Understanding the Basics of Bone Animation

Since Anime Studio's main focus is on bone animation, this book will be following suit and providing steps for creating rigged characters. When creating your characters, you will want to think ahead of how you'll want to draw up and eventually rig the character to a system of bones. There are three ways you can use bones in Anime Studio: **Region binding**, **Layer binding**, and **Point binding**. They all have their strengths and different uses (and cartoonists usually end up using all three in some capacity). Hopefully, the next sections will give you a better understanding of all three systems.

Using Region binding

By default, when you place bones down in Anime Studio, they will end up affecting whatever sublayers they happen to be touching or have influence over. This provides a springy, cartoony look to the movements that occur on our characters and objects. In the past, Region binding proved to be more difficult because the bones would sometimes affect other parts that you did not intend to be affected. This is no longer an issue with a new feature introduced in Anime Studio 9.5, which we will be getting to shortly.

Launch Anime Studio and open up the work file **BoneExample.anime** from your list of work files provided for this book. On the screen are four vector layers, each making up a part of the arm. We're going to need to put these vectors into a bone layer. Perform the following steps from step ① to do so:
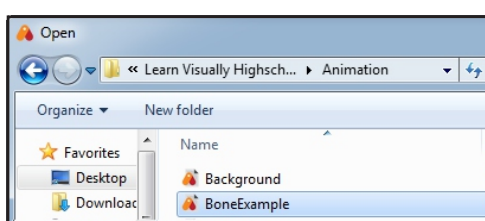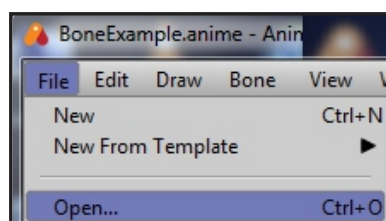
1. Click the Shin R-Patch layer, then click on the **New Layer** button on the Layers panel and select **Bone** from the list.

2. Type and name the bone as **Right Leg**.

3. Move all of the vector layers into(under) the bone layer you have just created(Right Leg bone layer)by clicking on the bottom vector layer , holding the *Shift* key and clicking on the Shin R-Patch to highlight or select all the leg parts. They all should now be highlighted, as shown in the following screenshot(right).

4. Hold down your left mouse button and drag the vectors into the bone layer(Right Leg).

5. All leg pieces or parts are now inside the Right Leg bone layer as shown in the screenshot(right).
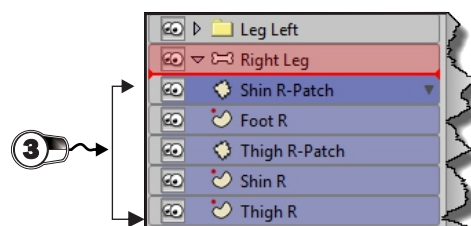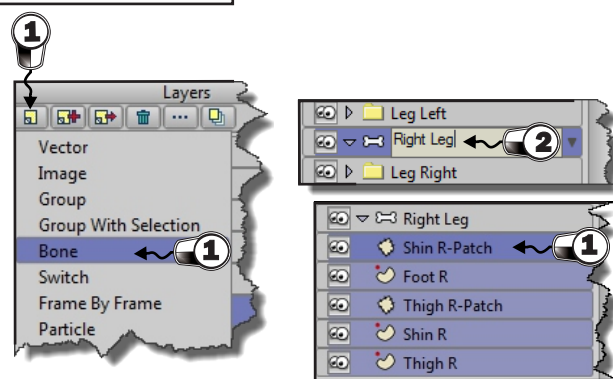
NOTE...
You can always create the bone layer first and place the vector layers inside it as you draw out the different pieces or objects. The order you choose is completely optional.

Now we need to draw the bones for the bone layer. These will ultimately control the sublayers inside the bone layer. Perform the following steps to do so:

① Make sure the **Leg bone layer** is selected on your Layers panel.

② Click on the **Add Bone** tool on the toolbar to the left. This should look like a bone with a + icon underneath it. You can also use the *A* key on your keyboard to select it.

③ Starting with the top of the **Thigh**, you are going to hold down your mouse button and drag down to where the Thigh starts and then release it. A triangular red shape is now present on your Leg bone layer. This is what a bone looks like in Anime Studio, as shown in the following screenshot(right)

④ Repeat the same steps for the bottom portion of the Leg. Draw the bone from the shin until it meets the end of it.

⑤ The final bone will be for the Foot. Draw a bone from the Shin to its foot. If you desire, you can draw a bone for each toes, but for now, we'll keep things simple.

⑥ If you ever misplace a bone or incorrectly size it, click on the **Transform Bone** tool (it looks like a bone with a crosshair underneath it). This allows you to move bones by clicking and holding on the thick end of the bone and dragging it. You can also resize bones by holding down on the tapered end and dragging in or out.
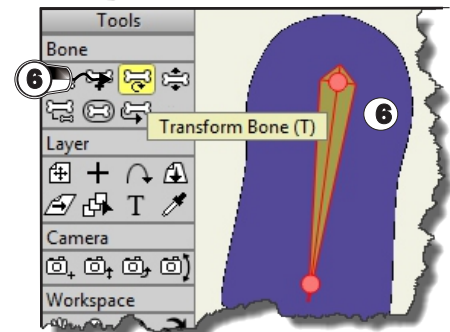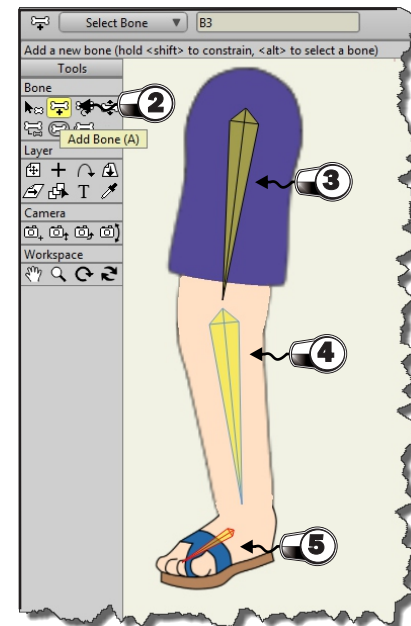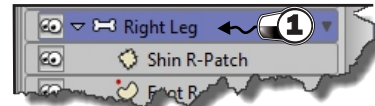
> **NOTE...**
> If you're on frame 0 when working with the Transform Bone tool, you will simply be altering the bones before animation. However, if youalter bones with this tool while past frame 0, your bones will animate out just like any other channel. Your layers will also be affected if attached or influenced by the bones. Animating with the Transform Bone tool is useful if you want to alter just one bone at a time, unlike the Manipulate Bones tool that affects all children you are moving from the parent bone. This is also referred to as Inverse Kinematics.

⑦ If you click on the **Bone Strength** tool, which looks like a bone with an oval going around it, you will see some colored clouds or highlights appear over each bone. These are the areas of influence each of your bone has. The bigger the **influence**, the more objects will be affected in the surrounding area. You can adjust these clouds by clicking-and dragging from left to right or adjusting the number for each cloud on the top bar, as shown in the following screenshot:

⑧ Save your work in own folder.
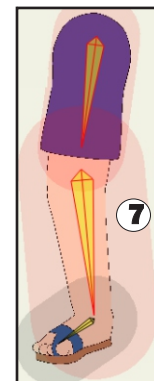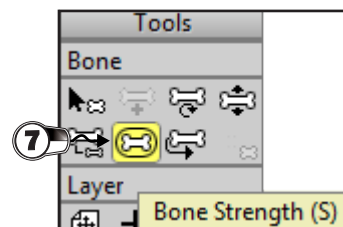
There, that wasn't so hard! Drawing the bones is only the first step. From here, we will see how these can apply to animation.

Let's test out the movement of this Leg to see what Region binding looks like by performing the following steps:

1. Click on the **Manipulate Bones** tool from the toolbar to the left. This looks like a horizontal bone with two black arrows pointing up and down.

2. Move your mouse pointer over to the Shin bone and foot bone.

3. Hold down your mouse button and drag it around. You should notice how the bones affect each other and consequently move the sublayers, as shown in the following screenshot(right).
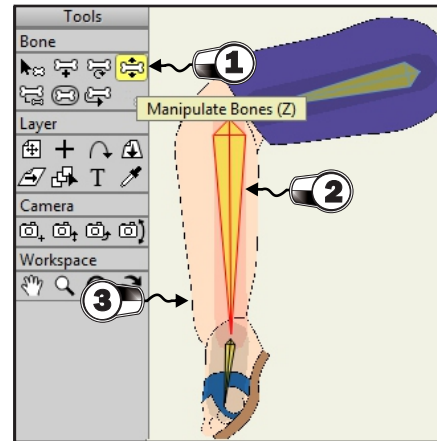
If the movement doesn't look quite right, certain things can be corrected using the **Bone Strength** tool, such as restraining bone movements and creating Smart Bone actions.

Since we are in frame 0, no animation is being recorded. If you want to revert your bone layer back to its default state, simply click on the **Select Bone** tool. Additionally, you can page-forward to frame 1, and then come back to 0 to reset the layer.
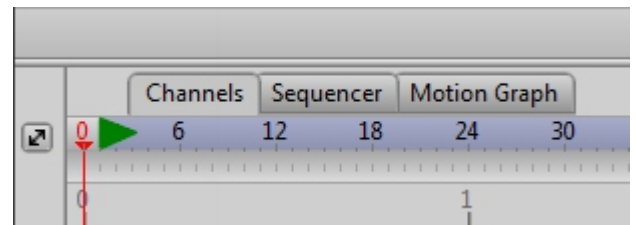
Region binding can be a powerful animation type, especially when coupled with Smart Bone actions and other techniques. We will be exploring these additional features in a little bit.
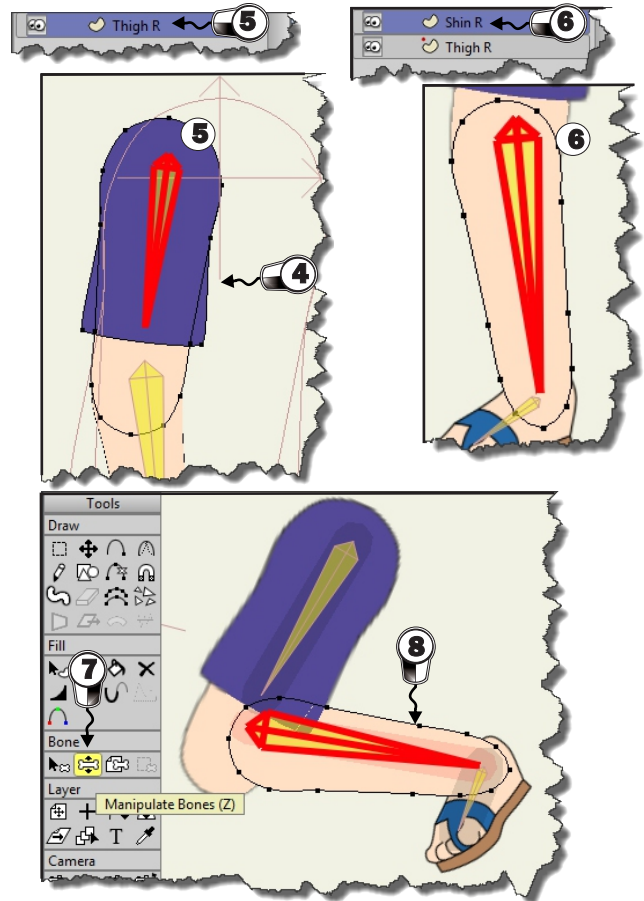
Using Layer Binding

Layer binding allows us to anchor vector layers to bones of our choosing. This will not only give you more control over some aspects of the animation but also provide limitations of its own.

Keeping the **BoneExample.anme** work file open, we will build off of the bone structure we have already established by performing the following steps:

1. Click on the **Foot R** vector layer in the Layers panel.

2. On the toolbar to the left is the **Bind Layer** tool. It looks like a piece of paper with a bone on it, as shown in the following screenshot. Click on it.

3. With the **Foot R vector** still selected, click on the **Foot** bone. The bone will turn red, indicating it has been selected.
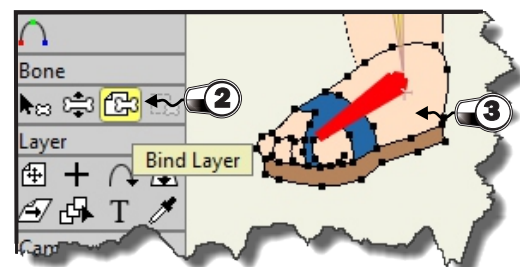
④ For the **Thigh** and top portion of the leg, we will bind these to the bone that is drawn over both of them, as shown in the screenshot(right).

⑤ Click on the **Thigh R layer**; then click on the bone going through it.

⑥ Click on the **Shin R layer**; then click on the bone that is drawn over it.

⑦ Click on the bone layer and click **Manipulate Bones** tool and use it.

⑧ Click-and-drag on the Foot bone to move the Leg. You should notice that there is a change in how the Leg moves. There's much more conformity to the movement. The Bone Strength clouds have no relevance if you have everything bound to bones. In fact, you may want to disable them completely to remove some clutter from the workspace, as shown in the following screenshot(right).

⑨ Save your work in own folder.

Layer binding is a much more organized way of creating movements with your assets. This is the preferred way of most longtime users, since Region binding takes a lot of effort to master. However, things have slowly evolved over the course of new versions of Anime Studio.

NOTE...
If you're having issues with the parts of your arm tearing or popping out of place when moving, try resizing or repositioning your bones with the Transform Bone tool. Sometimes, even a small change in size or position can help correct significant issues with layer bound bones.

Using Point Binding

Point binding is a sort of the middle ground between the two mentioned techniques. Here, instead of binding layers to bones, you bind individual points. This can be useful if Layer binding is too restrictive and Region binding is causing glitches or other issues. This is also the best way to bind bones if you only have one layer containing your objects.

For this example, we will open a new work file named **PointBinding.anime**. Keep the layer bound file in another tab as we will be using it as reference in the next exercise. Now we will use the arm of our assest, you will now notice there is only one vector layer making up the entire arm. **Bone Strengths** are off, so using the Manipulate Bones tool does nothing.

Let's bind some points by performing the following steps:

1. Click on the **Left Arm** vector layer.

2. Click on **Select Bone** tool then select the hand bone.

3. There is a tool in the **Bone** section labeled **Bind Points**. Click on that, this allows you to select points as shown in the screenshot.

4. Beside selecting the points of the hand one by one, you can also click the hand directly as shown in the screenshot. Use a shortcut by holding down the Alt-key and left-click on the hand bone.

5. Select all of the points on the arm by clicking+dragging a box or using a shortcut keys **Ctrl+A**. If you more control, you can also tick the **Lasso Mode** button. Hit the **Enter** key to deselect all points.
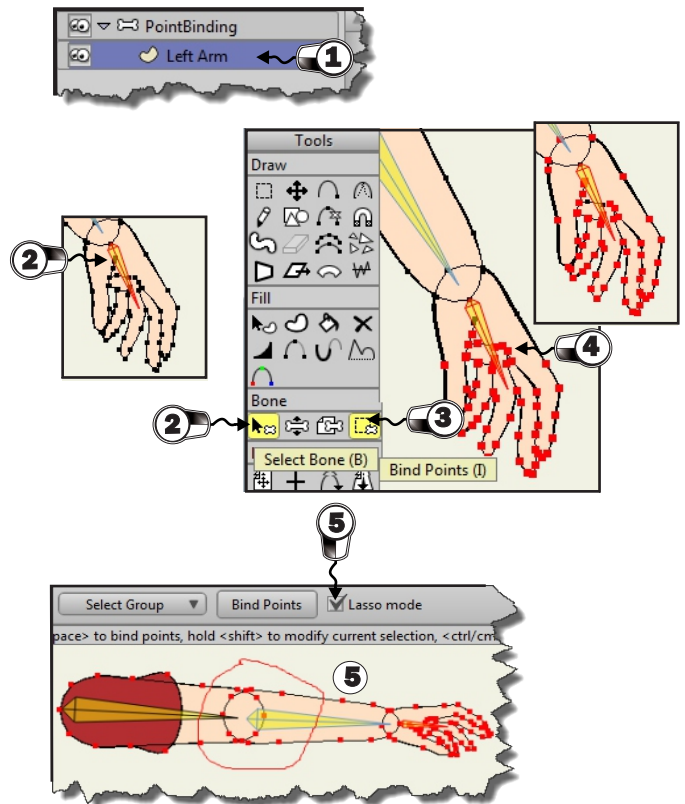
Binding the Hands area

6. Click the **Bind Points** tool again, select the hand bone, then this time highlight only the points that makes up the hand (with the hand bone still selected) use Shift key, if you notice some points are not added in the group.

7. Then click on the **Bind Points** button on the top bar, as shown in the following screenshot(right). This will ensure that all of our points are now accounted for. Press enter when finished.
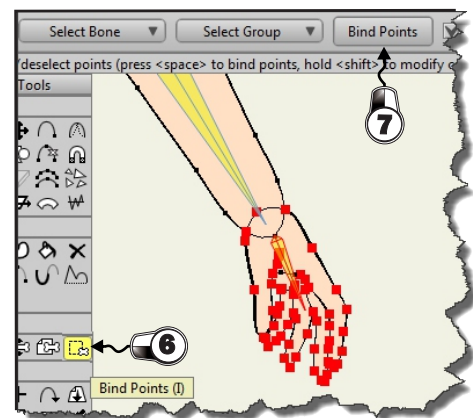
Binding the Lower Forearm part

8 Lets do the shortcut, hold down **Alt key + left-click** on the forearm bone.

9 Click to use the **Bind Points** tool and click inside the points that make up the forearm, as shown in the following screenshot. If you see some points that is not selected, try to get as close as you can with the accuracy of your selection, hold down the shift keyso you could add that point .

10 Click the **Bind Points** button on the top bar. Tip: hit spacebar, notice the points are binded.
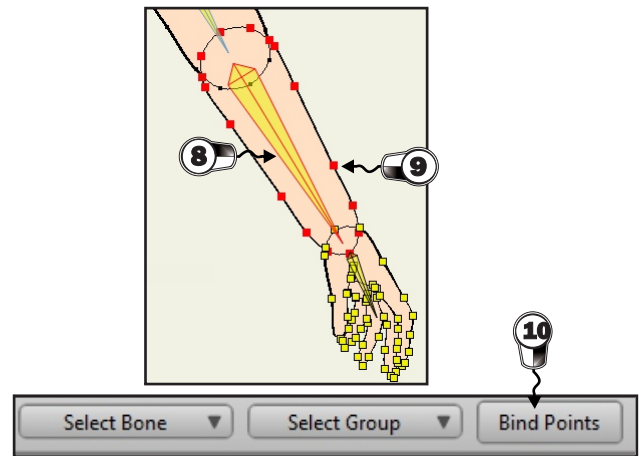
Binding the Upper Forearm part

11 Repeat these steps with the top arm bone. Make sure that the bone is selected, click and use the **Bind Points** tool then select the points that have yet to be accounted for, and click on Bind Points.

12 Now click the **Manipulate Bones** tool and move the arm around by its hand. You should notice a result similar to that of Layer binding; except, things are a bit more flexible. Pretty cool!.

13 Save your work in own folder.
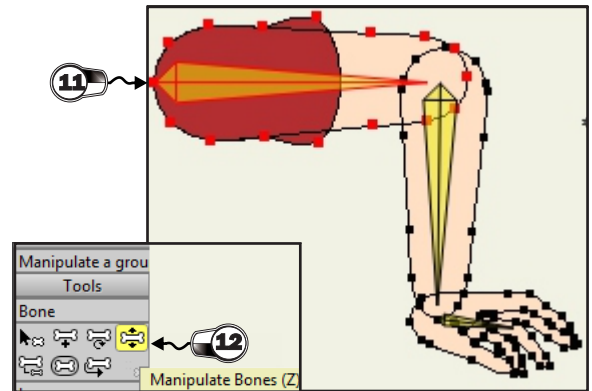
Binding points is great if you have many assets on a layer and want to assign them to different bones. It can also be great for a more flexible look without the headaches that Region binding can bring.

Restricting bone movements

It can be helpful to restrict just how far a bone can move to avoid awkwardness with movements and positions. You can restrict the movement of any bone you wish and in varying degrees.

Let's use the layer bound (`BoneExample.anme`) arm we just set up as an example for this lesson. Click on its tab to bring the file back up.

Perform the following steps to restrict bone movements:

1 Select the **Select Bone** tool from the toolbar, it looks like a bone with a black arrow to its left.

2 Click on the **middle bone** that controls the **Shin R layer** as shown in screenshot.

3 On the top bar is a drop-down menu labeled **Bone Constraints**. Click on it.
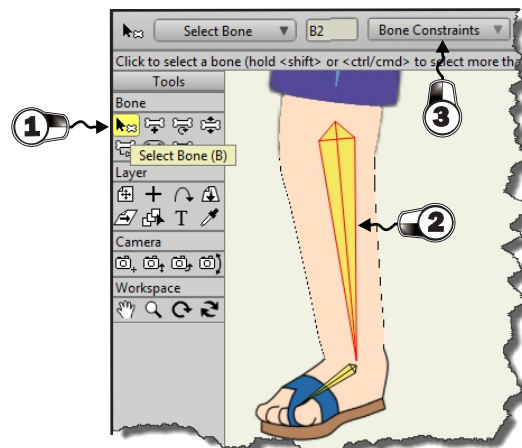
4. Tick/click the **Angle Constraints** checkbox to turn on.

5. From here, you can enter two sets of numbers to determine the angle constraint for the selected bone. How far you constrain the bone will depend on your needs and the situation. For this example, let's enter **-20** and **70**, as shown in the following screenshot(right).

6. Two angled lines should now appear on the top of the bone. This is a visualization of the bone constraints. This helps when experimenting with different values.

7. Once you are finished, select the **Manipulate Bones** tool and move the leg around. Notice how the bend of the leg is restricted, yet we still have some issue with the foot moving unnaturally. Let's add some restrictions to this as well.

8. Select the foot bone with your **Select Bone** tool and bring up the **Angle Constraints** panel again.

9. Check the **Angle Constraints** checkbox and enter **-5** and **5** for the restriction values. This will give us a little wiggle room; yet, keep the Foot almost stationary during movement.

10. Now try moving the Leg with the **Manipulate Bones** tool to see the results.

11. Save your work in own folder.
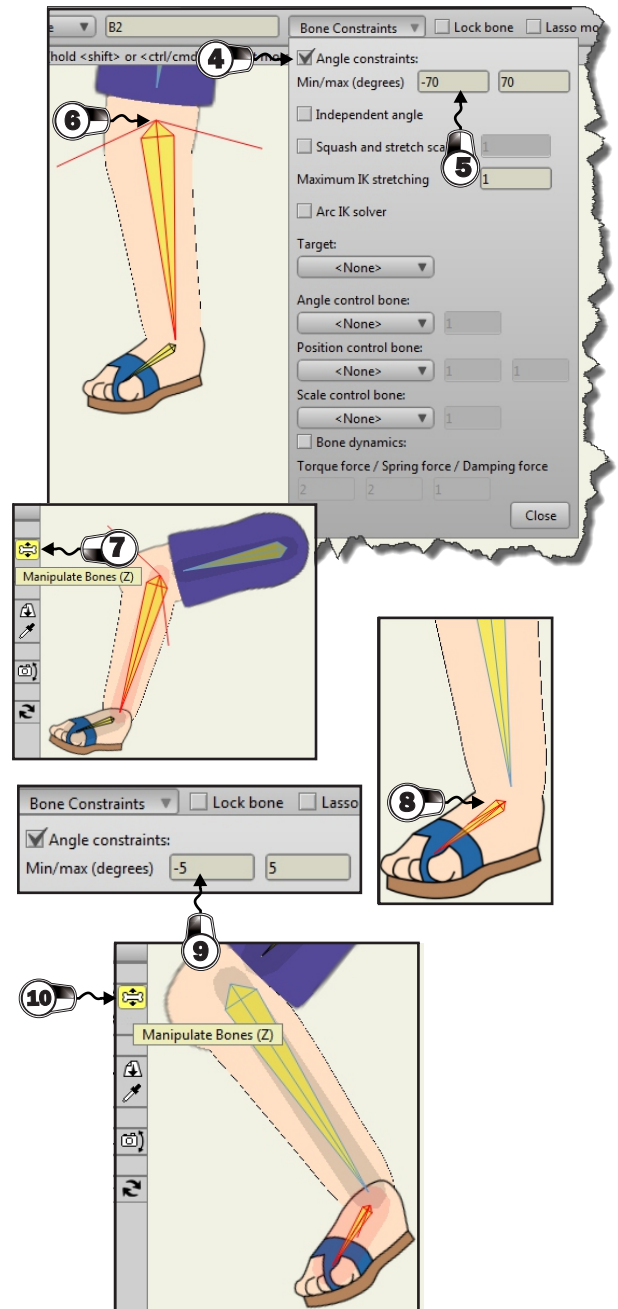
Restricting bone movements has the benefit of maintaining a certain consistency as well as hiding defects that could pop up during animation. Be sure to keep this in mind, especially as we start to design a full-fledged character.

┌─ **NOTE...**
Anime Studio Pro 10 has introduced some great new bone constraint features that can really streamline our workflow and increase the visual flare of an animation. We will be looking at some of these options in the succeeding chapters.

Advanced Region Binding Techniques

While Region binding can provide a nice "springy" cartoony look to your rigged objects, there are some issues when it comes to your bone strength spheres intersecting with other objects. Anime Studio introduced a new feature called Flexi-Binding, which really helps with containing the sometimes-problematic Bone Strength spheres.

To work with this technique, let's open up the example file **FlexiBindingExample.anime** from the book's work files. You will see a familiar green face. As you can see, we already have a bone structure rigged/set-up for the character. We will be focusing solely on how the bones work in this exercise.

Perform the following steps to work with Flexi-Binding.

① With the **Mr. Flexibind Bone** layer selected and at frame 0, click the **Manipulate Bones** tool.

② Click on the bottom bone of the **Left arm** and move it around. Notice how the Region binding is causing other parts of our character to react. Even if we were to reduce the strength of our bones as low as they can go, this will still be an issue to some extent.

③ In order to fix this, we will need to target each section of bones that we want to link to certain body parts.

④ Click the **Select Bone tool** and drag a selection area around the Left arm. You could also select all of the arm bones by clicking on one, holding the Shift key, and clicking on the others. Once all of the arm bones are highlighted in red, then you are set.

⑤ Click on the layer labeled **Left Arm** in the Layers panel. We are doing this because this is the layer we want to bind with the bones selected.

⑥ Now, go up to your top menu bar and navigate to **Bone | Use Selected Bones For Flexi-Binding** (Ctrl+Shift+F), as shown in the following screenshot(right).

⑦ Do and perform similar steps when manipulating the other arm, two legs, and body as well.
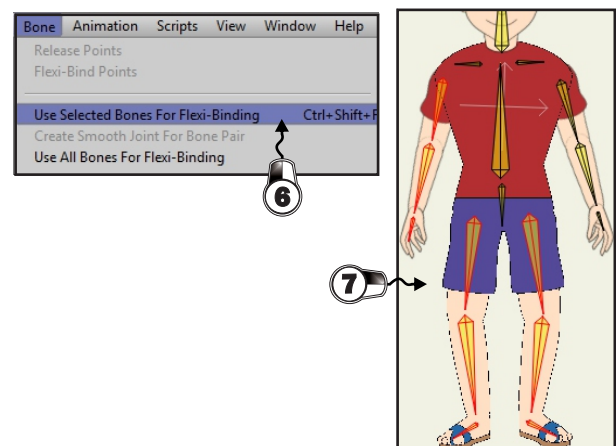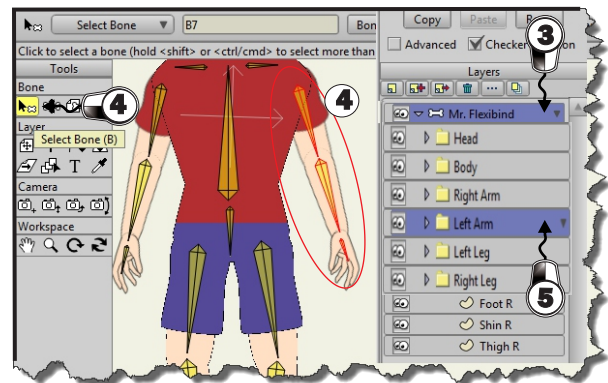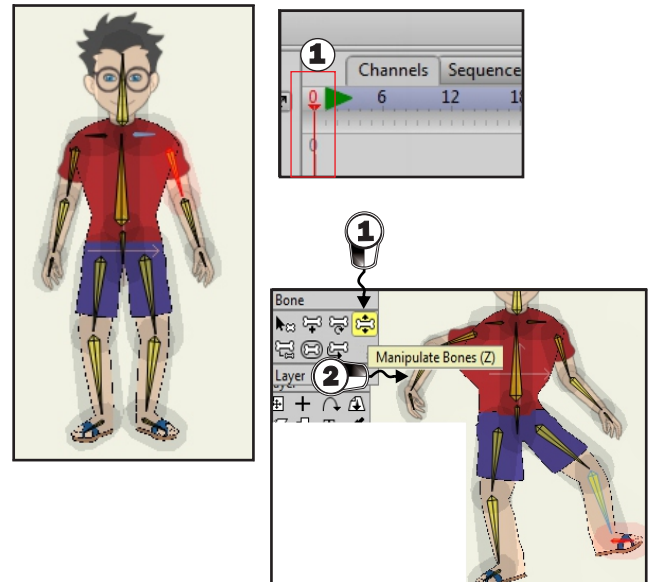
8 For the **Body** and **Leg** bones, we have to accurately identify each part of its layer and properly use **Flexi-binding**, so your arm and other parts should be independent and with no conflict.

9 To do this, just follow the same steps as how it was done in previous steps as with the arm. But you have to physically identify each layer and Flexi-bind it with their respective bone.

10 For example, in **Body Torso** it has to be the bone in the center, for the **Thigh L** or **Thigh R** it has to be the Thigh on its left and right Leg so on and so forth, perform the Flex-Binding as shown in the screenshot (right). Refer to previous topic on how Flexi-binding.
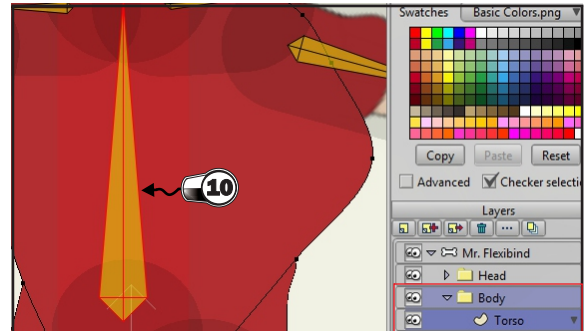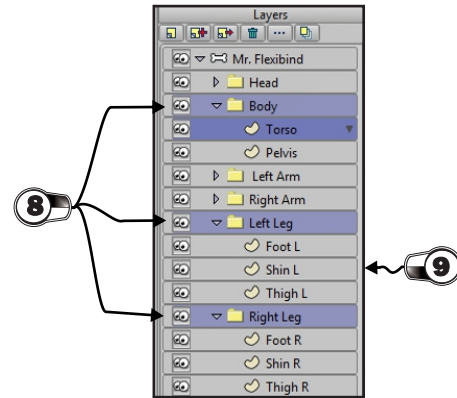
11 Use **Manipulate Bone tool** to see the effect and its behavior when you drag in and out the bones.
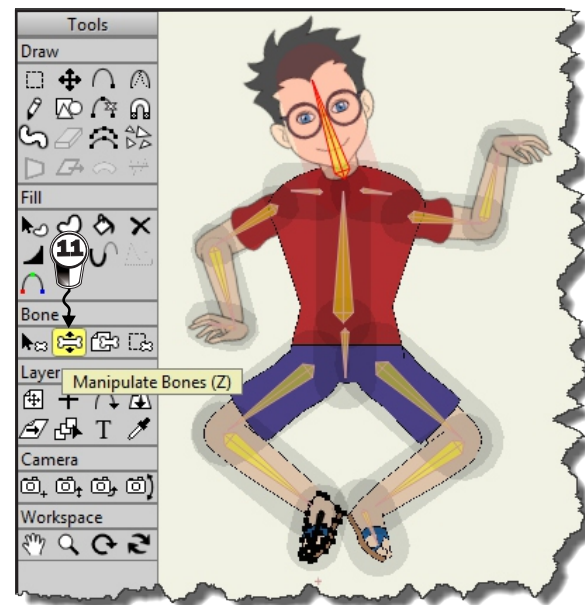
After applying **Flexi-binding** to all the vector layers for your bones, all your body parts should be independent and not in-conflict with other parts of your character or asset.

> **NOTE...**
> On frame 0, you can split up your bones and vectors using the Offset Bone tool to ensure the regions don't intersect with one another. After that, you can put everything back together on frame 1. This was the old method and is still viable. However, since Anime Studio 9.5's introduction of Flexi-Binding, offsetting bones is no longer needed.

If you decide to use Region binding for your bone structures, be sure to take advantage of the new Flexi-binding option. It will save you a lot of headaches down the road.

6 Bringing a Cartoon Character to Life

Laboratory Activities

Jake's Layer Binding

Lab Exercise 6.2

Task: <u>Bind bones to its layer</u>
Expected Output File: <u>None</u>
Work File: <u>Jake the Boy.png</u>

Video Tutorial: Bone Rigging Tutorial.mp4

① Launch the Anime Studio application from your desktop. You may start viewing the video tutorial.

② Open the character "Jake the Boy " from the previous project that you have made.

③ Bind all bone that correspond to the parts of Jake. Use the Bind Layer tool and Manipulate Bones tool to test if bone moves together with its part.

④ Save this project file to your folder.