CSCI 5607 HW1b Writeup

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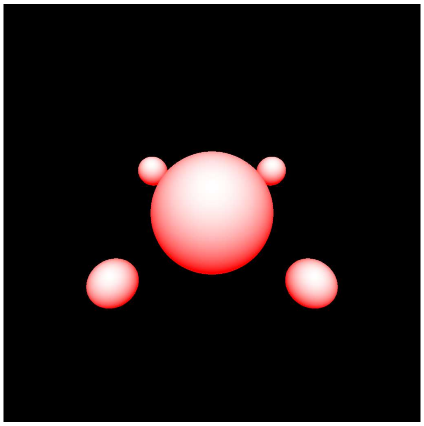
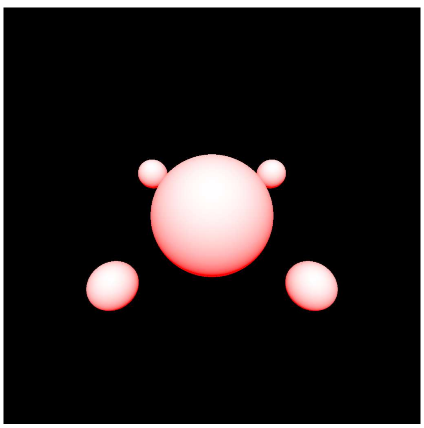
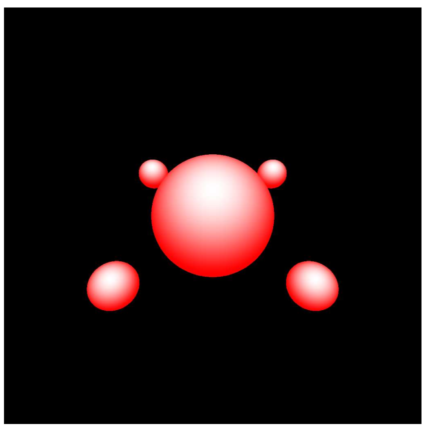
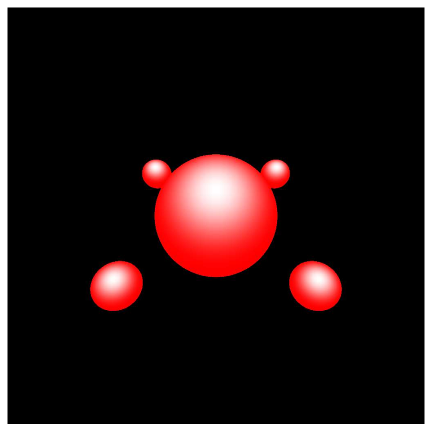
Varying Coefficients and Diffuse/Specular:

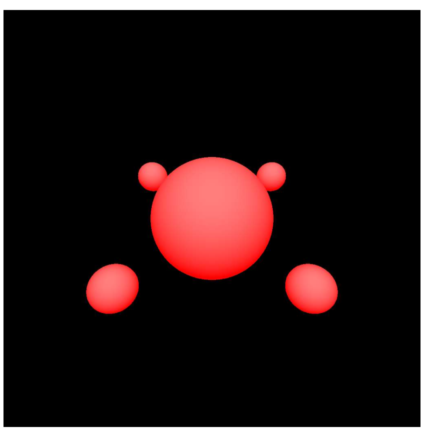
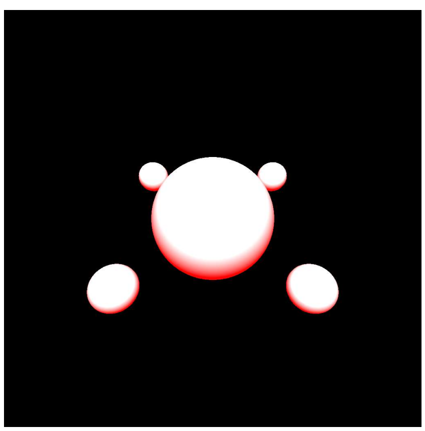
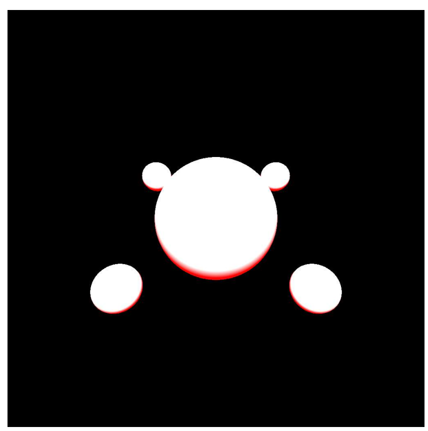


The left image is the base image that will be used for all the changing of values and comparisons. The material values for all the spheres are n = 1, Odr = 1, Odg = 0, Odb = 0, Osr = 1, Osg = 1, Osb = 1, ka = 1, ks = 1, kd = 1, n = 1. The light coming in is a directional light with direction (0, -1, 0) and intensity of (1, 1, 1).

The first value that was changed was the power that the specular component is raised to in the calculation of the Phone Shading. The left image, as stated above, is the base image with n = 1. The three images below correspond to spheres with n = 0.5 on the left, n = 2 in the middle, and n = 4 on the right. We can see from this that as the value of n is increased, the specular component becomes less and less influential. This is because the dot product between N and H produces a value between 0 and 1, and when that value is taken to a power, it only gets smaller. We can also see that as n is reduced, the specular component becomes more prominent because that value gets bigger in more places.

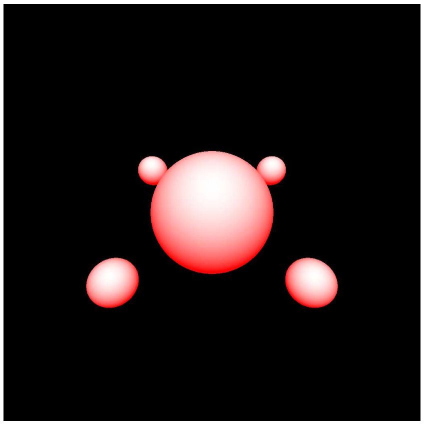
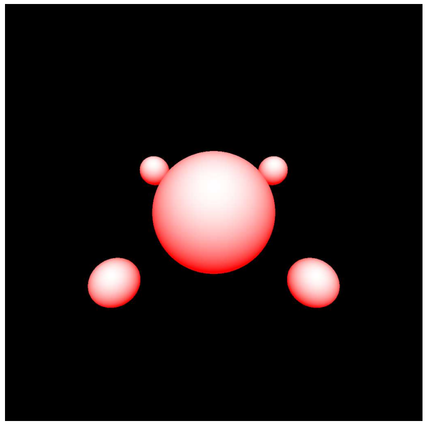
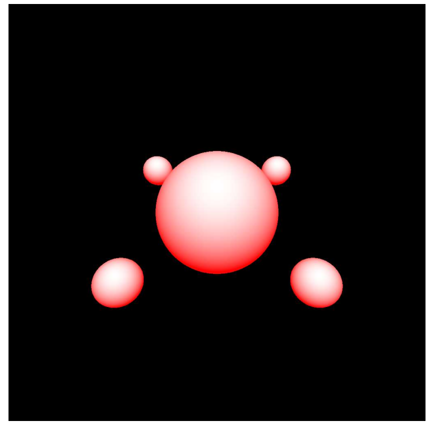




Varying ks:

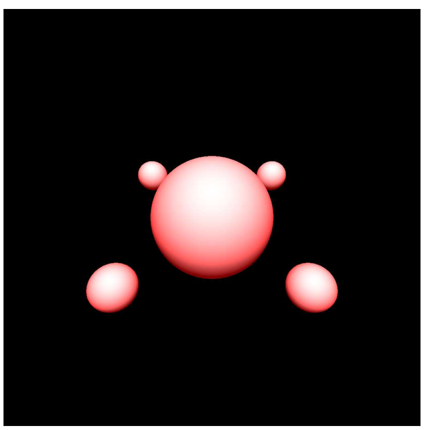
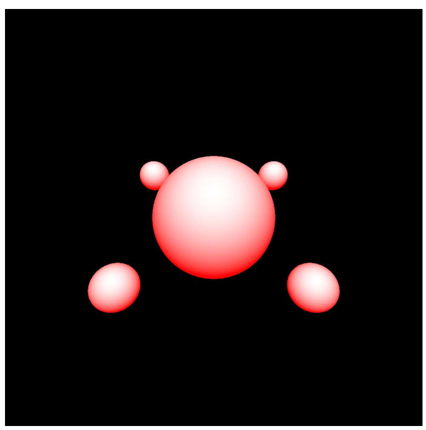
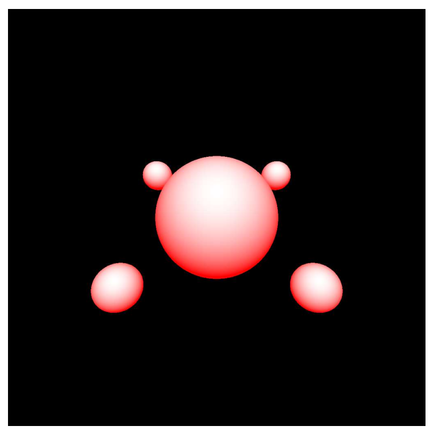
The above three photos, from left to right go ks = 0.5, ks = 2, ks = 4. As we can see, ks increasing leads to a dramatically increased effect of the specular component. This makes sense because it is modifying the specular component. A reduction in this leads to a dramatic decrease in the component as is expected.

Varying kd:

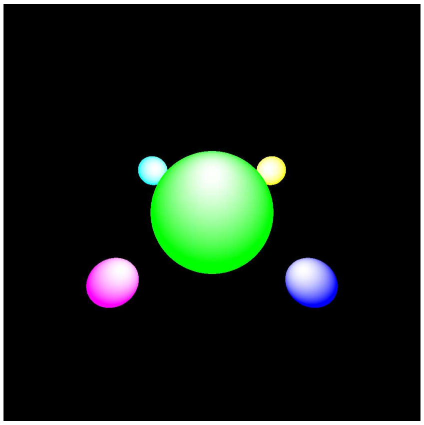
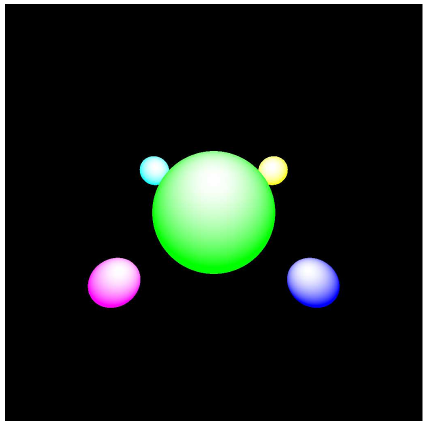
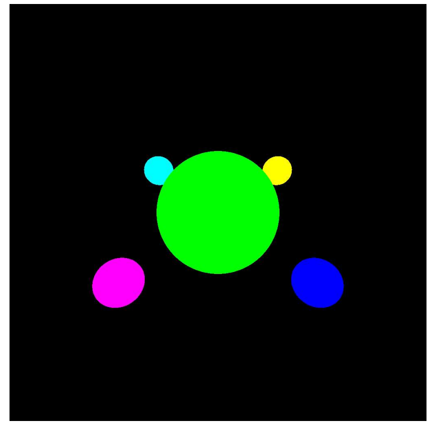
From left to right is kd = 0.5, kd = 2, kd = 4. I'm uh not exactly sure why they're all the same but they are and I can't find any place where I might be going wrong so I'll just accept it.

Varying ka:

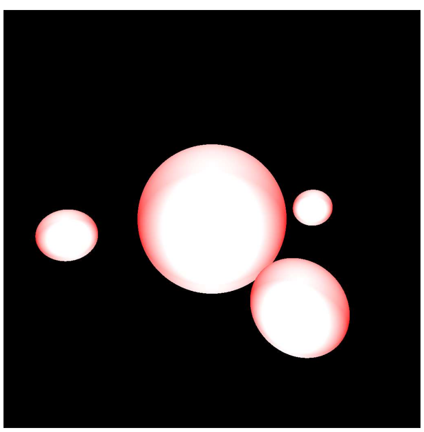
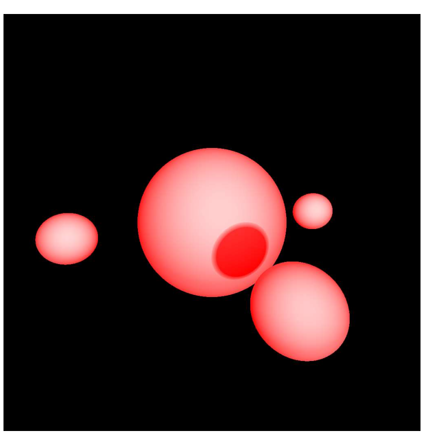
From left to right is ka = 0.5, ka = 2, ka = 4. From this we can see that as ka increases, the diffuse component (the red) gets more prominent in the areas where the specular component is not as prominent. As ka gets lower, those areas become a more dull color as the ambient color outside the light is not as much due to the lower ka.

Point Light (And different colors)

The above three photos are of the point light directly above the center sphere. The first image, the point light is at y = 25 which is fairly close to the center sphere. We can see that the light is more focused on the very top of the sphere and that the outer spheres have less focused light that is kind of facing inward. The second photo, the light is at y = 50 and the light is subsequently more spread out and even. The third photo is the same as the second except with the specular color the same as the diffuse color, showing off how the change in specular color can change the look of the light. We can see that this, compared to the directional light in the above photos, is not as even along the whole hemisphere that is facing the light. It depends on the position of the light and different objects are affected differently.

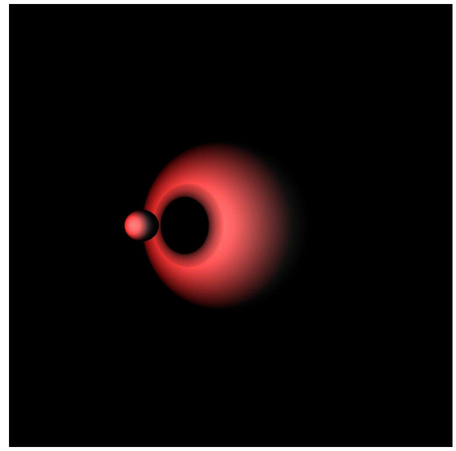
Two or More Lights

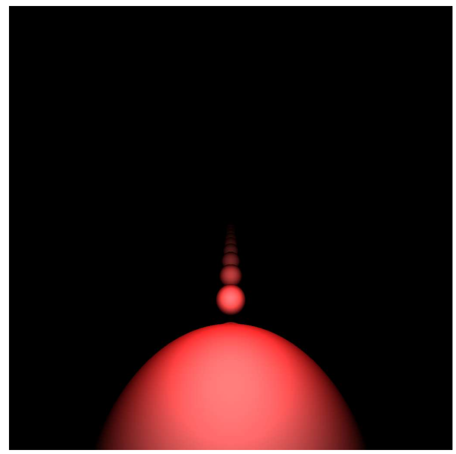
This first image on the left is of the original scene, with a slightly different eye position and view direction. Additionally, a second directional light was added pointing directly upwards. Now, the two directional lights are illuminating pretty much all of the spheres' surfaces. This scene is so bright because the intensity of both lights is 1 for all channels. In the scene below it, there is a directional light going in the negative z and negative x direction. A point light is placed at y = 75 in the center of the scene. In this scene, the intensities are turned down a bit, with the point light being 0.3 across all channels and the directional light being 0.6 across all channels. This also shows off the shadows and soft shadows (extra credit). The shadow is slightly red because of the point light that is also above, giving a bit of light to the shadow that might otherwise be much darker with only the directional light.

Extra Credit

- Soft Shadows: Achieved by shooting a cone around the direction to the light. Both the number of rays and the radius of the cone can be changed, though in all of these photos the number is 50 and the radius is 0.03. In the image, a point light is placed just behind the small sphere so that the soft shadow is much more noticeable on the large sphere. This also shows how much a point light can be blocked when it is behind another object. I especially like this image because of how much it looks like an eye



- Attenuation: The right image shows a line of spheres, each of radius 3 in a line from 0,0,0 to 100,0,100 with an attenuated point light with c1, c2, and c3 all equal to 0.001. Any much higher values result in very dark images but I think it's a quite cool effect like this.



- Depth Cueing: The image to the right shows the same scene as the attenuation image but the attenuation light replaced with a normal point light and depth cueing enabled. The color is (0,0,0), amax = 1, amin = 0.02, dmax = 50, dmin = 0. From this we can see that a very similar result can be obtained with depth cueing as we get from attenuation of the light source. I like how cueing to black makes everything look a bit spooky :)