DAYANAND COLLEGE OF ARTS, LATUR.

ANIMATION DEPARTMENT

Class:- B.A Animation Second year Sem:- III

Subject Name:- Character Modeling (Major)

Paper Code:-(IANICTP1202)

Name:- Prof. Khonde Pooja S.

Syllabus

IANICTP1202: Character Modeling (Optional 1) Curriculum Details

Credits – 04 **Mark – 100** **Periods – 84** **Th and** Pr

Course pre-requisite: Basic Computer Knowledge

Course objectives: After completing this course, students will be familiar with a typical work-flow for creating 3D art assets in a modern game engine. Students will gain understanding of techniques and technical specifications of common high quality Model used in Film and Games today.

Course outcomes:

- Inform project development through the analysis of character designs, styles, commercial genres, technical approaches and workflows in supporting project material
- Show technical aptitude and efficiency in three-dimensional modeling by applying best practice techniques to the construction of a three-dimensional character base mesh
- Design the surface complexities and details of a three-dimensional character model through the application of digital sculpting tools and techniques to a base mesh
- Construct the appearance and reduce the surface complexity of a three-dimensional character model through the application of digital painting tools and techniques
- Use design and technical processes within a three-dimensional computer environment to present a fully resolved and audience appropriate three-dimensional character model.

ModuleNo.	Topic	Hrs. Required to cover the contents
1. 0		
Introduction	3D interface, Basic skills for handling the selected software like transforming objects, Object properties, Hierarchies, Pivots Etc.	**15**
2.0		
Interface	Creating a New Project, Editing and Changing Projects, File References	**15**
3.0		
Tools Of Modeling	Polygon Vertices, Polygon Edges, Polygon Faces, Working with Smooth Polygons, Understanding NURBS, Understanding Curves, Understanding NURBS Surfaces Surface Seams, NURBS Display Controls.	**18**
4.0		
The Process Of 3D Character Creation	Male or female anatomy. Body Structure - Proportion and construction of body parts (Torso, Face, Eyes, Nose, Ears, Mouth, Hand, Feet etc	**20**
5.0		
Sculpting Polygons	Soft Select Tool, Sculpting Polygons.	16
	Total	**84**

Practical List:

- Books, Magazine, News papers
- Visual Identity such as Letterhead, business card, Brand Guide, Logos
- Marketing Materials: Pamphlet, Brochures, Postcard, one-sheet, Posters
- Product Packing and Labels
- Presentations
- Typography
- Web Layouts Software: Autodesk Maya

Text Books:

- How to Draw What You See: Rudy De Reyna
- Figure Study Made Easy: Aditya Chari
- Figure Drawing Without a Model: Ron Tine Career Options:
- In film and television production there are jobs for Modeling.
- The games industry is a big employer, and for any major game title, more than half of the production budget will go on art production

Notes

Set the project

When creating a new project, you can use the default locations and names that Maya generates by default, or you can specify custom ones. You can also create new file rules to specify custom data locations for custom files.

To start a new project

1. Select File > Project Window.
2. In the Project Window, click New.

   Maya populates the Project Window with default project locations and names.

   Note: You can clear all of the currently set project locations by selecting Edit > Clear Settings from the Project Window. To restore the default project locations, select Edit > Reset Settings.

3. Type the name of your new project in the Current Project text box.
4. Click the browse icon to the right of Location, and then specify a location for your project directory.

   This location is known as the project root directory. You can use this location for primary and secondary project locations and any other locations you add to your project.

5. To change the directory of a primary project location, click the browse icon at the end of its text field, and then specify a new directory.

   Otherwise, the Primary Project Locations are added to the specified projects root Location.

6. To change the directory of a secondary or translator data location, select Edit, click the browse icon at the end of its text field, and then specify a new directory.

   Otherwise, the Secondary Project Locations are added to the specified projects root Location.

7. Click Accept to save your changes and close the Project Window.

   This creates the project directories and sub-directories if they don't already exist.

How to import Image plane?

You can create two types of image planes: a free image plane that is not attached to a camera and that you can select and transform in your scene; or, an image plane that is attached to a camera.

To create a free image plane

1. Do either of the following:
    - Select Create > Free Image Plane from the main menu bar.
    - In any orthographic view, select View > Image Plane > Import Image, then browse to select an image.

    To edit or position a free image plane, select it in the scene and move or transform it as you like. When you select the free image plane, you can also edit its attributes in the Attribute Editor.

To create an image plane attached to a camera

1. Do either of the following:
    - In the perspective view panel, select View > Image Plane > Import Image.

      Browse to the file you want and click Open.

    - Select View > Camera Attribute Editor from the panel menu, then click Create beside Image Plane attribute in the Attribute Editor (under the Environment heading).

      This creates an image plane node, and you can then browse for your image file next to the Image Name attribute.

To edit an existing image plane

1. Select View > Image Plane > Image Plane Attributes from the current view and choose any of the camera's image planes you want to edit.

   The selected image plane's attributes display in the Attribute Editor (unless the Attribute Editor has been hidden)

To position an image plane

1. Do one of the following:

- Use the Placement attributes to position an image plane relative to the camera.
- Use the Placement Extras attributes to control which portion of an image file is visible on the image plane.

Making an eye

PART 1

Step one if you want to make a human eye, choose a photo reference. All eyes are different and the generic eye does not really exist. Usually a model becomes unrealistic when you make it generic, in this case the eyes. They lack any kind of individuality, which is what makes each person stand out. The main differences between eyes are the colour of the iris, the eyebrows but what usually gives the eye unique characteristics is the flesh that encapsulates it. Between the eye and the nose, everyone has different amounts of fat. In the picture above, you can see that the fat surrounds the top of the eye and you can only see a small part of the eyelid. Other eyes like mine have very little fat and you see a concave area between the forehead and the eyelid.

STEP 1

Find an image for reference; if you are working on an animation/games project then use the concept art, and this method makes no difference if the eye is realists or cartoonie, the principles are the same. I got my image reference from here. It's called “mariah3angles”. Put the images accordingly in your program and begin to model.

STEP 2

NOTE: Because I am only making an eye I am modelling with faces, but this also works if you model the whole head from a cube (like I do). If you are doing that then ignore this step.

Model the superior and inferior arches of the eye. The area that is closest to the eye itself. Make sure the curvature is correct in the three dimensions (This is for the newbies).

STEP 3

Now make a sphere and use it as reference for the eye. It's a common mistake that you model an incredible eye but the overall curvature is wrong and your eye won't fit properly.

STEP 4

Select the top edge of both of your arches and extrude (extend) inwards just a tiny amount, like -0.02 in Maya. Be aware that the actual number varies and depends on the size of your model and program that you are using. The amount that you extrude corresponds to the horizontal plane of flesh between your outer skiing and the eyeball. COMBINE the 2 arches.

STEP 5

Rotate you camera as to look from the inside, on this step it is useful to have double sided faces on. Go to the edges, select the edges and connect them (usually that is called the Bridge function).

PART 2

Although the basic shape is right now we have to build the surroundings and create the muscle that surrounds the eye so later you can rig it.

STEP 6

Extrude the top edge of the top eyelid. Adjust the edges to match the curvature if your reference images. (You can ignore this step if you are modelling fro a box and you already have the head).

STEP 7

At the edges, we need to unite the 2 eyelids. Create a polygon between the horizontal edges and the face you bridged before.

STEP 8

Select the last edges of your eyelid, including the one of the face you just created and extrude them (extend edges).

STEP 9

Set your edge loop to create one at the middle and make one for the top and the bottom.

STEP 10

Using the split polygon tool connect the 2 edge lines that you just created.

STEP 11

Now in order to remove the N-Gons we need another edge loop through the faces in between the 2 eyelids.

STEP 12

Select the 2 vertices of the triangles that you created when you joined the edge loops and merge them. You will delete the N-gon and return to a Quad topology.

STEP 13

Inside the vertices you just merged, add another edge loop.

PART 3

STEP 14

Add another edge loop to the extrusion above the eyelid. Modify the geometry accordingly. Bevel that edge to from the curvature of the eyelid.

STEP 15

At the inner part of the eye take the inner edge and move it to form the beginning of the nose bridge. Do the same at the outer edge. This edges will form the side of the of the head.

STEP 16

Take the bottom edge and extrude it like you did at the top. Move the vertices accordingly to fit your reference image.

STEP 17

You should have something like this. **NOTE:** The last 2 steps can be skipped if you are modelling from a finished head, leaving the eye to the end. Either way is fine and this will not affect anything.

As you can see in this image, a very sharp line separates the inner eyelid to the outer parts. This is the folding of the eyelid. This is what makes a lot of the character of the eye. People of countries of Far East Asia, China, Japan, Korea, Taiwan, etc., have the eyelid to the bottom. Consider this because it is very important in order to get the shape right.

STEP 18

After smoothing the polygons, you should have something like this image. It is almost done. The only problem that you have is that there is a gap between the eye and the skin. We are going to solve this.

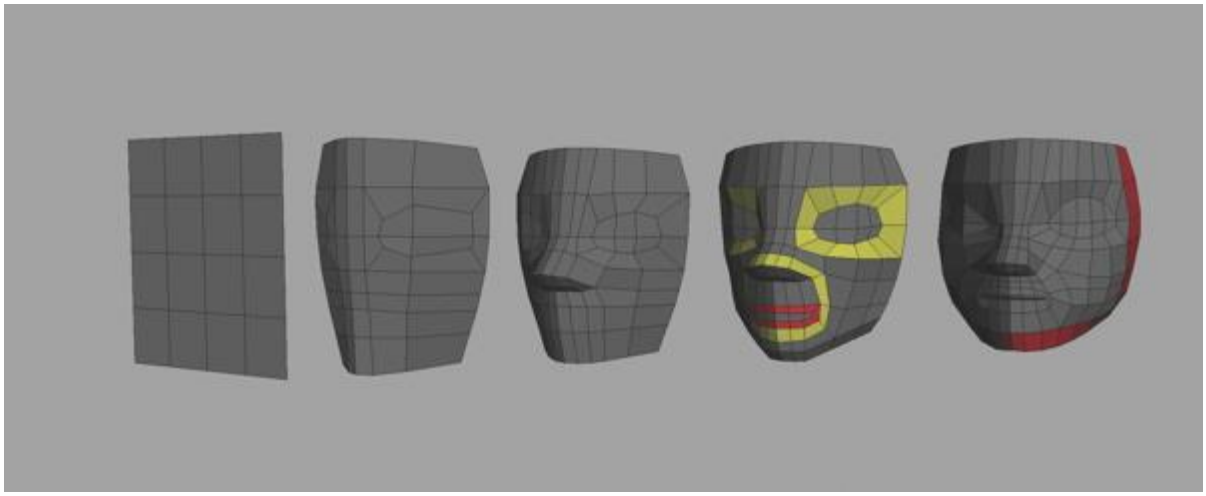
STEP 19

Select the inner edge inside the eye and extrude it backwards, towards the eyeball. Move the vertices so that they follow the curvature of the eyeball.

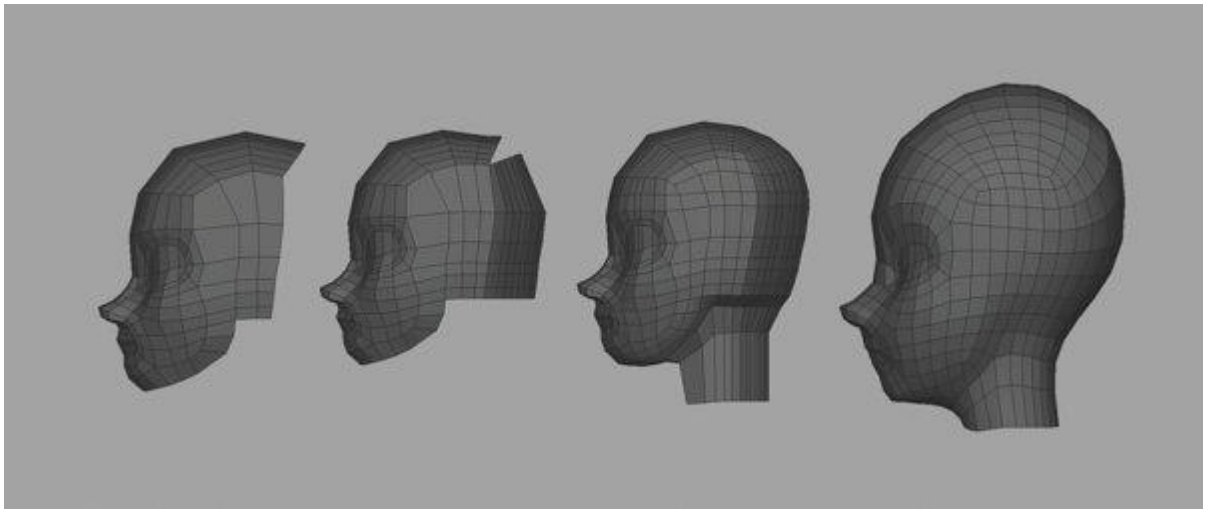
Now extrude the edge of the faces you just created and again make adjust them accordingly.

And there you have it. This eye construction method is quite easy. You can adapt it to all of your designs. You can change the shape of the main curves of the eye depending on for reference pictures or drawings. Be careful when you are making animal eyes, as you might have to modify the geometry of the eye in order to make it accurately.

Model the head

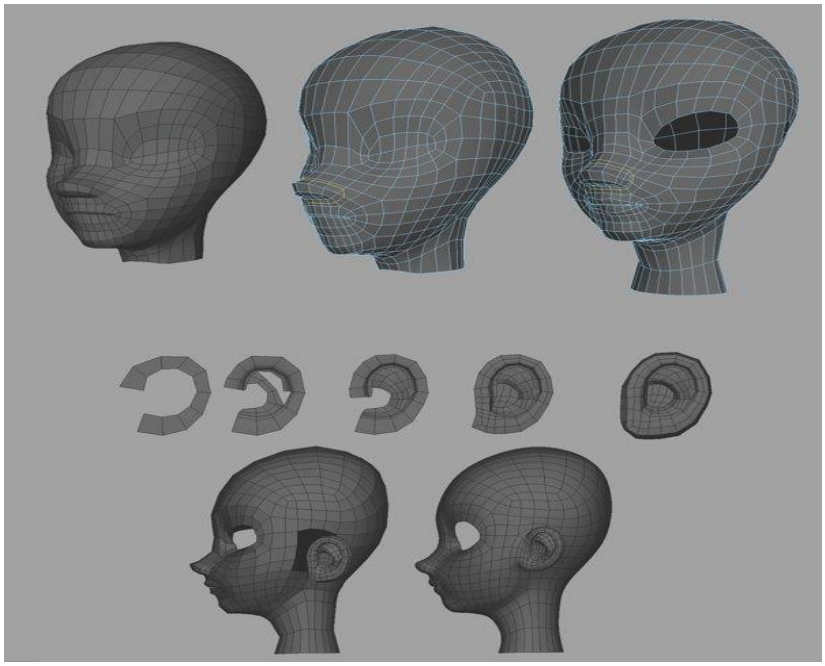


Starting with a 4×4 plane we start by creating the edge loops that will become the main areas of the face, such as the eyes, mouth and nose. The eye sockets are just circular extrusions and the mouth consists of two circular extrusions: an outer one going around the mouth up to the nose bridge area, and an inner extrusion that will become the mouth and lips. At this point it is useful to have a sphere to serve as an eye placeholder – it will also help us to build and define the eye sockets around it.



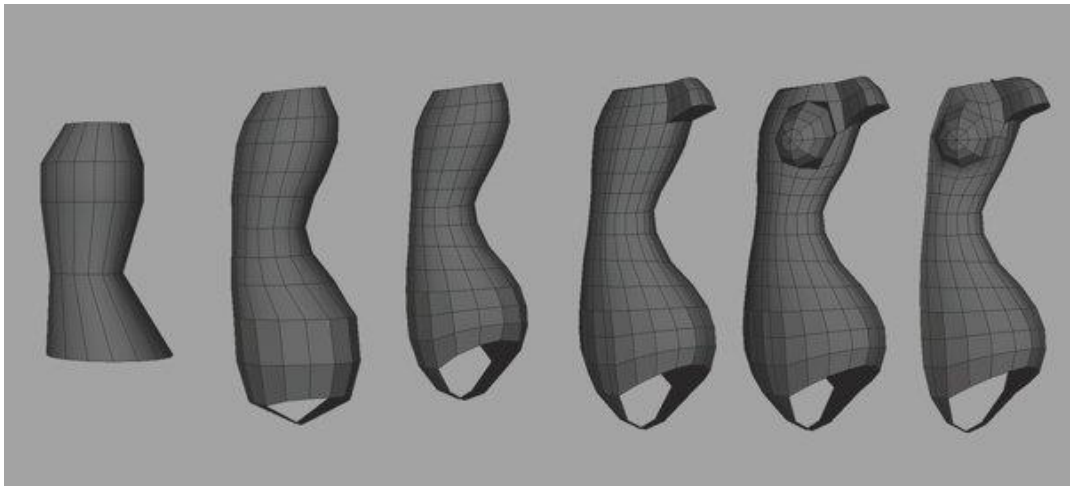
By extruding the border edges of the sides and the bottom of the head we will get the polygon flow that will define the jawline. Now extrude the edges of the sides and the top to the back of the head, this will leave room at the bottom to extrude the neck. You can close the head by extruding the edges of the back and merging the vertices to the top of the head – just think of the shape as a smoothed cube. Then extrude the hole in the bottom of the head to create the neck. Using the Sculpt tool, smooth the new edges to get a round shape.

Model the nose and ear



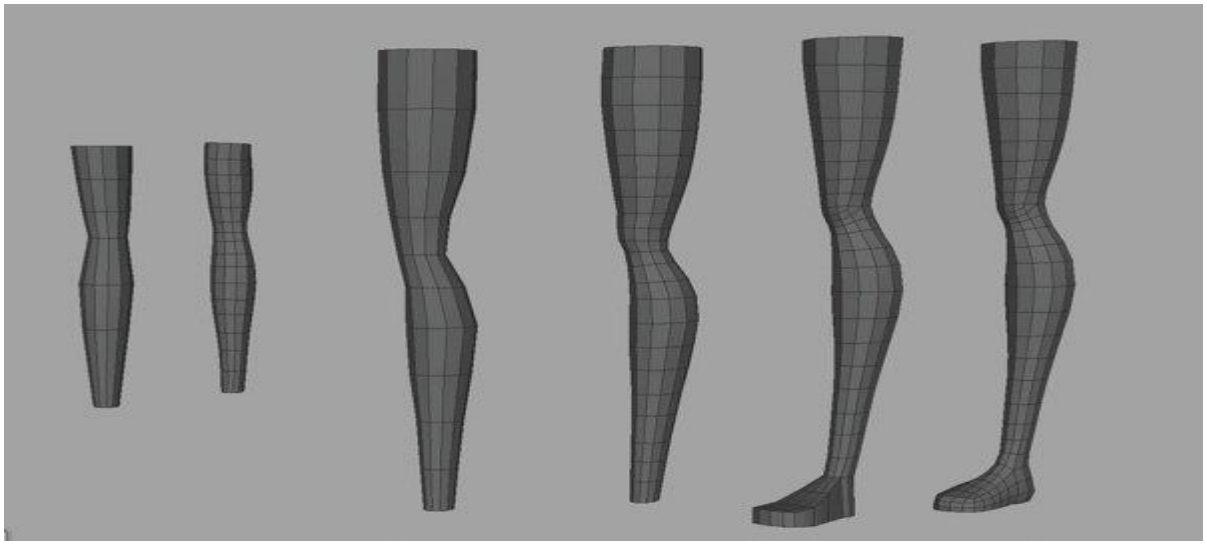
We create the nose by adding a face loop in the nose area. The ear is modelled in parts, starting with a simple row of polygons shaped as a spiral section. We don't need a fully detailed ear for this character – modelling a simple, suggestive antihelix and the inner ear is enough to get believable cartoon ear. By deleting some faces on the head and leaving the same amount of edges in the hole and in the ear border, we can attach it to the head using a Bridge operation.

Build the torso



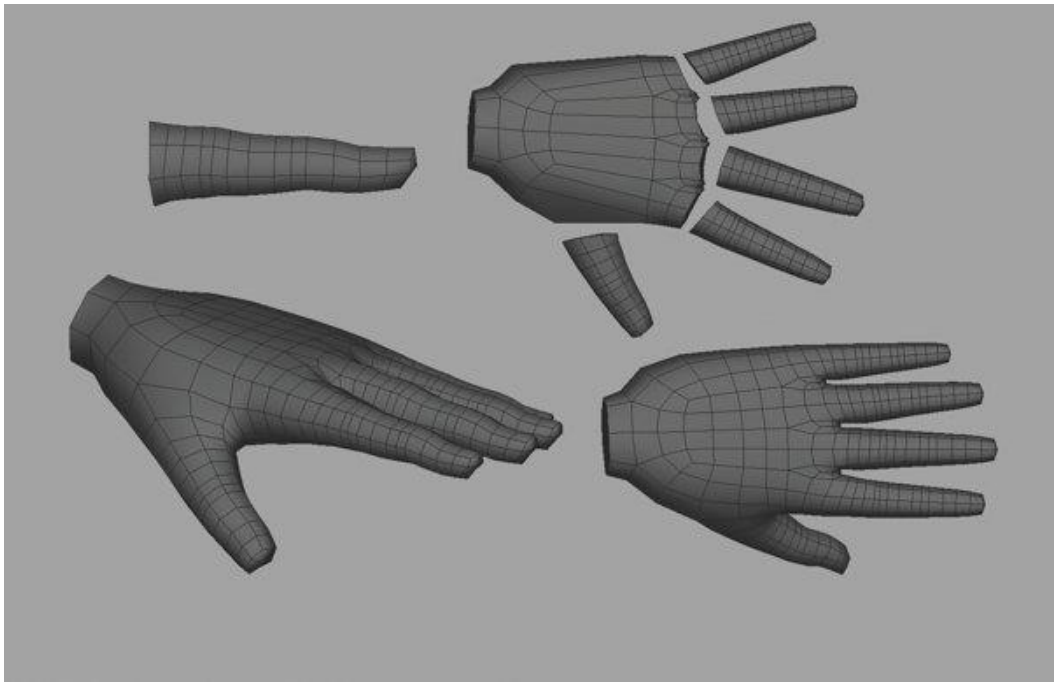
The main shape of the torso is basically a cylinder. With a few divisions we start to block the base of the neck, the shoulders, the waist and the hips. With those areas defined it's easy to start adding divisions to the rest of the piece, as well as extruding the shoulders. The breast area is just a section of a 8×8 sphere attached in the front, slightly below the shoulder's height. We close the bottom area by creating a bridge with the central edges in the front and back, this will leave the holes for attaching the legs later.

Build the arms, legs and feet



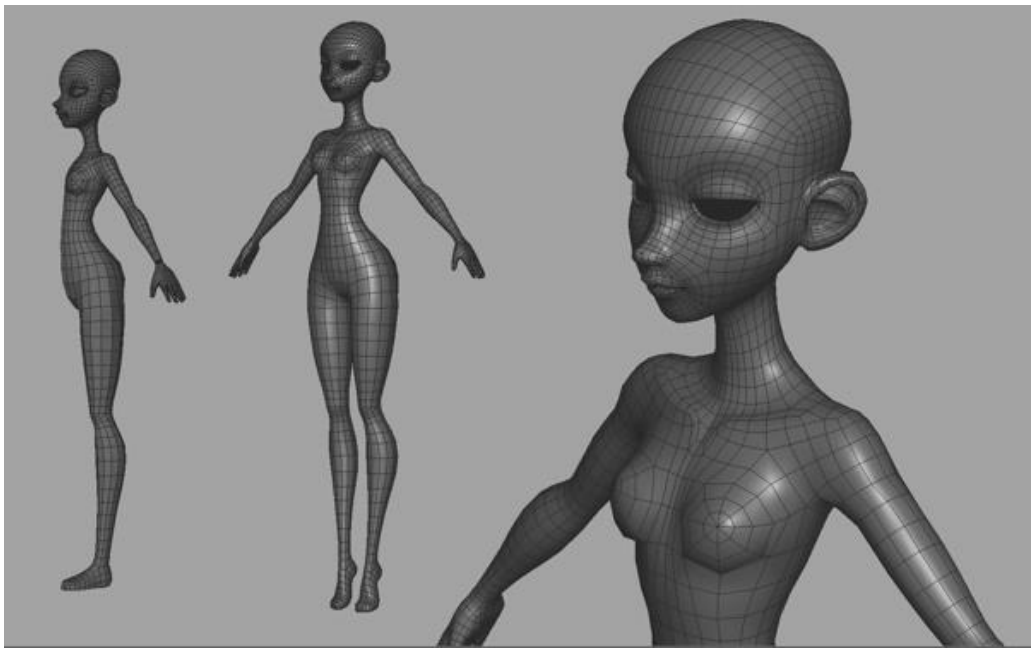
The arms and legs are cylinders too, but with the edges extruded. The main areas and widths that we want to define here for the arm are the biceps, elbow, forearm and wrist; and for the leg the width of the thigh, knee, calf and ankle. For both parts always check from both views to get the desired shape. Once we have those sections blocked we can start detailing by adding more divisions. The foot in this case is created by closing the bottom of the leg and extruding the front faces, we don't need toes since our character will have shoes.

Model the hands



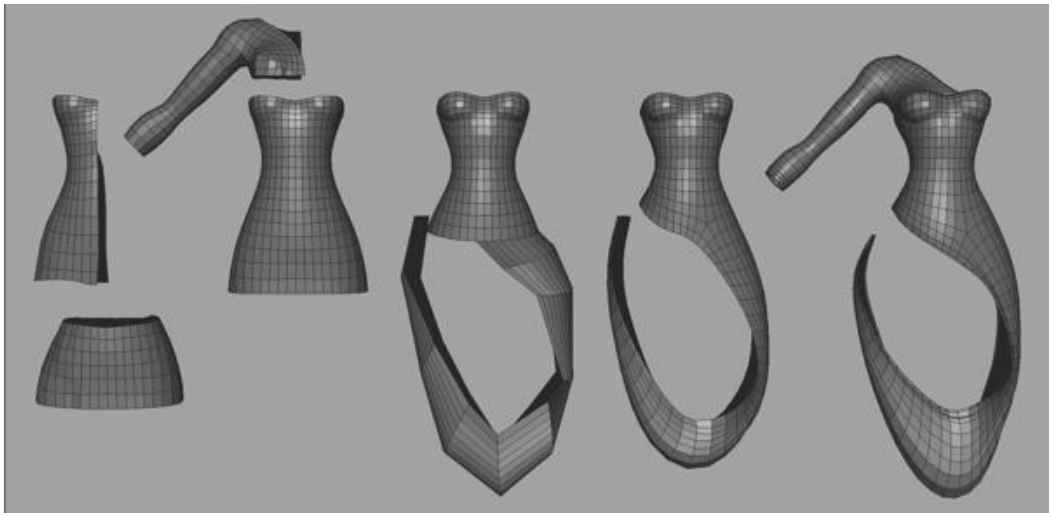
Starting with a cylinder we create a base finger. The palm can be started from a cube with enough divisions for attaching fingers later. It can come in handy too, when adding the skin, to leave space between each finger. Duplicate the finger and place them around the palm, scaling each one to its proper size. Then attach each finger to the palm, using a Bridge or the Merge Vertex Tool. The base topology is really basic, so focus more on avoiding a blocky shape by sculpting or tweaking vertices using a soft selection.

Merge the pieces together



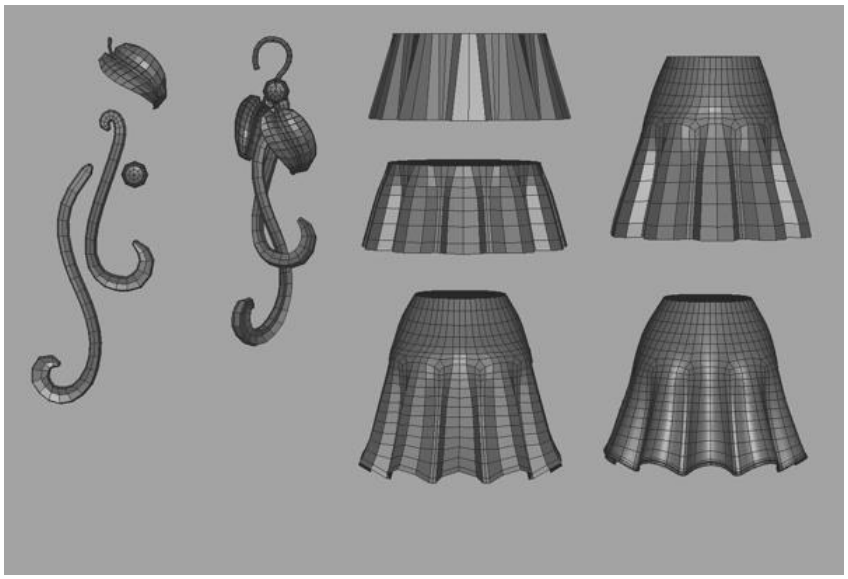
Attach all the limbs to the torso, and smooth out the joins if needed. Add some clavicle detail on the body since it is a part of the body that will not be fully covered by cloth. For the final eyes we start with a sphere, extruding and sculpting the bulge on the front that is useful to catch highlights pleasantly. The iris and pupil is just a concave disc placed inside the outer eye, by using a transparency map it will enable us to see through the cornea inside the iris.

Make the dress



We create the dress by using a duplicate of the body, this way we will make sure it will fit with no major effort. The upper part of the dress uses the geometry of the waist up to the shoulders, and the skirt itself will come out of the hips' geometry. Once extracted, we need to get rid of the breast details and close the dress more naturally. The cloth extension is just an extrusion of the bottom half of the dress, going back and up to connect to the opposite side of the dress at the hip's height.

Add the skirt and Accessories



The skirt is created in two parts, the folds can be easily created by using a cylinder and pulling out vertices to create the folds. After extruding and shaping the bottom part of the skirt attach it to the hip's geometry that was previously extracted from the body. The shoes are created using geometry from the feet, and then building them around the foot. For things like earrings and hair ornaments,

model the elements and then combine them to create each accessory, this adds a consistent style by having repeating patterns across the model.

DAYANAND COLLEGE OF ARTS, LATUR.
ANIMATION DEPARTMENT
Internal Examination(Test)

Class:- B.A Animation Second year
Subject:- Character Modeling (IANICTP1202)
Total Marks: 30 **Time: 2:00 Hour**

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1) **First question are compulsory.**
2) **All questions will be written in English.**

Q.1) Answer all the following questions. **(10 Marks)**

1. What is character modeling?

2. What is Autodesk Maya?

3. What is polygon modeling?

4. What is the use of the Extrude tool in Maya?

5. What is the difference between vertices, edges, and faces?

Solve any TWO of the following questions. **(20 Marks)**

Q.2) Explain and draw the complete process of creating a Ear modeling.

Q.3) Explain the steps involved in modeling a human face using polygon modelling techniques.

Q.4) Describe the different modeling tools used in Autodesk Maya with suitable examples.

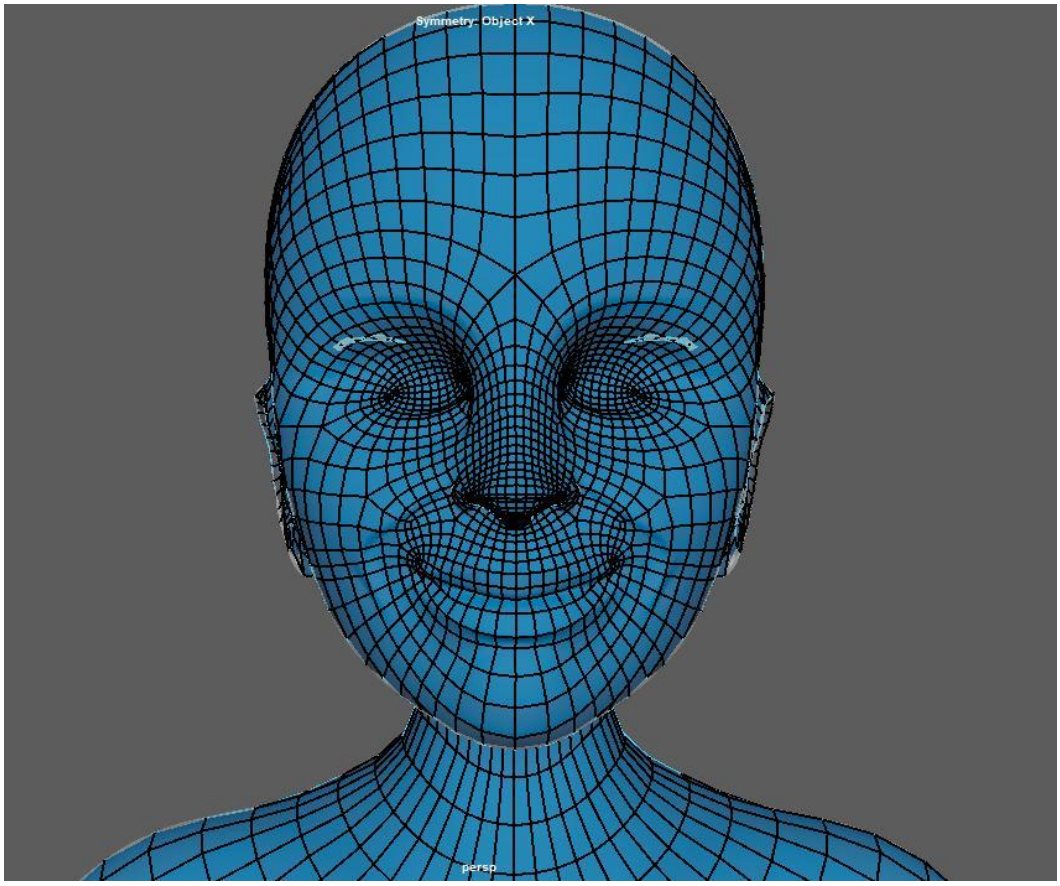
Q.5) Explain the process of creating a Hand modeling in maya.

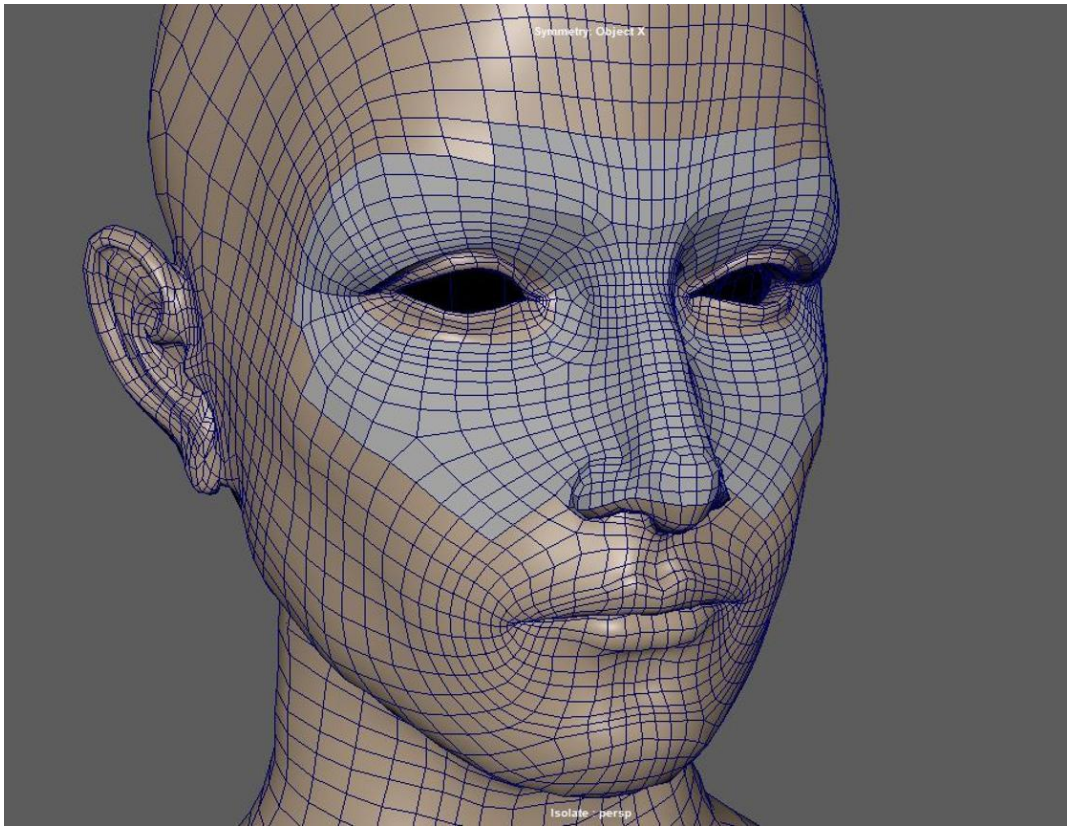
Answer

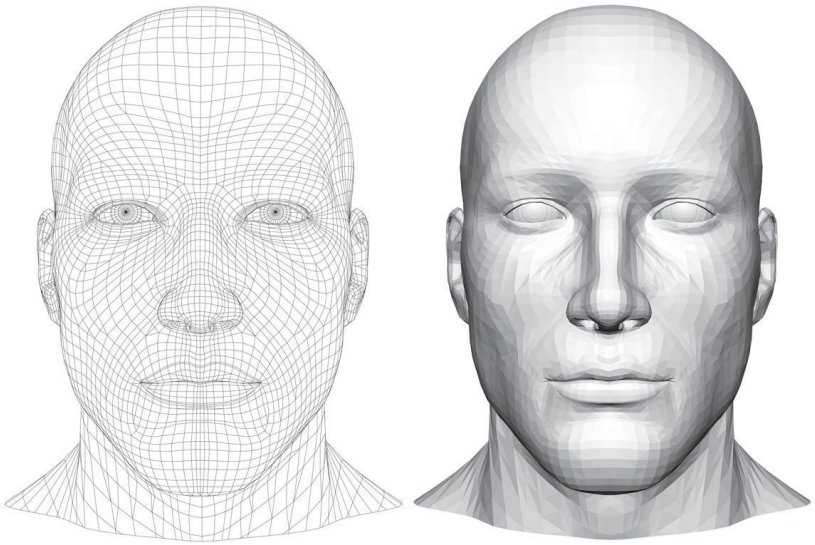
Q: Explain the steps involved in modeling a human face using polygon modeling techniques.

Polygon modeling is a 3D modeling technique used to create objects by using vertices, edges, and faces. In Autodesk Maya, polygon modeling helps us create a realistic 3D human face with proper facial features.

2. Steps Involved in Human Face Modeling in Maya







Step 1: Set Up Reference Images

- Collect front and side-view images of a human face.
- Import them into Maya using image planes.
- Align the images properly.

Step 2: Create the Basic Mesh

- Create a polygon sphere or polygon cube.
- Position it according to the reference images.
- Adjust the vertices to form the basic shape of the head.

Step 3: Model the Forehead and Cheeks

- Use the Move Tool to adjust vertices.
- Shape the forehead, cheekbones, and jawline.
- Maintain the correct facial proportions.

Step 4: Model the Eyes

- Create openings for the eyes using polygon edge loops.
- Shape the eyelids and eye sockets.
- Place eyeball geometry inside the sockets.

Step 5: Model the Nose

- Select the polygons in the center of the face.
- Use the Extrude Tool to create the nose bridge.
- Shape the nose tip, nostrils, and wings by adjusting vertices.

Step 6: Model the Mouth and Lips

- Create edge loops around the mouth.
- Use extrusion and vertex editing to form the upper and lower lips.
- Create the mouth opening and refine the corners.

Step 7: Model the Ears

- Create the outer ear shape using polygon faces.
- Form the inner folds, ear canal, and earlobe.
- Adjust the ears to match the reference images.

Step 8: Refine the Facial Topology

- Add edge loops around the eyes, nose, and mouth.
- Maintain clean polygon flow, preferably using quads.
- Check that the geometry supports facial expressions and animation.

Step 9: Smooth the Model

- Use Smooth Preview by pressing 3.
- Adjust vertices to remove unwanted bumps and sharp edges.

- Check the model from front, side, and perspective views.

Step 10: Finalize the Face

- Check facial proportions and symmetry.
- Assign a suitable skin material.
- Add lighting and render the final model if required.