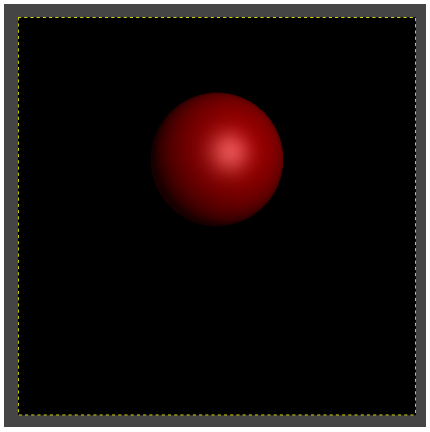
CSCI 5607 Assignment 1b Write-up - Madisyn Vanasse

1. How can the values of ka, kd, ks, n and Osl can be varied to simulate qualitatively different material types?

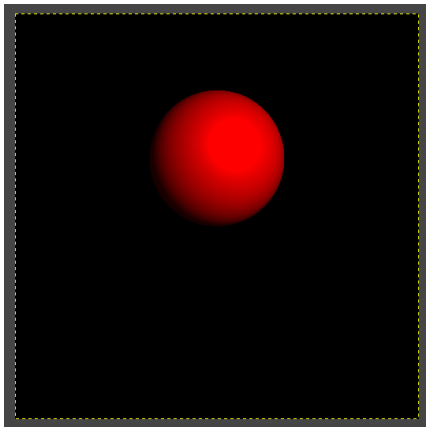
Odl is the intrinsic color fo the object, or the light color that is diffusely reflected when white light is shined on the object. The value ka controls the surface's ambient, or the extent to which the object is illuminated by and then uniformly reflects the light that arrives to it indirectly. The value kd controls the surface's diffuse, which controls the matte appearance of the object. The value ks controls the surface's specular reflectivity, or how shiny an object is. The value n controls the falloff of the intensity of the specular highlight. Osl is the specular highlight color. By inputting different combinations of the values listed so far, we can change what the perceived material of the object is. The original Blinn-Phong did not include Osl. Osl essentially defaulted to white. White specular highlight gives the appearance of plastic. The addition of the specular effect allowed for materials that reflect light specularly, like glass, water, and metal.

Here's a few examples of how the first test input can look depending on certain changes:

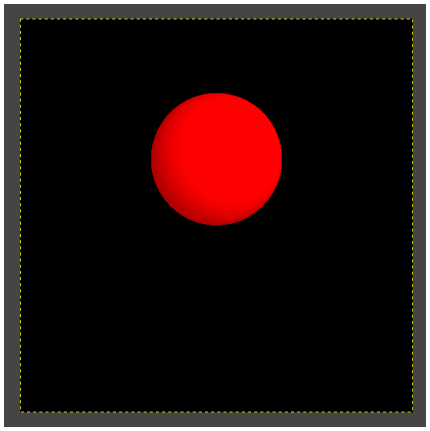
The unchanged first test input:



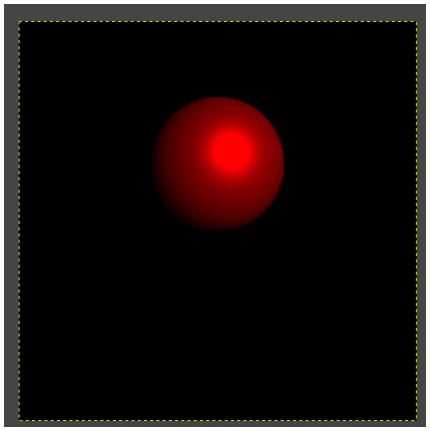
Increasing kd:



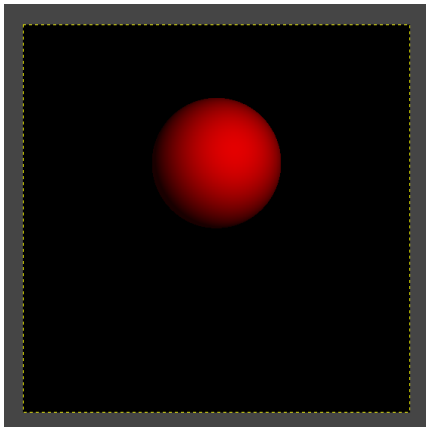
Increasing ka:



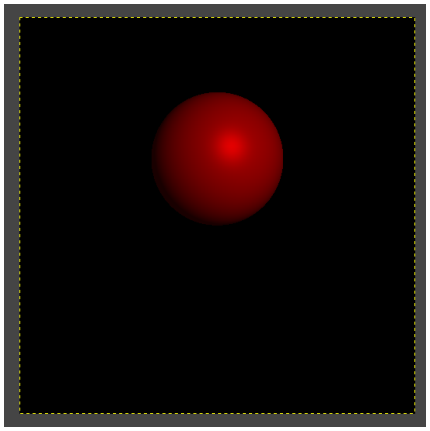
Increasing ks:



Decreasing n:

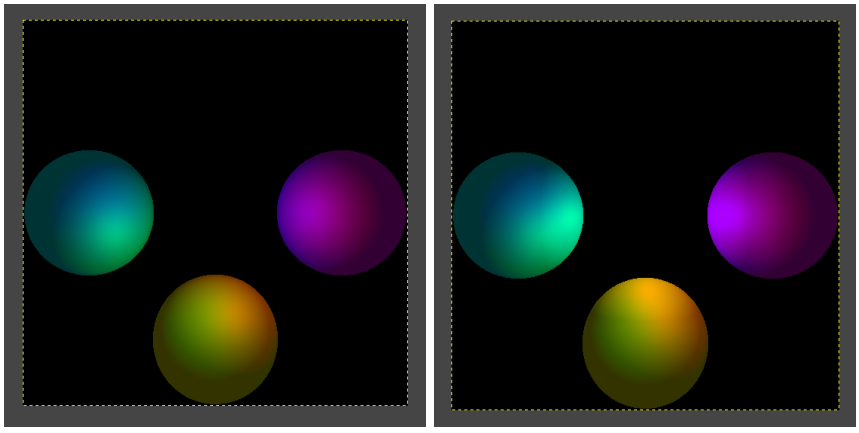


Increasing n:



2. What phenomena can be represented using a point light source that cannot be effectively simulated using a directional light source?

Because directional lights are infinitely far away, it would be impossible for them to exist in between objects in the scene. Directional lights cannot exist inside the scene as they are infinitely far away from it. Point lights, on the other hand, can be positioned inside the scene and therefore in between objects. This does mean that point lights are more computationally expensive than their counterparts. Especially because we have the option to add many point lights inside of the scene.



Here on the left is the second test input. There are three point lights slightly in front of the the three spheres, in the same formation but slightly scaled down. In the second picture I added a point light in between the three spheres and at the same distance on the z axis that the spheres are at. It would be impossible to put a directional light in that exact same spot. Just like how in the first example the one light source simulates the real life effect of one light shining on an object, these many lights work together to create simulation of how multiple lights shining on one or more objects.