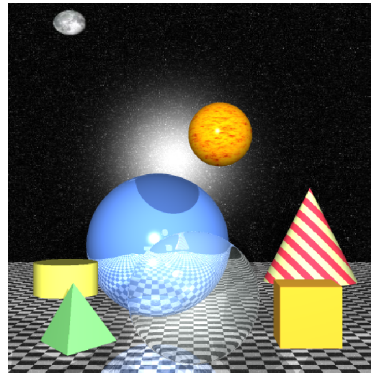# COSC363 Assignment 2 report

Features

The scene includes two light source and diffuse, specular reflections generated by the source, and it also includes two light sources with two shadows generated.

Other features

• Cone has been implemented with a procedural pattern

Ray equation: $x = x_0 + d_x t;$ $y = y_0 + d_y t;$ $z = z_0 + d_z t;$

Intersection equation: $(x-x_c)^2 + (z-z_c)^2 = \left(\frac{R}{h}\right)^2 (h-y+y_c)^2$
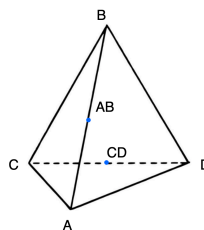
(Notes [9]-45)

• Cylinder

Ray equation: $x = x_0 + d_x t;$ $y = y_0 + d_y t;$ $z = z_0 + d_z t;$
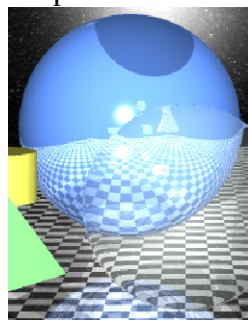
Intersection equation: $t^2\left(d_x^2 + d_z^2\right) + 2t\{d_x(x_0 - x_c) + d_z(z_0 - z_c)\} + \{(x_0 - x_c)^2 + (z_0 - z_c)^2 - R^2\} = 0.$
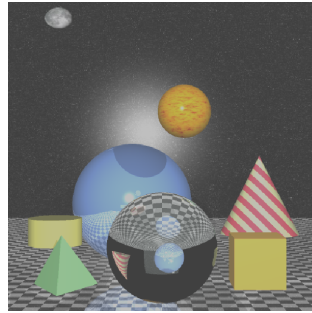
(Notes [9]-38)

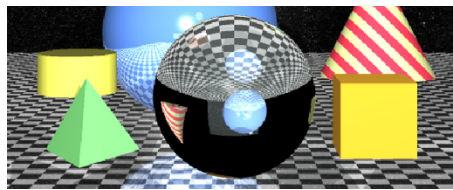• Tetrahedron: uses four plane objects with one vertex hidden in each plane, as shown in the figure below:

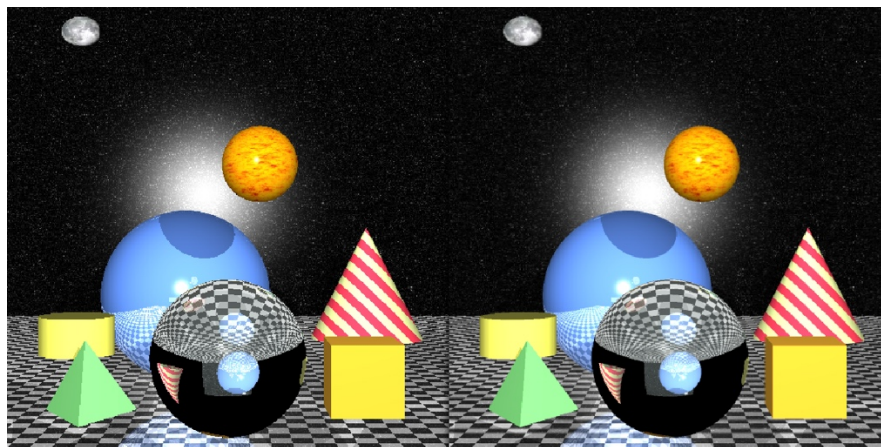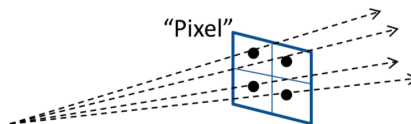• Reflection: The floor reflects the blue sphere.

• Fog:

• Transparent object: the bubble. Use formula $I = I_A + \rho_t I_c$ (Notes [9]-12)
• Refraction of light through an object: the refraction of the bubble (as figure below with eta = 2.5), by recursively trace the reflected ray.

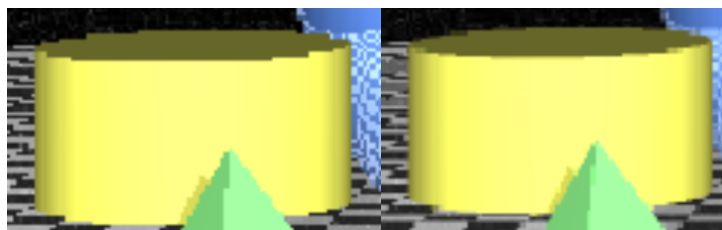• Anti-aliasing (diminishing jaggies), using super-sampling as in the slides 34, (four rays)

Before   after

Before   after

• A non-planar object textured using an image: the sun
• A non-planar object textured using a procedural strip pattern: the cone