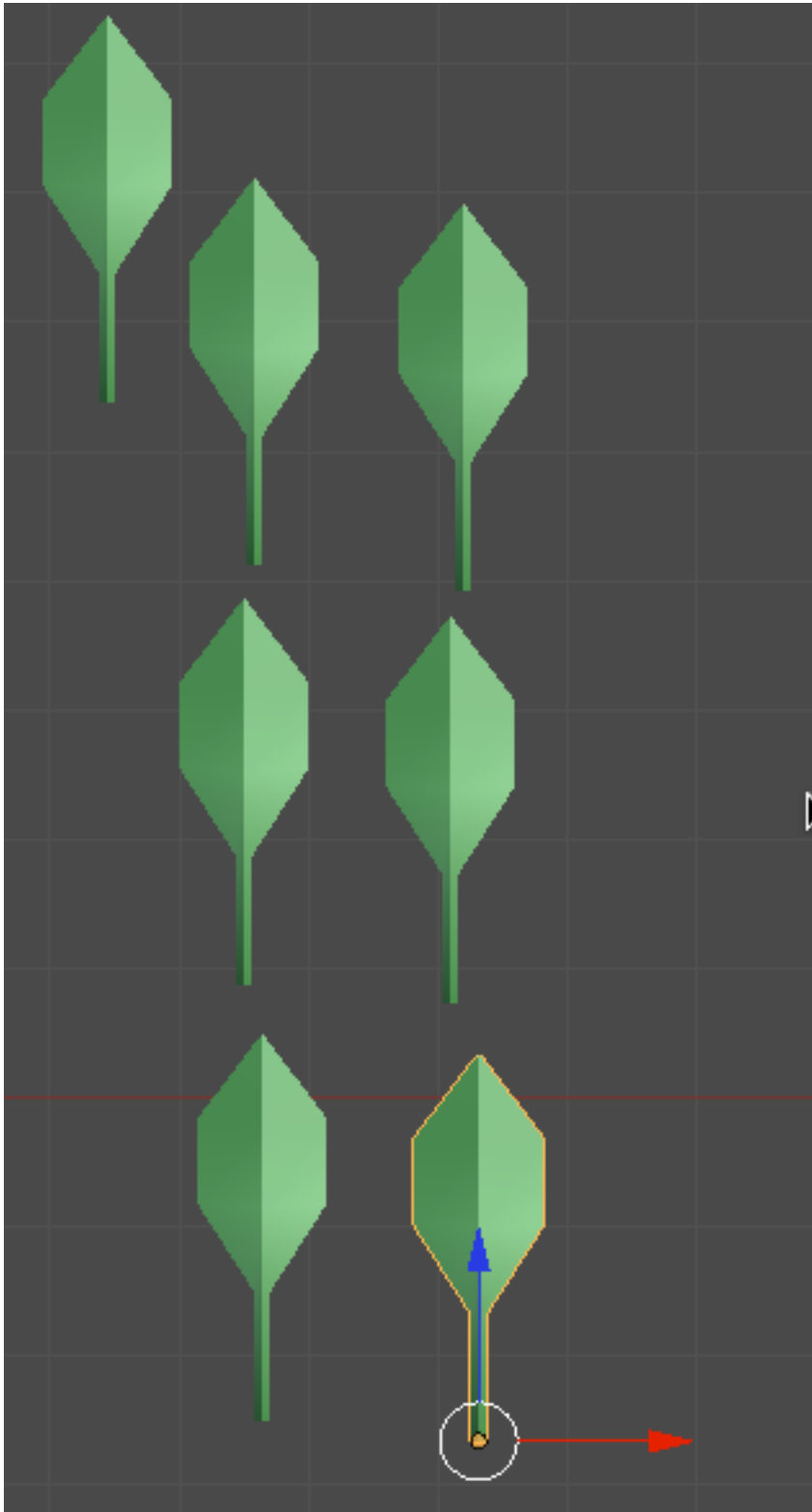
Go to Front view. Select the Leaf object. Set the X Rotation to 90.



We will now duplicate some leaf objects and assemble them into a twig. Our duplication process will use the ALT-D rather than the CTRL-D command because we want all of the duplicate objects to be “linked” (if we transform one, all will be transformed).

Go to top view. In object mode, select the leaf object and press ALT-D and drag the linked duplicate copy to the side. Re-select the original leaf, press ALT-D and make

another copy. Repeat this process (always re-selecting the original leaf object), pressing ALT-D (Linked duplicate) and moving it to the side 6 times.

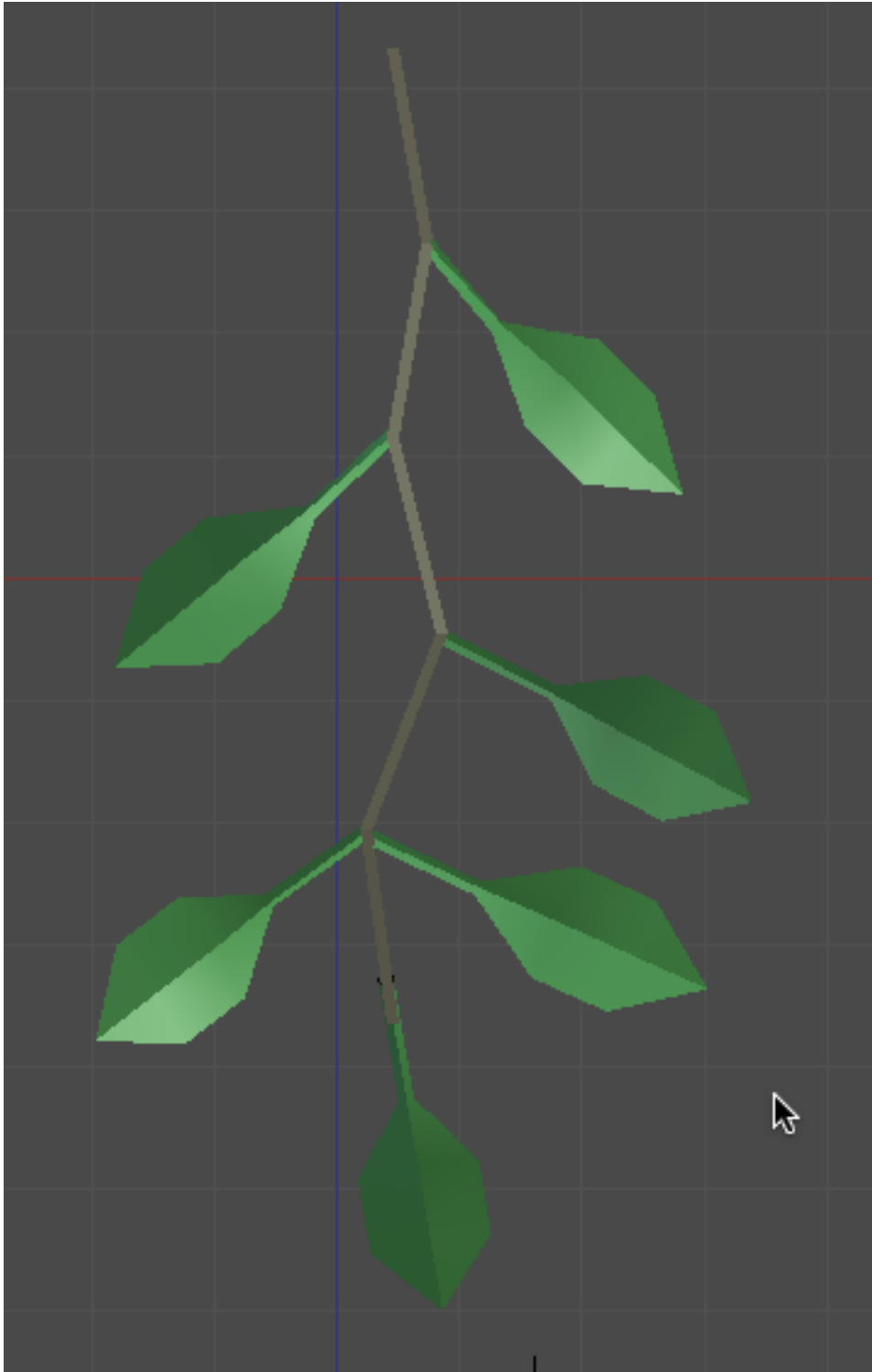


Select the original Leaf object and place it on layer 2 (MKEY)

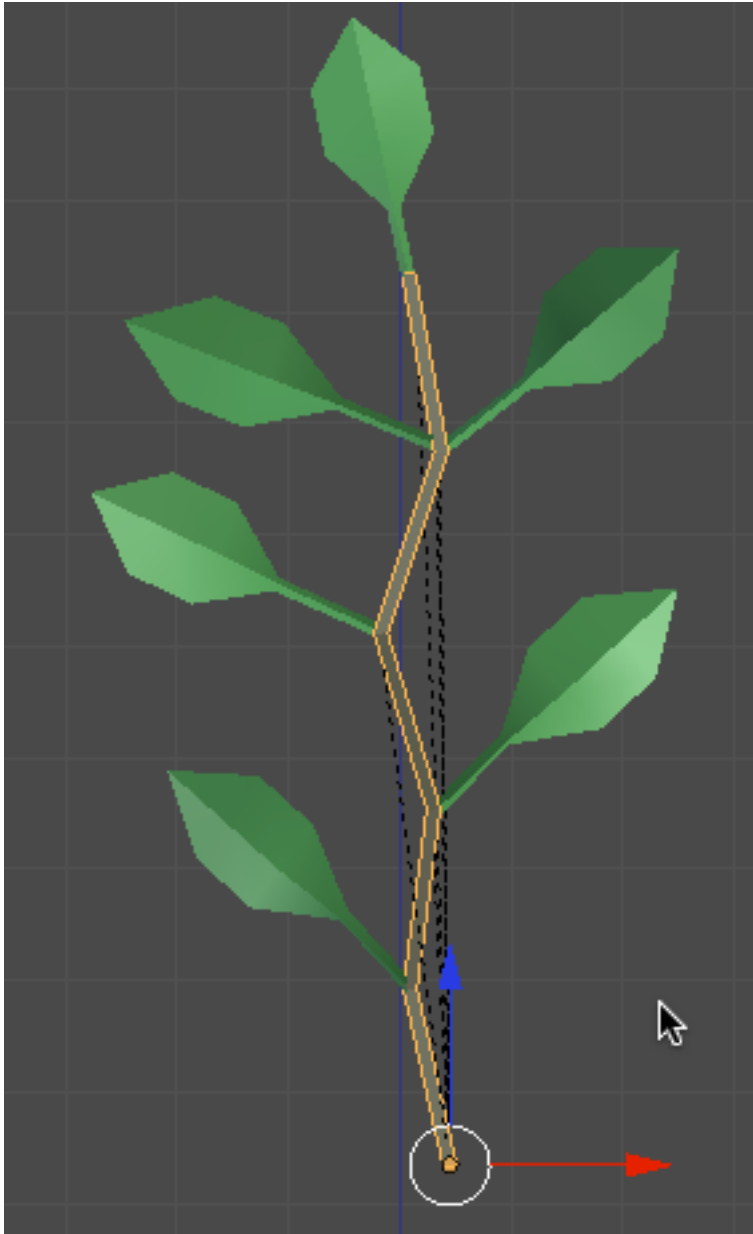
Each of our linked duplicate leaves are automatically named - “Leaf.001” to “Leaf.006”. Any change we make to the original Leaf object will be reflected in the 6 linked duplicates.

Arrange the 6 linked duplicate leaves around the twig. **You can rotate/move any of the leaves to compose the twig.** When you are done, your twig/leaf assembly should look something like below:





Select each of the leaf objects in succession adding it to the selection. Finally add the Twig object to the selection (last) then press CTRL-P and make the Twig object a parent to all of the leaves. Select the Twig and rotate it in top view around the Y-axis so the bottom of the twig is at the bottom of the display



Select the Twig object itself in object mode and then press “Smooth”

Save your Blender file.

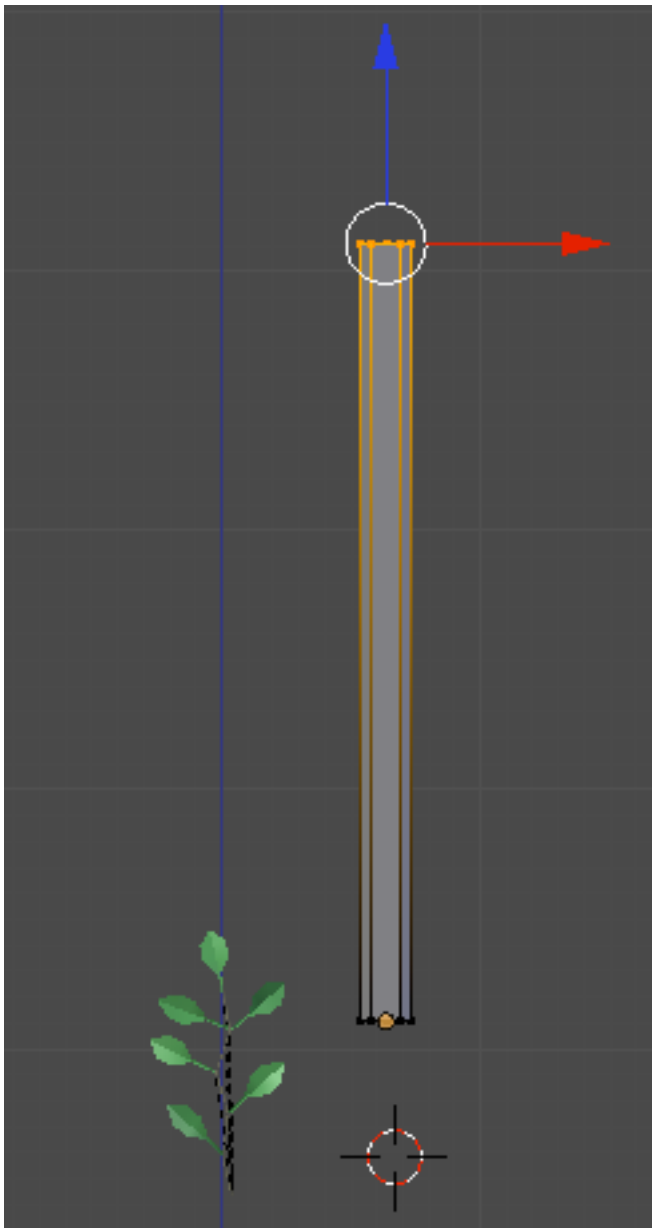
### **Sprig:**

Go to front view. Add a mesh circle.

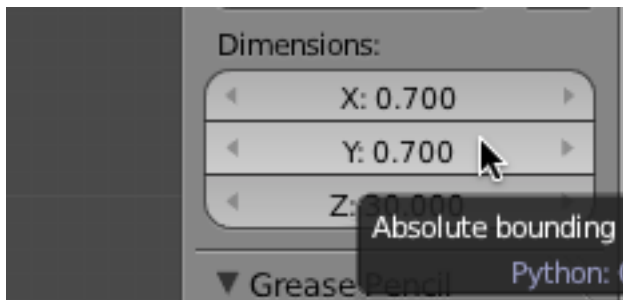
In the tool panel on the left, set the vertices to 5



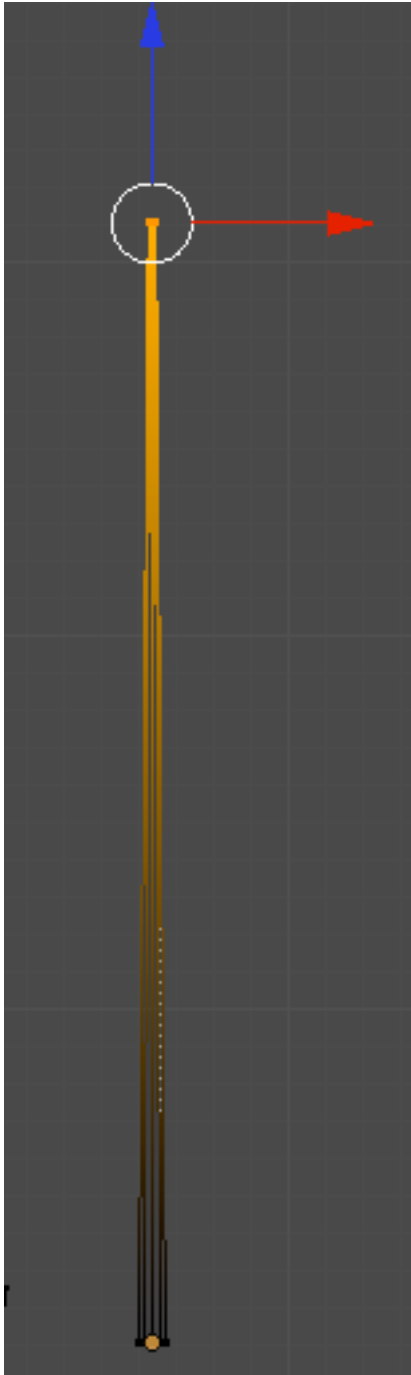
TAB into edit mode. **Go to Vertex select** (CTRL-TAB). Press the EKEY (extrude) followed by the ZKEY followed by 30 and extrude the circle up along the Z-axis 30 Blender units.



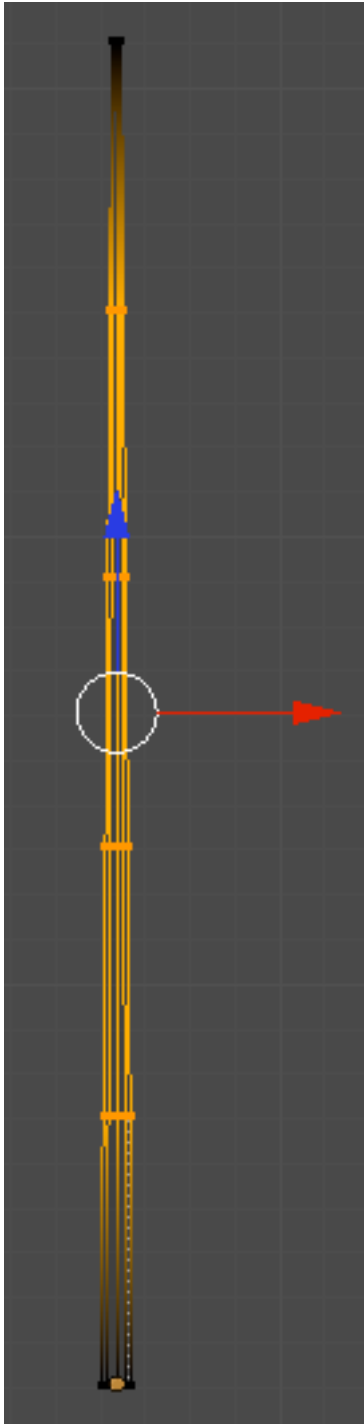
TAB out of edit mode. Set the X and Y dimensions to .7



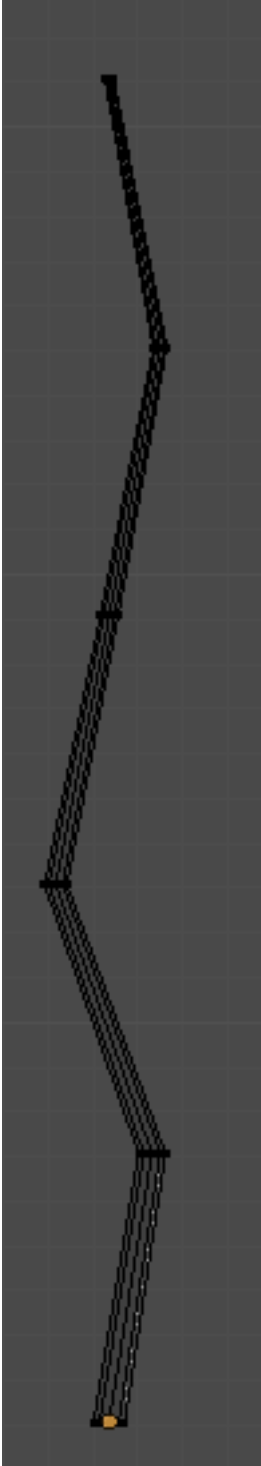
TAB into edit mode. Go to wireframe. Box select the top four vertices and scale them down as shown below.



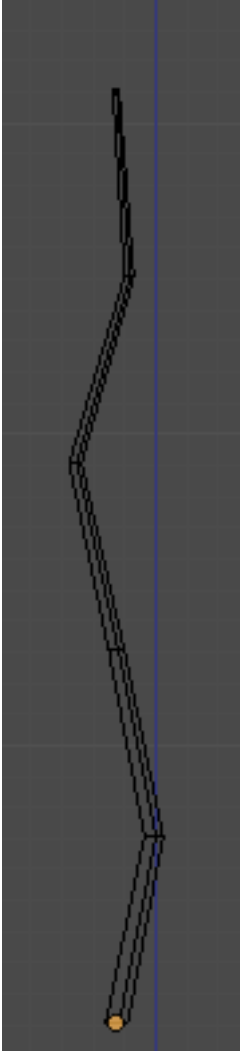
Press CTRL-R (loop cut and slide) and using your scroll wheel create 4 edge loop cuts as shown below.



Select the groups of vertices and position them something like shown below.



Go to side view and select the groups of vertices and position them something like shown below.



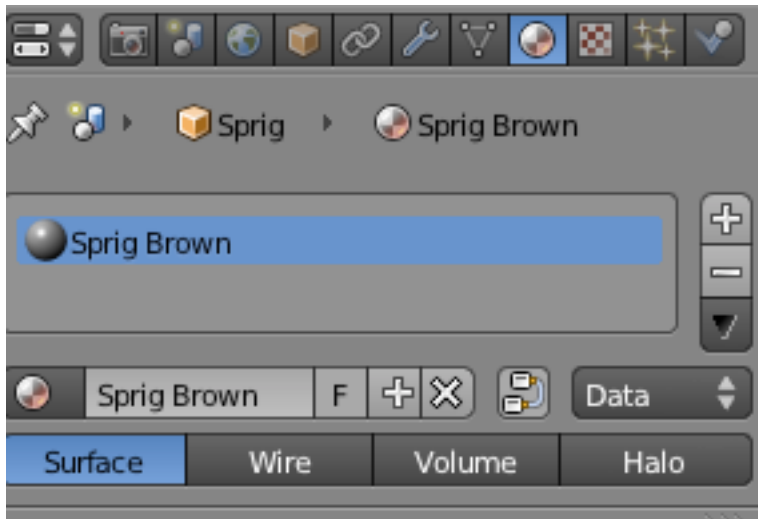
Go to front view. Name this object “Sprig”.

Since we extruded this from a flat circle object, the object origin point is in place at the bottom of the Sprig object.

TAB out of edit mode. Go to solid shading mode. Press the “Smooth” button.

Go to the Material Editor. Press New and name the new material “Sprig Brown”.





Click on the diffuse color swatch. Set the color sliders to R= .2, G= .2 and B=.1 making a brownish color.

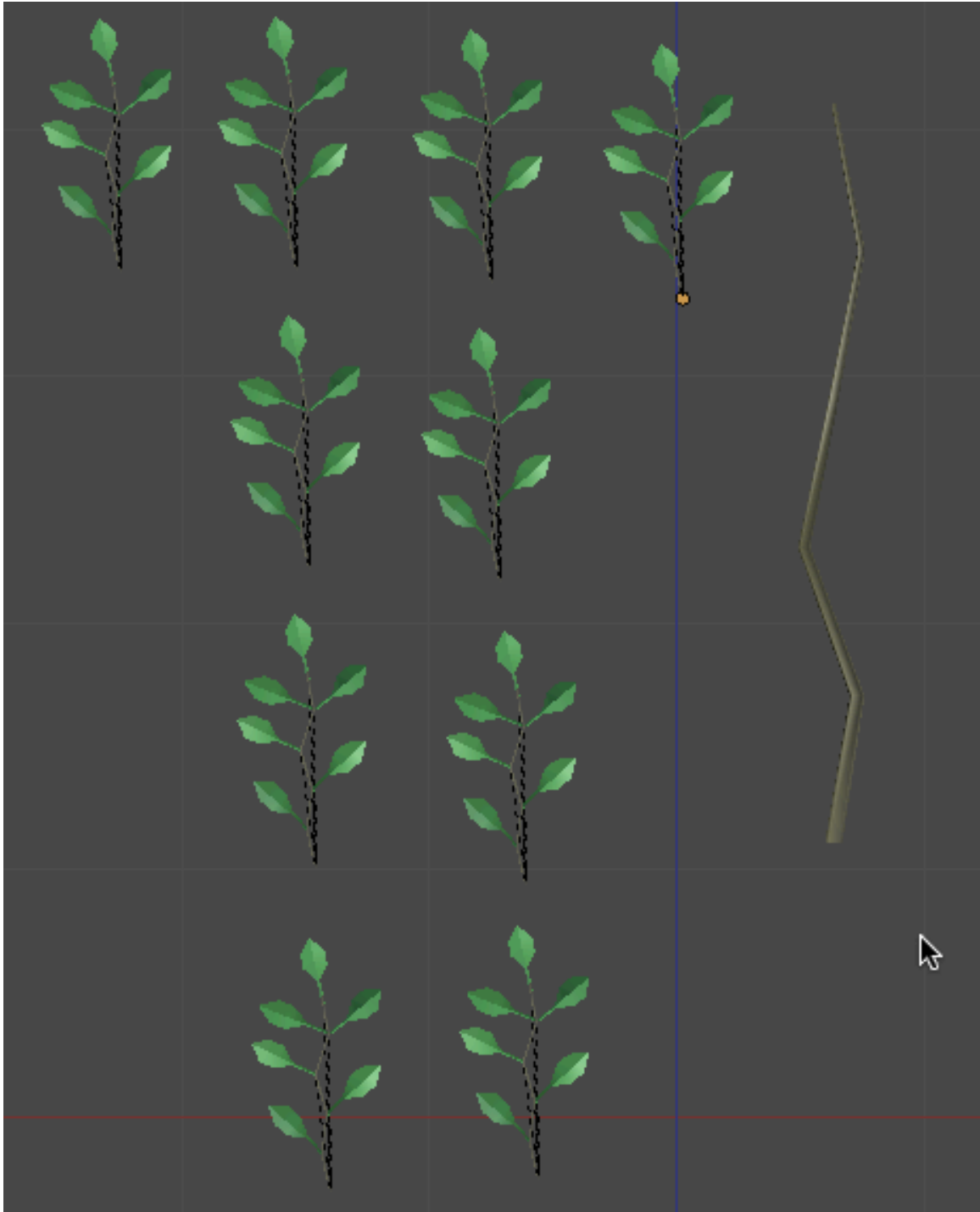
In the Specular panel, set the specular intensity to 0.



Save your Blender file.

## Sprig / Twig Assembly:

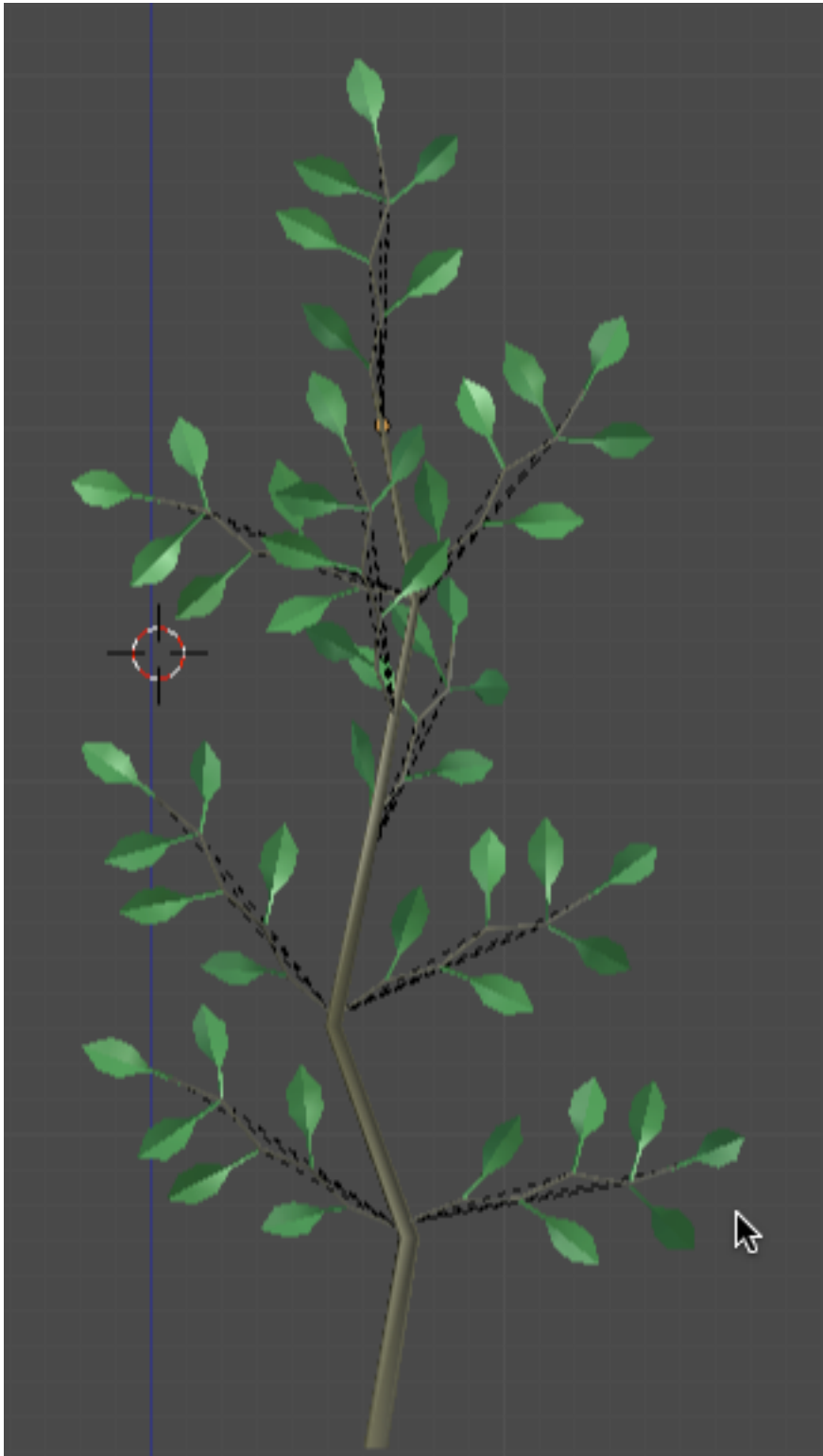
In object mode, box select the twig and leaves objects and press **ALT-D** and drag the duplicate copy to the side. Press the **A**KEY so nothing is selected. Box select the original twig and leaves, press **ALT-D** and make another copy. Repeat this process (always re-selecting the original twig and leaves objects), pressing **ALT-D** (linked duplicate) and moving it to the side 9 times. (Note: you may want more or fewer duplicate Twig/Leaves depending on the size and structure of your Sprig object).

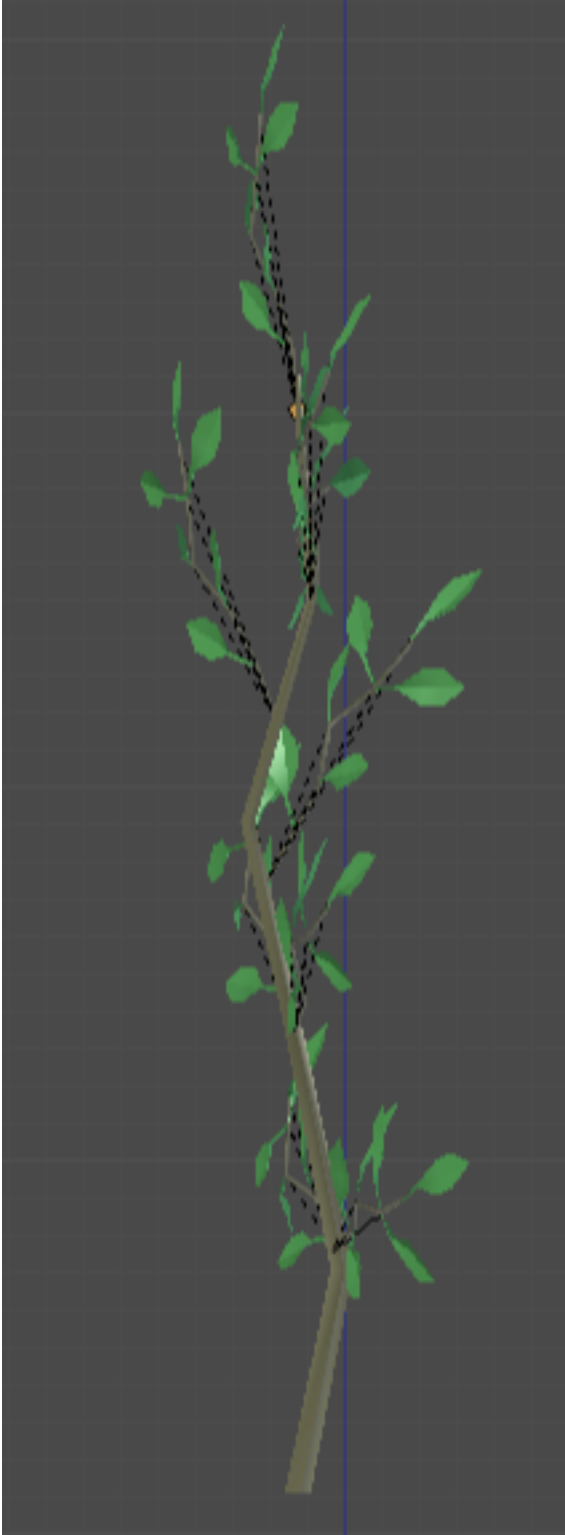


Select the original Twig and Leaves assembly and place it on layer 2 (MKEY)

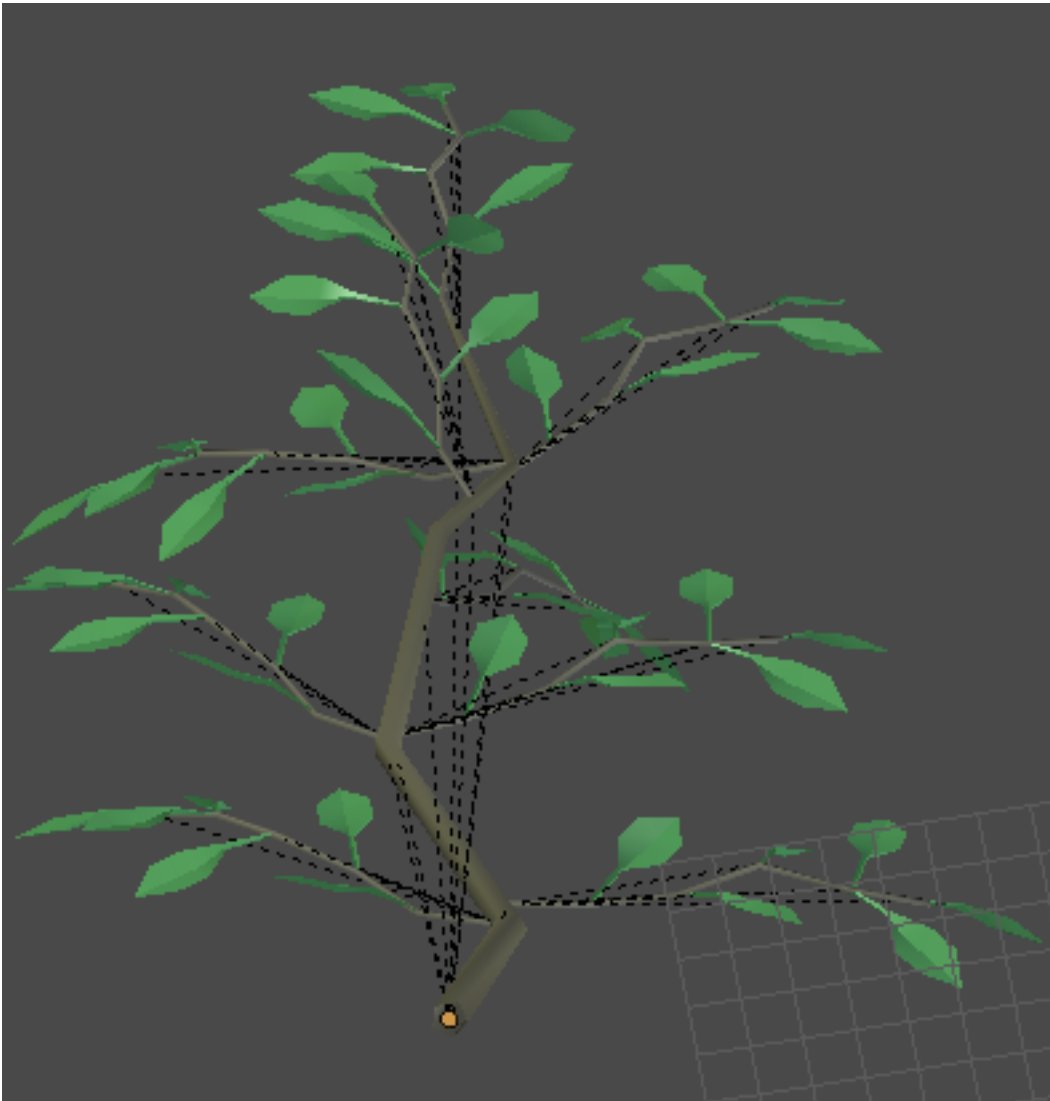
Arrange the 9 duplicate twig/leaves around the sprig object (Remember since the twig is a parent to the leaves you can just move or rotate the twig object and the leaves will follow).

**You can rotate/move any of the twig/leaves to compose the sprig.** When you are done, your sprig/twig assembly should look something like below:





Select each of the Twig objects (not the leaves) in succession adding it to the selection. Finally add the Sprig object to the selection (last) then press CTRL-P and make the Sprig **object** a parent to all of the Twig objects. You can now move/rotate the Sprig object and the Twig and Leaves will follow.



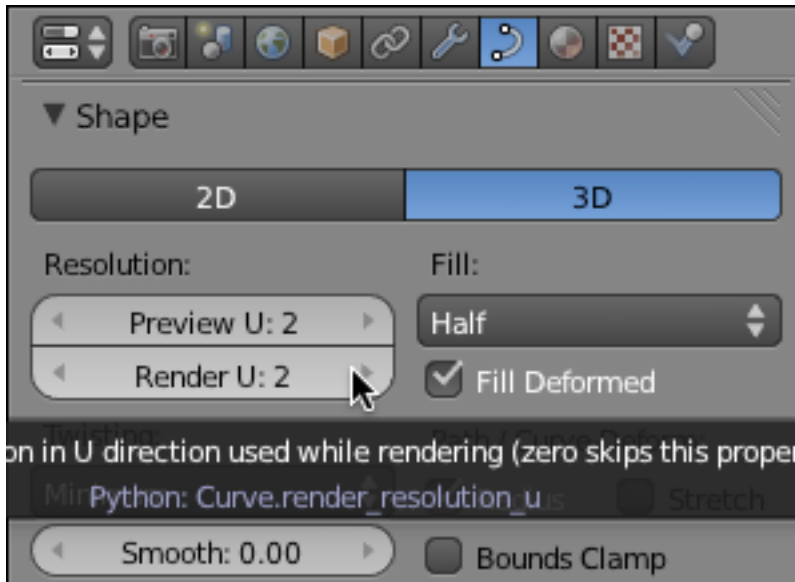
Save your Blender file.

## **Branch:**

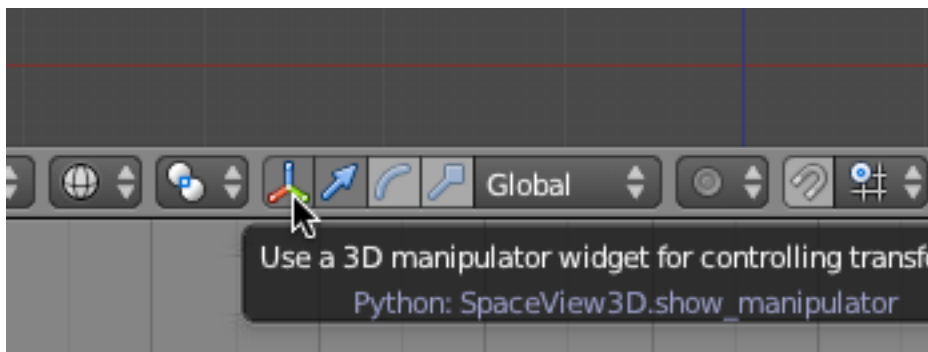
Go to front view. Add a CURVE circle. (Note: For the Branches we will use a Bezier curve circle and not a mesh circle)

Go to the Object Data editor.

In the Shape panel, set the Preview U and the Render U to 2. This will greatly reduce the resultant faces.

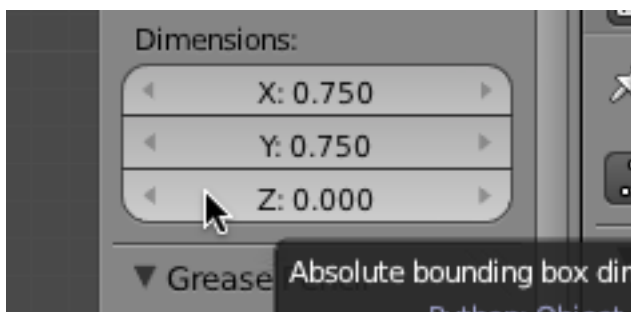


Turn off your 3D manipulator widget.

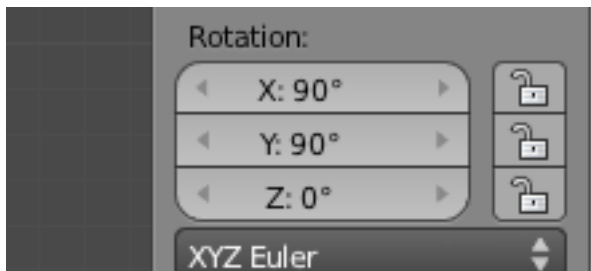


This will make extruding the Branch object easier.  
Name this Bezier circle object “C1”.

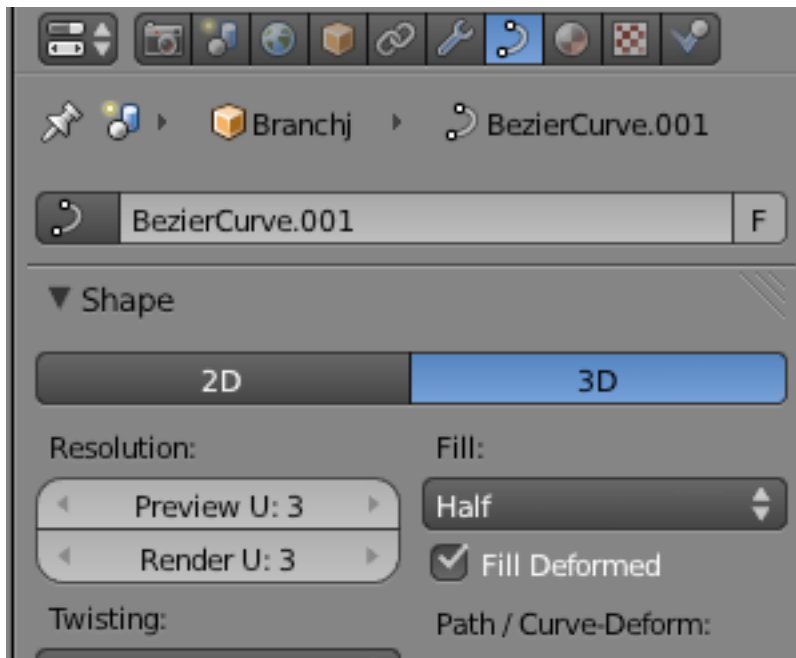
Set the X and Y dimensions to .75



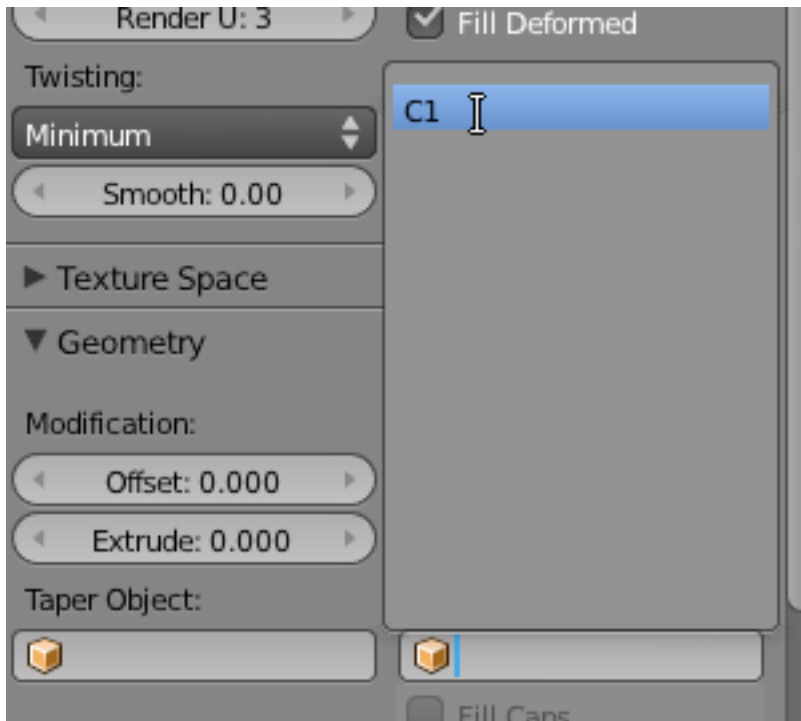
Place your 3D cursor to the right of the C1 object and add a Bezier curve object. Set the X and Y Rotation to 90.



Name this object “Branch”. Go to the Object Data editor and set the Preview U and Render U to 3.



In the Geometry panel, click on the Bevel Object box and select the C1 curve circle object.



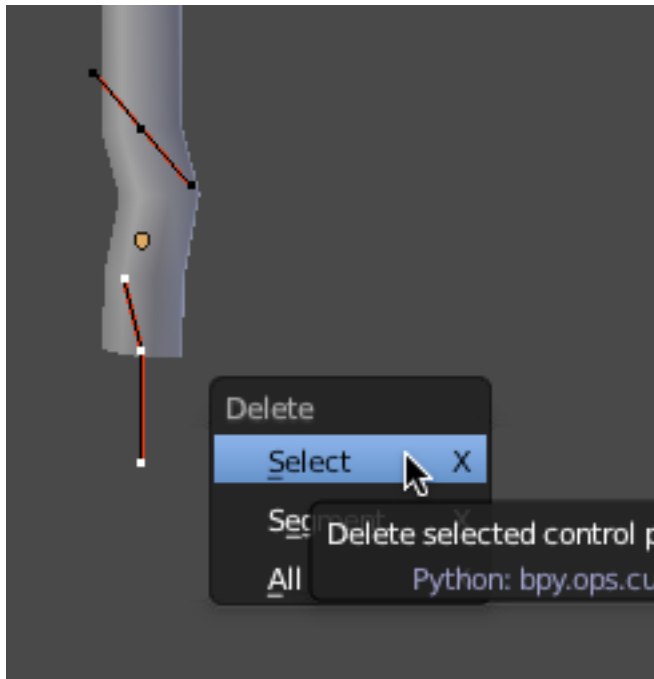
Go to solid shading mode (ZKEY)

TAB into edit mode. Press the VKEY (curve handle type) and select Free Handles.

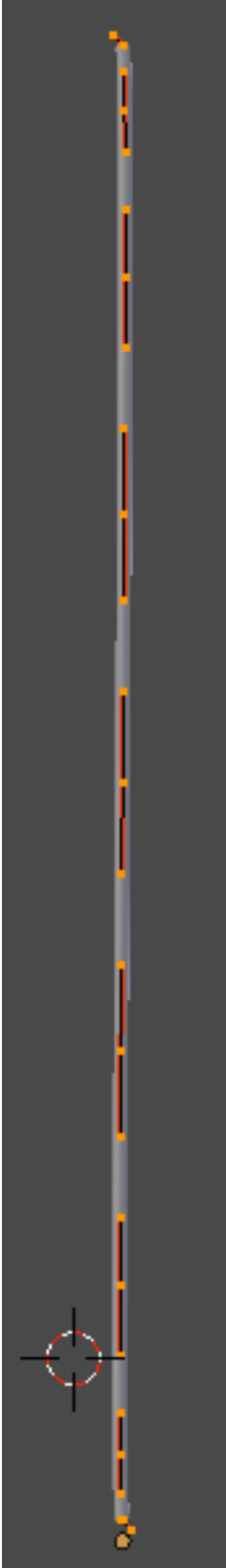
Select the top curve control point. Press the EKEY (extrude) followed by the ZKEY followed by 70, then left-click to set. This will extrude the control point 70 Blender units up along the Z-axis.

Zoom into the lower part of the Branch object. Select the bottom control point, press the XKEY and delete it.

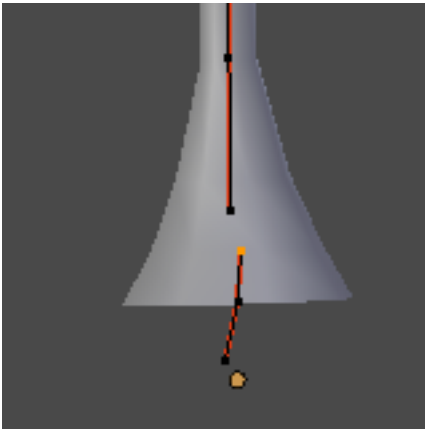




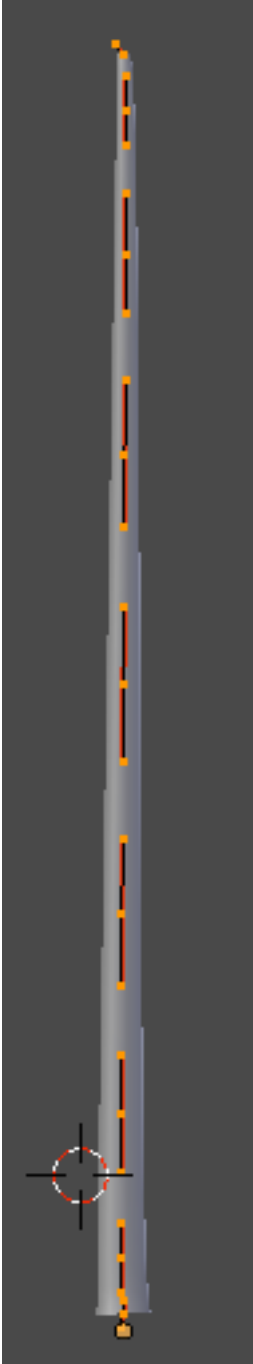
Select all of the Branch object's control points. Press the Subdivide button in the left tool panel 3 times. This will create control points (with handles) along the length of the Branch object.



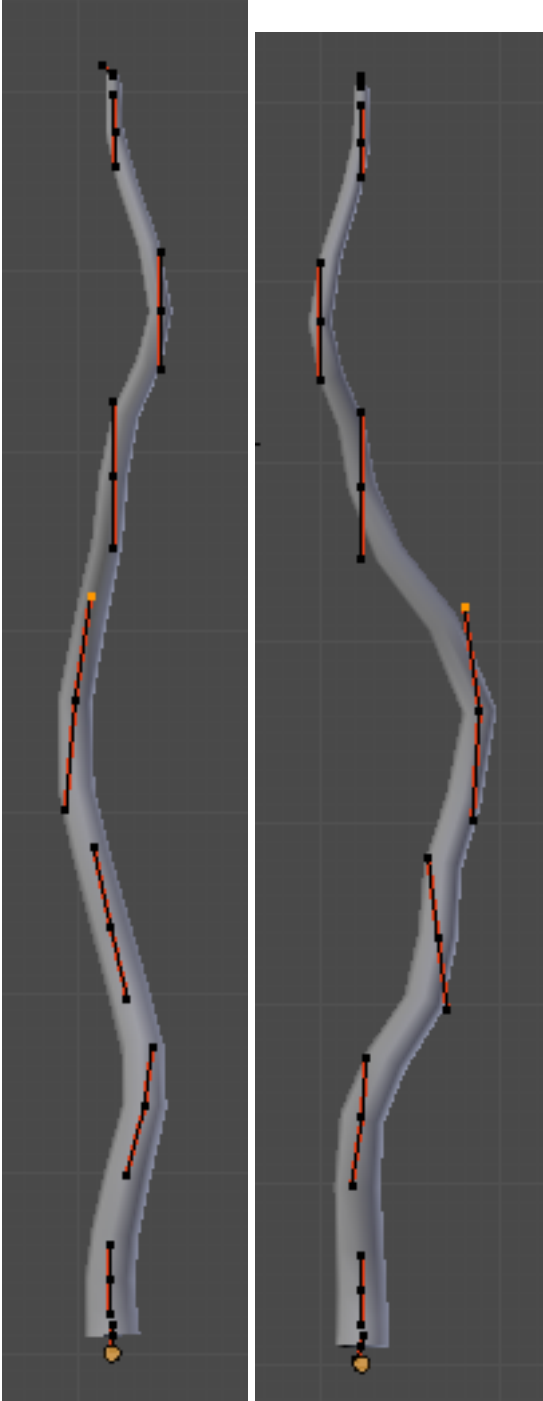
Select the bottom control point. Press ALT-S (scale curve control point) and scale it out a bit as shown below.



Select all of the Branch object control points. Press the SPACEBAR and search for “Smooth” and select “Smooth Curve Radius”. This will adjust the scale of all of the control points from the thickest at the bottom to the thinnest at the top.



Adjust the control points and the associated Free handles in both front and side view to add some variation to the Branch object.



TAB out of edit mode. Go to front view. Click the “Smooth” button.

**Select the C1 curve circle object. Place it on Layer 2 (MKEY).**

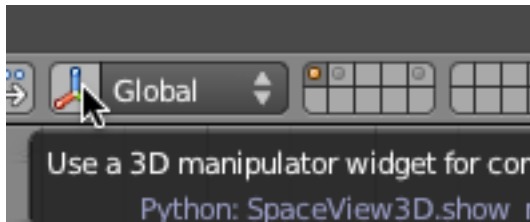
Save your Blend file.

Box select the Sprig object (along with all of the twigs and leaves). Press **ALT-D** and make a duplicate copy. Repeat this until you have 7 linked duplicate copies.



Reselect the original Sprig assembly and place it on layer 2 (MKEY)

Turn back on your 3D Manipulator widget.



Arrange the 7 duplicate sprig/twig/leaves around the Branch object (Remember since the sprig is a parent to the twig/leaves you can just move or rotate the sprig object and the twig/leaves will follow). You can rotate/move any of the sprig/twig/leaves to compose the Branch. When you are done, your Branch assembly should look something like below:

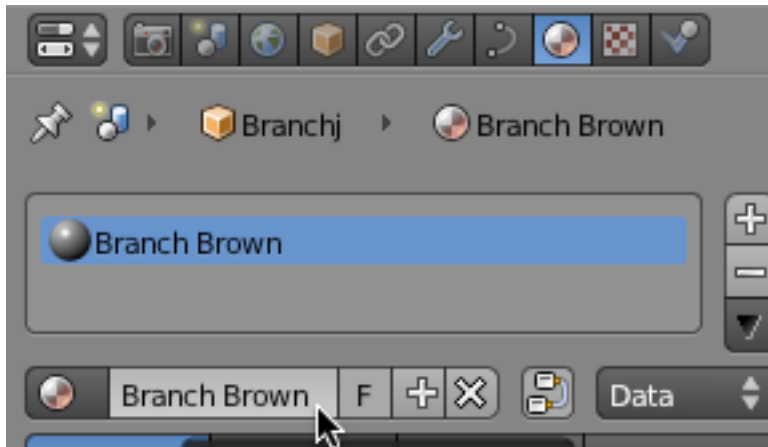






Select each of the Sprig objects (not the Twigs or Leaves) in succession adding it to the selection. Finally add the Branch object to the selection (last) then press CTRL-P and make the Branch **object** a parent to all of the Sprig objects. You can now move/rotate the Branch object and the Sprig, Twig and Leaves will follow.

Select the Branch object. Go to the Material Editor. Click new and name the material Branch Brown.



Click on the diffuse color swatch and set the color sliders to R= .15, G= .15 and B= .1

In the Specular panel, set the specular intensity to 0.

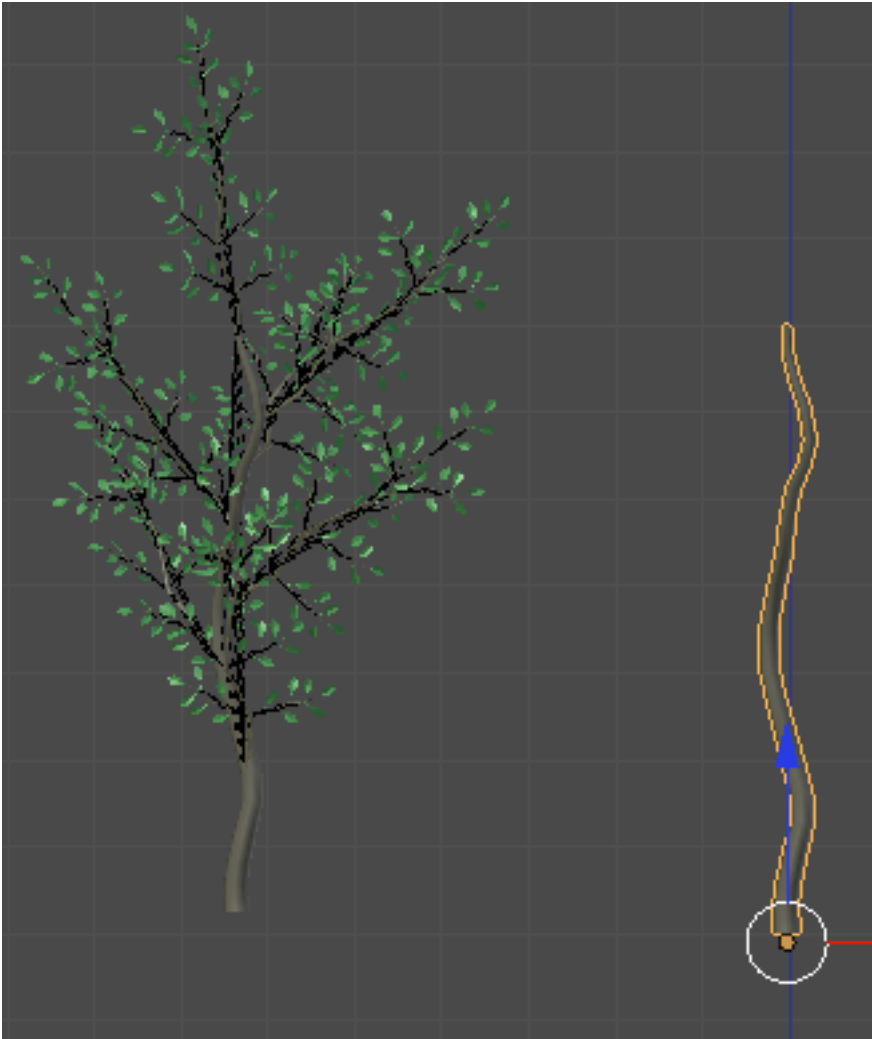


**Note: A Branch object, with a few modifications, can server as a small tree.**

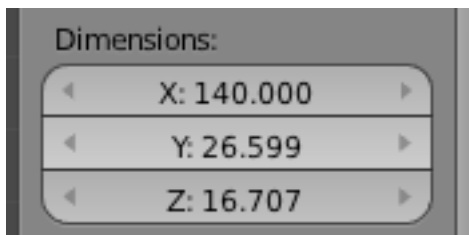
Save your Blend file.

## Tree:

Go to front view. Select the Branch object and press **SHIFT-D** and make a duplicate and set it to the side.

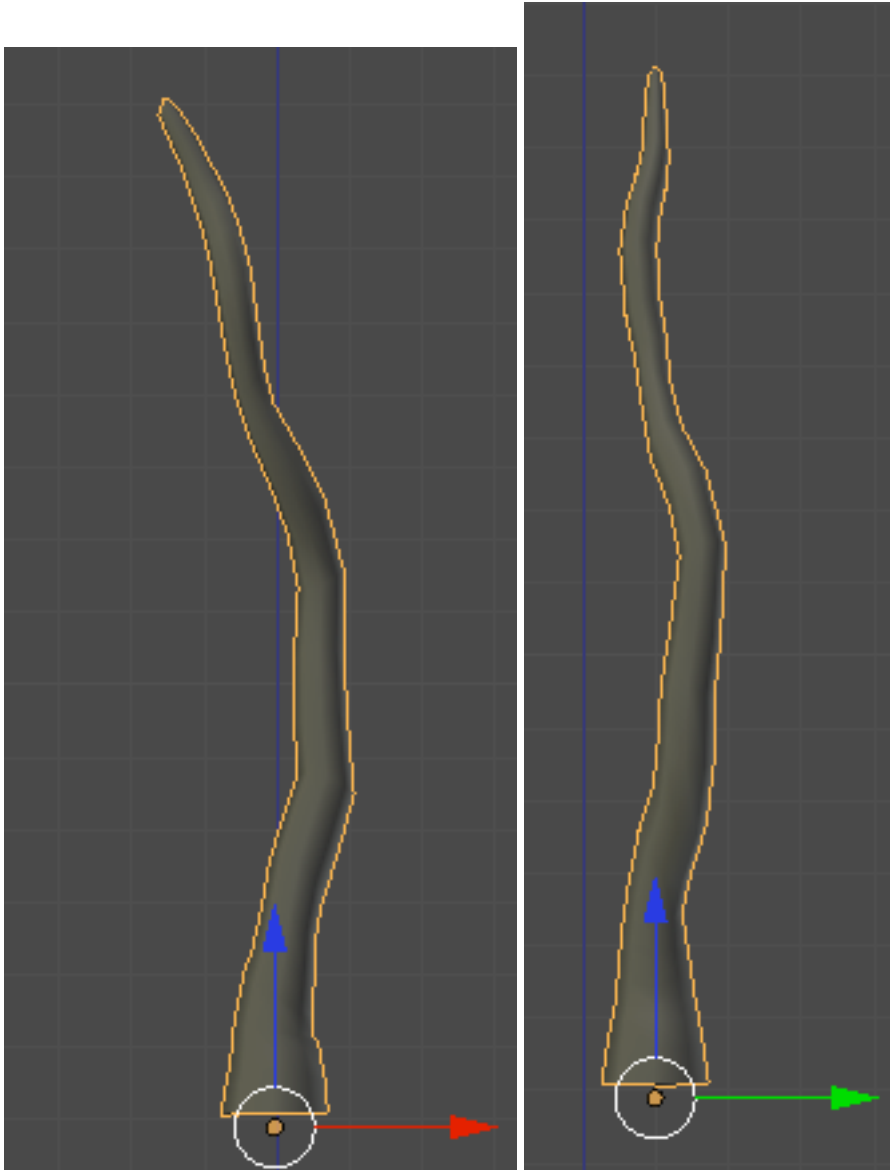


Set the X Dimension for this object to 140

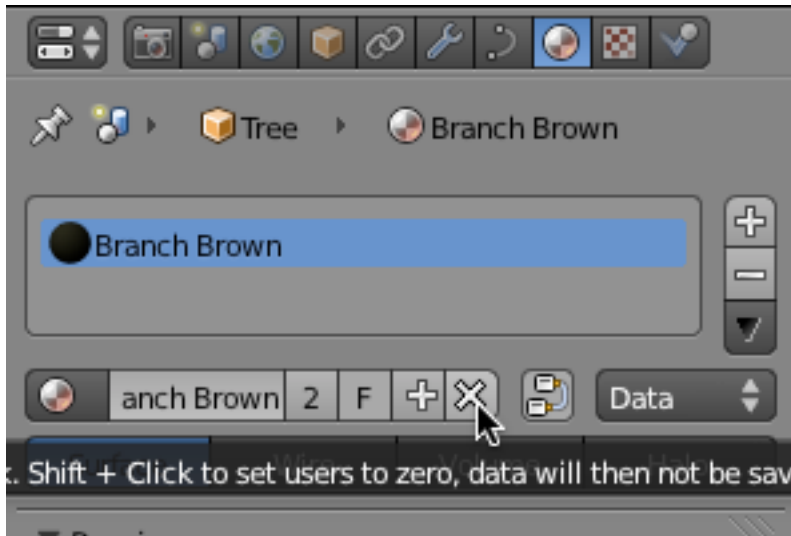


Name this object Tree.

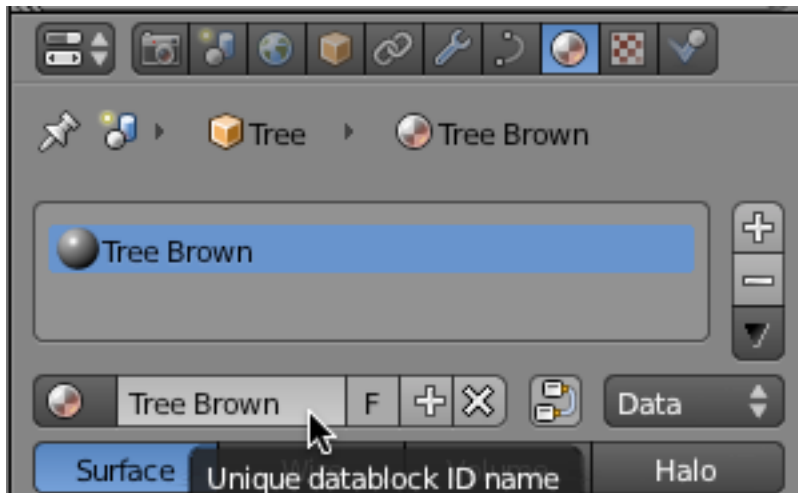
TAB into edit mode. Adjust the position of the control points and the handles to shape the Tree trunk. Make sure to check the shape from all sides. Try to make the Tree object look something like below.



Go to the Materials Editor. Note that the Tree object has the Branch Brown material attached to it. Click on the “X” to remove this material from the Tree object.

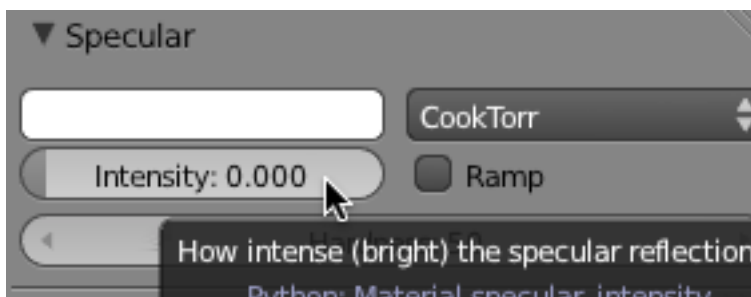


Click on the New button and name this material “Tree Brown”.



Click on the Diffuse color swatch and set the color sliders to R= .1, G= .1 and B=.075

In the Specular panel, set the specular intensity to 0



Save your Blend file.

Box select the Branch assembly and make 8 **linked duplicate copies (ALT-D)**.

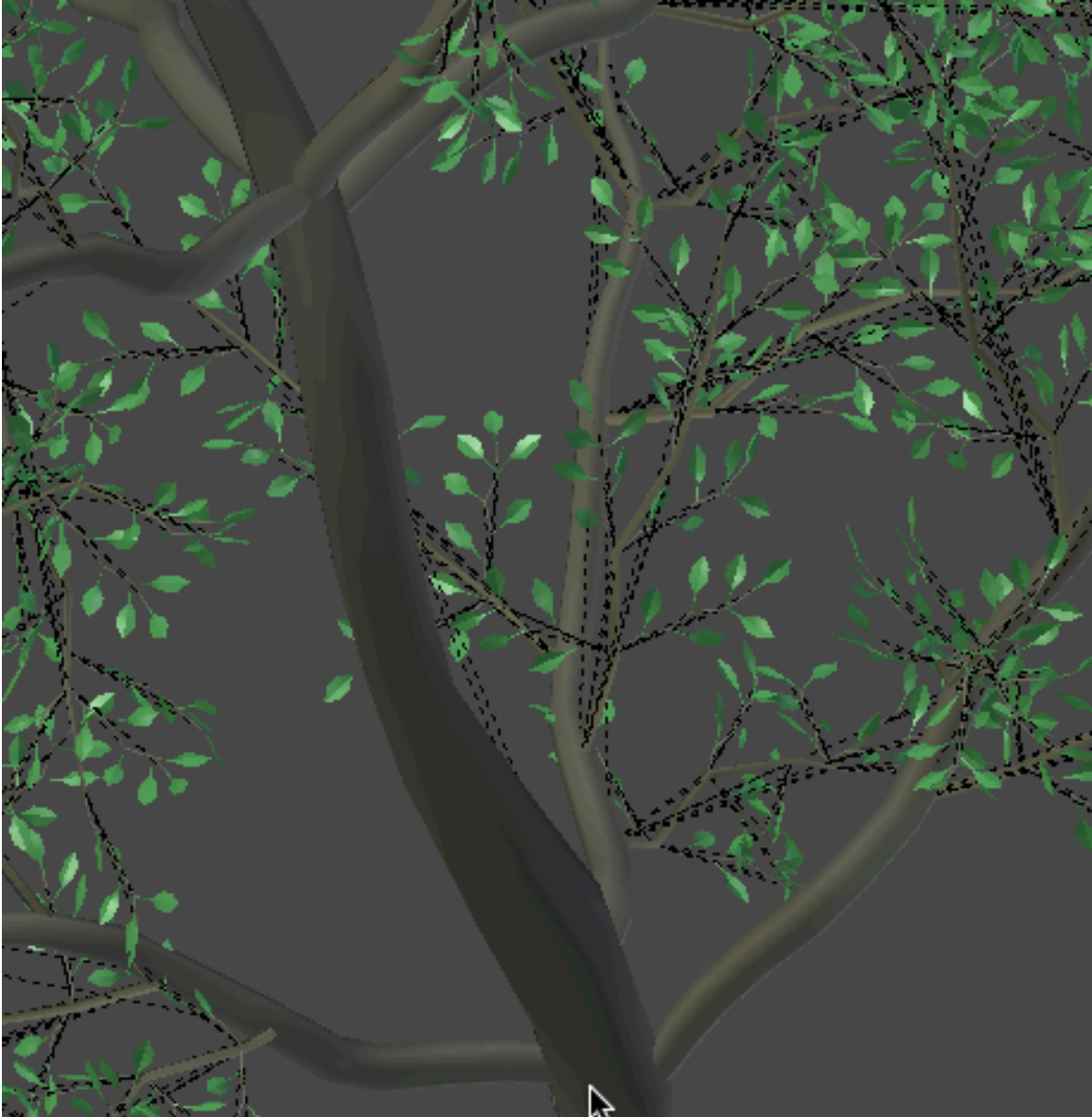
Arrange these linked duplicate Branch assemblies about the Tree object. Check your positioning and rotation from all sides. Make sure the Tree has volume placing the branches all around. If your Tree needs more foliage, make more Branch copies. Remember, the tree is dimensional so place branches on all sides.

Your Tree may look something like shown below.



Select the original Branch object and place it on layer 2 (MKEY)

Select each of the Branch objects in succession adding it to the selection. Finally add the Tree object to the selection (last) then press CTRL-P and make the Tree **object** a parent to all of the Branch objects. You can now move/rotate the Tree object and the Branch, Sprig, Twig and Leaves will follow.



Save your Blender file.

Press the AKEY and select all of the objects on layer 1. Press the SKEY (Scale) and scale them down so that they can fit on the Blender grid.



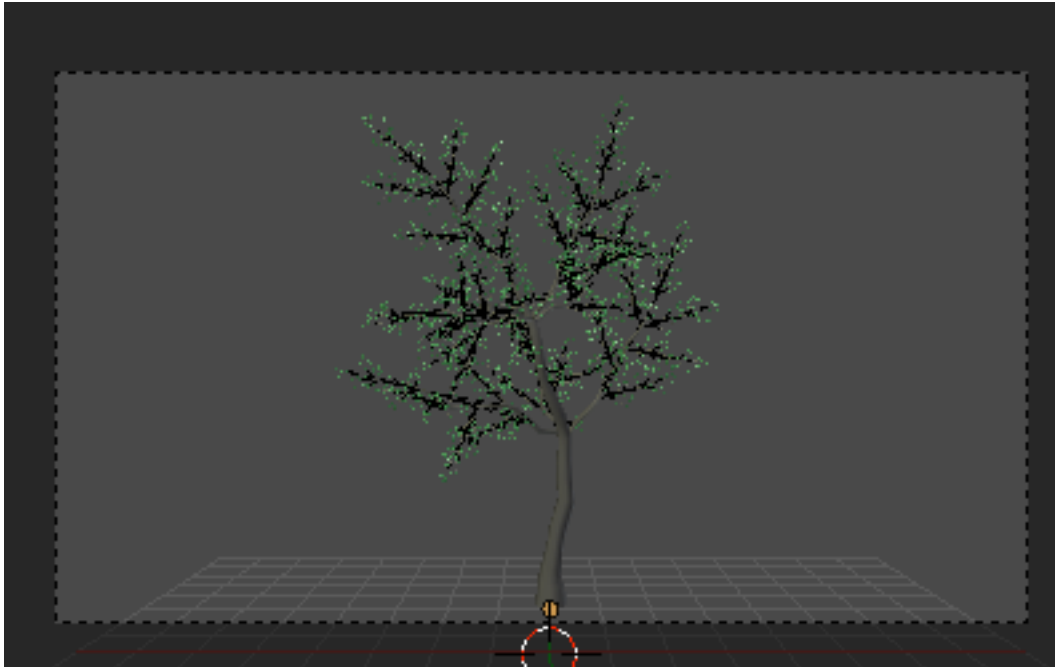
Go to the World Editor. Checkmark Blend Sky. Set the Horizon colors to  $R=.155$ ,  $G=.162$  and  $B=1$

Set the Zenith color sliders to  $R$ ,  $G$  and  $B = 1$  (white)

Add layer 3 to the scene (This is where we placed the camera and default lamp object.)

Set your camera position so that it displays the Tree object dimensionally.



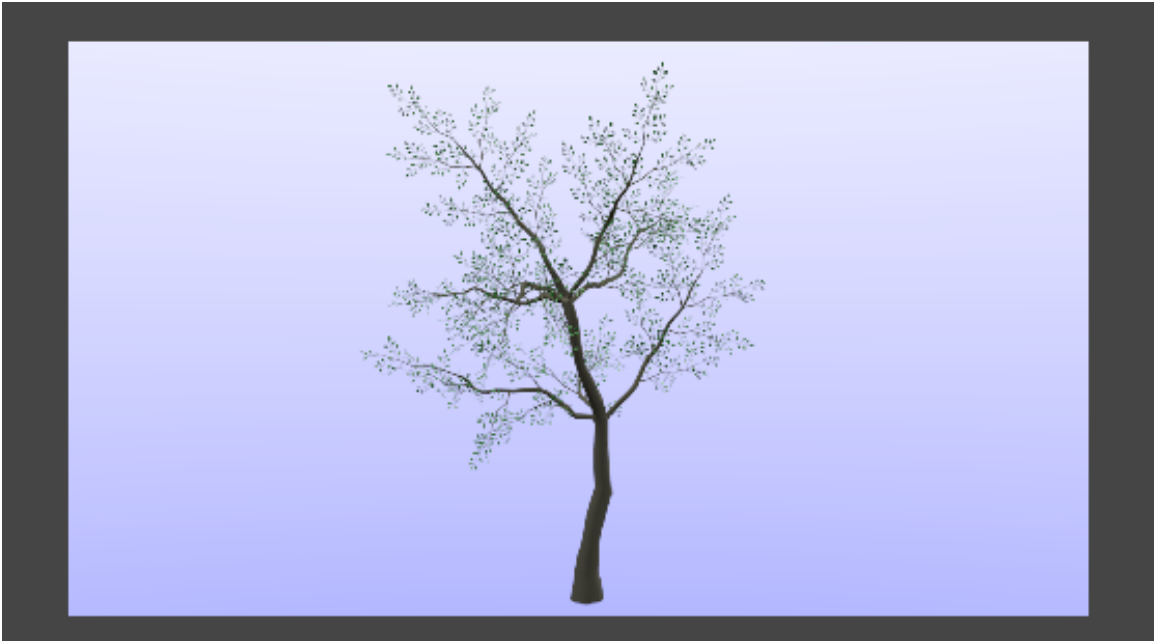


Render the image.



In front view add a Sun and Hemi lamps as shown below. In the Object Data Editor set their intensity to .4



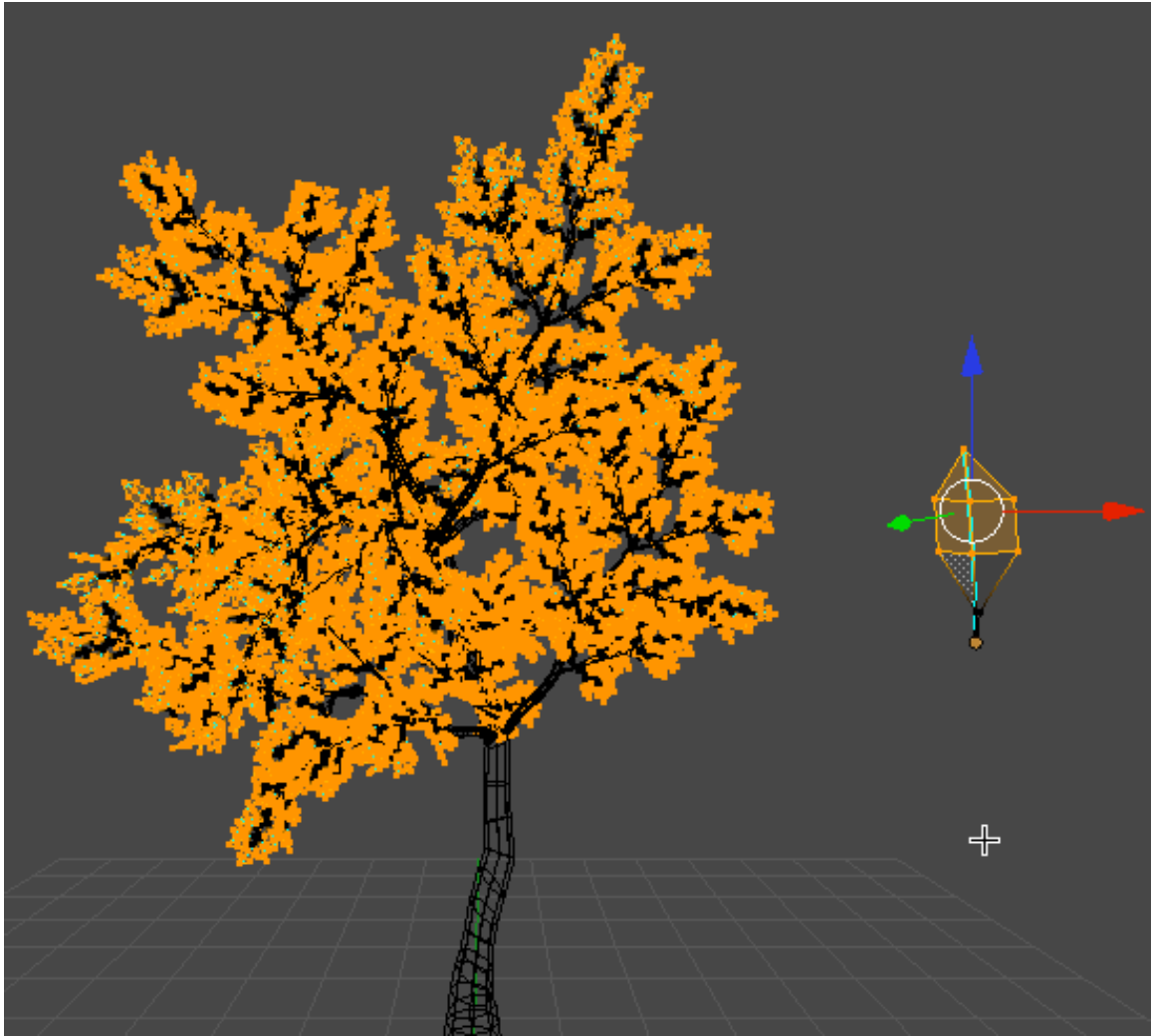
**Variations:**

Because we used “ALT-D” (Linked duplicate copies) we can adjust the original leaf mesh and all of the tree leaves will follow in kind. Select the original leaf object (should be on layer 2). Place it on layer 1 (MKEY). TAB into edit mode.

Note that all of the leave on the tree are now in edit mode.

Go to wireframe. Box select the top 7 vertices.

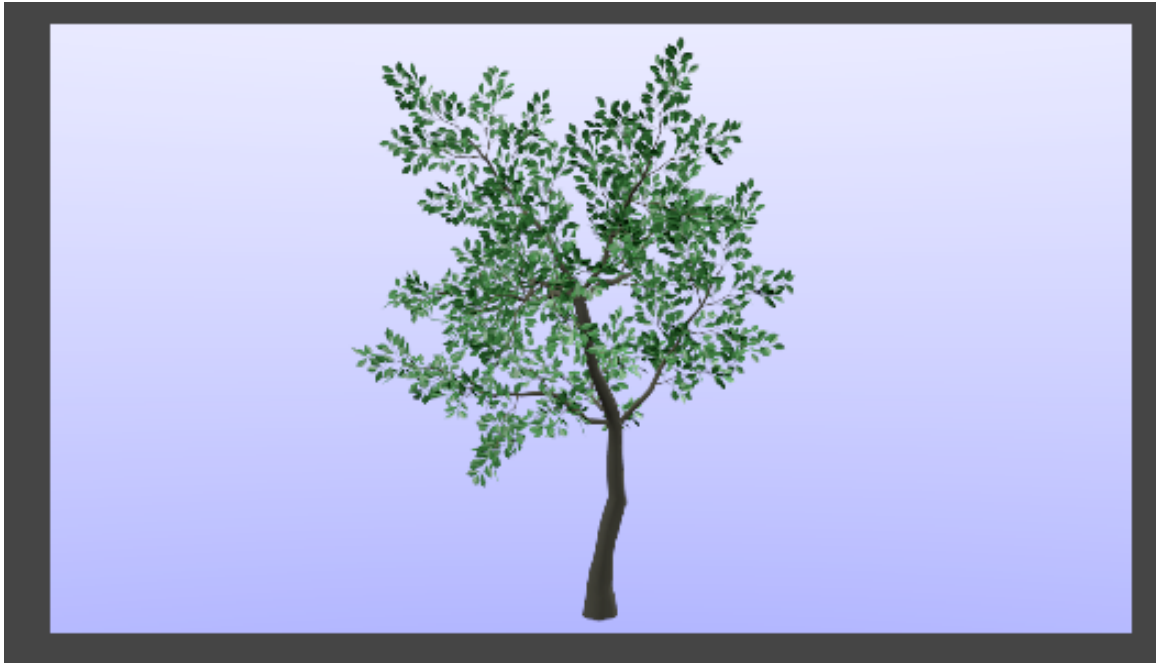
Scale them up a bit and then move them up a bit as shown below.



TAB out of edit mode. Go to solid shading mode.

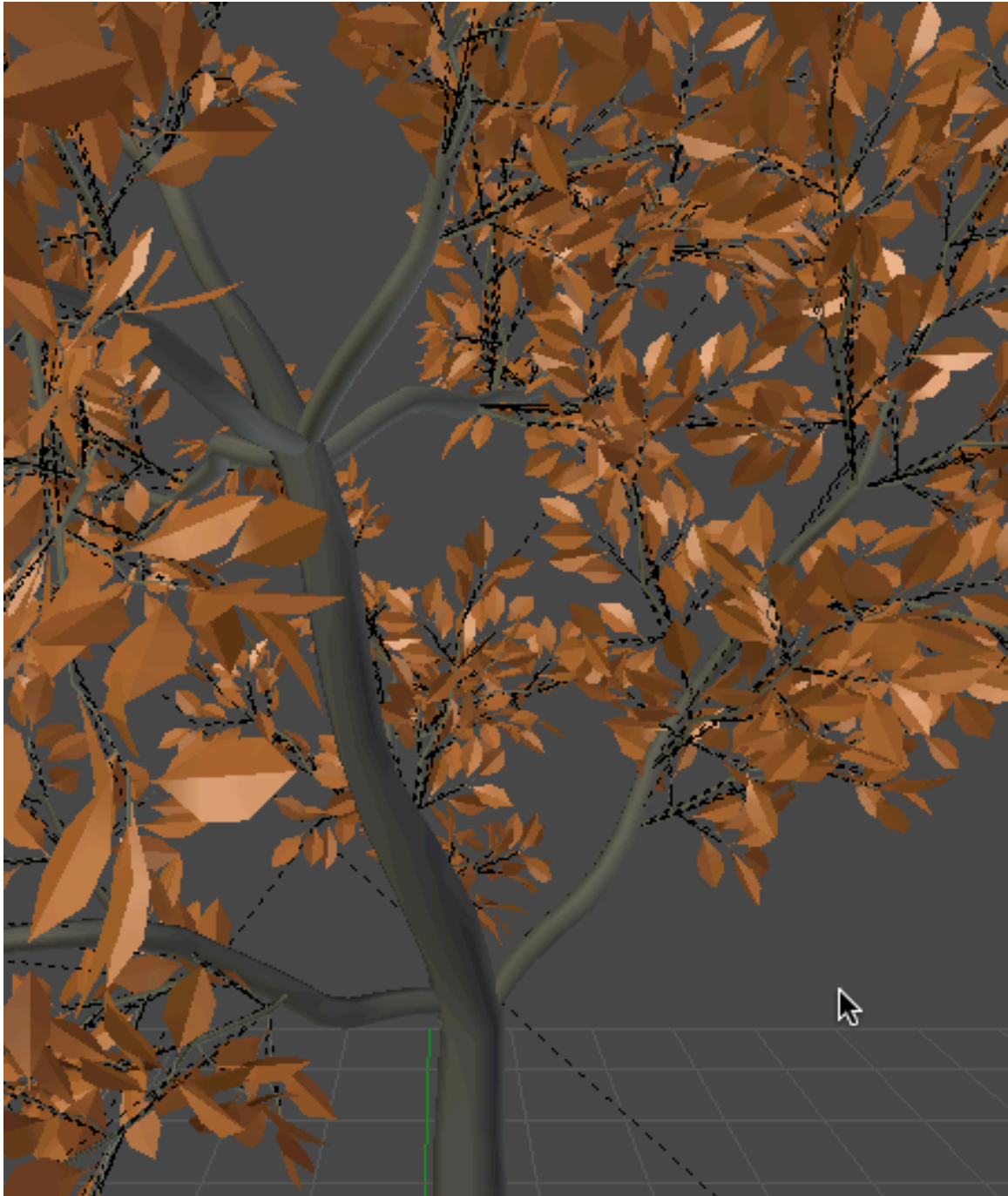


Place the original leaf object back on layer 2. Render the scene.



You can restructure the entire mesh making different types of leaves to suit your tree (for instance a maple leaf shape).

We can also easily change (or animate) the leaf color. Select any single leaf object. Go to the material editor and change the diffuse color swatch color slider settings. Here I have changed the colors to a reddish orange.





A completed .blend file of this tutorial named DeciduousTrees.blend can be downloaded [HERE](#).