7

Character Modeling

It's finally time to start modeling Jim! In this chapter, you'll learn about topology and some of the most popular modeling methods; then, you'll set up the reference images you created so that you can model over them; and finally, step by step, you'll model every part of Jim's body. This is one of the most crucial phases of the project because it will define the shapes and looks of the character with which you're going to work in the chapters to come.

What Is Mesh Topology?

Mesh topology is the method in which edges are distributed along the surface of a model. Two surfaces can have identical shapes but completely different topologies, so why is topology so important? Topology is especially critical when it comes to animated characters. When the character moves, the model is going to be deformed. A good topology ensures that deformations look realistic; otherwise, the mesh will pinch, stretch, or just deform incorrectly and look weird.

In Figure 7.1, you can see two different topology examples, one good and one bad. (These examples are very exaggerated and they are meant just to illustrate how a shape can be created with a badly distributed topology.) In the example on the left, the topology is poor: most of the edge loops run only vertically and horizontally, and they don't really adapt to the face's shape, which will certainly cause problems when, for example, you want to make the character open its mouth. In the example on the right, the topology is much better: edge loops flow with the face's shape and define it correctly.

Think of topology as the skin and the muscles of a face or other body part. Depending on how they will deform, they need to follow the shapes of the model; otherwise, the creation of the skin will have serious problems.

Here are some things you should keep in mind to make sure you have a good topology:

- **Use four-sided faces (quads) as often as you can:** Avoid the use of triangles or n-gons unless you really have a good reason to use them. Triangles and n-gons, when used carelessly, can generate pinches in the surface when the model is subdivided and deformed.

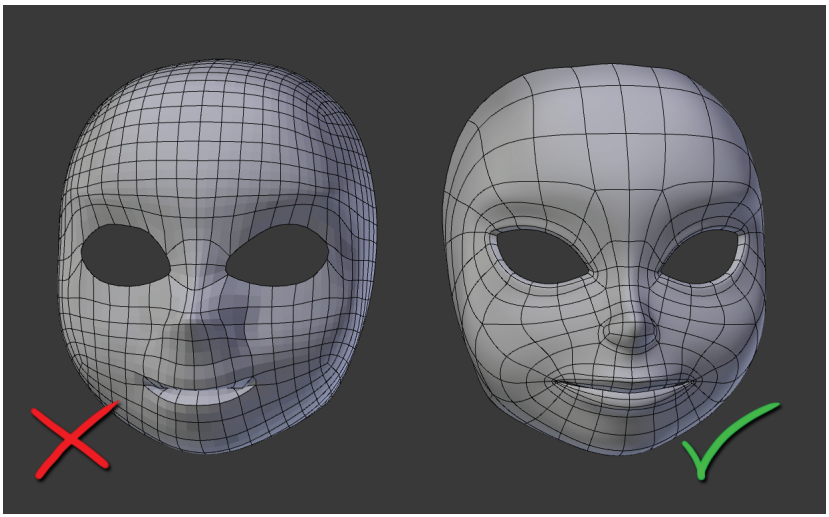

Figure 7.1 An example of a poor topology (left) and a good topology (right)

- **Use squares rather than rectangles:** Overall, if you're working with organic shapes, four-sided faces won't have the same length on all four sides, so try to avoid really long rectangles, as they'll be difficult to manage during deformations and other stages of the animation process that follow modeling.
- **Keep an eye on areas requiring complex deformations:** Some parts of a model will be more complex than others, not just because of their shape, but because when animated, you'll probably need a wide range of movement for them. The edge flow should be especially good in those areas to make sure the model will deform correctly later on. The eyelids, shoulders, knees, elbows, hips, and mouth are some examples of areas to which you should pay more attention to a good topology and perhaps even include more faces to provide additional geometry for more defined deformations.
- **Keep a low poly count:** Poly count refers to the number of polygons (usually measured in triangles, as any polygon can be divided into triangles) that form a model. More polygons mean more work in all the stages of modeling, which could result in difficulties if you have to change something. As a rule of thumb, you should keep the number of polygons to the minimum needed to achieve the shape and the level of detail you need for your model.
- **Follow the shapes:** Your edges should flow with the shapes. For example, around the mouth there should be circular loops that will create a realistic

deformation when the character opens its mouth or talks. If those "lines" are vertical and horizontal, chances are your character will look cubical (the usual pitfall when you start modeling for the first time and don't yet have control over your edge flow) and quite strange when it opens its mouth.

> **Note**
>
> Topology is a complex subject and a whole book could be written about it, with techniques and ways to achieve a good edge flow or how to use n-gons or triangles correctly. If you're interested in learning more about mesh topology, look for resources on the Internet. A lot of great articles and websites are available to you!

Modeling Methods

Modeling can seem rather technical (and it really is), but modeling also offers a lot of freedom and creativity. Quite a few methods and techniques are available to explore and use as you need them. Working with some of them may be more comfortable for you than with others, or you may want to pick one or another, depending on the type of model you're working on. In this section, we'll present some of the most popular methods you can use.

Box Modeling

Box modeling is based on the premise that you can model anything from a simple primitive (for example, a cube, a sphere, or a cylinder). Don't be fooled by its name: the "box" in box modeling means only that the most essential shape can be the base for any kind of object. The idea behind this method is that if you start from a primitive, you can divide it, extrude it, and otherwise modify it to reach the shape you want.

With box modeling, you start from something very basic and, little by little, keep adding details to it. However, from the beginning, your model already has the basic shape it will need, so you only have to add as many details as you want. You can compare box modeling to sculpting with mud: for example, you would start with a sphere or other very basic shape, and then gradually add details, such as a Subdivision Surface modifier, to that shape to make it smooth.

Poly to Poly

Also called poly2poly, poly to poly is about "drawing" a shape one polygon at a time. You create vertices and edges, extrude them, and join them to make faces, basically constructing the model as if you were building a brick wall. Again, you'd add a Subdivision Surface modifier to smooth the geometry you created.

Sculpt and Retopologize

While box modeling and poly to poly are probably the most "traditional" modeling methods, sculpting came to the 3D scene just a few years ago and it's now widely used, especially for organic models. With sculpting, you create a very basic shape—topology doesn't matter much here. Then you sculpt it, adjust the shape, and add a lot of detail to it. After that, you can use the Retopo (short for retopology or retopologize) process, which is basically creating the final topology for the model with a poly-to-poly method, but the geometry you create snaps to the shape you sculpted initially.

This is by far the most creative modeling method and artists love it. It allows you to focus on the shapes of your model and not have to think about a lot of technical stuff like topology. Only when you're happy with your shapes do you worry about topology, which you create very easily because you don't have to think about whether the shapes will look right, as you already have that covered from your sculpture!

Modifiers

Using modifiers is not a method in itself, but modifiers play a big role when modeling in a lot of cases. Let's say you're modeling a character. You can model one side of it and use a mirror modifier so the opposite side simultaneously builds itself, mirroring the one on which you're working. You can speed up your work by using modifiers. Let's say you have to work on a complex curved model. Just make it in a plane and then you can deform it along a curve with a modifier. Modifiers help a lot and, in some cases, they'll be essential to the construction of your model, so they deserve a mention here.

The Best Method!

Well, if you had some idea that this section would tell you the best method to use when modeling, I'm sorry, but there is no *best* method. Each individual is more comfortable with one method over another, depending on the skills he or she has, the spatial vision, the particular project, and so forth. Some people switch between methods as needed: Modeling a car? Use box modeling. Creating a monster? Try Blender's Sculpt and Retopo features.

However, the most powerful modeling tool to keep in mind is that you can mix every possible method (only some of the most popular ones for character creation are mentioned here) in the same model as you may find it necessary! You can model one part with box modeling, another with poly to poly, and the most organic parts with sculpting. You can even adjust the shapes of your character using Sculpt Mode when you have the basic topology in place and then keep working with box modeling.

The possibilities are endless and that's why 3D modeling, even though it requires some technical knowledge, can be a very enjoyable and creative process.

Setting Up the Reference Planes

Before you start modeling, you need to load into your scene the character designs you created in Chapter 5 as "background images" to use as a reference while modeling. This will definitely help a lot to define the right proportions of our character, Jim.

Some people prefer to load references in planes that they can see when they rotate the camera around the scene. You can do this by adding planes in the views you need to show and then adding the images to those planes as a texture. This can be a little tricky (especially before you learn to use materials in later chapters) but Blender actually offers two easy ways to use reference images.

- Open the folder in which you have your images and drag them into the 3D View. Once they're loaded into the scene, you may need to adjust them a little. You can go to the Background Images menu in the 3D View Properties Region to make any necessary adjustments.
- Go to the 3D View Properties Region and scroll to the Background Images panel and turn that feature on to load your images (see Figure 7.2).

From the Background Images panel, you can load an image and decide in which view it will be visible. After you load your image, you'll be able to adjust its position, size, and opacity.

> **Note**
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> These Background Images are only visible when you're using a predefined orthographic view (for example, Front, Right, Back, Top); they won't work if you're in a Perspective View or in a random orthographic point of view. If you have a NumPad, press **5** to switch between Perspective and Orthographic views; otherwise, you can switch views from the View menu on the 3D View header.

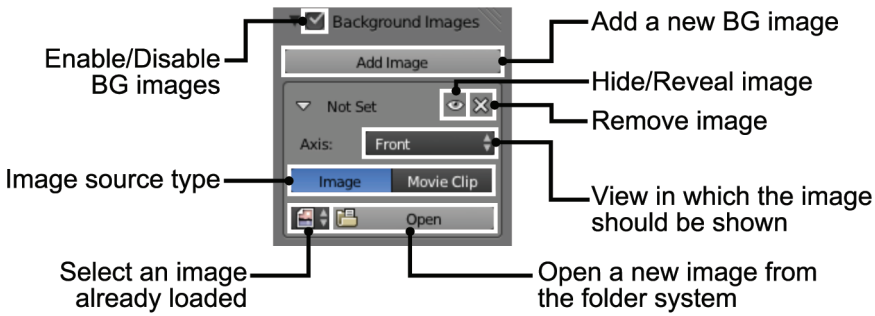

Figure 7.2 Background Images panel in the 3D View Properties Region

Load the reference images for the front, side, and back of the head into their corresponding views, so you can see them in the background while you're building Jim's head (see Figure 7.3).

Caution

It's very important that the reference images are properly aligned. In this case, they all have the same height and the front and back images are centered. In some cases, however, the images can have different sizes or margins, so you may need to adjust the scale and position from the Background Images menu in the 3D View Properties Region. To help you with those adjustments, you can use a very simple mesh that allows you to compare the size and position of the images with those of the 3D model. In Figure 7.3, you can see that a sphere was used to make sure that Jim's head references were properly aligned. Also, remember that the drawings are not physically accurate, so you'll have to leave some space for modifications to the images, as it's very difficult to make the 3D model fit the 2D images perfectly.

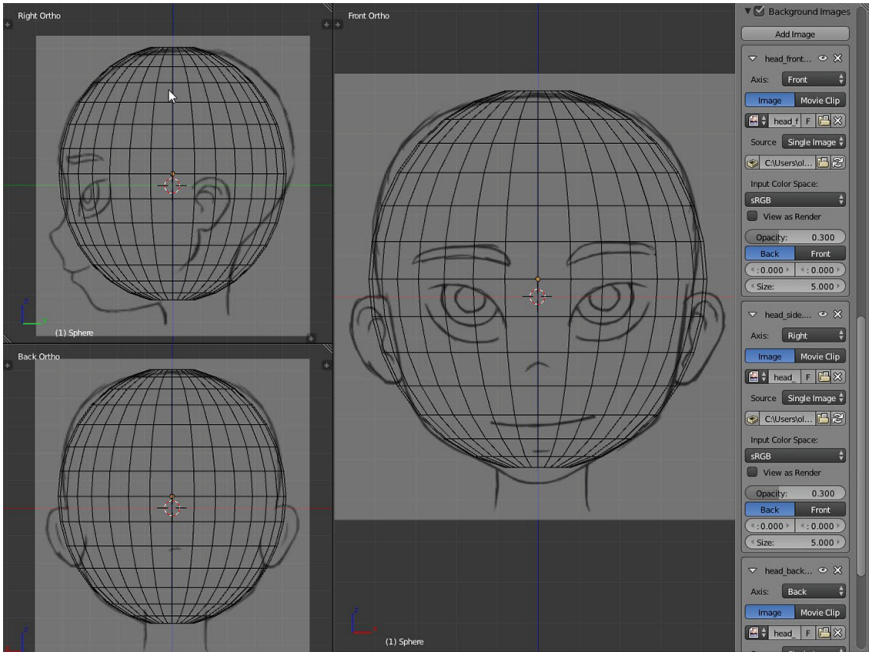

Figure 7.3 The three views with their reference background images

Modeling the Eyes

Of course, each person feels more comfortable by beginning to model a certain part of the body; some may prefer to start with the face, others with the body. For Jim, let's start with the eyes because that way you'll be able to use them as a reference when modeling the rest of the face, and especially the eyelids, because you'll be able to align those features to the eyes.

Creating an Eyeball

Jim's eyes are drawn in kind of an animation/manga style (not completely round). The eyes are basically spherical, but to make them a little more realistic, you can create the cornea with the pupil beneath it. Figure 7.4 shows the process step by step and an explanation of what happens in each step follows.

1. In Object Mode, create a UV Sphere and, in the Operator panel, set it to have 16 segments and 16 rings.
2. Rotate the sphere 90 degrees on the X-axis so the poles are positioned at the front and back. This way, you'll be able to use the circular edge loops on the front pole to build the pupil.
3. Enter Edit Mode by pressing **Tab**. Select the two edge loops of the front pole and the pole vertex. A quick way to do this is to select the vertex in the pole and then press **Ctrl + NumPad +** to increase the selection twice.
4. Press **Shift + D** to duplicate the geometry you selected in the previous step and move the new geometry out a little or, for now, hide it by pressing **H**. Later, this geometry will become the eye's cornea.
5. Select the same geometry you selected in step 3 from the sphere and extrude it into the eye by pressing **E** on your keyboard.
6. Scale the selected geometry to invert its curvature by pressing **S**, then pressing **Y** to scale on the Y-axis, and then typing **-1**. Press **Enter** to confirm. Then, adjust the position of this geometry on the Y-axis so it fits into the eye in case the geometry moved out of alignment when you inverted it.
7. Select the outer edge loop of that inverted circular area and bevel it (**Ctrl + B**) so it will have a little more detail when you add the Subdivision Surface modifier later.
8. Press **Alt + H** to unhide everything and see the cornea you previously detached. Move it back to its place and even scale it up a little bit if it's needed to cover the gaps that you made when beveling the borders.
9. Apply a Subdivision Surface modifier with two divisions. Go to Object Mode and, in the Tools Region, click the Smooth option so the eyeball doesn't show the edges of all the flat faces.

Figure 7.4 Steps for creating the eyes

> **Note**
>
> For this exercise, the lamp and the camera are in a different layer. Press **M**, select one of the squares, and then on the 3D View header you can turn those squares (layers) on and off. You'll learn more about layers in future chapters. Alternatively, you can delete the lamp and the camera to get them out of the way until you need them in the final stages of the project. If you do this, though, you'll need to create them later when you need them again.

Using Lattices to Deform the Eyeballs

Now you have one eyeball, but it's completely round and in the reference designs for Jim, the eyes are more oval. Fortunately, Blender has a tool called Lattice that lets you deform geometry and then it will maintain that deformation when you rotate the

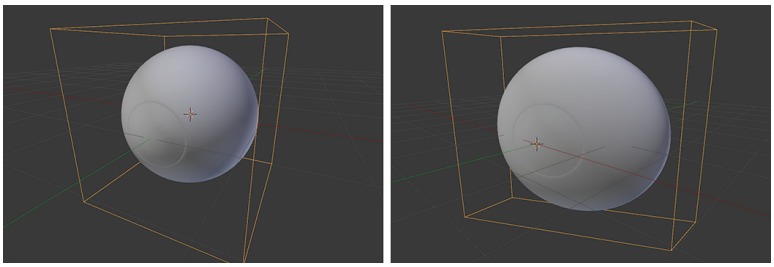

Figure 7.5 A lattice (left) and how it affects the eyeball (right)

geometry, which is exactly what you need for the eyeballs. You could just go ahead and scale the eye on the Y-axis to make it flatter, but when you rotate it to look at something, it won't fit the eye socket. Figure 7.5 shows the effects of the Lattice modifier.

Follow these steps to apply a Lattice modifier to the eyeball:

1. Press **Shift + A** and create a lattice.
2. Scale it up so it covers the whole eyeball.
3. Select the eyeball and add a Lattice modifier to it. It's better if you add it on top of the Subdivision Surface modifier; that way, the lattice will deform the low-resolution mesh and the deformed mesh will be subdivided afterward, so it will work more smoothly.
4. From the Lattice modifier options, select the name of the lattice you created in step 1 of this list in the Object field.
5. Now, you can select the lattice, press **Tab** to enter Edit Mode, and see how, as you move its vertices, the eyeball deforms accordingly.
6. Select all of the vertices (press **A**) and scale them down on the Y-axis.
7. Pick the outer side's edges to better align the eye with the side view.
8. Exit from Edit Mode and rotate the eyeball. It should rotate while keeping the lattice deformation in place, which is exactly what you need.

Mirroring and Adjusting the Eyes

We've made one eyeball, but Jim needs two of them! First, you need to align the existing eyeball to one of the eyes in the background image. Keep in mind that as the lattice is now deforming the eyeball, you'll need to select both eyeball and lattice to move them together. To create the second eyeball, you'll duplicate and mirror the first one (see Figure 7.6).

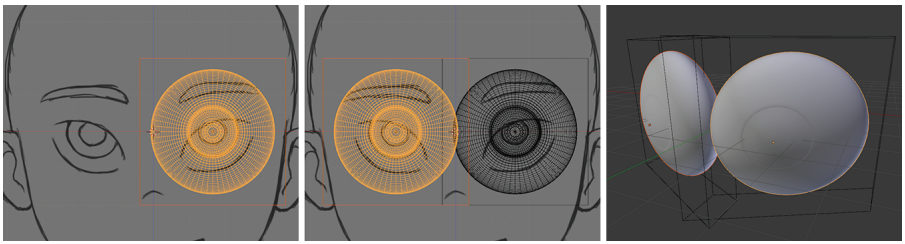

Figure 7.6 Aligning the eyeball (left), mirroring a second eyeball (center), and the result in 3D (right)

Here are the steps to adjust and mirror the eye:

1. Select the eyeball and the lattice.
2. Move and scale them to adjust them to the shape and size of the drawn eye in the front view. Adjust their position in the side view as well. Don't worry if they don't fit perfectly.
3. Once the first eye is aligned, make sure you place the 3D cursor in the center of the scene. You can press **Shift + S** and select the option of Cursor to Center, or you can press **Shift + C**.
4. Press **Shift + D** to duplicate the eyeball and its lattice. Right click to cancel the movement and this will leave the new eyeball and lattice in the same exact location as the originals.
5. Press **.** (period) on your keyboard to set the pivot point in the 3D cursor.
6. Press **Ctrl + M** to enter Mirror Mode. This will make the current pivot point the mirror plane (that's why you should use the 3D cursor for mirroring; otherwise, you'd be mirroring from the selection's origin). Remember to set the pivot point to Median Point (**Ctrl + ,**) or to Bounding Box Center (**,**) before you continue working.
7. Once in Mirror Mode, you can press **X, Y,** or **Z** to select the axis of the mirror. In this case, press **X** and the new eyeball and its lattice should move right into place (see Figure 7.6). Press **Enter** to confirm this action.

Caution

When using this mirroring method (**Ctrl + M**), you may find that sometimes it can give you unwanted, weird results such as the object doesn't mirror in the expected way. What usually happens is that you've rotated or negatively scaled that object and its axes are not correctly aligned with the world space. If you find yourself in this situation, select the object before mirroring, press **Ctrl + A** to apply the Rotation and Scale, and try again. This should solve the problem.

Modeling the Face

Now that Jim has a good pair of eyes, it's time to start modeling a cool face for him to support those eyes! Throughout this stage, box modeling will be the method you'll use for creating the face, so you can get a good idea of how this method works.

Studying the Face's Topology

Remember how important the preproduction phase was for a project? Well, it's also important for any modeling task, and the face is one of the trickiest parts of the body to model. It's useful to look at the reference drawings you created and quickly study the topology that could work for the face so you'll have an idea of how to model before you begin, which is a much better approach than modeling blindly! Figure 7.7 shows a topology study for Jim's face, with quick sketches over the reference drawings.

Blocking the Face's Basic Shape

In this section, you'll start by blocking the face. *Blocking* is what we call the first stages of creating a model, animation, painting, or any other artistic endeavor. It is the stage in which you define, quickly and roughly, how something will look; you're not paying a lot of attention to detail, but just defining the base. In this case, for example, the blocking consists of creating the very basic shape and geometry of the face to which we'll add definition in later steps.

Blocking is very useful because it's the part of the process in which making substantial changes is easier and faster, so during this stage you can experiment with different modeling ideas.

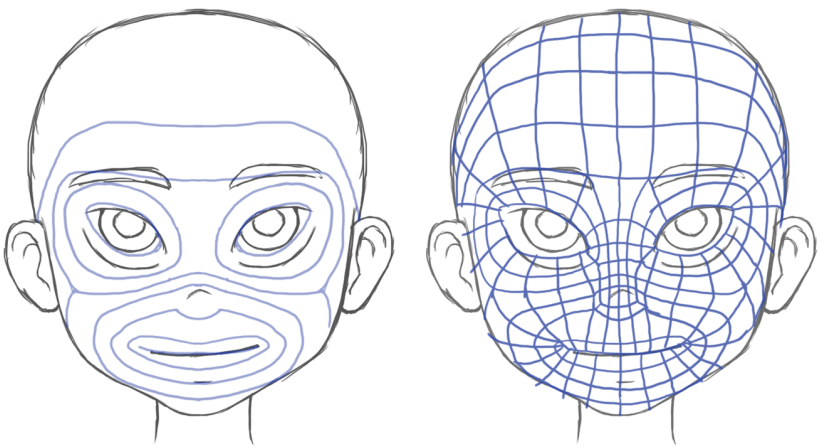

Figure 7.7 A representation of the edge flow around the main areas of the face such as the eyes, nose, and mouth (left), and a drawing of a possible topology (right)

Remember that keeping your scene organized is important, so now that you'll start creating a lot of new objects, it's a good choice to name them intuitively.

In Figure 7.8, you'll see the first steps for modeling the face, which we'll use to create the basic shape. Explanations of each step immediately follow the figure.

1. Create a cube, go to Edit Mode, and divide the cube as shown in the first image: three vertical divisions for the front of the face, one horizontal division through the front and sides of the face, and one vertical division for the sides of the face. These edge loops will help you set the basic shape of the face in the first stages. The reason for three vertical lines in the front is that you'll need additional details for the mouth and the eyes. You can perform these divisions using Loop Cut and Slide (**Ctrl + R**).

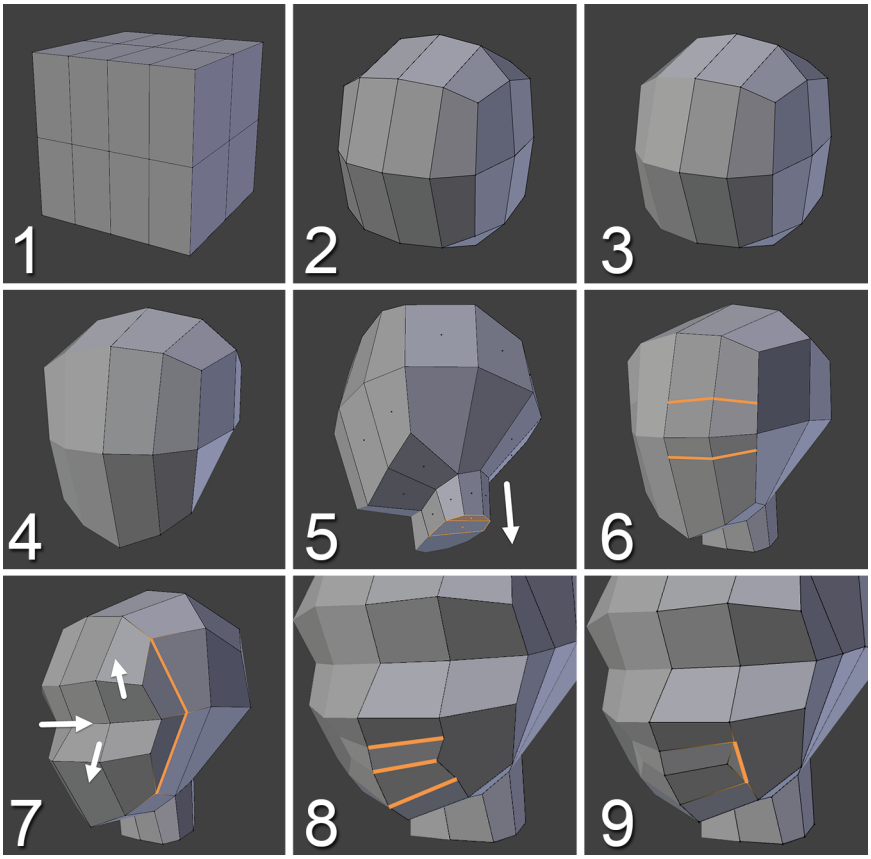

Figure 7.8 First steps of modeling Jim's face

2. Select all vertices with **A** and use the Smooth Vertices tool from the Tools Region or from the Vertices menu (**Ctrl + V**). Once smoothing is applied, increase its iterations in the Operator panel. The idea is to get a more spherical shape. Now, scale the whole shape to make it approximately fit the size of the head in the reference images.
3. From the front view, select the vertices of the left section of the mesh (negative X) and delete them, so you're left with only one-half of the face model. Now, add a Mirror modifier and the default settings should be enough to make the mirroring work. Just activate the Clipping option in the modifier so the vertices in the middle are prevented from jumping to the opposite half of the mirror center. At this point, you can work on half of the face and those changes will automatically be reflected on the other side.
4. Using Proportional Editing (press **O** to enable/disable it), adjust the shape of the geometry to fit the reference images of the head. The eyes should be placed on the horizontal line in the front. At the bottom of the head, the faces in the back will be the base for the neck.
5. Select the faces in that area and extrude them to create the neck. To form the neck, adjust the vertices so they look round. At this stage, you'll be defining the basic shape, so avoid cubic shapes; otherwise, as you start adding details, those cubic shapes will be more noticeable and it will be more difficult to arrange them properly at that later stage.
6. With the Knife tool (**K**), make a couple of cuts in the front as highlighted in the corresponding image in Figure 7.8.
7. From the previous step, you're left with three edge loops. Move them accordingly to fit Jim's face: the top one will define the eyebrows, the middle one will determine the center of the eyes, and the bottom one will establish the nose and cheeks. After that, using the Knife tool again, make the cuts highlighted in the image to end up with a round face loop that surrounds the face.
8. Perform three cuts in the mouth area and move them as needed. The middle one will establish the mouth, the bottom one can help define the chin, and the top one will mark the area of the mouth near the nose.
9. Join the side vertices of the edges above and below the mouth to form a triangle in the corner of the mouth.

Defining the Face's Shapes

After the blocking stage, in which we've already created the face's basic shape, we'll now go ahead and add some definition to the geometry.

Figure 7.9 shows the next steps of the face's modeling process, with step-by-step explanations.

> **Tip**
>
> When you're adjusting your mesh to the reference images, it's better to overestimate the shapes' sizes and make them a little bigger. The reason is that as you add more and more details, some of those vertices will be divided and this will cause the shapes to shrink. This can also happen when applying a Subdivision Surface modifier: when you smooth shapes, they'll shrink.

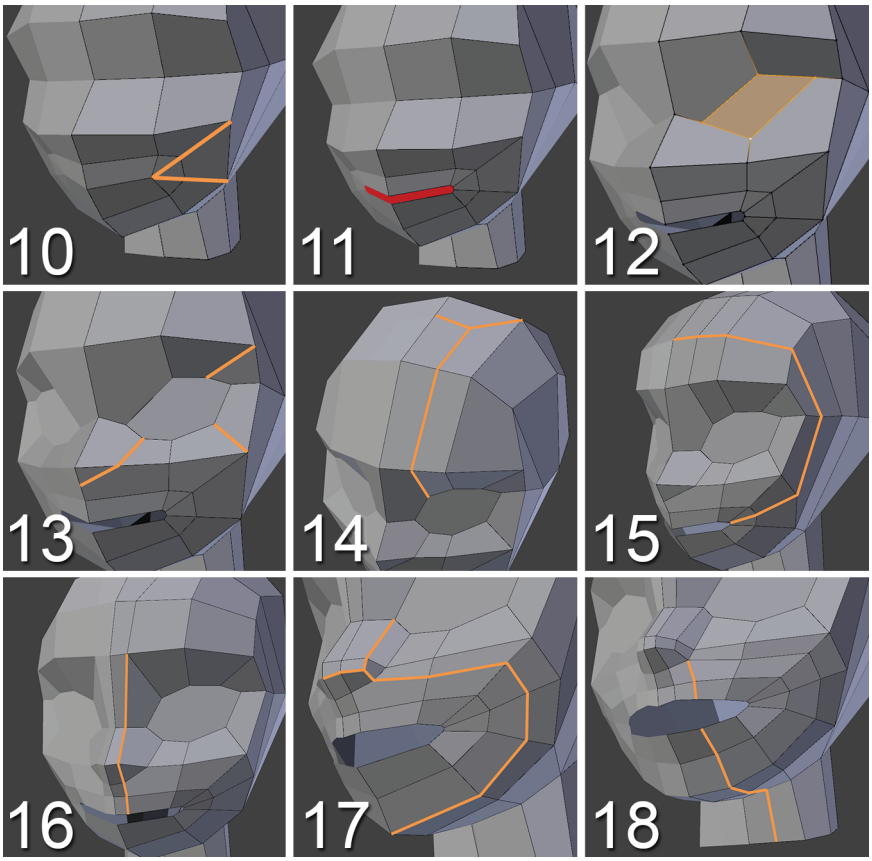

Figure 7.9 Continuing with the face modeling

10. Using the Knife tool, cut the triangle generated in the mouth's corner in step 9 above and create two new edge loops to connect the mouth with the cheek and the jaw. Now, the loop around the mouth is completely composed of quads (four-sided faces).
11. Select the mouth's edge, bevel it just a little, and delete the new geometry so you can make the mouth's opening and the area surrounding it with circular loops formed of quads.
12. Select the vertex in the middle of the eye and bevel it (you can use the Bevel Vertices tool: **Shift + Ctrl + B**). Then, move the resulting vertices to make a shape similar to the eye in your reference images.
13. Perform several cuts around the eye with the Knife tool, as highlighted in the corresponding image. This will give you more vertices to define the eye's shape, as well as some additional cuts to start defining the nose's geometry.
14. There was a side of the eye that was not cut in step 13. Cut it now but keep the cut going to the top of the head and convert the two edge loops into one as shown in the image. You only need the loop in the front of the head, so this way you can end the loop where it's no longer needed.
15. Using **Ctrl + R,** add a new loop from the mouth corner all around the face and adjust its shape and the surrounding vertices.

> **Tip**
>
> When you add a new loop to an organic shape with the Loop Cut and Slide tool (**Ctrl + R**), you can take advantage of the Smooth option in the Operator panel to make the new loop less rigid and flat between the two existing loops. Also, when you have an area with quite a few vertices, you can select all of them and use the Smooth Vertices tool to smooth them.

16. Cut a line from the eyebrow to the mouth and define the nose a little more.
17. Make a new cut from the eye down to the nose, and join it with a new loop around the mouth area. Adjust the shapes and you'll now have the geometry necessary to create the nostrils.
18. Create some new edges from the bottom of the neck to the nose and then to the mouth, and also a new vertical loop at the chin. Move things around a little to adapt the new vertices to the reference images and you're ready to add some more details and create the lips.

Defining the Eyes, Mouth, and Nose

Little by little, Jim's face is starting to take shape! The next steps, shown in Figure 7.10, add definition to the eyes, mouth, and nose.

19. Select the mouth's loop, extrude it, and adjust the vertices to get the lips' shapes, according to the reference images.
20. Using **Ctrl + R,** add a new loop to the lips to add a little more detail to that area. You can probably inflate the lips by just adjusting the Loop Cut and Slide Smooth options in the Operator panel. At this point, you can add a Subdivision Surface modifier to the mesh and enable it from time to time to make sure the geometry is behaving correctly when it's smoothed.
21. Select the outer loop of the lips and press **Ctrl + B** to add a bevel to it. Then, slide the loops near the mouth's corners to separate them a little more than the

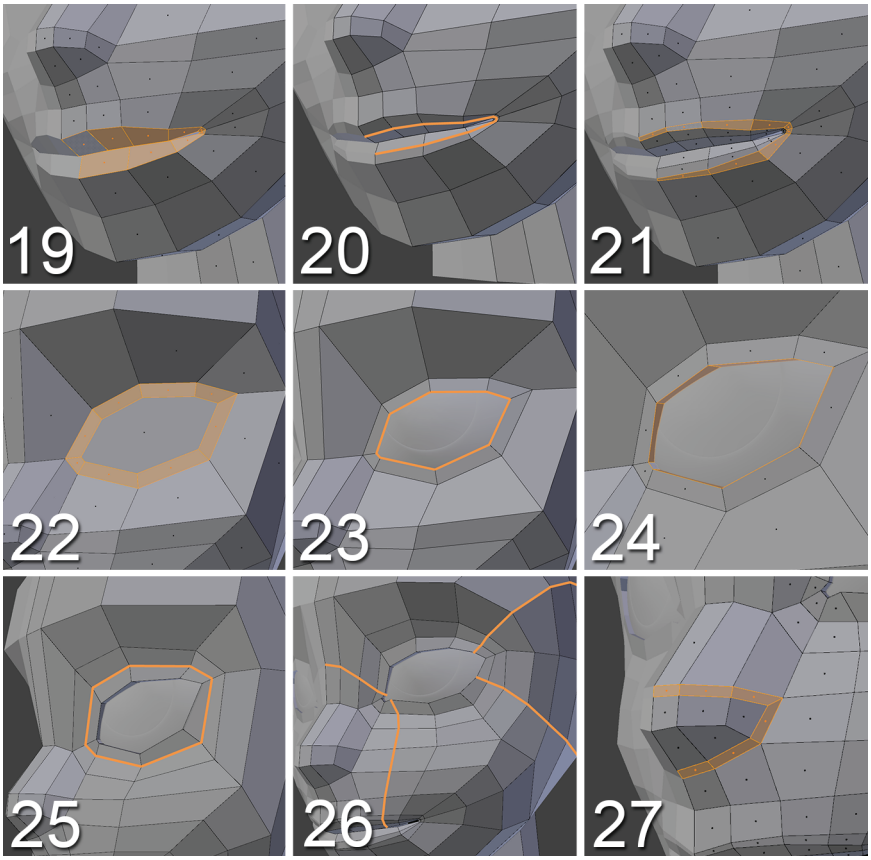

Figure 7.10 Adding more definition to the eyes and the mouth

other loops. This will define the shape of the lips when you add a Subdivision Surface modifier. Separating the vertices near the mouth corners will make those areas smoother, while the central area of the lips will have more definition, as its loops are closer together.

22. Select the n-gon of the eye and press **I** to inset and create the base of the eyelids.
23. Unhide the eyes and adjust the eyelids' geometry to the eyeball's surface. Proportional Editing can help with this. Leave a space between the eyelids and the eyeball.
24. Select the inner loop of the eyelids and extrude it to fill in the space between the eyelid and the eyeball.
25. Select the outer loop of the eye and slide the vertex out to make some space for a new loop to help define the eyelids a little more.
26. In the eye area, add some more loops with **Ctrl + R** to define the section between the nose and the forehead; then, adjust the vertices to the reference images and make sure the vertices are smooth between the rest of the geometry.
27. Select the nose's bottom and nostril faces. Inset them and turn the Boundary option off (you'll find it in the Operator panel) so the nose's front faces don't inset in the center.

> **Tip**
>
> While you model, try to think ahead to plan how you'll perform the next steps. If you have in mind what the final topology will look like, you can add loops and vertices to achieve that specific goal. Modeling blindly is also possible, but you'll probably lose some time figuring it out, and sometimes you'll have to delete certain parts and rebuild them to create a better topology.

Adding Ears

The face is almost done! Figure 7.11 shows additional steps that add more details to Jim's face. At this stage, you'll add the ears and define the neck and head a little more.

28. Move the nose vertices you just created to define the shape of the nose. Turn on the Subdivision Surface modifier to see how the model looks when subdivisions are enabled. You may want to play with the nose geometry; in this case, as the design presents a pretty stylized character, we're not going to model the nostrils.

> **Note**
>
> While you are working on the model, it's useful to enable the Subdivision Surface modifier from time to time to see if the geometry behaves correctly when subdivided. Also, this modifier provides several display modes (the four buttons located at the top of the modifier panel), and the last two are really helpful for this stage. One of them allows you to see the subdivided model in Edit mode, while you keep working

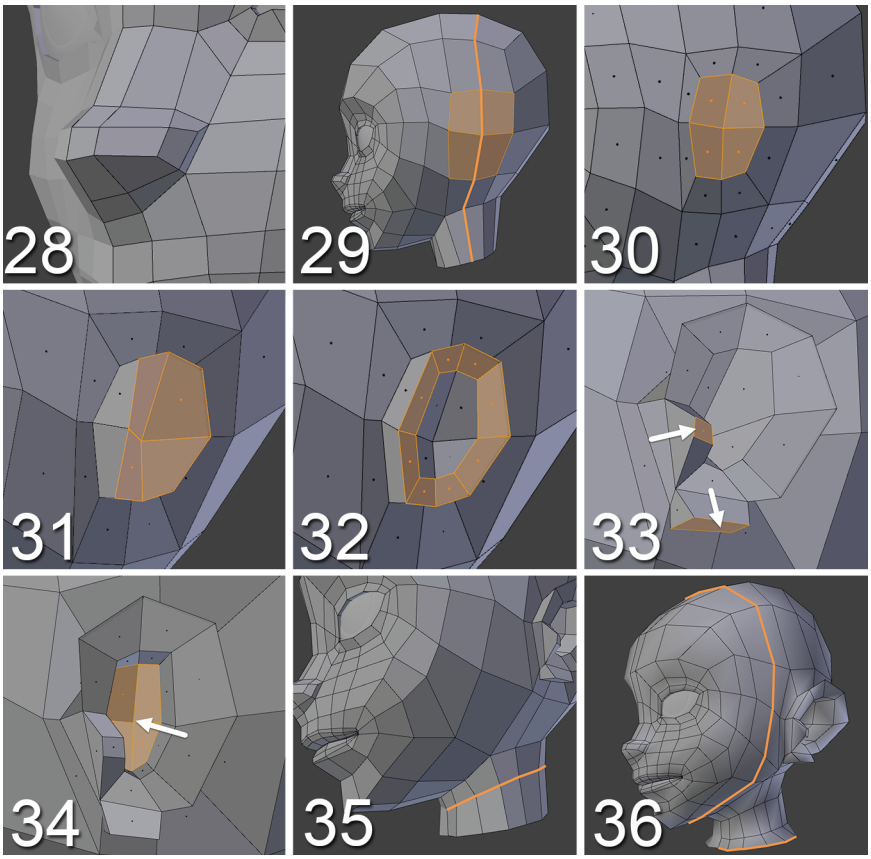

Figure 7.11 More adjustments and details to create the ears

> on the original mesh as if it were a cage for the subdivided model. The last button modifies the option previously described, letting you work directly on the subdivided model without displaying the original mesh cage (an option that, in some situations, can be more useful and intuitive).

29. Go to the side of the head and create a new loop from the neck to the top of the head. The highlighted faces are going to serve as a base from which to extrude the ear. Ears are quite tricky, but in this case, we're making an anime design, so let's create a simple ear, not very realistic but one that will fit the overall look of the character.
30. Inset the selection to create the base for the ear.
31. Extrude it and adjust the shape to resemble an ear.

32. Make an inset within the ear.
33. Extrude and shape the highlighted areas to define those parts of the ear.
34. Add a new extrusion to create the ear canal and arrange those vertices a little. Don't worry if the geometry looks weird; just keep an eye on the subdivided mesh because when it's smoothed it will look quite different.

> **Tip**
>
> In the images that accompany the modeling steps, you're seeing the low-resolution mesh, so you can get a clear idea of how the polygons and vertices work; however, at this point in the process, you could have been working with the subdivided mesh from the beginning.

35. Cut a new loop in the neck to define the articulation between it and the base of the head.
36. Keep adding more and more loops in the areas where you think you'd like to have more detail. In the image for this step, two loops that were added to the mesh are highlighted: one is at the bottom of the neck so later on you won't have an empty space under Jim's jacket. Also, there is now a clean loop surrounding the whole face, which you can think of as a division you could use to extract a mask from the face.

Building the Inside of the Mouth

In this section, you'll add the final details to Jim's head. The face is looking good, but you need to create the interior of the mouth, so when Jim opens his mouth, you won't see empty space or the back of his head! Look at Figure 7.12 to see the last steps.

37. Select the inner lips' loop and extrude it into the head. In these images, the rest of the head has been hidden so you can clearly see what's going on.

> **Tip**
>
> Sometimes it's easier to select what you don't want to hide, then press **Ctrl + I** to invert the selection and finally press **H** to hide it.

38. Add some loops to better define a rounded area inside the mouth. Most importantly, add a loop near the inner lips; otherwise, they'll lose some shape when subdivided. Don't worry if the geometry overlaps in the inner lips area.
39. Close the back of the hole and refine the shapes a little. You can also add another loop near the inner lips so the inside of the mouth in that area is more vertical: this will create some space for the teeth later on.

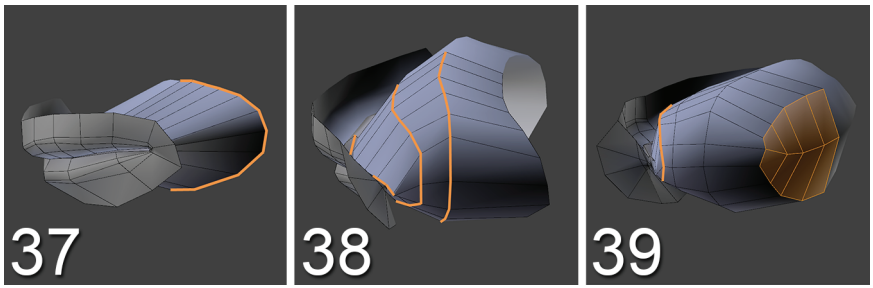

Figure 7.12 Creating the inside of the mouth, so it isn't empty space and Jim can open it

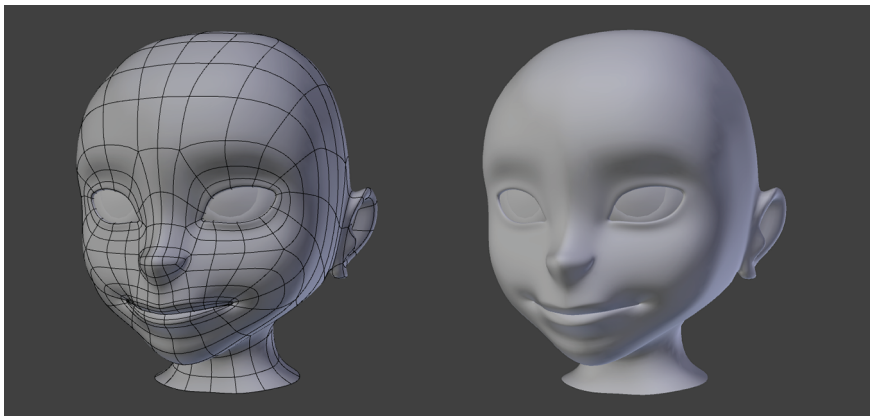

Figure 7.13 The topology for Jim's face (left) and the final subdivided result (right)

You're done modeling Jim's face! In Figure 7.13, you can see the result. The face is often one of the trickiest parts when modeling a character. You get used to seeing faces and it will immediately look wrong if something is out of place, so it can be difficult to achieve a pleasing result.

Modeling the Torso and Arms

Up to this point, you've been working on the face, but now you'll switch to the body. That means the face's reference images in the background are not useful anymore. You can just go to the Background Images panel in the 3D View Properties Region, delete the images, and load the full-body references; alternatively, you can replace the head references with the full-body references, but this time, you'll do something different: in the side view, you'll modify the reference image so the feet are touching the floor