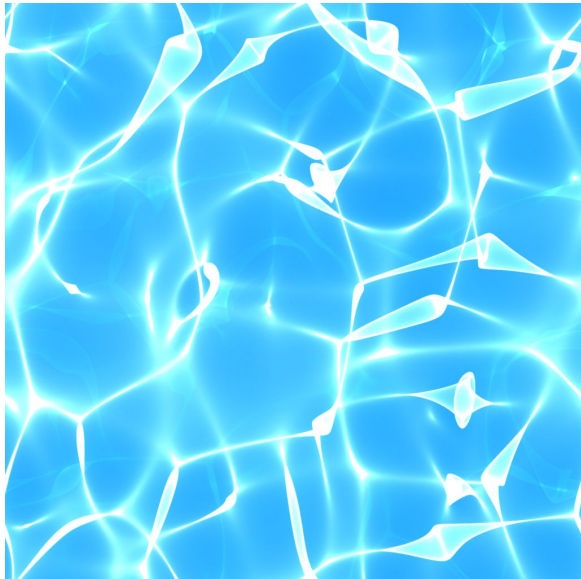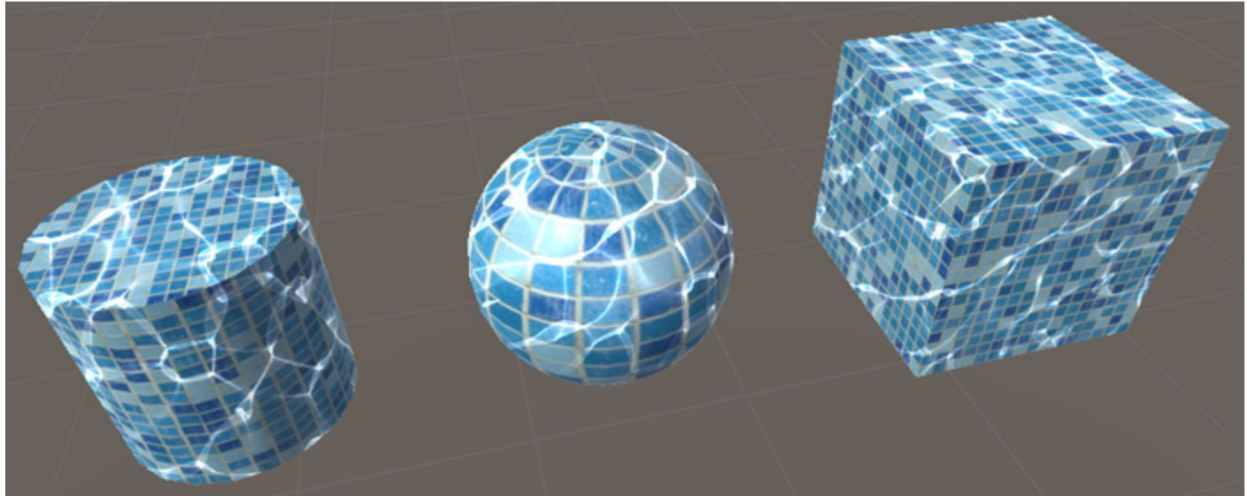Caustics:

Caustics are formed by the concentration of light. In our daily life, they are often observed when light shines through glass or water. It is because the light is reflected or refracted through the curved surface of the glass or wave. My straightforward understanding of making this kind of effect by computing is to trace possible paths of the light beam. We can do a simulation in which photons can be raytraced from the light source to the surface of the object and reflected or refracted to certain directions with a certain amount of attenuation, until it reaches another surface, and so forth until its intensity is approximate to zero. But the computation is too expensive.

For cheaper solution, we can use backward ray tracing to do a reverse calculation. That is to cast a ray from the camera or eye to the surface of the object to see if the ray can reach the position of the light or not. Or in 2D rendering, we can use a predefined caustic texture superimposed onto the actual scene with some noise function calculation. The caustic textures can also be mapped on to 3D geometries. In glsl, I might add a caustic texture to my scene, distort each pixel of the texture through noise function and let it change through time. Then I'll mix this color info and the original scene to get the final effect.

Caustics:

Caustics mapped to 3D objects:

A sketch:

Pixel distortion

Texture

Original scene