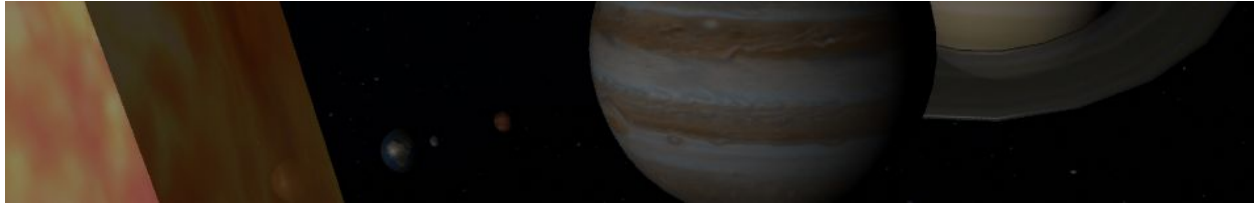


The Solar System (part three)



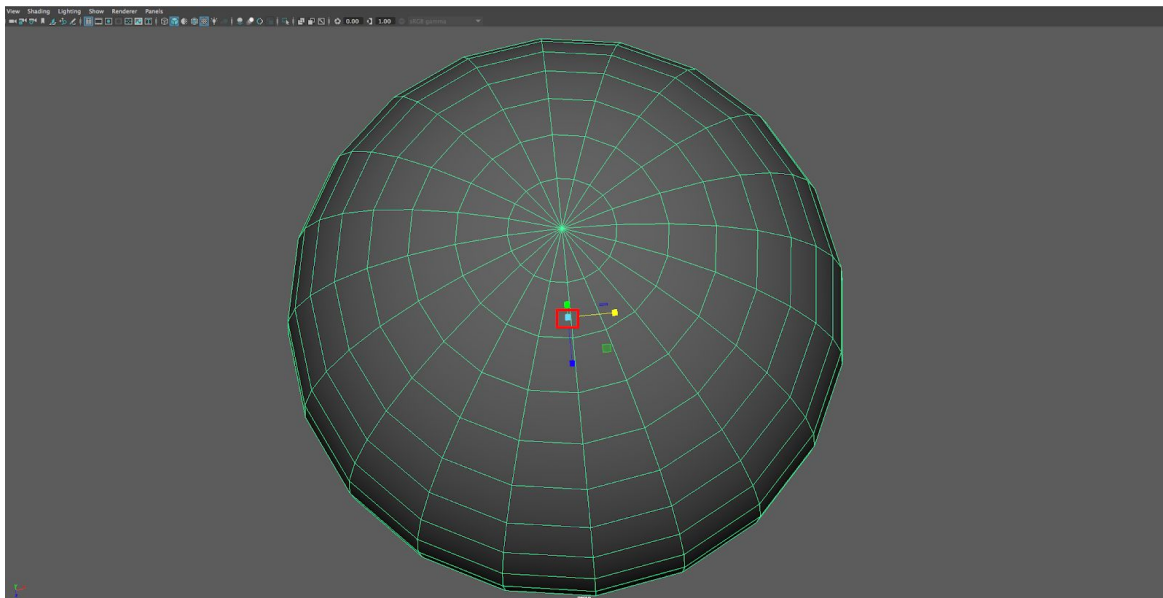
Here are the things we will cover in this PDF:

- Making the stars
- Setting up the animation
 - Making the planets rotate on their own axis
 - Making the planets revolve around the Sun
 - Making the moons revolve around the planets

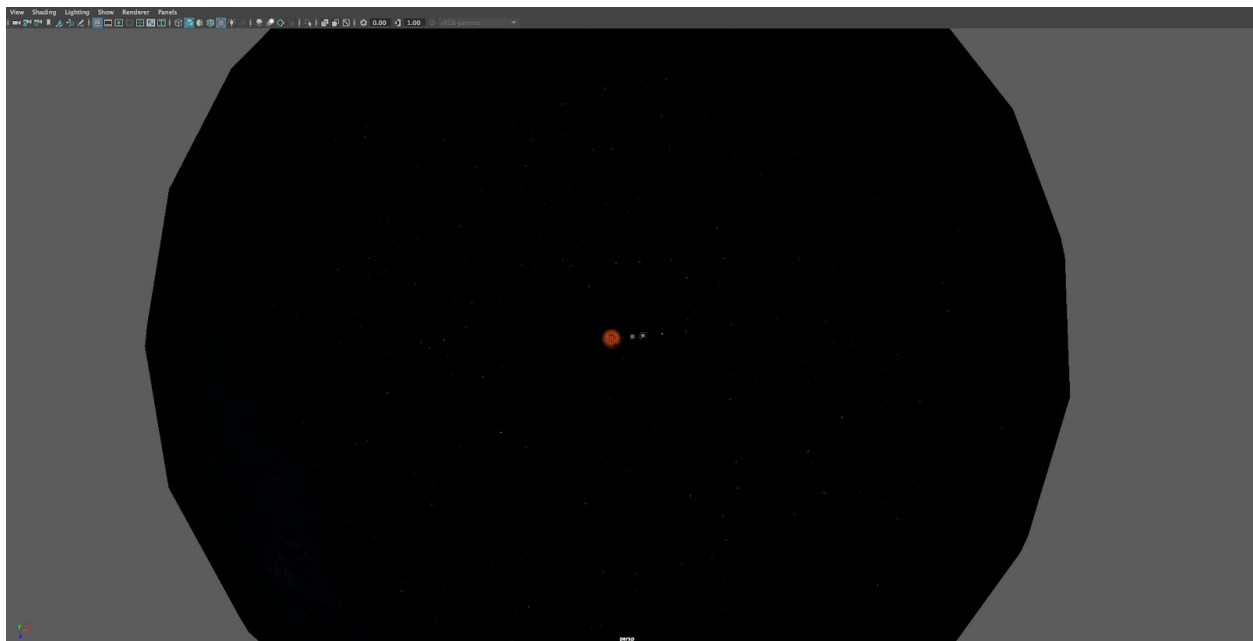
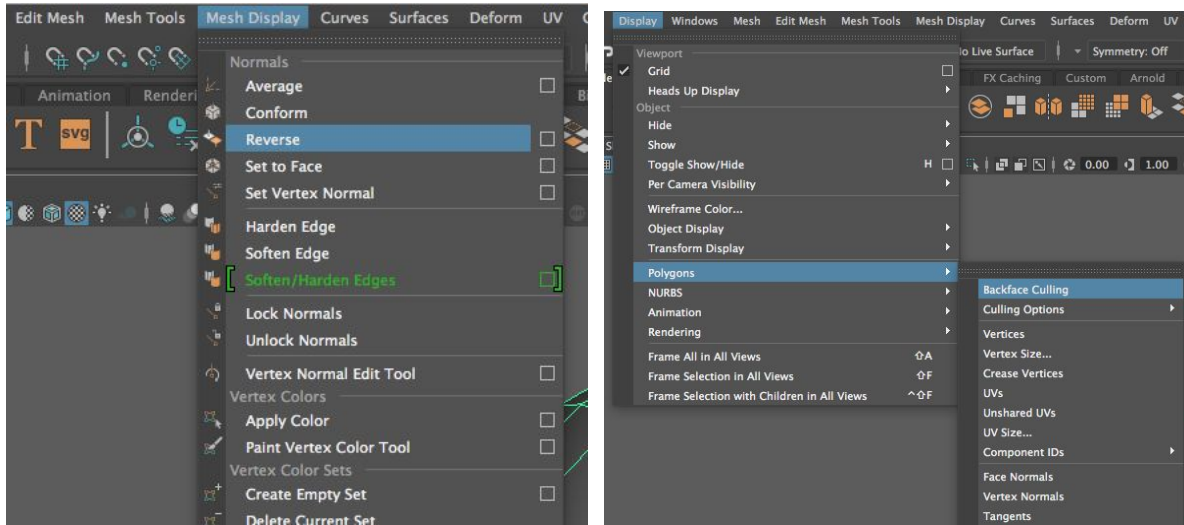
All of the planets will need to rotate on their own axis, rotate around the sun, and have the moons rotate independently around their respective planets.

Making the Stars

Creating the star map is fairly straightforward based on what we've done thus far, with a couple added steps. So, first get a star map texture. Please nothing over 4k. Once you have your texture, create a material in hypershade with it (pt 2). Next, make a sphere and scale it way up. Ensure that it encompasses all of your planets then some. Scale it with "R" as you don't need to put in a specific number for this one. Make sure to use the light blue block in the center when scaling to keep it's proportions. Once you select the block, it will turn yellow to let you know that it is the active one.



Once you have it scaled, go ahead and apply the material to it. If you notice, this will put the material on the outside of the sphere, because that's the way the normals are facing (Don't worry we will cover this in more detail later). This isn't helpful as we need to see the stars inside the sphere. To change the direction the normals are facing, simply select the sphere and go to Mesh Display>Reverse. Next we need to be able to see through the reverse faces because we may end up outside of the sphere while scrolling because of the size of this project. To solve this problem, we will turn on backface culling. Select the object then go to Display>Polygons>Backface Culling.



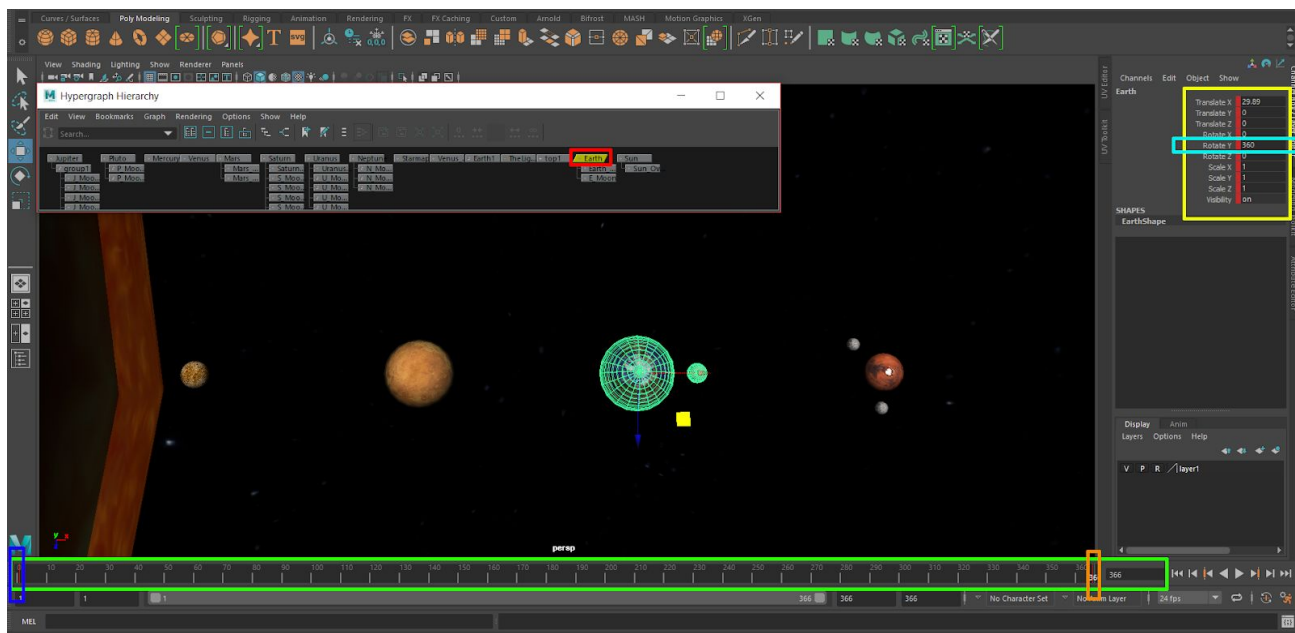
Setting up the Animation

Our end goal is to ensure that the animation for our solar system is fairly accurate. I realize the issues with distance did arise, and hopefully we don't run into any others. So as long as you set it up close to the image provided in part 1 of this, it should work out just fine.

Making the planets rotate on their own axis.

Getting the planets to spin is a pretty simple process, so we will start there. It will help you get into the habit of doing it. All things considered, it is a rinse and repeat process with a small difference for the moons.

The first thing we need to do is select the planet we want to rotate. We will start with Earth, because you should be familiar with it. Now, you will need to set the keyframe. Make sure your rotate Y value in the channel box is set to 0. There are loads of ways you can do this, obviously. First, you can just press “s” this will add a red line (Blue) to the timeline (Green) on the bottom left hand corner and add red dashes to your channel box next to all of your attributes (Yellow). This will also turn the rectangle for said object into a rhomboid (Red) in the hypergraph window That is a word I just learned meaning slanted rectangle.



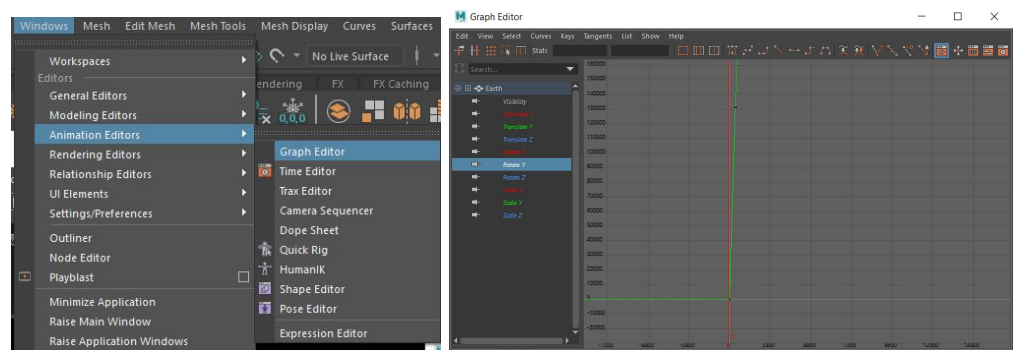
Next, You will need to change the time slider. You can change the time slider after you rotate the planet, but once you click on the slider again, it will reset back to 0 because you set your first frame there. This can be avoided if you middle mouse click on the time slider instead of left clicking. Now, time to rotate the planet. This can easily be done by changing the rotate Y value in the channel box (Light Blue). You will do this for every planet. If you want to make it accurate, just remember that every

1 frame is equal to 1 earth day. So for earth, you would set your first keyframe on 1 and your second on 2 changing the rotate Y value to 360.

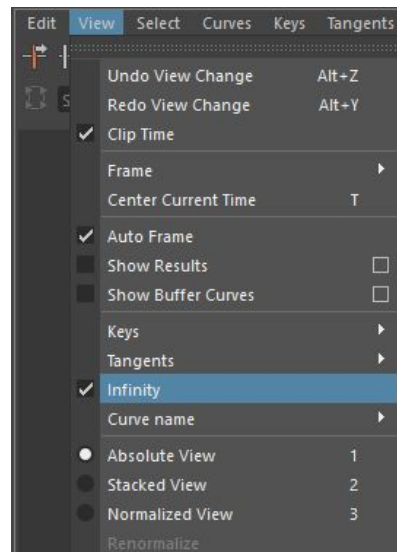
NOTE: Sorry for putting so much on one screenshot, but I wanted to make sure everything was visible so you could find it. A lot of this project is just selecting a planet or group, setting a keyframe at 1 on the time slider and 0 on the rotate Y value, moving to a new number on the time slider, changing the value of rotate Y and setting it again. I'll show you more in detail later on in this PDF.

You won't be able to see the earth rotate because of how quickly it is doing so. If you are unsure if it's working watch the value as you scrub (drag across) the timeline. As long as your value changes from 0 to 360, it is working. If you want to see it working, you'll have to up the fps in lower right hand corner. This isn't necessary, but you can do it.

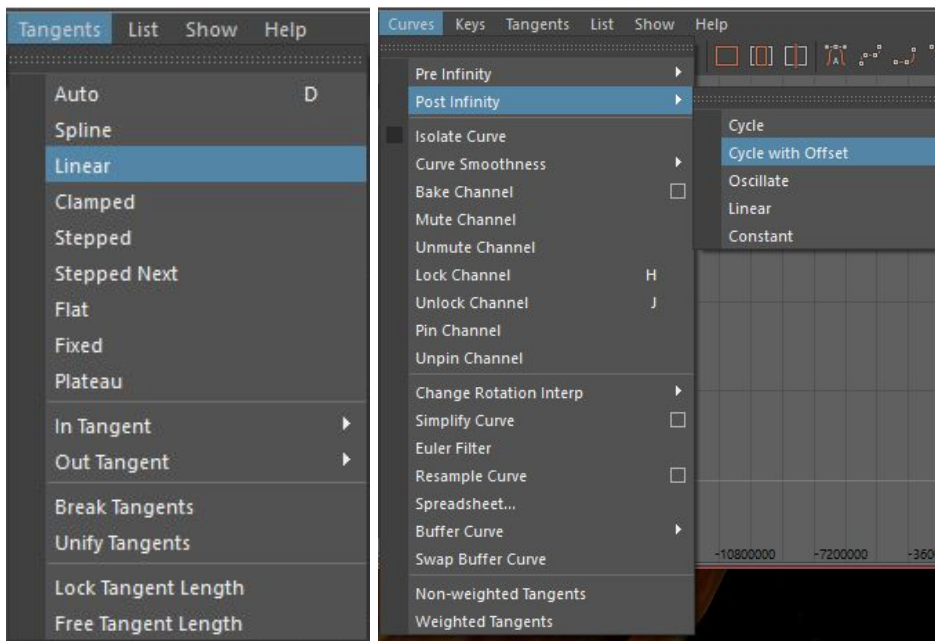
Now we want to make it go on for.. Well... forever. To do this, we will need the graph editor. You can find this under Windows>Animation Editors>Graph Editor.



As long as you have the planet selected, earth in this case, you can select the Rotate Y on the left side of the graph editor and it should look similar to above. The first thing you need to do, and shouldn't have to do again, is to set it so you can see to infinity. To do this, simply click View>Infinity (make sure the box is checked).

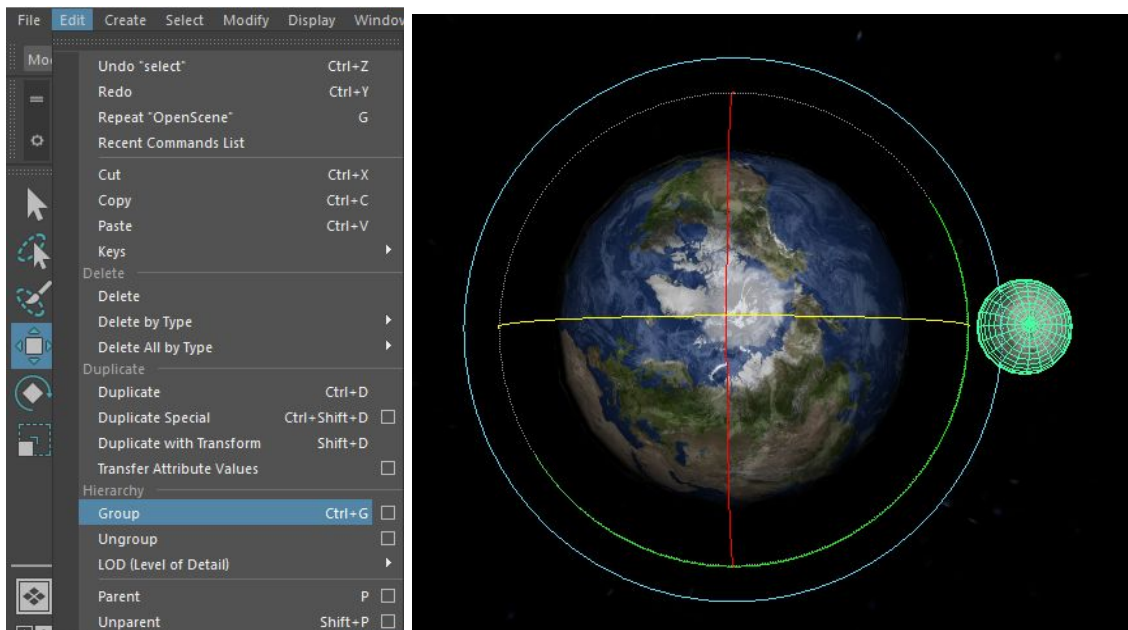


You only need to do two other things in this window. Of course, you'll have to do these two things for everything that moves in the scene. These will allow us to keep the movement going at a steady pace. The first, with the planet or group selected, is to go to Tangents>Linear. This will keep it moving at a constant pace. Second, go to Curves>Post Infinity>Cycle with offset. This will keep it going on forever.



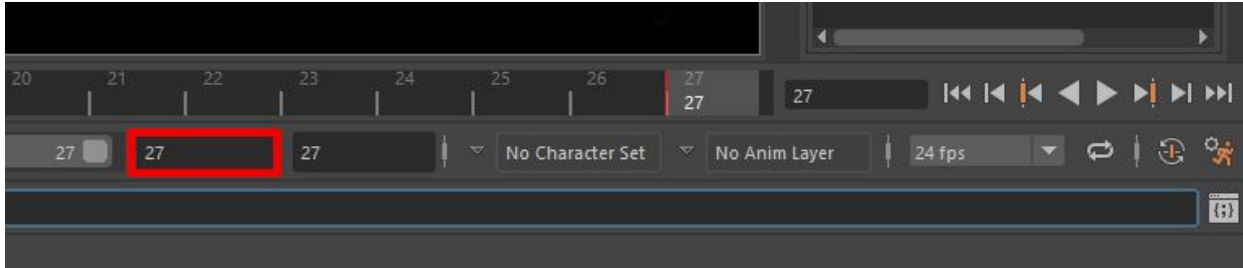
Making the moons revolve around the planets

This will work the same way as getting the earth to spin on its own axis, you just need to apply that same technique to the group the moon is in. So next, we need to make a group for the moon. To do this, just select the moon (which should already be parented to Earth), then press CTRL+G (Command+G on Mac). It is also under Edit>Group.



This creates a new pivot point for the moon in the center of the planet it is parented to. In this case, Earth. So, all that is left is to get it to rotate around the planet. If you want to be accurate with this (understand that being accurate with all of the moons of all of the planets that have them will become incredibly difficult), you just need to know that the moon cycle for earth is 27 days (1 day = 1 frame).

We can change the frames to make this easier by changing the number here to 27.



You still need to select the frame at the end of the time slider (area highlighted in grey).

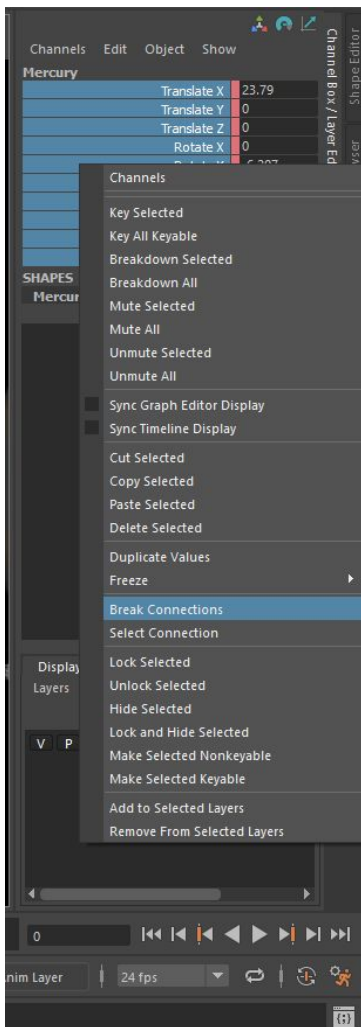
Making the planets revolve around the sun

Once we have the planets rotating on their own axis and the moons revolving around them, we need to get the planets orbiting around the sun, like they do. For the most part this is the same as making the moons revolve. We will select the planet itself and create a group. The difference, with the moons, is because they were parented to their planet, the center point moved to the center of said planet. Because the planets are not parented to anything, the group's pivot will move to 0,0,0. That is convenient because guess where the sun is?

If we set this up as one day equaling one frame, then you can look up how many days it takes for each planet to move around the sun. You can change the number of frames in the same place you did for the moons. It's all about rinse and repeat with this. Just remember that you need to change the info in the graph editor for each one.

Quick Recap:

1. Select the planet or group
2. Make sure the time slider is at 0
3. Set the keyframe (S)
4. Change the number of frames based on 1 day equals 1 frame. It will get crazy, it's suppose to.
5. Move the time slider to the end
6. Change the Rotate Y value in the Channel Box (if you find out how long it is based on 360 degrees, it will be easier on you. Basically google how long a day and a year are for each planet)
7. Set the key
8. Go to the graph editor (Windows>Animation Editors>Graph Editor)
9. Change it to Linear
10. Change the post infinity to Cycle with Offset



NOTE: If you need to remove a key frame, just right click on it in the time slider, and delete it. If it is incredibly hard to click on, you can break it's connections. To do this, go up to the channel box and select all of the attributes that have the red dash next to them. Then, right click and select break connections.