MAKING FOLIAGE WITH PARTICLE SYSTEMS

Making a leaf

Go to layer 2 by using the 2 key above the letter keys (not the keypad) or left clicking on the second square in the Layers button panel.

Create a plane, make a central edgeloop, and add a subdivision surface modifier.

Extrude the ends a few times and pull the center line of vertices down to create a simple leaf like the one on the left.

Now add a cube (still in Edit mode, so that it’s part of the same object) and resize it to create a stem.

It will also be subdivided so you’ll need to add some edgeloops to turn it into a tapered cylinder like a stalk.

Give the stem a realistic color by adding two submaterials to the mesh, a green and a brown and apply them as needed.
Finally, make sure the origin point of the leaf is almost at the large end of the stem as this is where the particle system will attach the leaves to the tree. This is done in Edit mode by selecting All with the A key and moving the geometry. The origin point will stay in place.

At this point you may want to duplicate the leaf object in Object mode, change it, and then select both objects. Use Control_G to make a group and name the group leaves. Using a group of similar objects rather than just one makes the particle system look more natural, and it doesn’t add much to the size of the file.

**Making the armature**

We’re going to add these leaves to the tree. They’ll look odd at the start because they will be too large and too simple but we’ll change that later and every instance in the system will update to reflect those changes.

But first, if we’ve made our tree using the Skin modifier, it is currently a series of edges and has no faces that can be weight painted. The Skin modifier will need to be applied before we can weight paint the trunk and branches for leaves. Before doing this, however, let’s make an armature for animation (if the tree is going to move).

Make sure that the lowest vertex in the trunk (just before the roots come out) is defined as the Root. The root vertex will be the fixed point from which all animation data will be created, and it needs to be set at the base of the trunk.

Next, click Create Armature in the Skin modifier panel.

This will create a copy of the original vertex and edge structure, but using weight painting in a way that can let each edge control the movement of the mesh nearby.
Go into Weight Paint mode for the tree mesh and Pose mode for the armature. You should be able to right click on each bone and see the influence it has on the mesh as in the image left. If you use R to rotate you can preview the action of the bones on the tree as a whole.

Note that if you go to Vertex Groups under the Object Data tab you’ll see a vertex group for each of the bones as right. These were created when we made the armature, and they define the influence of each bone on the mesh. To paint the leaves we’ll have to make another vertex group. Left click on the top + button and name that new group **leaves**. Keep it selected (the blue highlight).

### Weight painting the trunk and branches

Now that the armature has been created we can apply the Skin and Subdivision modifiers. These subdiv should be applied at a level of 1 or 2; you may want to preview these to see which is better for your scene. You may also want to keep a copy of the tree in another layer in case you change your mind later.

When all the modifiers are applied this will create a quad mesh for the tree trunk, branches, and roots.

Go into Weight Paint mode. The tree should be entirely blue, as the new leaves vertex group has no weighting on any vertex as it has only just been made. Paint weights to the end of the branches. You may find the red weighting is only done on the sides facing the view; in that case click on the Limit Selection to View button in the foot of the 3D window as shown left so that its background is a lighter gray. The tree mesh will also appear in a ghosted mode (ie, it is shaded, but you can see through it). Paint the mesh yellower/redder (ie: hotter) where you want denser foliage, bluer/greener where you want less.
You should end up with something like the image on the left.

**Adding the particle system**

Now take the newly weight painted tree back to Object mode and go to the Particle Systems tab in the Properties window. That’s the one with four small stars, between the Texture and Physics tabs. Click on New.

A long and complex column of panels will appear. Don’t worry about it; we’ll only be using a few of them.

In the top panel click on Emitter and change it to Hair. The tree will be covered in long hairs, growing out normal to all the faces, as in the image below right.

In the Emission panel, next down, reduce the Hair Length to whatever looks good for the size of your tree. This won’t make any difference to the foliage but makes the preview less confusing.

Now go all the way down to the panel called Vertex Groups. Click on the triangle to expand it and left click on the Density selection box. Choose the leaves vertex group. You will probably have to scroll down past all the bones to find it. Now the hairs should only be growing from the parts of the mesh that you weight painted in that vertex group.

In the Render panel of the Particle Settings tab, choose Group and select your leaf group from the pop-up Dupli Group list.
Now you should have something like the image on the left. Not very like a tree - yet.

Increase the Size value to something you like and take the Random Size value to 1.000.

Next, go up to the top of the Particle Systems panel and enable the Advanced feature as below.

A new panel called Rotation will appear. Enable it and open it. Change the Initial Orientation to Normal, and the Random values to whatever looks good. Same with the Phase value (which changes all the leaves’ rotation at the same time).

Now you should have something like the image on the next page.
We’re almost there

Go back to one of the leaf objects on layer 2 and duplicate it, arrange it, and extend the original stalk, so that it is more complex. Don’t forget to change the origin point so that it emerges from the tree mesh at the foot of the main stem. Do the same for the other(s).

When you go back to Layer 1, the tree particle system immediately updates, and looks more realistic. Keep refining the leaves and the particle system settings until you achieve the effect you need.

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