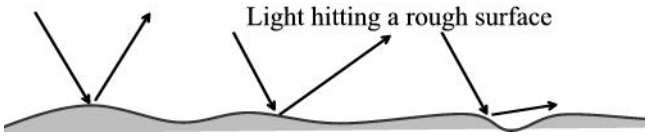
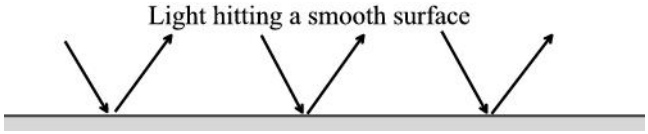
Topic 2 – Reflection (pgs. 188-199)

Reflection is the process in which light strikes a surface and bounces back off that surface. How it bounces off the surface depends on the Law of Reflection and the type of surface it hits.

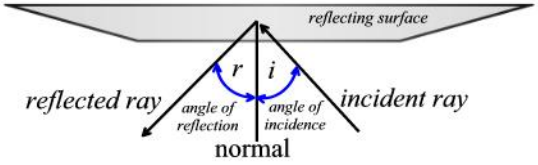
If it hits a rough surface, the light is scattered.



If it hits a smooth surface, the light reflects at an opposite angle to the angle it hits.



Light coming from a light source is called an incident ray and the light that bounces off the surface is called a reflected ray. A line that is perpendicular (90o with the surface) to the plane mirror is called the normal line. The angle between the incident ray and the normal line is called the angle of incidence (i). The angle between the reflected ray and the normal line is called the angle of reflection (r).



Forming An Image

The **Law of reflection** states that:

the angle of incidence equals the angle of reflection
the incident ray, the normal line and the reflected ray lie in the same plane (an imaginary flat surface)
Figure 3.17 p. 194

An image is formed in a mirror because light reflects off all points on the object being observed in all directions. The rays that reach your eye appear to be coming from a point behind the mirror. Because your brain knows that light travels in a straight line, it interprets the pattern of light that reaches your eye as an image of an object you are looking at.

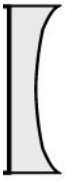
Figure 3.19 explains why an image in a mirror is the same size as the object and appears to be the same distance from the mirror as the object. (only true for flat mirrors)

Curved Mirrors

Mirrors that bulge out are called
Convex mirrors

Convex mirrors form images that appear much smaller and farther away than the the object - but they can reflect light from a large area, making them useful as security devices.

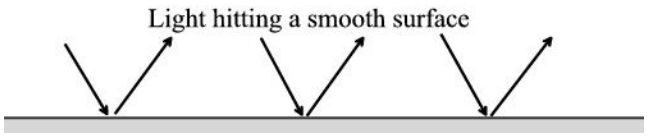
Mirrors that cave in are called
Concave mirrors



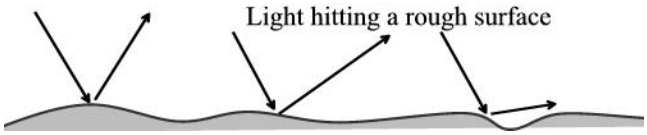
Concave mirrors form an image that appears to be closer than it actually is and can be useful because it can also reflect light from a large area - side mirrors on automobiles.

Rough Surfaces

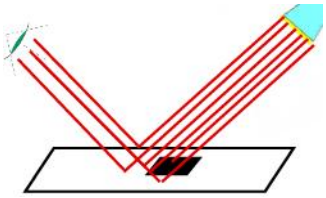
Smooth surfaces reflect light uniformly



Rough surfaces appear to reflect light randomly,



But this seemingly scattered light creates the image of the print on the page. Light hits the white paper and reflects in all directions (some of it reaching your eye). Since there is no pattern, your eye just sees white light. The ink on the paper absorbs the light and no light from the ink reaches your eye. Therefore your eye sees the letters in black ink.



(see Figure 3.23, p. 198)

Using Reflections

Reflectors help to make bicycles and cars visible at night. A reflector is made up of hundreds of tiny, flat reflecting surfaces arranged at 90o angles to one another. These small surfaces are packed side by side to make the reflector. When light strikes the reflector the light bounces off the tiny surfaces and bounces back toward the light source.

Pool players use the law of reflection to improve their game. Like a light ray, a pool ball travels in a straight line. In a 'bank shot' (Figure 3.25, p. 199) the cue ball is bounced off the cushion at an angle which enables the player to hit the target ball. This angle is calculated as the angle of contact (with the cushion) is equal to the angle of impact (with the target).

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