

## Waves

## 2. Light

## CONCEPT 2

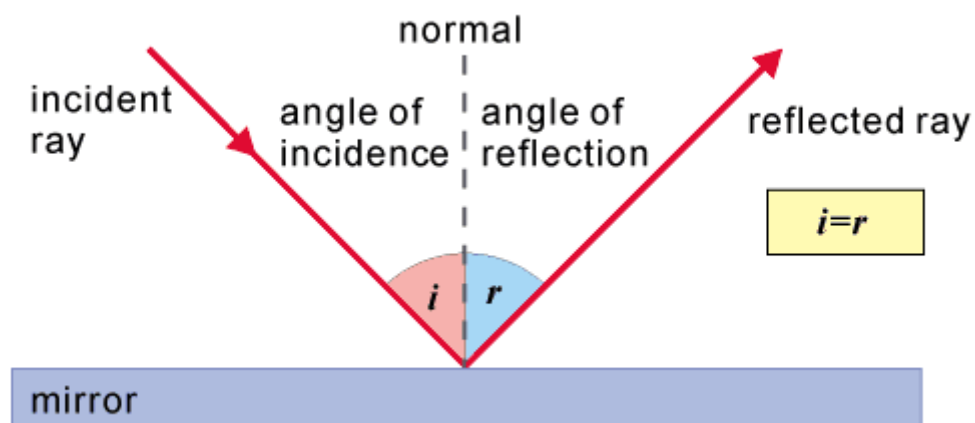
## REFLECTION OF LIGHT

## NOTES

When you look in the mirror it appears that there is someone who looks just like you behind the mirror. When you look at yourself in a flat, or plane, mirror the image is the same size and shape as you are. It appears to be as far behind the mirror as you are in front of the mirror with left and right swapped.

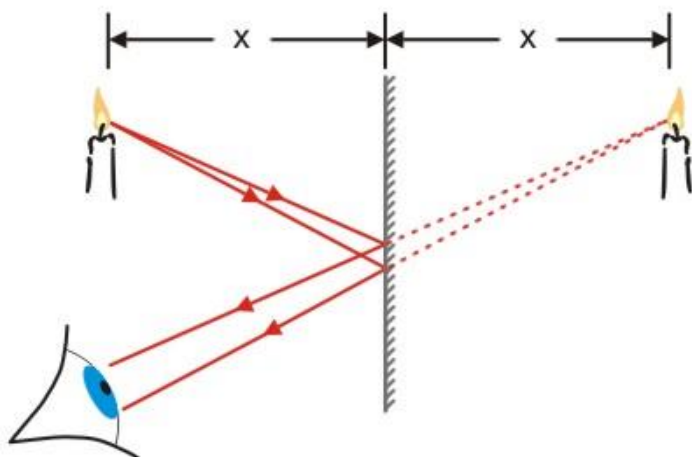
When light bounces off surfaces we call this reflection. Most surfaces reflect light to some extent which is why we can see objects around us. You can only see your image in surfaces that reflect light in a regular way.

Plane mirrors produce specular reflection and can be demonstrated using a ray box. The ray that hits the mirror from the ray box is called the incident ray. The ray that is reflected is called the reflected ray. There is an imaginary line at  $90^\circ$  to the surface of the mirror called the normal. We use this line to measure the angles of incidence and angles of reflection in a ray diagram as shown below.

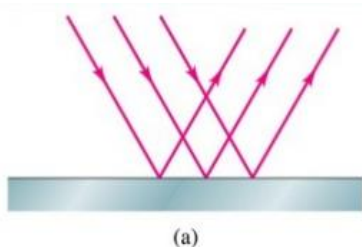


When a single beam light is reflected from a mirror, the angle of incidence is equal to the angle of reflection. This is called the law of reflection. In specular reflection, all beams of light hitting the mirror are reflected in a regular and predictable way.

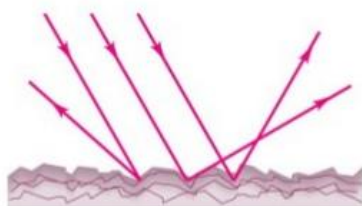
By completing a ray diagram for two reflected beams of light in a mirror we can deduce where the image in will be formed, as shown below. Our brain processes the rays of light from our eyes such that the image appears to be coming from behind the mirror. The image formed is virtual, which means it can't be projected on a screen.



Most surfaces we see are not mirrors. Light beams are not reflected from these surfaces in a regular way. Individual beams of light obey the laws of reflection but because the surface is bumpy the light is reflected in different directions. This is called diffuse reflection because the light is scattered in different directions.



specular reflection  
smooth surface  
e.g. mirrors



diffuse reflection  
rough surface  
e.g. screens

### SUGGESTED ACTIVITIES / IDEAS

Using ambigrams to show how light is reflected in a mirror.

Play table tennis and discuss how a player judges which way the ball is going to bounce

Investigate how the angle of reflection of a light ray varies with the angle of incidence.

Simulation of refraction of light <https://phet.colorado.edu/en/simulation/bending-light>

E-chalk reflection balloon blast game

<https://subscription.echalk.co.uk/Science/physics.html#Wavesandoptics>

E-chalk creating a virtual image with a plane mirror

<https://subscription.echalk.co.uk/Science/physics.html#Wavesandoptics>

Using reflection diagrams to get laser light from one side of a sheet of A4 to a switch at the other side of the paper using exactly 6 mirrors.

Demonstrating Pepper's ghost

Measuring the amount of light reflected off surfaces using a light meter? (not sure if we have one)