Creating More Realistic Lens Effects

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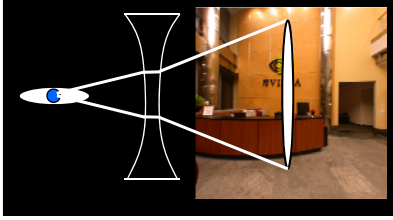
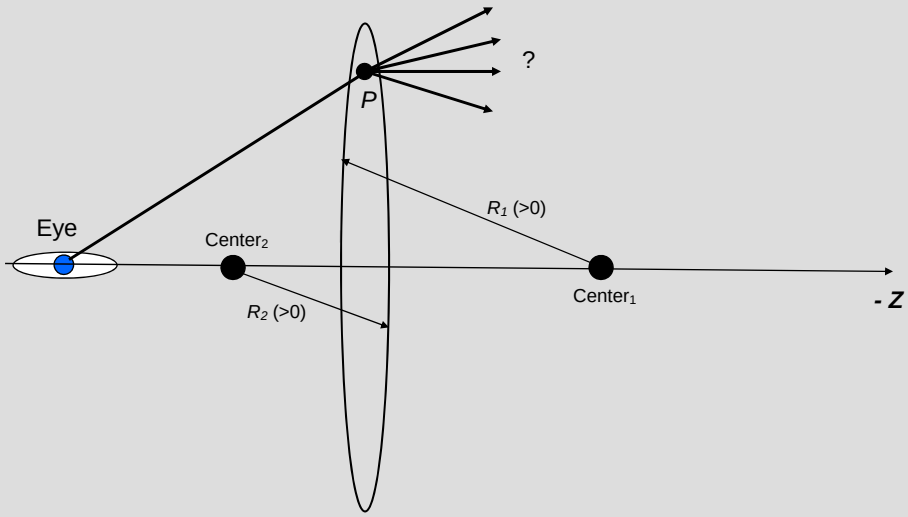


Convex Lens Definitions



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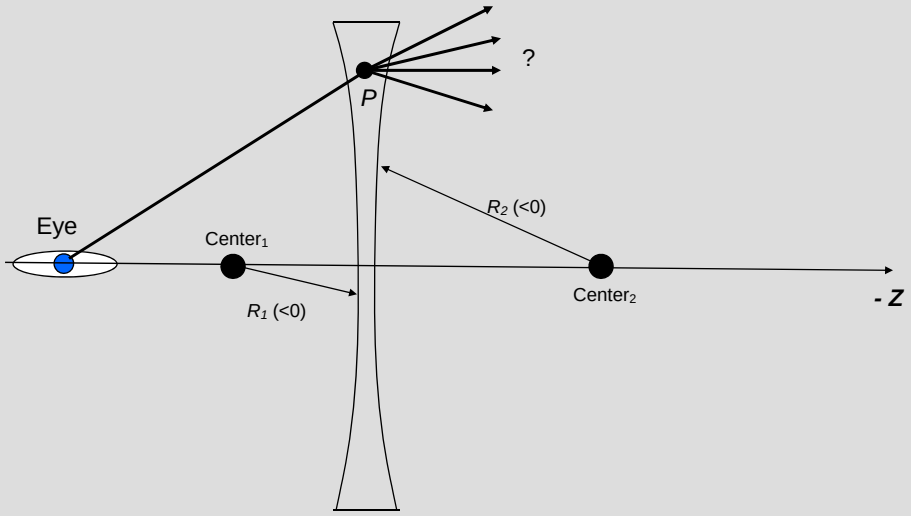
Concave Lens Definitions



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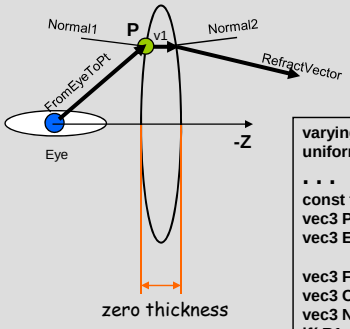
lens.vert – Setup for a Cube Map Texture




```
varying vec3 RefractVector;
uniform float R1, R2;

. . .
const float ETA_RATIO = 0.66;
vec3 P = vec3( gl_ModelViewMatrix * gl_Vertex );
vec3 Eye = vec3( 0., 0., 0. );

vec3 FromEyeToPt = normalize( P - Eye  );          // vector from eye to pt
vec3 Center1 = vec3( 0., 0., P.z - R1 );
vec3 Normal1;
if( R1 >= 0. )
        Normal1 = normalize( P - Center1 );
else
        Normal1 = normalize( Center1 - P );

vec3 v1 = refract( FromEyeToPt, Normal1, ETA_RATIO );   // eta ratio = in/out
v1 = normalize( v1 );
vec3 Center2 = vec3( 0., 0., P.z + R2 );
vec3 Normal2;
if( R2 >= 0. )
        Normal2 = normalize( Center2 - P );
else
        Normal2 = normalize( P - Center2 );

RefractVector = refract( v1, Normal2, 1./ETA_RATIO );

gl_Position = gl_ModelViewProjectionMatrix * gl_Vertex;
```

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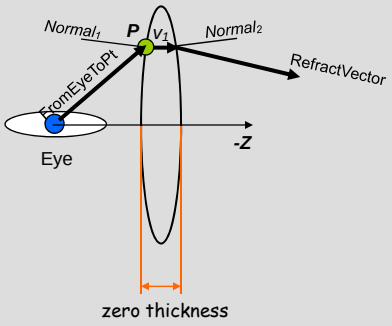

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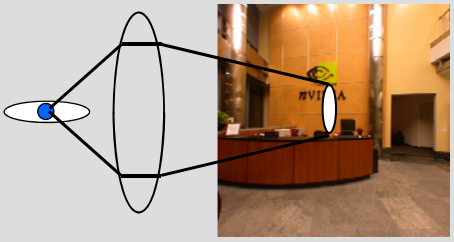
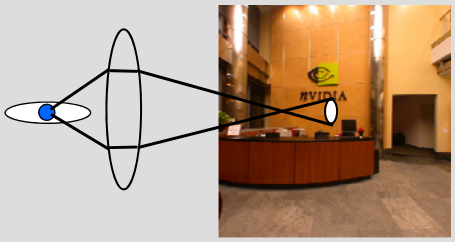
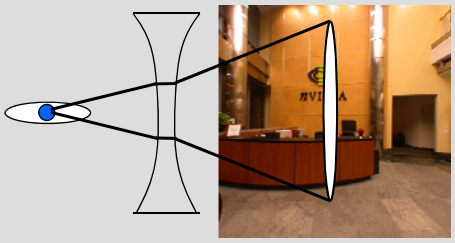
Convex Lenses (R1>0, R2>0)



Convex Lenses (R1>0, R2>0)



Concave Lenses (R1<0,R2<0)



Convex

Concave

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