Answers:

1. Modeling is creating the specifications for a model or image (such as vertices and color) such that they can be stored in a computer

Rendering is the process of making models or images visible on a computer for users to see

Animation is the process making models “move” this is typically achieved through quickly showing a series of images to make it look like the object is moving.

1. CAD software such as Autodesk, information visualization, video games such as Minecraft, and in movies such as Jurassic World
2. Images are formed by vertices that contain coordinates and a color value, which is operated on by the vertex shader. These vertices are then connected in the shape assembly stage, which uses a primitive to determine how to connect them (point, triangle, polygon, etc.). The primitives are then mapped to pixels on the computer screen in the rasterization step. Then a fragment shader is used to determine the color of all of the pixels, and lastly the alpha testing and blending stage checks which objects should be displayed (for example if one object is behind another object, then it won’t be displayed) as well as checks alpha values to determine the final colors of the pixels
3. The vertex processor takes vertices and primitives and determines the shape of them. The rasterizer takes this shape and assigns the pixels on the screen that will make up the object. The fragment processor determines the color of all of the pixels, and output merging checks what objects will be displayed and the final colors of the pixels
4. A double buffer is used to eliminate visual artifacts that stem from using a single buffer. This is accomplished by using one buffer to display the completed output (the front buffer) while another buffer renders the image in the background (the back buffer). Once the image is done rendering, then the back buffer is displayed instead of the front buffer.
5. NDC are where the x,y, and z coordinates all range from -1.0 to 1.0. The NDC coordinates are transformed into SSC coordinates using the glViewport functon.
6. Float vertices[] = {

0.0f , 0.5f, 0.0f,

-0.5f, -0.5f, 0.0f,

0.5f, -0.5f, 0.0f

};

1. glBindBuffer(GL\_ARRAY\_BUFFER, VBO);

glBufferData(GL\_ELEMENT\_ARRAY\_BUFFER, sizeof(indices), indices, GL\_STATIC\_DRAW);

1. Mipmaps are essentially smaller versions of a texture for when objects that use the texture are far away from the camera. Mipmaps are used because they prevent visual artifacts that occurs when an image is shrunk down, as well as improve performance
2. Local space – the space the object is created in

World space – the coordinates of objects in the world relative to each other

View Space – the coordinates of all of the objects relative to the point of view or camera

Clip Space – the view space coordinates are processed into -1.0 to 1.0 coordinates to determine what will appear on the screen

Screen Space – the coordinates of the objects when they are displayed on the screen

1. The z-buffer stores all of the information regarding depth. Depth testing compares the z values of the vertices to determine which ones are displayed. Depth testing is necessary because without it, objects that are supposed to be behind other objects will still be displayed, which is a problem since you shouldn’t be able to see objects that are behind another object.

10.

A screenshot of a computer

Description automatically generated

11.

a.

\* =

b.

\* =

c.

\* =

12.

A screenshot of a computer

Description automatically generated

A screenshot of a computer

Description automatically generated

A box with a dog on it

Description automatically generatedd

A screenshot of a video game

Description automatically generated