Report

Answers to Question:

Question 1:

What are your observations of the distance attenuation terms used for lighting on the sphere and teapot/urn models?

Solution 1:

The percentage of the original light intensity that is used to colour a pixel is called attenuation. The intensity of light becomes less as it travels further away from its source. The basic idea behind attenuation is to generate a function that is inversely proportional to the distance between a point and the light source. If b and c are zero, in that case, this will be a constant distance attenuation. Otherwise, we can set c to zero. This will lead to linear distance attenuation. If c is non-zero, in that case, $1/(a + bd + cd^2)$ will be a quadratic distance attenuation.

Ideal values need to be picked up by the trial and error method.

Question 2:

What are your observations about the change in the shading model on the two meshes?

Solution 2:

In comparison to the Gouraud model, the surfaces of the objects in the Phong model appear to be smoother and shinier. When comparing the Phong and Gouraud models, the specular highlight point on the objects appeared to be sharper in the Phong model. Phong shading's specular highlights in the middle of a triangle are visible, which were not visible in Gouraud shading. Phong is more computationally demanding, but it produces superior results. The explanation for this is that Phong computes the effect of light at each place rather than using linear interpolation.

Question 3:

What are your observations of the individual components of reflection in the Blinn-Phong model for each of the mesh models you have used?

Solution 3:

Ambient: Attenuation has no effect on ambient illumination. To some extent, both mesh models lose their 3D features.

Diffuse: The effect of light on a surface can be observed better if the light source is kept parallel to the normal of thesurface rather than at an angle to the normal, which is a trait of diffuse light. In the case of a sphere, this difference is difficult to notice because the normal at a location will always be parallel to the light source, even if the sphere is rotated. In the instance of the teapot, however, this is not the case.

Specular: The specular reflection produces a rough specular area when the surface is less glossy. The spot appears on both objects, but in the case of Gouraud shading, the spot looks flat, however, it seems smoother in Phong shading.