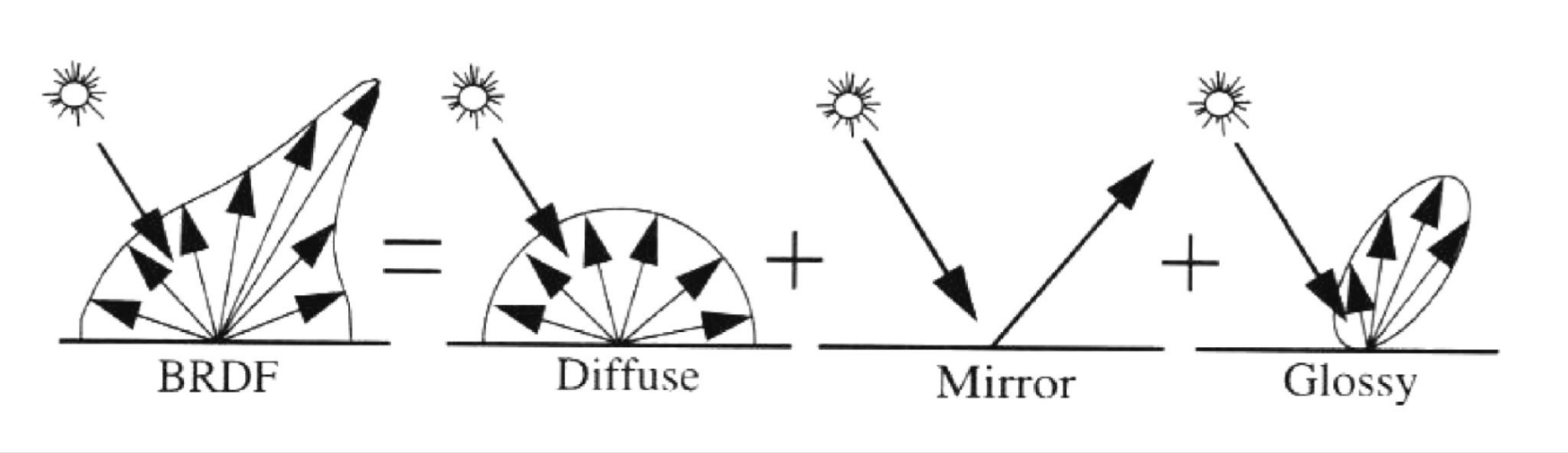
Computer Graphics

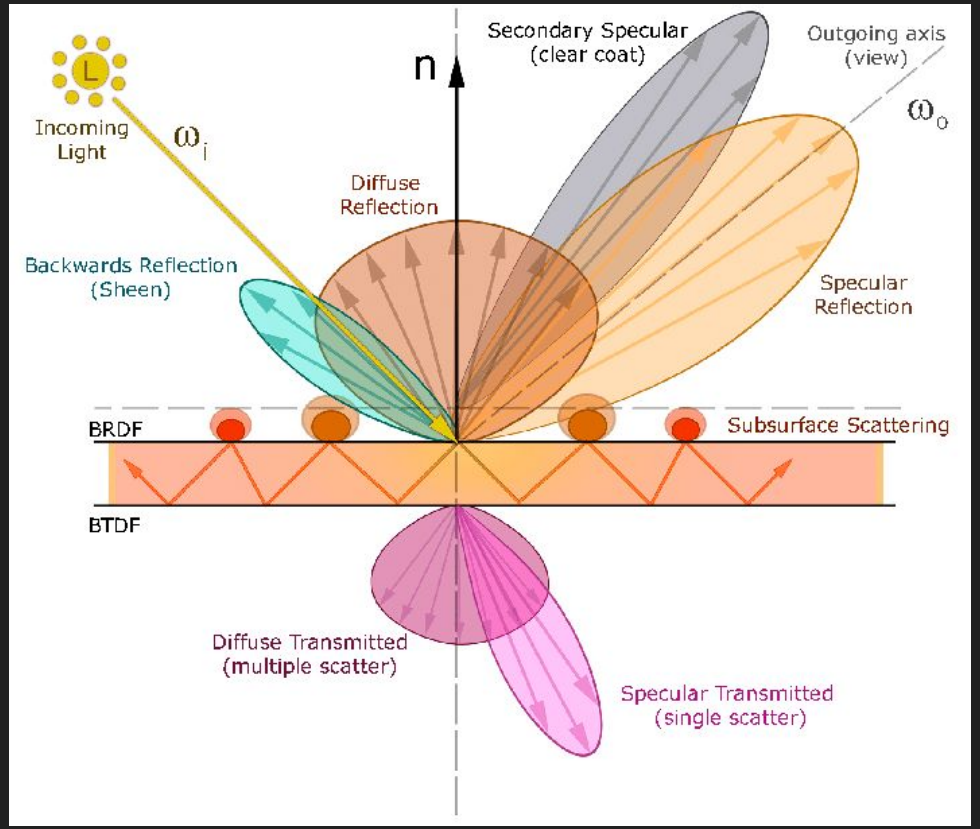
Tutorial for Exercise Sheet 04

Exercise 1: Bidirectional Reflectance Distribution Function (BRDF)

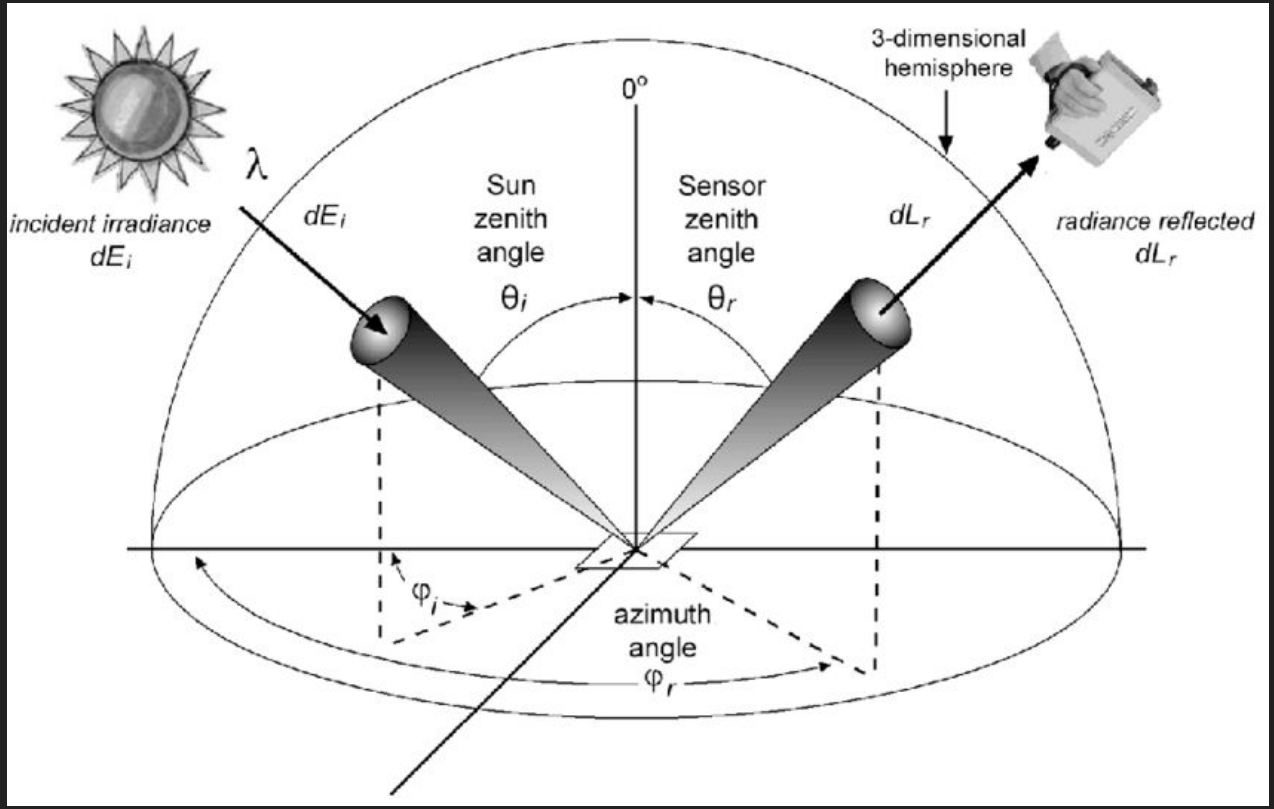
$$L(\mathbf{x},\omega) = E(\mathbf{x},\omega) + \int_{\Omega^+} f(\mathbf{x},\omega_i \rightarrow \omega) L_{in}(\mathbf{x},\omega_i) cos\theta_i d\omega_i$$



Exercise 1: Bidirectional Reflectance Distribution Function (BRDF)



Exercise 1: Bidirectional Reflectance Distribution Function (BRDF)



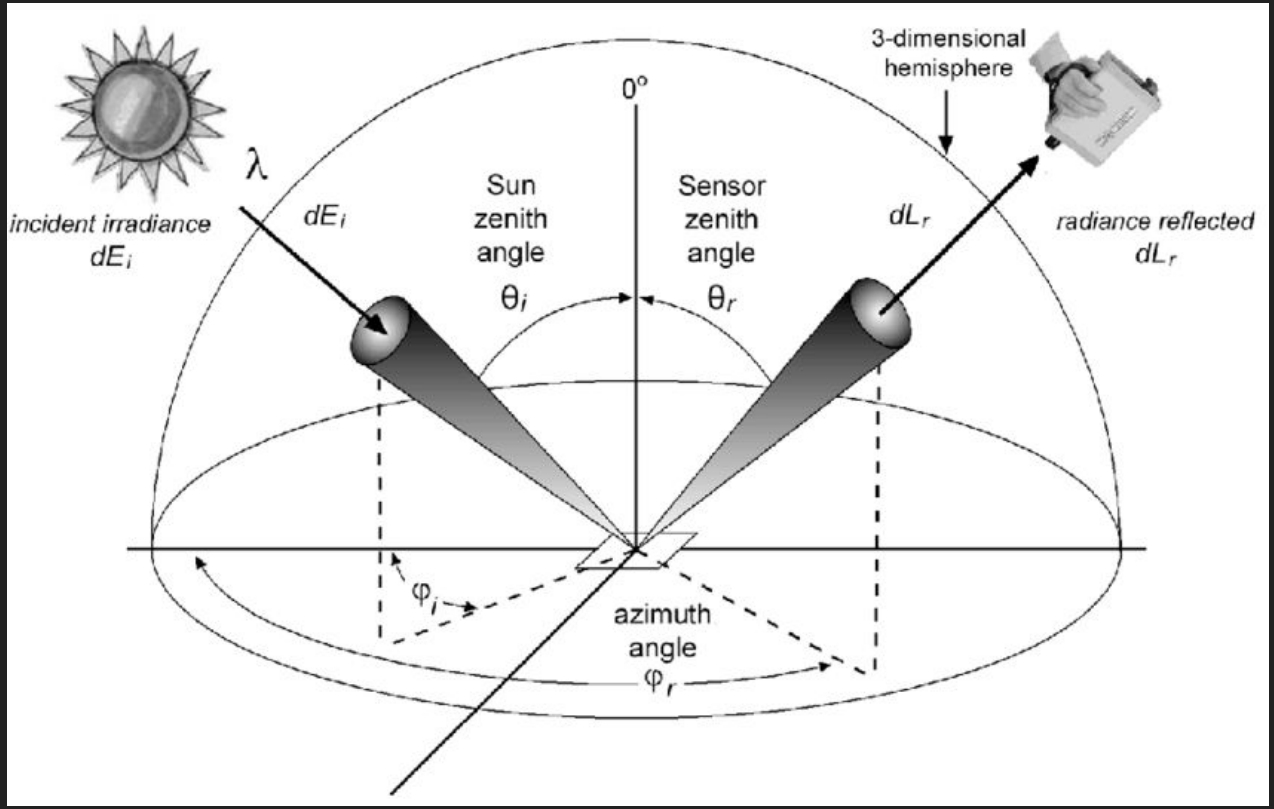
Exercise 1: Bidirectional Reflectance Distribution Function (BRDF)

a) Three parameters of the BRDF
   i) Incident light angle
   ii) Leaving light angle
   iii) Position

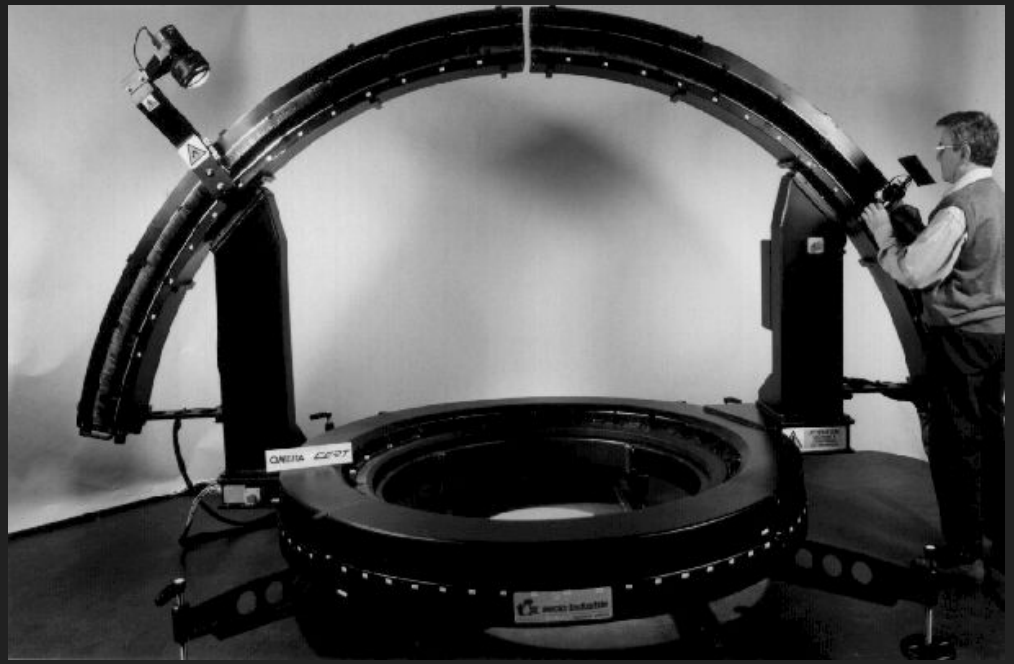
b) What does the value of BRDF for a certain parameter set tell us?
   i) Proportion of the reflected light (at a given angle) to the incident light (at a given angle)

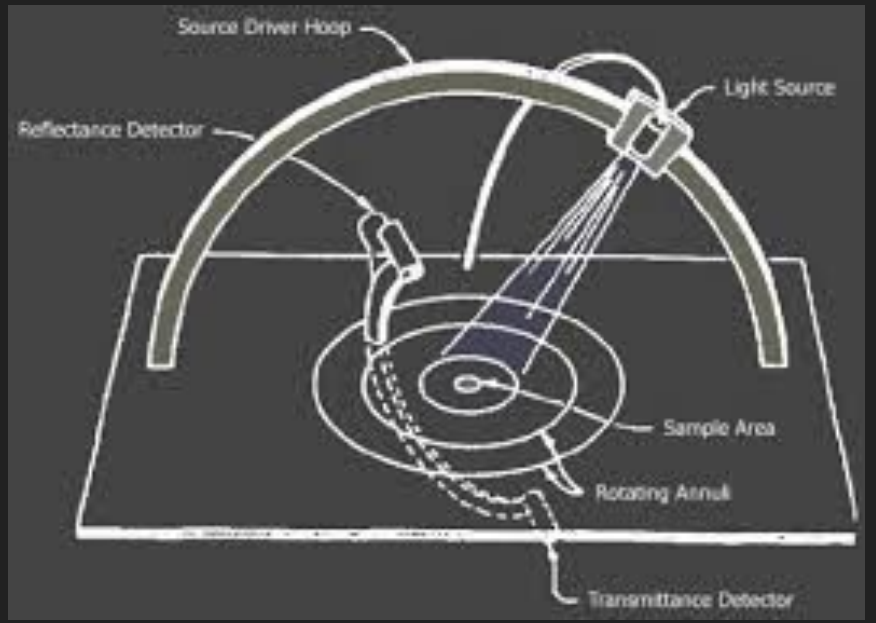
c) How can we obtain BRDFs? Name two different approaches.
   i) Measurement of real samples
   ii) Phenomenologically or physically motivated model

Exercise 1: Bidirectional Reflectance Distribution Function (BRDF)

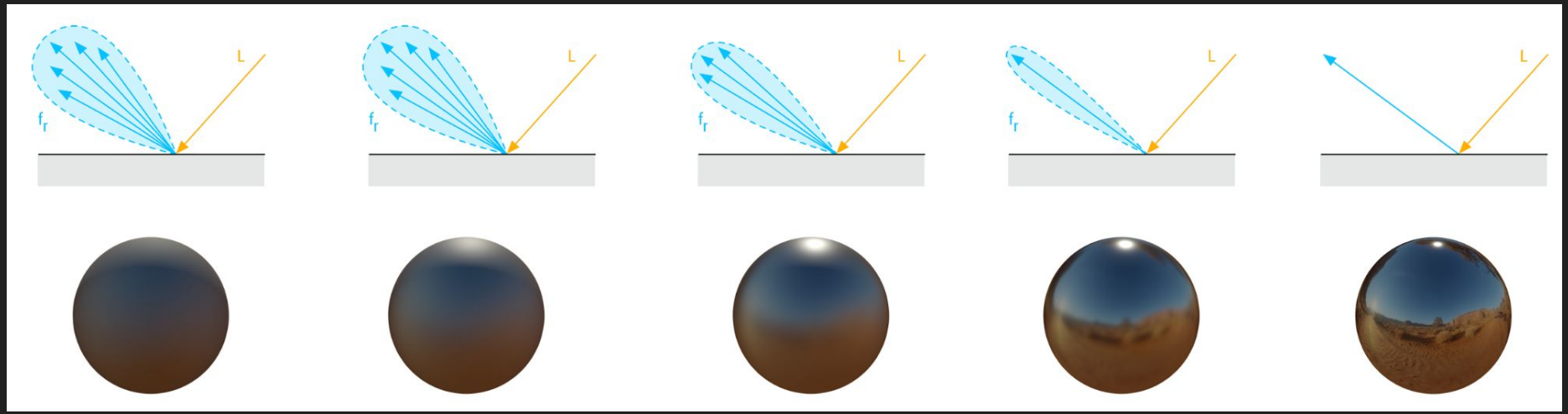


Exercise 1: Bidirectional Reflectance Distribution Function (BRDF)



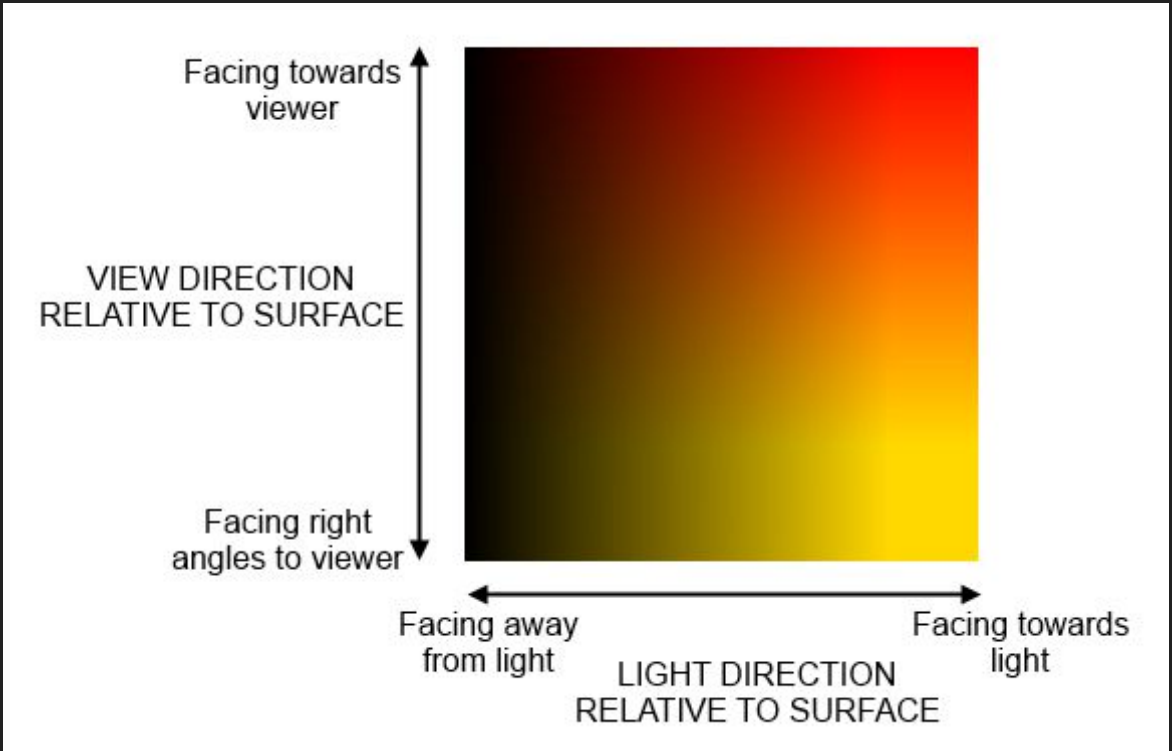


Exercise 1: Bidirectional Reflectance Distribution Function (BRDF)

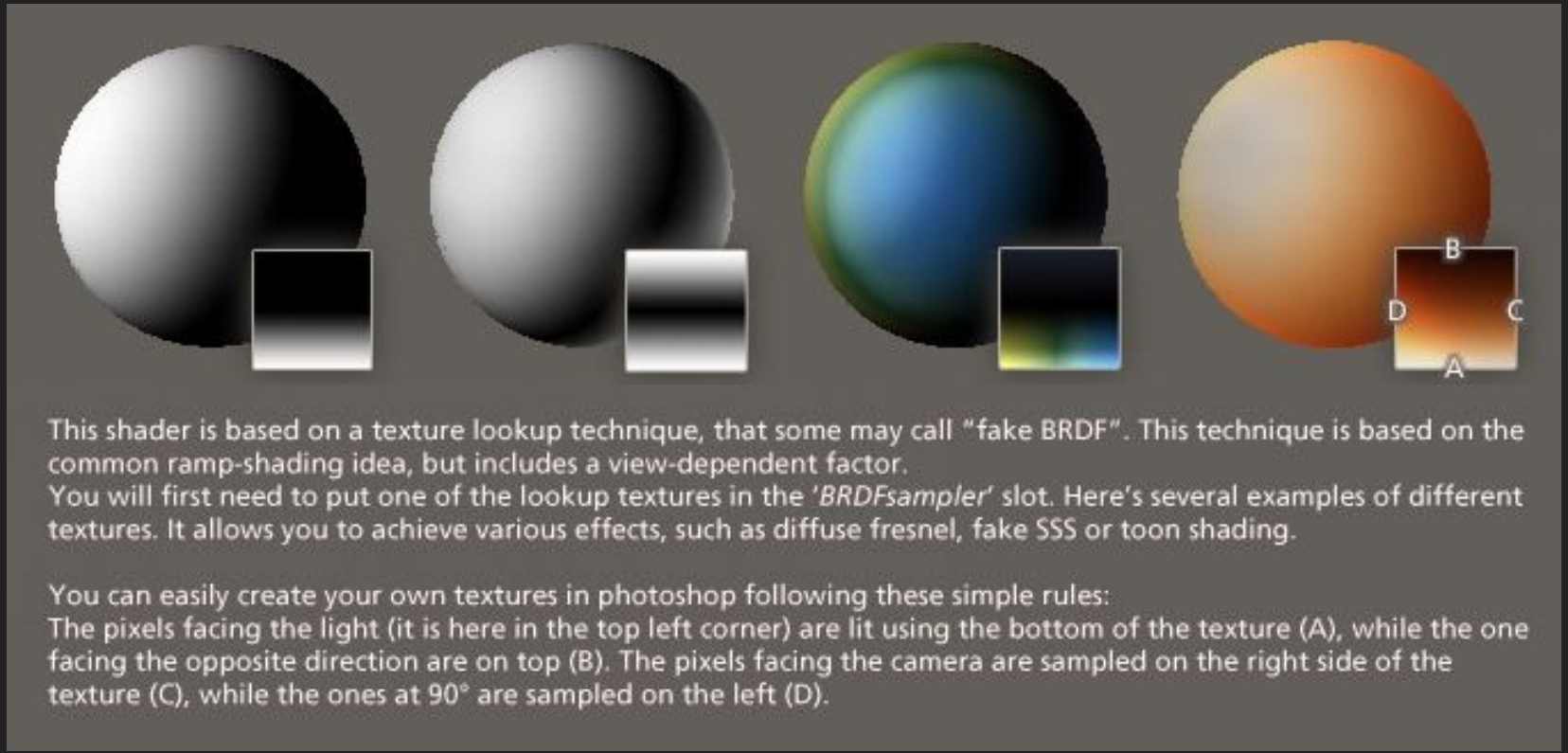


Exercise 1: Bidirectional Reflectance Distribution Function (BRDF)

Exercise 1: Bidirectional Reflectance Distribution Function (BRDF)



Exercise 1: Bidirectional Reflectance Distribution Function (BRDF)



This shader is based on a texture lookup technique, that some may call "fake BRDF". This technique is based on the common ramp-shading idea, but includes a view-dependent factor.
You will first need to put one of the lookup textures in the '*BRDFsampler*' slot. Here's several examples of different textures. It allows you to achieve various effects, such as diffuse fresnel, fake SSS or toon shading.

You can easily create your own textures in photoshop following these simple rules:
The pixels facing the light (it is here in the top left corner) are lit using the bottom of the texture (A), while the one facing the opposite direction are on top (B). The pixels facing the camera are sampled on the right side of the texture (C), while the ones at 90° are sampled on the left (D).

Exercise 1: Bidirectional Reflectance Distribution Function (BRDF)

Exercise 2: Analytic Geometry

On the blackboard