



Chapter 1

CHARACTER DESIGN



laurie stanley

"Skyscape Dream" by Laurie Stanley

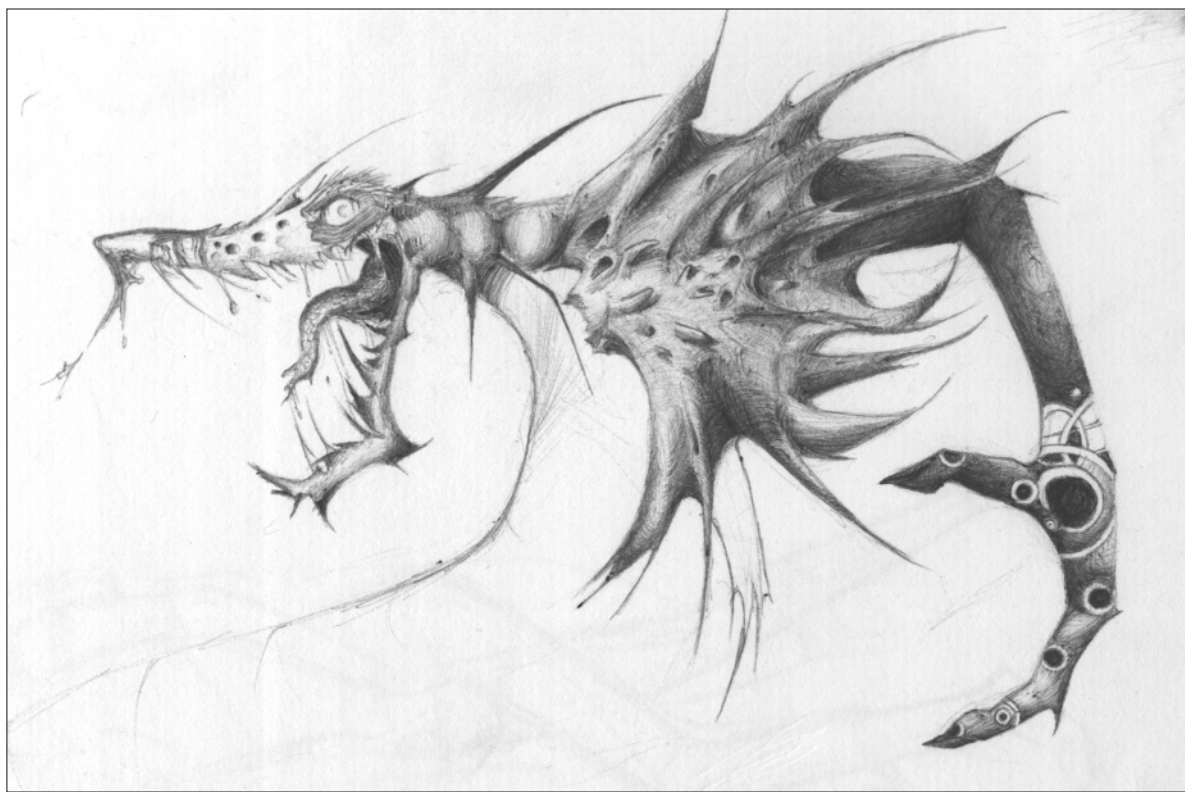
Designing and creating characters isn't a new art. It is the same job undertaken by Michaelangelo, Rodin, Bernini, and others throughout the centuries, but the current medium is much different from working in stone or bronze. Even though the tools used by 3d character artists today are radically different from those of the artists of yesteryear, many of the basic concepts are still relevant.

Traditional sculptors and artists required an extensive knowledge of human anatomy to create realistic models. Today's 3d artists likewise should have a strong knowledge of the type of characters they are developing. The sculpting concepts of proportion, space, scale, and perspective are just as applicable in the 3d world as they were to the traditional character artists.

DESIGN BEFORE MODELING

If I can make one definitive statement concerning character design that will help more than any other, it would be this: Do not start modeling until you have a concrete design. Many a 3d artist, myself included, have sat down at a computer and just started pushing vertices around. If you start without a design, then you'll end up with a character that looks like it was modeled without a design.

A conceptual design (see Figure 1-1) is the blueprint that will keep you on track. Conceptual design drawings, reference images, and modeling templates will help keep your modeling on target and will help keep your proportions in check. This chapter presents some



1-1

"Dragon Sketch" by Mari Murdock

ideas to help you as you prepare the character design drawings that will guide your modeling efforts. This chapter is not intended to teach drawing and sculpting skills. Many excellent resources are available in schools, in books, and on the Web to help you develop these skills.

STUDYING THE HUMAN FORM

Before you can design a realistic character, you need to understand the type of character you are modeling. For human character modeling, millions of examples are available all around us, as shown in Figure 1-2. Taking time to study the human form will help as you begin your designs.

The Web is another great resource that you can tap for images. Several Web sites specialize in reference images for artists. These sites often offer unlimited image downloads for a nominal monthly fee (see Figure 1-3). The following is a short list of such sites:

www.fineart.sk/

www.3d.sk

www.female-anatomy-for-artist.com/

www.human-anatomy-for-artist.com/

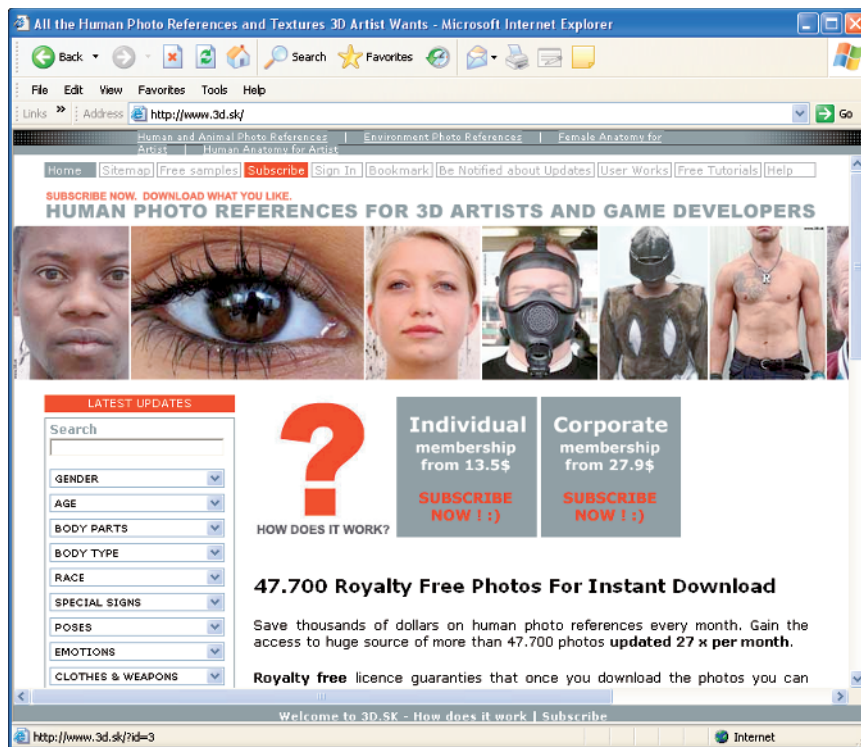
These sites include thousands of character images (see Figure 1-4) covering every gender, age, race, and body part. You can find images of characters in various poses showing different emotions and clothing styles. The sites include close-ups of body parts and images of various animals.

PRO TIP

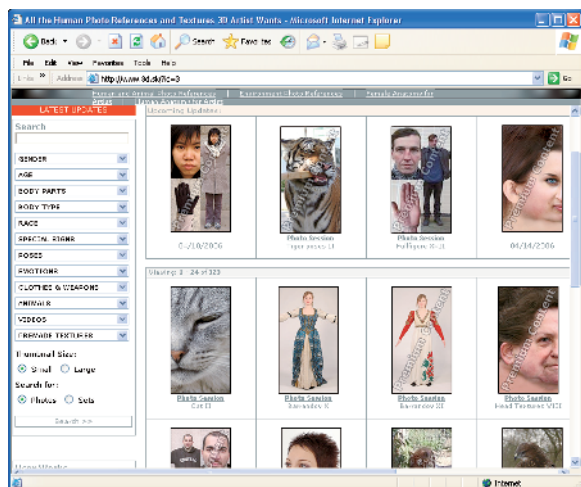
Try taking your digital camera out to a well populated area where you can capture images of people that you can study later for inspiration. Look for unique poses, expressions, and styles.



1-2



1-3



1-4

NOTE

Many of the images on these sites contain nude models, which are helpful for modeling realistic anatomically correct characters but may be inappropriate for minors.

STUDYING SCULPTED CHARACTERS

The drawback to images from books, movies, and magazines is that they are 2d, which loses the critical depth element. Even a video segment of a character doesn't give you the depth or all angles of the character.

In addition to 2d images from books, movies, and magazines, 3d characters are very helpful. This information can be gathered from real people who are patient enough to let you study them. Other good sources are sculpted characters (see Figure 1-5).



1-5

"Stepping Stones" by Dan Hildreth

3d character artists can learn a great deal from the work of talented sculptors, either historical or recent. If you seek out their work in museums (see Figure 1-6), in books, and on the Web, and learn from their techniques, your skill will improve as well.



1-6

"Candice" by Gary Price

I went on a search for sculpted works around my community and was delighted to find several wonderful examples (see Figure 1-7) within 5 miles of my house in rural America.

In addition to museums, memorials and cemeteries (see Figure 1-8) are great places to look for sculpted pieces.



1-7

"Father Escalante Monument" by Avard Fairbanks



1-8

"Veteran's Memorial" by Kelly Peterson

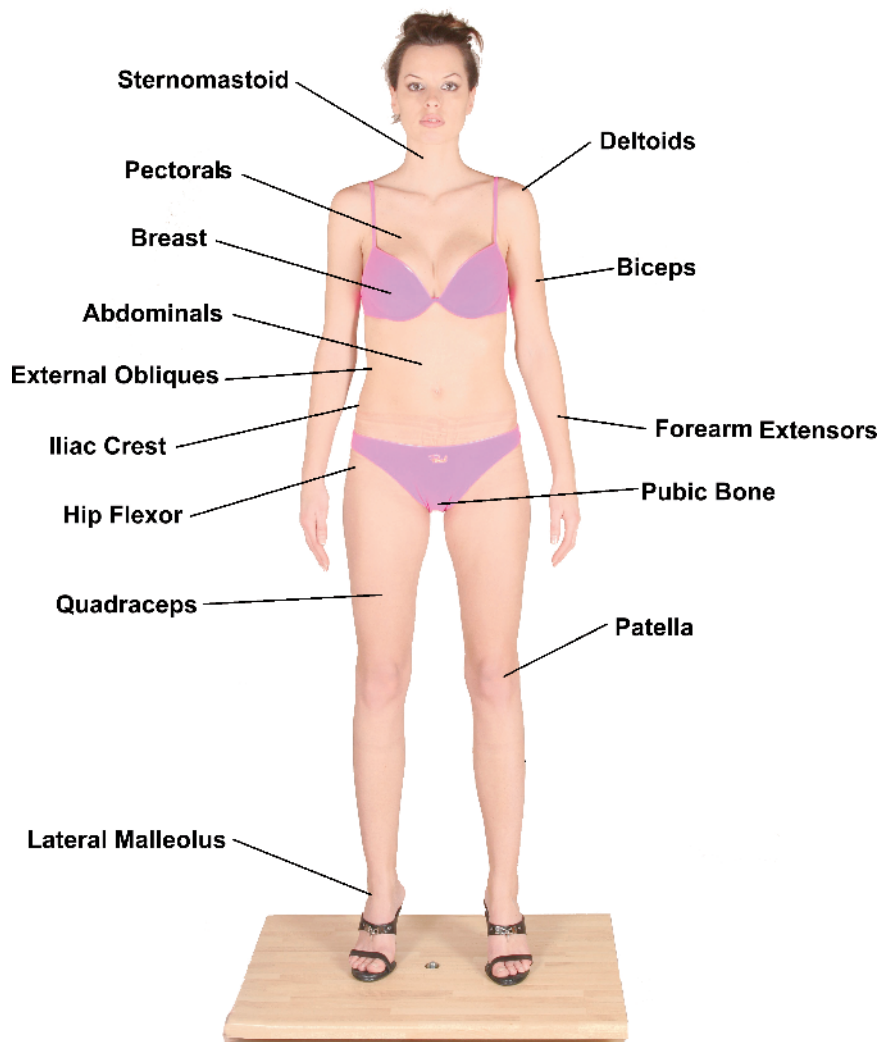
STUDYING ANATOMY

If you're going to model human characters, you need to understand human anatomy. Once you have a good understanding of your target character's exterior, you can focus on the character's interior structure. If you know the bones and muscles that are under the skin, then you're better able to model the skin flowing over these body parts.

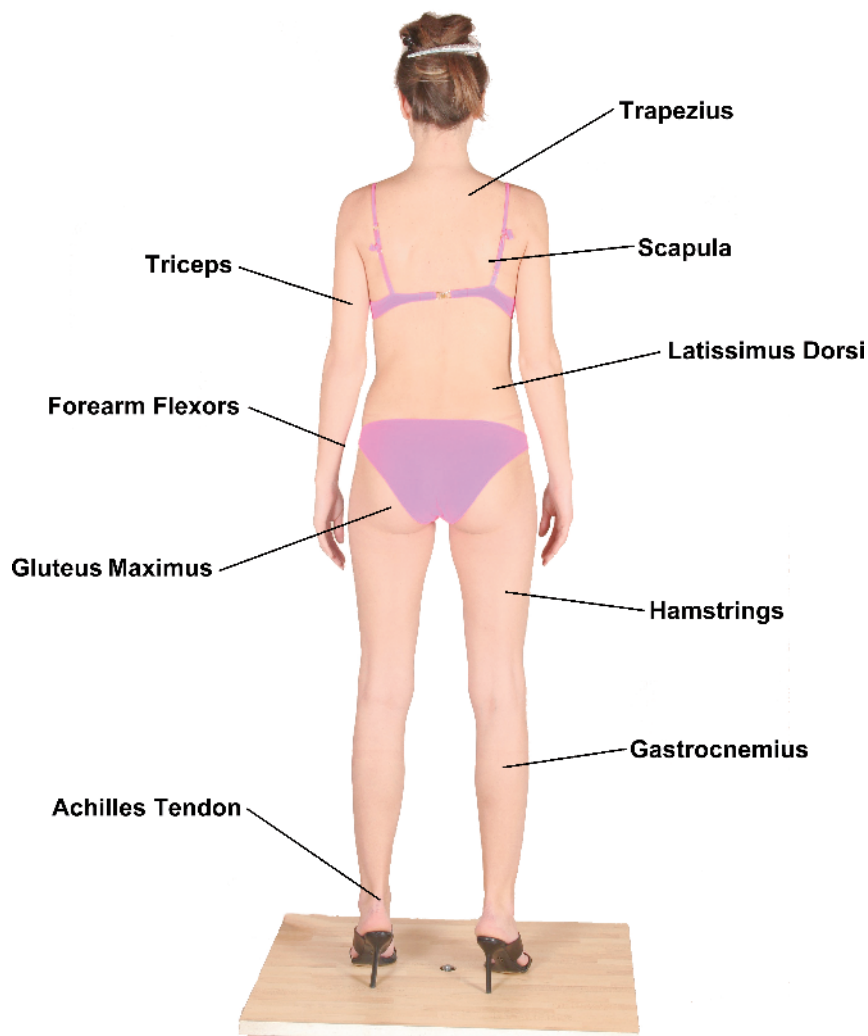
When studying anatomy, once again the Web is a great source of information. You can find many valuable resources online—everything from anatomical drawings to muscular charts that are used by sculptors as well as character artists.

Because our target character is a female model, we need to understand female anatomy for this project. We also need to learn a set of terms that we can use to refer to specific parts of the body.

Figures 1-9 and 1-10 show the major anatomical muscles and skeletal features for a female character. Figure 1-11 shows the major skeletal bones.



1-9

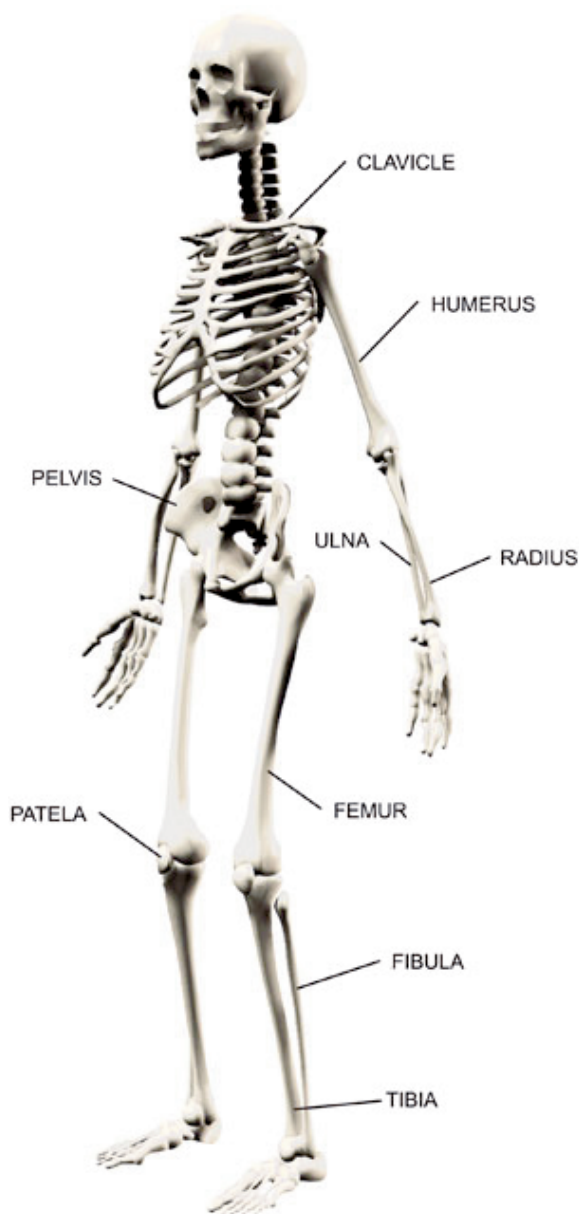


1-10

If the character you are designing isn't human, you can find reference images for it as well. As you design a character, be sure the anatomy makes sense. Try to design fictional characters that really could exist.

PRO TIP

When learning the names of the muscle groups, I find it helpful to use the more common names that gym trainers use rather than the scientific names used by doctors.



1-11

DEFINING CHARACTER ATTRIBUTES

As a character is being designed, give the character a name and a brief personality description. Having a description is beneficial as you go through the modeling steps because it helps as you add details to the

character. For example, a pirate character named Smokey Eye Pete could be given a peg leg, a hook for a hand, a parrot on his shoulder, an eye patch, and a couple of nice scars during the final refinement steps. The character's personality description helps much more than a description that just says, "a male character."

When modeling characters for games and movies, you generally do not face a shortage of character descriptions. Before starting your design, read through the game storyline or movie script to grasp the character's personality and nuances. Take some time to speak to the game designer or the screenwriter about the character. The better you understand the character, the easier it will be to create a character that works.

During every phase of the design, bounce your conceptual drawings off the creative team and get their approval before you sit down to model. The extra effort up front will save time spent making corrections, especially with tight deadlines.

UNDERSTANDING PROPORTIONS

Design sketches help keep all your proportions correct. If you're trying to model an ideal female character and you don't get the proportions right, then the character will look odd, but you won't know exactly why.

X-REF

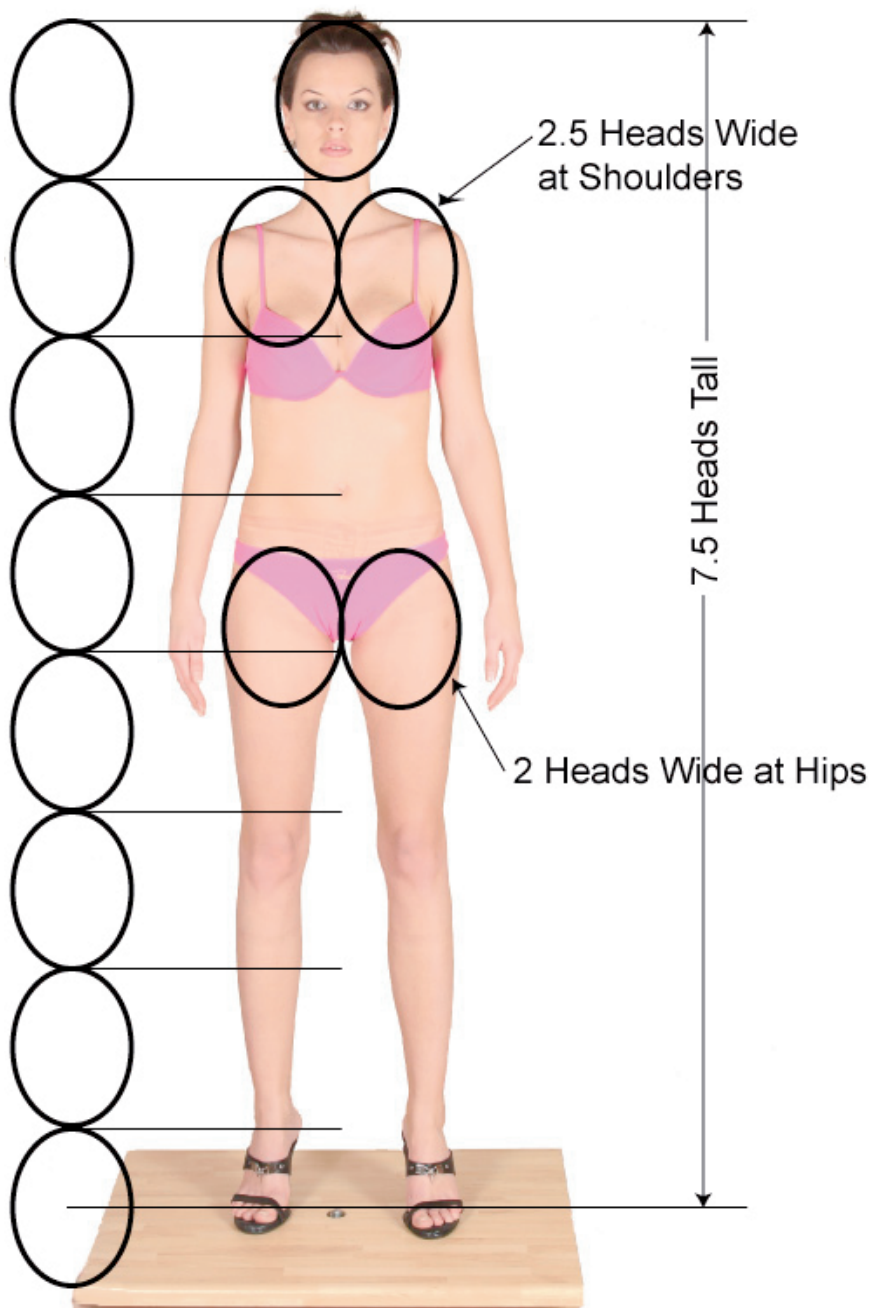
Each of these muscle and skeletal structures is covered in more detail in the applicable chapter.

STANDARD BODY PROPORTIONS

Many artists from the Greeks and their Golden Rectangle to DaVinci and his Vitruvian Man have drawn and defined the standard body proportions. Understanding these guidelines can help you keep your characters in check.

Body height is typically measured based on the height of the model's head. An average-sized adult human figure is typically about 7 to 7.5 heads tall (see Figure 1-12), but superhero characters are often

exaggerated to be 8.5 heads tall. Body width should range from 2 to 2.5 heads from shoulder to shoulder and 1.5 to 2 heads width at the hips.

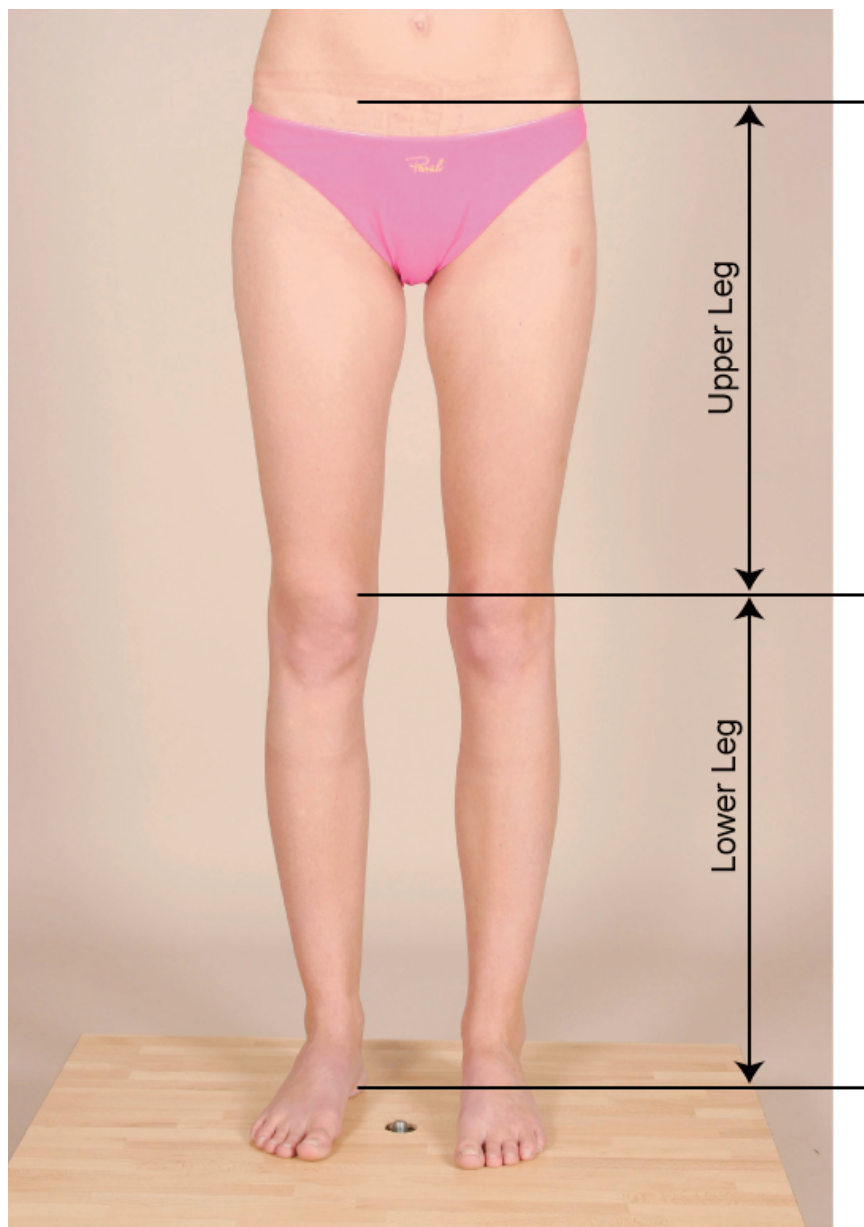


1-12

Each head height marks a location on the body. The first head height marks the chin, of course. The second head height comes across the mid-breast. The third head height is at the hip just above the navel. The fourth head height comes in just below the pubic area. The fifth head height marks the middle of the thigh. The sixth head height marks the top of the knee and the final head height marks the top of the heel.

The leg proportions typically are half of the character's height with the crotch marking the halfway point.

The height of the lower leg from the top of the knee down should be the same height as the upper leg from the top of the knee to the hip, as shown in Figure 1-13.



1-13



The arm length should be long enough that it reaches to the middle of the thigh when hanging naturally down from the shoulder, and the length of both arms outstretched tip to tip will be about the same as the character's height.

Finally, the foot length should be roughly equal to the forearm.

STANDARD HEAD PROPORTIONS

The facial features also have some standard guidelines for defining their positions, but keep in mind that these proportions are for a standard adult. You can quickly make a character appear creepy or inhuman by straying from these guidelines.

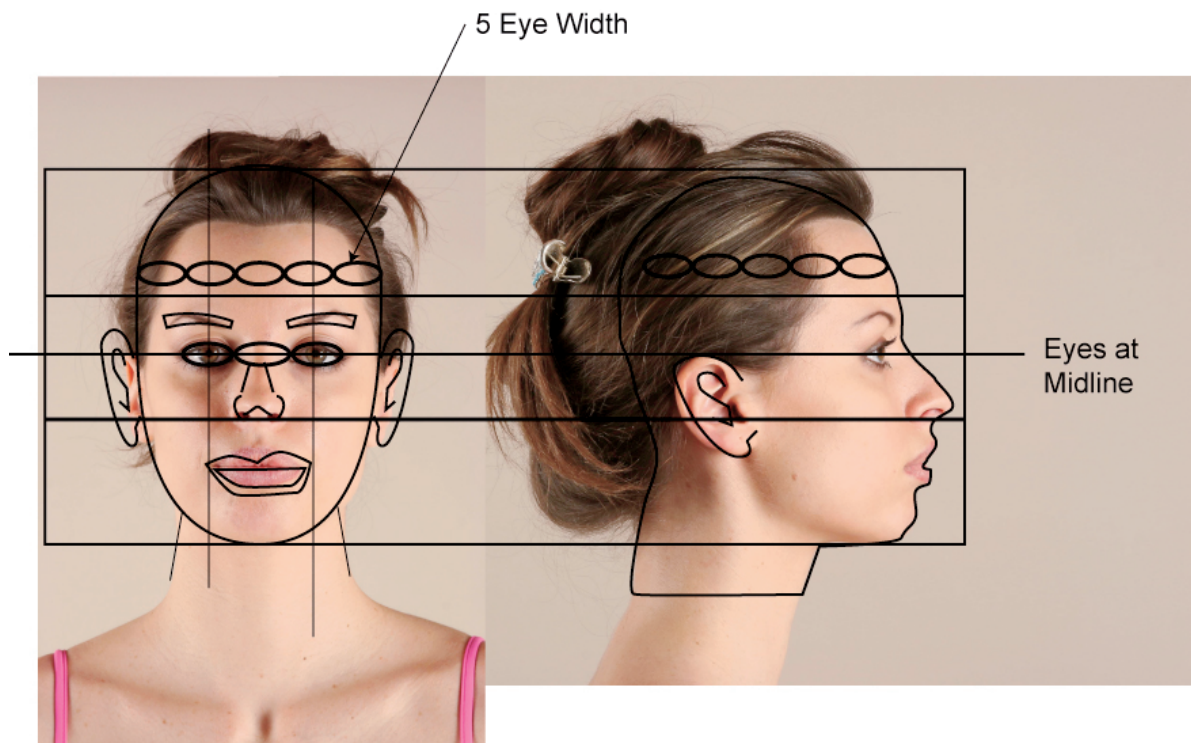
The position of the eyes should be at the mid-point of the head. You may be tempted to place the eyes above the head mid-point, but this is incorrect.

The head can be divided into thirds, with the top third being the forehead, the middle third from the brow to the bottom of the nose, and the lower third from the bottom of the nose to the chin, as shown in Figure 1-14.

The head width should be about equal to five times the size of the eyes, and each eye should be separated by the width of one eye. The width of the eye should also equal the width of the base of the nose.

The head height should be equal to the length of the character's hand.

The corners of the mouth should be aligned vertically to the center of the eye. The distance from the corner of the mouth to the corner of the eye should be equal to the height of the ear. The bottom of the ear (not the earlobe) should be aligned with the bottom of the nose.



1-14

DIFFERING PROPORTIONS FOR MALE AND FEMALE CHARACTERS

The biggest proportion difference between males and females is width. Males typically have a shoulder width of 2.5 to 3 heads and a hip width of 2 to 2.5 heads, but female characters are generally the exact opposite with more width at the hips.

Female characters are generally smaller and more slender than males. The female rib cage is shorter, revealing a longer, smoother abdomen. The pelvis is also shorter and wider, and the difference is found in the abdominal area and not in the legs.

Female characters also typically have shorter arms that extend to the top of the thigh instead of the middle of the thigh.

FACIAL DIFFERENCES

Many of the key gender differences are in the face. Subtle differences can have a huge impact. One way to differentiate women characters is to include eyelashes. Although male characters have eyelashes, they typically aren't modeled or visible. Men have thicker eyebrows, however, and their eyebrows are closer to the eye. Some women like to have thin eyebrows that arch above the eye.

Women also tend to have higher cheekbones and a narrow chin. Female necks are much thinner and slender without an Adam's apple.

DRAWING CONCEPT DESIGN ART

Once you have a description of your character and some good design ideas, you can begin creating conceptual drawings of the character. These drawings can be fun, showing the character in different poses with various characters and props. The goal of concept art is to portray some of the character's personality, as shown in Figure 1-15.

Most conceptual characters start as sketches. When a conceptual design starts to take shape, produce profile and front-on views of the character. These sketches, called modeling templates, can be mapped to a rectangular plane that you can position as a reference within your 3d program.

When sketching a character, remember to look frequently at the character's silhouette. A good design has a strong silhouette.

To help define the character's personality, try drawing the character in multiple poses with multiple expressions.

PRO TIP

If you decide to sketch a character design by hand, start with a light blue pencil and fill in details with a dark marker or pencil after the design is complete. This technique allows you to copy or scan the design without having the light blue lines appear.



1-15

"Character Sketches" by Mari Murdock

HIDING DETAILS UNDER CLOTHING

A good design includes all the props, clothing, and exterior pieces included on the character and can save lots of modeling time. For example, if you know your cowboy character will always wear his snakeskin boots, then you don't need to spend time modeling his toes. Focus on the boots instead.

However, you need to model the character in the simplest clothing configuration that the designers require. If your cowboy character has a scene where he jumps out in his underwear when a bear comes around, then you had better model to this condition. Clothes can be added on top of a character, but modeling toes is difficult after you've focused on the boots.

Several 3d packages, including 3ds Max and Maya, have cloth simulation features. As you decide on cloth modeling, consider whether or not to use these cloth simulations.

DECIDING ON HAIR METHODS

Another common decision that affects modeling is how to handle hair. Dynamic hair can add lots of realism to a character and eases the burden of modeling a polygon hair solution.

Both 3ds Max and Maya include hair and fur modules that can be used to produce hair effects.

DEVELOPING A STYLE

Stylized characters are easy to recognize. As you design, look for places where you can add a personal style to the character. Your characters will have a unique feel, which will help endear them to the viewer.

DETAILS, DETAILS, DETAILS

The more details you put into your character's design, the easier the character is to model. With no details, a character starts to look like every other model.

A good resource for character detail descriptions is a police sketch artist. Such an artist can zero in on specific details that can make your character one in a million.

Character details can include props, clothing, and weapon descriptions, but even more effective are descriptions that specify the character's physical appearance.

MODELING FOR ANIMATION

The final design consideration is to realize that at some point your model will be turned over to the animation team. You can think of the animation team as the production pipeline's torture chamber. The team will take your carefully crafted character and bend, twist, and deform it in ways you never anticipated.

If you build your model to handle this extreme deformation, then the resulting animation will look as great as your character.

After a character is complete, move it into several extreme poses to test its ability to deform. If the model has been built well, then through each extreme pose the model deforms as it should.

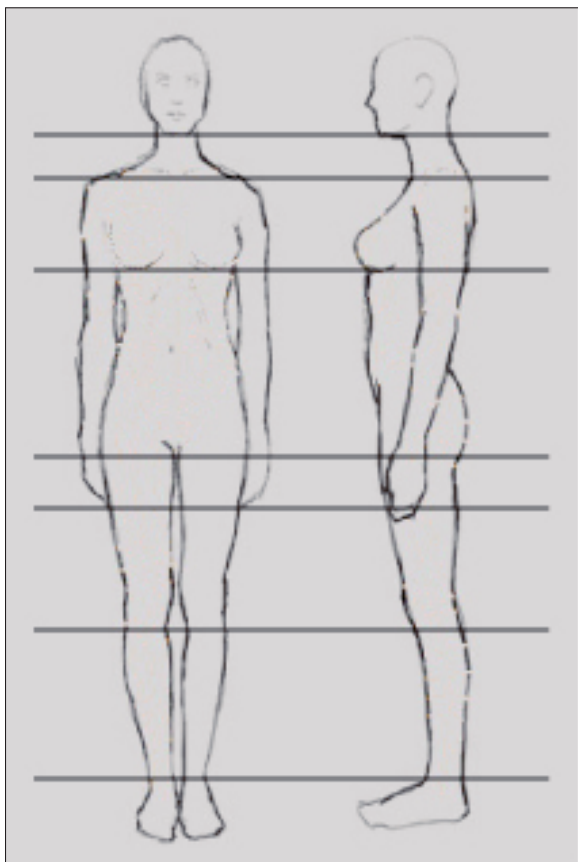
PRO TIP

An easy way to check the alignment of the reference images is to open both images side by side in Photoshop and drag some ruler guides between the two images.

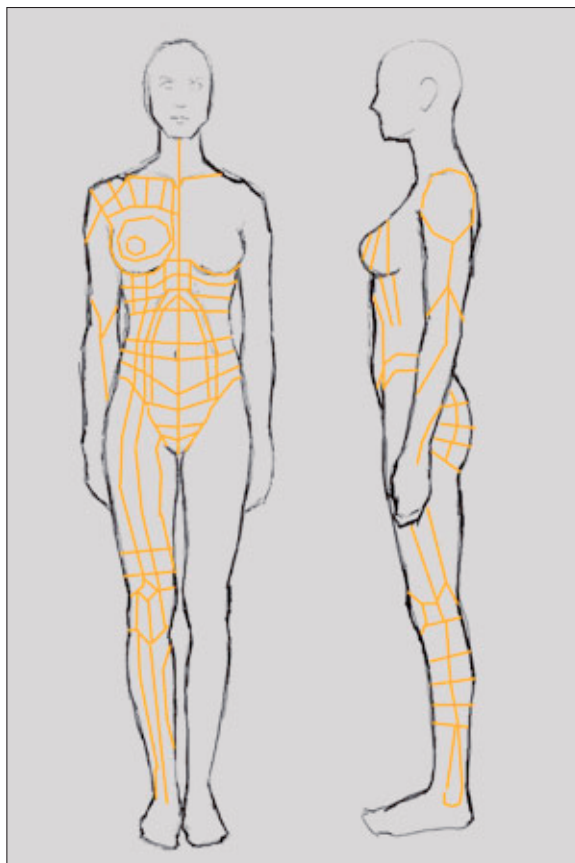
CREATING MODELING TEMPLATES

Before putting down your sketching tools, create a front and side view of your character to use as modeling templates. These two images should be the same height and their features should be perfectly aligned, as shown in Figure 1-16.

Once your modeling template images are complete, make a copy and sketch the edgeloop patterns on the sketched image, as shown in Figure 1-17. This gives you an idea of how to approach the modeling, and it helps keep the model simple.



1-16



1-17

PRO TIP

Keep the reference images with edgeloops drawn in nearby as you begin modeling. Be sure to keep a clean copy of the reference images in case you want to change the edgeloops.

STARTING FROM PHOTOGRAPHS

You also can model realistic characters from photographs. Be sure to take a photo of the subject's front, side, and three-quarter view. You can model against template planes created from these photos.

THE STARTING POSE

The standard pose for characters has them facing forward with their feet spread about shoulder width, their arms outstretched, and the palms facing down. The head and eyes are also looking straight ahead.

This pose (often called the T-pose) is the easiest to model in because the skin is stretched minimally, as shown in Figure 1-18 and Figure 1-19. It also provides access to overlapping areas such as under the arms and in the crotch area. With the arms



1-18



1-19



outstretched, the profile of the hips, back, and buttocks is clearly visible in the side view.

Another common template pose has the arms at 45-degree angles to the body. This pose is useful for viewing the arm details in the side view, as shown in Figures 1-20 and 1-21.

PRO TIP

You can get a better resolution front-view image of the T-pose by including a single outstretched arm. Only one arm is necessary because the character is symmetrical.



1-20



1-21

The back view, shown in Figure 1-22, is another helpful view that can be included as a modeling template. It provides details of the buttocks, back, knees, scapula, and elbows.

Side-angled views like the ones in Figures 1-23 and 1-24 show the details from another angle. They are useful as reference images but not as modeling templates.



1-22



1-23



1-24

What if my sketching skills aren't that good?

The best modelers are also great artists. If your sketching skills aren't that good, then I suggest you take a course to improve them. Learning to draw will help you as you develop your modeling skills. If you want to create realistic humans, enroll in a figure drawing class and perfect your skills. Being able to replicate the human form correctly takes practice.

Another alternative to sketching a character design is to use real-life images, although photos lack the hard black and white lines of a sketch. You also can start with an anatomical sketch taken from one of the many art resource sites on the Web, but be cautious about basing your designs on a copyrighted character. Many modelers have started by modeling Star Wars characters or superheroes, which is fine for practice as long as they never leave your own personal computer.

What if my 3d package doesn't have hair or cloth features?

Good character design doesn't depend on the features of a 3d package. Advanced features such as cloth and hair can save some modeling time and add a level of realism to a character, but a poorly designed character with excellent hair and cloth is still a poor character.

