Plane Mirrors WS

REFLECTION OF LIGHT

When a wave reaches a boundary, some or all, of the wave reflects.

THE **LAW OF REFLECTION** STATES: the angle of reflection equals the angle of incidence

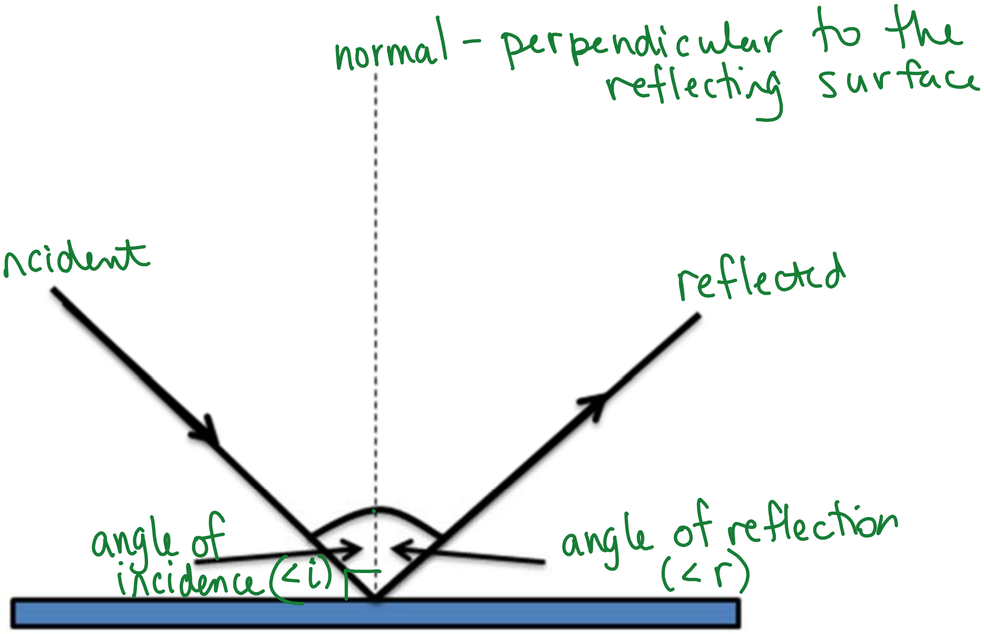
Light obeys this law. Light always travels in a straight line.

Light is a form of energy and energy can travel is two ways: wave or particle

Both waves and particles will reflect according to the law of reflection –

$$\angle r = \angle i$$

incidence means incoming



Only for smooth surfaces.

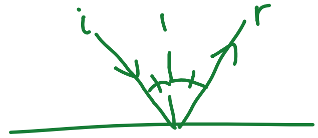
Rough surfaces diffuse the reflection (blurry). (scatter)

Example 1 –

If the angle of reflection from a mirror is 25.0°, what is the angle of incidence?

$\angle i = \angle r$

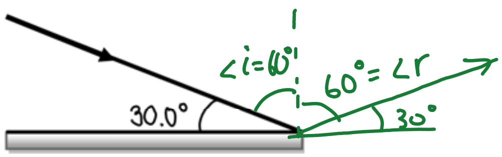
$= 25.0^\circ$



Example 2 –

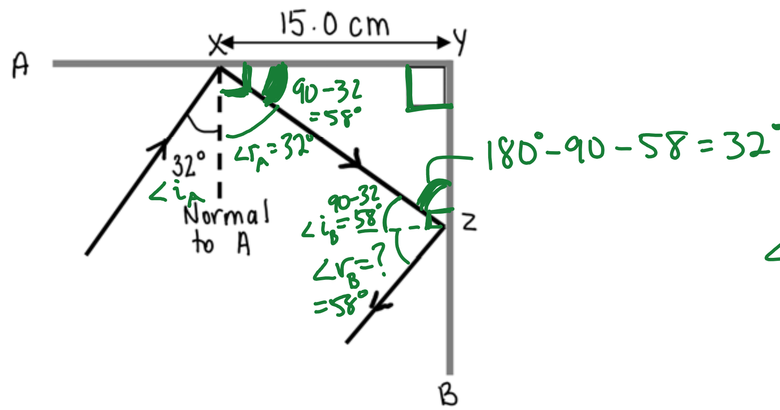
If a ray of light makes an angle of 30.0° with a mirror as shown in the diagram, what is the reflected angle?

$\angle r = 60^\circ$



Example 3 –

A ray of light is reflected in series from two mirrors (A and B) as shown in the diagram. What is the angle of reflection from mirror B?



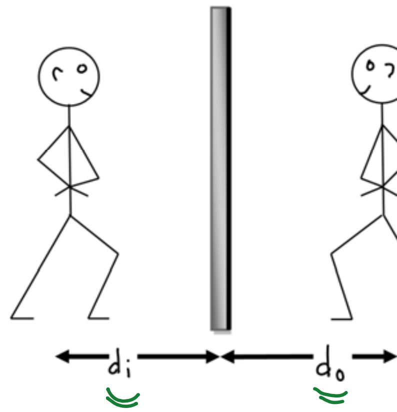
$\angle r_B = 58^\circ$

*diagram is not drawn to scale

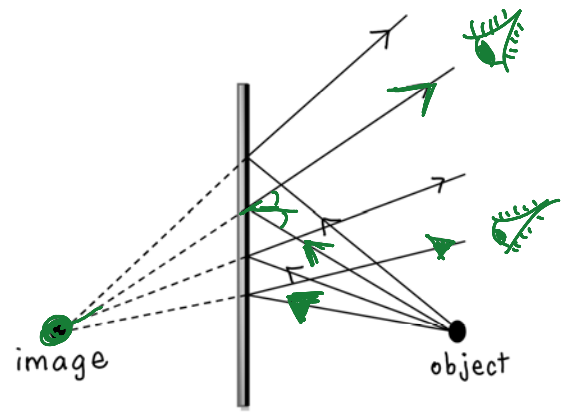
Ray Diagrams – Plane Mirrors

There are a number of types of mirrors. A **plane** mirror is simply a ___flat___ mirror.

When you look at your image in a plane mirror, the image seems to be as large as you are and just as far behind the mirror as you are in front of it.

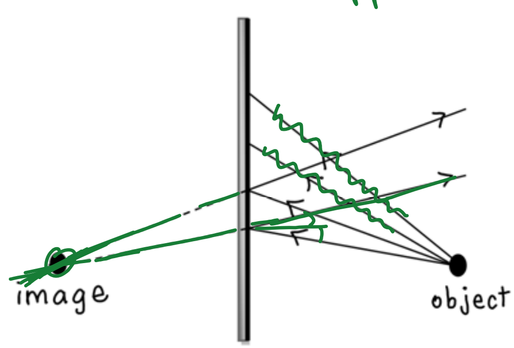


There is any number of rays that you can draw in the diagram below. However, they all reflect according to ___the law of reflection___. $\angle i = \angle r$



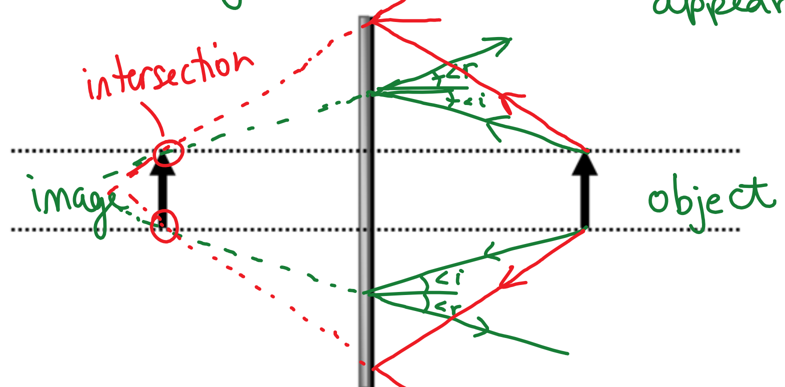
Observe that they all appear to be coming from the same location = ___image___.

To locate the image, it is only necessary that we draw ___2___ of these rays as shown in the diagram below. Note: the rays only ___appear___ to meet and this is where the image is located.



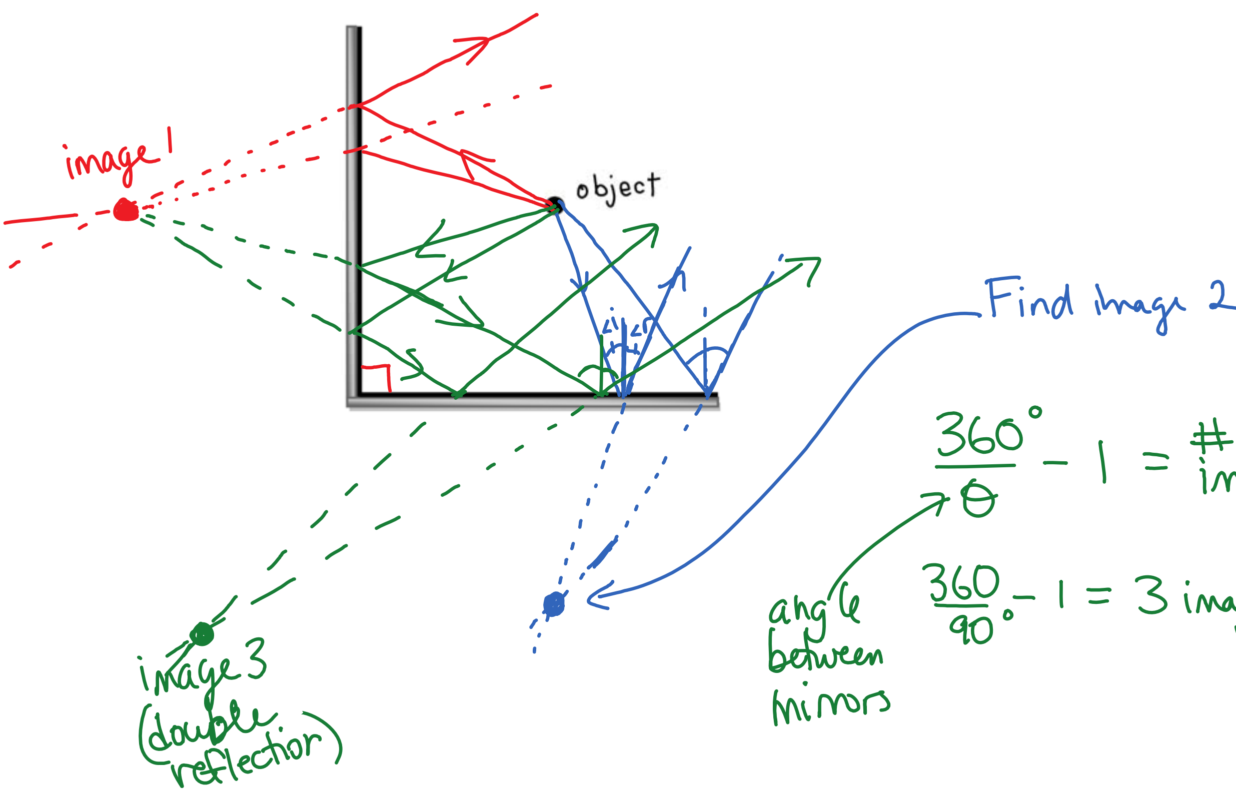
In a plane mirror, the image has the following characteristics:

- erect (right side up)
- same size as object
- virtual – no light actually reaches where the image appears to be.



use a ruler

Finally, we will look at reflection from two mirrors that are at right angles to each other. There are ___3___ images.



$\frac{360°}{\theta} - 1 = \#$ of images

angle between mirrors

$\frac{360}{90°} - 1 = 3$ images

Lateral Inversion –

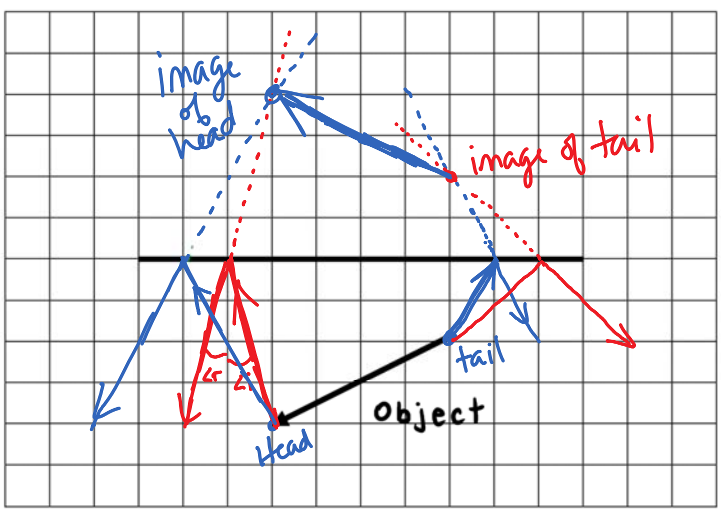
When you look at an image in a plane mirror, the left and right sides appear ___reversed___. This is called **lateral inversion.** The letters are not upside down, but they are laterally reversed.

Example – ƎƆИAJUꓭMA → AMBULANCE

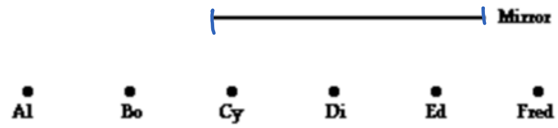
> Summary of characteristics of an image produced by a plane mirror:
> - lateral inversion
> - erect (right side up)
> - same size as object
> - virtual (light only appears to come from the image)
> - same distance behind mirror as object is in front.

Practice: Complete the following ray diagrams

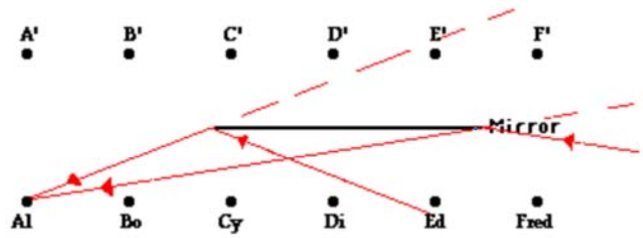
use a ruler



Suppose that six students - Al, Bo, Cy, Di, Ed, and Fred sit *in front of* a plane mirror and attempt to see each other in the mirror. Whom can each person see?



The task begins by locating the images of the given students. Then, Al is isolated from the rest of the students and lines of sight are drawn to see who Al can see. The leftward-most student whom Al can see is the student whose image is to the right of the line of sight that intersects the left edge of the mirror. This would be Ed. The rightward-most student who Al can see is the student whose image is to the left of the line of sight that intersects the right edge of the mirror. This would be Fred. Al could see Ed and Fred in the mirror. The diagram below illustrates this using lines of sight for Al.



Quick Quiz Of course the same process can be repeated for the other students by observing their lines of sight. Determine whom Bo, Cy, Di, Ed, and Fred can see?

Al sees: Ed + Fred

Bo sees: Di, Ed, Fred

Cy sees: C, D, E, F

Di sees: B, C, D, E, F

Ed sees: B, C, D, E

Fred sees: A, B, C, D