**Design Decision**

To begin, I will attempt to draw a visual picture of my 3D scene. There are four objects in my 3D scene, an orange at the 2 o’clock position, a dumbbell at the 4 o’clock position, a rectangle at the 7’o clock position, and a mug at the 11 o’clock position. These objects were all in my home at the time of the picture. As random as they may appear, the items were chosen with a select purpose. First, each of the objects have a distinct color and texture. I wanted my project to help me develop variety and having different colors would allow me to broaden my computer graphics skills. Secondly, each object displays different shapes and multiple shapes among themselves. The mug contains a rectangular handle and a cylinder, and the dumbbell is made of a cylinder with two differently shaped cylinders at the end. The other two shapes are a sphere and a rectangle. When developing the shapes, I chose two different routes. When creating the cylinders and the sphere I choose a more convenient route. This entailed using header and source files containing the already created sphere and cylinder. This made the shapes easier to render and saved me a bit of time. The other route was utilized to create the rectangular handle for the mug, the rectangular object, and the plane where all the objects lay on top of. The method entailed using vertices, vertex array objects, and vertex buffer objects. Either method could have been used to create all the shapes but using both methods allowed me to learn more about creating 3D objects.

The OpenGL program uses a processInput function to allow user input that gives the ability for camera movement as well as the ability to toggle between perspective and orthographic mode. To toggle between the orthographic and perspective view the “tab” button is pressed. When navigating through the 3D scene it is helpful to use a mouse to control the cameras direction. The camera can be translated using the “w”, ”s”, ”a”, ”d”, “q” and “e” buttons which move the camera forward, back, left, right, down, and up respectively. The buttons chosen are those similar to a variety of visual movement programs. The easiest comparison is with videos games. Whether it is a first person or a third person view game, the controls are the same. In addition, those buttons are close to one another. Finger ergonomics are important to keep in mind when creating computer programs.

When designing computer graphics through Visual Studios, a render loop is mandatory. The render loop(which is a while loop) allows the program to maintain the images until we tell it to stop. Without one we may just have an image without the ability to interact. This would make for a truly short and boring computer graphic. The use of vertex array objects and vertex buffer objects make the code for the objects easily reusable. Allowing the ability to create an endless supply of objects. Adding textures to the objects was similar to creating the objects. The code became very modular, adding objects either through the vertices method or the header file method, and textures became very efficient.