Introduction to Mudbox

If you are familiar with Maya, 3ds Max, Cinema 4D, or any other three-dimensional (3D) program, you will be right at home in Mudbox and will begin sculpting in a matter of minutes. However, if you are new to 3D and digital sculpting, Mudbox is still the perfect choice because of its artist-friendly interface, shallow learning curve, and intuitive sculpting and painting workflows. In the first part of this chapter, you will briefly review important parts of the Mudbox interface like menus, tools, windows, and camera navigation. After the interface overview, you will be reviewing the basics of 3D computer graphics. Then, you will complete the first tutorial in this book that will introduce various sculpting tools, layers, and provide you with hands-on experience with Mudbox.

Interface Overview

Upon launching Mudbox, you will see the Welcome window, which provides quick access to the Learning Movies, the models that come with Mudbox, and any recent Mudbox files worked on. You may turn off the Welcome window by checking the "Do not show this Welcome window again" option in the lower left corner. If you choose to turn it off, you will still have access to all of the
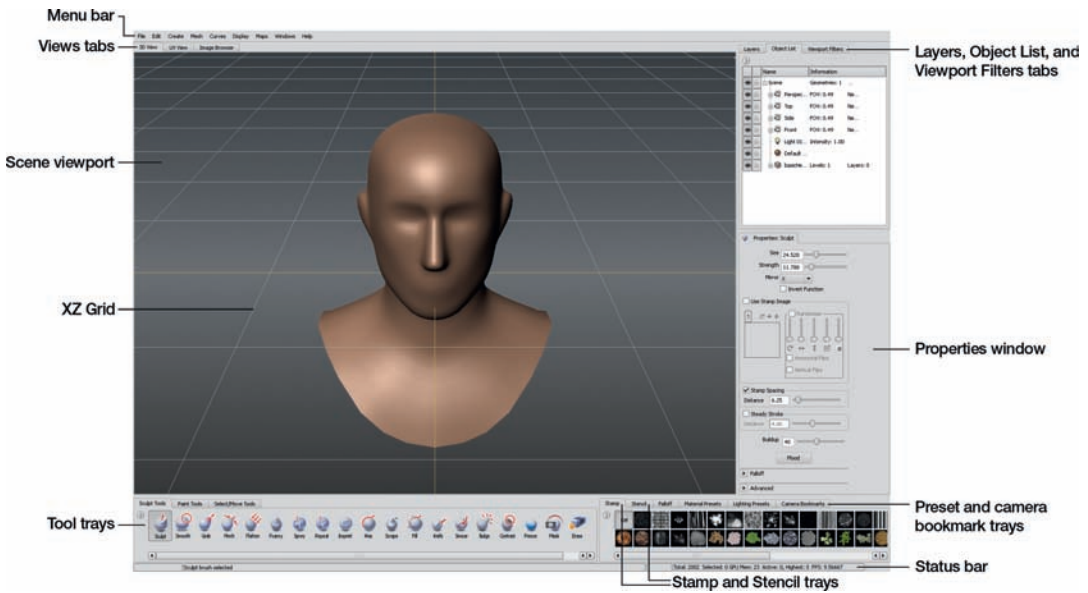
FIG 2.1 Mudbox Has a Standard, Intuitive Interface and Straightforward Sculpting and Painting Workflows.

same data through the menus. For now, select the Basic Head model from the "Start a new sculpture section" in the Welcome window. You should see the Basic Head model in the scene as shown in **Figure 2.1**.

By default, you should be looking through the perspective camera into the scene, which is contained in the 3D View. The 3D View is one of three main views in Mudbox. The other two are the UV View and the Image Browser. The 3D View is where you do sculpting and painting work, and it is analogous to viewports in other 3D programs. In most standard 3D modeling programs, you can view the scene through multiple cameras or viewports, but in Mudbox, there is one viewport. Nonetheless, you may use Mudbox's camera bookmarks, which you will learn about later, to quickly switch between the camera views. Next to the 3D View tab is the UV View, which displays the UV coordinates of the selected model. The third tab is the Image Browser, which allows you to preview and organize images and assign them to various tools. For example, you could browse to an image on your hard drive, load it into the Image Browser for inspection, and then assign it to be used as a stencil to detail a model. The Image Browser is also useful for viewing specialized types of files such as image-based lighting files and displacement maps.

At the bottom of the interface, you will find a collection of customizable trays that organize the Sculpt, Paint, and Select/Move Tools along with an assortment of trays for storing stamps, stencils, bookmarks, and various presets. The Sculpt, Paint, and Select/Move Tools comprise the three leftmost trays (**Figure 2.2**). Faces and Objects are selection tools, and the Translate, Rotate, and Scale tools are collectively known as the *transform tools*. You may customize any of the tool trays by adding, deleting, or renaming tools, as well as building custom
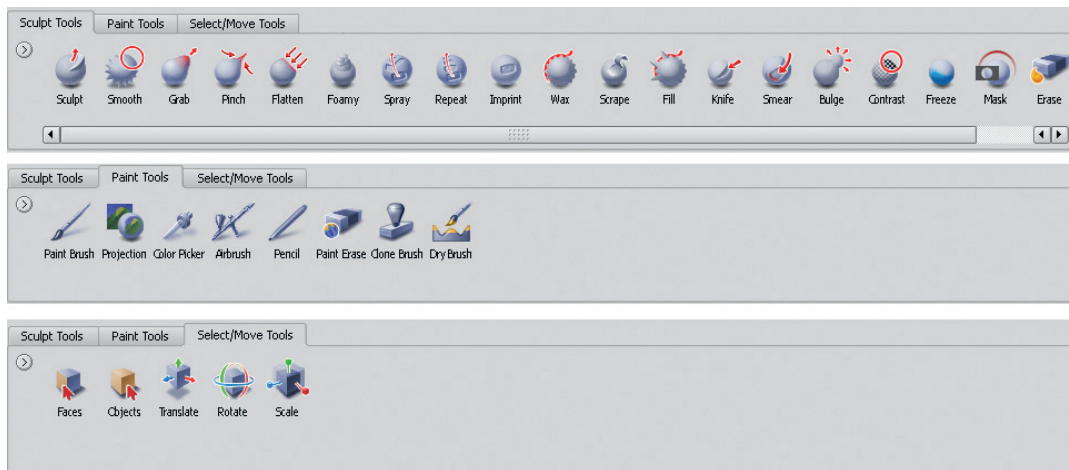
FIG 2.2   Mudbox Features a Comprehensive Set of Sculpting and Painting Tools. The Main Selection Tools Are Faces and Objects, and the Translate, Rotate, and Scale Tools Comprise the Select/Move Tools.

trays with your favorite tools for quick access. The first nine sculpting tools may be accessed by simply pressing the numbers 1 through 9 on your keyboard.

The first two trays on the right organize images that can be used as stamps or stencils in conjunction with various sculpting and painting tools. Mudbox ships with an assortment of stamps and stencils, but you can create your own tools and add them to the trays. Next is the Falloff tray, which stores presets that manage sculpting and painting tool profiles. At this point, it is worth mentioning that the falloff parameter is an important property of the Mudbox tools because falloffs dictate the shape of the stroke created by the tool. In other words, the same tool with different falloffs will create different effects. The last three trays on the right are the material presets, lighting presents, and the camera bookmarks.

The next important area in the Mudbox interface is the tabs and windows to the far right of the interface. Starting at the top, there are the Layers, Object List, and Viewport Filters tabs. The Layers tab is composed of the Sculpt and Paint layers. You may add, delete, merge, and restack the sculpting layers as needed. These may also be locked, hidden, or have their effect attenuated by adjusting the layer opacity. Much of the work you will do in Mudbox is directly tied to managing the sculpting layers efficiently. The tutorial in the chapter will introduce you to layer basics, and the tutorials that follow will cover layers in detail (**Figure 2.3**).

To switch to the paint layers, press the Paint button in the Layers tab. The paint layers organize the various texture types that may be painted on a model. For instance, you may paint several diffuse textures, as well as specular, gloss, bump, and reflection textures. Like the sculpt layers, the paint layers may also be restacked, locked, hidden, or have their opacity adjusted (**Figure 2.4**).
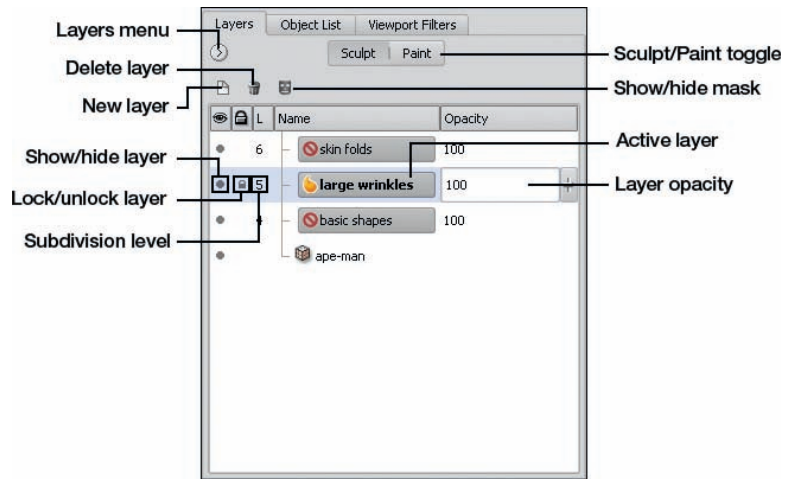
FIG 2.3 To Effectively Sculpt In Mudbox, You Must Learn to Manage the Sculpt Layers.
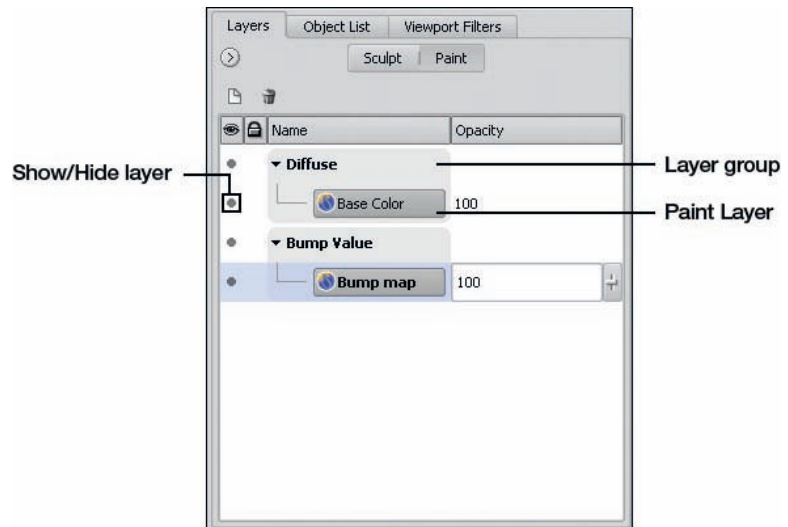

FIG 2.4 Paint Layers Organize the Different Types of Textures, Such as Diffuse, Bump, and Specular, that Mudbox Can Paint.

The Object List organizes, manages, and displays information about all of the objects in the scene including lights, cameras, and materials (**Figure 2.5**). For instance, you may choose a different camera to look through, as well as select, rename, or delete objects from the scene. Last in this set of tabs is the Viewport Filters. The first three Viewport Filters simulate various render environments through controls for lighting, depth of field, and ambient occlusion. The Screen Distance filter displays a gray scale depth map of the model based on the distance from the camera. The Normal Map filter previews the normal map, and the Non-photorealistic filter simulates a sketchy render.
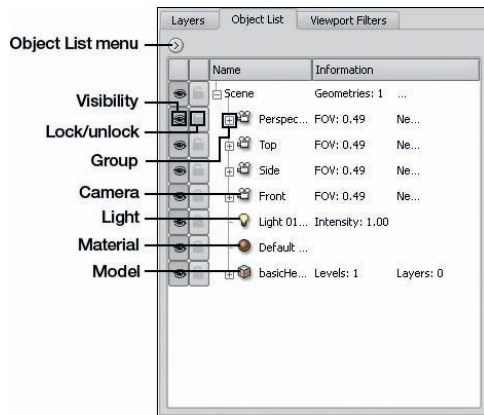
FIG 2.5   The Object List Is the Central Hub Where You Can Find Information about Any Object In the Scene.
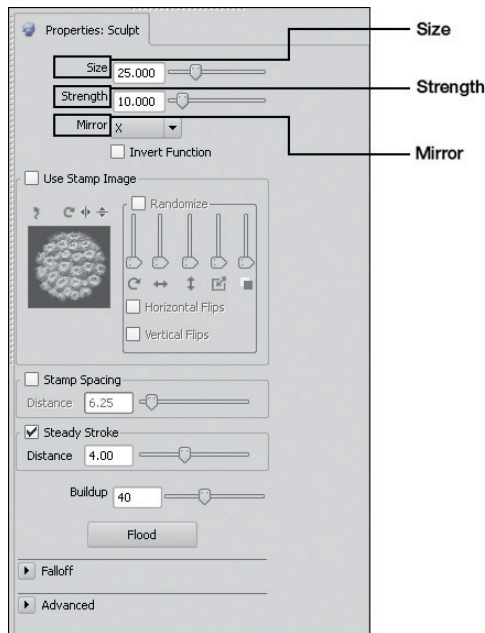

FIG 2.6   The Properties Window Displays Information about the Active Tool or Selected Object. The Strength, Size, and Mirror Properties Are Highlighted because They Are Often Used to Adjust the Mudbox Tools.

Below the Layers, Object List, and Viewport Filter tabs is the Properties window (**Figure 2.6**). The Properties window is context sensitive in that it will display attributes of selected objects or tools. For instance, if you select the Foamy tool, all of the properties for that tool will be displayed in the Properties window; if you then select a camera from the Object List, then the properties for the camera are displayed. It is important to highlight the Size, Strength, and Mirror properties of the sculpting and painting tools. You will be referring to these properties a lot in the following tutorials.

The menu bar is located along the top left corner of the interface (see **Figure 2.1**). These menus organize different commands by task. The File and Edit menus organize standard file-management commands, as well as selection commands. The Create menu sorts all of the different objects that may be created, and the Mesh menu provides quick access to subdivision commands. For now, we will skip over the Curves menu and move on to the Display menu. The top one-third of the Display menu holds the commands to hide and show objects, and the bottom two-thirds features commands for customizing how objects are displayed and how the scene looks. You may access the commands in the bottom two-thirds of the Display menu by right-clicking anywhere in the scene. Next, the Maps menu has the commands for extracting displacement maps, which will be covered in Chapter 6. And finally, the Windows menu allows you to display different tabs as floating windows. Some users may prefer to have specific windows handy all the time – by selecting them from the Windows menu, the selected window persists in the interface. The Preferences command in the Windows menu allows you to customize just about every part of Mudbox. If you are using the Macintosh version of Mudbox, the menus are slightly different. For example, the Preferences will be located in the Apple menu and not in the Windows menu.

Camera navigation is an integral part of working in Mudbox; it involves moving around the scene by panning, rotating, and zooming the camera. See **Table 2.1** for hotkeys to navigate the camera. Later on in this chapter, you will be prompted to set up your graphics tablet. Once you have finished, you will use the buttons on the tablet's stylus (pen) to navigate the camera throughout the scene.

A couple of last interface items that we will discuss are the Heads-Up Display (HUD) and the Status bar. When working in Mudbox, you will often see the HUD display important information about what you are doing. For instance, when you subdivide a model, the HUD will display the new number of polygons and subdivision level. Certain error messages are also displayed through the HUD, as well as information about different tools, like instructions when using stencils (**Figure 2.7**). The far left end of the Status bar displays a blue progress bar that indicates how much of a specific operation has been completed. This is usually noticeable when performing operations that can be time consuming like when extracting displacement maps. On the right side of the Status bar is information about the scene and, occasionally, you will see the far right end of the Status bar flashing to remind you to save your work (you can turn that off if you find it annoying).

In this section, you have briefly reviewed the Mudbox interface, so that you can effectively work through the tutorial, later in this chapter. However, there is much more to the Mudbox interface that is not specifically covered here, but you will eventually come across many of those features later in this book. If you are curious now and want to know more, go to the Help menu
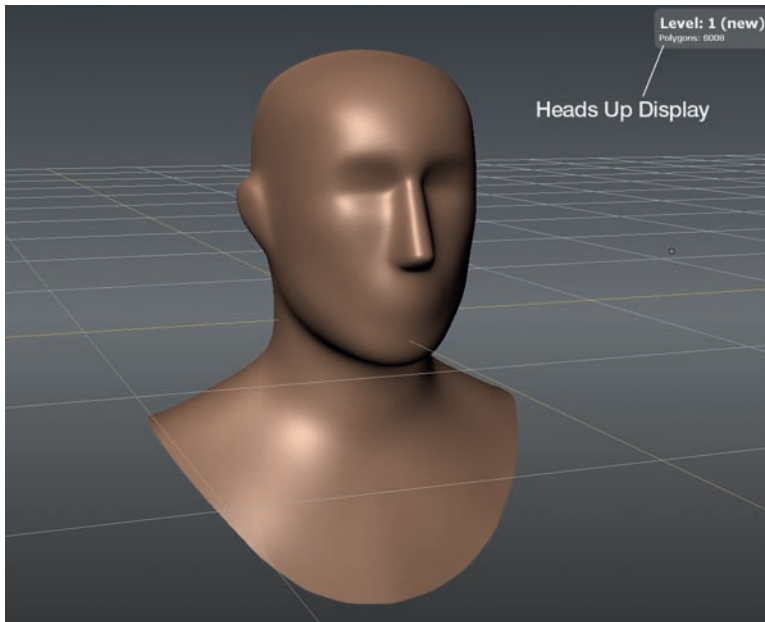
FIG 2.7 The HUD Displays Important Information about Current Operations.

and select Mudbox Help and choose User Interface to learn more about the Mudbox interface.

What You Will Need to Work In Mudbox

To get the best results from Mudbox's sculpting tools and painting brushes, you will need a pressure-sensitive graphics tablet. We recommend that you use a Wacom tablet. In fact, Autodesk lists a Wacom tablet as part of the system requirements for Mudbox. Wacom produces a wide variety of graphics tablets for all levels of experience and budgets. Before starting work on the tutorials, launch Mudbox, go to the Help menu, select Mudbox Help, and complete the Tablet Setup instructions. The reason we are not guiding you through the tablet set up process is that set up for different tablets may vary and you can customize how your tablet works.

Mudbox was developed to be used by a wide spectrum of users, including students, hobbyists, and professionals. Each type of user will require different configurations of computer hardware, depending on how they use Mudbox. For the tutorials in this book, your computer should meet the minimum hardware and operating system requirements listed for Mudbox on the Autodesk website. The reason your computer must have at least the minimum requirements is that to effectively sculpt in Mudbox, you will be working with models composed of hundreds of thousands and, sometimes, millions of polygons.

Although Mudbox is optimized to efficiently manage very large polygon datasets, you will still need the computer hardware that can handle the data. The tutorials in this book were designed so that almost anyone can complete the work with a standard computer that meets the minimum requirements.

A 3D Primer

Because Mudbox is a true polygonal modeler, it is important to understand some of the basics of 3D computer graphics. If you have experience working in programs like Blender, XSI, or 3ds Max, then you probably are already familiar with these concepts and may skip to the tutorial later in this chapter. However, if you are either new to 3D computer graphics, or a traditional sculptor curious about digital sculpting, this section will introduce you to several of these important topics.

Understanding 3D Space

Like most standard 3D programs, Mudbox uses *x*, *y*, *z* coordinates to plot the location of objects within its virtual 3D world space also know as the *scene*. Everything from the location of models, lights, and cameras, even how some of the sculpting tools work depends on the *x*, *y*, *z* coordinate system. The center of the coordinate system is called the *origin*. At the origin, the value of *x*, *y*, and *z* is 0. So, if an object that is located at the origin is moved 5 units along the *z* axes, the value of the *z* axis for that object changes from 0 to 5. In Mudbox, the *x* axis describes the horizontal plane (left/right), *y* axis describes the vertical plane (up/down), and *z* axis describes the depth plane (front/back).

To see the coordinate system at work, try the following quick exercise. Launch Mudbox, and from the Welcome window, select the Basic Head model to insert it into the scene. Next, click on the Select/Move Tools tab in the bottom tray and choose Rotate. You should see the Rotate manipulator appear within the model. If you look closely at the Rotate manipulator, you will see the rotation axes labeled *x*, *y*, and *z*, as seen in **Figure 2.8**. In the Properties tray, you will see three input fields (one for each axis) next to the label Rotate. Now, click anywhere in the scene and drag. Notice that the model is rotated as you drag but also notice that the values in the Rotate field change. By dragging the mouse, you are interactively changing the *x*, *y*, *z* Rotate values. Finally, type a 0 in each Rotate input field. The model should go back to its original position. The Translate (move) and Scale tools work in a similar fashion. It is important to understand the underlying coordinate system because it describes the 3D space within Mudbox and affects just about everything within the scene.

Polygon Basics

Mudbox is a polygonal modeler, which means that the sculpting tools move the polygons that make up a model to change its shape. But what exactly
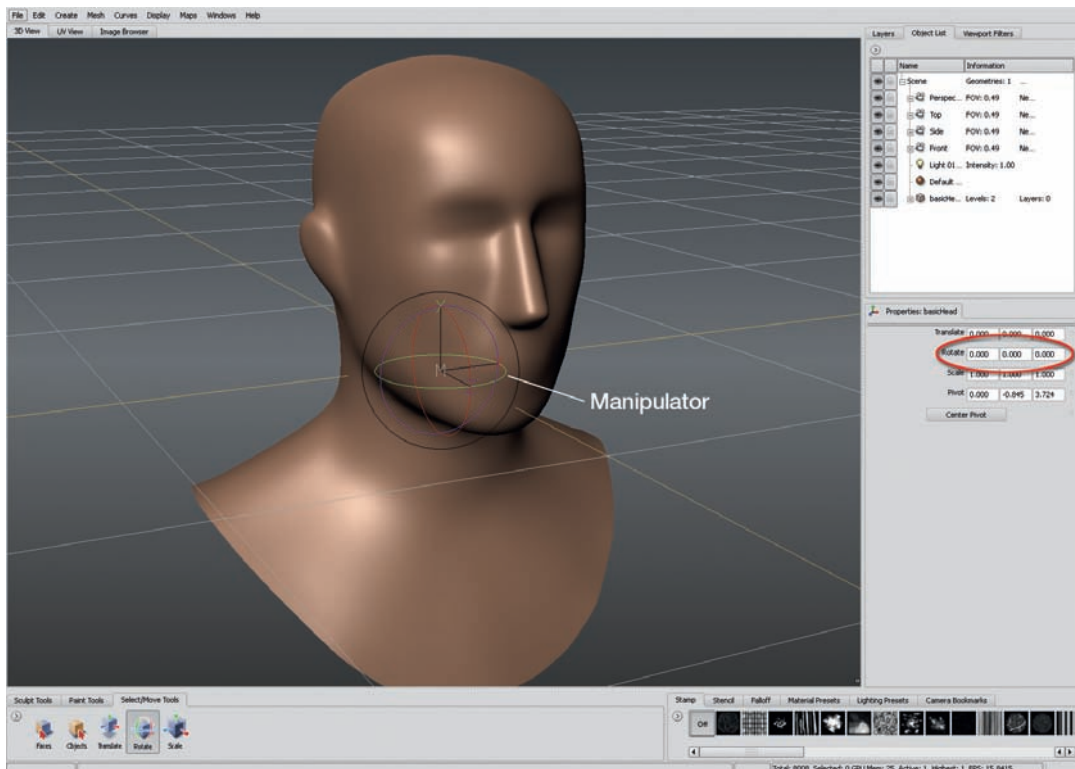
FIG 2.8 You Can See the *x*, *y*, *z* Axes Labeled In the Rotate Manipulator. Also Notice the *x*, *y*, *z* Coordinate Input Fields In the Properties Window.

is a polygon? A *polygon* is a virtual 3D object that is composed of at least three vertices and three edges forming a triangle. However, a polygon that is composed of just vertices and edges is empty and usually invisible. To become visible, a polygon must be filled so that it can interact with virtual lights. Once filled, a polygon has a front face and back face. Typically, it is the front face of a polygon that can interact with virtual lights. This type of polygon is called a single-sided polygon, and it is the type of polygon that Mudbox displays. If a single-sided polygon is flipped, with the back face pointing toward the light, it becomes invisible again. To see the edges of the polygons that make up a model in Mudbox, referred to as the *wireframe*, press W (**Figure 2.9**).

When many polygons share their vertices and edges, a polygonal model is constructed. A polygonal model can be open like a plane or a closed volume like sphere. When working in Mudbox, you only need to be aware of polygon faces. Mudbox does not have any tools to directly manipulate vertices or edges. Mudbox works best with polygons that have four vertices and four edges, otherwise known as a *quadrangle* or *quad* in short.
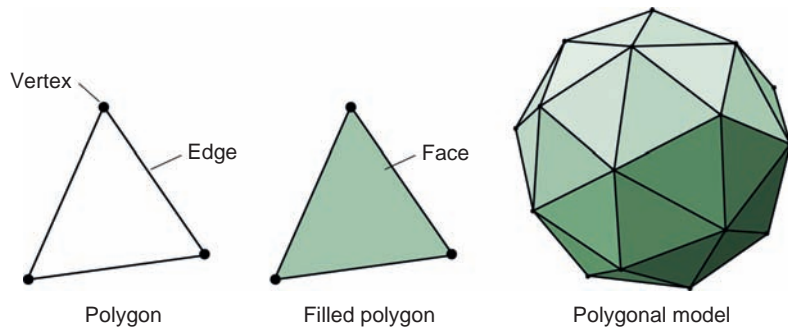
FIG 2.9 Polygons Are Composed of Vertices and Edges. Filled Polygons Interact with Virtual Light, and When Many Polygons Share Vertices and Edges, a Polygonal Model Is Constructed.

Resolution

Another concept that is important to understand is resolution. In computer graphics, resolution can mean many things like how many pixels make up an image. However, in digital sculpting, the resolution of a model is determined by how many polygons make up the model. For example, a model with half a million polygons has a lower resolution than a model with a million polygons. The process of adding polygons or increasing the resolution is called *subdivision*. Try the following quick exercise. With the Basic Head model in the scene, press W to display the wireframe. In the lower right corner status bar, you should see the number of polygons that make up the Basic Head model as 2002. Now, press Shift + D to subdivide. Notice the total is now 8008 polygons and the wireframe is denser. Each time a model is subdivided, the number of polygons is multiplied by four. You can see how it would be easy to increase the resolution of a model into the hundreds of thousands if not millions of polygons with just a few subdivisions. To sculpt fine details, a high-resolution model is often required, but the higher the resolution, the more computer resources are needed to display the model (**Figure 2.10**).

UV Mapping

UV mapping is a coordinate system that specifies how an image texture is applied to a polygonal model. UV mapping uses the U and V axes to assign the pixels in an image to specific locations on a model. In Mudbox, a model does not have to be UV mapped to use the sculpting tools, but it must be UV mapped to effectively use Mudbox's paint brushes. Mudbox can display UVs, but it does not have any tools to edit UVs. Consequently, if a model is imported into Mudbox for painting, it must be UV mapped in a separate program like modo. If you want to see a UV map, insert the Basic Head model into the scene and click on the UV View tab. Notice that the UV map is a flattened 2D representation of the model packed into the UV tile or space (**Figure 2.11**).
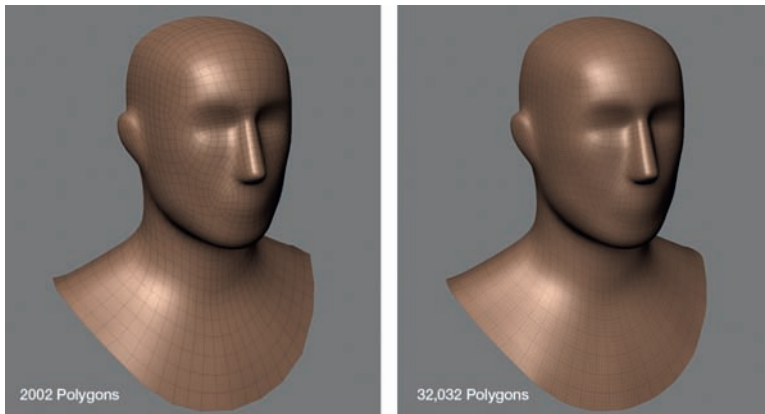
FIG 2.10 The Resolution of a Model Depends on How Many Polygons Compose the Model. The Model on the Left Has a Lower Resolution than the Model on the Right.
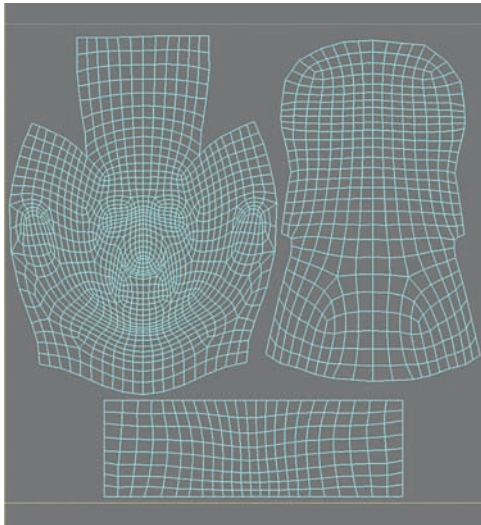

FIG 2.11 UV Mapping Is a Coordinate System that Specifies How a 2D Image Is Applied to a 3D Model.

Digital Images

A digital image is a 2D grid or dataset that stores information as pixels (pixel is short for picture element); see **Figure 2.12**. For example, a picture taken with a digital camera is a digital image composed of pixels. Pixels store information like color (RGB or CMYK), bit-depth (8, 16, or 32 bits), and transparency. Mudbox uses digital images in several ways. For instance, when painting a texture on a sculpture, Mudbox is creating a digital image. The stencils and

FIG 2.12 Digital Images Are Composed of a Pixel Grid. Each Pixel Stores Information Like Color and Transparency. Mudbox Uses Digital Images as Stencils and Stamps and Creates Digital Images When Painting Textures. *Photography by Christina Sizemore.*

stamps are digital images, and Mudbox can also save screenshots of the scene as digital images of various formats.

Mudbox Hotkeys

You should become familiar with the following important keyboard shortcuts referred to as hotkeys. These hotkeys increase productivity and usability by allowing you to quickly access common commands or tasks while working (**Table 2.1**). There are many more Mudbox hotkeys, but for now, you need to know the ones in the list below. If you would like to see a complete hotkey list, go to the Help menu and choose Mudbox Help.

Quickstart Tutorial: Sculpting a Bell Pepper

The purpose of this tutorial is to introduce you to the basics of sculpting with Mudbox. This tutorial is designed for someone who has little or no experience with Mudbox, so it assumes that you don't know anything about Mudbox or digital sculpting. If you have experience with Mudbox, you may want to skip to the sculpting tutorial in Chapter 3. This tutorial will cover fundamentals like camera navigation, several of the sculpting tools, sculpting workflow, layers, and stencils.

The subject of the sculpture in this tutorial is a bell pepper. This may seem like an odd choice for the subject of the first tutorial, but the reason we chose a bell pepper is because it has a simple but recognizable shape that is forgiving

TABLE 2.1 Hotkeys

Action	Windows Hotkeys	Mac OS X Hotkeys
Rotate camera	Alt + left mouse button	Option + left mouse button command + left mouse button
Pan or Track camera	Alt + middle mouse button	Option + middle mouse button command + middle mouse button
Zoom or Dolly camera	Alt + right mouse button	Option + right mouse button command + right mouse button
Roll camera	Shift + middle mouse button	Shift + middle mouse button
Focus	Place cursor on the area of interest and press F	Place cursor on the area of interest and press F
Frame all	A	A
Adjust tool size	B + left mouse button	B + left mouse button
Adjust tool strength	M + left mouse button	M + left mouse button
Toggle Smooth tool	Shift	Shift
Invert Sculpting tool	Ctrl	Control
Add subdivision level	Shift + D	Shift + D
Step up subdivision level	Page Up	Page Up
Step down subdivision level	Page Down	Page Down
Invert Freeze	Shift + I	Shift + I
Unfreeze all	Shift + U	Shift + U
Undo	Ctrl + Z	Command + Z

enough to allow you to focus on learning the sculpting workflow without worrying too much about details. You will sculpt the sphere model that comes with Mudbox into a bell pepper, so everything will be done within Mudbox without any imported models.

Setting Up the Scene

After launching Mudbox, you will see the Welcome window. In the "Start a new sculpture section," scroll down until you see the Sphere and click to insert it into the scene. The default Mudbox scene displays a grid along the *x* and *z* axes and a gradient background. For the purposes of this tutorial, turn off the grid and gradient by right-clicking anywhere in the scene (but not on the sphere), and from the contextual menu, uncheck Grid and Gradient Background (**Figure 2.13**).
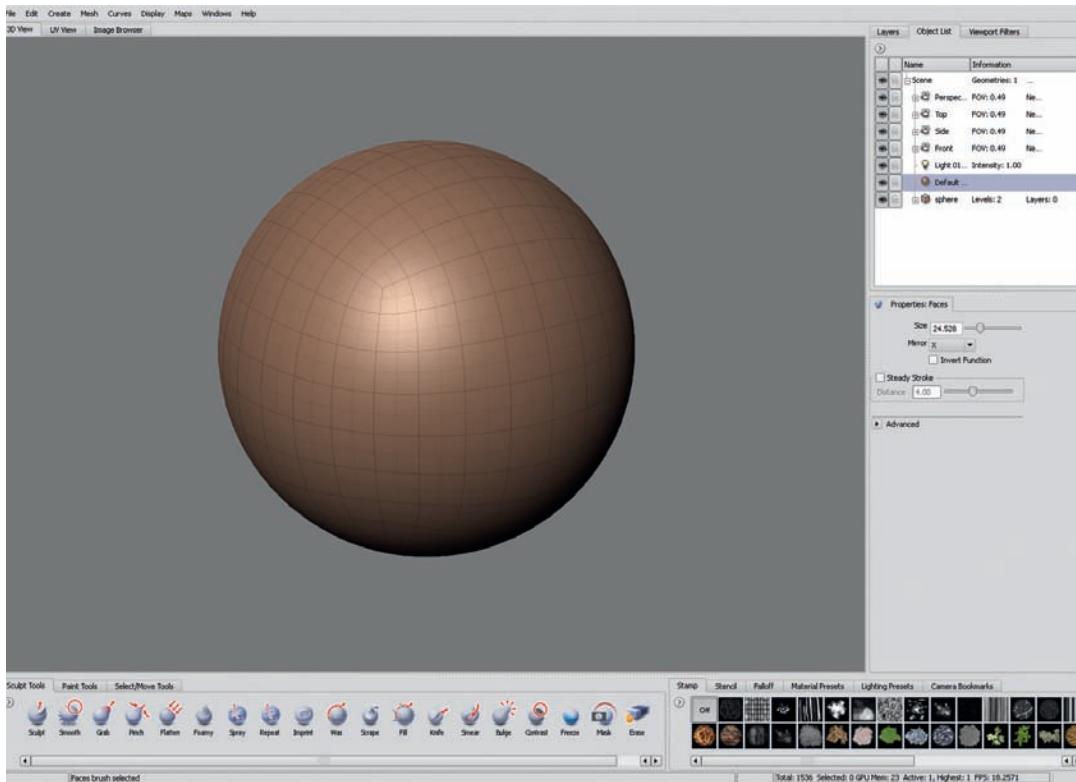
FIG 2.13 The Pepper Will Be Sculpted from Mudbox's Stock Sphere Model. Insert a Sphere into the Scene and Turn off the Grid and Gradient Background.

Selecting and Scaling a Model

Next, you will select the sphere in the scene and scale it down (make it smaller). You may select the sphere either by clicking on its icon in the Object List or by choosing the Objects tool from the Select/Move Tools tray and clicking on the sphere in the scene, and once selected, the sphere will turn yellow. Next, choose the Scale tool from the Select/Move Tools tray. Notice that the Scale manipulator is displayed within the sphere. At this point, you may scale the sphere by clicking and dragging on any of the manipulator's squares. However, clicking and dragging on the green, blue, or red squares will scale the sphere along one axis, resulting in an oval. In this case, the sphere should be uniformly scaled so that it retains its spherical shape. Click on the manipulator's white middle square and drag until the sphere is about half of its original size (**Figure 2.14**). An alternate method to scale the sphere is to do it numerically. To scale the sphere numerically, make sure that it is selected, choose the Scale tool from the Select/Move Tools tray, and in the Properties tray, enter the numerical value in the Scale input fields. In this case, you would enter .5 for each field to scale down the sphere by 50%.
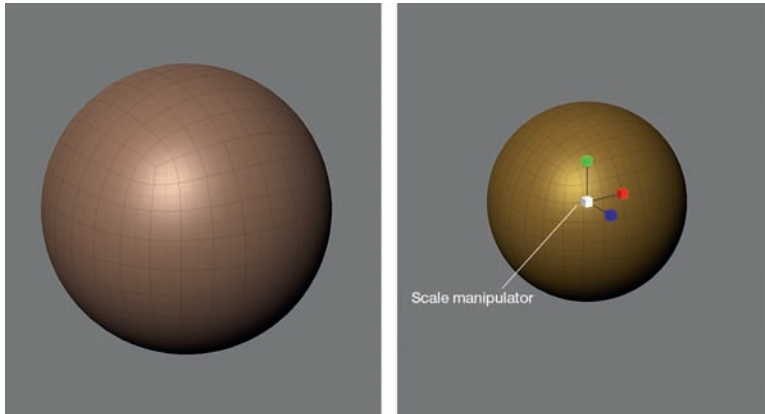
FIG 2.14 Scale Down the Sphere by about 50%. You May Scale a Selected Object by Clicking and Dragging the Scale manipulator or by Numerically Changing the Values of the Rotate *x*, *y*, *z* Input Fields.

Creating a Layer and Subdividing

Next, you are going to create the first sculpting layer and subdivide the sphere in preparation for sculpting. A layer in Mudbox is an important tool that manages the sculpting process. For example, you could rough in the basic shape of the pepper in one layer and then add details in another layer. If you don't like the work you have done in the layer in which you sculpted the details, you can delete it, create a new layer, and try again without disturbing any of the work done in the first layer in which you roughed in the basic shape. Mudbox's layers are in many ways similar to layers in programs like Photoshop. As mentioned earlier in this chapter, subdividing the model means increasing the resolution or number of polygons that makes up the model. The reason the model is subdivided is to have enough polygons to effectively sculpt. You will learn more about layers and subdivision as you work through this tutorial; for now, follow these next steps to add a new layer and subdivide the sphere.

To add a new layer, click on the Layers tab, then click on Layers menu (the small, circular button with the arrow pointing to the right), and select New Layer. A new layer is created above the object-labeled sphere. Double-click on the layer to make the layer name editable and name the layer as Basic Shape.

Press Shift + D twice to subdivide the sphere two times. As you subdivide, notice that the HUD in the upper right corner of the scene displays the active subdivision level and number of polygons in the model. You should be in level 3 and the model should have 24,576 polygons. If you missed the HUD display (it flashes by quickly), look for labels "Total:" and "Active:" in the status bar at the bottom of the interface, and they should read Total: 24,576 and Active: 3 (**Figure 2.15**). A key Mudbox feature is that you can move between subdivision levels. In this case, press the Page Down key to go down to level 2; now press Page Up to go back up to level 3.
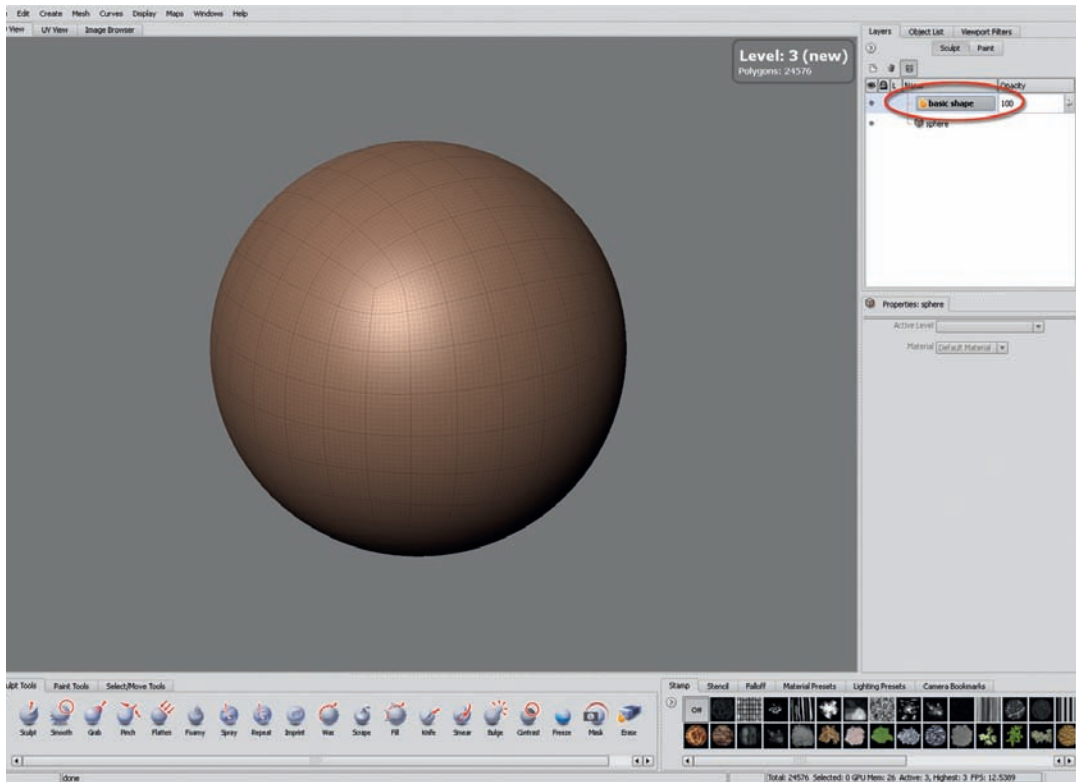
FIG 2.15 Before Starting to Sculpt, Create a New Sculpt Layer and Subdivide the Sphere Twice.

An important feature about layers and subdivision levels is that layers only work with one subdivision level. In other words, if you are at subdivision level 3 and begin sculpting in the layer Basic Shapes, then that layer is locked at level 3. So, if you subdivide again to level 4, you cannot sculpt in the layer Basic Shapes anymore and you would have to create a new layer to work at level 4.

Roughing In the Shape

At this point, the scene and sphere are set up, a new layer has been created, and the sphere has enough polygons to begin sculpting – so let's get started. Make sure that you are working in the layer named Basic Shape by clicking on it once to make it active. Now, rotate the camera so you can see the top of the model. Select the Grab tool from the Sculpting Tools tray and set the Size of the Grab tool to about 50 and the Strength to 65. Position the Grab tool above the sphere (at the North pole) and move the Grab tool down to flatten the sphere as seen in **Figure 2.16**. Repeat the process for the bottom of the sphere.

In this next step, you will mark the sections of the pepper. Peppers can have many sections, but to keep things simple, our pepper will have four. Rotate the camera so that you are looking down on the sphere and select the Bulge
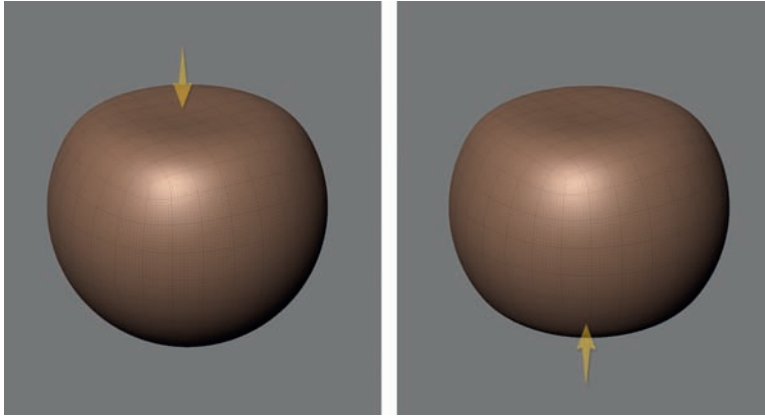
FIG 2.16 To Begin Shaping the Sphere into a Pepper, Use the Grab Tool to Quickly Flatten the Top and Bottom.
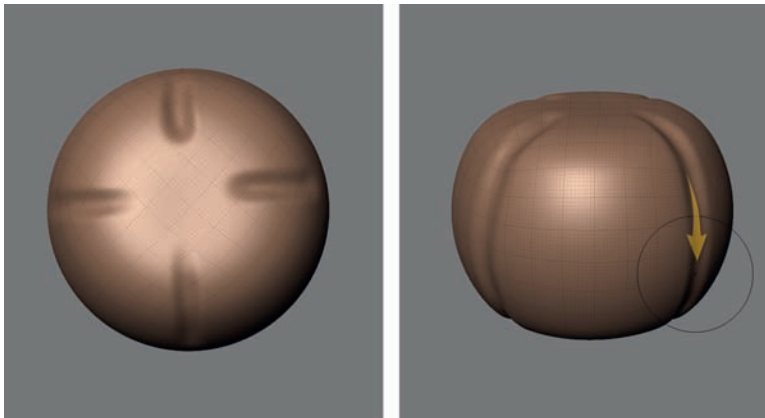

FIG 2.17 Use the Bulge Tool to Mark the Sections of the Pepper. However, In This Case, You Will Invert the Bulge Tool by Pressing Ctrl While Sculpting to Sculpt Indentions.

tool. Set the Size to about 20 and the Strength to 65. But, before applying the Bulge tool, press Ctrl (Mac Control) and then create four indentations. Certain sculpting tools like the Bulge tool can be inverted by pressing the Ctrl key. This means that instead of pulling out when sculpting, the tool pushes in. Rotate the camera around to see the sides of the model and use the inverted Bulge tool to continue the indented marks to the bottom of the model (**Figure 2.17**). Don't worry too much about making the indentions perfect; these are just guides for sculpting the sections of the pepper.

Now, you will shape the sections so that the sphere is even squattier. With the Grab tool set to about Size 50 and Strength 65, push in each end of the sphere. Reduce the Strength of the Grab tool to about 30 and shape the top as in **Figure 2.18**. Select the Bulge tool, set its Size to about 40 and Strength to 60, and sculpt the bumps at the top of each section. To delineate grooves between
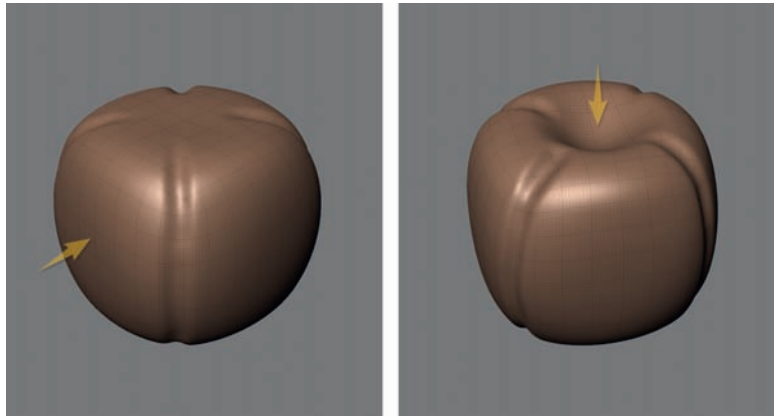
FIG 2.18 With the Grab Tool, Push in the Sides of the Sphere Then Indent the Top.
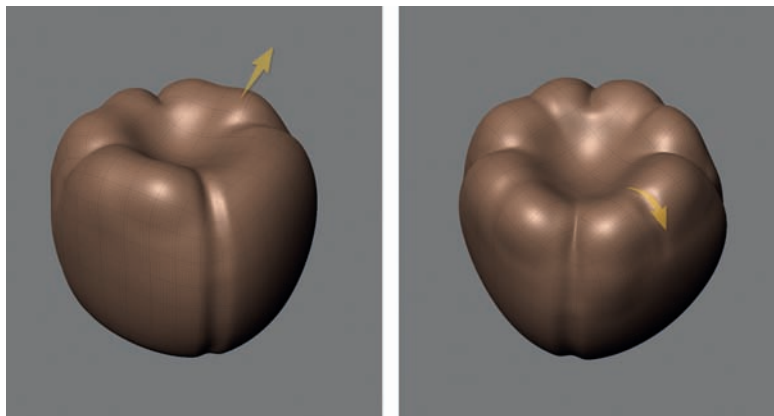

FIG 2.19 Use the Pinch Tool to Delineate or Tighten the Grooves between Bumps and Sections.

the bumps, invert the Bulge tool, set it to a small size of about 15, and sculpt the grooves as seen in **Figure 2.19**. Focus on getting a feel on how the sculpting tools work; don't fret too much over details. You may use the Smooth tool to soften or smooth out any bumps or lumps you don't want. The Smooth tool may be accessed by selecting it from the Sculpt Tools tray or by pressing Shift to toggle to the Smooth tool while working with any other sculpting tool.

Rotate the camera so that you are looking at the bottom of the sphere. Use a combination of the Grab and the Bulge tools to create the features seen in **Figure 2.20**. At this point, the sphere should resemble a pepper, so we'll refer to it as a pepper from now on. Rotate the camera so that the pepper is right-side-up. Use the Grab tool to pull out the sides at the top of the pepper and push in the sides at the bottom. See **Figure 2.21**. You can do as little or as much reshaping as you like. Remember that peppers come in all shapes, so you can't
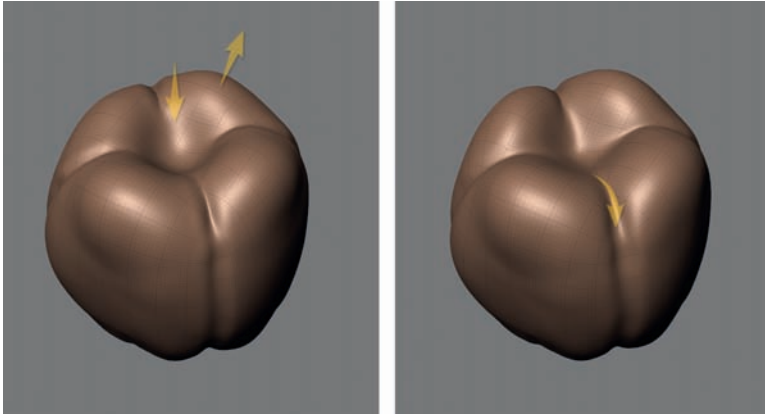
FIG 2.20 Use a Combination of the Grab and Bulge Tools to Shape the Bottom of the Sphere. By This Point, You Should Be Getting a Feel of How the Sculpting Tools Work.
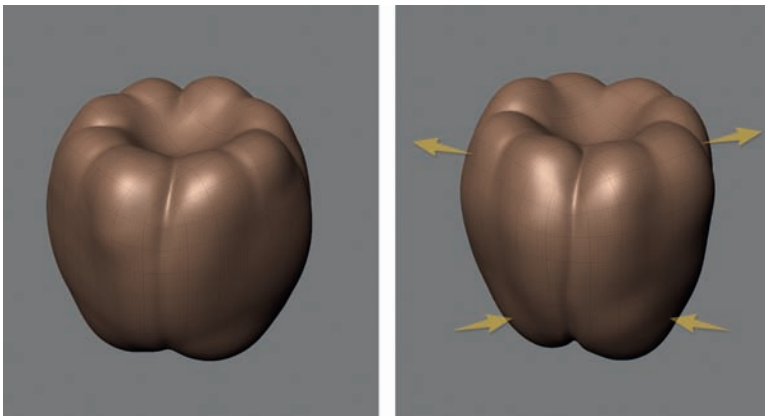

FIG 2.21 Use the Grab Tool to Give the Pepper Its Characteristic Bell Shape.

get it wrong. Once you are finished shaping the pepper, use the Pinch tool to emphasize the grooves between each section. The Pinch tool moves polygons closer together, so when the tool is run along a groove, it makes the groove tighter. Select the Pinch tool and set its Size to about 10 and Strength to 30. In the tool properties, check the Steady Stroke option. Steady Stroke makes it easier to follow along a path. Run the Pinch tool along all of the grooves on the pepper to make them tighter and more distinct.

Sculpting Details

So far, you have sculpted a sphere into the general shape of bell pepper using the Grab, Bulge, Smooth, and Pinch tools. You have learned that some sculpting tools may be inverted by pressing the Ctrl key (Control Mac) so they push in instead of pulling out, and that the Smooth tool can be toggled on
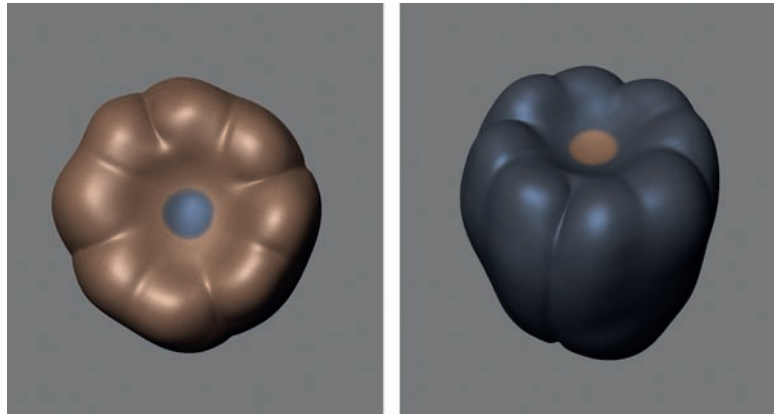
FIG 2.22 Use the Freeze Tool to Paint the Area Where the Stem Will Be Sculpted. Then Invert the Freeze Tool to Freeze the Rest of the Pepper and Leave the Stem Spot Unmasked.

by pressing Shift while working with any other sculpting tool. You have also learned to manage the size and strength of the sculpting tools to get the desired amount of sculpting effect. In the next section of this tutorial, you will sculpt the floret and stem of the pepper with new tools like Freeze, Flatten, and Fill, and continue to practice with the sculpting tools that you have already been working with.

Before moving on to sculpting the floret and stem, add a new layer and name it Stem. In this way, you can practice sculpting the stem without disturbing the work you have already done to shape the pepper. If you mess up the stem, delete the Stem layer, create a new layer, and try again. After you have created a new layer, subdivide (Shift + D) the pepper twice to level 5. At this level, the pepper has 393,216 polygons. The added polygons will allow you to sculpt with the smaller details of the floret and stem.

In the following steps, you will use the Freeze tool to create a mask that will allow you to sculpt the stem. The Freeze mask will protect the masked areas, allowing the sculpting tools to work only in the unmasked areas. Rotate the camera so you are looking down at the pepper. Select the Freeze tool from the Sculpting Tools tray, set its Size to about 10 and Strength to 100, and paint the area shown in **Figure 2.22**. Now, press Shift + I to invert the Freeze. Make sure that you are working in the new Stem layer by clicking on it once to make it active.

With the Grab tool set to Size 20 and Strength 65, pull out the stem as shown in **Figure 2.23**. The Freeze mask is not necessary any more, so turn it off by pressing Shift + U. Next, use the Smooth tool to smooth the base of the stem if necessary. You can shape the shaft of the stem by using any combination of the Grab, Bulge, and Smooth tools. Try experimenting with different tools to see how they work together. The top of the stem can be shaped with the

Flatten tool. If you like, you may turn off the wireframe by pressing W. At very high subdivision levels, there are so many polygons that the wireframe is not useful.

The floret of the pepper is made up of very small, lumpy leaves. In the following steps, you are going to suggest the floret without really sculpting all of the details. Use the Fill to fill in the area around the sections of the pepper and the stem, as shown in **Figure 2.24**. You may have to determine the appropriate Size and Strength for the Fill tool because your pepper and stem will probably be different than what is shown in the figures. However, a Size of about 30 and Strength of 25 is a good starting point. Next, use the Bulge and Wax tools to sculpt the lumps and bumps of the floret and use the Pinch tool around
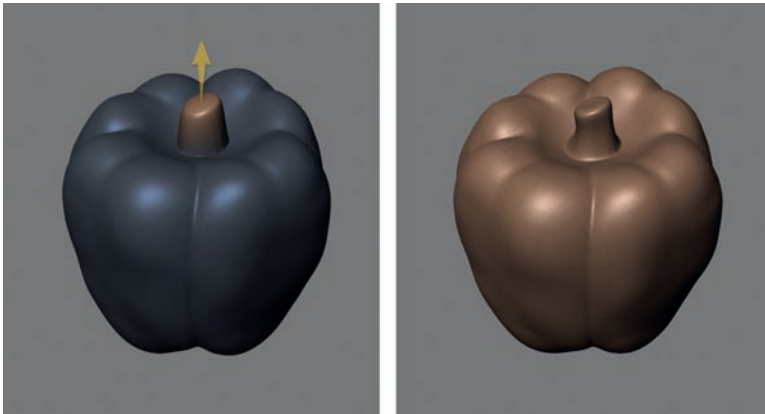

FIG 2.23 Use the Grab Tool to Pull Out the Stem. Once Finished, Turn Off the Freeze Mask and Shape the Stem.
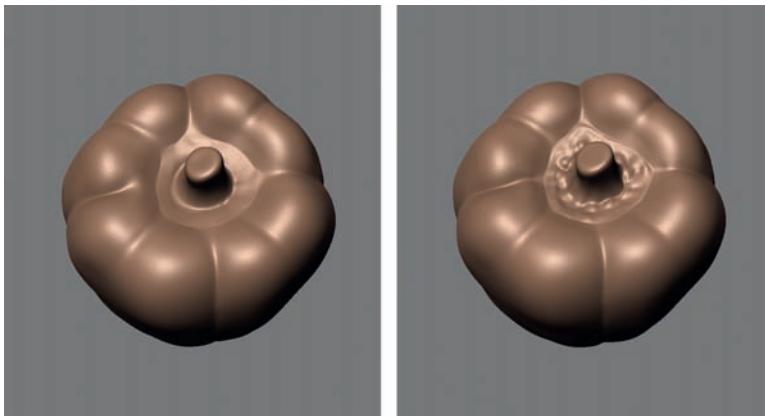

FIG 2.24 Use the Fill Tool to Fill In the Area around the Stem. This Will Give You a Base to Sculpt the Floret. Then Use the Bulge and Wax Tools to Sculpt the Lumpy Leaves and, Finally, Use the Pinch Tool around the Edges to Delineate the Floret.

the edges of floret to separate it visually from the body of the pepper, as seen in **Figure 2.24**. At this point, you should have a recognizable sculpture of a bell pepper.

Adding Texture with a Stencil

Although the skin of a pepper may appear perfectly smooth, if you look closely, it has a slight texture. So, in these last few steps, you will add a texture to the skin of the pepper, using the Sculpt tool along with a Stencil. But first things first, create a new layer and name it Texture. As with the other two layers, adding this layer just for sculpting the texture preserves any work you have done so far and allows you to experiment without worry.

Select the Sculpt tool and set its Size to about 20 and Strength to about 5. Then, from the top row in the Stencils tray, choose the third image to the right by clicking on it once. If you hold the mouse over the stencil images, the file name is displayed; the one you want to choose is named bw_finestonedetail. png. As soon as you select the stencil, it is displayed in the viewport along with a HUD that has instructions on how to manipulate the stencil image. In this case, the stencil should be smaller, so press S + RMB and drag to scale it down (**Figure 2.25**). Next, click on the Sculpt tool once more to display its properties in the Properties tray and turn on mirroring across the *x* axis by selecting X from the Mirror menu. Mirroring allows the Sculpt tool to texture both sides of the pepper at the same time.

Now that everything is ready, start brushing with the Sculpt tool along the surface of the pepper. You should see a texture appear underneath the sculpted area. Rotate the camera so that you can apply the texture on all of the pepper's skin. Don't worry if the texture appears very rough; apply the texture to all of the pepper's skin, but try to avoid the stem and floret (**Figure 2.25**). Once you
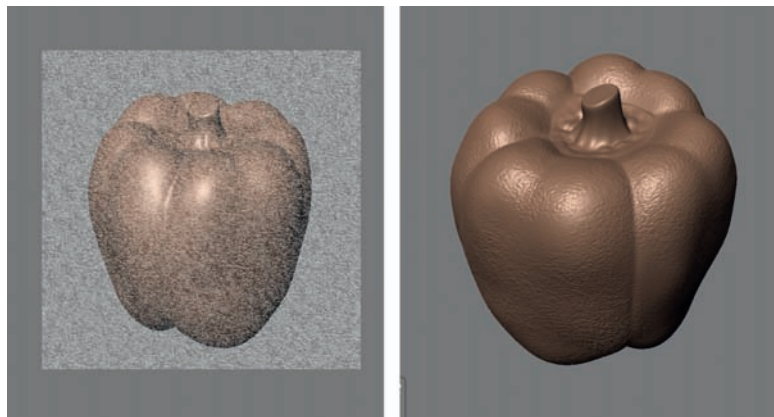

FIG 2.25 Use the Sculpt Tool with a Stencil to Add a Texture to the Pepper's Skin. When Finished, the Texture Will Appear Very Rough.
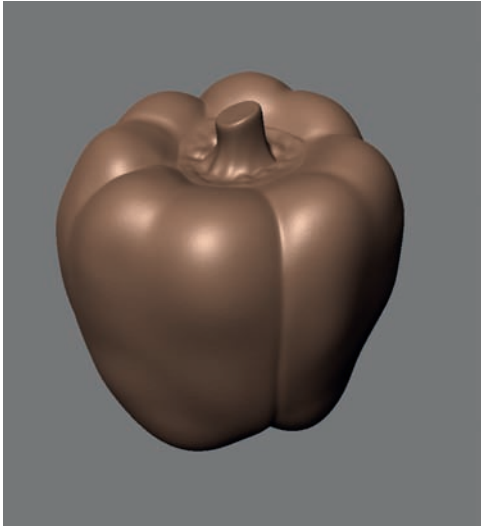
FIG 2.26 Use the Opacity Property of the Texture Layer to Reduce the Skin Roughness.

are finished applying the texture, click on the Off button in the Stencils tray. At this point, the pepper has a very rough skin. To remedy this problem, go to the layer named Texture and in the Opacity field change the value from 100 to 10. You should see the texture become very subtle as in **Figure 2.26**. The opacity property of the layer may also be changed by using the Opacity slider.

Summary

Congratulations on completing the first sculpting tutorial. By this point, you should be familiar with the Mudbox interface and be able to locate the sculpting tools, the Layers tab, the Properties window, and navigate the scene using the mouse or stylus. In this tutorial, you used many of the sculpting tools and managed layers and subdivision levels to sculpt a bell pepper. That is quite an accomplishment for a beginner. And you have probably figured out that there are many possible ways to sculpt a bell pepper. Becoming proficient with Mudbox requires practice, but the great thing about Mudbox is that it makes practice fun. In the next chapter, you will sculpt a portrait bust. You will take everything you have learned in this chapter and apply it to a more challenging sculpture.