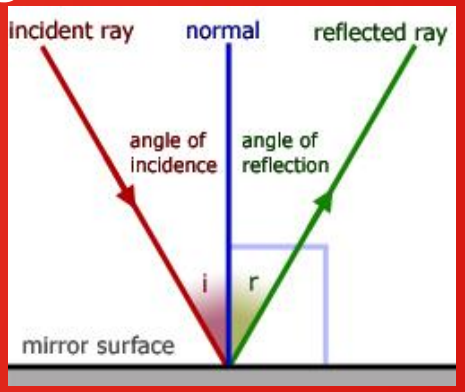
NOTES ON 18.2 Reflection and Mirrors

Chapter 18 Light

Light waves can be represented as straight lines called rays.

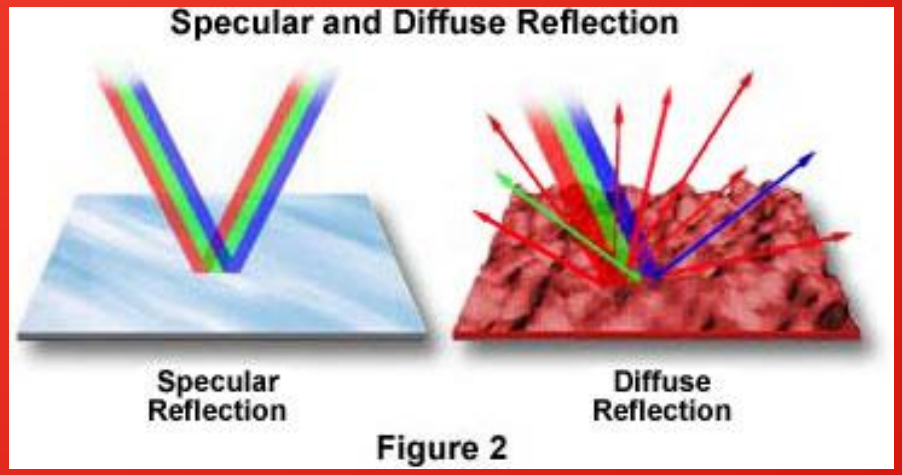
Light rays obey the law of reflection – the angle of reflection equals the angle of incidence.



The 2 ways in which a surface can reflect light are *regular reflection (specular)* and *diffuse reflection.*

Parallel rays of light hit a smooth surface.

Sharp reflection



Parallel rays of light hit an uneven surface.

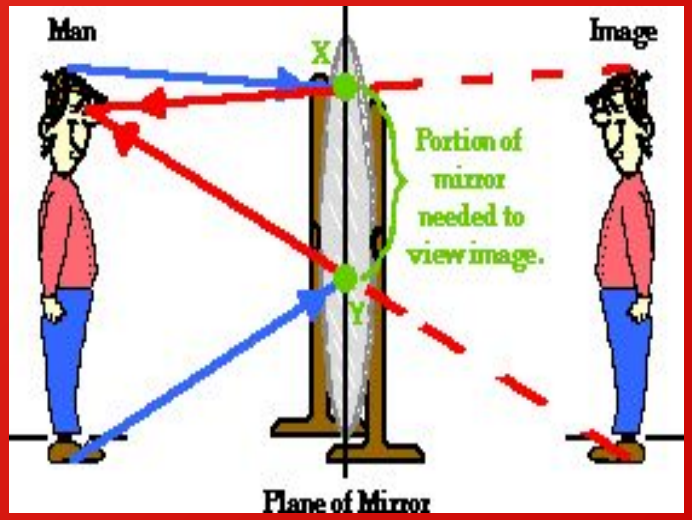
Image is unclear.

Each light ray is obeying the law of reflection but hits the surface at different angles because the surface is uneven.

A *plane mirror* is a flat sheet of glass that has a smooth, silver-coating on one side. The coating is on the back of the mirror to protect it from damage. When light strikes the mirror, the coating reflects the light.

A clear image forms because it is a smooth surface and regular reflection occurs.

An image is a copy of an object formed by reflected or refracted rays of light.

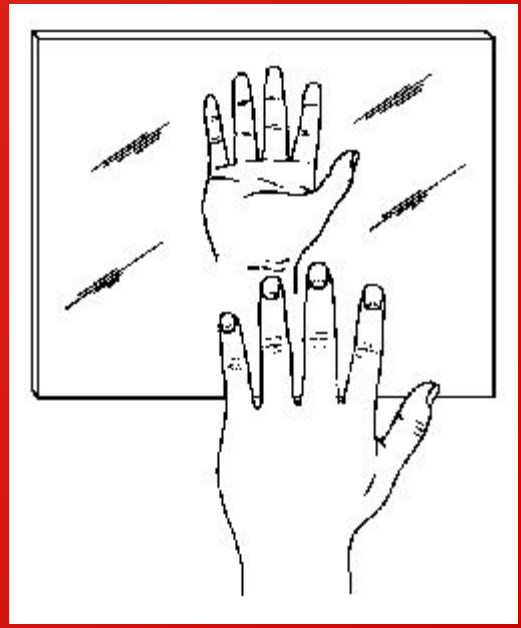


The image you see in a plane mirror is a <u>virtual image</u>.

"Virtual" describes something that doesn't really exist.

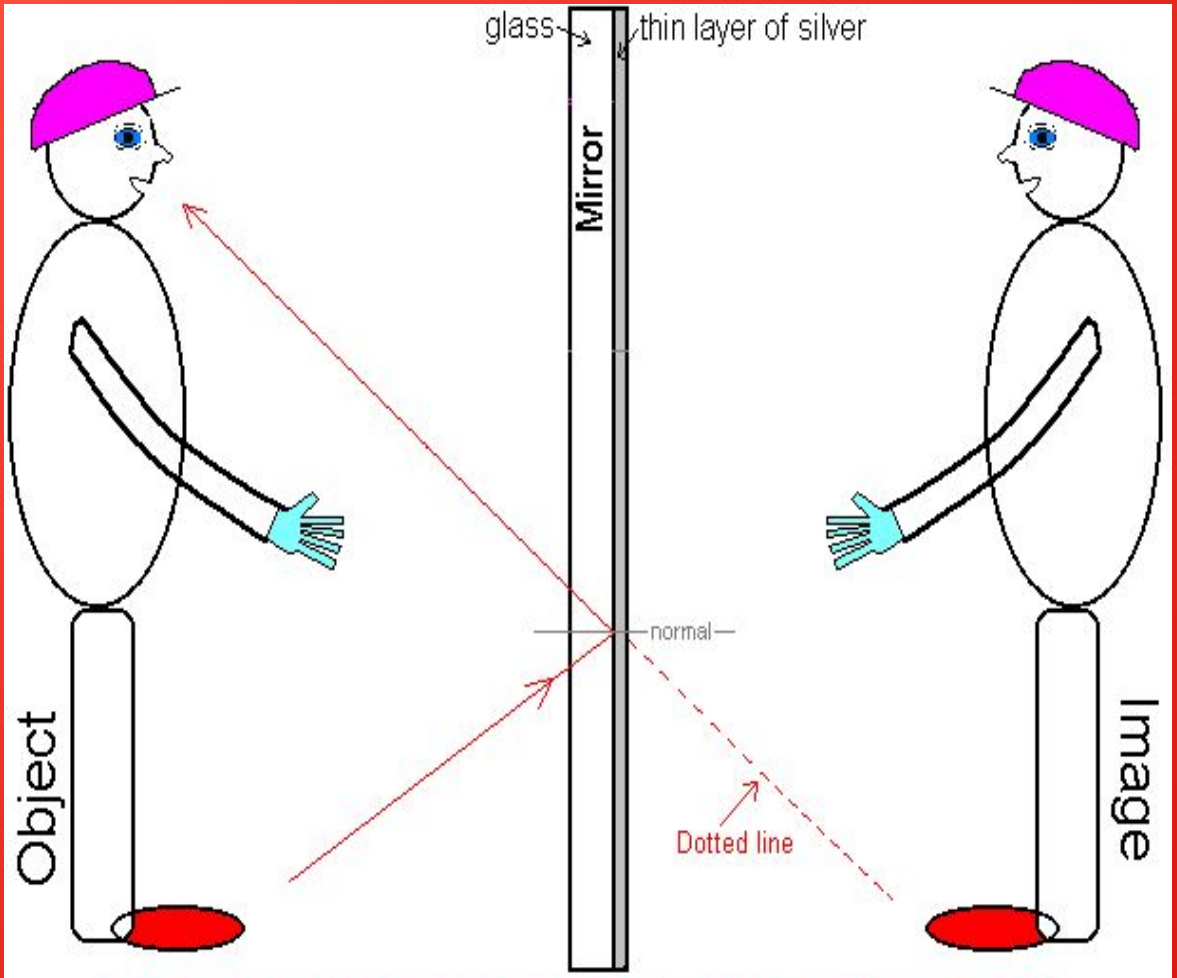
Your image appears to be behind the mirror, but you can't reach behind the mirror and touch it.

Your virtual image is the same size and upright, but the left and right are reversed.



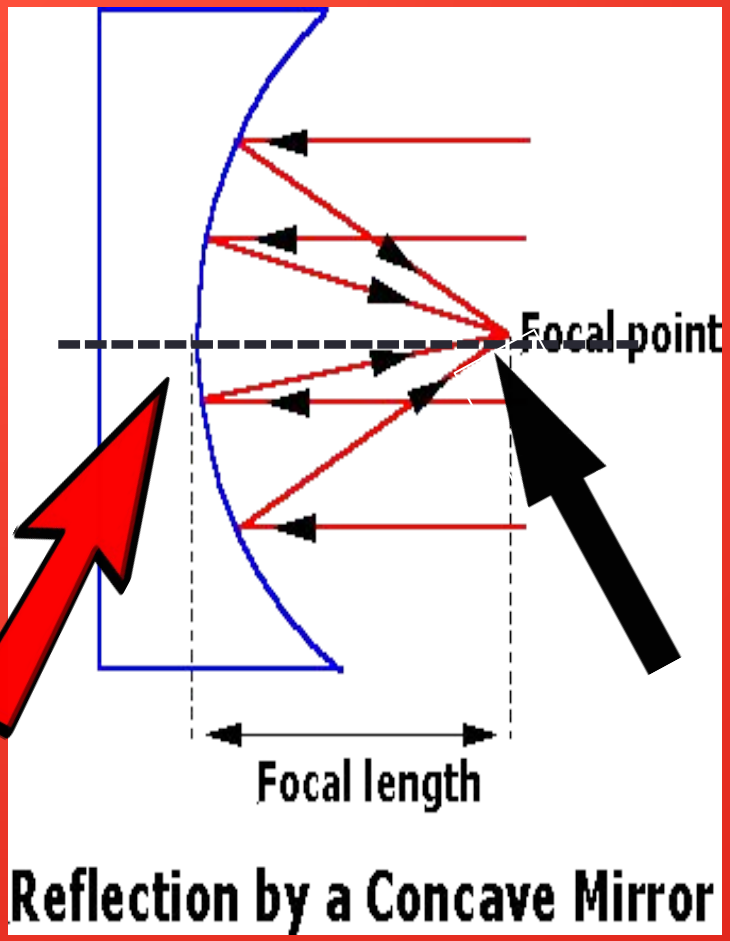
PROPERTIES OF A PLANE MIRROR IMAGE

1. Opposite the object
2. As far behind as the object is in front of the mirror
3. Virtual (the light only *seems* to come from the image)



Dotted line because light does not actually travel along this line it only appears to travel along this line. Your eye can only trace light rays backwards in straight lines

Partner up!
Play a quick round or two of Object vs Image



A **concave mirror** can reflect parallel rays of light so that they meet at a point. This is called the **focal point.**

These rays run parallel to the **optical axis.**

The **optical axis** is an imaginary line that divides the mirror in half, similar to how the Equator divides Earth.

The more <u>curved</u> the concave mirror is, the <u>closer</u> the focal point is to the mirror.

Ray diagrams are used to show where a focused image forms in a concave mirror.

A ray diagram shows rays of light coming from points on an object that meet or appear to meet at the corresponding point on the image.

Turn to p 620.

Figure 9 Why are parallel rays no longer parallel after they are reflected by the concave surface of the mirror?

Because the rays strike the curved surface at different angles, causing them to be reflected at different angles as well.

Figure 9 When rays parallel to the optical axis strike a concave mirror, where do all the reflected rays meet?

At the focal point.

Discuss Figure 10

Keep your book open!

The type of image that is formed by a concave mirror depends on the location of the object.

The image can either be real or virtual.

Look at Figure 11 on page 621.

Real images:

1. When the object is farther away from the mirror than the focal point, the reflected rays form a real image. The image forms where the rays actually meet.

2. Real images are upside down.

3. A real image may be larger or smaller than the object.

1. If the object is between the mirror and the focal point, the reflected rays form a VIRTUAL image.

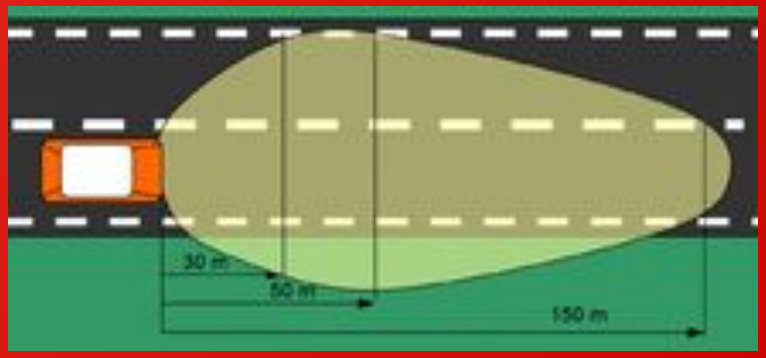
2. The image appears behind the mirror and is upright.

3. Virtual images formed by concave mirrors are always LARGER than the object.

1. If an object is placed at the focal point, no image forms.

2. If a light source is placed at the focal point, the mirror can project parallel rays of light.

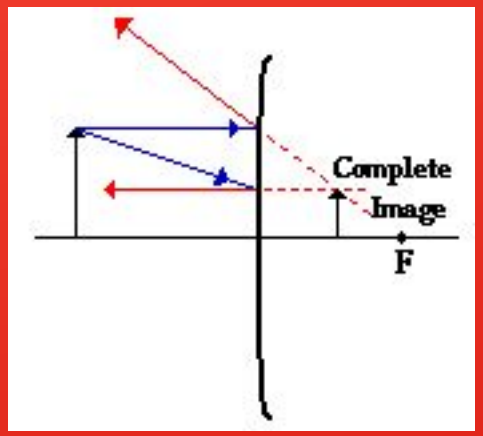
3. Cars' headlights have a lightbulb at the focal point. Light hits the mirror, forming a beam of light which shines on the road ahead.



A convex mirror reflect parallel rays of lights, but the image appears to come from a focal point behind the mirror.

The focal point is the point from which the rays appear to come.

Because the rays never meet, images formed by convex mirrors are always virtual and smaller than the object.



The advantage to convex mirrors is that you can see a larger area than you can with a plane mirror.

The disadvantage is that the image is reduce in size, so it appears to be farther away than it actually is.