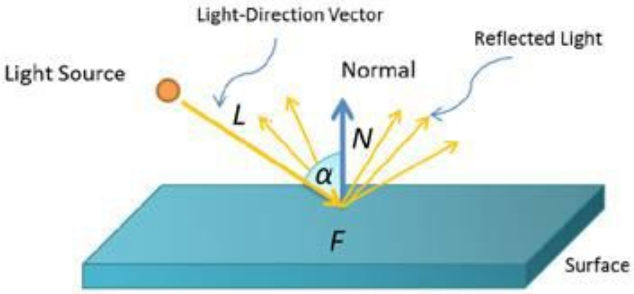
Implementing Diffuse Reflection in WebGL

Files: 07-lighting01.html, 07-lighting02.html, 07-lighting03.html, 07-lighting04.html, 07-lighting05.html

Recall that the formula for computing the surface color by diffuse reflection is given by the lambertian light reflection model which is

$$DiffuseColor = LightDiffuseColor \times Material\ DiffuseColor \times \cos\alpha$$

Lambertian Reflectance

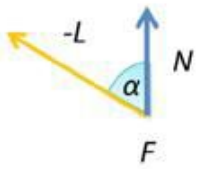


Final Diffuse Color

$$F = C_l C_m(-L \cdot N)$$

Light Diffuse Color Material Diffuse Color

Final diffuse color calculation for fragment F



$$-L \cdot N = |-L||N|\cos\alpha$$

If L and N are normalized then:

$$-L \cdot N = \cos\alpha$$

$$F = C_l C_m \cos\alpha$$

A Lambertian surface reflects light in many directions

Computing Correct Normals on Translated/Rotated Objects
Files: 07-lighting06.html, 07-lighting07.html

To correct the normals of translated/rotated objects, another matrix to represent the correct transformation must be used. This is usually called the normal matrix.

$$correctedNormal = normalMatrix * normalVector$$

Normal Matrix is dependent on the model matrix that was used to transform the vertex position of the objects. The normal Matrix is computed as

$$(modelMatrix^{-1})^{T}$$

or

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normalMatrix = transpose(inverse(modelMatrix))
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CMSC 161 UV-1L
Interactive Computer Graphics
Meeting 07 - Lighting (Part I)

Exercise

Create a lighted cube (Lambertian LRM, Flat Shading, directional light)