Absorption, reflection, and refraction of light

The color of the objects we see in the natural world is a result of the way objects interact with light. When a light wave strikes an object, it can be absorbed, reflected, or refracted by the object. All objects have a degree of reflection and absorption.
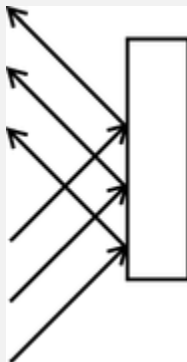
Note

In the natural world, light can also be transmitted by an object. That is, light can pass through an object with no effect (an x-ray, for example). These types of light, however, are not represented in Autodesk® Maya® because they have no visual effect.
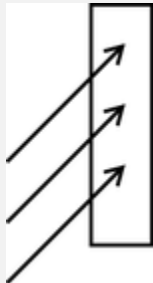
Absorption.

Light stops at the object and does not reflect or refract. Objects appear dark or opaque.

Example: wood.
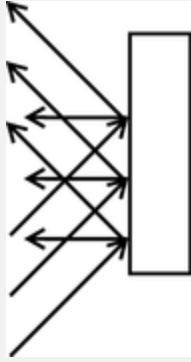

Reflection on a smooth surface.

Light bounces off the surface of a material at an angle equal to the angle of the incoming light wave.

Example: mirrors or glass.

See also Diffuse, Specular, and Glossy reflection .
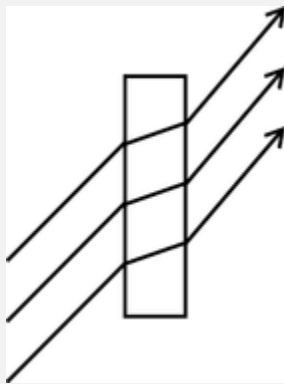
Reflection on a rough surface (also called Scatter).

Light waves bounce off at many of angles because the

surface is uneven.

Example: the earth (that's why the sky is blue).

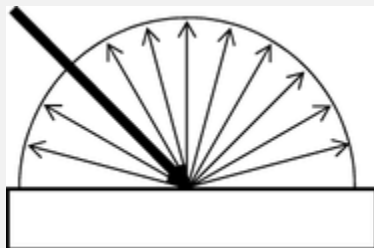See also Diffuse, Specular, and Glossy reflection .

Refraction

Light goes through the object and bends at an angle.

Example: diamond (greater angle) or water (lesser angle)

See also Diffuse, Specular, and Glossy refraction of light.

Diffuse, Specular, and Glossy reflection

Reflection is divided into three types: diffuse, specular, and glossy.
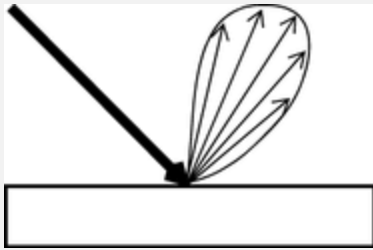
Diffuse reflection.

Diffuse surfaces reflect (scatter) light in many angles.

Diffuse reflection accounts for more of the color than any other type of distribution because most objects are opaque and reflect light diffusely.
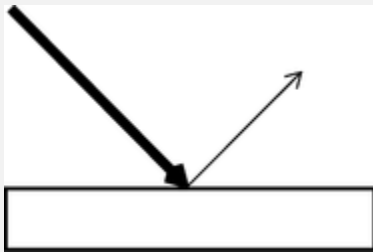
Glossy reflection.

Glossy surfaces are actually specular surfaces with micro surfaces at angles to surface plane.

These micro surfaces reflect light not only specularly but

also diffusely (at angles very close to the specular transmission), giving the surface a glossy appearance.
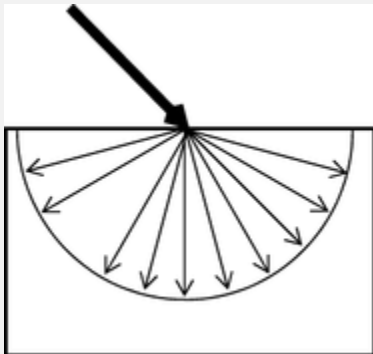
Specular reflection.

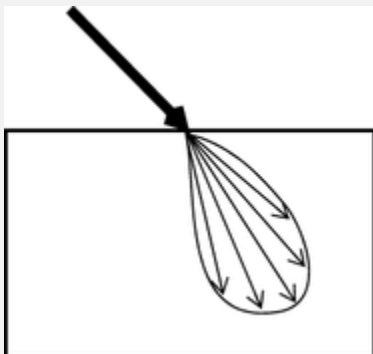Specular surfaces reflect light at the same as the angle at which the light strikes the surface.

Specular reflection gives objects a glossy or mirror-like appearance.

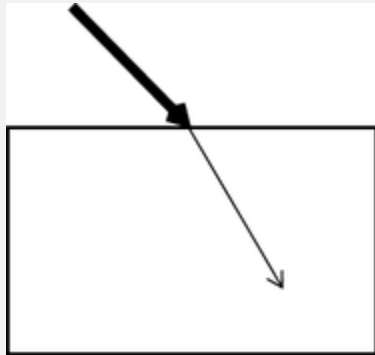Diffuse, Specular, and Glossy refraction of light

Diffuse refraction.

Diffuse refraction scatters light in many angles.

Glossy refraction.

Glossy surfaces are actually specular surfaces with micro surfaces at angles to surface plane.

These micro surfaces refract light not only specularly but also diffusely (at angles very close to the specular transmission), giving the surface a glossy appearance.

Specular refraction.

Specular surfaces reflect light at the same as the angle at which the light strikes the surface.

Related topics

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