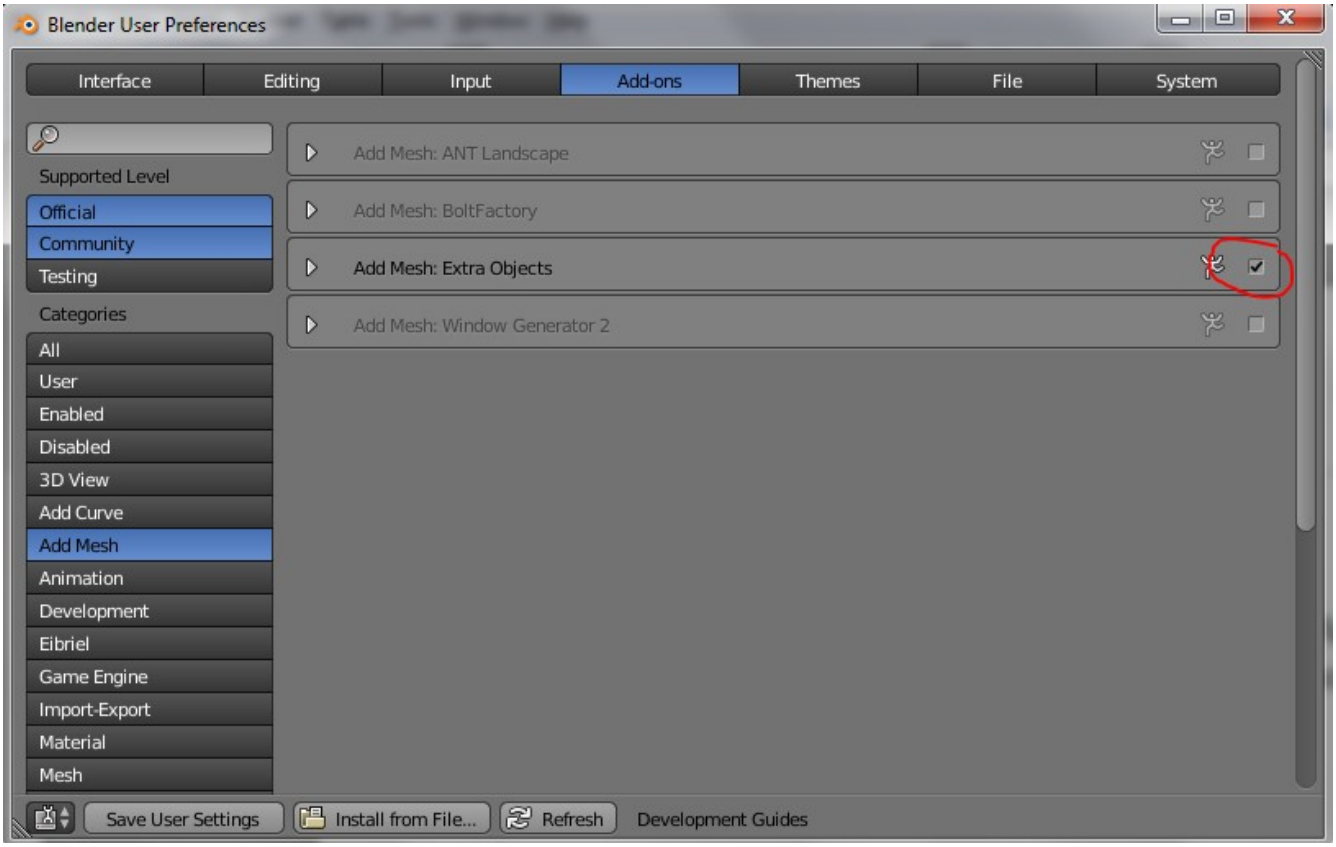
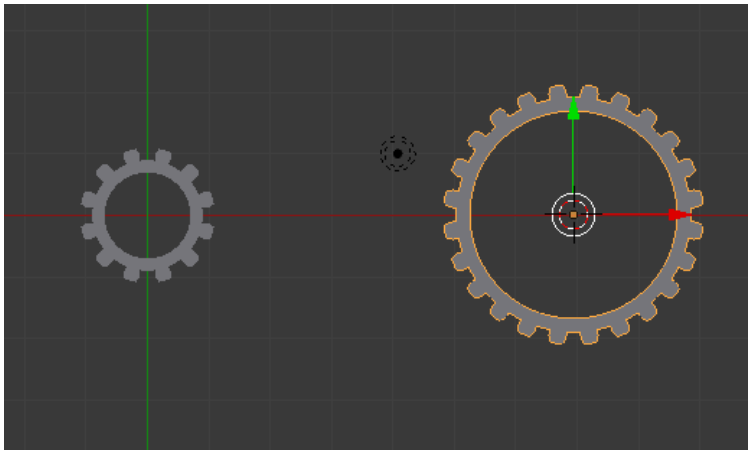
Rigging Demo

Drivers

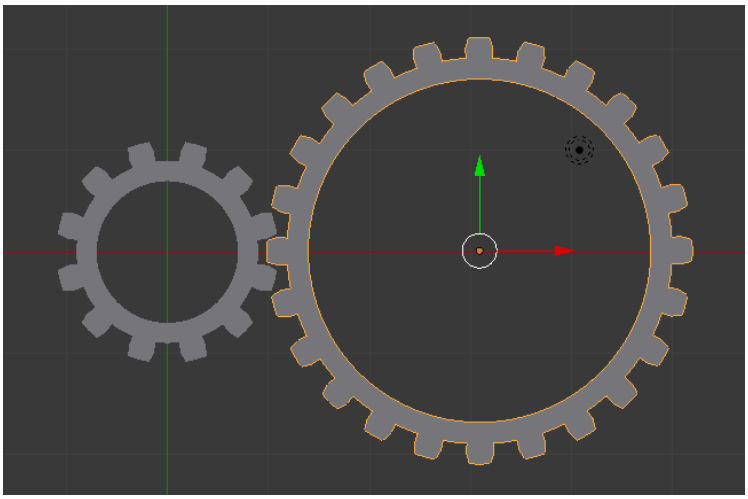
Open Blender and delete the default Cube.
Open the *User Preference* window and click on the *Add On* tab.
Click the *Add Mesh* category and check the check box to the right of the *Add Mesh: Extra Objects* section.



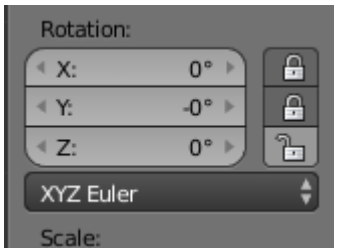
Close the *User Preference* window.
This will add more pre-made objects to the list of standard primitives that are available in the Add menu.
Open the *Add Menu* with **Shift A** and select *Mesh*, then *Gears*, then *Gear.*
At the bottom of the Tool Shelft you will see the Add Gear Panel with all the parameters for the gear you have just created. Note the Number of Teeth parameter is set to 12 and the Radius is set to 1. For this exercise these are all we are interested in.
Go to top view with Num Pad 7 and left click to the side to move the 3-D Cursor to the side.
Add another gear at this location, and change the number of teeth parameter to 24 and the radius to 2.
Name the first gear *gear_small* and the second larger gear, *gear_large*.



Move the large gear with the G key and rotate it with the R key to where the gear's teeth inter-mesh.



Press Ctrl A and select Apply Rotation to set this rotation to zero.
Open the Numeric Properties pane by pressing the N key while the mouse pointer is in the 3-D View Port. Since the gears will only rotate around their Z axis. Click the lock beside the X and Y rotational fields for both *gear_large*, and *gear_small*.

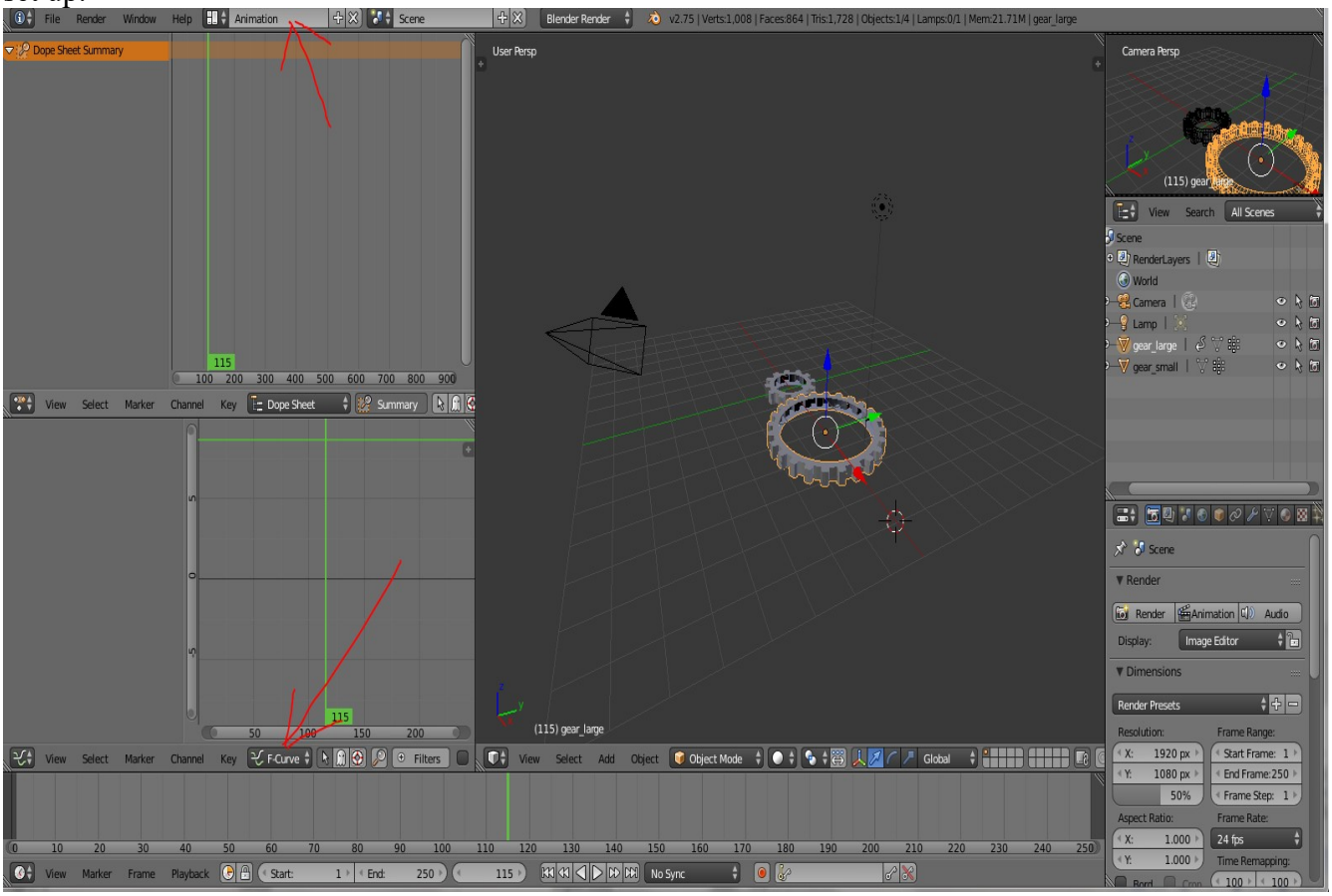


At this point the gears can be rotated on the Z Axis, but neither will affect the other. We are going to set up our rig so that when we turn *gear_small*, then *gear_large* turns by half the amount in the opposite direction. (Remember that the smaller gear is half the radius and tooth number as the larger gear.)

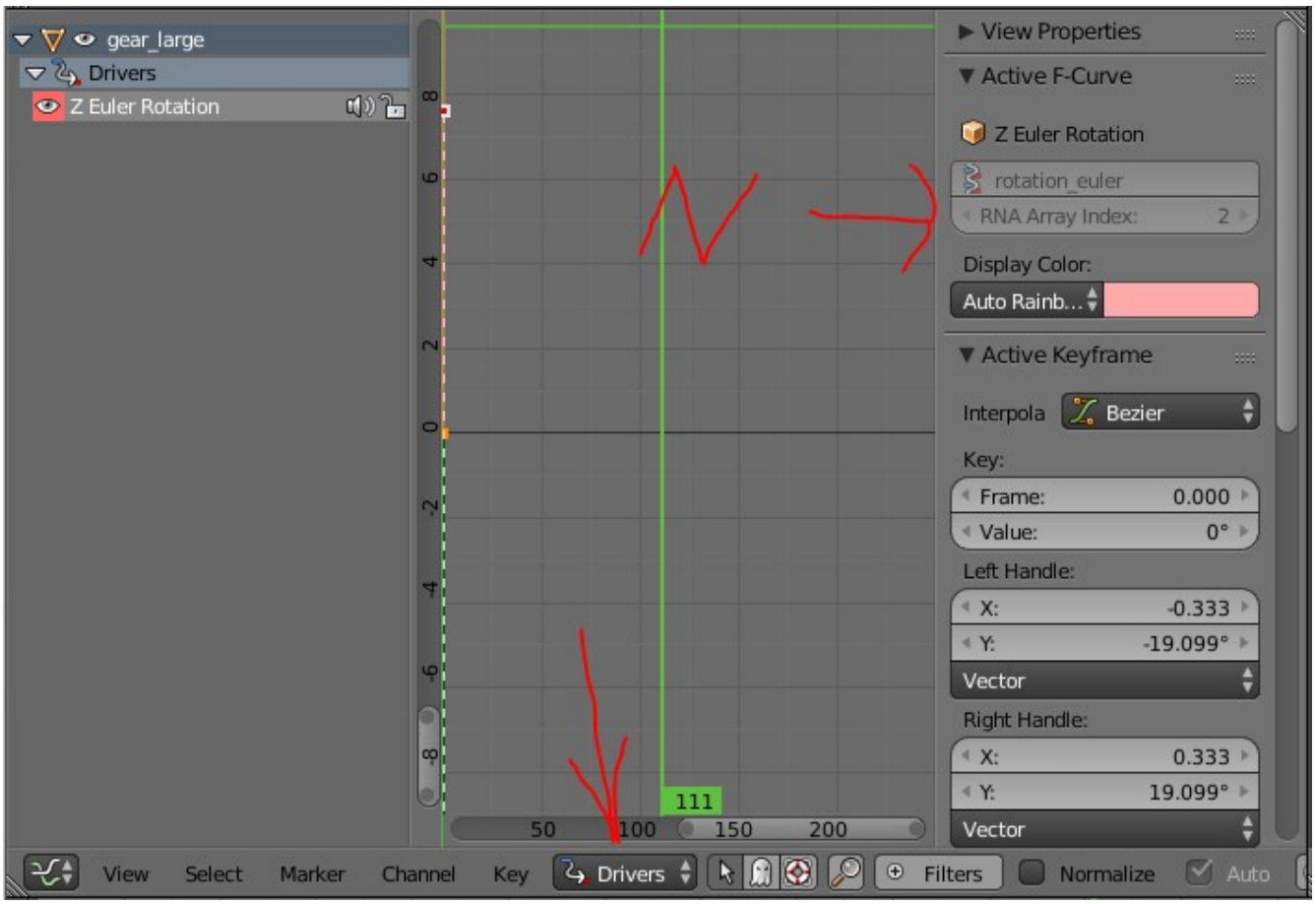
Since *gear_large's* Z rotation will be driven by *gear_small's* Z rotation, we will add a driver to gear_large's Z rotation field. Make sure gear_large is selected and then right click on the Z rotation field. Select the option to add a single driver.

Two things have happened at this point. The field for the Z rotation has changed color to purple, and you can no longer rotate *gear_large.* Purple is the color that lets you know a field has a driver and can no longer be directly changed. We still can't control *gear_large* with *gear_small* however. Blender still doesn't know that we want it to or how we want it to do it.

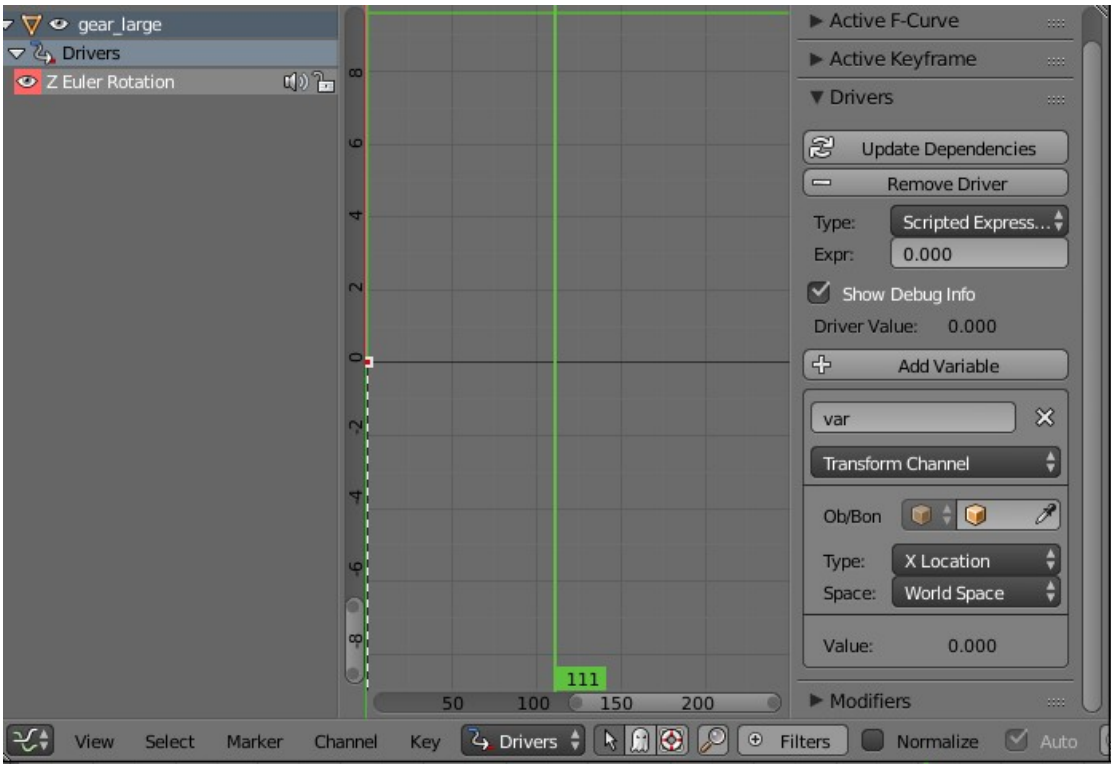
Next go to the Animation screen by changing from the Default screen set up to the Animation screen set up.



Change from the fCurves context in the Curves window to the Drivers context. Click on the Z Euler Rotation on the left side of the window to select this driver. Press the N key while the mouse is in the fCurves window to open a numeric properties pane.



Minimize all panels in the Numeric Properties pane except the Drivers panel.



We need to tell Blender what object will be the controller and what transform will be used. We will use a variable in an expression to calculate how much we want the bigger gear to turn and in what direction. We already have a variable named var in our panel. We need to set the variable to our small gear's Z rotation. Since we want gear_small to be rotated on the Z axis we will go down to the Ob/Bone field. Here you can click on the second Orange Cube and select gear_small from the drop down menu or click the eye dropper icon and then click on the smaller gear in the 3-D View Port. Click in the Type field and change the type from X Location to Z Rotation.

Now back to the top of the Driver panel. Click on Update Dependencies. The type is set to Scripted Expression. That is what we want so we won't change that one. Our Expression field however needs something other than 0.00 or our gear_large will always have a rotation of 0 degrees.
We can set the expression to our variable var. That will cause gear_large to just copy gear_small's rotation. What we want is for our big gear to rotate in the opposite direction only half the amount of rotation as our smaller gear, so set the expression to "-.5*var".