

# Creating and Rigging a Basic 2D prop in Toon Boom Harmony Premium.

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Hi there!

This tech paper covers the basics of creating a simple 2D rigged element in Toon Boom Harmony. The process described here is applicable to most any basic 2D prop or object you might want to add to your film. The film I worked on combined major 2D and 3D elements, but this can also be useful if you are using Harmony to create animated elements on flat surfaces or cartoon graphics for your primarily 3D film. I won't be covering everything necessary to rig an entire 2D character, but the basics of making a 2D simple prop transfer to large scale rigs as well.

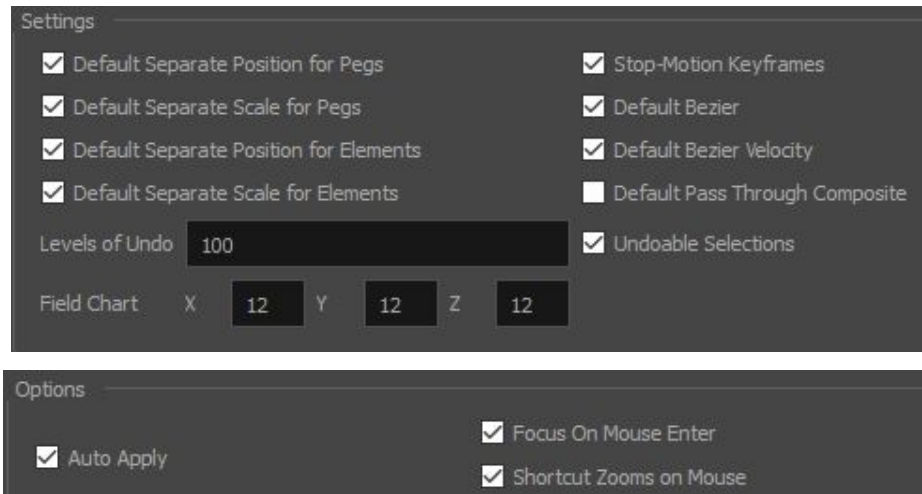
A properly rigged object, even if it is a simple object that doesn't do much more than rotate or bend slightly, is key to making your animator's lives easier.

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## SETUP

Harmony is a rather fickle program, and proper settings are key to avoiding future issues. Ensure you have the following settings before starting on your prop or scene by doing the following:

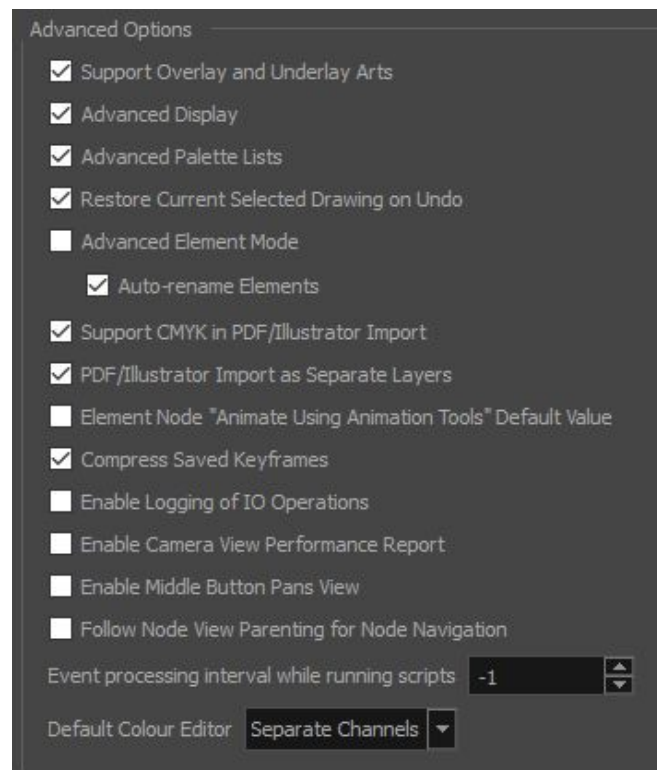
- ❖ Go to Edit -> Preferences
- ❖ (On MAC it may be under Harmony Premium -> Preferences)
  - Under the GENERAL tab (This is the tab you start on by default) use the following settings:



-Ensuring Separate positions and scales on Peg is important because it allows animators to key movements on each axis separately

-Checking “Stop-Motion Keyframes” is important for setting keys later on the object.

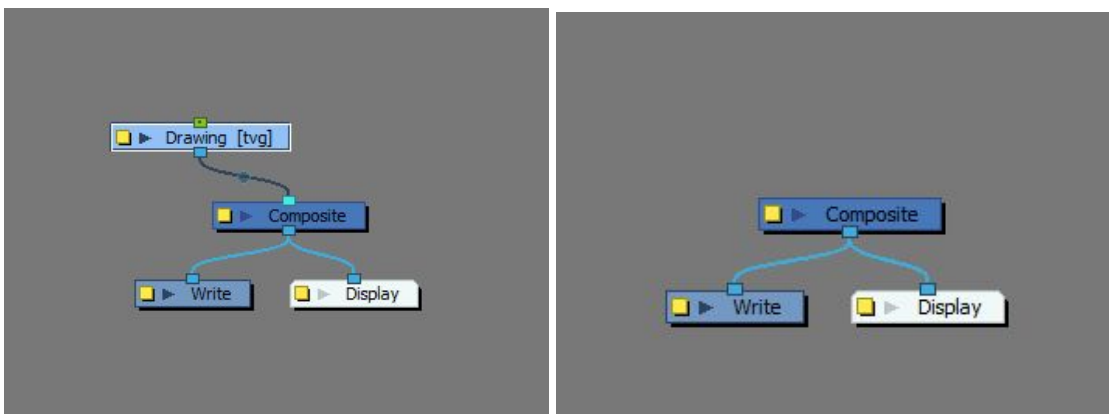
- ❖ Under the ADVANCED tab use the following settings: (taking special care to ensure “Support Overlay and Underlay arts” and “Element Node ‘Animate Using Animation Tool’ Default Value” are checked and unchecked, respectively).



- ❖ **SHORTCUTS:** For ease of use (and because Harmony's default shortcuts are bordering on unusable) I will be using these shortcuts, and referring to them throughout this paper. I recommend setting these yourself under Edit -> Keyboard Shortcuts (On MAC it may be under Harmony Premium -> Keyboard Shortcuts)

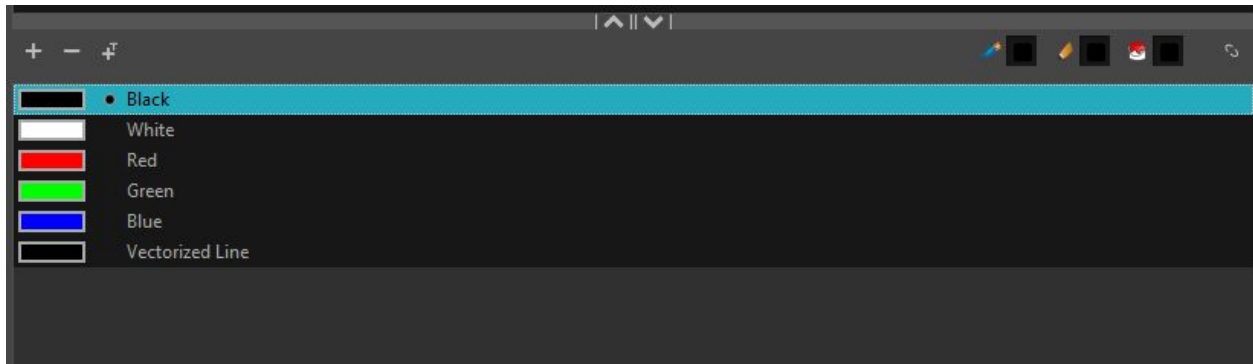
N - Pencil Tool  
G - Paint Tool  
V - Stroke tool (invisible line)  
1 - Zoom Out  
2 - Zoom In  
3 - Select tool  
4 - Snap to contour toggle (for connecting points)  
5 - Apply to Line and Color art Toggle  
6 - Paint Tool  
8 - Pencil Editor Tool (line thickness adjustment)  
Alt + Q - White arrow select tool  
Alt + Shift + D - Duplicate new drawing substitution  
F/G - switch between drawing substitutions

- ❖ When you open your new scene, in the node view window (You can bring this up under windows if it isn't already present in your scene) you should see a drawing already there and connected to the composite node. **DELETE IT.** It's cursed and we don't want to touch it.



- ❖ Also delete all the default colors in the scene (Under the color window): they also have the ability to cause us problems and junk

up our scene later on in production. Simply select and hit delete until no colors are left.



- ❖ Hit the + button in the top right to add a fresh, new, unproblematic color.



- ❖ Doubleclick the swatch to edit the color, and doubleclick on the name to rename it. Because our prop uses black outlines, it's safe to call this color "LINE" and assign the color value to an RGB value of 5,5,5
- ❖ *(You need to have a drawing node selected to do this, so if you already deleted the initial drawing, simply come back and do this later)*

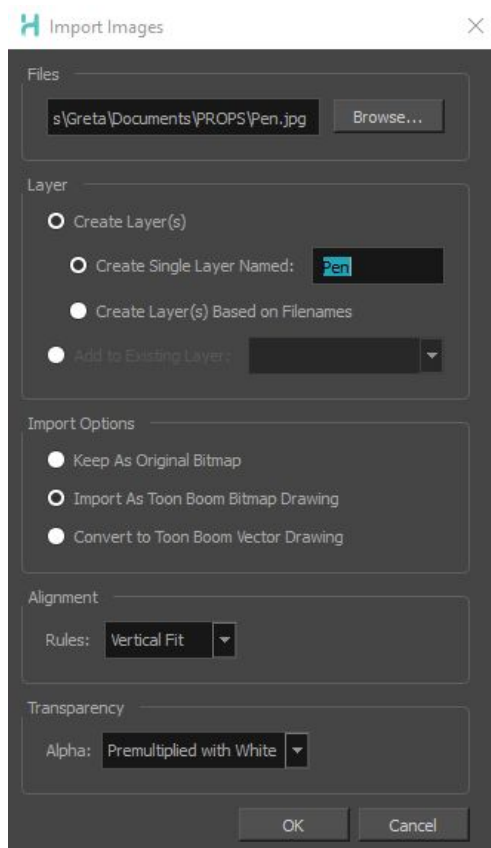
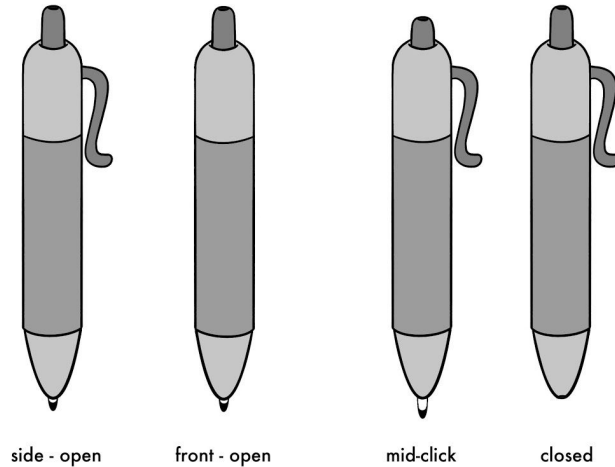
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## Creating the Object

The first step to creating our prop is getting the reference art for it. If the object doesn't turn all the way, we don't need a full turnaround. Sometimes in the industry, you only get one reference image for a prop, but if you can, it's always good to get whatever major angles you need from the person designing the prop.

This is the prop we will be creating:

## Ollie's Pen - 2D



To import the image go to File -> Import -> Images

Hit Browse and locate the image you are referencing

Import it as a Toon Boom Bitmap Drawing, and hit OK.

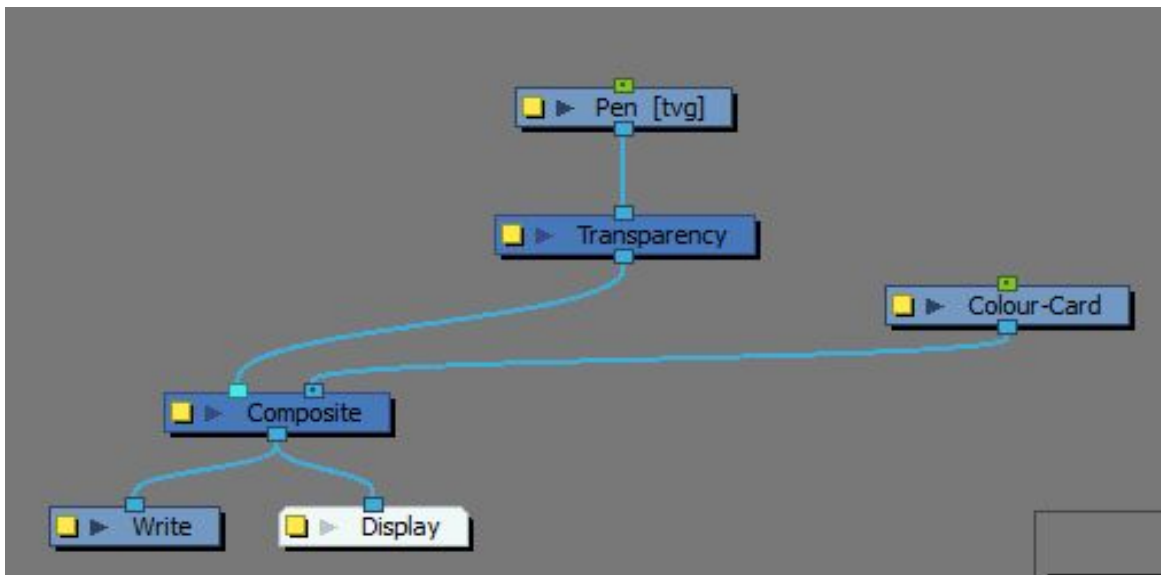
The drawing will appear in the Node View as a light blue tvb node.

Open the **Node Library**. Search for and drag a Colour-Card (This is a canadian program, you need to include the U to properly search it) and a Transparency Node into the node view.

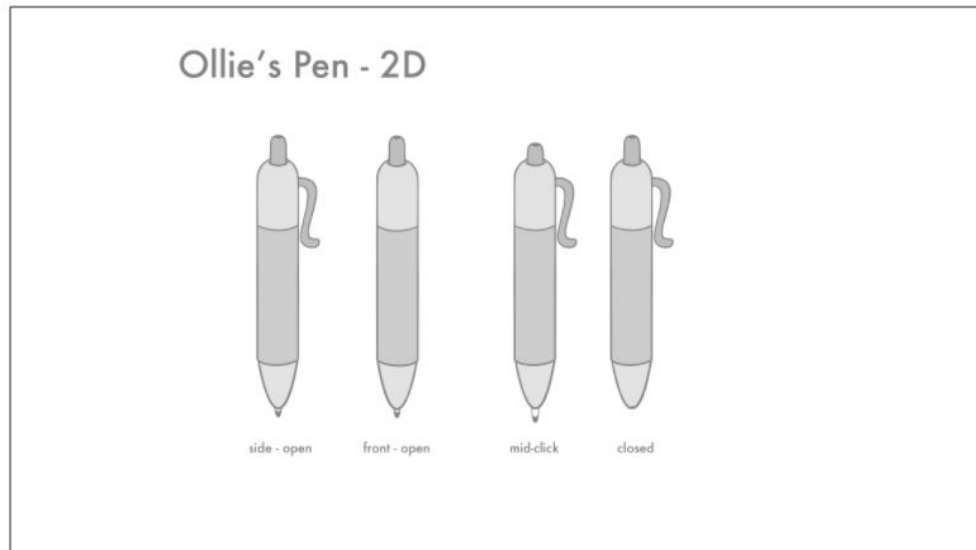
Click and drag the blue boxes at the bottom of the 3 nodes you've created like the image below: feeding the reference image (Pen [tvg] in the screenshot) through the transparency node and into the composite, and feeding the colour card into the RIGHT of the artwork.

### --- WHY RIGHT?

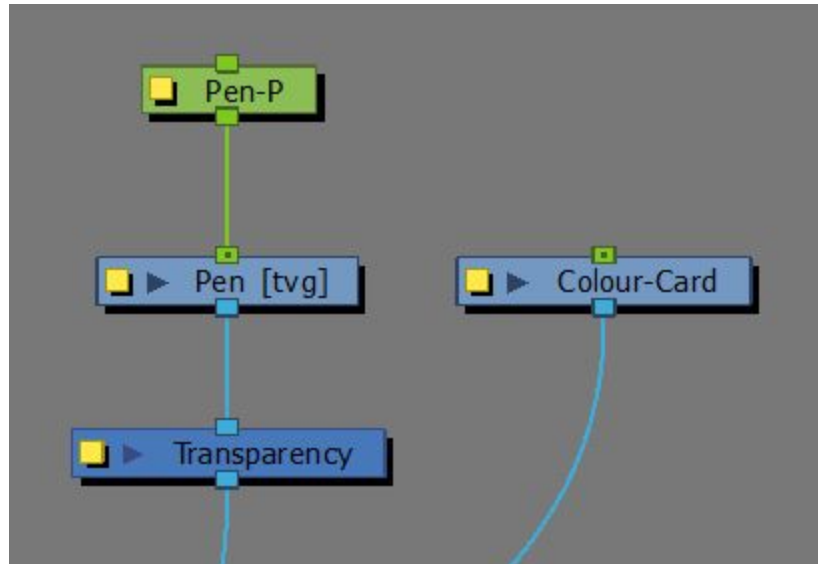
- Harmony's Composites are like layer groups in photoshop. The composite in the scene here serves to flatten the incoming image data before sending it to the display and write nodes. Instead of having lower layers be below others physically in the display, the hierarchy moves from left (top) to right (bottom). You can always check which side is the bottom of the composite by looking for the connection with the **black dot**. (In my image, this is the color card connection)



With this setup: My Camera view looks like this:  
With the reference image faded out and visible.

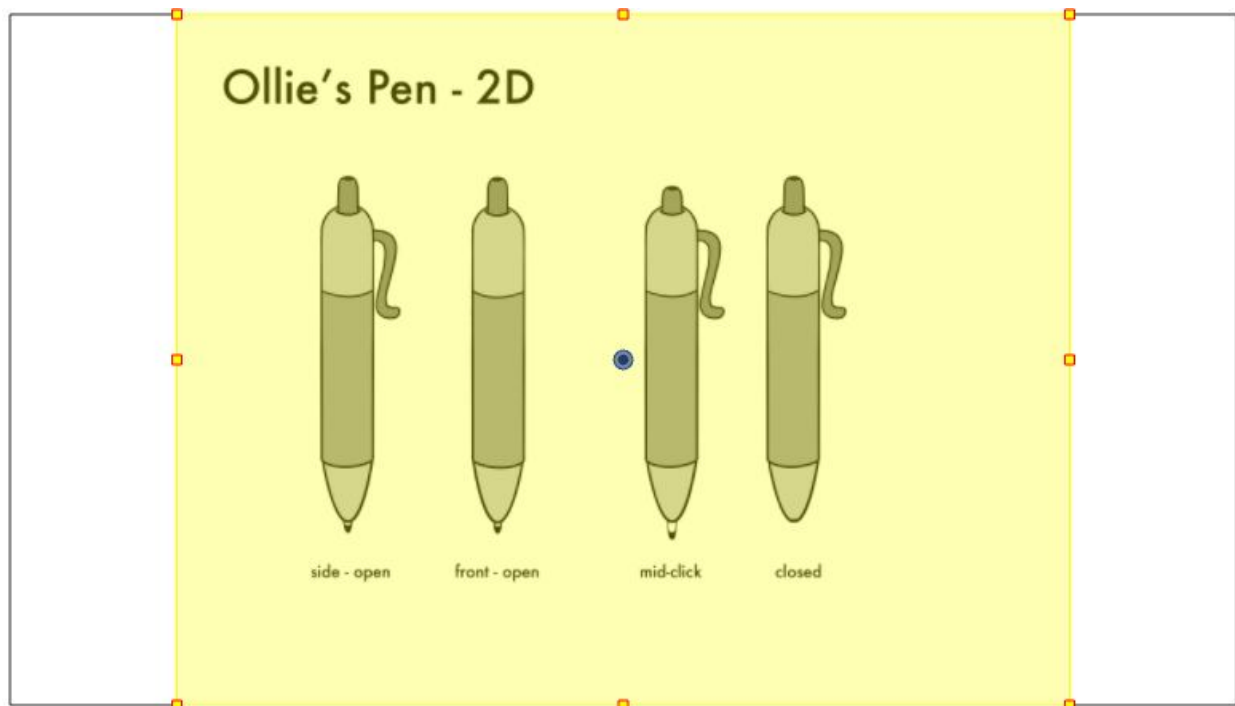


- ❖ The Pen is nearly the height of the camera window! This pen is far larger than what it needs to be for the scene, so let's scale it down a bit! To do that, or to move **ANYTHING** beyond individual strokes, the best practice is to add a **PEG**.
- ❖ A **PEG** is a node that holds transformation information, and it can be animated! All drawings in our 2D objects **MUST** have a peg to be animated. Adding the pegs correctly is a large part of 2D rigging!
- ❖ To add a **PEG**, select the drawing node you want to add it to and hit CTRL + SHIFT + P, or search for the peg node in the node library and drag it into the scene and connect it like so:



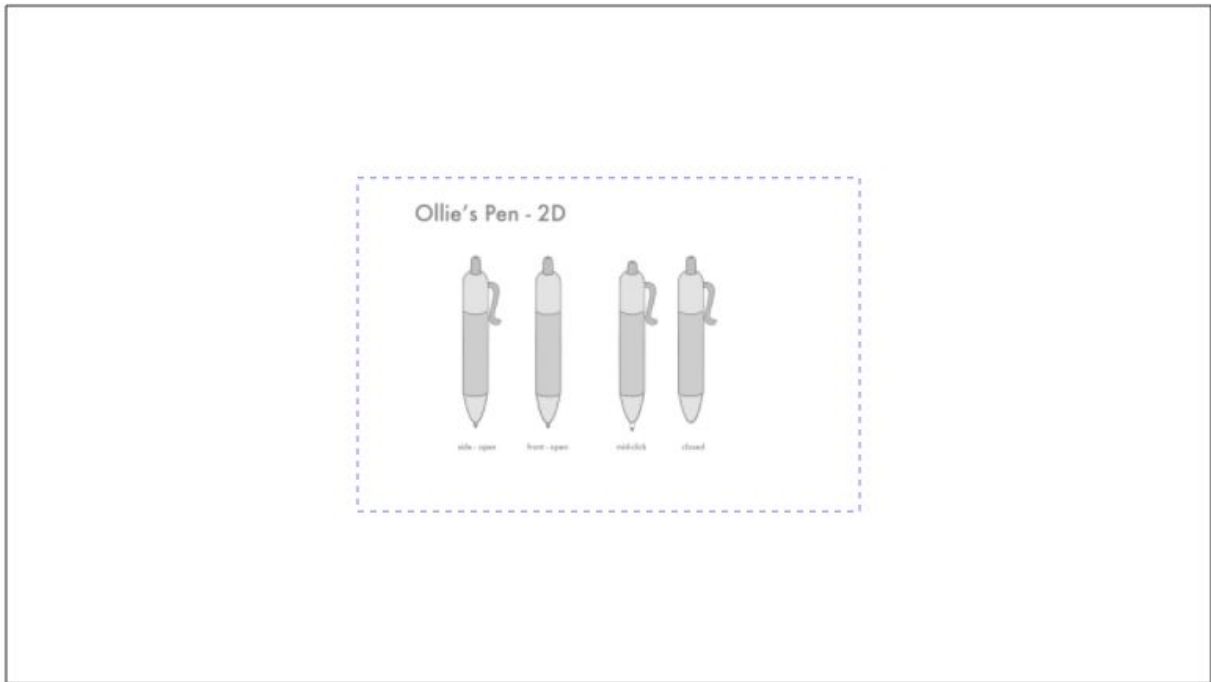
This is the transform tool! It's found on the main toolbar. Select it to move and scale things in the camera view.

- ❖ With the Transformation tool selected, click on the Peg so that the drawing is highlighted yellow in the camera view:



- ❖ Now you can scale it down to the approximate size it will be in the scene. Mine is this size:

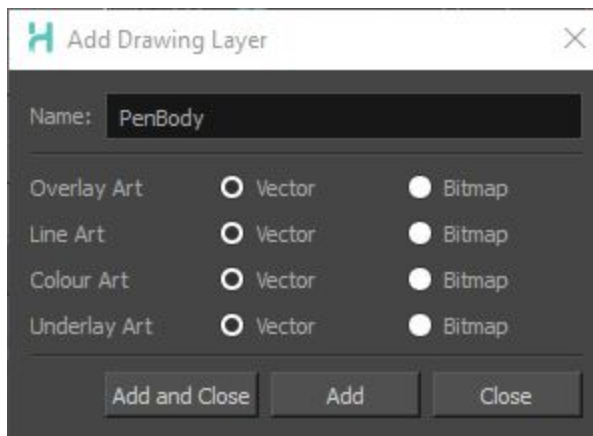




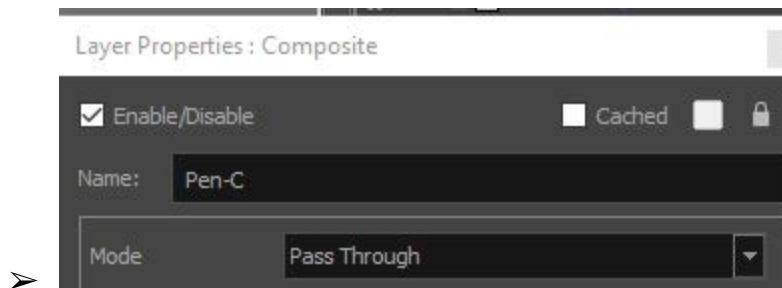
Now that we have our reference artwork in, We can add in the drawings we'll need. For this pen, I am going to be creating six separate drawing nodes. That might seem like a lot, but each individual drawing is going to be a part that can be individually moved. The button, the pen tip, the clip, and the main body are all individual parts. I will also be adding 2 additional drawings to the body in order to get the perspective we want.

#### ADDING THE DRAWING NODES:

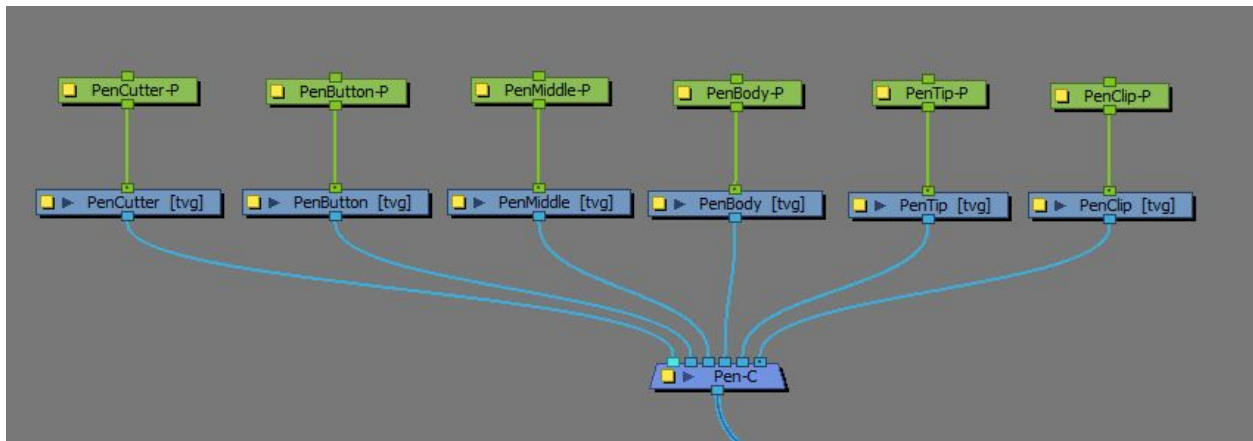
- ❖ Hit Ctrl + R to add a new drawing in the node view.



- ❖ Make sure it's a vector layer, and name it accordingly. If you hit "ADD" you can add a new drawing immediately after. When you have enough drawings, hit "APPLY AND CLOSE"
- ❖ Arrange the new drawing nodes next to each other horizontally, with the lowest element on the right and so on.
- ❖ Drag a new COMPOSITE node and position it under the new drawings. Rename it to PEN-C (or whatever the object name is -C)
  - Click the yellow option box on the composite node to enter the node settings:



- Change the mode to PASS THROUGH. This will allow any depth data to maintain, and not flatten.
- ❖ Add a PEG to the drawings by selecting all of them and using CTRL + SHIFT + P to add pegs to all of them.
- ❖ Connect the nodes like this: (The composite connects to the main composite the colour card is plugged into)



**Now we're ready to insert our artwork!**



-Select your pencil tool, or hit N if you're using my shortcuts, and select your "lines" color we made earlier. We want

to use the pencil and not the brush, as the pencil allows for greater control of our strokes.

Starting with just the linework, draw the art you need on the relevant drawings.



Make sure to put this on the Lineart layer, as shown on the image to the side. This matters for creating more complicated things like clipping masks in the image.

Toggle snapping on with 4 to connect vector points together

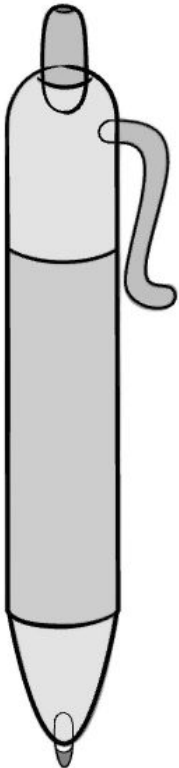


Use the Select (3) and Direct Select (Alt +Q) to edit whole lines, and individual points respectively.

Holding ALT while pulling vector handles breaks the handles into sharp corners.



Use as few points as you can to get the stroke to be smooth

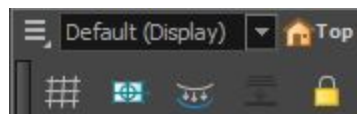


Now that we have the lines in, it's time to insert our colors! Open your reference art in a program like photoshop, since the colors can be altered on import into harmony.


Make a new color swatch for each color you need, name it, and eye drop the color from the other application window to get the exact color you need.

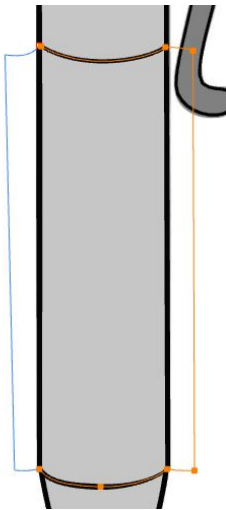
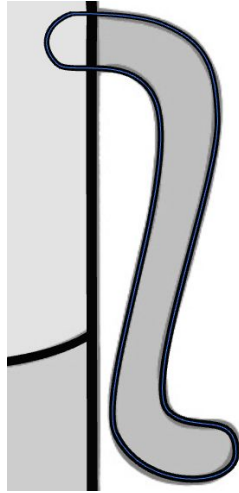
To set up each drawing for color, do the following:

- Use the select tool to grab all the lineart



- Hit the Line art to Color art button at the top of the camera window (The button in the bottom middle that looks like an eyelash)

- Select the Color Layer: 
- You should see the line stroke has been transferred to this layer: (the color layer highlights in blue when not being directly selected)



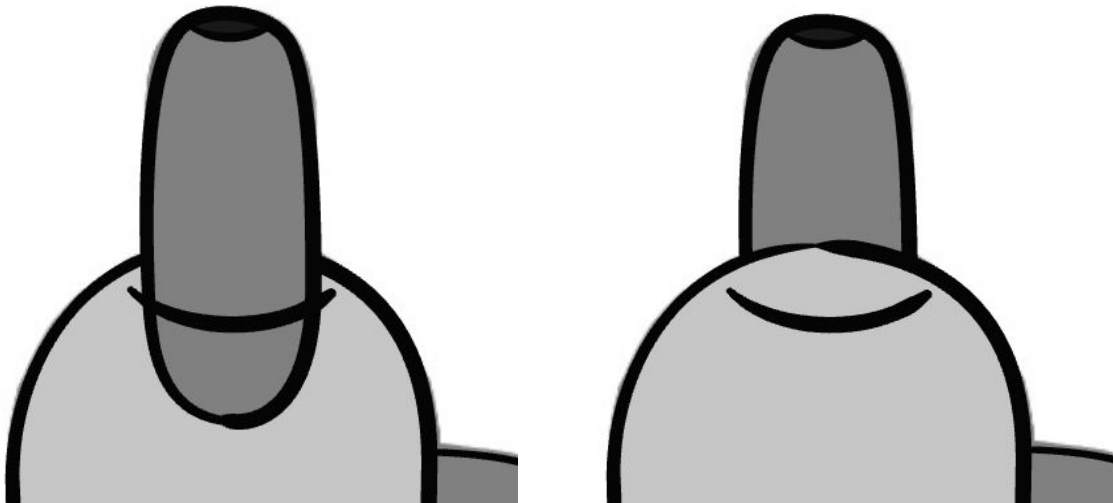
- If the lineart isn't a closed shape, use the stroke tool (V) to close the shape with an invisible line. (As shown on the left)



- Select the paint bucket tool (G) and fill the layer in with the right color.

If your object is something simple like a single star, you only need one drawing layer. If this is the case, you can skip to Page 17 once you have that drawn.

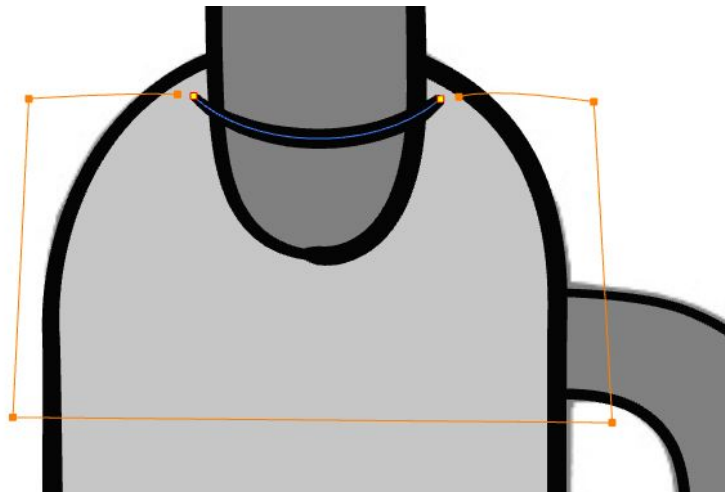
Otherwise, let's look into some things we notice with the fully colored pen:



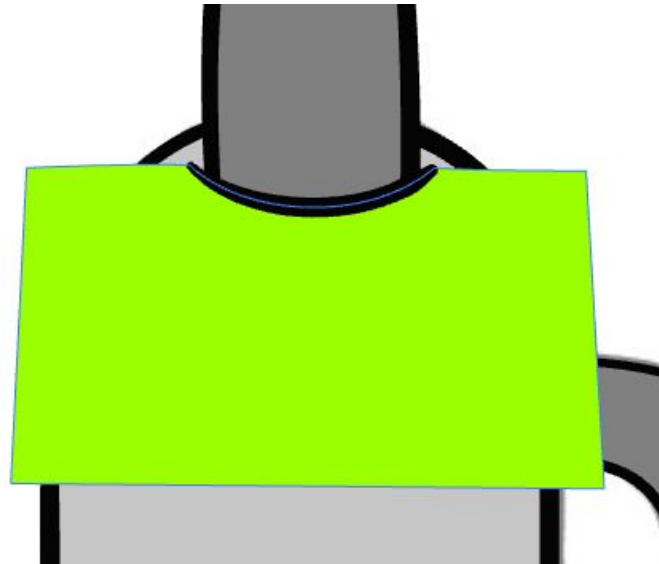
The Cap is behind the line of the (Pencutter) drawing, and in front of the Body of the pen. If I try and move it behind, it no longer reaches the line.

I named this drawing “Pencutter” because it will be a cutting shape for a clipping mask we’re going to apply to the object.

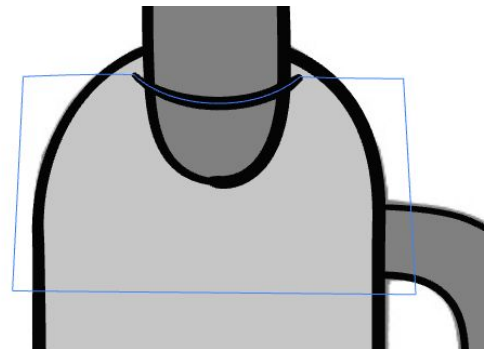
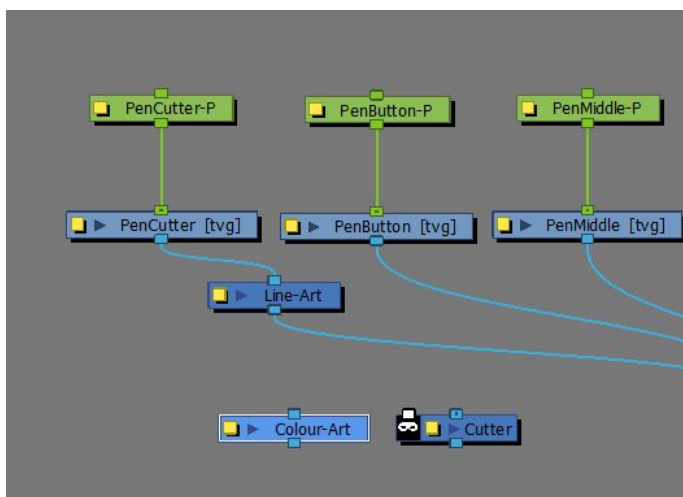
Let’s create a box shape using the stroke of the line of the pencutter art using the stroke tool on the Color art layer: (In this screenshot i hadn’t connected the box to the line yet, but you will need to do this)



- ❖ Create a new color and make it something OBNOXIOUS that you'd never use in your scene. Name it MASK and fill this new shape with it:

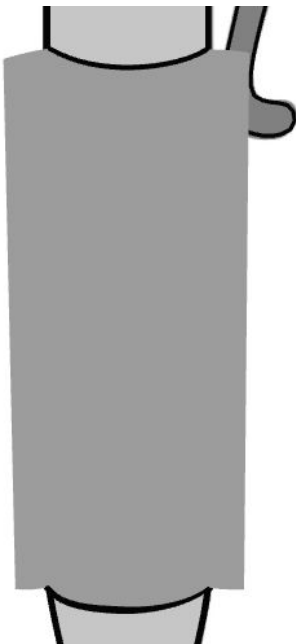
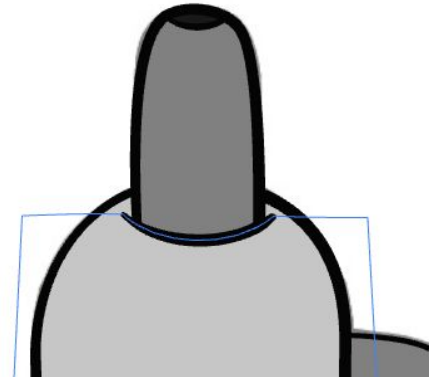
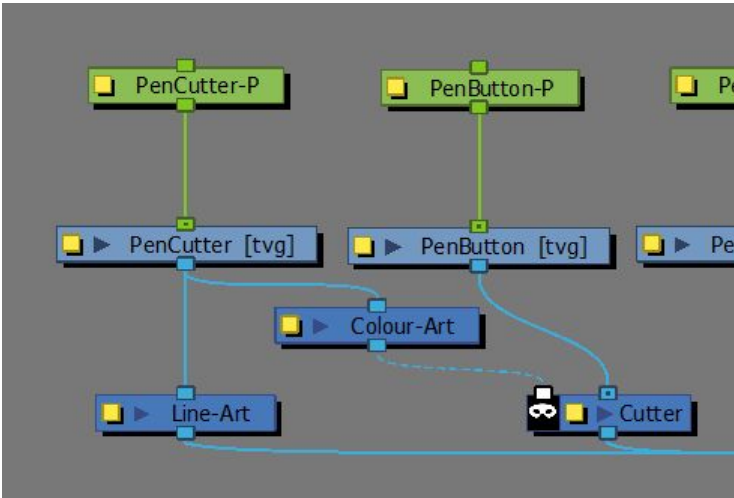


- ❖ That way, you know if a certain color is there for technical reasons, it will look obvious like this.
- ❖ Next, drag a COLOUR ART, LINE ART, and CUTTER node into the node view. Hold ALT and drag the lineart node between the pencutter art node and the composite: The green should become invisible
- ❖ This is because we are only feeding the visual information of the Line art Layer into the composite. We don't want to see the green, but we DO want to use it.



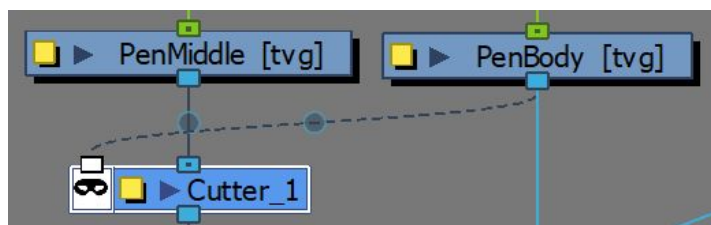
- ❖ Take the cutter node, insert it between the button art and the composite.

- ❖ Drag a new line from the cutter art and feed it into the top of the colour art node.
- ❖ Connect the bottom of the color art node to the left port of the cutter. This assigns the shape of the color layer at the masking shape for the pen: Hiding the shape.



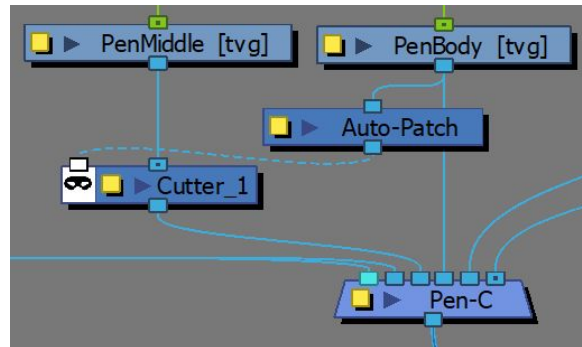
For the middle section, I also wanted to make it separate in case the animators want to adjust the perspective on the bands. I do something similar to cut this shape into the pen, but with a slight difference:

Feed the body shape into the cutter, and click the mask shape to invert the mask so that instead of hiding the shape, it reveals it (Don't disconnect the Penbody from the composite, just drag a new line)





However, now we have lost the linework in this section of the body, as the mask has covered it.

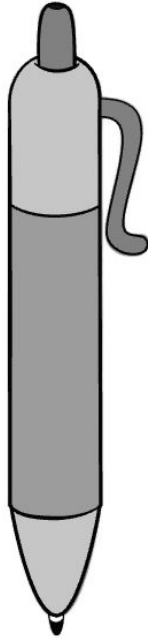


Inserting an autopatch between the body and the cutter solves this issue, as now instead of the entire shape, it only reveals the middle drawing within the visible color art of the body.

\*\*\*AUTOPATCH NODES are like colour art nodes, but slightly heavier on computing power as they calculate the color art, but only what you see underneath the lineart layer.



Perfect!

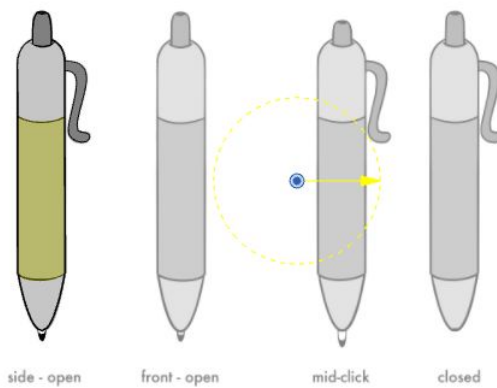


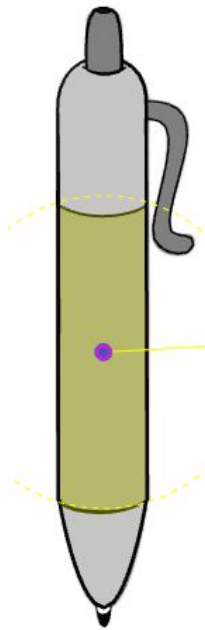
The last thing we need to do is set up our pegs and pivots!



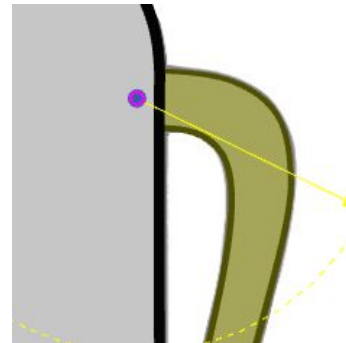
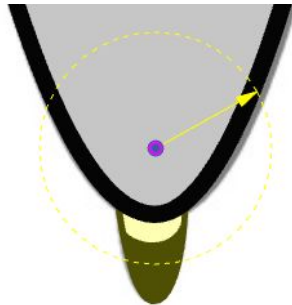
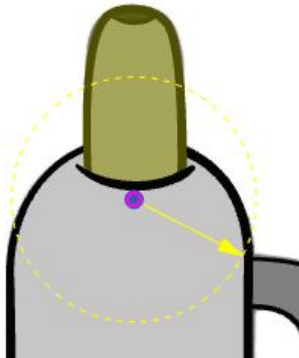
Find this button, the Rotate tool!

Ollie's Pen - 2D





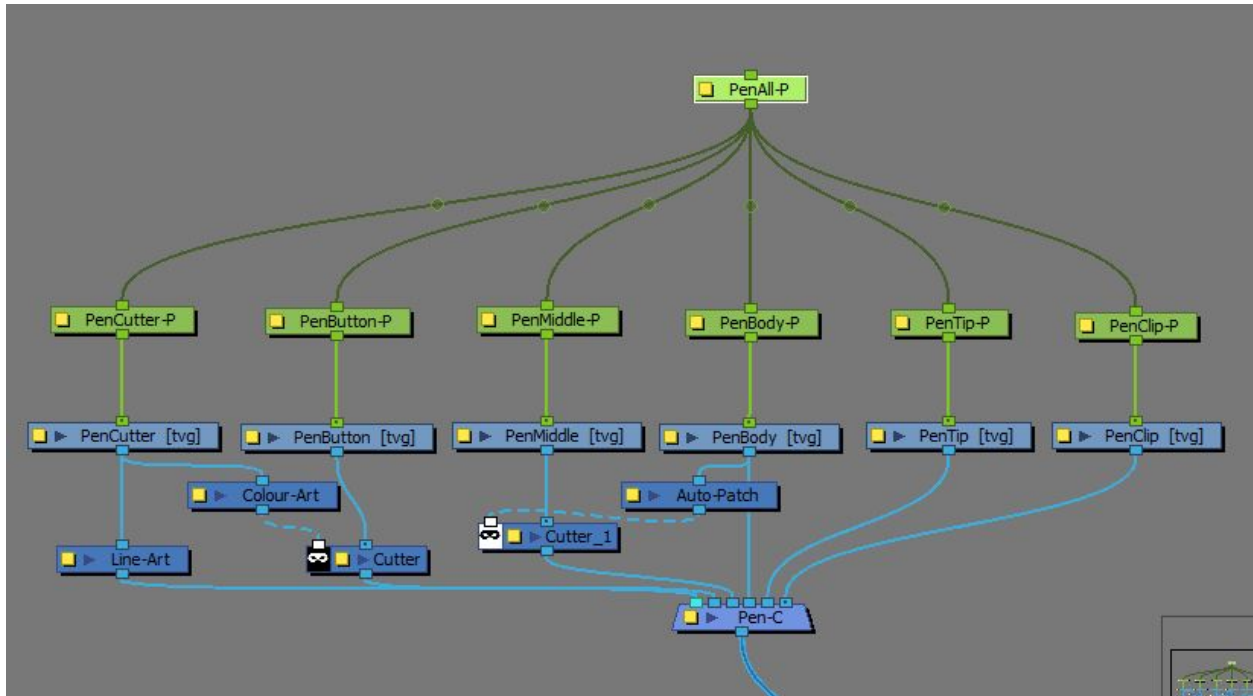
Select any of the Peg Nodes in the node view, you should see a blue dot indicating the pivot location of that peg. In my image, it's clear to see that the pivot is far out of the object. I don't want my pen rotating around that point! I want it to rotate around a point inside. With the rotation tool on, drag the pivot into the location that fits best. Do this for all the different drawings in the scene. I've show some of my pivot placements below:



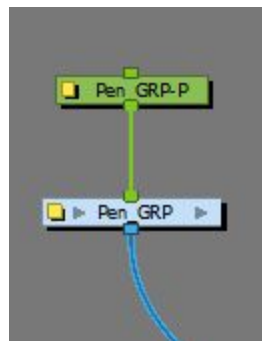
We're almost done!

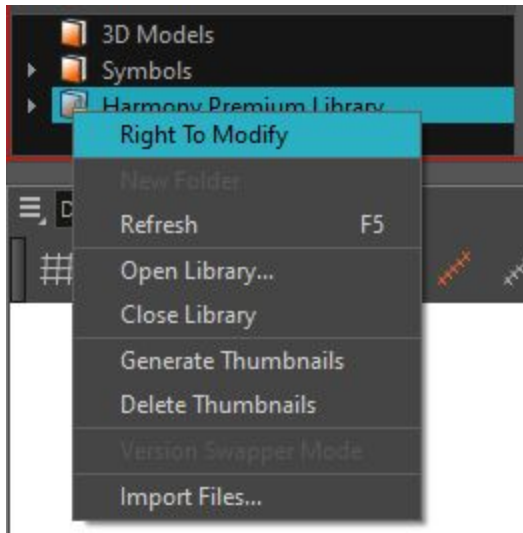
We still want to be able to move the pen as a whole, so let's make one more Peg and connect it to all the other pegs so that it can control all of them together: Don't forget to set the pivot on this one too!

I named my peg PenAll-P



Select all the nodes in the image above and hit CTRL + G to group them into a single group node. Add a peg and adjust the pivot on the peg above the group like so:

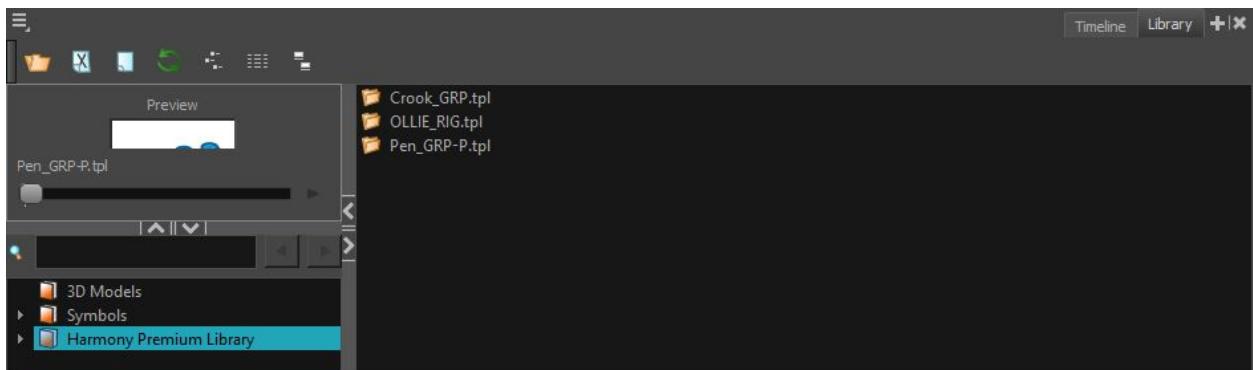




Select the peg and group, and hit CTRL + C to copy them both.

Next, in the LIBRARY WINDOW, right click on the Harmony Premium Library folder and select “right to modify”

This allows you to edit its contents, and paste the group into the library! This will be obtainable in the library folder in your computer’s documents folder.



There it is!! Pen\_GRP-P completed and ready to be handed off to the scene where it’s needed! This can be dragged into any Harmony scene as the animators deem fit.

If you need to add deformers to your object, there are many helpful online tutorials that can take you through that, but this is all I am going to cover in this paper. I hope this paper was helpful, good luck on integrating those 2D elements!