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# Lab Report 09

## Introduction

In this lab we learned how to create a shader with a texture property and go through the process of the vertex and fragment shader to display the texture on the shader.

## Methods

Starting with defining the properties to show up in unity. We used   
“\_Color ("Color Tint", Color) = (1,1,1,1)” to show a color picker in the properties panel of the material.  
“\_MainTex("Diffuse Texture", 2D) = "white"{}” shows a texture picker with tile and offset properties as well.

Under the SubShader we start our first pass and switching over to CGPROGRAM we define or pragmas. These will name the vertex and fragment functions for later and let us access them. We do this by typing #pragma vertex ‘nameoffunction’.

Declaring variables we have to use the same name to access the property panels of the shader.

We then declare the input struct, that holds the vertex position, texture coordinates, and vertex normals. The output struct holds pixel position texture coordinates and color.

We then declare the vertexFunction. Inside the method we set the output struct’s texture to the input struct’s texture. For the lighting we grab the light direction and normalize it to get a value between 0 and 1, then we set the objects normal by getting the vertex’s normal and converting it to world space. We grab a diffuse reflection by multiplying the light color by the object color and clamp it to the dot product of the object normal and light direction. We add the ambient light to make the shadow not pure black. The vertex color then is that light value. And we return the vertex information.

The fragment function sets the texture to the texture property and we can scale it or offset it to the user defined scale, and offset.

## Conclusion

Using this we can create simple to complex shaders using light direction and math to make really realistic effects!!

### Think About It

2. What meaning does a UV have in relation to a texture and/or a model?

Its where the texture pixels correspond to the models uv position.

3. What does it mean when you say that you will sample a texture?

Getting the information from the texture.

4. What does it mean when you say that you are unwrapping a texture?

Flattening out the faces of a model onto a 2d plane. Like being a seamstress.

5. If I had a sampler2D named \_RawrTex, what would I name the next variable to capture the tiling and offset of that sampler2D?

\_RawrTex