Animating The Donut

Camera Settings

We will need to adjust the camera settings and the rotation of the donut, to get things set up the way we want.

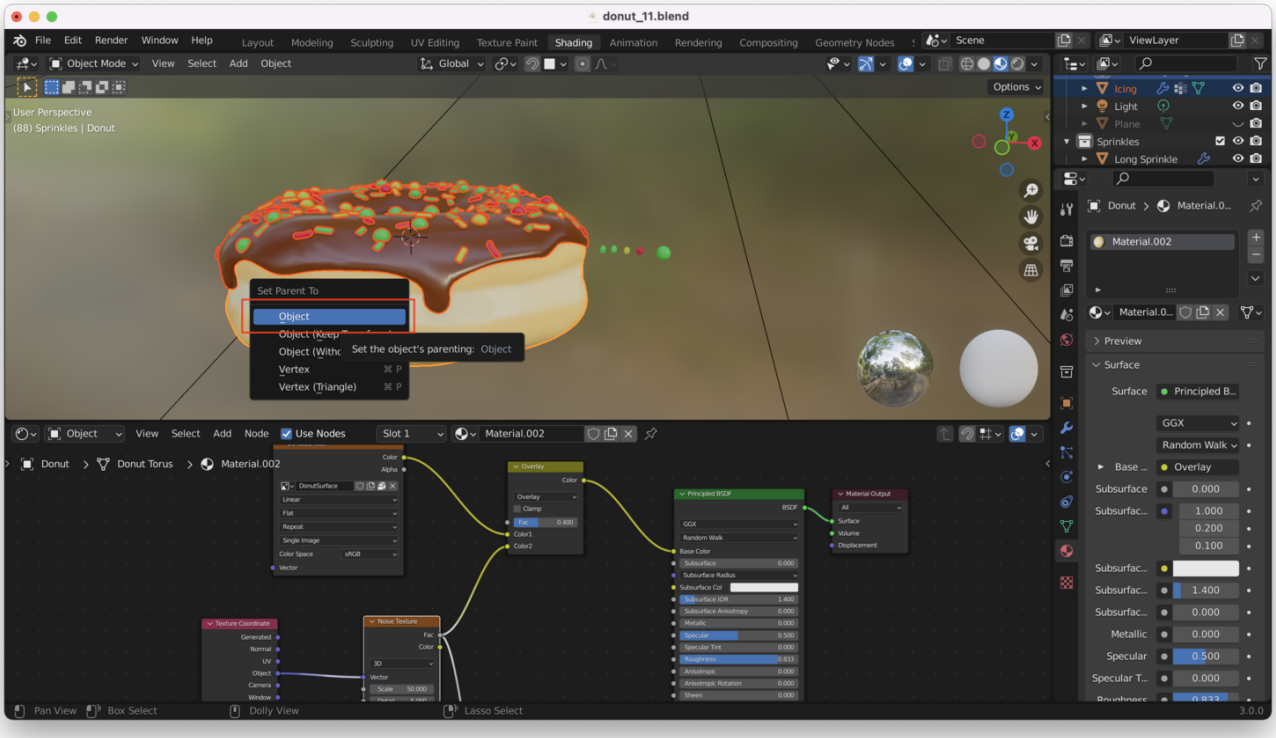
> **Tip**: You can set the camera to your current viewing angle by clicking "View → Align View → Align Camera To View" (from the "View" menu)

To make it easier to rotate the donut around, we want to "parent" the icing to the donut, meaning that objects will track (follow) each other when rotated or moved.

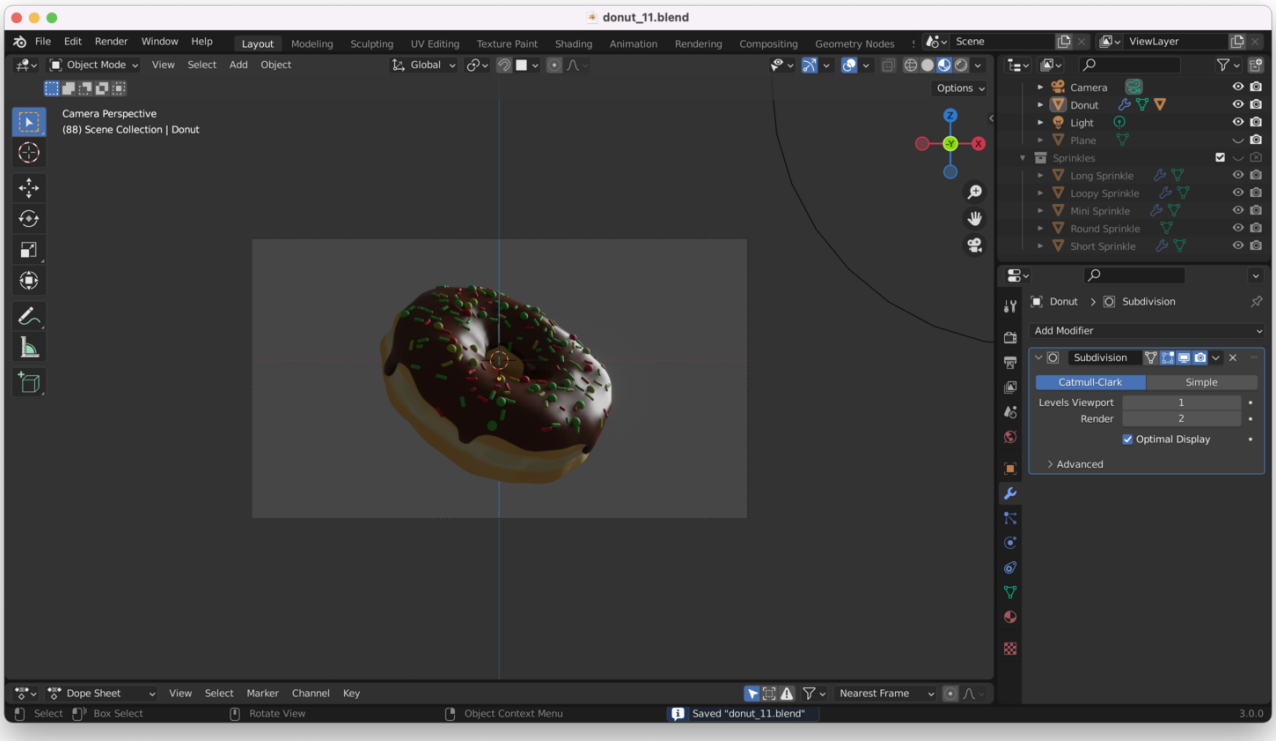
Setting the icing's "parent" to be the body of the donut means that the icing will rotate and move with the donut, whenever the donut is rotated or moved.

We "parent" one object to another like this:

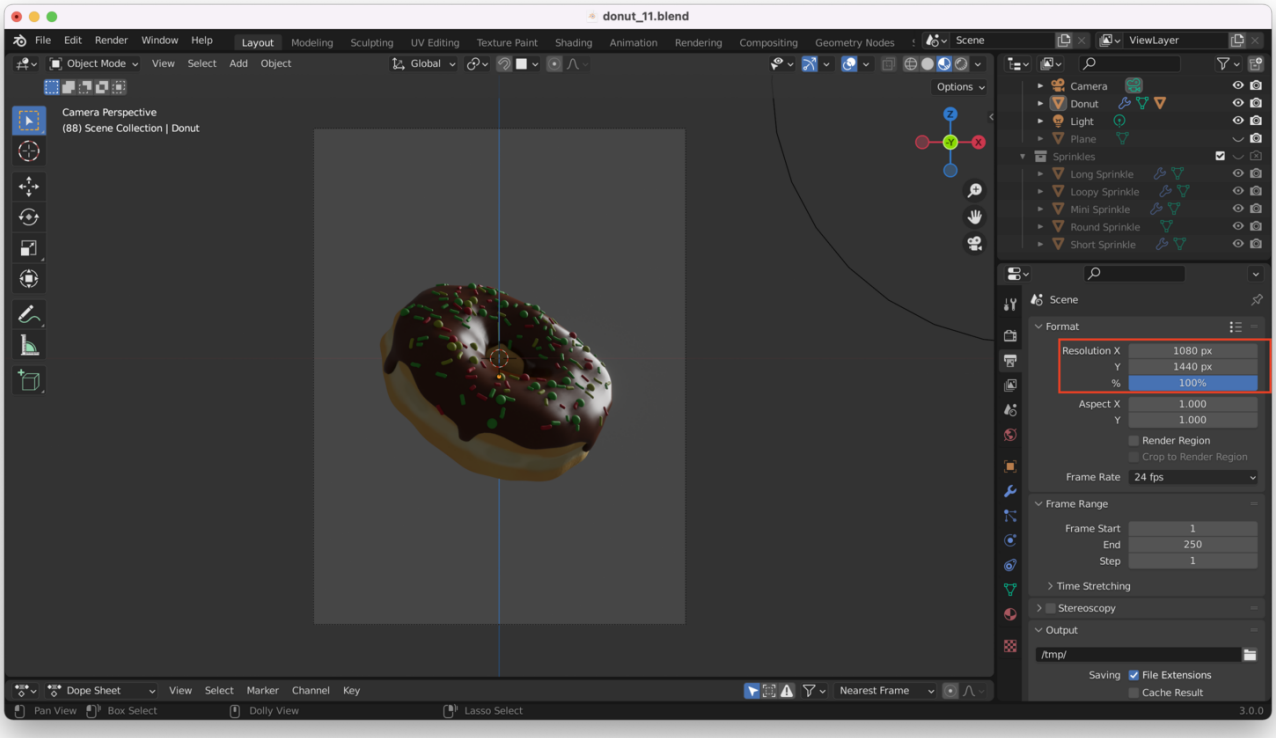
1. Click on the "child" object, by left-clicking on it in the viewport
2. "Shift + Left Click" on the object we want to set as the "parent"
3. Hit "Control + P" to confirm the relationship
4. Choose "Object" from the menu that comes up (see below)



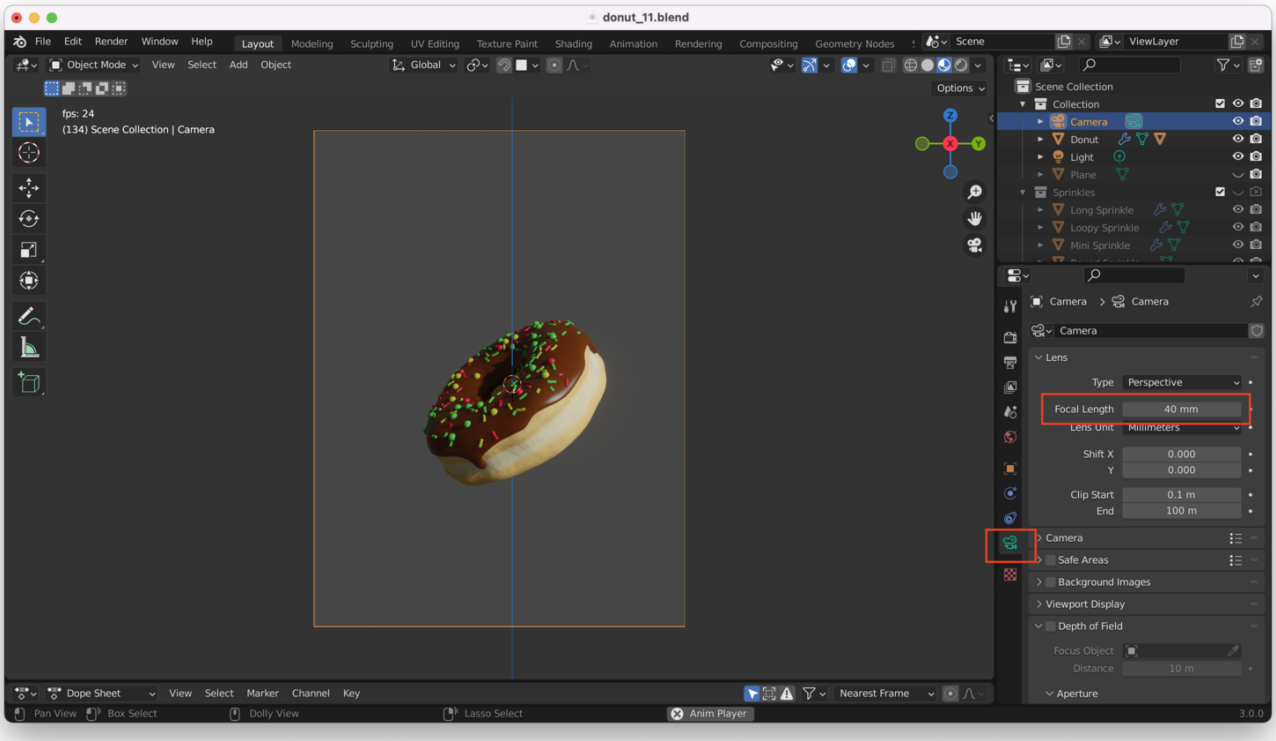
Orient the donut at an angle to the camera, like so:



Next, we adjust the camera settings to change the aspect ratio and resolution. Let's try 1080 by 1440:



We will also adjust the focal length of the camera to 40mm to give the donut an enhanced sense of "depth" as it rotates:



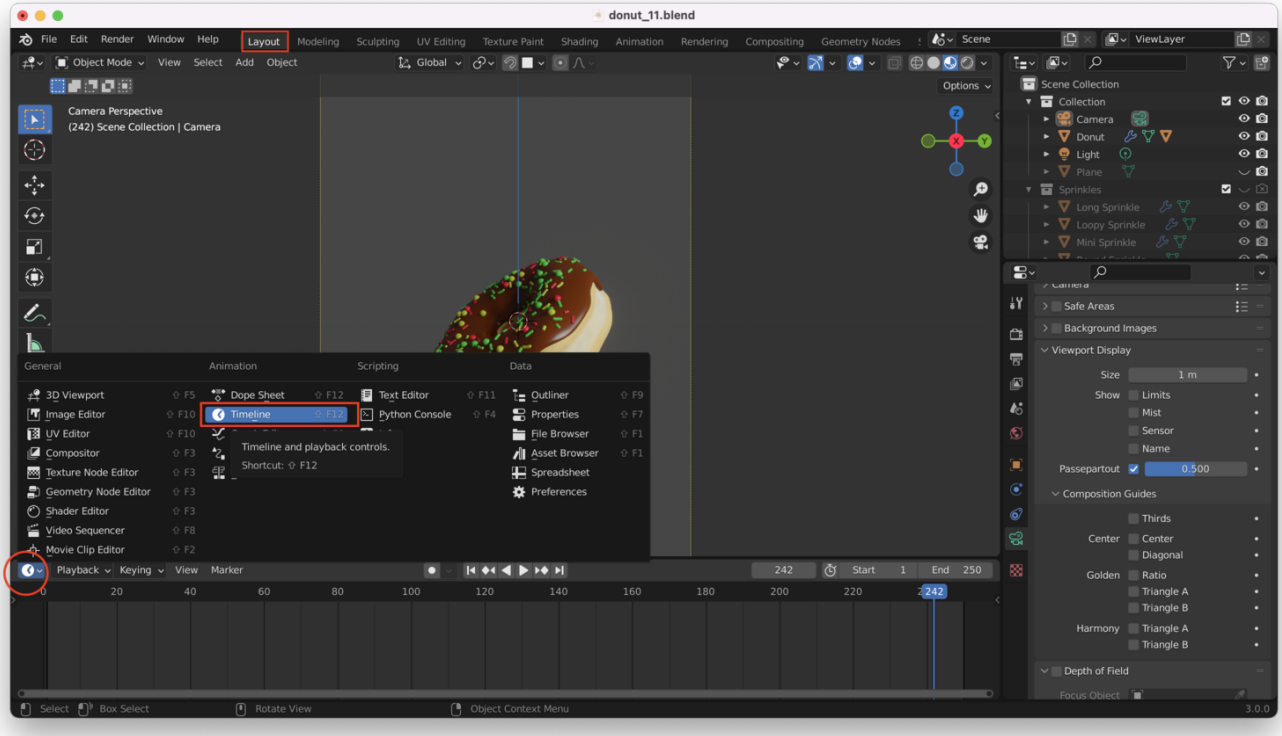
In general "high" focal length "flattens" things by compressing the depth of the scene, while you can get a more exaggerated "fisheye" look (emphasize the depth) by setting a

"low" focal length.

Using The Timeline (Playback) Editor

When animating, we will need the ability to see and manipulate the timeline for the animation.

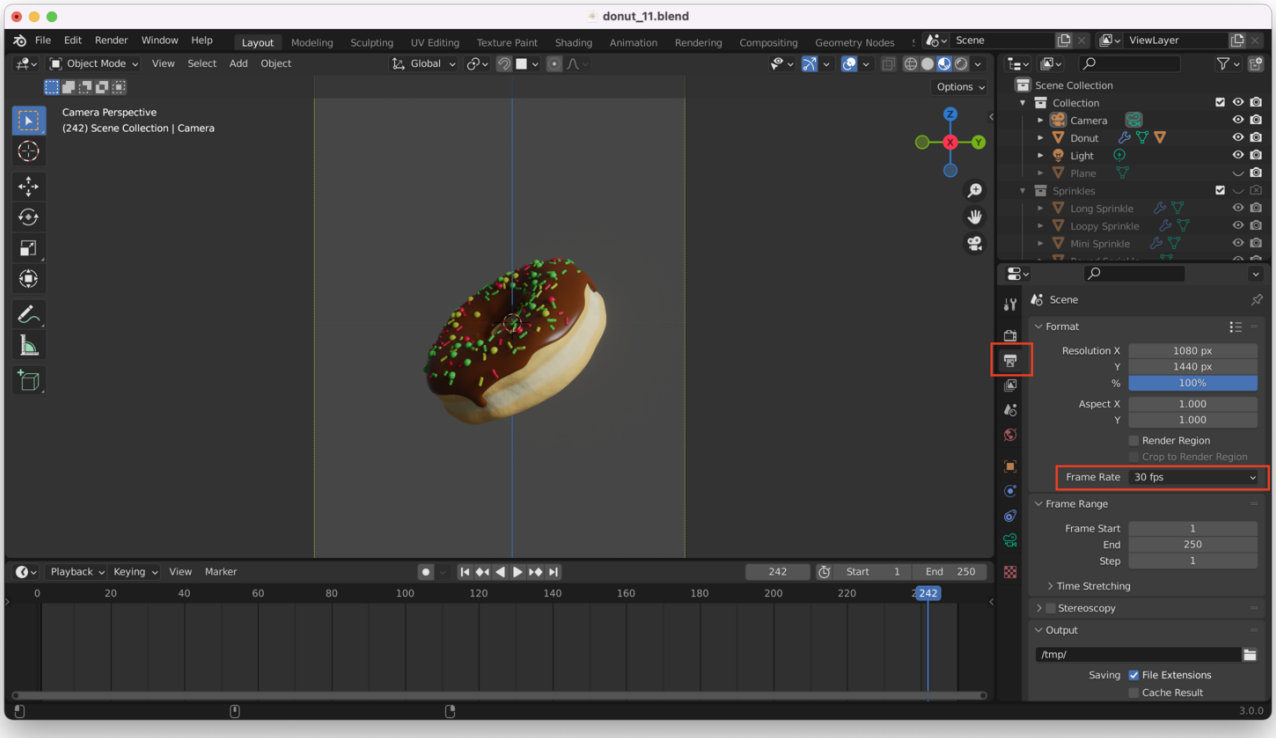
To show the playback view, I switched to "Layout" from Blender's top menu bar, dragged the bottom window up to enlarge it, and chose "Timeline" as shown here:



Before we start editing, we should choose a framerate (measured in FPS - frames per second) as well.

- 24 FPS is standard for big-budget movies
- 29.97 or 30 FPS for television and films (and a lot of phones and cameras)
- 60 FPS for some new equipment

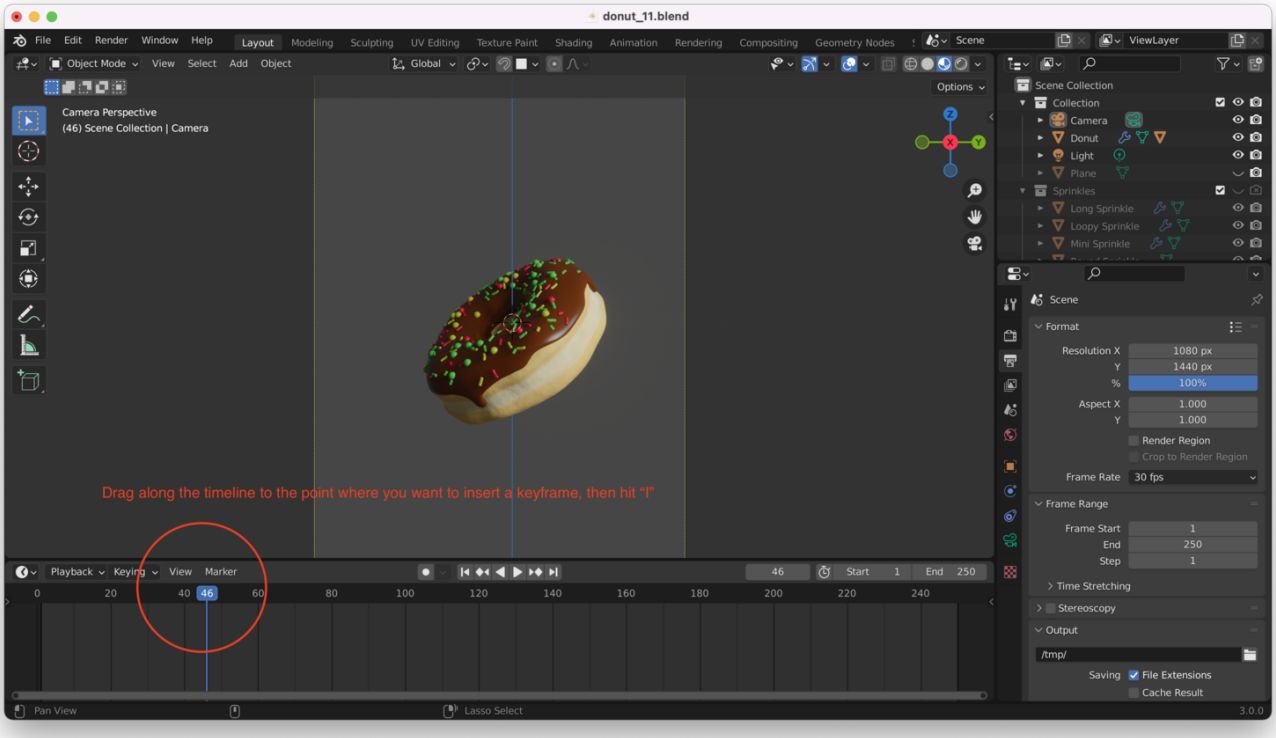
Blender Guru used 60 FPS for his animation because he likes the "hyper-real" feel of it, but it's very taxing to render 60 FPS, so he recommends 30 FPS, as a reasonable alternative:

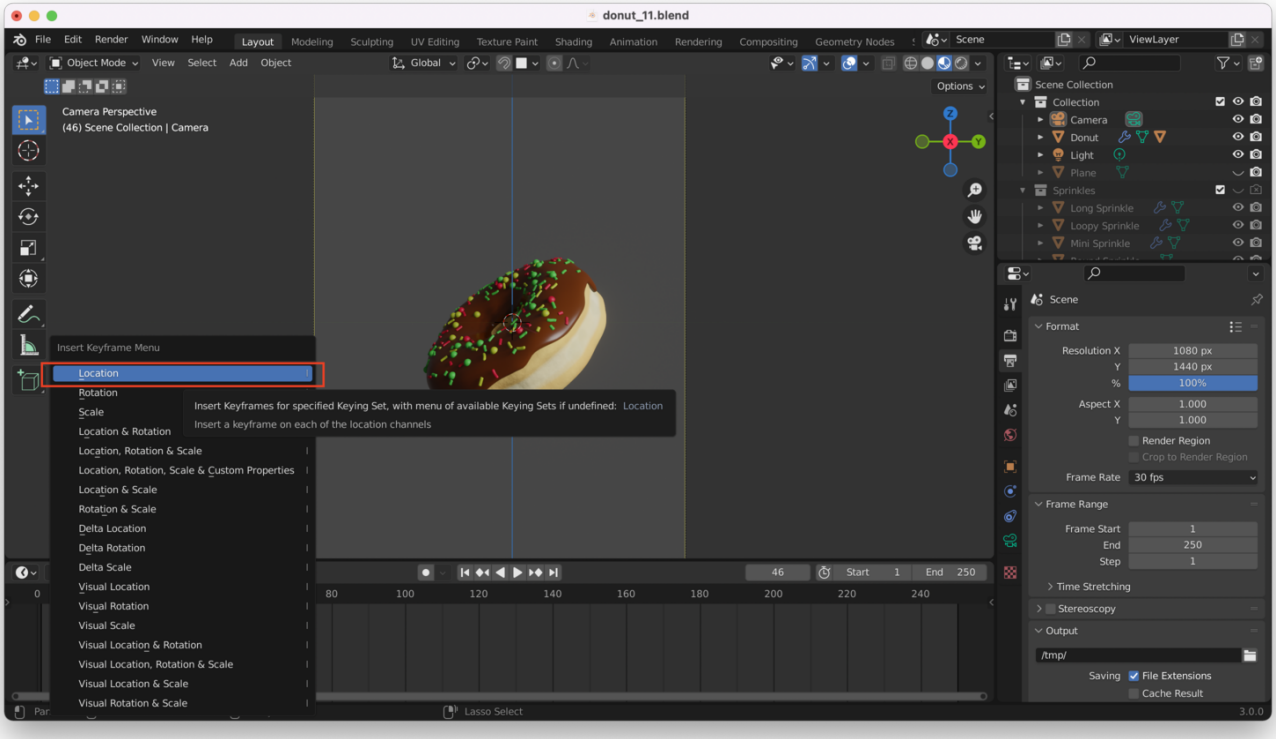


Inserting "Keyframes"

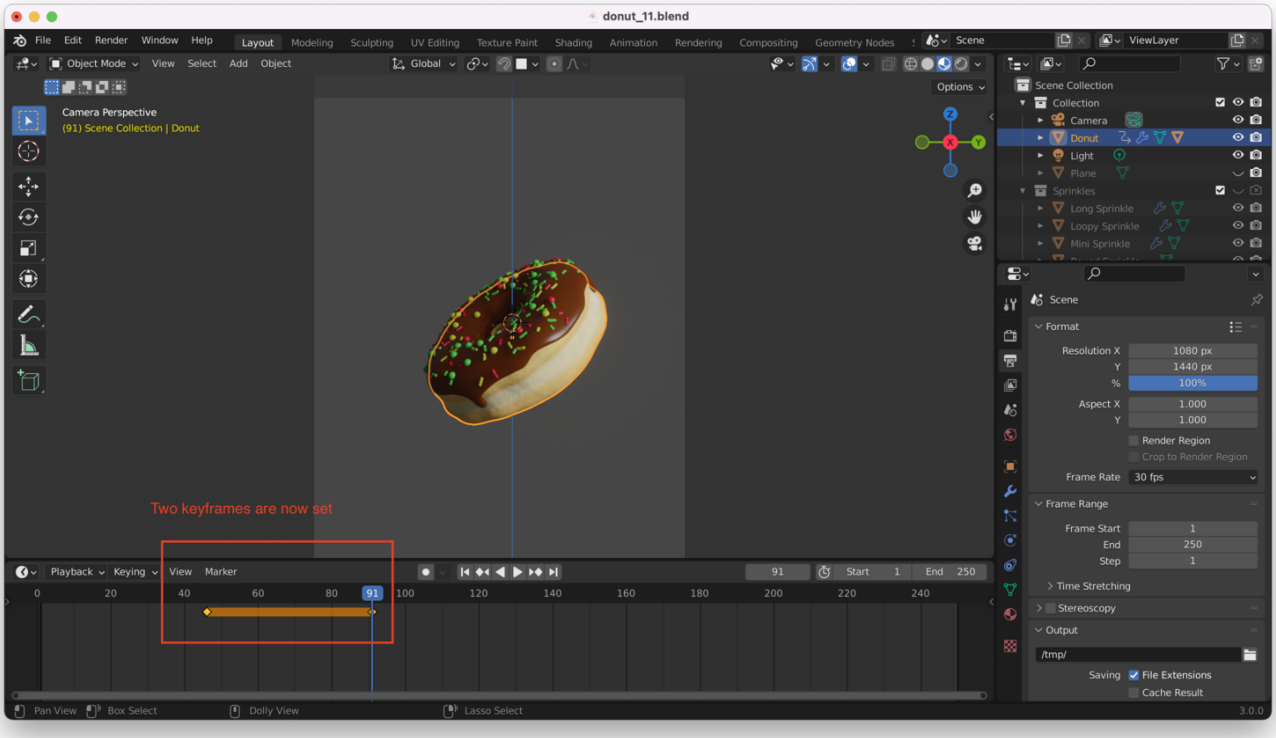
The start and end frames on the timeline window at the bottom show the **total** number of frames in the animation (you can adjust this as needed). By default, there are 250 frames. At 30 FPS, this will result in an 8.3-second animation.

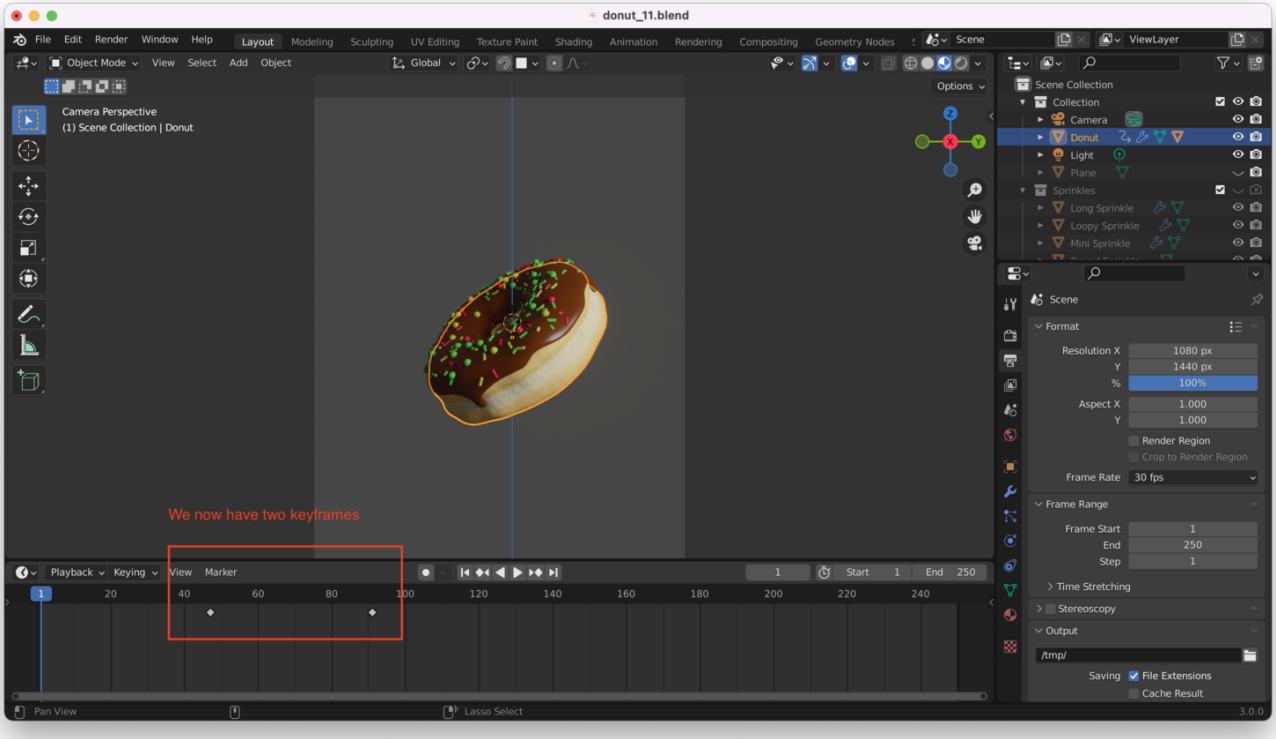
Along the timeline, we can insert "Keyframes", which - among other things - mark the location an object should be at when a given frame is reached:





You should move the donut and then set another keyframe (again by hitting "I"), perhaps 30 or 40 frames after your initial keyframe:

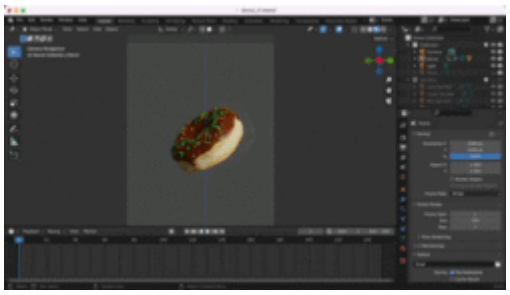




> **Tip**: You can return to the start of the playback timeline with "Shift + Left Arrow", then hit "Spacebar" to start the animation

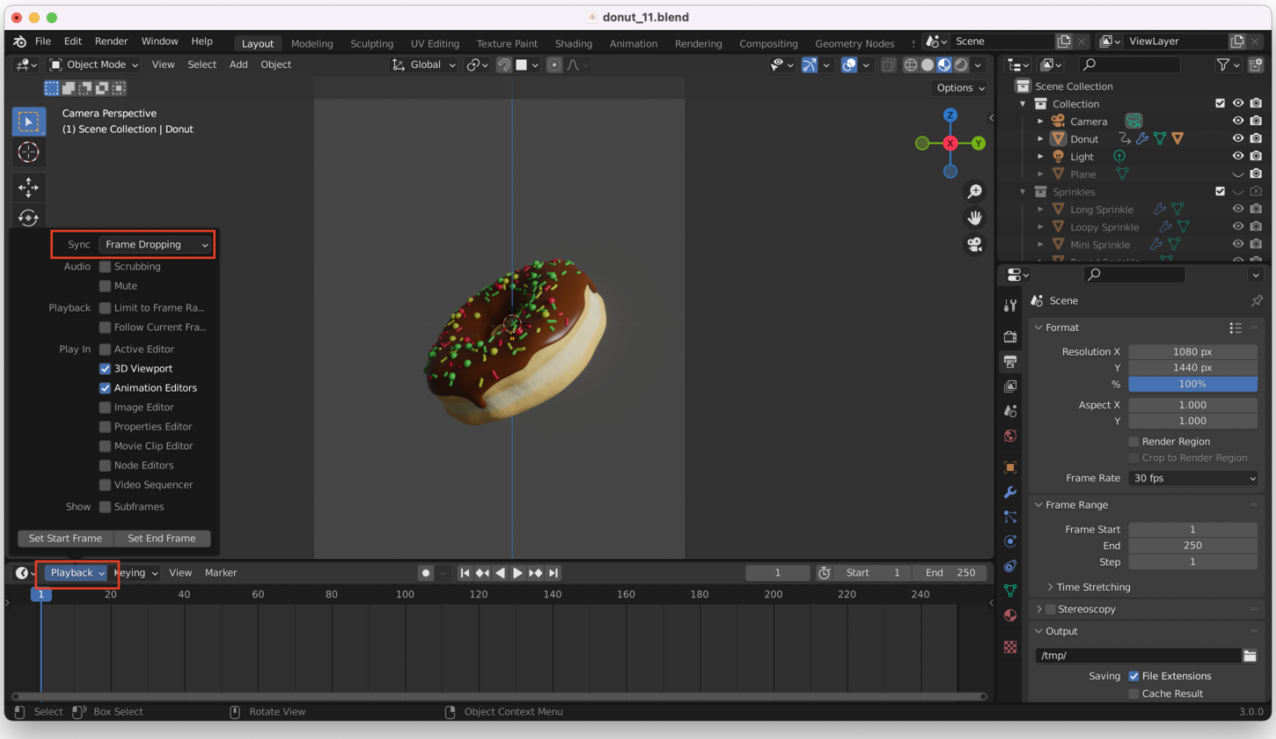
Playing the animation back should now show something like this (if you are reading this in PDF format, the below image is a .GIF. You can find the original post on

https://jeremypedersen.com/categories/blender-donut/ along with others in this series):



If you paid **very** close attention, you might notice that the donut moves more slowly than we would expect for 30 FPS (in my case, the whole movement should be completed in under 2 seconds, but appears to take longer when previewing in Blender).

Going to "Playback" and changing "Sync" from "Play Every Frame" to "Frame Dropping" will play the animation back at full speed, dropping frames that cannot be rendered in time:



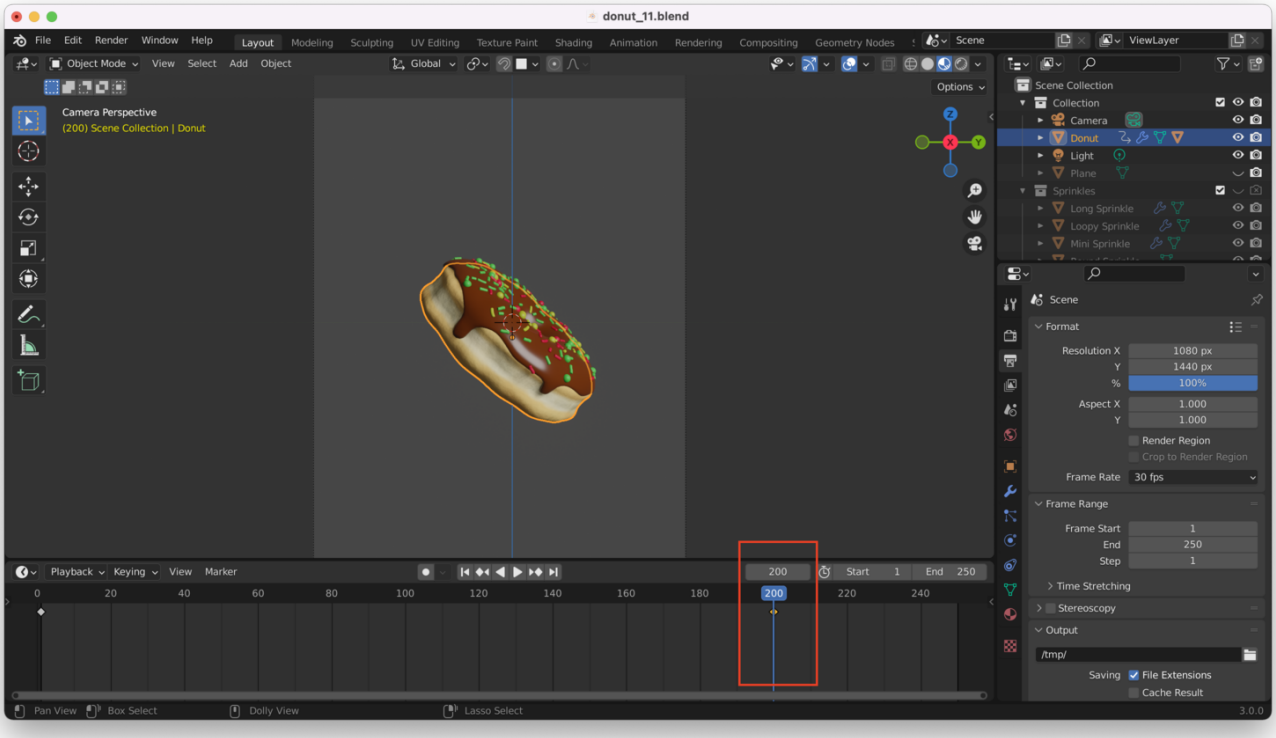
Blender may struggle to do rendering in real-time, so the on-screen movement may be slower than the expected 30 FPS unless we turn on frame-dropping.

> **Tip**: With the timeline at the bottom of the window selected, you can hit "Control + T" to switch from Frames to Seconds (and back).

Setting Up The Animation

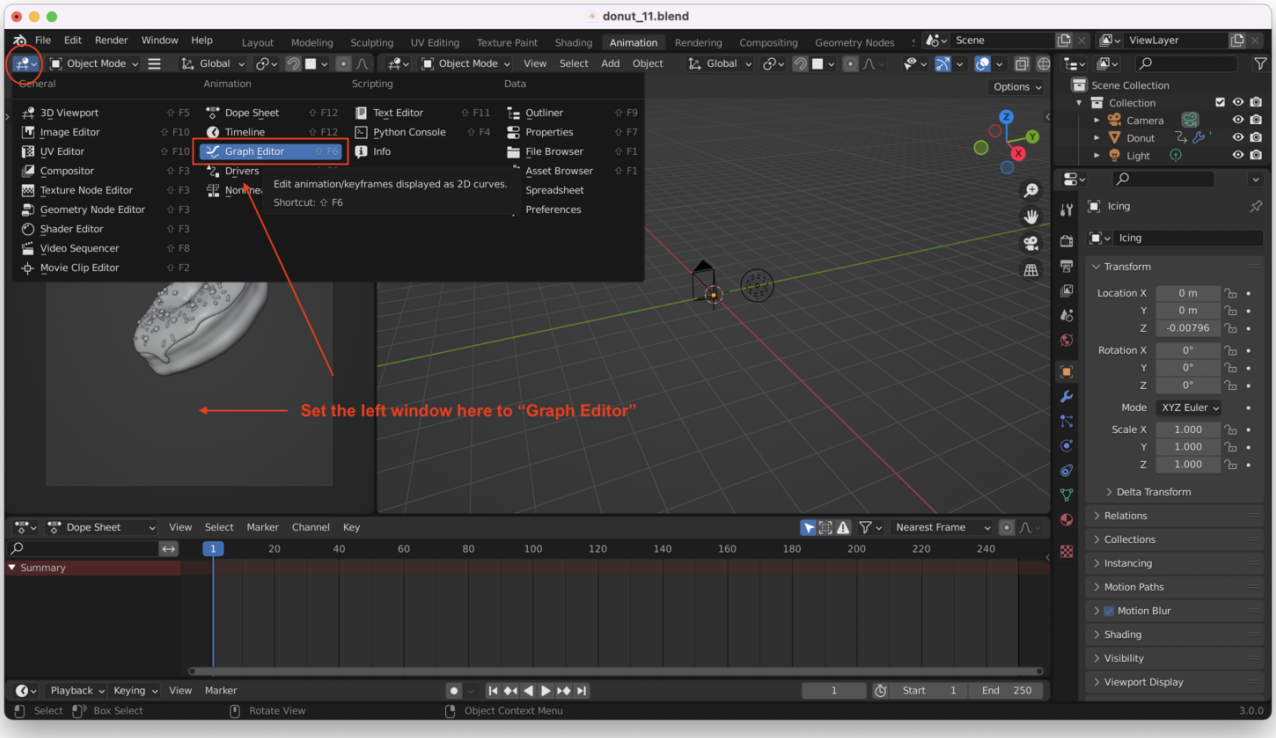
I hit "Shift + Left Arrow" to return to the first frame, rotate my donut to a nice-looking angle along the Z-axis (10 degrees in my case), and hit "I" to add a keyframe at frame 1. This time I choose **Rotation** *not* Location:

I then rotate my donut to just the point where the back of the donut would start to come into focus, and set another keyframe near the end of the timeline (around frame 200), like this:

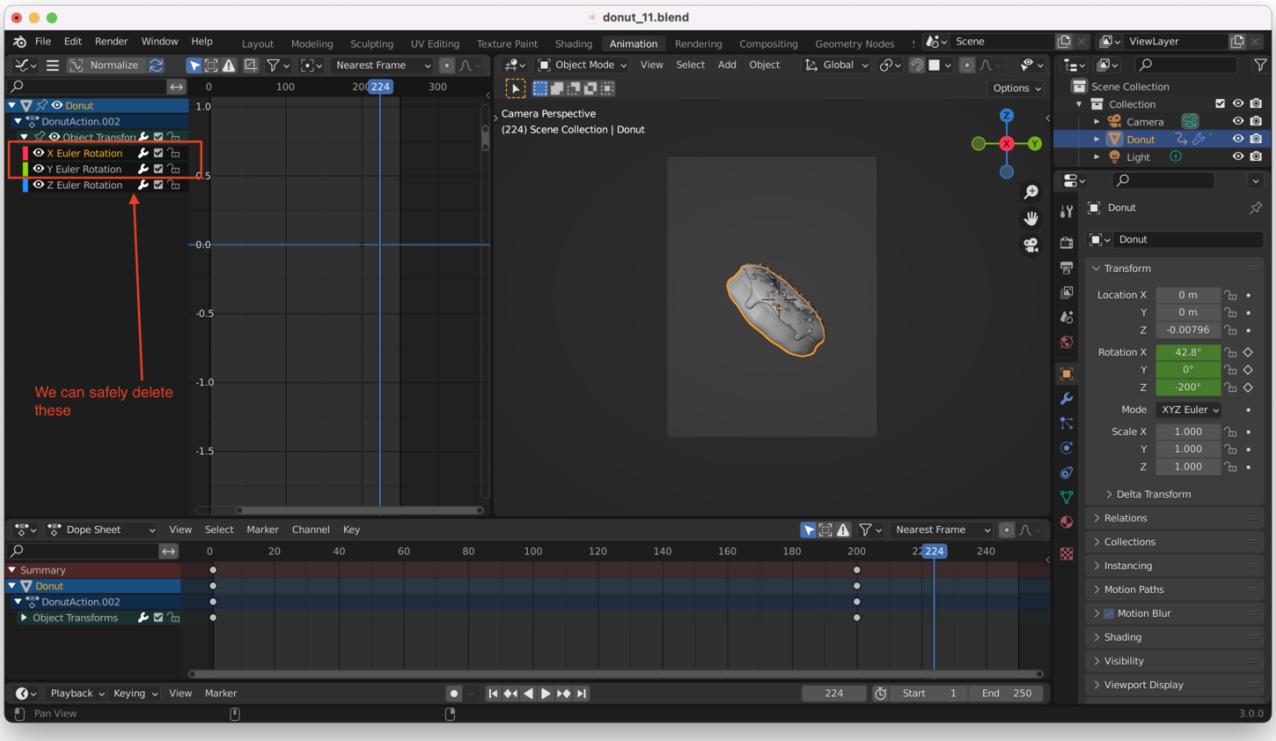


You might notice that the donut appears to "speed up" and "slow down" as it moves between the two keyframes. This is because the keyframes are "bezier" keyframes, and Blender is trying to blend smoothly from one frame into the next.

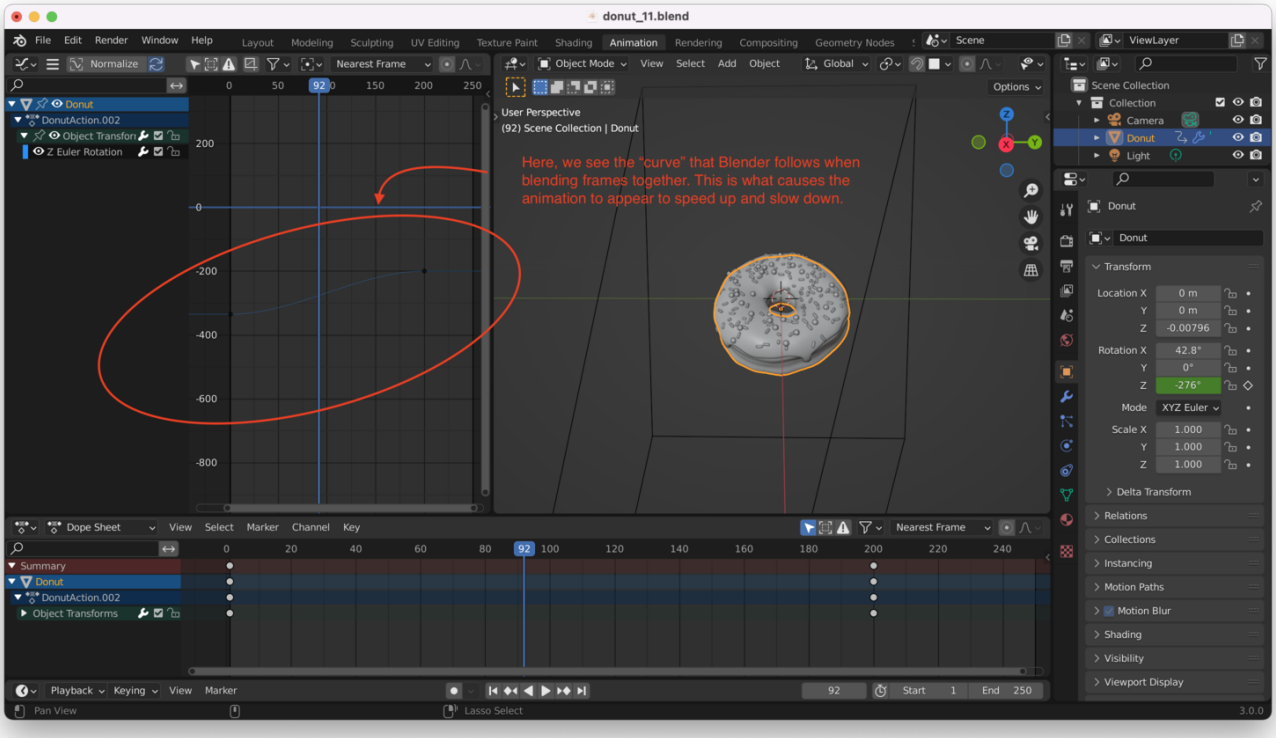
This will be easier to see from the "Animation" view, so let's switch to that. We will also set the lefthand window to "Graph Editor":

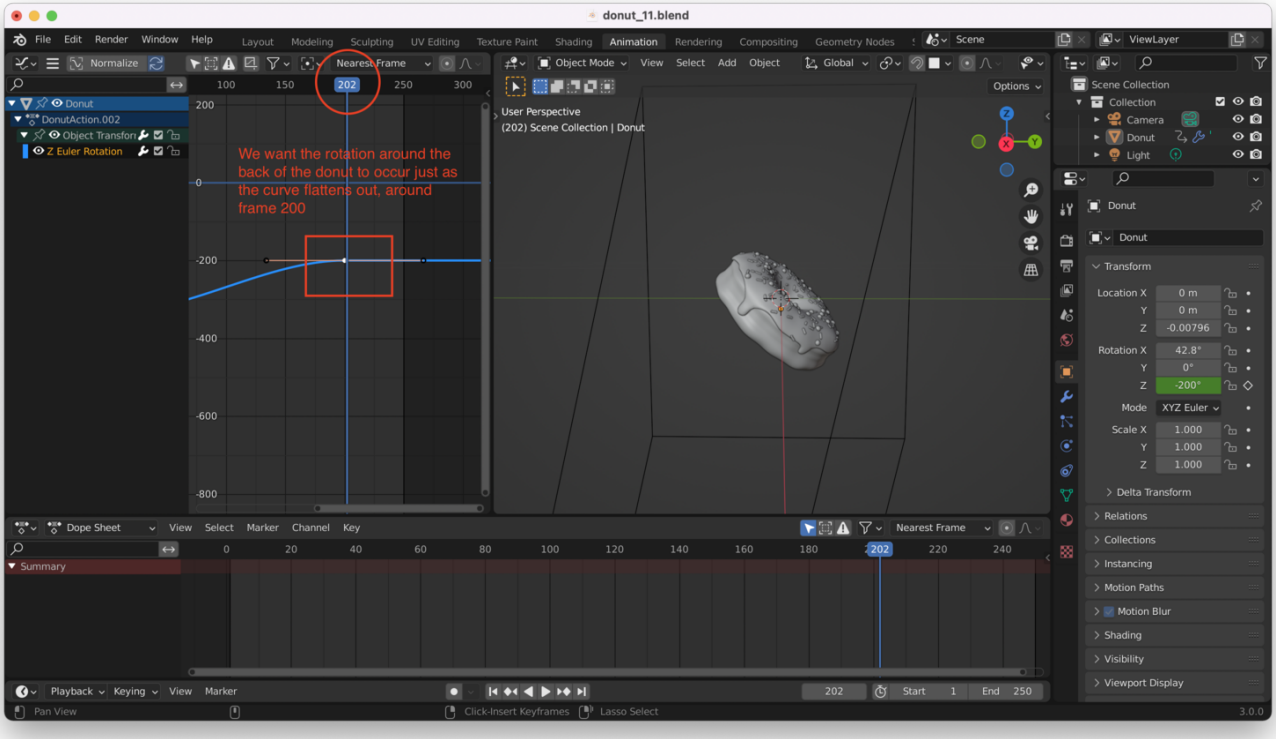


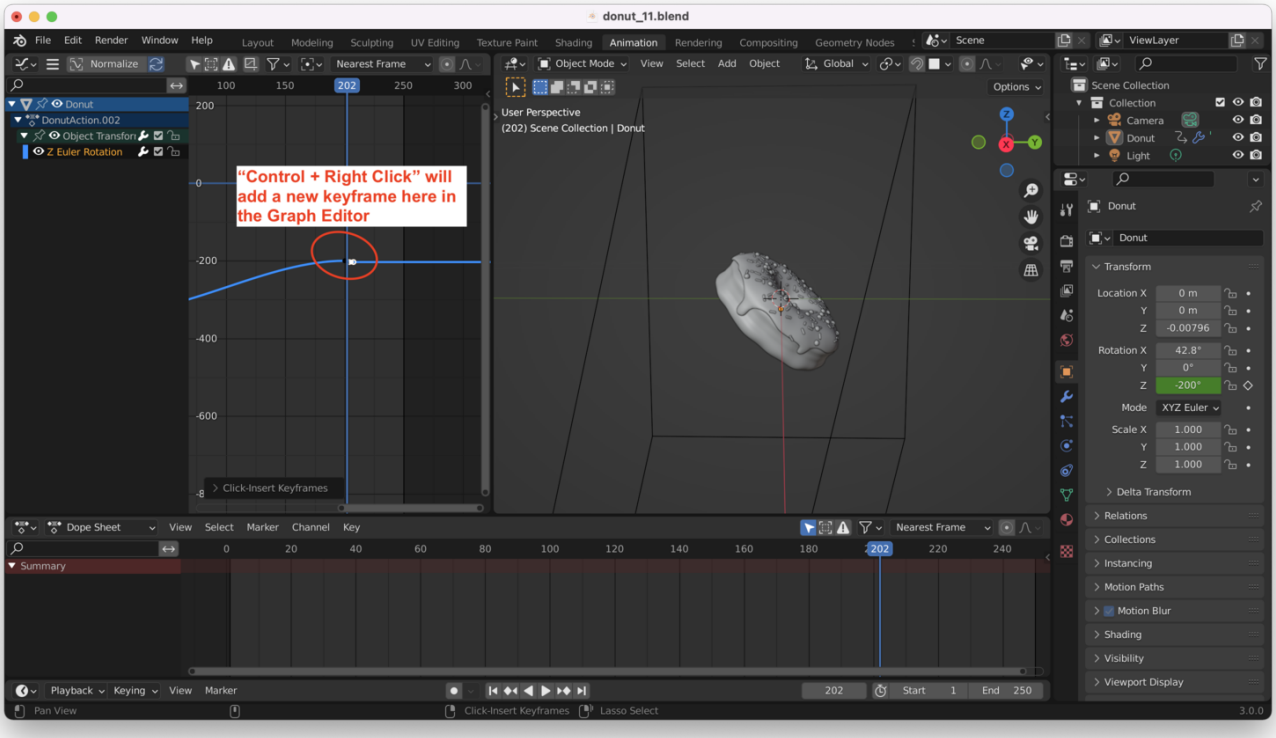
Note that we can delete the "object transformations" along the X and Y axis, as all of our motion is a rotational motion about the Z-axis:



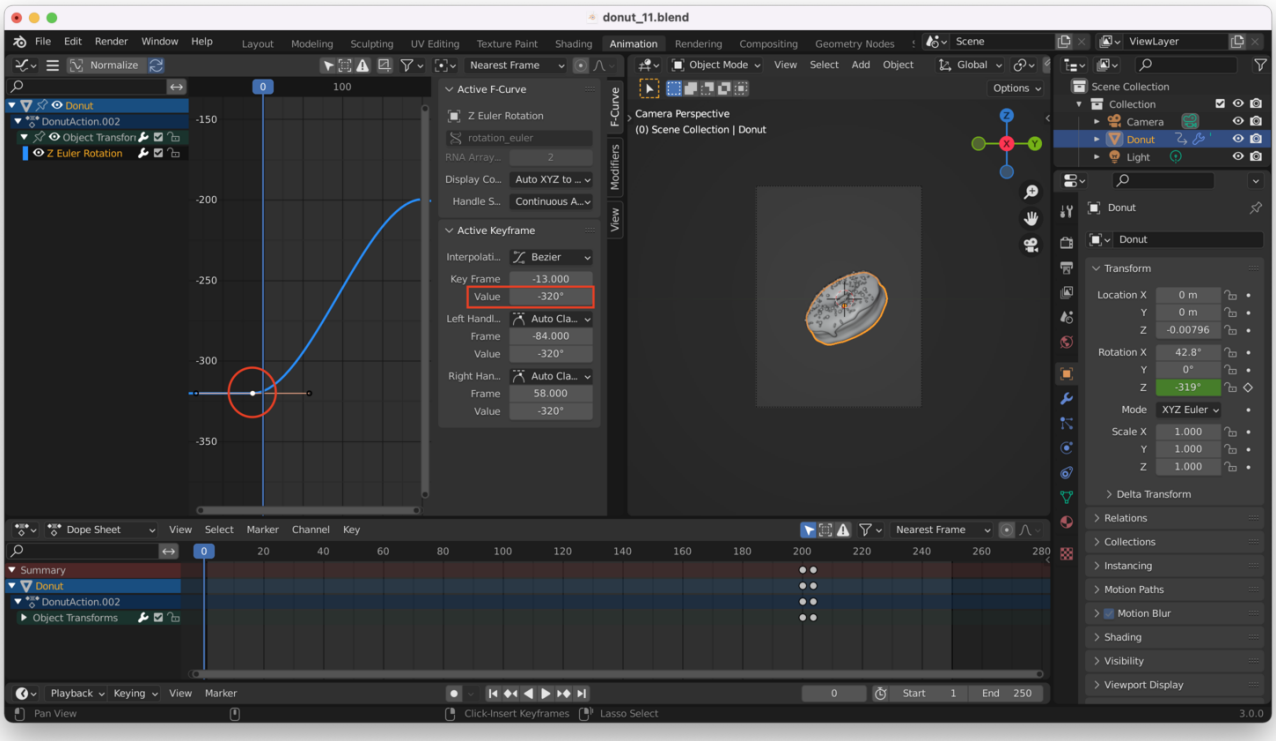
Next, we add a new keyframe right around our last keyframe, like so:


donut_11.blend
Here, we see the "curve" that Blender follows when blending frames together. This is what causes the animation to appear to speed up and slow down.
User Perspective
(92) Scene Collection | Donut

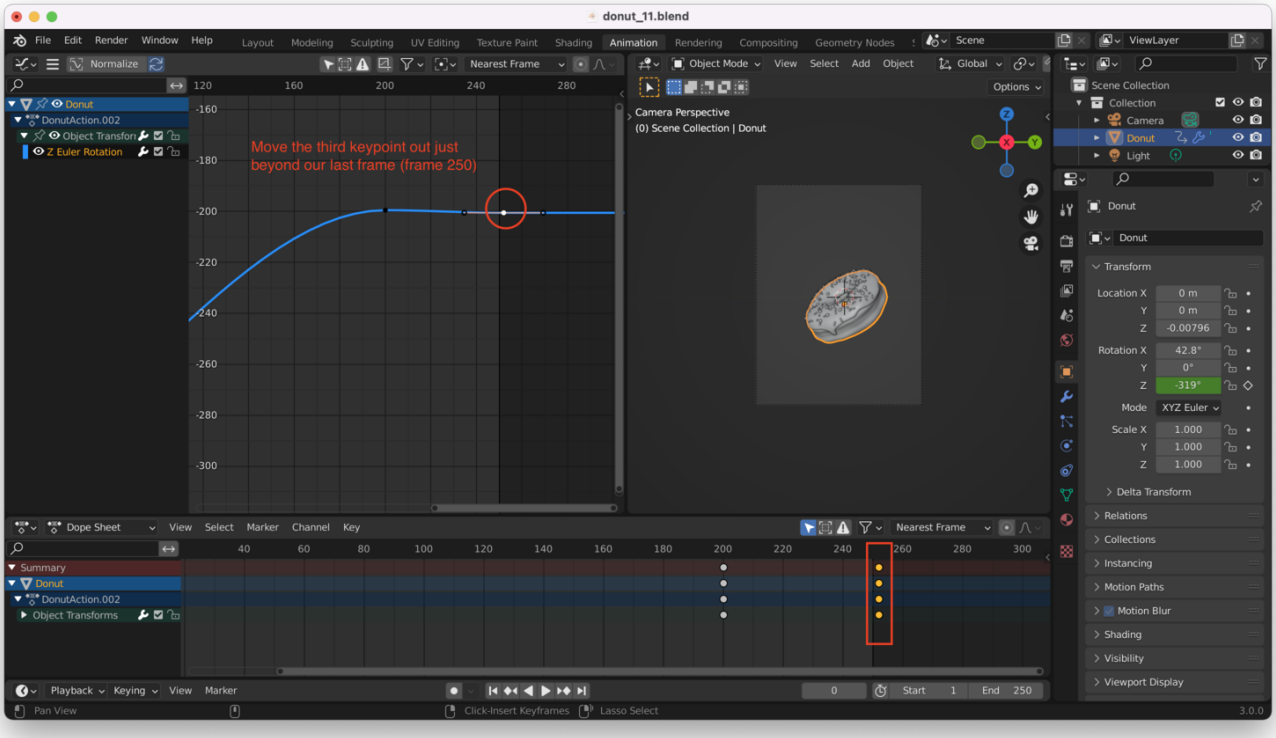

donut_11.blend
We want the rotation around the back of the donut to occur just as the curve flattens out, around frame 200
User Perspective
(202) Scene Collection | Donut



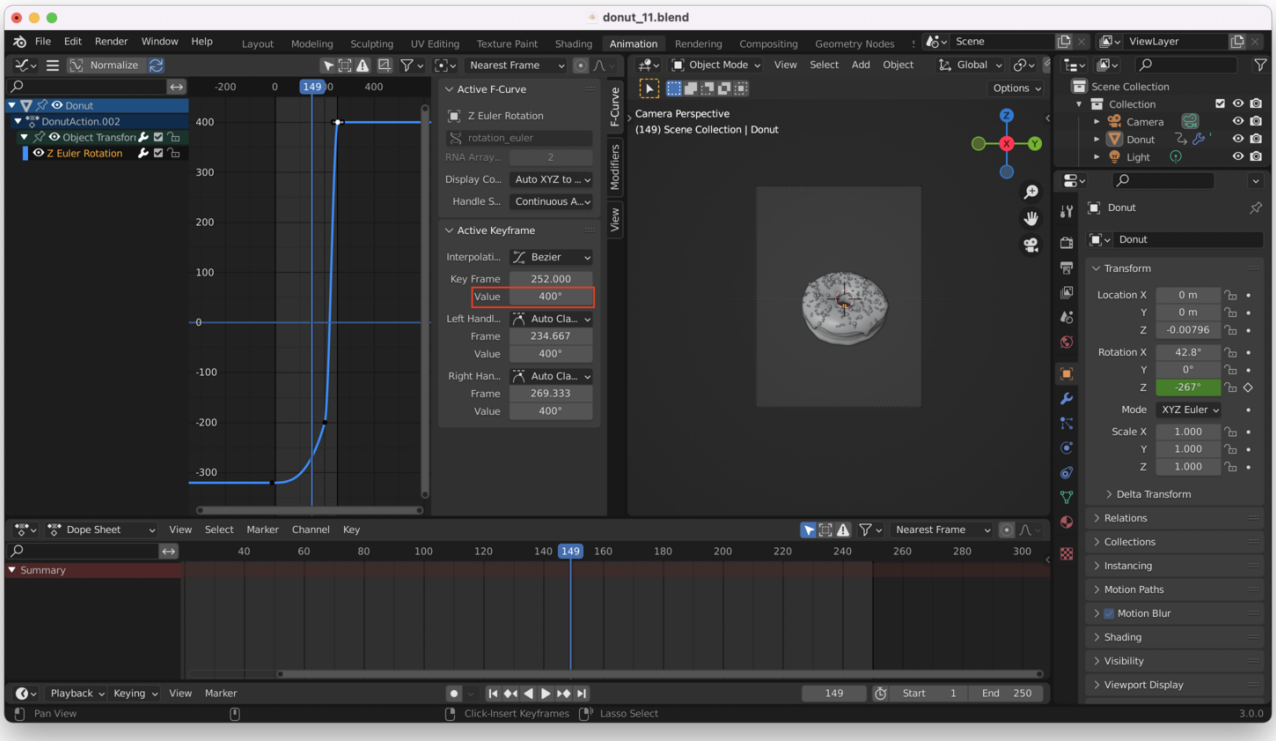
Choosing a keyframe from the "Graph Editor" and hitting "N" will show us the properties of that keyframe. Here, I can see the rotation value for the first keyframe (-320 degrees):



From -320 degrees, we want to do TWO revolutions of the donut. First, we drag the last keyframe out past the final frame in the animation (frame 250):



Then we set the angle value for the rotation at that keyframe to -320 + 360 + 360. This should give us two **full rotations** and return us to our original position:

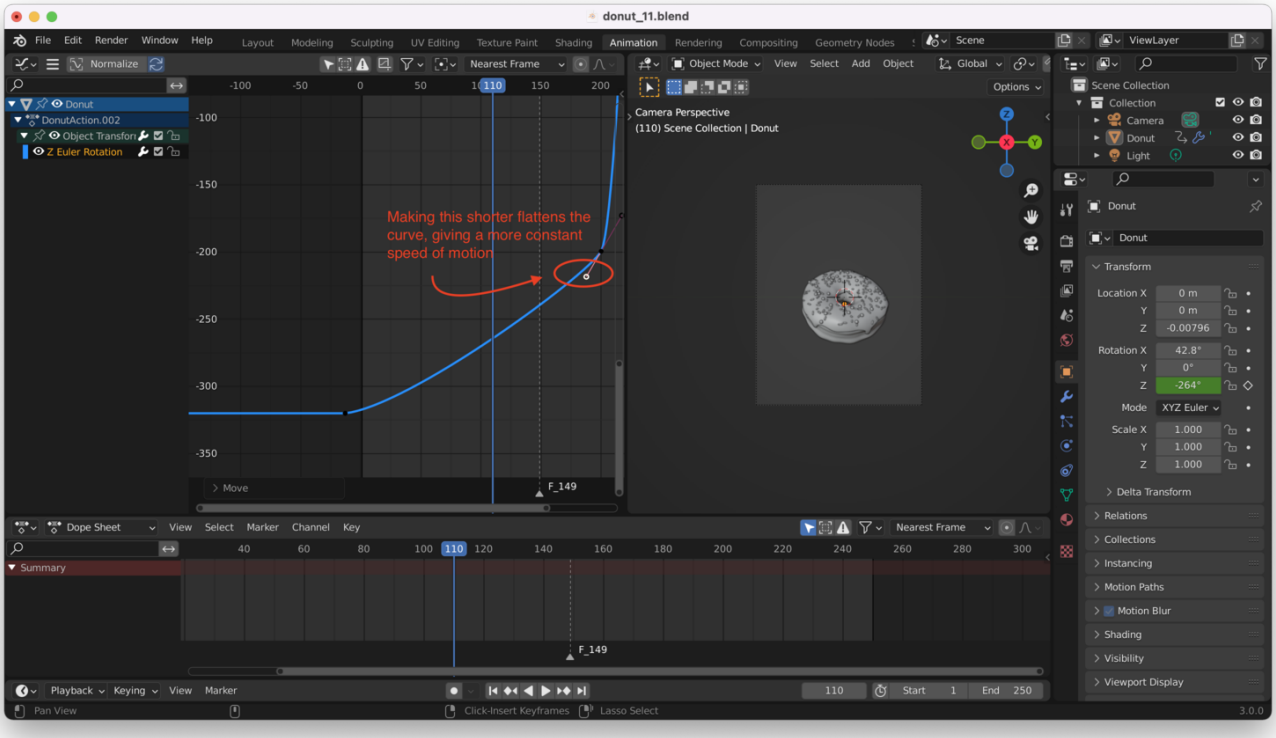


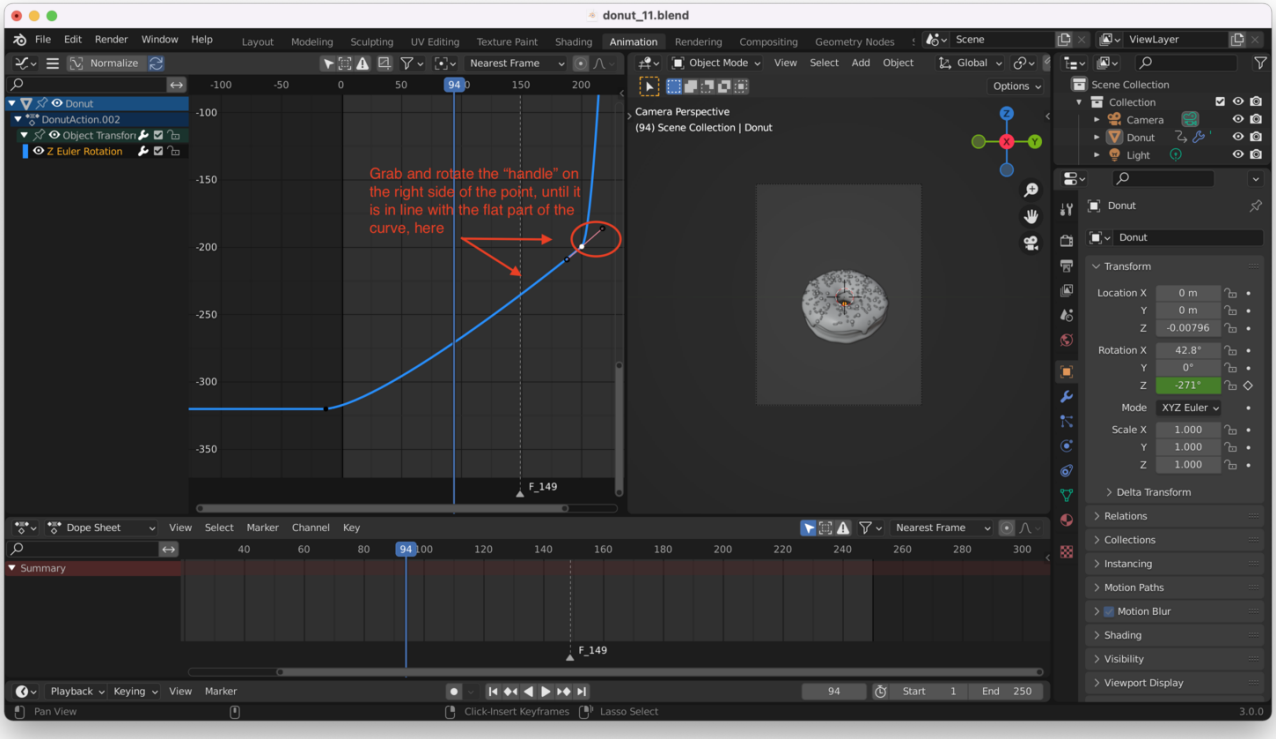
If you look at the Graph Editor window, you'll see that the speed of motion is not constant, since the rotational change from the second keyframe to the third keyframe is **larger** than

that from the first keyframe to the second keyframe.

This **is** what we are going for (we want to see more of the front of the donut than the back, so the rotation "around the back" should be fast), but we still want the motion to be a little less abrupt.

We can do this by adjusting the "bezier handles" associated with the first two keyframes. Adjusting their length will affect "speed", while adjusting their position will affect "smoothness". You'll get a feel for exactly what that means by playing with things yourself:





Continue tweaking until you get an animated loop you are happy with (if you are reading this in PDF format, the image below is a .GIF. You can find the original post on https://jeremypedersen.com/categories/blender-donut/ along with others in this series):