

Sculpting the Body

A digital sculptor is not that different from a traditional sculptor. In both cases, the brain must understand form in 3D and learn various tricks to plot the landscape of the body.

A digital sculptor, however, works in a virtual environment, which is a blessing and a curse. Traditional sculptors move around the model and use their entire body. A digital sculptor uses small movements of the wrist on a Wacom pad or a Cintiq. As digital sculptors, we do not get to move around and all that jazz, but we have undo!

In this chapter, I give you an overview of my method for teaching digital sculpting in ZBrush. This method is a volume-centric approach to sculpting and focuses on muscular anatomy only during the last 25 percent of the journey. Note that in the finished sculpt at the end of the chapter, the head is not sculpted yet. We sculpt the head in Chapter 3 and spend more time talking about the specific anatomy of the face.

Proportions

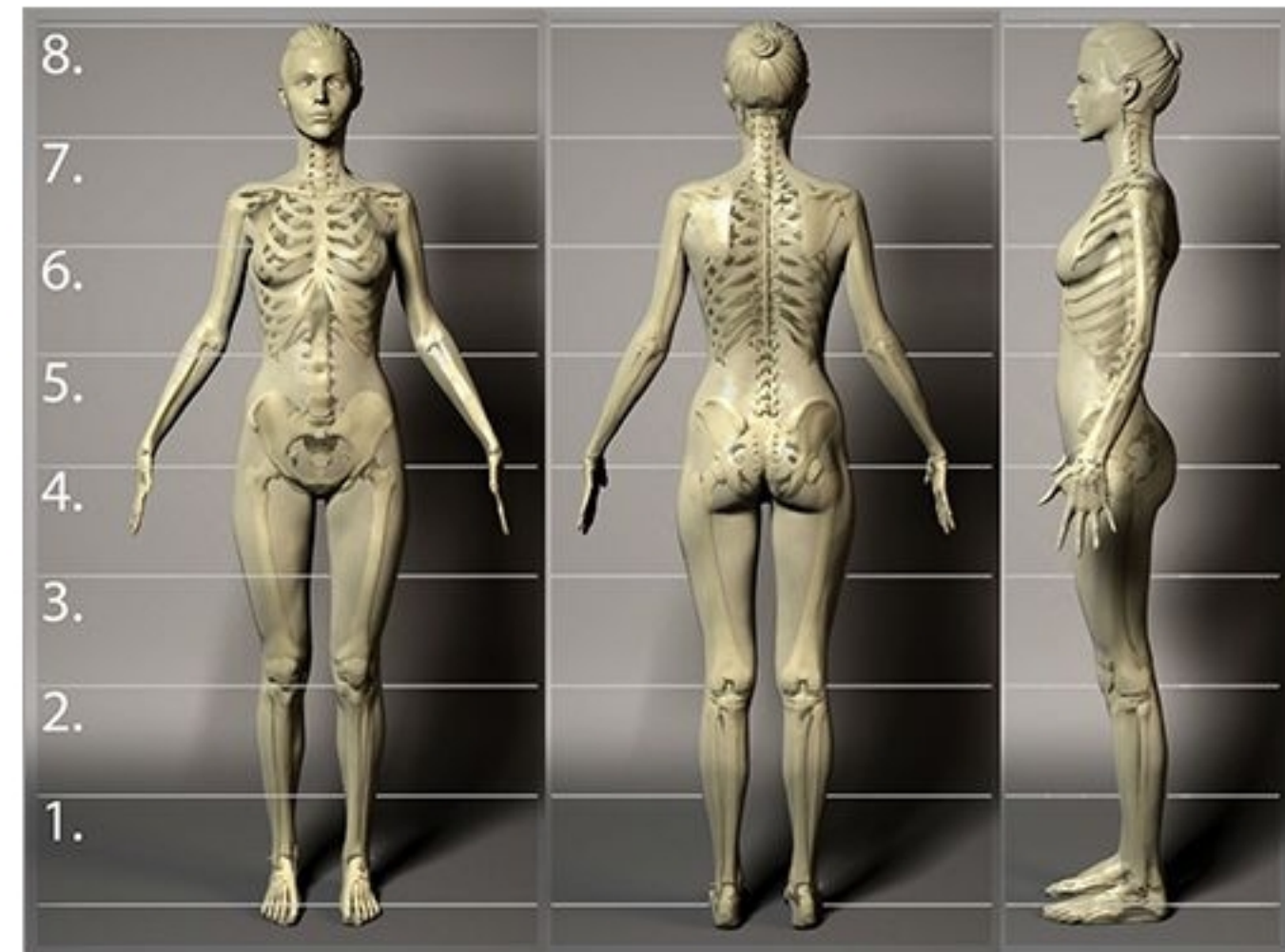
Proportion and gesture are the first battle we need to face. We will use the head as our primary unit of measurement. The total character height will be 8 heads, which gives our character a distinctly graceful yet powerful look. It also makes measurements much easier than using a more natural 7.5 head tall figure.

[Figure 2-1](#) is our proportional chart. Our primary concerns here are accurate measurements for each major part of the model, accurate alignment of the form, and nailing the natural gesture of the human body. Pay attention to the following parts of the model:

- Head
- Neck
- Shoulder
- Waist
- Hip
- Thigh
- Knee

- Calf
- Ankle
- Foot

Figure 2-1: Proportion chart



Project 1: Modeling Base Mesh in Maya

If you are not familiar with Maya or any other polygon modeler you can skip this section and use the mesh titled 8HeadBaseMesh.obj in the accompanying DVD.

We start our process in Maya, but you can work in any 3D modeling application. I am using Maya instead of ZBrush because many production artists find this a more comfortable place to begin and an understanding of working in another application such as Maya is essential for working in the game or film industry.

When I work on my own meshes, I typically start in ZBrush and stay there until the end. Either way, the goal is the same, and we can take advantage of Maya's polygon modeling toolset to help us optimize our base mesh and create a few happy accidents along the way.

All ZBrush Workflow

To see an all ZBrush workflow, check out [zsphereBaseMesh.mov](#) on the accompanying DVD.

Proportions and Gesture

Follow these steps to begin:

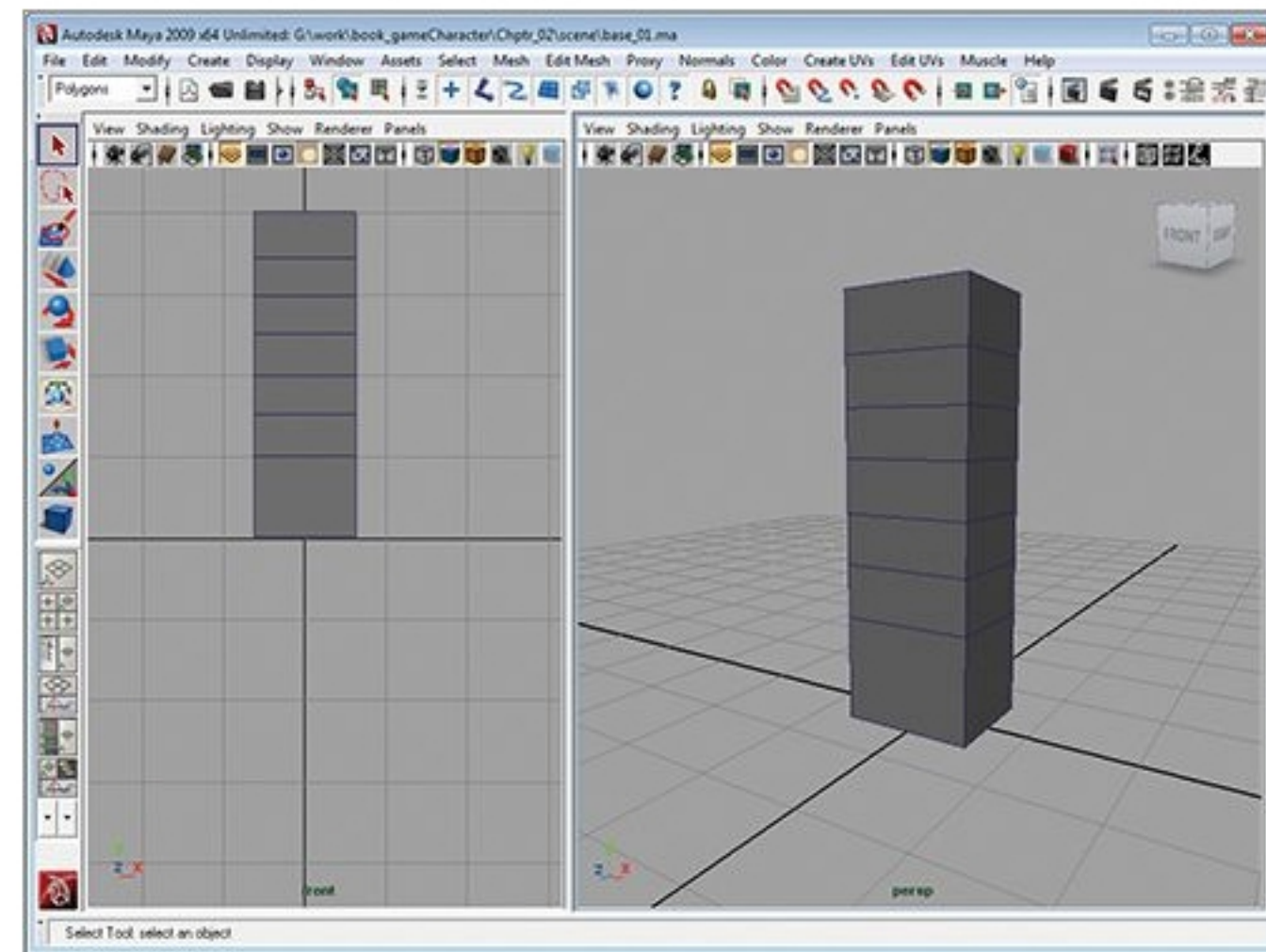
1. We begin with the front view in Maya and a PolyCube. Raise the PolyCube so that it sits on the ground plane. Increase its X Scale to 1.25. Select the top face and extrude upward one-half unit (See [Figure 2-2](#)). Repeat this extrusion every half unit until you have extruded upward 3 units in Y.

2. Select the bottom face and scale it down along the x-axis until its width is very small. Make sure to only scale it along the x-axis. Then select the faces of both sides and choose Edit Mesh ⇒ Extrude. Immediately press **W** to enter Move mode and pull downward one-half a head unit.

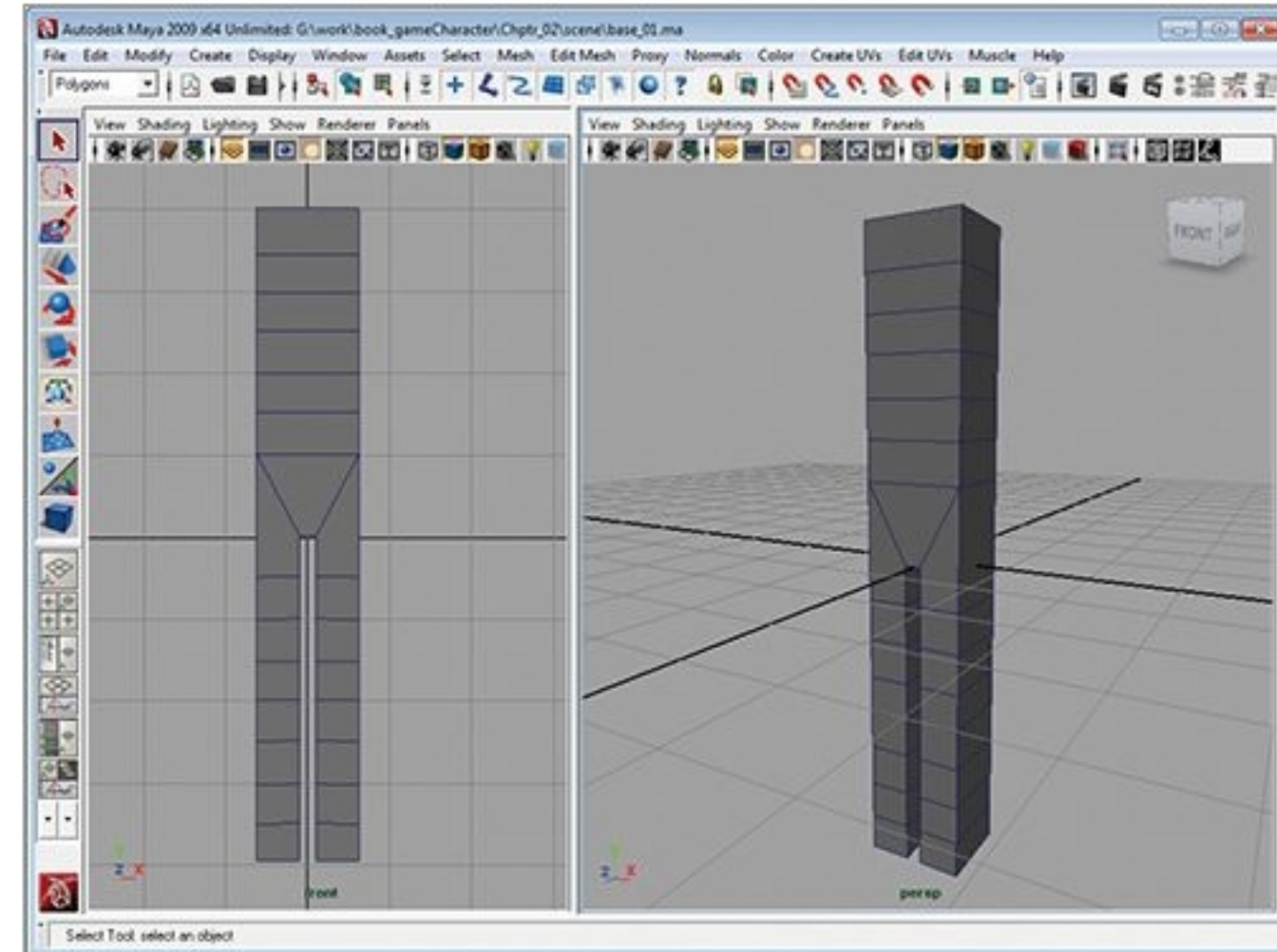
Press **R** to enter Scale mode and drag the top scale manipulator into the center. This will flatten the face as much as possible and help create even topology later.

Press **G** to repeat the extrude, immediately press **W** to enter Move, and drag down another half-head unit. Repeat this process until you have legs that are 4 heads tall, as in [Figure 2-3](#).

[Figure 2-2](#): Starting the torso



[Figure 2-3](#): Adding the legs



3. Now, let's adjust the shape of our model and make it more human. Turn

Reflection on by pressing **W** and then clicking and dragging upward to the Reflection marking menu. Make the following adjustment (refer to [Figure 2-4](#)).

First, move the line that will be the pit of the neck (7.5 heads from the ground) upward so that it is one-third of a head from the chin.

Make sure the head is .75 units wide.

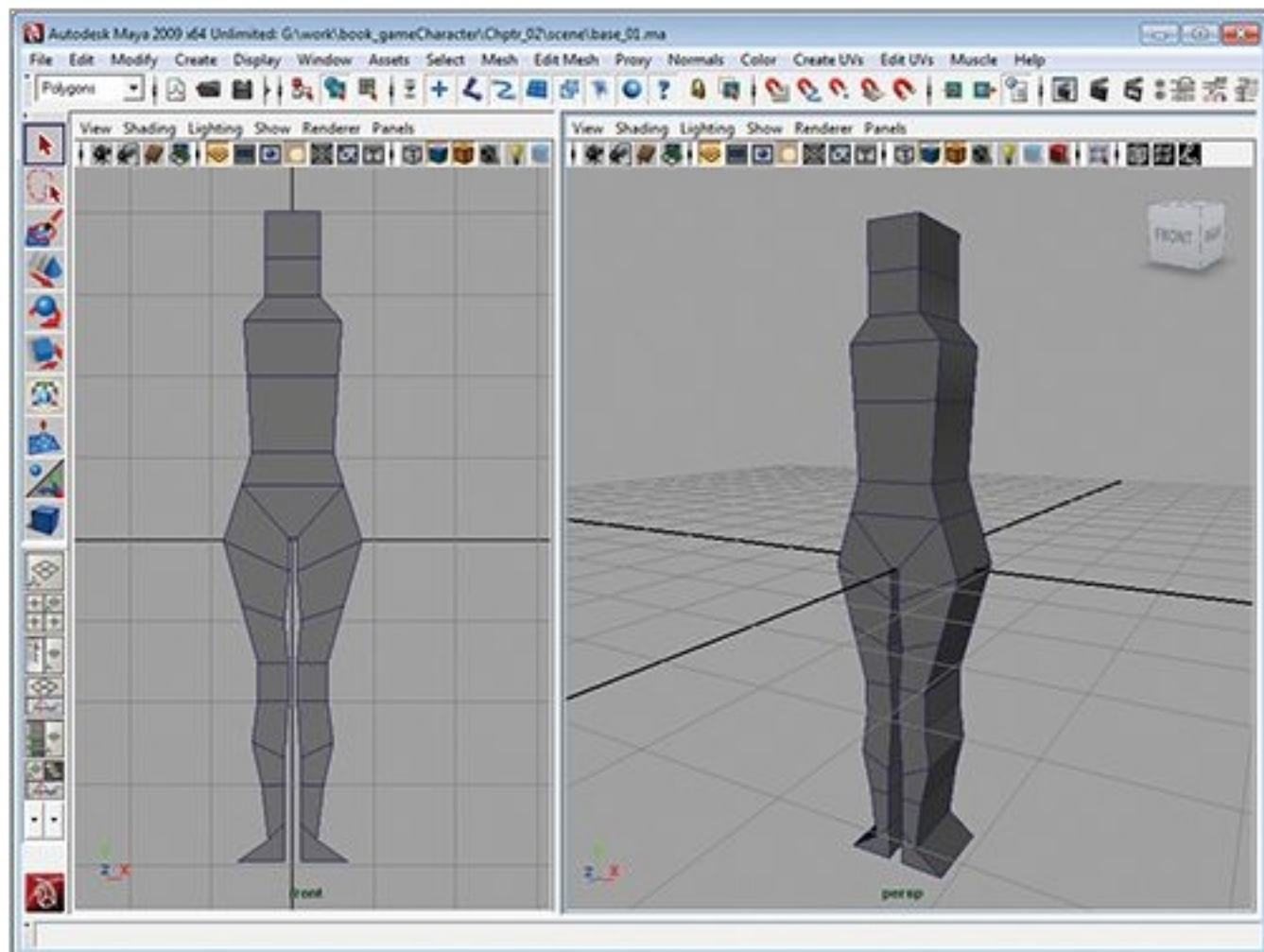
Move the line at 5 heads downward until it is 4.75 heads off the ground. This line will represent the anterior-superior iliac crest.

Move the line at 5.5 heads down to 5 heads off the ground and scale it inward to become the waist.

Move the outer vertices at line 3.5 heads upward so that it describes the hips at the 4 head mark.

Your model should now look like [Figure 2-4](#).

Figure 2-4: Adjusting the shape

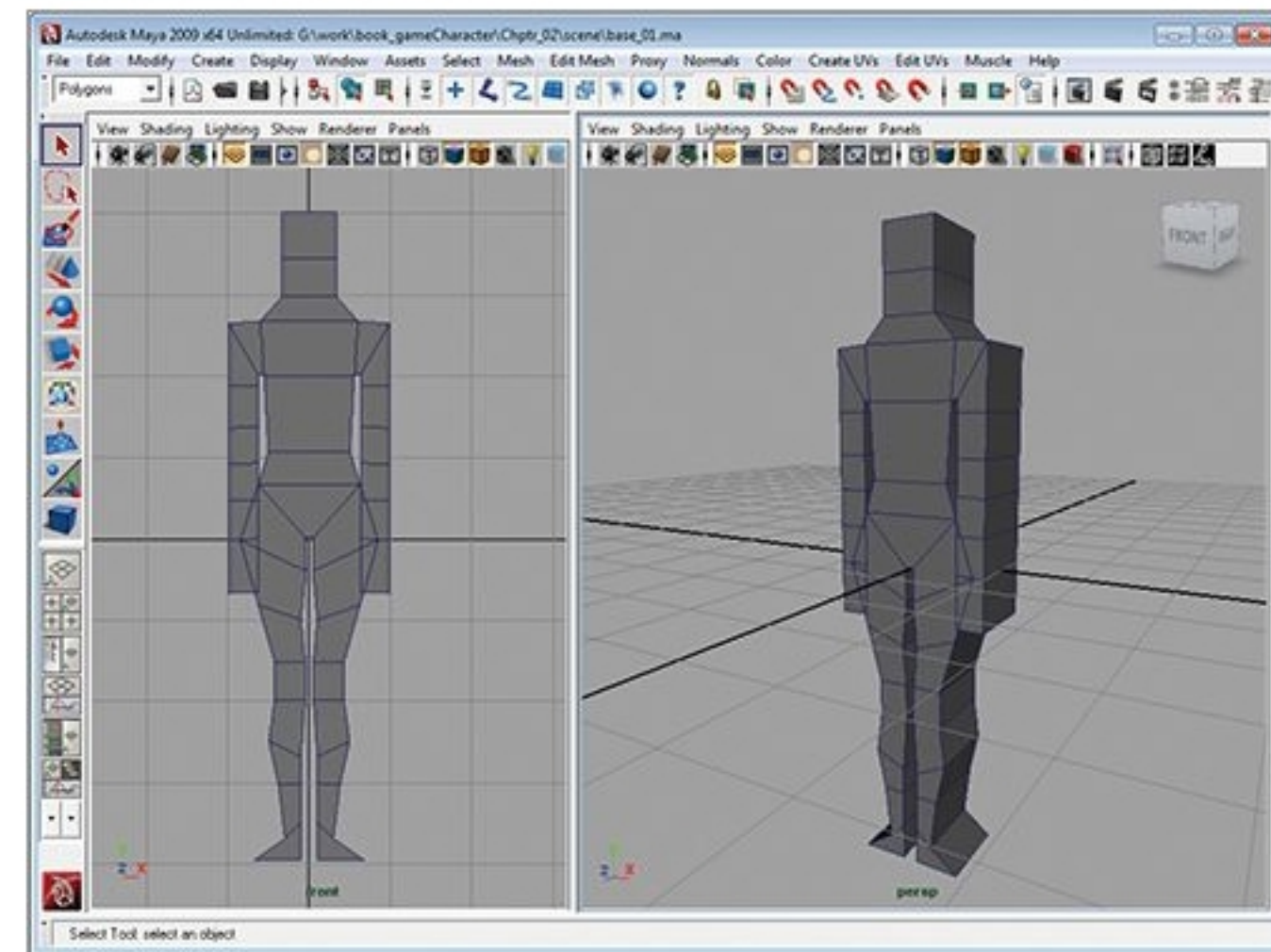


4. Select the faces on the side of the model that represent the shoulder area. These will be directly below the neck. Choose Edit Mesh ⇒ Extrude and pull the faces outward one-half unit until they touch the next grid line. Select the vertices along the bottom and scale them inward.

Once the faces are scaled inward, you can select them along the side and choose Edit Mesh ⇒ Extrude. Click the tiny circle in the upper right section of the manipulator

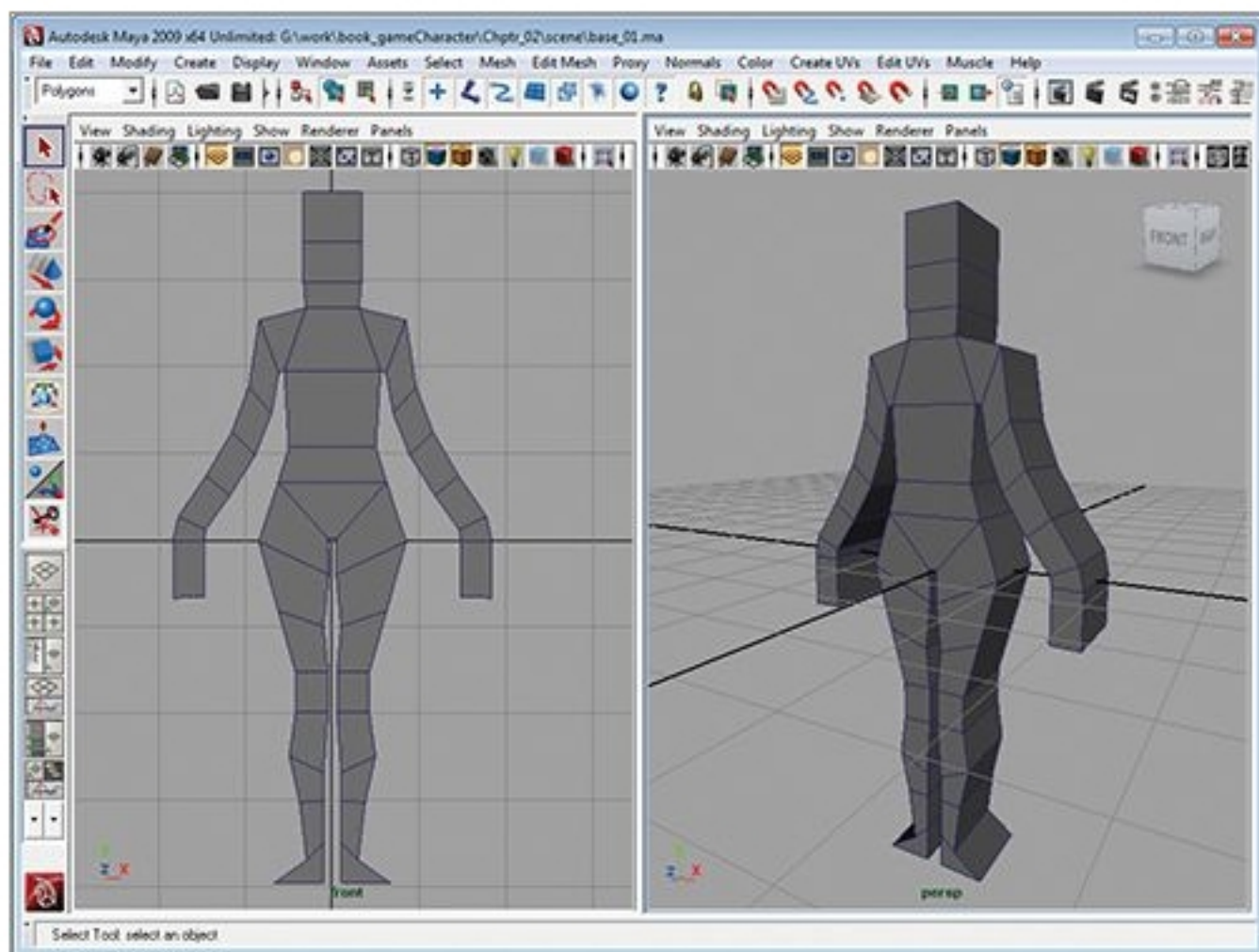
to switch to World Space and drag downward. Scale as you did the legs. Continue extruding the arms and hands downward. Remember to extrude downward in half-head units. Use [Figure 2-5](#) as your guide.

Figure 2-5: Adding the arms



5. Adjust the shape of the arms to match [Figure 2-6](#). It's important to pay attention to the high points on the inside and the outside. In fact, nothing could be more important at this stage. Let me say that again: there is no more important item at this particular moment than for you to get the high points of the arm and the rest of the body exactly as I have them.

Figure 2-6: Shape of arms



- Pit of neck
- Front of shoulder
- Knee
- Front of lower leg

2. Adjust the front and back vertices as shown in [Figure 2-08](#). Here is a checklist of the modifications to make:

- Thin the chest and stomach area slightly.
- Extrude the feet.
- Bring the calf muscle back slightly.
- Adjust the alignment of the neck and shoulder area.
- Define the bottom of the cranium.

3. Select just the back and butt vertices seen in [Figure 2-09](#) and move them backward a tiny bit. It's important not to select any of the arm faces in this process. Then press **3** to see how you are doing. Looking pretty good, huh? Press **1** to get back into low poly mode.

Figure 2-7: Creating center of balance

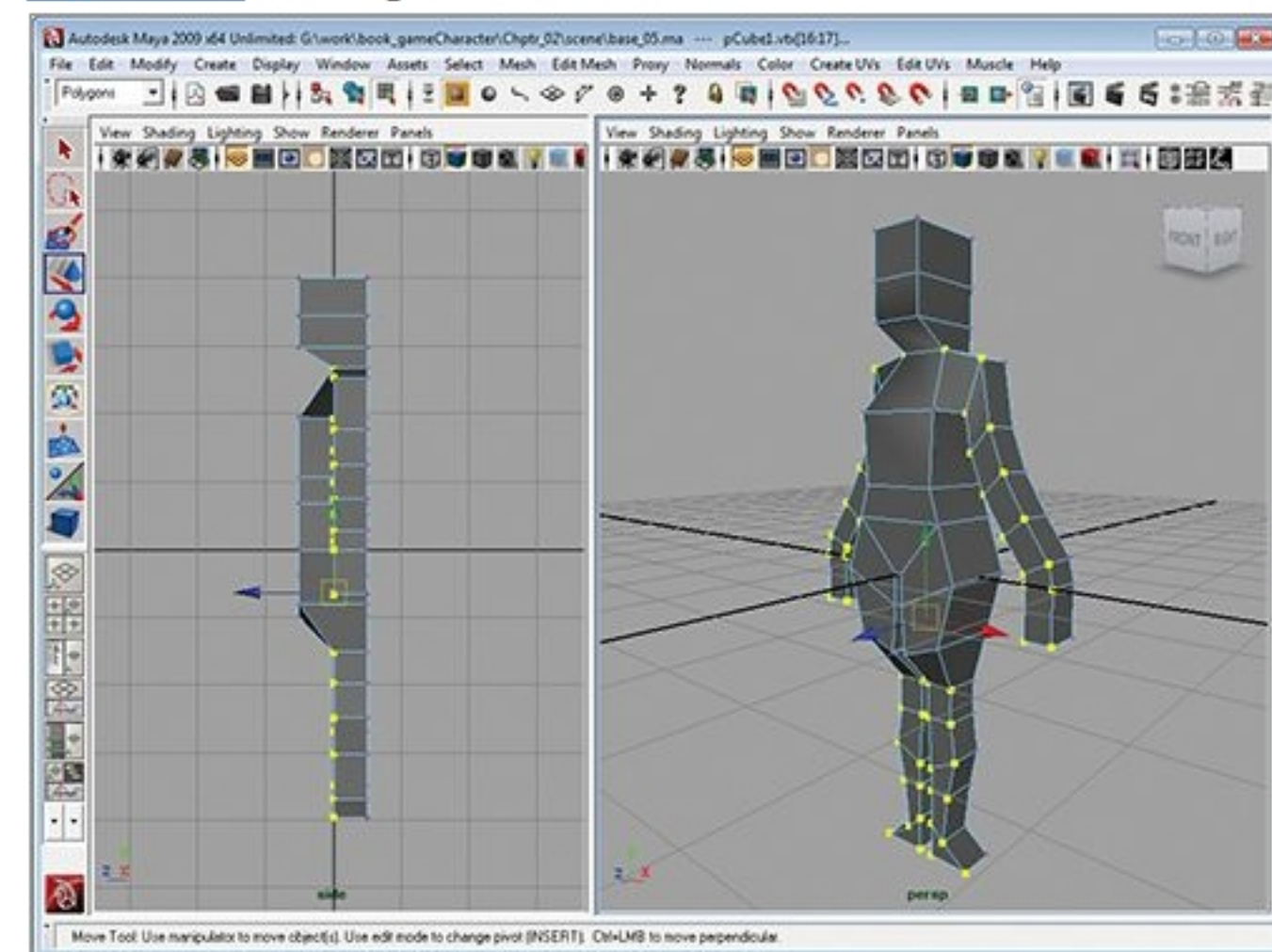


Figure 2-8: Refining the form

So far, we have established all of our limbs from the front view. However, the side view shows us that we still have some work to do. We are making great progress though, and our base mesh is already shaping up into the perfect armature to sculpt upon.

I can't stress enough how important it is to take time while making your base mesh to get the natural gesture and correct proportions as accurate as you can.

Refining the Shape from the Side View

Now it's time to work on the side view. Before we go further, though, I want to point out the two major conceptual hurdles to getting the side view working correctly:

- The placement of the knee
- The placement of the shoulder

Students are invariably placing the shoulders and the knees too far forward. Also, the deltoid often inflates and becomes one with the pectoralis muscle.

Follow these steps to continue:

1. Select each of the following sets of vertices and move them backward to the center line (refer to [Figure 2-7](#)).

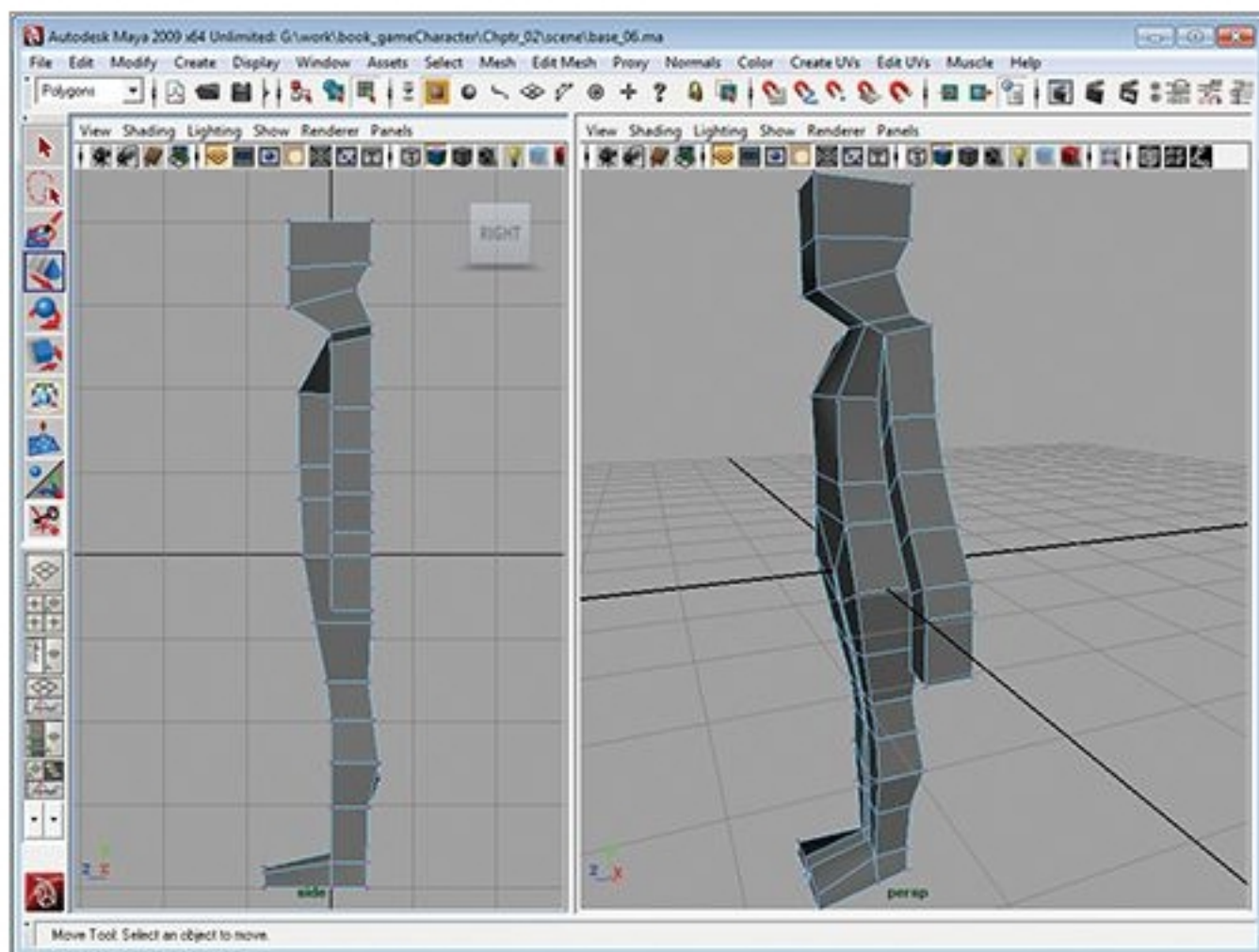
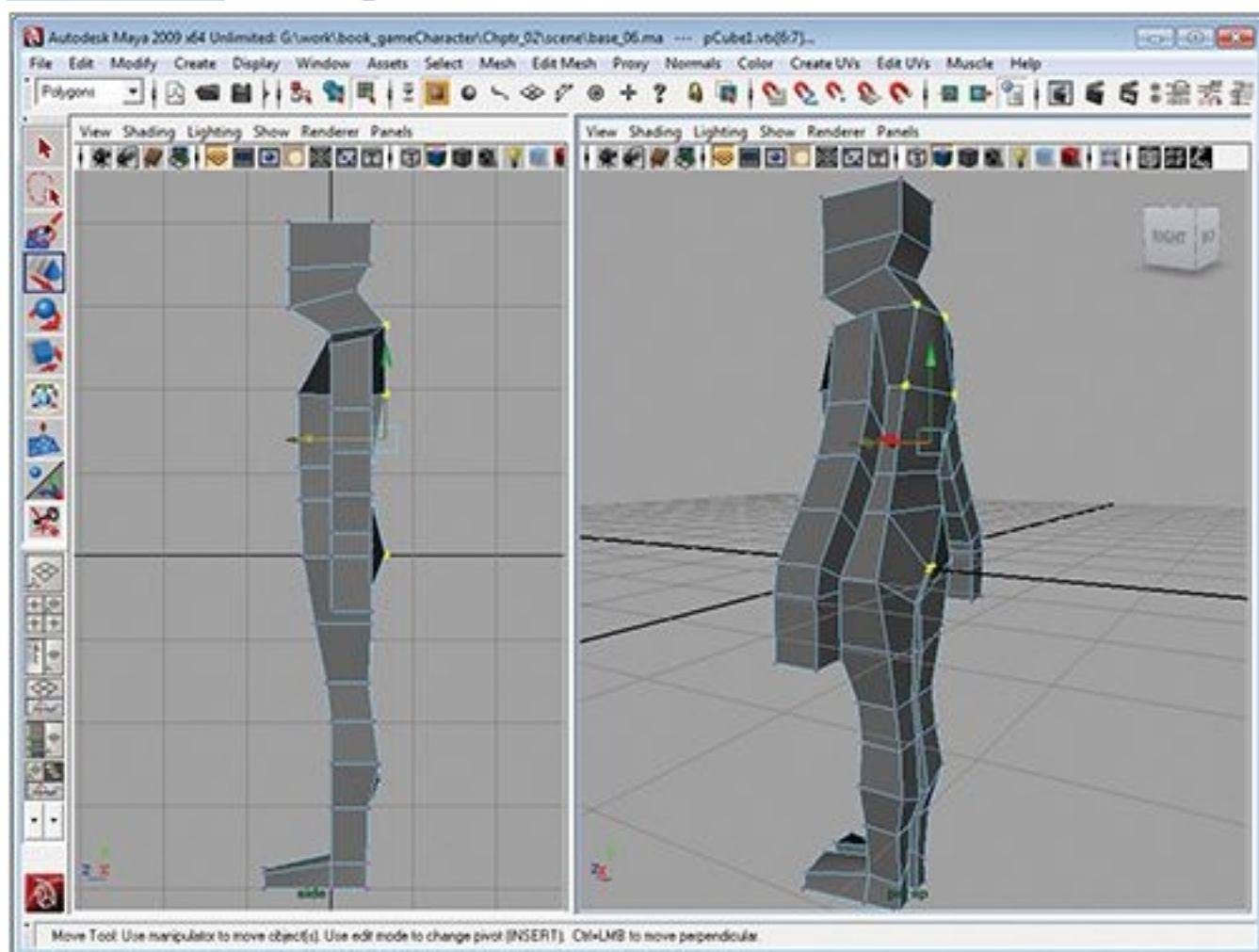
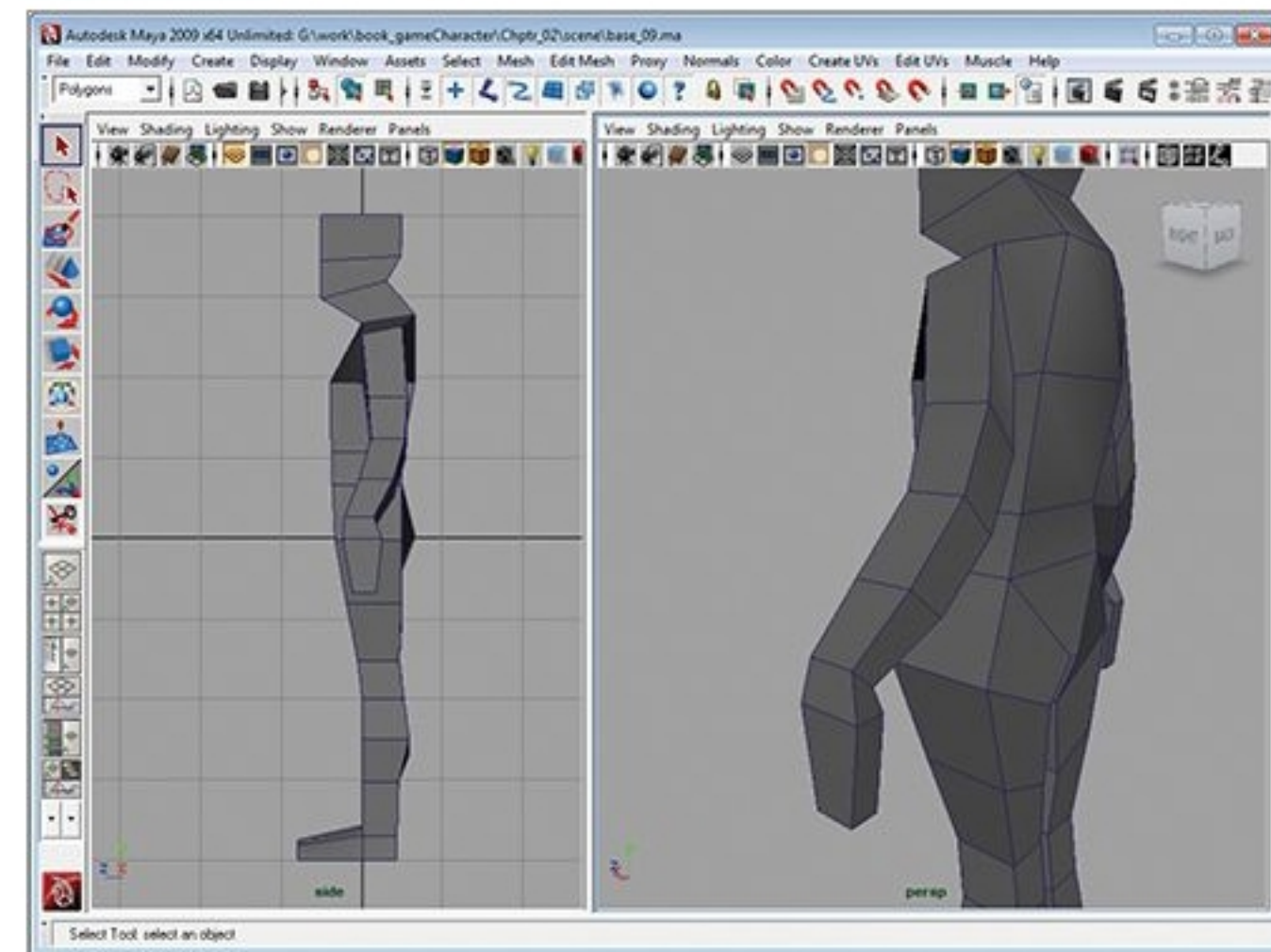


Figure 2-9: Refining further



all of the preceding steps, the gesture should already be accurate from the front.

Figure 2-10: Rounding the arm



Creating Hands

Adding hands requires a little polygon finesse. This is the one area where ZSpheres falter, in my opinion. I usually find it better to create them in Maya, but they require a lot of geometry to describe all five fingers. Luckily, if you follow the steps I lay out it will be relatively painless:

1. First add one edge loop directly down the center as in [Figure 2-11](#).
2. Then select the faces on either side of both hands and extrude outward as shown in [Figure 2-12](#). At this point the hands are much too big, but that is easy to fix once you have the geometry all set up.
3. Extrude all four fingers. Make sure to turn off Keep Faces Together in the channel box. Extrude three segments so the fingers will have the natural setup of your own fingers, as in [Figure 2-13](#).
4. To extrude the thumb, we will have to first insert an edge loop around the hand and then extrude the face above the edge loop as seen in [Figure 2-14](#). At this point, we will not be working on both sides of the model and will mirror the other half before

4. Next, we need to give the arm its natural gesture, as in [Figure 2-10](#). If you followed

sending it over to ZBrush.

Figure 2-11: Splitting the arm

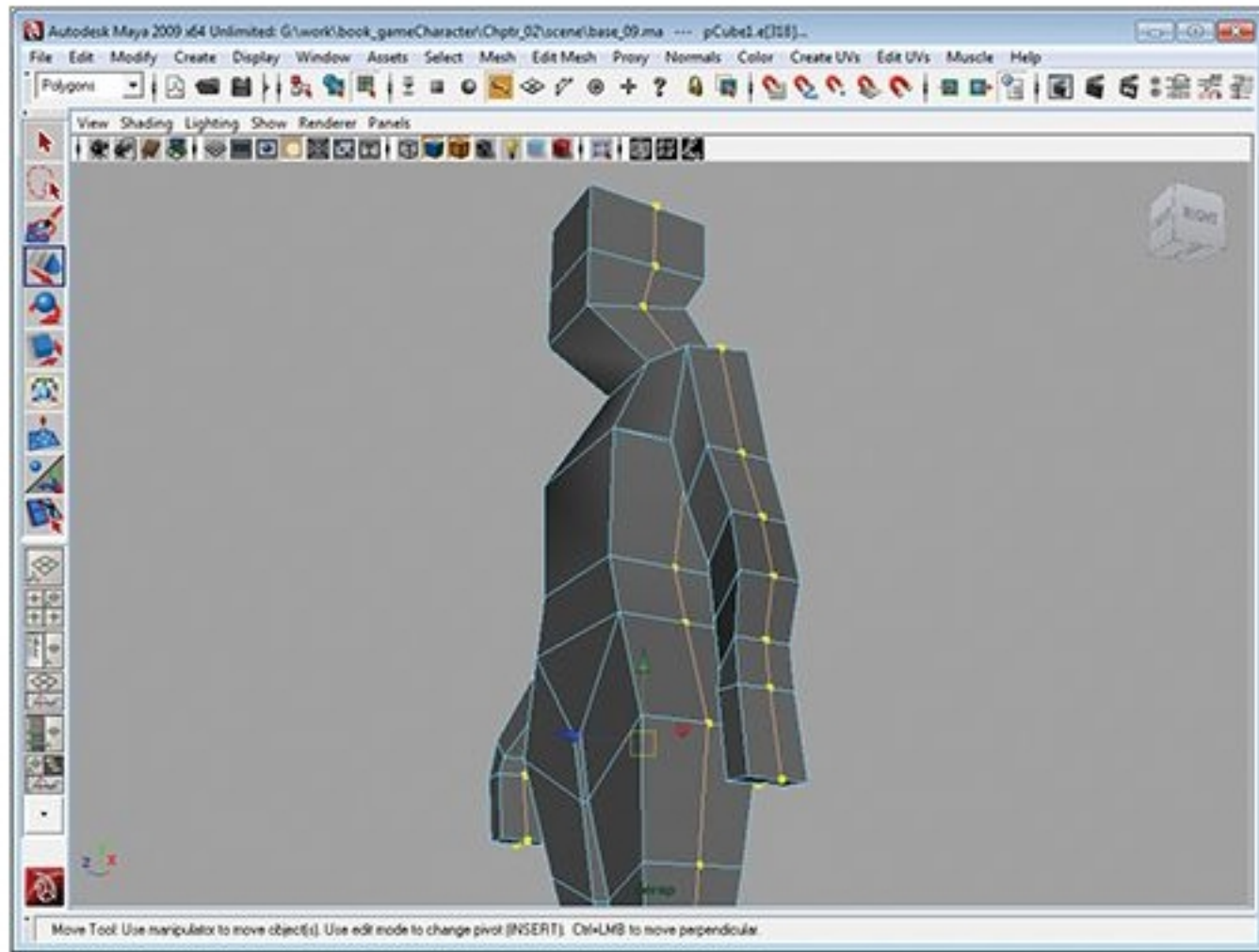


Figure 2-12: Extruding the palm

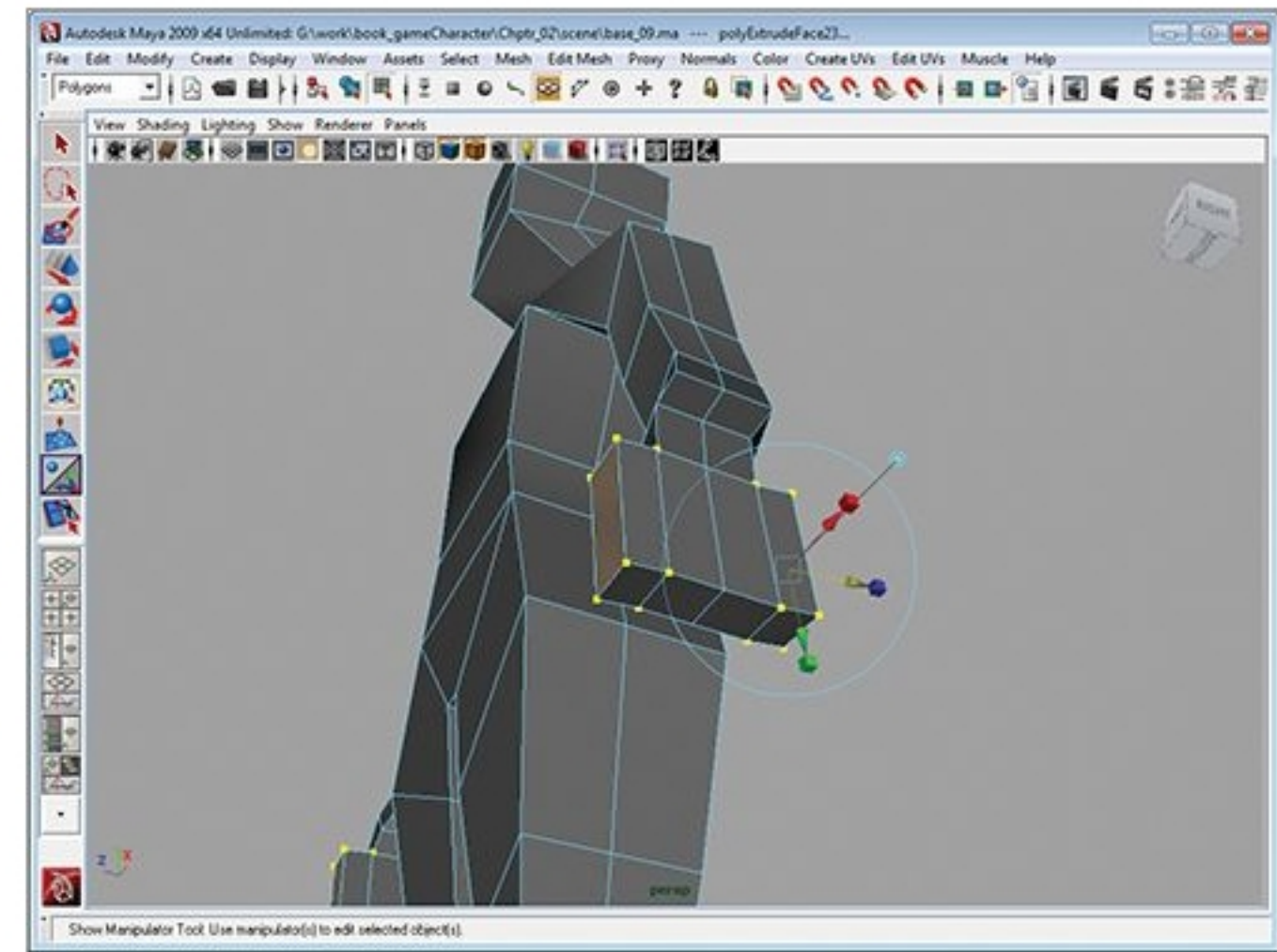


Figure 2-13: Extruding the fingers

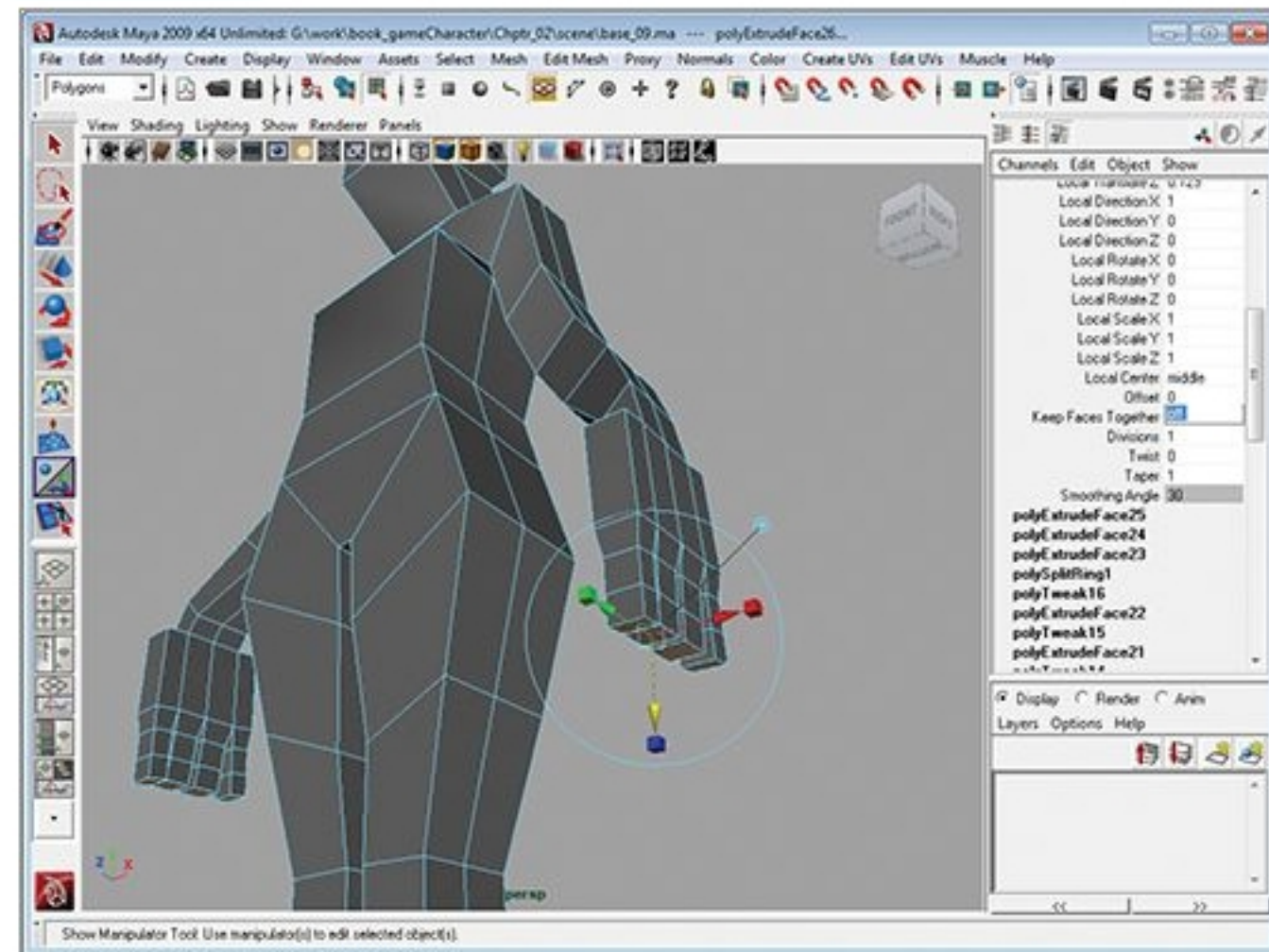
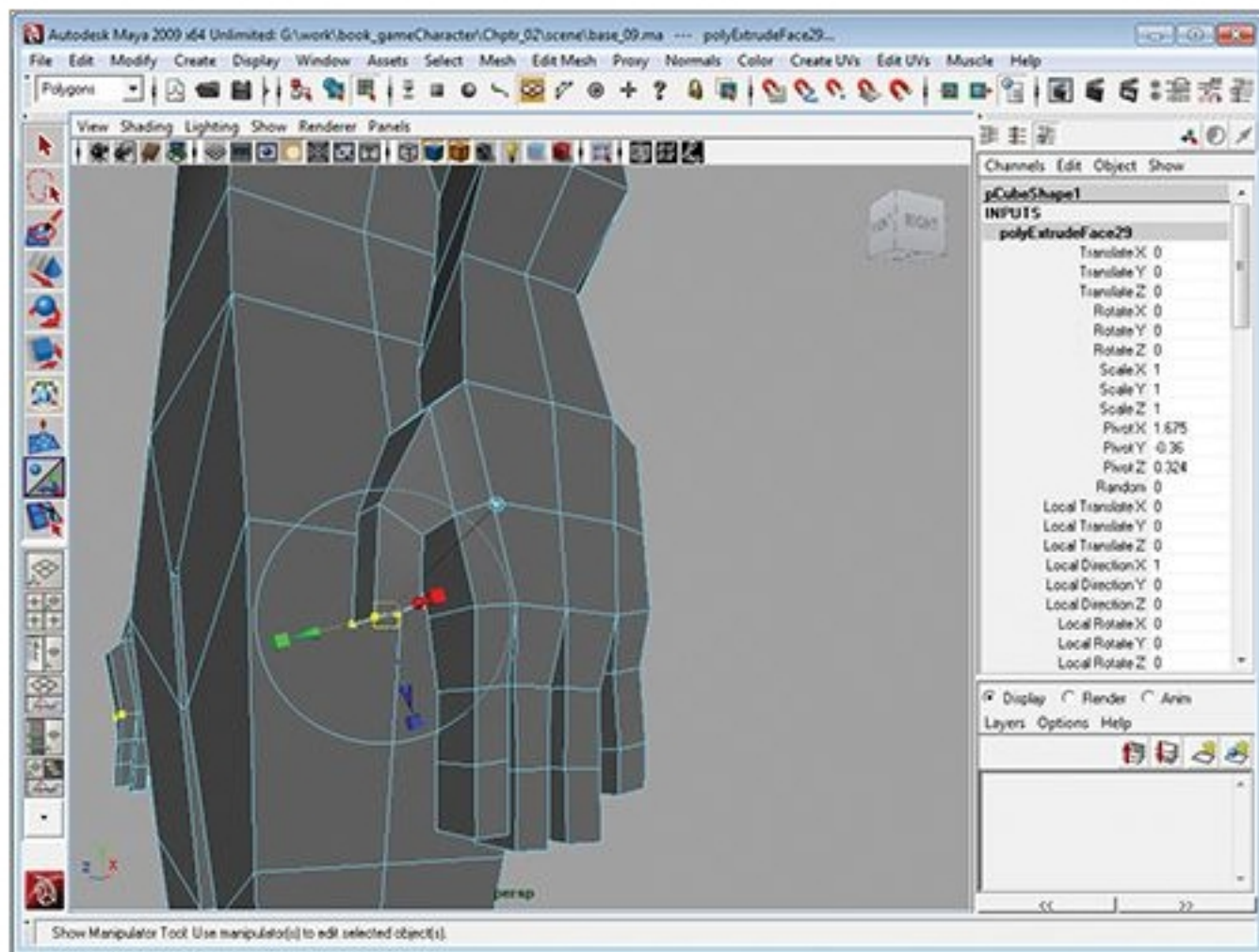


Figure 2-14: Extruding the thumb

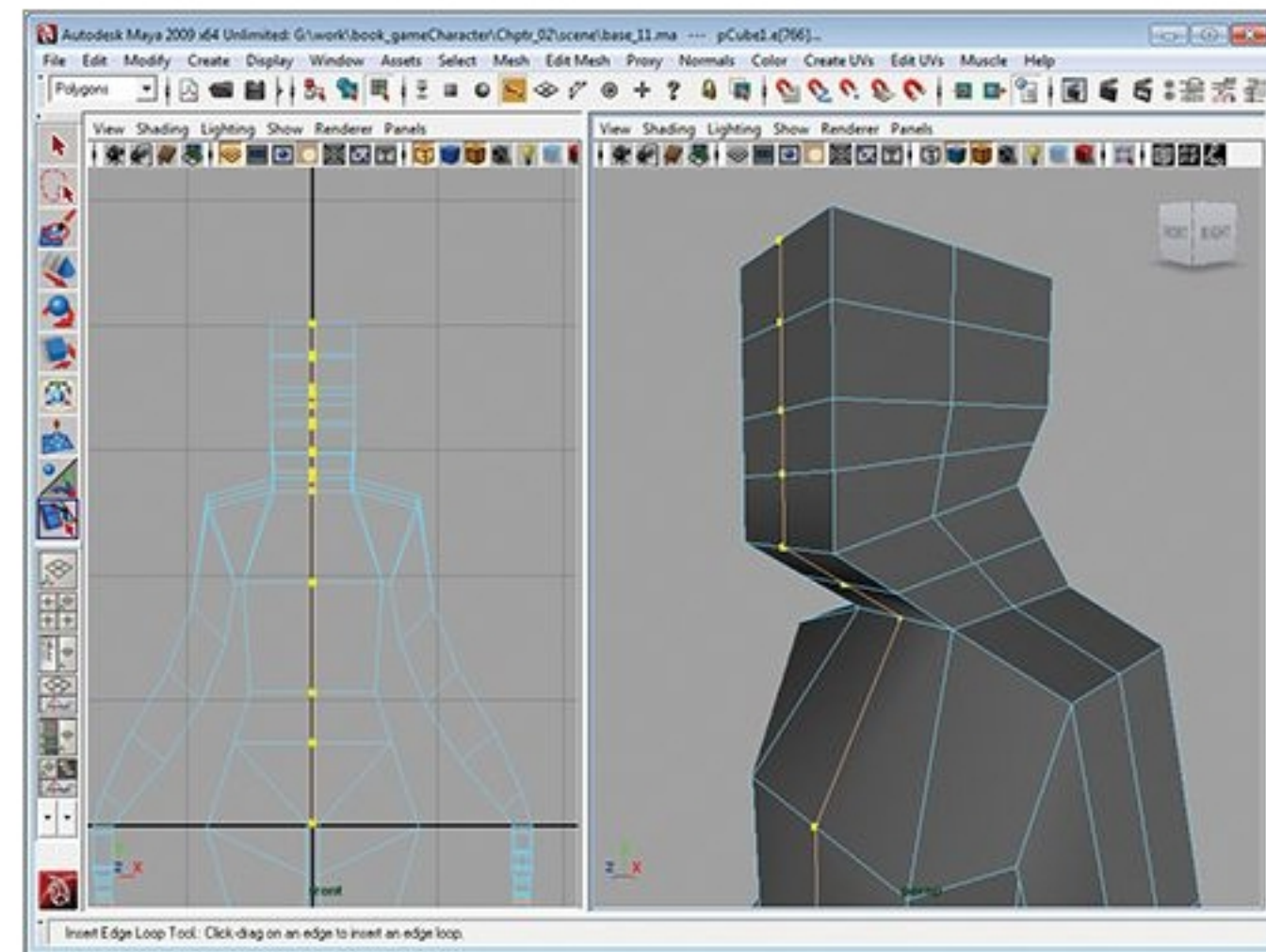


Mirroring and Finishing the Model

Part of the job of our base mesh is to put polygons where we will need them most, so our last step before mirroring over our topology is to insert edge loops as needed:

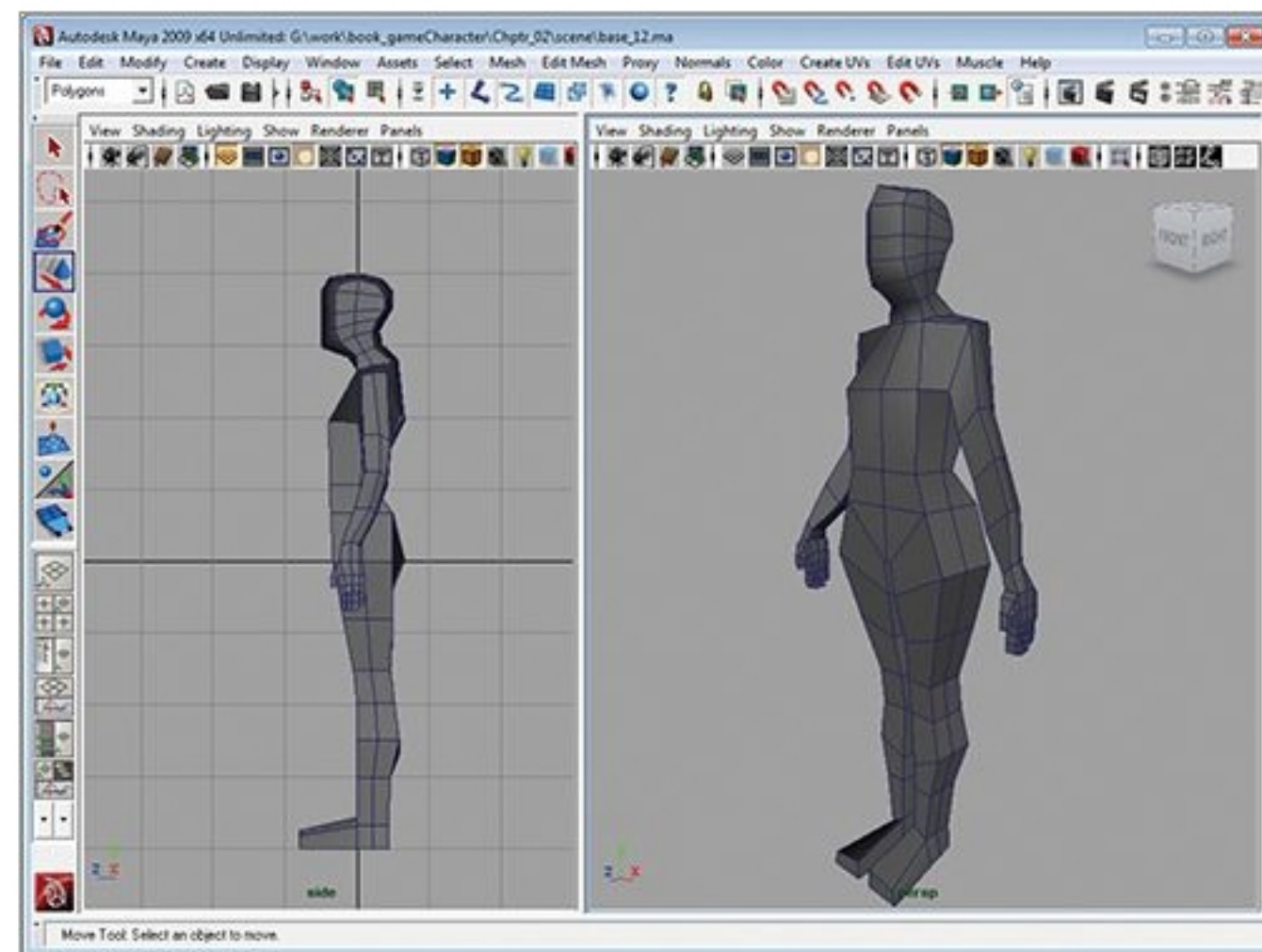
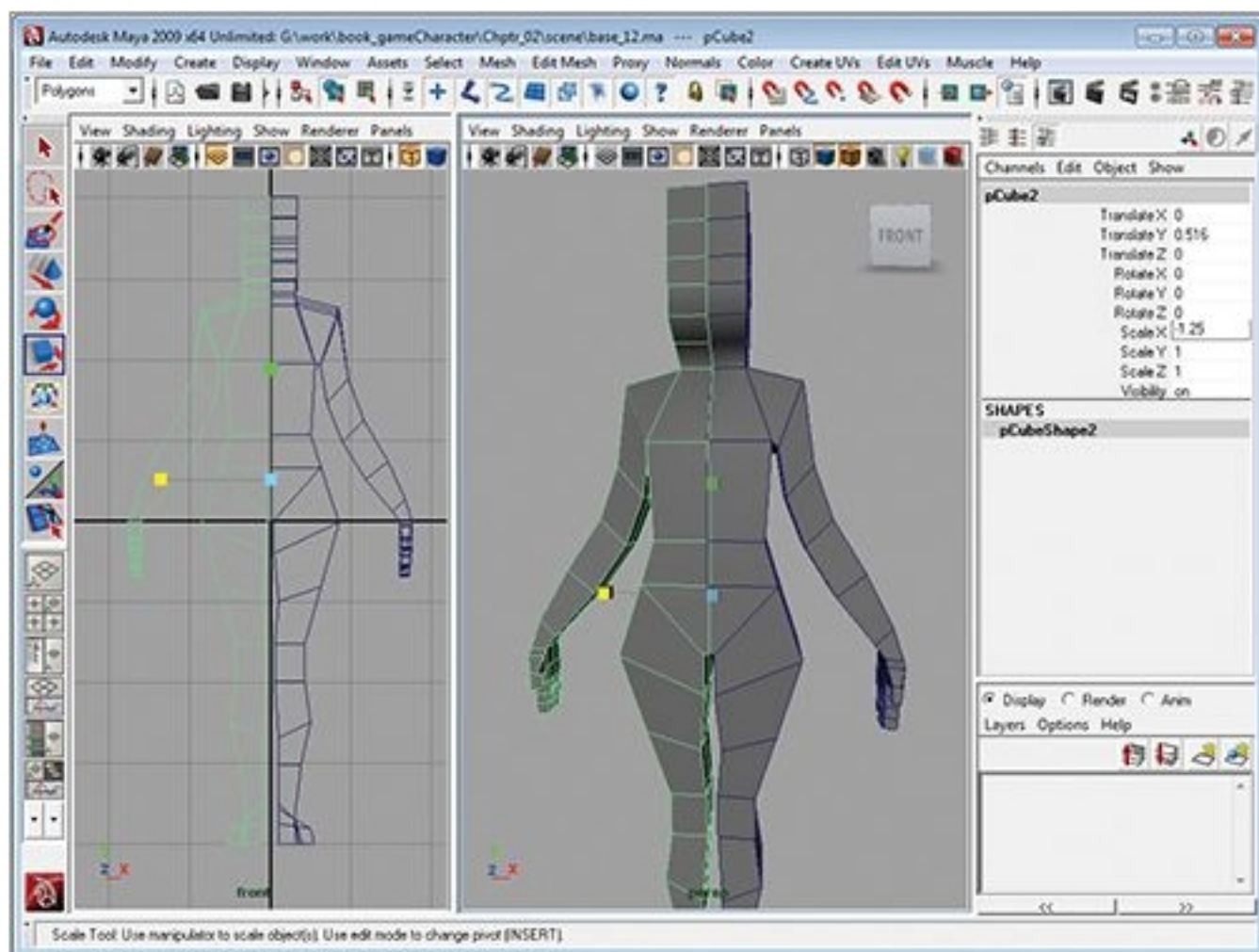
1. Use [Figure 2-15](#) as a guide for where to add edge loops. In general, you want to make sure you have enough polygons in the chest area, elbow area, knee area, and shoulder area.

[Figure 2-15](#): Splitting the model



2. Now, delete the half of the model that does not have a thumb. Select the half with the thumb and duplicate it by choosing Edit ⇒ Duplicate. Set its X scale to -1.25 so that it mirrors the other side, as seen in [Figure 2-16](#).

[Figure 2-16](#): Mirroring the model



You may have noticed that we have not edge-looped the eyes, mouth, or nose in any way yet. We have enough to worry about when sculpting without throwing topology into the mix. We'll look at retopologizing the head in the next chapter.

3. Select both and choose Mesh ⇒ Combine. Select the vertices along the center and scale them inward toward each other. Choose Edit Mesh⇒ Merge Vertices to merge them into one mesh. Press 3 to check the mesh and to make sure everything merged correctly. Make sure to fix any problems you see before moving on. Your base mesh must be in perfect working order before you start sculpting.

4. Finally, in my model I rounded some forms in the arms and the head, but otherwise, the model is unchanged from our process. [Figure 2-17](#) is as far as you should take the base mesh. The rest of the work will be sculpted in ZBrush.

[Figure 2-17](#): Final result of base mesh

Project 2: Bony Landmarks

The bony landmarks are the foundation of our sculpting. They are our first road map into the human body. Most of our sculpting will reference a bony landmark at one stage or another, so it is very important to establish them first, as shown in [Figure 2-18](#).

[Figure 2-18](#): Establishing bony landmarks